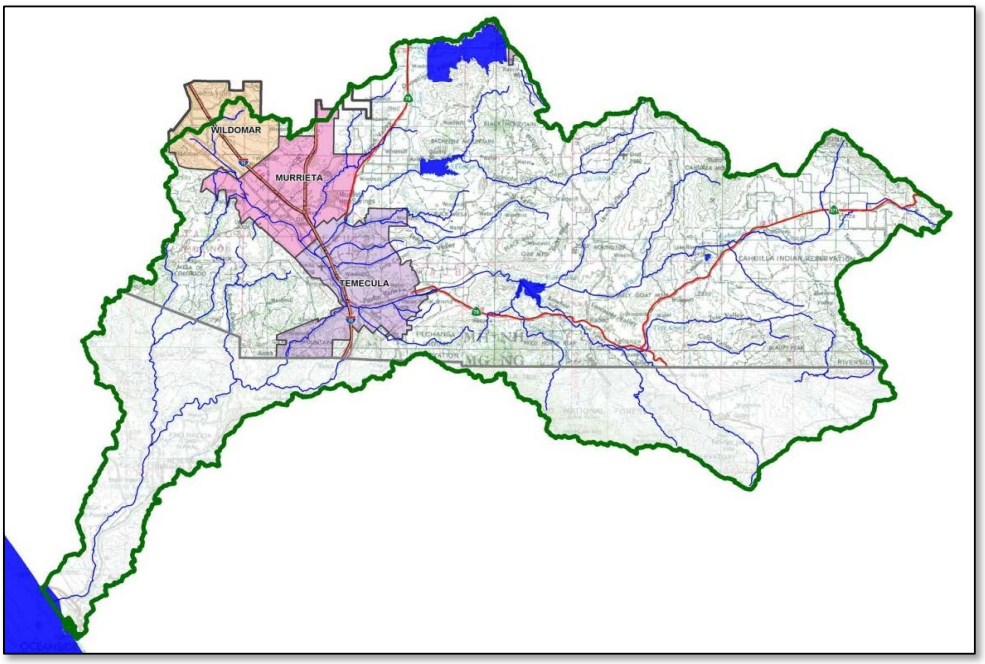
County Project Specific Water Quality Management Plan

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: Plot Plan No. 26225, Revised Permit No. 1, (PP26225R01)
Development No: TBD
Design Review/Case No: PP26225R01
BMP$_i$ (Latitude, Longitude): 33°32'18.26"N 117°07'24.02"W



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 11/7/2022

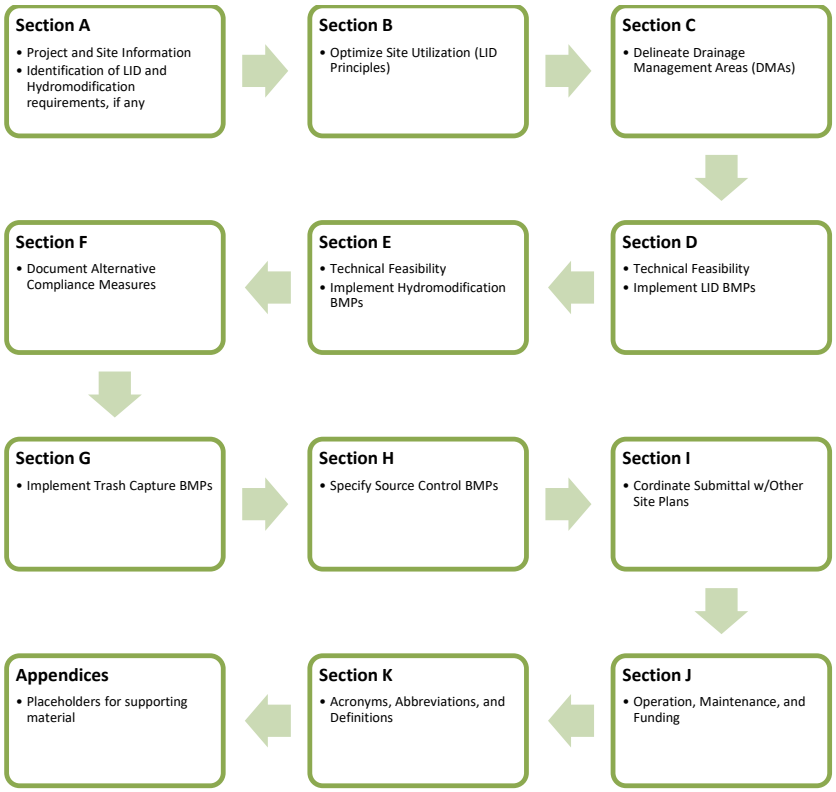
Revision Date(s): 05/08/2023
06/08/2023

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

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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.



To ensure compliance with State permanent recordkeeping, the County of Riverside is no longer accepting hard copies of the **approved** Final or Preliminary WQMPs or Hydrology Reports. Electronic submittals are highly encouraged for submittal reviews, single PDF file submittal on two CD copies, to the Transportation Department (4080 Lemon Street, 8th Floor, Riverside, CA 92501) is preferred.

For Approved Final WQMPs, submit with the single file WQMP on CD:

- A wet-signed and notarized BMP maintenance agreement (See Appendix 9 for details)
- Owner's Certification signed and scanned into the PDF, or wet-signed hard copy, dated after approval.
- Print out of the WQMP site map (11x17") and Coversheet (8.5x11")
- The CD should include a Hydrology report when applicable. The County requires a hydrology report with hydraulics for the design of drainage facilities. Then provide a print out of the Pre- & Post-Hydrology map (11x17") and Report Coversheet (8.5x11")
- For tracts, submit the County EDA approved maintenance exhibit
- Signed Exhibit B.9 - WQMP O&M Cost Sheet.xlsx

[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.

Signed and scanned into the PDF for Final Approved WQMP, or wet-signed hard copy

OWNER'S CERTIFICATION

This Project-Specific WQMP has been prepared for Akash Patel by Dino N. San Buenaventura for the Akash Winery Expansion project.

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
Akash Patel	Owner
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
Dino N. San Buenaventura	Project Manager
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:	Redevelopment-Expansion	
Type of Project:	Commercial	
Planning Case Number:	Insert Planning Case number (TR, PM, PP, CUP, etc) if the project is seeking entitlements	
Rough Grade Permit No.:	Insert Rough Grade Permit number if the project is entitled or seeking grading permits	
Development Name:	Insert Development Name if known	
PROJECT LOCATION		
Latitude & Longitude (DMS):	33°32'18.26"N 117°07'24.02"W	
Project Watershed and Sub-Watershed:	Santa Margarita River, Insert HSA here (see Section A.2)	
24-Hour 85th Percentile Storm Depth (inches):	0.80	
Is project subject to Hydromodification requirements?	☒ Y ☐ N (Select based on Section A.3)	
APN(s):	943-210-012	
Map Book and Page No.:	PAGE: 959, GRID: H1	
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)		Commercial
Proposed or Potential SIC Code(s)		31213
Existing Impervious Area of Project Footprint (SF)		Assumed 0 sqft
Total area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement		63,160 SQFT (effective)
Total Project Area (ac)		4.78 AC
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 N/A
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)		Insert text here.

Provide a brief description of the project:

The project is an existing winery that will expand the existing building to include, but not limited to, a tasting room, wine storage areas, and designated office space. The project will also improve the site with engineered slopes and a pervious, DG, driveway on the northwest side of the project. The building improvements will add approximately 5,250 sqft of impervious surface to the site. The project is in the County of Riverside, north off the major street intersection of Nicholas Valley Road/Camino Contento and Rancho California Road, on the east side of Camino Contento. The

project is bound by neighboring wineries on the projects north and east side, and Camino Contento on the westerly boundary. The parcel measures approximately 19.4 Ac and is designated as APN 943-210-012, referred thereafter as the Akash Winery.

The enclosed WQMP analyses the water quality volume required to treat the onsite expansion footprint. Additionally, since the site appears to not have implemented BMPs, as outlined in the previous approved WQMP, the enclosed report will correct this by adding additional BMPs beyond the expansion area, which includes treatment of the existing building, walkways, roundabout, and expansion area to the maximum extent practical. (Please refer to the WQMP Exhibit) The proposed BMPs include BMP 1A to3A, which are described as underground infiltrating BMPS. These will also be used to address hydromodification of the site, which will utilize and outlet riser to control the outflow rate to match the flow duration curve for 10% of the 2-year flow, up to the 10-year flow. Hillside drainage that is not being developed but is tributary to the proposed BMPs are also included in the analysis. Please see the enclosed report for additional details regarding the design of the proposed BMPs.

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	Proximity to RARE Beneficial Use
Murrieta Creek (HAS 2.32, 2.52)	Chlorpyrifos, Copper, Iron, Manganese, Nitogen, Phospherus, Toxicity	MUN, AGR, PROC, GWR, REC1, REC2, WARM, WILD	Not a RARE waterbody (approximately 5.3 miles from site)
Temecula Creek (HAS 2.51, 2.52)	Chlorpyrifos, Copper, Iron, Manganese, Nitogen, Phospherus, Toxicity	MUN, AGR, PROC, GWR, REC1, REC2, WARM, WILD	Not a RARE waterbody (approximately 5.3 miles from site)
Santa Margarita River, Upper portion (HAS 2.22, 2.21)	Phosphorus, Nutrrients	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	RARE Waterbody (approximately 5.5 miles from site)
Santa Margarita River, Lower portion (HAS 2.11, 2.12, 2.13)	None	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	RR (approximately from site)
Santa Margarita (HSA2.11)	Lagoon	Eutrophic (Nutrients), Oxygen demanding substance	REC1, REC2, EST, WILD, RARE, MIGR, SPWN

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 Gertrudes Creek (5 miles)	Earthen Channel	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 Grading Permit, County of Riverside Building Permit	☒ 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.
Insert discussion/justification here

☒ 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. *Insert discussion/justification here*

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. *Insert discussion/justification here*	
☒ 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. *Insert discussion/justification here*	

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. *Insert discussion/justification here*	
☐ 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. *No new landscaping features are proposed on the site.*	

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. *Harvets and reuse is infeasible, since the development is already established and implementation would be impractical.*	
☐ 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 areas in the project.*	

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

DMA Name or Identification	Surface Type(s)[1]	Area (sq.ft)	DMA Type
DMA A1	Mixed Surface	12,197	To be Determined in Step 3
DMA A2	Mixed Surface	145.055	
DMA A3	Mixed Surface	50,965	

Add Columns as Needed. Consider a separate DMA for Tree Wells or other LID principals like Self-Retaining areas are used for mitigation.

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

Tree wells are considered Type 'B' areas, and their tributary areas limited to a 10:1 ratio are considered Type 'C' areas. If Tree wells are proposed, consider grading or other features to minimize the pervious runoff to the tree wells, to avoid overwhelming the trees. Type 'A', 'B', and 'C' are considered LID Principals that can be used to minimize or potentially eliminate structural LID BMPs.

If Tree wells are proposed, a landscape architect shall be consulted on the tree selection, since compliance will be determined based on the survival of the tree. The tree type should be noted on the WQMP site map.

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

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

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

Note: Tree well areas can extend well beyond the drip line. The Tree Well area for open top types would include the shallow depressed area at the soil surface. The Tree Well area for Structural Soil Tree Wells or Suspended Pavement Tree Wells includes the area with open-graded gravel or void space over the structural soil or structural cells. Please specify type in this table and WQMP site map. See LID handbook Tree Well factsheet for additional details.

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

(Tributary Area: Self-Retaining Area)

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

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

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:

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*
		☐ Yes ☐ No
		☐ Yes ☐ No
		☐ Yes ☐ No
		☐ Yes ☐ No
		☐ 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
DMA A1	BMP A1
DMA A2	BMP A2
DMA A3	BMP A3

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 or Tree Wells 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		
Expansive Soil		
Slopes		
Liquefaction		
Low Infiltration Rate		
Other		

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)
Insert text here		
Insert text here		
Insert text here		
Insert text here		

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
No proprietary BMPs will be used.	BMP Design worksheets and Proprietary Biofiltration Criteria are completed in Appendix 5	☐ Yes or ☐ No Insert text here
	Proposed BMP has an active TAPE GULD Certification for the project pollutants of concern[4] or equivalent 3rd party demonstrated performance.	☐ Yes or ☐ No Insert text here
	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. Insert date here
	☐ The BMP includes biological features	Describe features here.

[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.

	including vegetation supported by engineered or other growing media.	

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 Principles or Tree Wells	LID BMP Hierarchy			No LID (Alternative Compliance)
		1. Infiltration	2. Biofiltration with Partial Infiltration*	3. Biofiltration with No Infiltration*	
DMA 1A	☐	☒	☐	☐	☐
DMA 2A	☐	☒	☐	☐	☐
DMA 3A	☐	☒	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

*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	N/A

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

reach findings?	
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

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 Imperviousness Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	ID: BMP 1A		
	[A]		[B]	[C]	[A] x [C]			
DMA 1A	12196.8	Mixed Surface	1	0.892	10,879.55	*Design Storm Depth (in)*	*V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic*
	12,196.8				10,879.55	0.70	630	630

DMA Type/ID	DMA (square feet)	Post- Project Surface Type	Effective Imperviousness Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	ID: BMP 2A		
	[A]		[B]	[C]	[A] x [C]			
DMA 2A	145,055	Mixed Surface	0.12	0.12	17,861	*Design Storm Depth (in)*	*V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic*
	145,054.8				17,860.69	0.70	1,088	1,088

DMA Type/ID	DMA (square feet)	Post- Project Surface Type	Effective Imperviousness Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	ID: BMP 3A		
	[A]		[B]	[C]	[A] x [C]			
DMA 3A	42,253	Mixed Surface	0.65	0.45	18,979	*Design Storm Depth (in)*	*V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic*
	42,253.2				18,979.22	0.70	1,092	1,092

[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.

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)
BMP A1	DMA A1	Infiltration Basin	630	630
BMP A2	DMA A2	Infiltration Basin	1088	1088
BMP A3	DMA A3	Infiltration Basin	1092	1092

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, including Tree Wells.

☒ 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

BMP Name / ID	DMA No.	BMP Type / Description	SMRHM* Passed	BMP Volume (cuft)	BMP Footprint (sf)	Drawdown time (hr)**
BMP 1A	DMA 1A	Infiltration Basin	☒	7190	1741	120
BMP 2A	DMA 2A	Infiltration Basin	☒	7185	1739	120
BMP 3A	DMA 3A	Infiltration Basin	☒	8272	1987	120

**Or other continuous simulation model, compliant with the WQMP and Permit. If Tree Wells are proposed for some or all of the project, check the box for Tree Wells in Section E.1 and enter each Tree Well DMA in Table E-1 above for the BMP Name/ID, DMA No. and BMP Type/Description. For Tree Wells, leave SMRHM* Passed Column and the columns to the left blank.*
*** Drawdown exceeds 72 hr. However, section 3.2vi of SMR HMP applies here, where system drawdown is exempt due to the large volumes of water being detained in the modeled storm event of 72-years.*

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. Include a copy of Exhibit G - CCSY & PSS Areas in Appendix 7, with the project location marked. If the project is outside of the "Potential Critical Coarse Sediment Yield Areas and Potential Sediment Source Areas" then check this box. 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.

Insert narrative description here

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)				

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.

Identified Channel #1 - Insert narrative description here

Identified Channel #2 - Insert narrative description here

☐ 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/

If applicable, insert narrative description here

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 = Σ[A]				Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$

[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

Insert narrative description here

☐ In-Stream Restoration Project

Insert narrative description here

For Offsite Hydrologic Control BMP Option

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)
		☐			
		☐			
		☐			
		☐			

For Instream Restoration Option

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 Santa Margarita Regional Board has required Full Trash Capture compliance thru Order No. R9-2017-007. For the Santa Margarita Watershed, the County is requiring Track 1 full trash capture compliance for projects proposing the following uses as part of their development after **December 3, 2018**.

- High-density residential: all land uses with at least ten (10) developed dwelling units/acre.
- Industrial: land uses where the primary activities on the developed parcels involve product manufacture, storage, or distribution (e.g., manufacturing businesses, warehouses, equipment storage lots, junkyards, wholesale businesses, distribution centers, or building material sales yards).
- Commercial: land uses where the primary activities on the developed parcels involve the sale or transfer of goods or services to consumers (e.g., business or professional buildings, shops, restaurants, theaters, vehicle repair shops, etc.).
- Mixed urban: land uses where high-density residential, industrial, and/or commercial land uses predominate collectively (i.e., are intermixed).
- Public transportation stations: facilities or sites where public transit agencies' vehicles load or unload passengers or goods (e.g., bus stations and stops).

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 and furnish hydraulic analysis calculating the flowrate in the catch basin does not exceed the flowrate capacity of the trash capture device in a fully clogged condition.

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

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]		
DMA 1A	12,197	Mixed Surface	1.00	0.89	10,880	*Trash Capture Design Storm Intensity (in)*	*Trash Capture Design Flow Rate (cubic feet or cfs)*
DMA 2A	145,055	Mixed Surface	0.12	0.12	17,861		
DMA 3A	42,253	Mixed Surface	0.65	0.45	18,979		
	97574.4				58,219	0.50	1.22

[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]
BMP A1	DMA 1A	Infiltration Basin	0.12	0.12
BMP A2	DMA 2A	Infiltration Basin	0.21	0.21
BMP A3	DMA 3A	Infiltration Basin	0.22	0.22

[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
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here

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)
BMP 1A	Underground Infiltration Basin	Sheet 2 of 3
BMP 2A	Underground Infiltration Basin	Sheet 2 of 3
BMP 3A	Underground Infiltration Basin	Sheet 2 of 3

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 Grading Permit County of Riverside Building Permit	☒ 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: Maintenance to be provided by the property owner.

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.

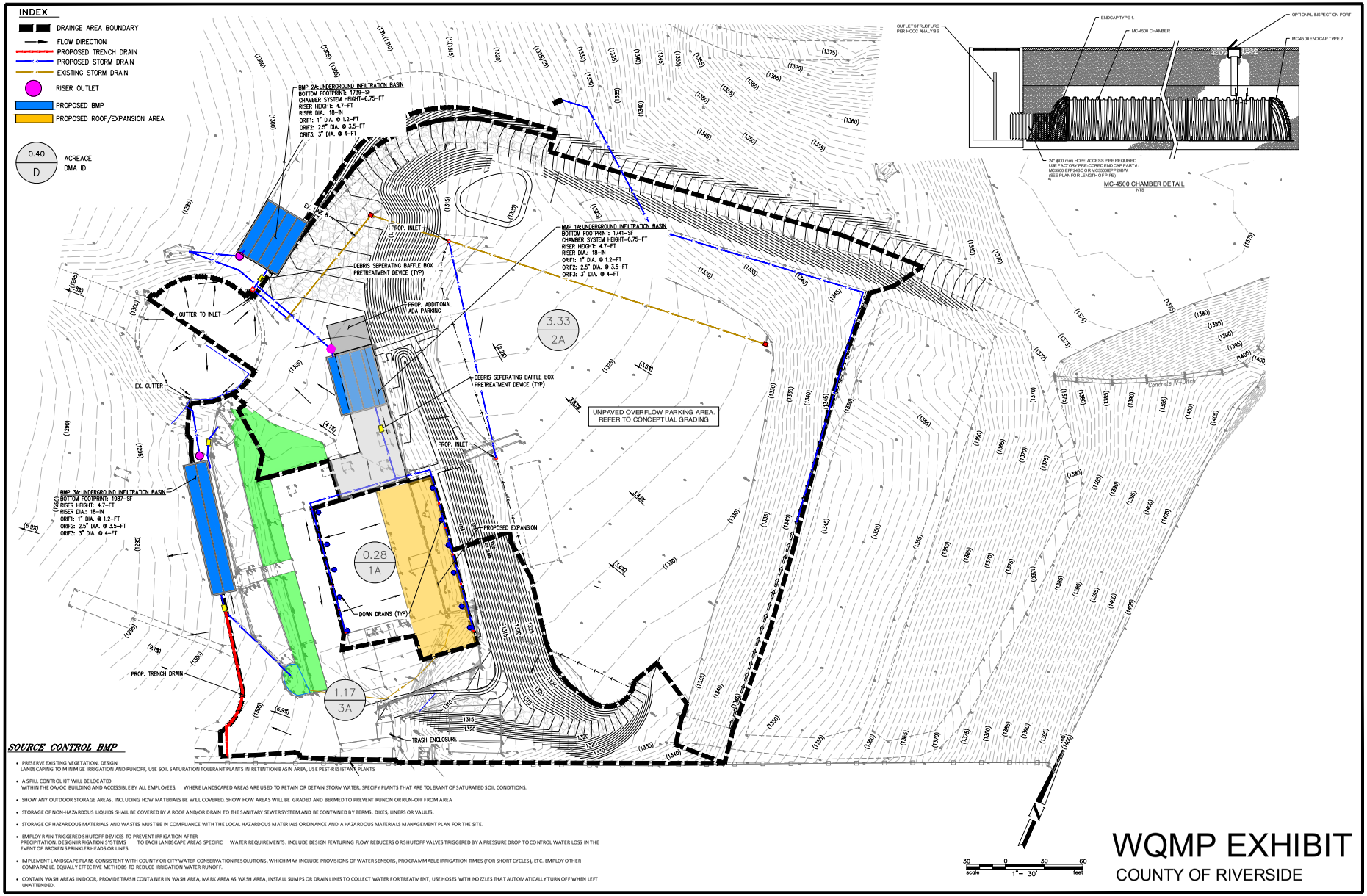
Source Control BMP	Source Control BMPs land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between Pollutants and runoff.
Structural 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.

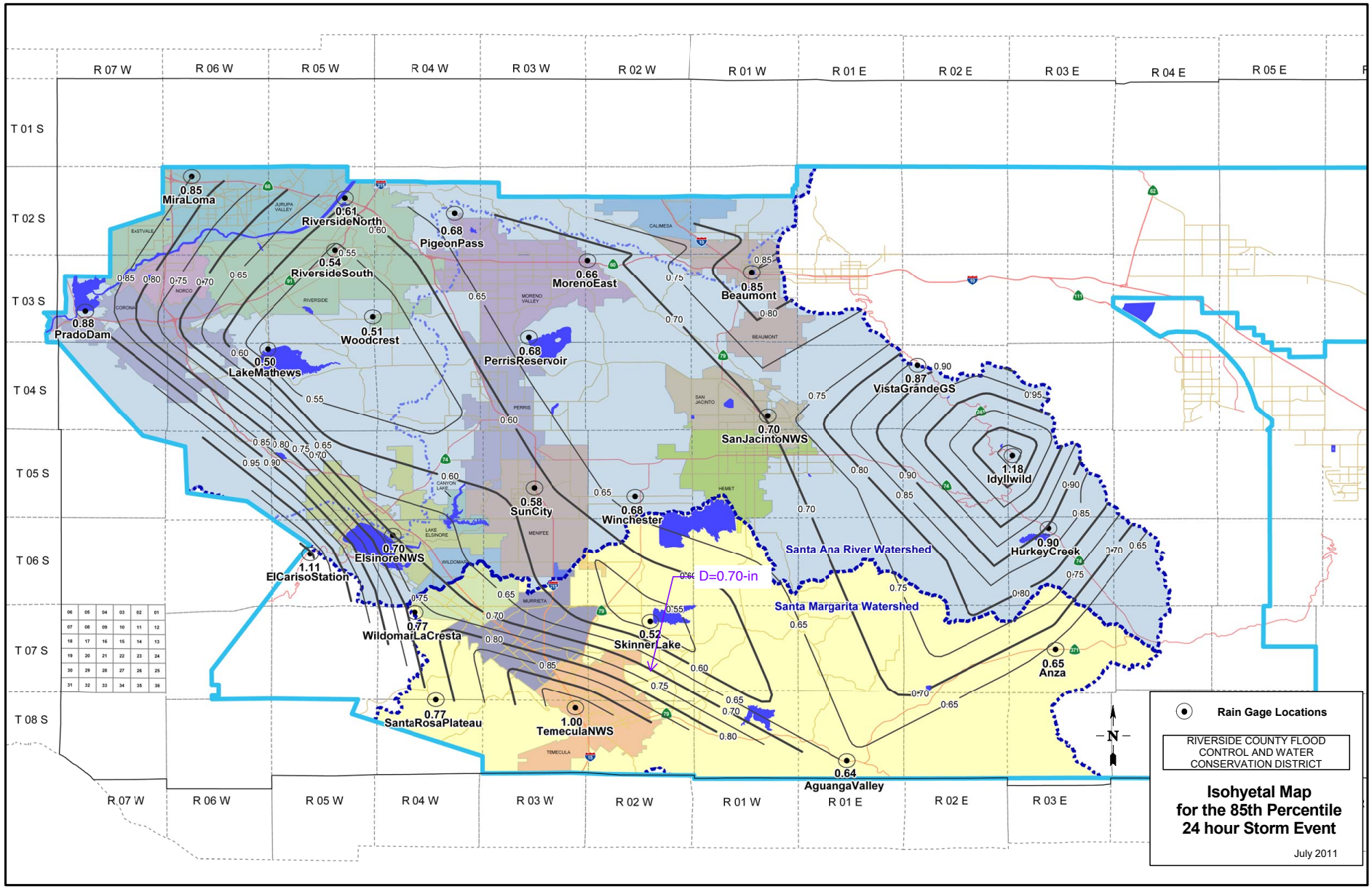
Appendix 1: Maps and Site Plans

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), with cross sections
☒ Drainage Paths
☒ Drainage infrastructure, inlets, overflows
☒ Source Control & Site Design BMPs (notes can be used for BMPs that can't be depicted)
☒ Buildings, Roof Lines, Downspouts
☒ Impervious Surfaces
☒ Pervious Surfaces (i.e., Landscaping)
☐ Standardized 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
☐ When underdrain are proposed, gravel shall be clean washed gravel, AASHTO #57 stone preferred. Underdrains shall be Schedule 40 PVC, with a minimum slope of 0.005, with cleanouts equal in diameter of the subdrain that extends 6 inches above the media with a lockable screw cap, spaced every 50 feet, at the collector drain line connection, and at any bends.
☐ When BSM is proposed, BSM shall consist of 60-80% clean sand, up to 20% clean topsoil, and 20% of a nutrient-stabilized organic amendment. BSM shall be placed on top of 3-inches of Choker Sand placed on top of 3-inches of ASTM No. 8 stone (1/4 to 1/2-inch pea gravel), and placed on top of 12 to 24-inches of a clean, open-graded drain rock layer.
☐ For Tracts, the Regional Board requires fully functioning 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.


INDEX
DRAINAGE AREA BOUNDARY
FLOW DIRECTION
PROPOSED TRENCH DRAIN
PROPOSED STORM DRAIN
EXISTING STORM DRAIN
RISER OUTLET
PROPOSED BMP
PROPOSED ROOF/EXPANSION AREA
0.40
D
ACREAGE
DMA ID
BMP 2A:UNDERGROUND INFILTRATION BASIN
BOTTOM FOOTPRINT: 1739-SF
CHAMBER SYSTEM HEIGHT=6.75-FT
RISER HEIGHT: 4.7-FT
RISER DIA.: 18-IN
ORIF1: 1" DIA. @ 1.2-FT
ORIF2: 2.5" DIA. @ 3.5-FT
ORIF3: 3" DIA. @ 4-FT
BMP 1A:UNDERGROUND INFILTRATION BASIN
BOTTOM FOOTPRINT: 1741-SF
CHAMBER SYSTEM HEIGHT=6.75-FT
RISER HEIGHT: 4.7-FT
RISER DIA.: 18-IN
ORIF1: 1" DIA. @ 1.2-FT
ORIF2: 2.5" DIA. @ 3.5-FT
ORIF3: 3" DIA. @ 4-FT
BMP 3A:UNDERGROUND INFILTRATION BASIN
BOTTOM FOOTPRINT: 1987-SF
RISER HEIGHT: 4.7-FT
RISER DIA.: 18-IN
ORIF1: 1" DIA. @ 1.2-FT
ORIF2: 2.5" DIA. @ 3.5-FT
ORIF3: 3" DIA. @ 4-FT
PROP. INLET
DEBRIS SEPERATING BAFFLE BOX PRETREATMENT DEVICE (TYP)
PROP. ADDITIONAL ADA PARKING
GUTTER TO INLET
EX. GUTTER
EX. CURB
3.33
2A
0.28
1A
1.17
3A
UNPAVED OVERFLOW PARKING AREA. REFER TO CONCEPTUAL GRADING
PROP. EXPANSION
DOWN DRAINS (TYP)
PROP. TRENCH DRAIN
TRASH ENCLOSURE
Conrete V-Ditch
OUTLET STRUCTURE PER HCOC ANALYSIS
ENDCAP TYPE 1
MC-4500 CHAMBER
OPTIONAL INSPECTION PORT
MC-4500 END CAP TYPE 2
24" (600 mm) HDPE ACCESS PIPE REQUIRED USE FACTORY PRE-CORED END CAP PART #: MC3500IEPP24BCCPANC3500IEPP24BW. (SEE PLAN FOR LENGTH OF PIPE)
MC-4500 CHAMBER DETAIL
NTS
SOURCE CONTROL BMP
PRESERVE EXISTING VEGETATION, DESIGN LANDSCAPING TO MINIMIZE IRRIGATION AND RUNOFF, USE SOIL SATURATION TOLERANT PLANTS IN RETENTION BASIN AREA, USE PEST-RESISTANT PLANTS
A SPILL CONTROL KIT WILL BE LOCATED WITHIN THE OA/OC BUILDING AND ACCESSIBLE BY ALL EMPLOYEES. WHERE LANDSCAPED AREAS ARE USED TO RETAIN OR DETAIN STORMWATER, SPECIFY PLANTS THAT ARE TOLERANT OF SATURATED SOIL CONDITIONS.
SHOW ANY OUTDOOR STORAGE AREAS, INCLUDING HOW MATERIALS BE WILL COVERED. SHOW HOW AREAS WILL BE GRADED AND BERMED TO PREVENT RUNON OR RUN-OFF FROM AREA
STORAGE OF NON-HAZARDOUS LIQUIDS SHALL BE COVERED BY A ROOF AND/OR DRAIN TO THE SANITARY SEWER SYSTEM, AND BE CONTAINED BY BERMS, DIKES, LINERS OR VAULTS.
STORAGE OF HAZARDOUS MATERIALS AND WASTES MUST BE IN COMPLIANCE WITH THE LOCAL HAZARDOUS MATERIALS ORDINANCE AND A HAZARDOUS MATERIALS MANAGEMENT PLAN FOR THE SITE.
EMPLOY RAIN-TRIGGERED SHUTOFF DEVICES TO PREVENT IRRIGATION AFTER PRECIPITATION. DESIGN IRRIGATION SYSTEMS TO EACH LANDSCAPE AREAS SPECIFIC WATER REQUIREMENTS. INCLUDE DESIGN FEATURING FLOW REDUCERS OR SHUTOFF VALVES TRIGGERED BY A PRESSURE DROP TO CONTROL WATER LOSS IN THE EVENT OF BROKEN SPRINKLER HEADS OR LINES.
IMPLEMENT LANDSCAPE PLANS CONSISTENT WITH COUNTY OR CITY WATER CONSERVATION RESOLUTIONS, WHICH MAY INCLUDE PROVISIONS OF WATER SENSORS, PROGRAMMABLE IRRIGATION TIMES (FOR SHORT CYCLES), ETC. EMPLOY OTHER COMPARABLE, EQUALLY EFFECTIVE METHODS TO REDUCE IRRIGATION WATER RUNOFF.
CONTAIN WASH AREAS IN DOOR, PROVIDE TRASH CONTAINER IN WASH AREA, MARK AREA AS WASH AREA, INSTALL SUMPS OR DRAIN LINES TO COLLECT WATER FOR TREATMENT, USE HOSES WITH NOZZLES THAT AUTOMATICALLY TURN OFF WHEN LEFT UNATTENDED.
30 0 30 60
scale 1" = 30' feet
WQMP EXHIBIT
COUNTY OF RIVERSIDE


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
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
D=0.70-in
Santa Ana River Watershed
Santa Margarita Watershed
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

RECEIVING WATERS

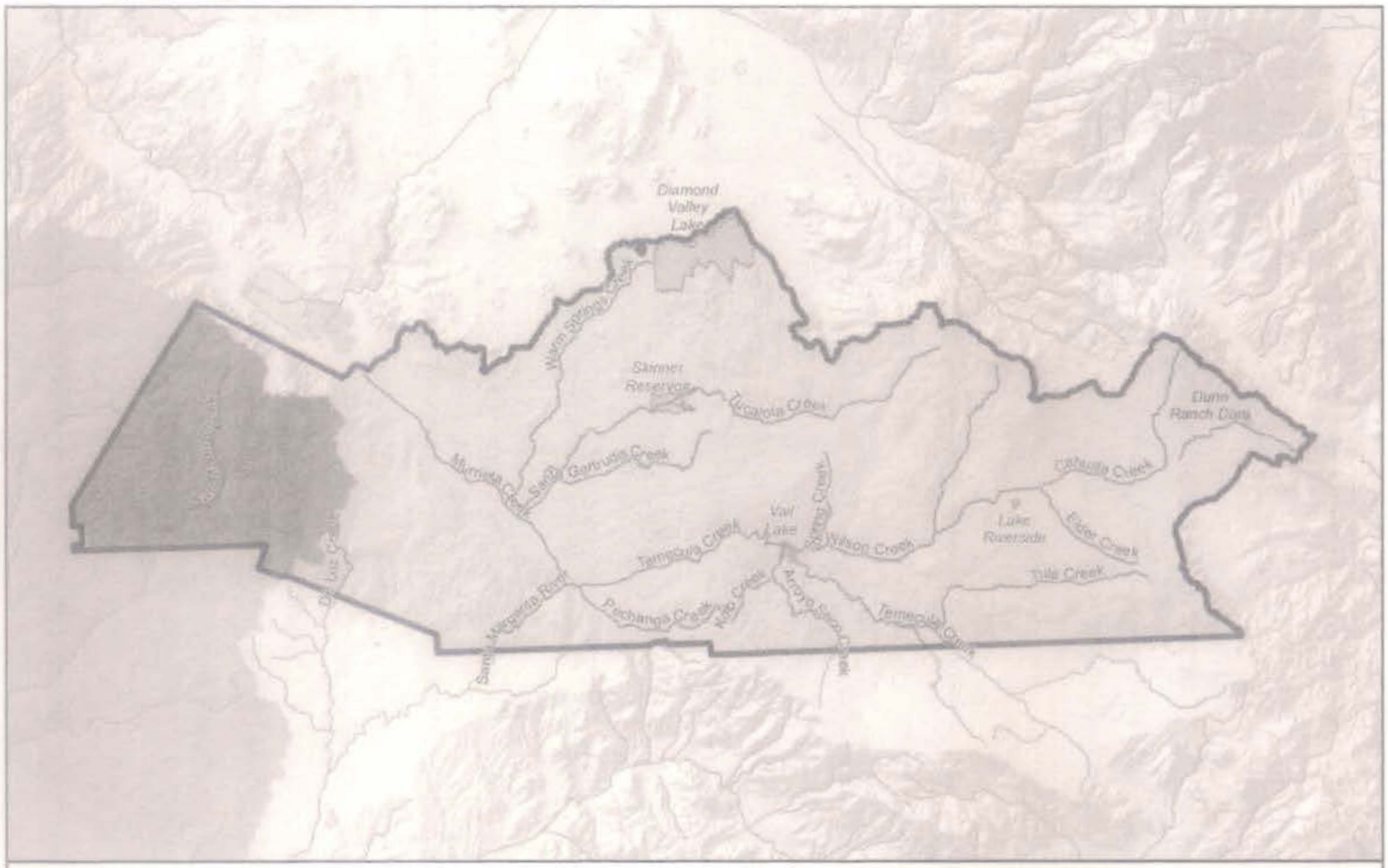


Figure 2-2: Watersheds and Surface Water Features
Upper Santa Margarita Watershed
IRWM Plan Update

Data Sources: USGS National Hydrography Dataset, California Resources Agency CALWATER Dataset, ESRI Basemaps

Filepath: L:\Projects GIS\0366-001 RCWD IRWM\MXDs\USM IRWMP Watershed v9.mxd

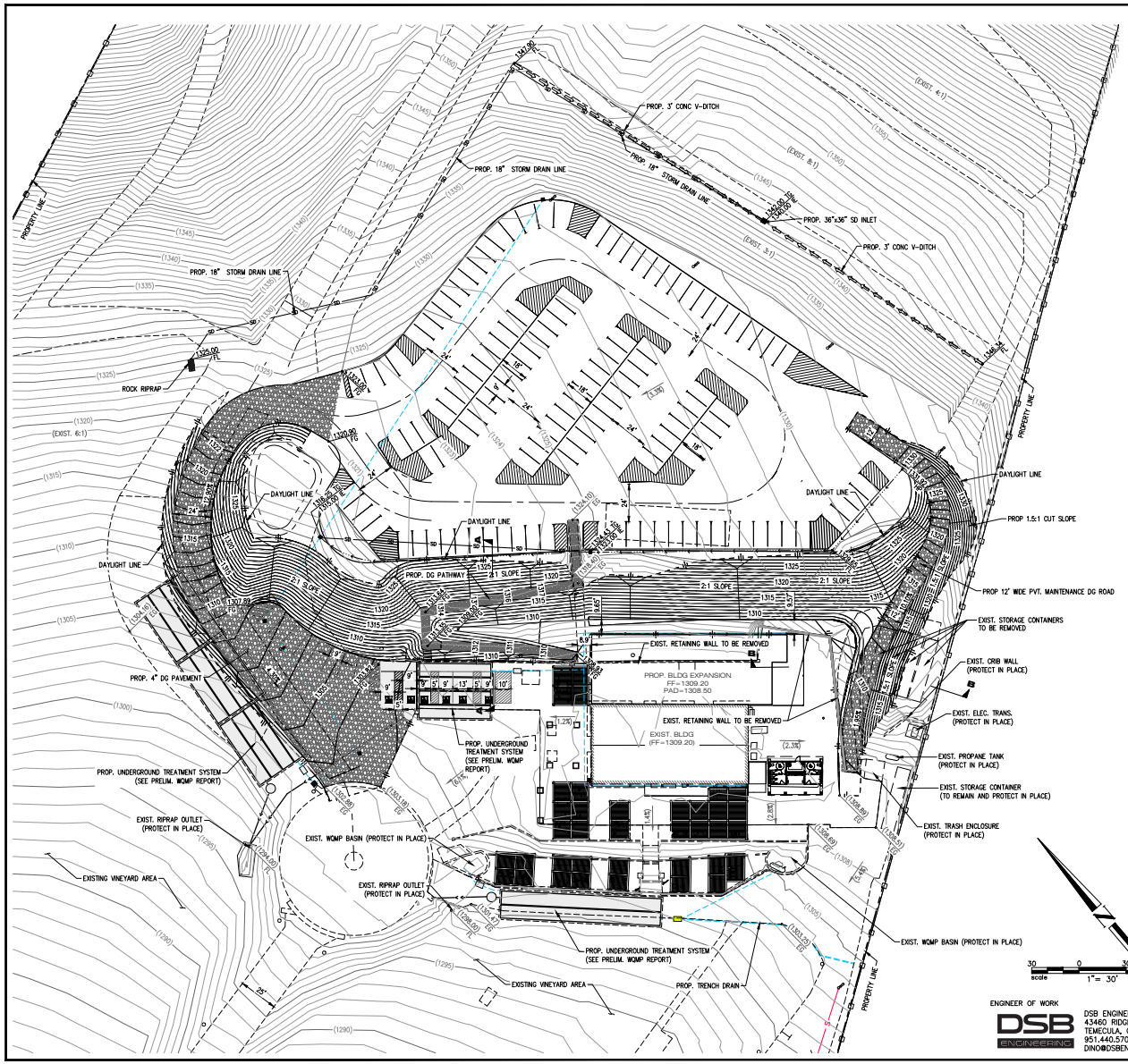
Appendix 2: Construction Plans

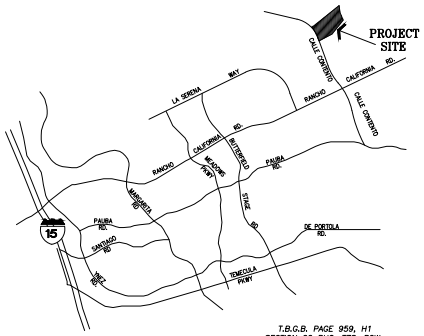
*The latest set of Grading, Drainage Plans, and Street Improvement plans **shall be included***

Bioretention/Biofiltration BMPs construction notes (Santa Margarita Region only). For Bioretention and Biofiltration facilities, the **following construction notes shall be shown on the Grading and/or Drainage plans:**

1. *The Engineer shall furnish to the County a copy of the source testing and a signed certification that the fully blended Bioretention/Biofiltration Soil Media (BSM) material meets all of the WQMP requirements before material is imported or if the material is mixed onsite prior to installation.*
2. *As BSM material is being installed, Quality Assurance (QA) tests shall be conducted or for every 1,200 tons or 800 cubic yards mixed on-site from a completely mixed stockpile or windrow, with a minimum of three tests. For imported material from a supplier with a quality control program the QA tests shall be conducted 2,400 tons or 1,600 cubic yards from the supplier.*
3. *The Engineer conducting the Quality Control testing shall furnish to the County copy of the QA testing and a certification that the BSM for the project meets all of the following requirements. Certified mitigation plans can be used for exceedances, as long as all requirements are designed to be met.*
    a. *BSM shall not be compacted. BSM shall consist of 60-80% clean sand, up to 20% clean topsoil, and 20% of a nutrient-stabilized organic amendment. The initial infiltration rate shall be greater than 8 inches per hour per laboratory test.*
    b. *pH: 6.0 – 8.5; Salinity: 0.5 to 3.0 mmho/cm as electrical conductivity; Sodium absorption ratio: < 6.0; Chloride: < 800 ppm in saturated extract; Cation Exchange Capacity (CEC): > 10 meq/100 g; Organic Matter: 2 to 5-percent on a dry weight basis; Carbon: Nitrogen Ratio: 12 to 40, preferably 15 to 40; Gravel larger than 2mm: 0 to 25-percent of the total sample; Clay smaller than 0.005mm: 0 to 5 percent of the non-gravel fraction.*
    c. *BSM shall be tested to limit the leaching of potential inherent pollutants. BSM used in Biofiltration BMPs shall conform to the following limits for pollutant concentrations in saturated extract: Phosphorus: < 1 mg/L; Nitrate < 3 mg/L, Copper < 0.025 mg/L. These pollutant limits are for the amount that is leached from the sample, not from the soil sample itself. Testing may be performed after laboratory rinsing of media with up to 15 pore volumes of water. Equivalent test results will be accepted if certified by a laboratory or appropriate testing facility.*
    d. *Low nutrient compost used in BSM shall be sourced from a facility permitted through CalRecycle, preferably through USCC STA program. Compost shall conform to the following requirements: Physical contaminants <1% by dry weight; Carbon:Nitrogen ratio: 12:1 to 40:1; Maturity/Stability shall conform to either: Solvita Maturity Index: ≥ 5.5, CO2 Evolution: < 2.5 mg CO2-C per g compost organic matter per day, or < 5 mg CO2-C per g compost C per day; Select Pathogens and Trace metals shall pass US EPA Class A Standard. Testing shall be no more than 6 months old and representative of current stockpiles.*
    e. *Coconut coir pith used in BSM shall be thoroughly rinsed with freshwater and screened to remove coarse fibers as part of production and aged > 6 months. Peat used in BSM shall be sphagnum peat.*

Please notify the County if additional sources and laboratories can be added to this list. The Potential Sources and Laboratories are not part of the construction note - **Potential BSM sources may include**: Gail Materials (Temescal Valley), Agriservice (Oceanside), and Greatsoils (Escondido). Earthworks (Riverside); **Potential Laboratories may include**: Fruit Growers Laboratory, Inc. (Santa Paula, http://www.fglinc.com/) Wallace Laboratories (El Segundo, http://us.wlabs.com/). Control Labs (Watsonville, http://www.controllabs.com) and A&L Western Laboratories (Modesto, http://www.al-labs-west.com/).





T.B.G.B. PAGE 959, H1
SECTION 22, RHO, T7S, R2W
VICINITY MAP
N.T.S.

OWNER/DEVELOPER

AKASH PATEL
AKASH WINERY
39730 CALLE CONTENTO
TEMECULA, CA 92592
akash@akashwinery.com

ENGINEER

DINO SAN BUENAVENTURA, P.E.
DSB ENGINEERING
43460 RIDGE PARK DRIVE, SUITE 200T
TEMECULA, CA 92590
(951) 440-5703
DINO@DSBENG.COM

ARCHITECT

JOSHUA R. SIGLER, ASSOC. AIA
AXIS 3 ARCHITECTS, PC
43020 BLACKDEER LOOP, STE 205
TEMECULA, CA 92590
(909) 963-9667
joshua@axis3architects.com

EARTHWORK QUANTITIES

RAW CUT- 3,547 C.Y.
RAW FILL- 3,547 C.Y.
IMPORT/EXPORT- 0 C.Y.
QUANTITIES ARE ESTIMATES ONLY AND CONTRACTOR IS TO VERIFY QUANTITIES PRIOR TO CONSTRUCTION

AREA OF DISTURBANCE

TOTAL AREA OF DISTURBANCE = 44,773 S.F. ~ 1.02 AC
24 HOUR EMERGENCY CONTACT: OWNER

IMPERVIOUS AREA

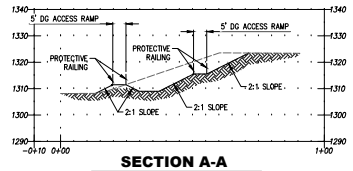
PROPOSED IMPERVIOUS AREA = 5,250 SF

LEGAL DESCRIPTION

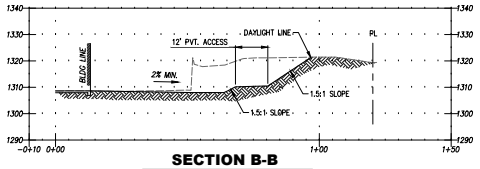
PARCEL 6 OF PM 14/93
GROSS= 20.05 ACRES

DATE PREPARED:

MAY 2023



SECTION A-A
HORIZONTAL AND VERTICAL SCALE: 1"=20'



SECTION B-B
HORIZONTAL AND VERTICAL SCALE: 1"=20'

30 0 30 60
scale 1"= 30' feet

ENGINEER OF WORK
DSB ENGINEERING
DSB ENGINEERING
43460 RIDGE PARK DRIVE, SUITE 200T
TEMECULA, CA 92590
951.440.5703
DINO@DSBENG.COM

DRAWN	COUNTY OF RIVERSIDE	SHEET NO. 1 OF 1 SHEETS
DESIGNED	AKASH WINERY	
CHECKED	39730 CALLE CONTENTO	
SCALE AS SHOWN	APN 943-210-012	FILE NO.
JOB NUMBER	PRELIMINARY GRADING STUDY	
DATE	FOR: W.O. COUNTY FILE NO.	

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.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Western Riverside Area, California



March 9, 2022

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

Soil Map

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

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,150 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

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

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

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

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

Date(s) aerial images were photographed: Jan 7, 2021—Jan 14, 2021

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AtD2	Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded	1.2	4.7%
GyC2	Greenfield sandy loam, 2 to 8 percent slopes, eroded	5.4	21.8%
HcC	Hanford coarse sandy loam, 2 to 8 percent slopes	10.2	41.4%
HfD	Hanford sandy loam, 2 to 15 percent slopes	0.2	0.9%
RaC2	Ramona sandy loam, 5 to 8 percent slopes, eroded	0.0	0.1%
RmE3	Ramona and Buren sandy loams, 15 to 25 percent slopes, severely eroded	2.4	9.6%
RnE3	Ramona and Buren loams, 5 to 25 percent slopes, severely eroded	5.3	21.5%
Totals for Area of Interest		**24.6**	**100.0%**

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas

are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Western Riverside Area, California

AtD2—Arlington and Greenfield fine sandy loams, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcr6
Elevation: 100 to 3,500 feet
Mean annual precipitation: 9 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Arlington and similar soils: 40 percent
Greenfield and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arlington

Setting

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

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 24 inches: sandy loam
H3 - 24 to 36 inches: cemented
H4 - 36 to 47 inches: coarse sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 24 to 40 inches to duripan
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.2 inches)

Interpretive groups

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

Description of Greenfield

Setting

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

Typical profile

H1 - 0 to 26 inches: fine sandy loam
H2 - 26 to 43 inches: fine sandy loam
H3 - 43 to 60 inches: loam
H4 - 60 to 70 inches: stratified loamy sand to sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

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

Minor Components

Unnamed, severely eroded

Percent of map unit: 20 percent
Hydric soil rating: No

Greenfield

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

GyC2—Greenfield sandy loam, 2 to 8 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcvw

Elevation: 100 to 3,500 feet
Mean annual precipitation: 9 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Greenfield

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 26 inches: sandy loam
H2 - 26 to 43 inches: fine sandy loam
H3 - 43 to 60 inches: loam
H4 - 60 to 72 inches: stratified loamy sand to sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 3 percent
Hydric soil rating: No

Pachappa

Percent of map unit: 3 percent
Hydric soil rating: No

Arlington

Percent of map unit: 3 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent
Hydric soil rating: No

Ramona

Percent of map unit: 3 percent
Hydric soil rating: No

HcC—Hanford coarse sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2y8tk
Elevation: 680 to 2,930 feet
Mean annual precipitation: 9 to 17 inches
Mean annual air temperature: 63 to 65 degrees F
Frost-free period: 290 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Hanford

Setting

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

Typical profile

A - 0 to 8 inches: coarse sandy loam
C1 - 8 to 40 inches: fine sandy loam
C2 - 40 to 60 inches: stratified loamy sand to coarse sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: R020XD012CA - SANDY
Hydric soil rating: No

Minor Components

Greenfield

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ramona

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Tujunga

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Unnamed

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Hydric soil rating: No

HfD—Hanford sandy loam, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2y8tw
Elevation: 620 to 3,170 feet
Mean annual precipitation: 10 to 19 inches
Mean annual air temperature: 62 to 65 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Hanford

Setting

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

Typical profile

A - 0 to 8 inches: sandy loam
C1 - 8 to 40 inches: fine sandy loam
C2 - 40 to 60 inches: stratified loamy sand to coarse sandy loam

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R019XD069CA - SANDY ALLUVIAL (1975)
Hydric soil rating: No

Minor Components

Tujunga

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Greenfield

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ramona

Percent of map unit: 4 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Riverwash

Percent of map unit: 1 percent
Landform: Channels
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

RaC2—Ramona sandy loam, 5 to 8 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcy7
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Ramona

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 14 inches: sandy loam
H2 - 14 to 23 inches: fine sandy loam
H3 - 23 to 68 inches: sandy clay loam
H4 - 68 to 74 inches: gravelly sandy loam

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained

Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

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

Minor Components

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

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

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

RmE3—Ramona and Buren sandy loams, 15 to 25 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: hcyj
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition
Ramona and similar soils: 45 percent
Buren and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona

Setting
Landform: Terraces, alluvial fans

Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 17 inches: fine sandy loam
H3 - 17 to 68 inches: sandy clay loam
H4 - 68 to 74 inches: gravelly sandy loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Description of Buren

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Alluvium

Typical profile

H1 - 0 to 12 inches: sandy loam
H2 - 12 to 28 inches: loam
H3 - 28 to 37 inches: loam
H4 - 37 to 52 inches: cemented

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 37 to 40 inches to duripan
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Buren

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

Ramona

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

Hanford

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

RnE3—Ramona and Buren loams, 5 to 25 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: hcyl
Elevation: 250 to 3,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 230 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Ramona and similar soils: 55 percent
Buren and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ramona

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear, convex
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 17 inches: fine sandy loam
H3 - 17 to 68 inches: sandy clay loam
H4 - 68 to 74 inches: gravelly sandy loam

Properties and qualities

Slope: 5 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Description of Buren

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Alluvium

Typical profile

H1 - 0 to 8 inches: loam
H2 - 8 to 28 inches: loam
H3 - 28 to 37 inches: loam
H4 - 37 to 52 inches: cemented

Properties and qualities

Slope: 5 to 25 percent
Depth to restrictive feature: 37 to 40 inches to duripan
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: C
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

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

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

Hanford
Percent of map unit: 2 percent
Hydric soil rating: No

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Earth Strata Geotechnical Services, Inc.
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March 3, 2017

Project No. 171654-10A

Mr. Reza James
P.O. Box 182
Temecula, CA 92593

Subject: **Preliminary Geotechnical Interpretive Report, Proposed Commercial Development, Assessor's Parcel Number 943-210-012, Lot Number 6 of Parcel Map 14/93, Located at 39730 Calle Contento, Temecula, Riverside County, California**

Earth Strata Geotechnical Services is pleased to present our preliminary geotechnical interpretive report for the proposed commercial development, Assessor's Parcel Number 943-210-012, located at 39730 Calle Contento in City of Temecula, Riverside County, California. This work was performed in accordance with the scope of work described in our proposal, dated February 7, 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

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Distribution: (2) Addressee

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Figure 2 – Regional Geologic Map (Page 5)
APPENDIX A – References (Rear of Text)
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APPENDIX C – Laboratory Procedures and Test Results (Rear of Text)
APPENDIX D – Seismicity (Rear of Text)
APPENDIX E – General Earthwork and Grading Specifications (Rear of Text)
Plate 1 – Geotechnical Map (In Pocket)

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 at 39730 Calle Contento in the City of Temecula, Riverside County, California. The approximate location of the site is shown on the Vicinity Map, Figure 1.

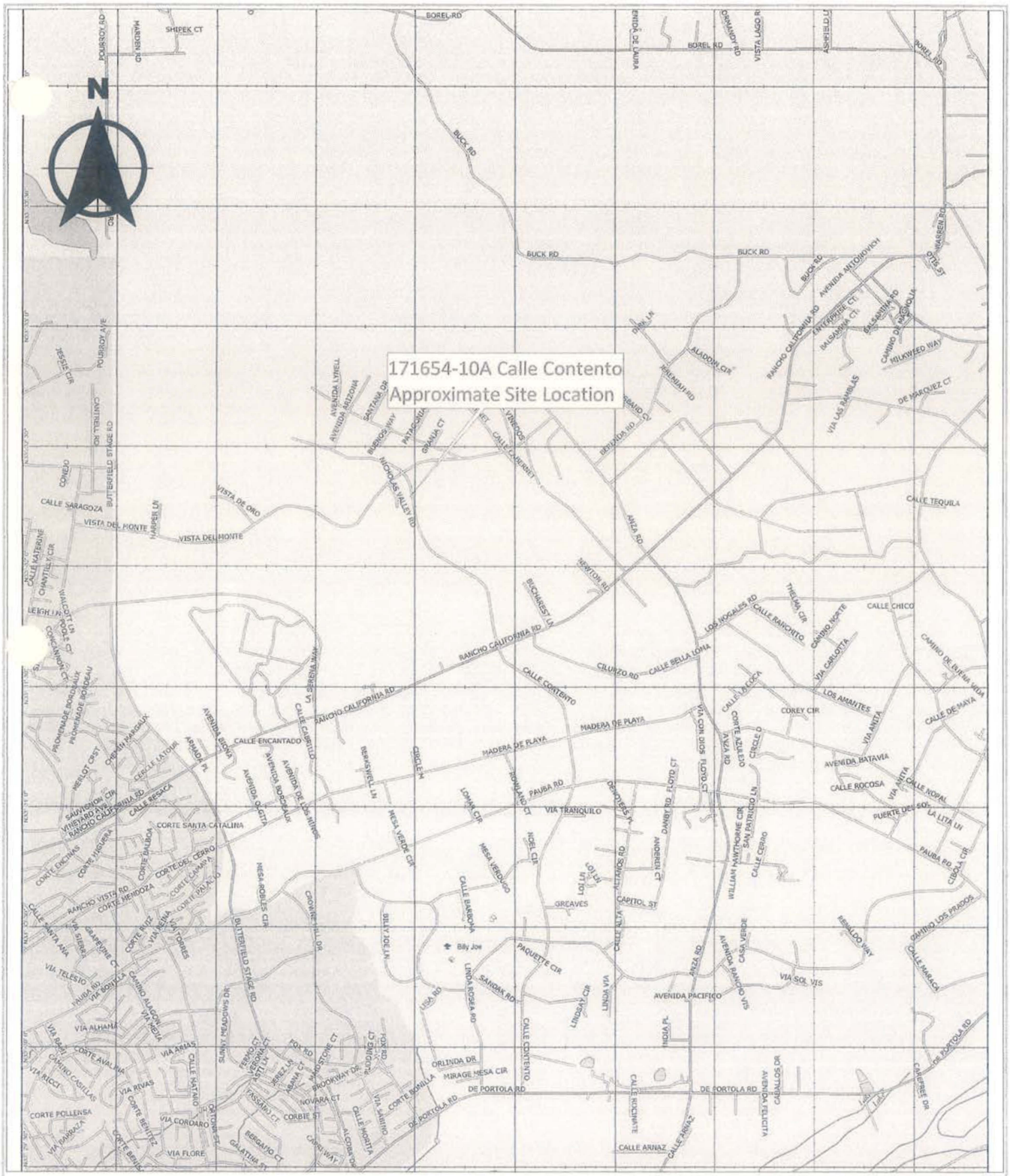
The subject property is comprised of approximately 19.43 acres of partially developed land. The site has been graded, in association with the existing one story agricultural building and building pad. Topographic relief at the subject property is relatively moderate with the terrain being generally gently sloping, with a one story agricultural building located in the southern portion of the site. Elevations at the site range from approximately 1,265 to 1,405 feet above mean sea level (msl), for a difference of about 40± feet across the entire site. Drainage within the subject property generally flows to the west.

The site is currently bordered by residential and commercial developments. Most of the vegetation on the site consists of an existing vineyard and sparse amounts of shrubs and small to large trees.

PROPOSED DEVELOPMENT AND GRADING

The proposed commercial 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 four (4) building pads positioned throughout the site. The plans provided by you were utilized in our exploration and form the base for our Geotechnical Map, Plate 1.

Figure 1
Vicinity Map



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CALLE CONTENTO	171654-10A
VICINITY MAP	SCALE 1:40,625
	MAR 2017 / FIGURE 1

FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Subsurface exploration within the subject site was performed on February 28, 2017 and March 3, 2017 for the exploratory excavations. A hand-auger was utilized to excavate four (4) borings throughout the site to a maximum depth of 5.5 feet. A truck mounted hollow-stem-auger was utilized to drill three (3) additional borings to a maximum depth of 11½ 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 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 artificial fill. A general description of the dominant earth materials observed on the site is provided below:

- Artificial Fill, Undocumented (map symbol Afu): Undocumented artificial fill materials were encountered throughout the site in the upper 7 feet of the pad area. These materials are typically locally derived from the native materials and consist generally of light brown to dark brown silty sand and poorly-graded, silty sand. These materials are generally inconsistent consolidated fills.

- Quaternary Young Alluvial Deposits (Qya): Quaternary young alluvium was encountered below the artificial fill and was mapped at the surface in the topographically low portions of the site to a maximum depth of 11.5 feet. These young alluvial deposits consist predominately of interlayered brown to yellow brown, fine to coarse grained silty sand and clayey sand. These deposits were generally noted to be in a slightly moist, medium dense state.

Faulting

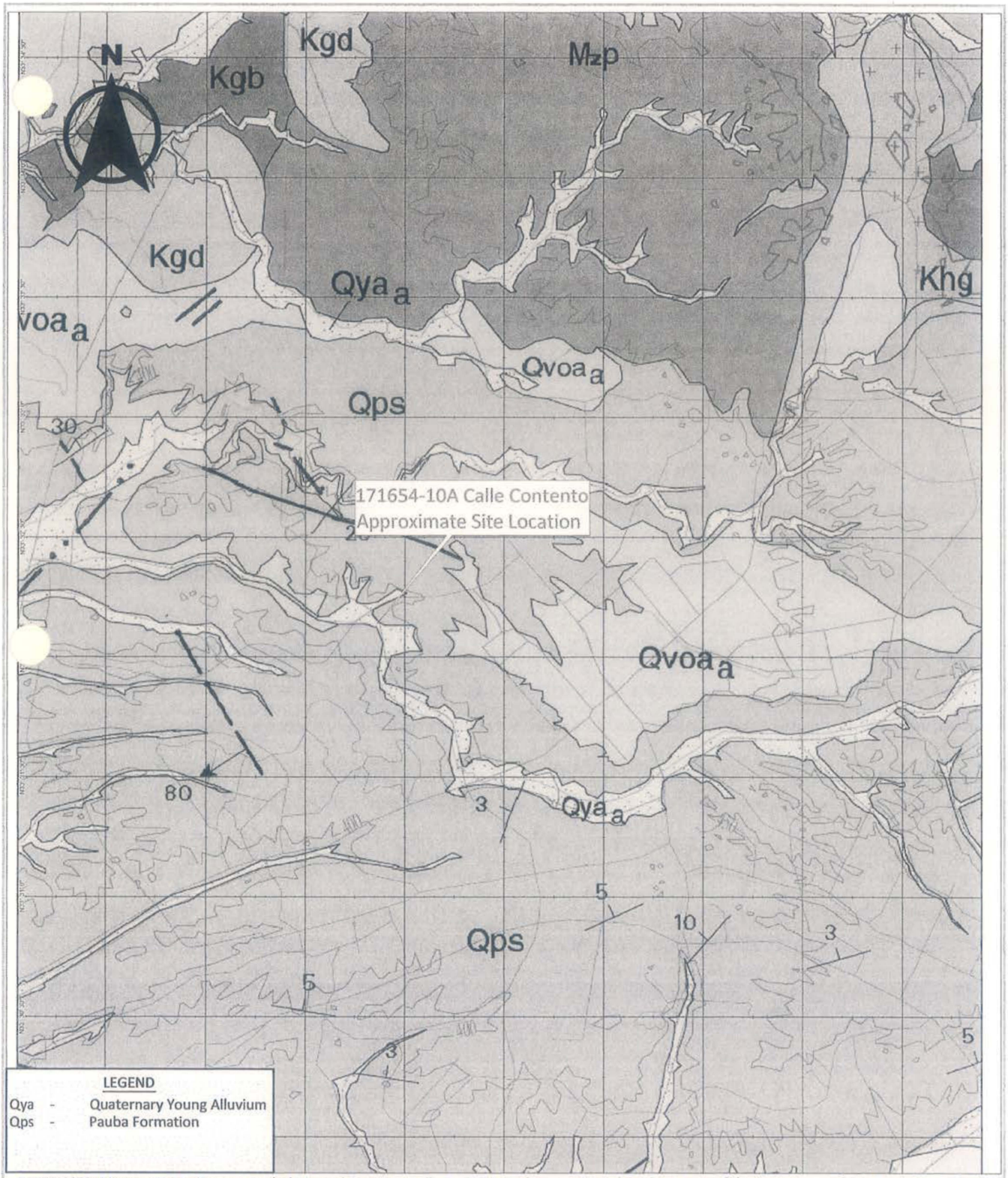
The project is located in a seismically active region and as a result, significant ground shaking will likely impact the site within the design life of the proposed project. The geologic structure of the entire southern California area is dominated by northwest-trending faults associated with the San 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 Murrieta Hot Springs Fault with an approximate source to site distance of 0.55 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 7.76; the Elsinore Fault (Temecula Section) with an approximate source to site distance of 7.57 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.

Figure 2
Regional Geologic Map



REFERNCES: Morton, D.M., Hauser, Rachel M., and Ruppert, Kelly R., 2004, Preliminary Digital Geologic Map of the Santa Ana and San Bernadino 30' x 60' rangle, Southern California, Version 2.0: U.S. Geological Survey Open-File Report 99-0172.
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CALLE CONTENTO		171654-10A
REGIONAL GEOLOGIC MAP	SCALE 1:40,625	
	MAR 2017	FIGURE 2

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.

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 data indicates current regional groundwater highs approximately 331 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 and undocumented artificial fill, should continue until firm competent alluvium 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 5 to 7 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 competent earth materials, 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 competent earth materials.

Cut Slopes

When properly constructed, cut slopes into older alluvium 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 alluvium. 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 (%)
Artificial Fill	5 to 10
Alluvium	10 to 15

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 1557-00. 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 1557-00. 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: 33.537709° (North) Longitude: -117.075181° (West)
Site Class	D
Mapped Spectral Accelerations for short periods, S_s	1.622
Mapped Spectral Accelerations for 1-Second Period, S_1	0.658
Maximum Considered Earthquake Spectral Response Acceleration for Short Periods, S_{ms}	1.622
Maximum Considered Earthquake Spectral Response Acceleration for 1-Second Period, S_{m1}	0.988
Design Spectral Response Acceleration for Short Periods, S_{DS}	1.082
Design Spectral Response Acceleration for 1-Second Period, S_{D1}	0.658
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 0.635 g.

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 1,250 feet above mean sea level and is located more than 25 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.

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.

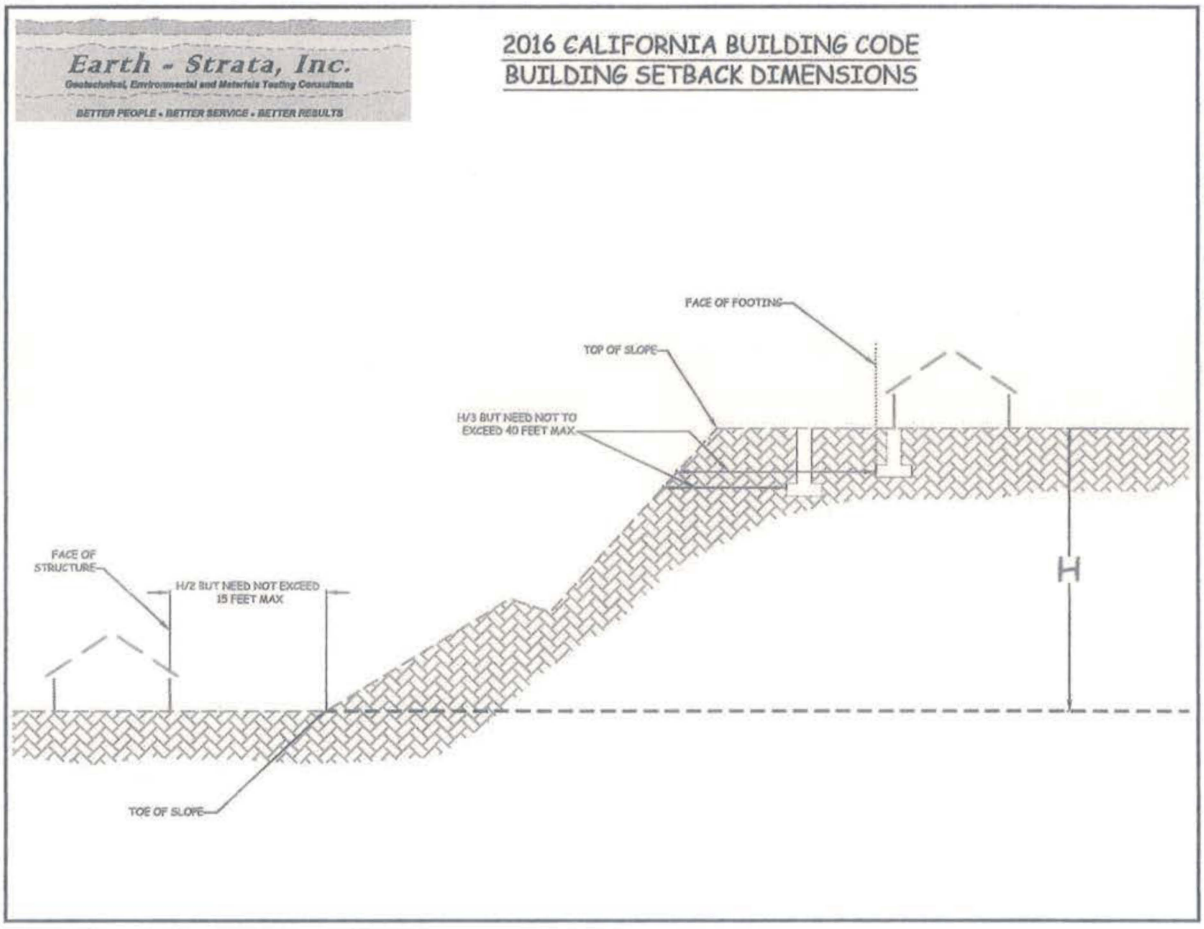
The above lateral resistance values are based on footings for an entire structure being placed directly against either compacted fill or competent alluvium.

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. 18-inch minimum depth for one and 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 5 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 *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 1557-00 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 **Mr. Reza James** 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

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APPENDIX B

EXPLORATORY LOGS

Geotechnical Boring Log B-1

Date: February 28, 2017	Project Name: Calle Contento — Page: 1 of 1
Project Number: 171654-10A	Logged By: JCF
Drilling Company: N/A	Type of Rig: Hand Auger
Drive Weight (lbs): -	Drop (in): - Hole Diameter (in): -
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		0-5.5'				**Artificial Fill, Undocumented (Afu)**
		1'	110.1	4.7	SM	Silty SAND; brown, dry, loose, fine to coarse sand, trace clay and gravel
		3'	105.3	5.3		
					SP-SM	Poorly-Graded, Silty SAND; dark brown, slightly moist, medium dense, fine to
						coarse sand with gravel, trace clay
5		5'	110.9	4.9		
						Total Depth: 5.5 feet
						No Groundwater
10						
15						
20						
25						
30						

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Geotechnical Boring Log B-2

Date: February 28, 2017	Project Name: Calle Contento — Page: 1 of 1
Project Number: 171654-10A	Logged By: JCF
Drilling Company: N/A	Type of Rig: Hand Auger
Drive Weight (lbs): -	Drop (in): - Hole Diameter (in): -
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						**Artificial Fill, Undocumented (Afu)**
		1'	109.6	3.9	SM	Silty SAND; light brown, slightly moist, loose, fine to coarse sand with gravel, trace clay
		3'	109.3	5.2	SP-SM	Poorly-Graded, Silty SAND; dark brown, slightly moist, medium dense, fine to coarse sand with gravel, trace clay
5		5'	102.4	5.8		Light brown below 4 feet
						Total Depth 5.5 feet
						No Groundwater
10						
15						
20						
25						
30						

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Geotechnical Boring Log B-3

Date: February 28, 2017		Project Name: Calle Contento	Page: 1 of 1
roject Number: 171654-10A		Logged By: JCF	
Drilling Company: N/A		Type of Rig: Hand Auger	
Drive Weight (lbs): -		Drop (in): -	Hole Diameter (in): -
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						**Artificial Fill, Undocumented (Afu)**
					SM	Silty SAND; light brown, slightly moist, loose, fine to coarse sand with gravel,
		2'	113.6	5.8		trace clay
					SP-SM	Poorly-Graded, Silty SAND; dark brown, medium dense, fine to coarse sand
		4'	100.2	5.2		with gravel, trace clay
5						Light yellowish brown below 4 feet
						Total Depth: 5 feet
						No Groundwater
10						
15						
20						
25						
30						

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Geotechnical Boring Log B-4

Date: February 28, 2017		Project Name: Calle Contento	Page: 1 of 1
roject Number: 171654-10A		Logged By: JCF	
Drilling Company: N/A		Type of Rig: Hand Auger	
Drive Weight (lbs): -		Drop (in): -	Hole Diameter (in): -
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						**Artificial Fill, Undocumented (Afu)**
		1'	108.5	5.2	SM	Silty SAND; light brown, slightly moist, loose, fine to coarse sand with gravel,
						trace clay
		3'	112.2	7.3	SP-SM	Poorly-Graded, Silty SAND ; dark brown, slightly moist, medium dense, fine to
						coarse sand with gravel, trace clay
5		5'	96.0	4.7		Yellowish brown, with clay below 4 feet
						No Recovery at 5 feet
						Total Depth: 5.5 feet
						No Groundwater
10						
15						
20						
25						
30						

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Geotechnical Boring Log B-5

Date: March 3, 2017	Project Name: Calle Contento — Page: 1 of 1
Project Number: 171654-10A	Logged By: JCF
Drilling Company: Drilling It	Type of Rig: Simco 2800
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						**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; dark brown, slightly moist, medium dense, fine to coarse sand
	19	2.5'	119.0	6.3		with clay and trace gravel
5	19	5'	106.7	7.5		
	22	7.5'	109.5	5.7		**Quaternary Young Alluvial Deposits (Qya):**
					SP-SC	Poorly-graded, Clayey SAND; yellowish brown, slightly moist, medium dense,
10						fine to medium sand with gravel
	30	10'	101.8	6.0		
						Practical Refusal at 11.5'
						Total Depth 11.5'
						No Groundwater
15						
20						
25						
30						

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Geotechnical Boring Log B-6

Date: March 3, 2017	Project Name: Calle Contento — Page: 1 of 1
Project Number: 171654-10A	Logged By: JCF
Drilling Company: Drilling It	Type of Rig: Simco 2800
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						**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; dark brown, slightly moist, medium dense, fine to coarse sand
	17	2.5'	104.4	5.6		with clay and trace gravel
5	23	5'	110.5	6.5		
	24	7.5'	108.7	7.2		**Quaternary Young Alluvial Deposits (Qya):**
		7'-10'			SC	Clayey SAND; yellowish brown, slightly moist, medium dense, fine to medium
10						sand with gravel
		10'				
						No Recovery at 10'
						Practical Refusal at 11.5'
						Total Depth 11.5'
15						No Groundwater
20						
25						
30						

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Geotechnical Boring Log B-7

Date: March 3, 2017	Project Name: Calle Contento — Page: 1 of 1
Project Number: 171654-10A	Logged By: JCF
Drilling Company: Drilling It	Type of Rig: Simco 2800
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						**Artificial Fill, Undocumented (Afu):**
					SC	Clayey SAND; dark brown, slightly moist, medium dense, fine to medium sand
	42	2.5'	118.2	6.0		with trace gravel
5	33	5'	106.2	6.0		
	18	7.5'	110.2	8.4		**Quaternary Young Alluvial Deposits (Qya):**
					SP-SM	Poorly-graded, Silty SAND; yellowish brown, slightly moist, medium dense, fine
						to coarse sand with clay and gravel
10	30	10'	105.5	8.2		
						Practical Refusal at 11.5'
						Total Depth 11.5'
						No Groundwater
15						
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 (%)
Bulk 1 @ 0-2 feet	Silty SAND	124.0	10.0

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
Bulk 1 @ 0-2 feet	Silty SAND	0	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)
Bulk 1 @ 0-2 feet	Silty SAND	7.5	2.000

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
Bulk 1 @ 0-2 feet	Silty SAND	0.003	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)
Bulk 1 @ 0-2 feet	Silty SAND	230

APPENDIX D

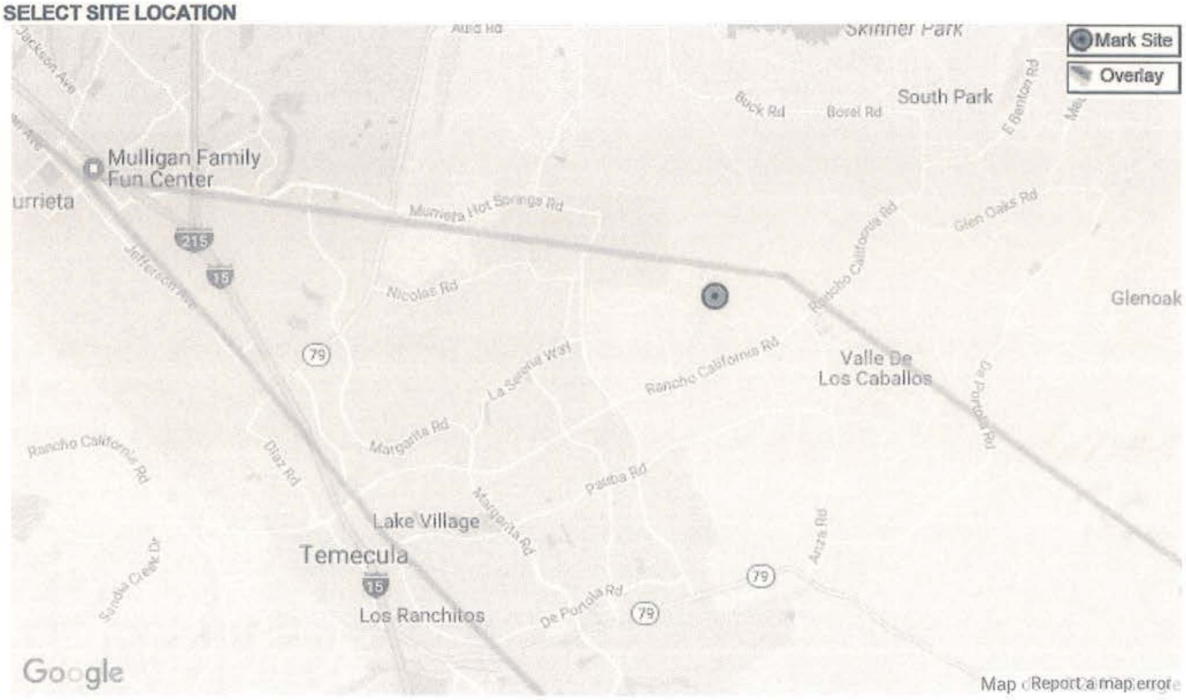
SEISMICITY

CALIFORNIA DEPARTMENT OF
TRANSPORTATION

Caltrans ARS Online (v2.3.08)

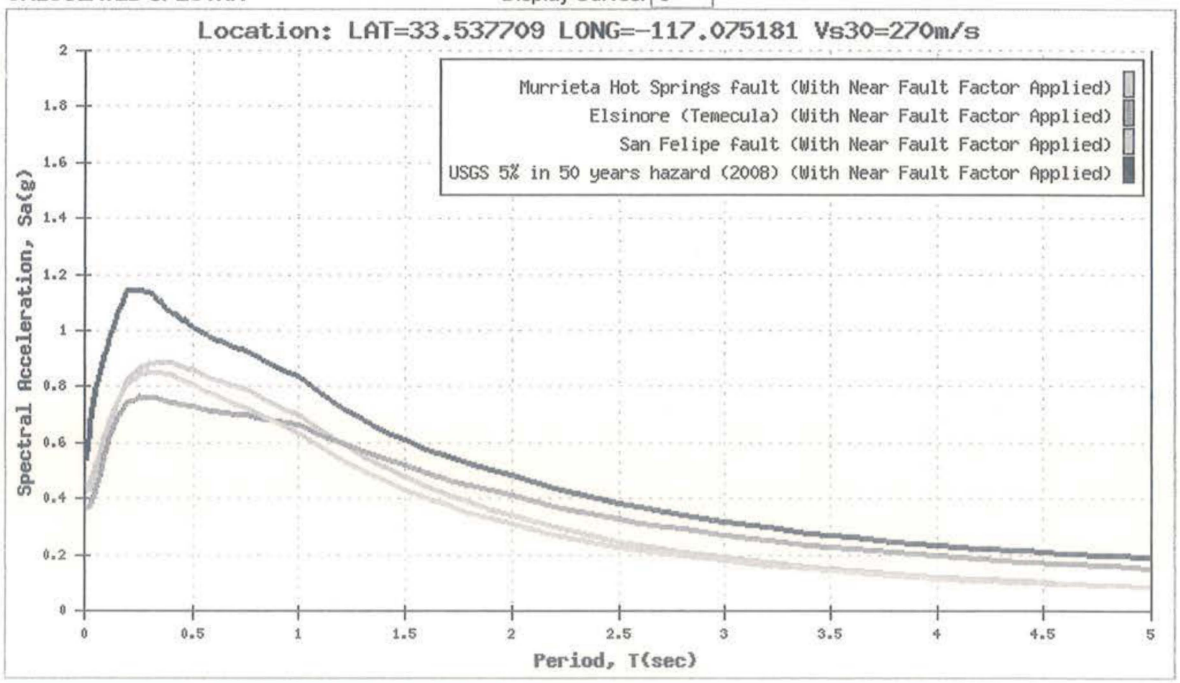
This web-based tool calculates both deterministic and probabilistic acceleration response spectra for any location in California based on criteria provided in *Appendix B of Caltrans Seismic Design Criteria*. More...

SELECT SITE LOCATION



Latitude: 33.537709 **Longitude:** -117.075181 ***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

0.55	Km Murrieta Hot Springs fault
7.57	Km Elsinore (Temecula)
1.47	Km San Felipe fault

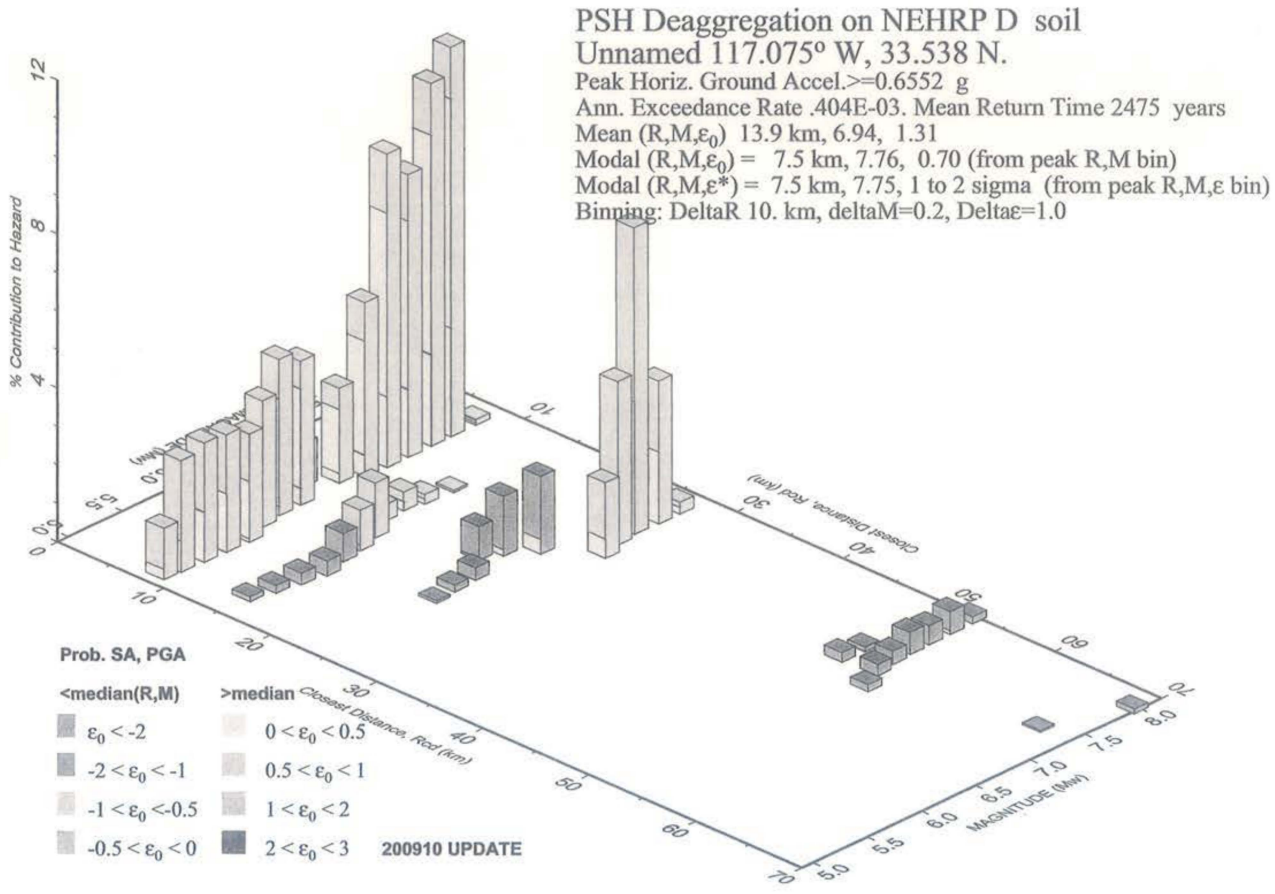
☑ Probabilistic Spectrum Using

0.55	Km (Recommend Performing Deaggregation To Verify)

◉ Show Spectrum with Adjustment Only
○ Show Spectrum with and without near fault Adjustment

OK

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GMT 2017 Feb 27 23:12:14 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 270. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

```
*** Deaggregation of Seismic Hazard at One Period of Spectral Accel. ***
*** Data from U.S.G.S. National Seismic Hazards Mapping Project, 2008 version ***
PSHA Deaggregation. %contributions. site: Unnamed long: 117.075 W., lat: 33.538 N.
 Vs30(m/s)= 270.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08  See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475  yrs. Exceedance PGA =0.6552   g. Weight * Computed_Rate_Ex 0.404E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00001
#This deaggregation corresponds to Mean Hazard w/all GMPEs
DIST(KM) MAG(MW) ALL_EPS EPSILON>2  1<EPS<2 0<EPS<1 -1<EPS<0 -2<EPS<-1 EPS<-2
    8.3    5.05    1.337    1.074    0.263    0.000    0.000    0.000    0.000
    8.3    5.20    2.894    2.087    0.807    0.000    0.000    0.000    0.000
   14.7    5.21    0.124    0.124    0.000    0.000    0.000    0.000    0.000
    8.4    5.40    3.098    1.802    1.295    0.000    0.000    0.000    0.000
   15.1    5.41    0.202    0.202    0.000    0.000    0.000    0.000    0.000
    8.5    5.60    3.060    1.540    1.505    0.015    0.000    0.000    0.000
   15.5    5.60    0.300    0.300    0.000    0.000    0.000    0.000    0.000
    8.6    5.80    2.815    1.239    1.482    0.094    0.000    0.000    0.000
   15.9    5.80    0.392    0.392    0.000    0.000    0.000    0.000    0.000
    7.7    6.01    3.282    1.073    2.070    0.140    0.000    0.000    0.000
   15.2    6.02    0.731    0.683    0.048    0.000    0.000    0.000    0.000
   24.0    6.02    0.057    0.057    0.000    0.000    0.000    0.000    0.000
    7.3    6.20    4.058    1.026    2.789    0.242    0.000    0.000    0.000
   14.9    6.20    1.058    0.911    0.147    0.000    0.000    0.000    0.000
   23.7    6.21    0.175    0.175    0.000    0.000    0.000    0.000    0.000
    7.2    6.40    3.746    0.722    2.579    0.446    0.000    0.000    0.000
   14.2    6.40    1.423    1.003    0.420    0.000    0.000    0.000    0.000
   23.5    6.42    0.329    0.329    0.000    0.000    0.000    0.000    0.000
    5.5    6.60    1.116    0.179    0.726    0.211    0.000    0.000    0.000
   13.0    6.60    0.426    0.263    0.163    0.000    0.000    0.000    0.000
   21.6    6.63    0.881    0.824    0.057    0.000    0.000    0.000    0.000
    6.8    6.79    2.464    0.553    1.663    0.248    0.000    0.000    0.000
   12.8    6.80    0.485    0.247    0.237    0.000    0.000    0.000    0.000
   22.4    6.79    1.551    1.383    0.168    0.000    0.000    0.000    0.000
    7.4    6.97    4.518    1.003    2.963    0.552    0.000    0.000    0.000
   13.2    6.96    0.258    0.121    0.136    0.001    0.000    0.000    0.000
   24.0    6.97    2.019    1.645    0.375    0.000    0.000    0.000    0.000
   54.2    7.03    0.185    0.185    0.000    0.000    0.000    0.000    0.000
    7.5    7.17    8.141    1.540    4.775    1.826    0.000    0.000    0.000
   13.4    7.21    0.058    0.020    0.034    0.003    0.000    0.000    0.000
   27.6    7.21    1.966    1.465    0.500    0.000    0.000    0.000    0.000
   49.9    7.21    0.241    0.241    0.000    0.000    0.000    0.000    0.000
   53.0    7.23    0.294    0.294    0.000    0.000    0.000    0.000    0.000
    7.5    7.36    7.338    1.197    4.379    1.763    0.000    0.000    0.000
   26.8    7.40    4.244    3.003    1.242    0.000    0.000    0.000    0.000
   49.9    7.42    0.124    0.124    0.000    0.000    0.000    0.000    0.000
   52.6    7.42    0.338    0.338    0.000    0.000    0.000    0.000    0.000
   66.8    7.38    0.051    0.051    0.000    0.000    0.000    0.000    0.000
    7.5    7.57    9.420    1.346    5.700    2.374    0.000    0.000    0.000
   26.5    7.58    7.963    4.516    3.447    0.000    0.000    0.000    0.000
   52.4    7.59    0.575    0.575    0.000    0.000    0.000    0.000    0.000
    7.5    7.76   10.115    1.334    5.959    2.822    0.000    0.000    0.000
   26.6    7.79    3.717    1.847    1.870    0.000    0.000    0.000    0.000
   52.3    7.77    0.494    0.467    0.026    0.000    0.000    0.000    0.000
    7.5    7.98    0.143    0.016    0.075    0.052    0.001    0.000    0.000
   26.6    7.99    0.305    0.134    0.171    0.000    0.000    0.000    0.000
   52.3    7.97    0.598    0.499    0.099    0.000    0.000    0.000    0.000
   69.4    7.98    0.122    0.122    0.000    0.000    0.000    0.000    0.000
   52.3    8.18    0.179    0.156    0.024    0.000    0.000    0.000    0.000

 ummary statistics for above PSHA PGA  deaggregation, R=distance, e=epsilon:
 ontribution from this GMPE(%):  100.0
 Mean src-site R=   13.9 km; M= 6.94; eps0=   1.31. Mean calculated for all sources.
Modal src-site R=    7.5 km; M= 7.76; eps0=   0.70 from peak (R,M) bin
 MODE R*=   7.5km; M*= 7.75; EPS.INTERVAL: 1 to 2 sigma  % CONTRIB.=  5.959
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Principal sources (faults, subduction, random seismicity having > 3% contribution)
Source Category:                % contr.  R(km)    M   epsilon0 (mean values).
California A-faults               67.08    15.9   7.42    1.24
CA Compr. crustal gridded         32.63     9.4   5.94    1.45
Individual fault hazard details if its contribution to mean hazard > 2%:
Fault ID                        % contr.   Rcd(km)  M   epsilon0 Site-to-src azimuth(d)
Elsinore; Glen Ivy aPriori         2.06    20.9   6.83    2.03     -62.0
Elsinore;T aPriori                 5.28     7.5   7.00    1.10    -134.7
Elsinore;GI+T aPriori              9.76     7.5   7.25    0.91    -134.7
Elsinore;T+J+CM aPriori            3.67     7.5   7.64    0.74    -134.7
Elsinore;GI+T+J+CM aPriori         3.81     7.5   7.72    0.71    -134.7
San Jacinto;A+C aPriori            5.02    26.6   7.50    1.74      32.5
San Jacinto;SBV+SJV+A+C aPriori    2.46    26.6   7.77    1.61      34.5
Elsinore;T+J+CM MoBal              3.64     7.5   7.64    0.74    -134.7
Elsinore;GI+T+J+CM MoBal           2.18     7.5   7.72    0.71    -134.7
Elsinore aflt, unsegmented         5.22     7.9   7.42    0.83    -133.9
#*********End of deaggregation corresponding to Mean Hazard w/all GMPEs  *********#

PSHA Deaggregation. %contributions. site: Unnamed long: 117.075 W., lat: 33.538 N.
 Vs30(m/s)= 270.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08  See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475  yrs. Exceedance PGA =0.6552   g. Weight * Computed_Rate_Ex 0.188E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00000
#This deaggregation corresponds to Boore-Atkinson 2008
DIST(KM) MAG(MW) ALL_EPS EPSILON>2  1<EPS<2 0<EPS<1 -1<EPS<0 -2<EPS<-1 EPS<-2
    7.7    5.05    0.105    0.105    0.000    0.000    0.000    0.000    0.000
    7.9    5.20    0.274    0.274    0.000    0.000    0.000    0.000    0.000
    8.2    5.40    0.363    0.363    0.000    0.000    0.000    0.000    0.000
    8.3    5.60    0.432    0.409    0.023    0.000    0.000    0.000    0.000
   15.5    5.61    0.030    0.030    0.000    0.000    0.000    0.000    0.000
    8.4    5.80    0.476    0.431    0.045    0.000    0.000    0.000    0.000
   16.1    5.81    0.070    0.070    0.000    0.000    0.000    0.000    0.000
    7.5    6.01    0.678    0.560    0.118    0.000    0.000    0.000    0.000
   15.6    6.02    0.174    0.174    0.000    0.000    0.000    0.000    0.000
   24.5    6.02    0.028    0.028    0.000    0.000    0.000    0.000    0.000
    7.1    6.20    0.909    0.694    0.215    0.000    0.000    0.000    0.000
   15.1    6.20    0.279    0.279    0.000    0.000    0.000    0.000    0.000
   24.1    6.21    0.095    0.095    0.000    0.000    0.000    0.000    0.000
    7.1    6.40    0.853    0.585    0.269    0.000    0.000    0.000    0.000
   14.6    6.40    0.394    0.394    0.000    0.000    0.000    0.000    0.000
   23.8    6.42    0.191    0.191    0.000    0.000    0.000    0.000    0.000
   34.3    6.41    0.041    0.041    0.000    0.000    0.000    0.000    0.000
    5.8    6.60    0.281    0.144    0.136    0.001    0.000    0.000    0.000
   13.5    6.60    0.157    0.148    0.008    0.000    0.000    0.000    0.000
   21.7    6.63    0.723    0.666    0.057    0.000    0.000    0.000    0.000
   33.8    6.61    0.028    0.028    0.000    0.000    0.000    0.000    0.000
    7.1    6.79    0.987    0.310    0.669    0.008    0.000    0.000    0.000
   13.4    6.80    0.184    0.163    0.022    0.000    0.000    0.000    0.000
   22.6    6.78    1.342    1.174    0.167    0.000    0.000    0.000    0.000
   33.9    6.80    0.038    0.038    0.000    0.000    0.000    0.000    0.000
   54.5    6.80    0.030    0.030    0.000    0.000    0.000    0.000    0.000
    7.5    6.97    2.043    0.486    1.398    0.159    0.000    0.000    0.000
   13.8    6.96    0.104    0.082    0.021    0.001    0.000    0.000    0.000
   24.2    6.97    1.825    1.461    0.364    0.000    0.000    0.000    0.000
   34.2    6.98    0.026    0.026    0.000    0.000    0.000    0.000    0.000
   48.8    6.99    0.050    0.050    0.000    0.000    0.000    0.000    0.000
   54.2    7.03    0.185    0.185    0.000    0.000    0.000    0.000    0.000
    7.5    7.17    3.639    0.693    2.245    0.701    0.000    0.000    0.000
   13.9    7.20    0.036    0.012    0.023    0.002    0.000    0.000    0.000
   27.8    7.21    1.604    1.134    0.470    0.000    0.000    0.000    0.000
   49.9    7.21    0.241    0.241    0.000    0.000    0.000    0.000    0.000
   53.0    7.23    0.294    0.294    0.000    0.000    0.000    0.000    0.000
   65.0    7.18    0.026    0.026    0.000    0.000    0.000    0.000    0.000
    7.5    7.36    3.304    0.556    2.054    0.694    0.000    0.000    0.000
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  13.7    7.40    0.028    0.008    0.018    0.002    0.000    0.000    0.000
  26.9    7.39    3.336    2.189    1.147    0.000    0.000    0.000    0.000
  49.9    7.42    0.124    0.124    0.000    0.000    0.000    0.000    0.000
  52.6    7.42    0.338    0.338    0.000    0.000    0.000    0.000    0.000
  66.8    7.38    0.051    0.051    0.000    0.000    0.000    0.000    0.000
   7.5    7.57    4.316    0.607    2.725    0.983    0.000    0.000    0.000
  26.5    7.58    6.150    3.333    2.816    0.000    0.000    0.000    0.000
  52.4    7.59    0.562    0.562    0.000    0.000    0.000    0.000    0.000
  67.5    7.55    0.032    0.032    0.000    0.000    0.000    0.000    0.000
   7.5    7.76    4.584    0.596    2.904    1.084    0.000    0.000    0.000
  26.6    7.79    2.604    1.190    1.413    0.000    0.000    0.000    0.000
  52.4    7.77    0.455    0.429    0.026    0.000    0.000    0.000    0.000
  69.2    7.78    0.040    0.040    0.000    0.000    0.000    0.000    0.000
   7.5    7.99    0.060    0.007    0.035    0.017    0.000    0.000    0.000
  26.6    7.99    0.202    0.077    0.125    0.000    0.000    0.000    0.000
  52.3    7.97    0.555    0.456    0.099    0.000    0.000    0.000    0.000
  69.4    7.98    0.115    0.115    0.000    0.000    0.000    0.000    0.000
  52.3    8.18    0.138    0.114    0.024    0.000    0.000    0.000    0.000

Summary statistics for above PSHA PGA  deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%):   46.4
 Mean src-site R=   18.4 km; M= 7.23; eps0=   1.44. Mean calculated for all sources.
Modal src-site R=   26.5 km; M= 7.58; eps0=   1.60 from peak (R,M) bin
 MODE R*=  26.5km; M*= 7.58; EPS.INTERVAL: 1 to 2 sigma  % CONTRIB.=  3.333

Principal sources (faults, subduction, random seismicity having > 3% contribution)
Source Category:                % contr.  R(km)    M   epsilon0 (mean values).
California A-faults               39.61    19.4   7.41    1.38
CA Compr. crustal gridded          6.50    10.8   6.13    1.73
Individual fault hazard details if its contribution to mean hazard > 2%:
Fault ID                        % contr.   Rcd(km)  M   epsilon0 Site-to-src azimuth(d)
Elsinore; Glen Ivy aPriori         1.73    20.9   6.82    1.97     -62.0
Elsinore;T aPriori                 2.42     7.5   7.00    1.15    -134.7
Elsinore;GI+T aPriori              4.31     7.5   7.25    0.98    -134.7
Elsinore;T+J+CM aPriori            1.67     7.5   7.64    0.79    -134.7
Elsinore;GI+T+J+CM aPriori         1.72     7.5   7.72    0.77    -134.7
San Jacinto;A+C aPriori            3.85    26.6   7.50    1.66      32.5
San Jacinto;SBV+SJV+A+C aPriori    1.74    26.6   7.77    1.54      34.5
Elsinore;T+J+CM MoBal              1.66     7.5   7.64    0.79    -134.7
Elsinore;GI+T+J+CM MoBal           0.99     7.5   7.72    0.77    -134.7
Elsinore aflt, unsegmented         2.57     8.1   7.40    0.90    -133.9
#*********End of deaggregation corresponding to Boore-Atkinson 2008      *********#

PSHA Deaggregation. %contributions. site: Unnamed long: 117.075 W., lat: 33.538 N.
 Vs30(m/s)= 270.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08  See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475  yrs. Exceedance PGA =0.6552   g. Weight * Computed_Rate_Ex 0.306E-04
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00000
#This deaggregation corresponds to Campbell-Bozorgnia 2008
DIST(KM) MAG(MW) ALL_EPS EPSILON>2  1<EPS<2 0<EPS<1 -1<EPS<0 -2<EPS<-1 EPS<-2
    8.0    5.05    0.174    0.174    0.000    0.000    0.000    0.000    0.000
    8.2    5.21    0.482    0.480    0.002    0.000    0.000    0.000    0.000
    8.4    5.40    0.677    0.616    0.061    0.000    0.000    0.000    0.000
   14.3    5.42    0.014    0.014    0.000    0.000    0.000    0.000    0.000
    8.5    5.60    0.727    0.626    0.101    0.000    0.000    0.000    0.000
   14.9    5.60    0.035    0.035    0.000    0.000    0.000    0.000    0.000
    8.5    5.80    0.638    0.520    0.117    0.000    0.000    0.000    0.000
   15.3    5.80    0.047    0.047    0.000    0.000    0.000    0.000    0.000
    7.7    6.01    0.681    0.553    0.128    0.000    0.000    0.000    0.000
   14.6    6.02    0.101    0.101    0.000    0.000    0.000    0.000    0.000
    7.2    6.20    0.855    0.670    0.186    0.000    0.000    0.000    0.000
   14.6    6.20    0.164    0.164    0.000    0.000    0.000    0.000    0.000
   22.9    6.21    0.010    0.010    0.000    0.000    0.000    0.000    0.000
    7.2    6.40    0.865    0.570    0.295    0.000    0.000    0.000    0.000
   14.0    6.40    0.243    0.243    0.000    0.000    0.000    0.000    0.000
```

23.2	6.41	0.021	0.021	0.000	0.000	0.000	0.000	0.000
5.1	6.60	0.302	0.130	0.171	0.000	0.000	0.000	0.000
12.7	6.60	0.100	0.096	0.005	0.000	0.000	0.000	0.000
23.2	6.60	0.008	0.008	0.000	0.000	0.000	0.000	0.000
5.5	6.80	0.245	0.118	0.127	0.000	0.000	0.000	0.000
12.5	6.80	0.102	0.094	0.008	0.000	0.000	0.000	0.000
22.9	6.80	0.010	0.010	0.000	0.000	0.000	0.000	0.000
6.3	6.97	0.161	0.100	0.061	0.000	0.000	0.000	0.000
12.8	6.95	0.047	0.043	0.004	0.000	0.000	0.000	0.000
23.6	6.95	0.004	0.004	0.000	0.000	0.000	0.000	0.000
7.5	7.16	0.217	0.150	0.067	0.000	0.000	0.000	0.000
7.5	7.35	0.173	0.115	0.058	0.000	0.000	0.000	0.000
7.5	7.57	0.212	0.132	0.081	0.000	0.000	0.000	0.000
7.5	7.76	0.241	0.143	0.098	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 7.6
Mean src-site R= 8.4 km; M= 6.16; eps0= 1.62. Mean calculated for all sources.
Modal src-site R= 7.2 km; M= 6.40; eps0= 1.23 from peak (R,M) bin
MODE R*= 7.2km; M*= 6.20; EPS.INTERVAL: 1 to 2 sigma % CONTRIB.= 0.670

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
CA Compr. crustal gridded	6.61	8.6	5.98	1.58

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Elsinore; Glen Ivy aPriori	0.00	20.9	7.09	2.98	-62.0
Elsinore;T aPriori	0.12	7.5	7.03	2.07	-134.7
Elsinore;GI+T aPriori	0.27	7.5	7.25	1.91	-134.7
Elsinore;T+J+CM aPriori	0.10	7.5	7.64	1.85	-134.7
Elsinore;GI+T+J+CM aPriori	0.10	7.5	7.72	1.84	-134.7
San Jacinto;A+C aPriori	0.00	0.0	0.00	0.00	32.5
San Jacinto;SBV+SJV+A+C aPriori	0.00	26.6	7.92	2.96	34.5
Elsinore;T+J+CM MoBal	0.10	7.5	7.64	1.85	-134.7
Elsinore;GI+T+J+CM MoBal	0.06	7.5	7.72	1.84	-134.7
Elsinore aflt, unsegmented	0.02	7.5	7.44	2.68	-133.9

#*********End of deaggregation corresponding to Campbell-Bozorgnia 2008 *********#

PSHA Deaggregation. %contributions. site: Unnamed long: 117.075 W., lat: 33.538 N.
Vs30(m/s)= 270.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 2475 yrs. Exceedance PGA =0.6552 g. Weight * Computed_Rate_Ex 0.186E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00003
#This deaggregation corresponds to Chiou-Youngs 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
8.4	5.05	1.058	0.952	0.106	0.000	0.000	0.000	0.000
14.4	5.05	0.040	0.040	0.000	0.000	0.000	0.000	0.000
8.4	5.20	2.138	1.846	0.291	0.000	0.000	0.000	0.000
14.8	5.21	0.121	0.121	0.000	0.000	0.000	0.000	0.000
8.5	5.40	2.057	1.634	0.423	0.000	0.000	0.000	0.000
15.2	5.40	0.182	0.182	0.000	0.000	0.000	0.000	0.000
8.6	5.60	1.901	1.320	0.581	0.000	0.000	0.000	0.000
15.6	5.60	0.235	0.235	0.000	0.000	0.000	0.000	0.000
8.6	5.80	1.702	1.064	0.638	0.000	0.000	0.000	0.000
15.9	5.80	0.275	0.275	0.000	0.000	0.000	0.000	0.000
7.7	6.01	1.923	0.992	0.932	0.000	0.000	0.000	0.000
15.1	6.02	0.456	0.449	0.007	0.000	0.000	0.000	0.000
23.5	6.01	0.027	0.027	0.000	0.000	0.000	0.000	0.000
7.3	6.20	2.294	1.003	1.291	0.000	0.000	0.000	0.000
14.8	6.20	0.615	0.600	0.015	0.000	0.000	0.000	0.000
23.3	6.21	0.070	0.070	0.000	0.000	0.000	0.000	0.000
7.3	6.40	2.028	0.711	1.317	0.000	0.000	0.000	0.000
14.1	6.40	0.785	0.704	0.081	0.000	0.000	0.000	0.000
23.4	6.41	0.105	0.105	0.000	0.000	0.000	0.000	0.000
5.4	6.60	0.533	0.156	0.372	0.005	0.000	0.000	0.000

12.6	6.60	0.169	0.150	0.019	0.000	0.000	0.000	0.000
21.2	6.61	0.097	0.097	0.000	0.000	0.000	0.000	0.000
6.8	6.79	1.233	0.315	0.875	0.043	0.000	0.000	0.000
12.5	6.80	0.198	0.158	0.040	0.000	0.000	0.000	0.000
21.2	6.77	0.199	0.199	0.000	0.000	0.000	0.000	0.000
7.4	6.97	2.315	0.481	1.525	0.308	0.000	0.000	0.000
12.8	6.96	0.107	0.077	0.029	0.000	0.000	0.000	0.000
21.9	6.98	0.294	0.271	0.023	0.000	0.000	0.000	0.000
7.5	7.17	4.285	0.697	2.462	1.126	0.000	0.000	0.000
27.8	7.23	0.233	0.228	0.004	0.000	0.000	0.000	0.000
7.5	7.36	3.861	0.526	2.267	1.068	0.000	0.000	0.000
26.7	7.41	0.919	0.813	0.106	0.000	0.000	0.000	0.000
7.5	7.57	4.892	0.607	2.894	1.391	0.000	0.000	0.000
26.5	7.59	1.892	1.262	0.631	0.000	0.000	0.000	0.000
7.5	7.76	5.289	0.595	2.956	1.738	0.000	0.000	0.000
26.6	7.80	1.113	0.656	0.456	0.000	0.000	0.000	0.000
52.3	7.77	0.038	0.038	0.000	0.000	0.000	0.000	0.000
7.5	7.98	0.080	0.007	0.038	0.034	0.001	0.000	0.000
26.6	7.99	0.102	0.056	0.046	0.000	0.000	0.000	0.000
52.3	7.96	0.044	0.044	0.000	0.000	0.000	0.000	0.000
52.3	8.16	0.040	0.040	0.000	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 46.0
Mean src-site R= 10.3 km; M= 6.77; eps0= 1.13. Mean calculated for all sources.
Modal src-site R= 7.5 km; M= 7.76; eps0= 0.60 from peak (R,M) bin
MODE R*= 7.5km; M*= 7.75; EPS.INTERVAL: 1 to 2 sigma % CONTRIB.= 2.956

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California A-faults	26.52	11.1	7.43	1.00
CA Compr. crustal gridded	19.52	9.2	5.87	1.31

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Elsinore; Glen Ivy aPriori	0.33	20.9	6.85	2.37	-62.0
Elsinore;T aPriori	2.74	7.5	7.00	1.02	-134.7
Elsinore;GI+T aPriori	5.19	7.5	7.25	0.80	-134.7
Elsinore;T+J+CM aPriori	1.90	7.5	7.64	0.64	-134.7
Elsinore;GI+T+J+CM aPriori	1.99	7.5	7.73	0.61	-134.7
San Jacinto;A+C aPriori	1.17	26.6	7.51	1.99	32.5
San Jacinto;SBV+SJV+A+C aPriori	0.72	26.6	7.78	1.80	34.5
Elsinore;T+J+CM MoBal	1.89	7.5	7.64	0.64	-134.7
Elsinore;GI+T+J+CM MoBal	1.14	7.5	7.72	0.61	-134.7
Elsinore aflt, unsegmented	2.63	7.7	7.43	0.76	-133.9

#*********End of deaggregation corresponding to Chiou-Youngs 2008 *********#

********** Southern California **********

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)
7.57	Elsinore:GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16	195
7.57	Elsinore:T+J	CA	n/a	86	NE	strike slip	0	17	127
7.57	Elsinore:T+J+CM	CA	n/a	85	NE	strike slip	0	16	169
7.57	Elsinore:W+GI+T	CA	n/a	84	NE	strike slip	0	14	124
7.57	Elsinore:W+GI+T+J	CA	n/a	84	NE	strike slip	0	16	199
7.57	Elsinore:W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16	241
7.57	Elsinore:GI+T	CA	5	90	V	strike slip	0	14	78
7.57	Elsinore:GI+T+J	CA	n/a	86	NE	strike slip	0	17	153
7.57	Elsinore:T	CA	5	90	V	strike slip	0	14	52
21.03	Elsinore:W+GI	CA	n/a	81	NE	strike slip	0	14	83
21.03	Elsinore:GI	CA	5	90	V	strike slip	0	13	37
22.68	Elsinore:J	CA	3	84	NE	strike slip	0	19	75
22.68	Elsinore:J+CM	CA	3	84	NE	strike slip	0	17	118
26.57	San Jacinto:A+CC	CA	n/a	90	V	strike slip	0	16	118
26.57	San Jacinto:A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	178
26.57	San Jacinto:A	CA	9	90	V	strike slip	0	17	71
26.57	San Jacinto:A+C	CA	n/a	90	V	strike slip	0	17	118
26.57	San Jacinto:A+CC+B	CA	n/a	90	V	strike	0.1	15	152

						slip			
26.58	San Jacinto:SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
26.58	San Jacinto:SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
26.58	San Jacinto:SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
26.58	San Jacinto:SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
26.58	San Jacinto:SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
26.58	San Jacinto:SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
26.58	San Jacinto:SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196
26.58	San Jacinto:SJV+A	CA	n/a	90	V	strike slip	0	17	89
26.58	San Jacinto:SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
26.58	San Jacinto:SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
28.93	San Jacinto:SJV	CA	18	90	V	strike slip	0	16	43
28.93	San Jacinto:SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
49.95	San Jacinto:CC+B	CA	n/a	90	V	strike slip	0.2	14	77
49.95	San Jacinto:CC	CA	4	90	V	strike slip	0	16	43
49.95	San Jacinto:CC+B+SM	CA	n/a	90	V	strike slip	0.2	14	103
52.13	S. San Andreas:CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
52.13	S. San Andreas:CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
52.13	S. San Andreas:CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
52.13	S. San Andreas:NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
2.13	S. San Andreas:NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
52.13	S. San Andreas:CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512

52.13	S. San Andreas:NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136
52.13	S. San Andreas:SSB+BG	CA	n/a	71		strike slip	0	13	101
52.13	S. San Andreas:NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
52.13	S. San Andreas:PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
52.13	S. San Andreas:PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
52.13	S. San Andreas:SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
52.13	S. San Andreas:BG	CA	n/a	58		strike slip	0	13	56
52.13	S. San Andreas:SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
52.13	S. San Andreas:SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170
52.13	S. San Andreas:BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
52.13	S. San Andreas:BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
52.13	S. San Andreas:BG+CO	CA	n/a	72		strike slip	0.3	12	125
52.36	S. San Andreas:PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
52.36	S. San Andreas:CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
52.36	S. San Andreas:CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
52.36	S. San Andreas:NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213
52.36	S. San Andreas:NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
52.36	S. San Andreas:SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
52.36	S. San Andreas:SSB	CA	16	90	V	strike slip	0	13	43
52.36	S. San Andreas:BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
52.39	Newport-Inglewood (Offshore)	CA	1.5	90	V	strike slip	0	10	66
52.39	San Jacinto:C	CA	14	90	V	strike	0	17	47

						slip			
52.39	Newport Inglewood Connected alt 1	CA	1.3	89		strike slip	0	11	208
52.39	Newport Inglewood Connected alt 2	CA	1.3	90	V	strike slip	0	11	208
55.27	San Jacinto:SBV	CA	6	90	V	strike slip	0	16	45
55.55	Chino, alt 2	CA	1	65	SW	strike slip	0	14	29
56.07	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13	27
56.35	Rose Canyon	CA	1.5	90	V	strike slip	0	8	70
57.71	Elsinore:W	CA	2.5	75	NE	strike slip	0	14	46
59.69	Chino, alt 1	CA	1	50	SW	strike slip	0	9	24
60.30	Earthquake Valley	CA	2	90	V	strike slip	0	19	20
66.07	Pinto Mtn	CA	2.5	90	V	strike slip	0	16	74
69.29	S. San Andreas:NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170
69.29	S. San Andreas:CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
69.29	S. San Andreas:CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
69.29	S. San Andreas:NSB	CA	22	90	V	strike slip	0	13	35
69.29	S. San Andreas:PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
69.29	S. San Andreas:BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
69.29	S. San Andreas:SM+NSB	CA	n/a	90	V	strike slip	0	13	133
77.18	Burnt Mtn	CA	0.6	67	W	strike slip	0	16	21
78.79	Cucamonga	CA	5	45	N	thrust	0	8	28
79.82	Coronado Bank	CA	3	90	V	strike slip	0	9	186
79.82	Palos Verdes Connected	CA	3	90	V	strike slip	0	10	285
80.24	Newport-Inglewood, alt 1	CA	1	88		strike slip	0	15	65

81.68	S. San Andreas:CO	CA	20	90	V	strike slip	0.6	11	69
82.50	Eureka Peak	CA	0.6	90	V	strike slip	0	15	19
83.44	Palos Verdes	CA	3	90	V	strike slip	0	14	99
83.46	Cleghorn	CA	3	90	V	strike slip	0	16	25
83.65	Puente Hills (Coyote Hills)	CA	0.7	26	N	thrust	2.8	15	17
85.65	San Jose	CA	0.5	74	NW	strike slip	0	15	20
88.30	North Frontal (West)	CA	1	49	S	reverse	0	16	50
88.84	San Jacinto:B	CA	4	90	V	strike slip	0.7	13	34
88.84	San Jacinto:B+SM	CA	n/a	90	V	strike slip	0.4	12	61
89.52	Sierra Madre Connected	CA	2	51		reverse	0	14	76
89.52	Sierra Madre	CA	2	53	N	reverse	0	14	57
90.55	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13	114
92.21	North Frontal (East)	CA	0.5	41	S	thrust	0	16	27
92.45	Landers	CA	0.6	90	V	strike slip	0	15	95
92.85	Elsinore:CM	CA	3	82	NE	strike slip	0	13	39
96.88	S. San Andreas:NM+SM	CA	n/a	90	V	strike slip	0	14	134
96.88	S. San Andreas:PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13	342
96.88	S. San Andreas:CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	306
96.88	S. San Andreas:SM	CA	29	90	V	strike slip	0	13	98
96.88	S. San Andreas:CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	243
96.88	S. San Andreas:BB+NM+SM	CA	n/a	90	V	strike slip	0	14	184
97.72	Puente Hills (Santa Fe Springs)	CA	0.7	29	N	thrust	2.8	15	11
98.52	Lenwood-Lockhart-Old Woman Springs	CA	0.9	90	V	strike slip	0	13	145

Search Results

3 of 3 earthquakes in map area.

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 WSW of Oasis, CA** 1937-03-25 16:49:02 (UTC)	6.0 km

Didn't find what you were looking for?

- Check your Settings.
- Which earthquakes are included on the map and list?
- Felt something not shown – report it here.

USGS Design Maps Summary Report

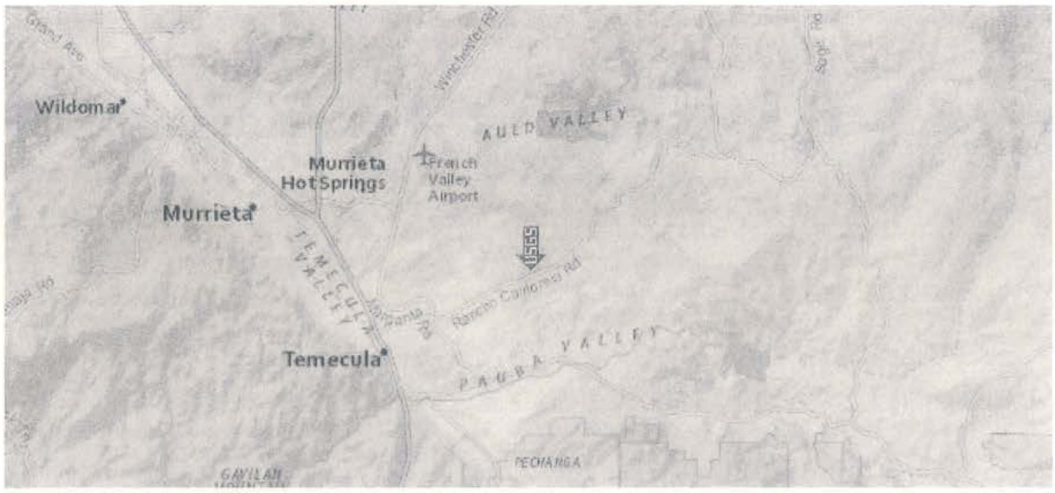
User-Specified Input

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

Site Coordinates 33.53771°N, 117.07518°W

Site Soil Classification Site Class D – "Stiff Soil"

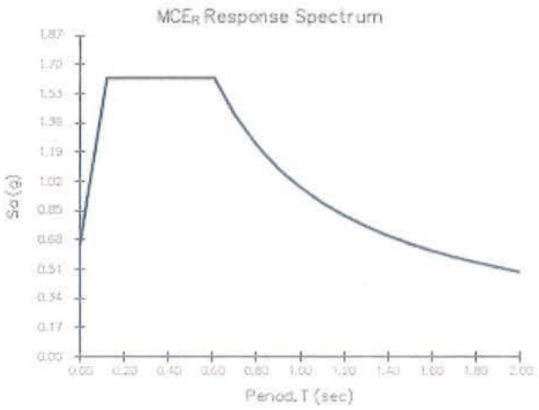
Risk Category I/II/III

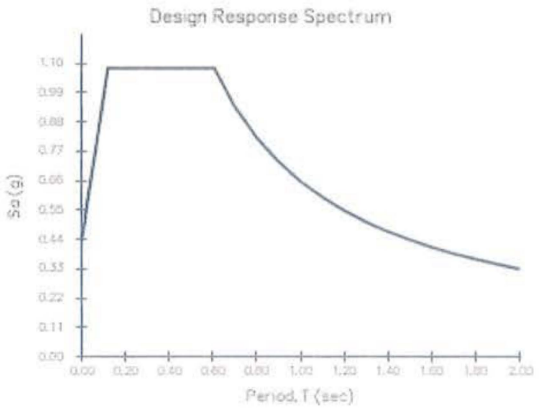


USGS-Provided Output

S_S =	1.622 g	S_{MS} =	1.622 g	S_{DS} =	1.082 g
S_1 =	0.658 g	S_{M1} =	0.988 g	S_{D1} =	0.658 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.

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

USGS Design Maps Detailed Report

ASCE 7-10 Standard (33.53771°N, 117.07518°W)

ite 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 = 1.622 g
From Figure 22-2 [2]	S_1 = 0.658 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	$\overline{v}_s$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

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

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

Table 11.4-1: Site Coefficient F_a

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

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

For Site Class = D and S_S = 1.622 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

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

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

For Site Class = D and S_1 = 0.658 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.622 = 1.622$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.658 = 0.988$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

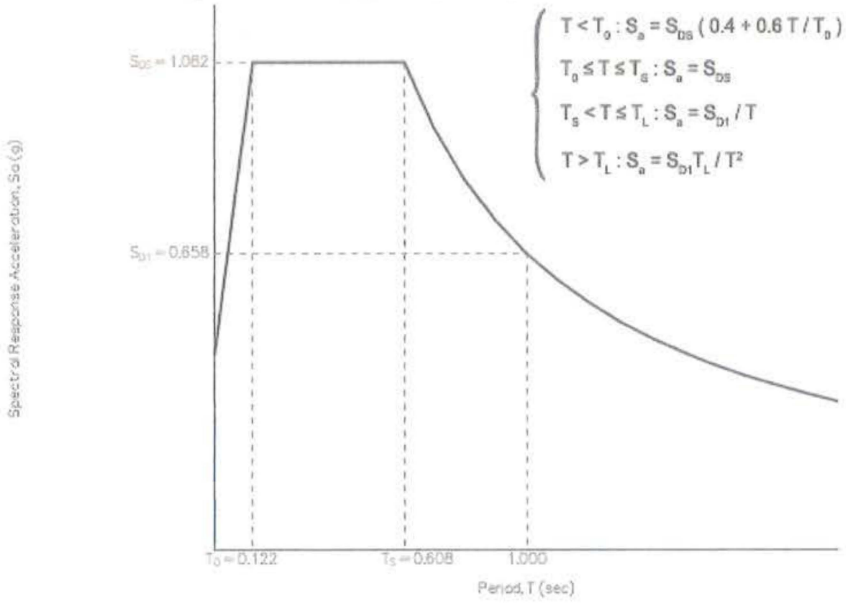
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.622 = 1.082$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.988 = 0.658$ g

Section 11.4.5 — Design Response Spectrum

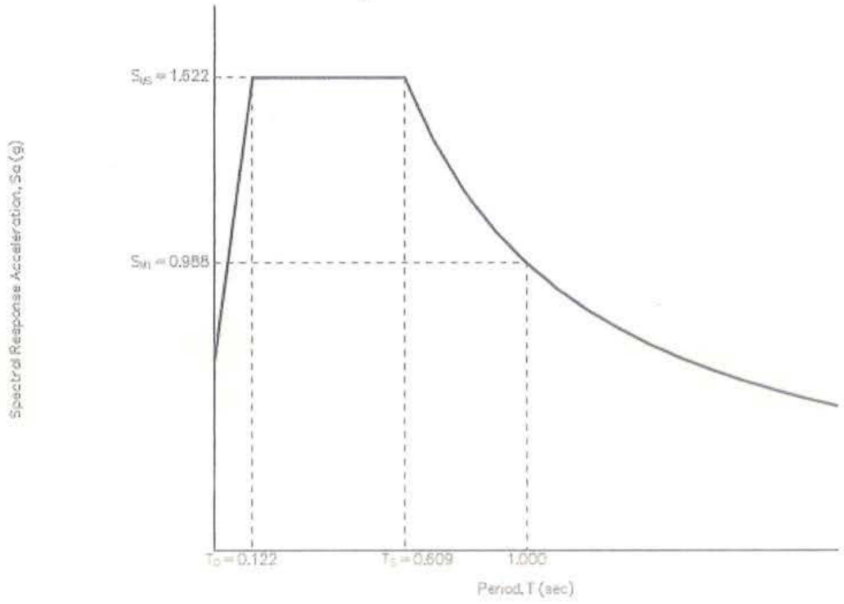
From Figure 22-12 [3] $T_L = 8$ seconds

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 = 0.635

Equation (11.8-1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.635 = 0.635$ g

Table 11.8-1: Site Coefficient F_{PGA}

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

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

For Site Class = D and PGA = 0.635 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} = 0.993

From Figure 22-18 [6] C_{R1} = 0.983

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} = 1.082 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} = 0.658 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for uildings 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

INTERPRETIVE REPORT
FOR INFILTRATION SYSTEM DESIGN,
PROPOSED 171654-12A, APN 943-210-012,
LOT NUMBER 6 OF PARCEL MAP 14/93,
LOCATED AT 39730 CALLE CONTENTO,
TEMECULA AREA, RIVERSIDE COUNTY,
CALIFORNIA

PROJECT NO. 171654-12A

ISSUED: MARCH 3, 2017

Earth Strata Geotechnical Services, Inc.
Geotechnical, Environmental and Materials Testing Consultants

March 3, 2017

Project No. 171654-12A

Mr. Reza James
P.O. Box 182
Temecula, CA 92593

Subject: **Double Ring Infiltration Testing for Water Quality Treatment Areas, Assessor Parcel Number 943-210-012, Lot Number 6 of Parcel Map 14/93, Located at 39730 Calle Contento, Temecula, Riverside County, California**

Earth Strata Geotechnical Services is pleased to present this infiltration feasibility report for the proposed commercial development located at 39730 Calle Contento, Assessor's Parcel Number 943-210-012, in the City of Temecula, 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 water quality management plan (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 39730 Calle Contento, Temecula, Riverside County, California (see Figure 1). The subject property consists of a 19.43-acre parcel of undeveloped land with relatively flat terrain. The property is bounded by vineyards. The subject property is underlain by Quaternary Alluvial Channel Deposits (Qya).

PROPOSED CONSTRUCTION

Based on plans provided by you, the proposed development as illustrated on the conceptual grading plans will consist of a commercial development complete with interior streets, utilities, driveways, and two (2) onsite water quality management systems.

SUBSURFACE EXPLORATION AND INFILTRATION TESTING

SUBSURFACE EXPLORATION

Subsurface exploration of the subject site consisted of one exploratory boring within the proposed basin to depths of 15 feet, conducted on February 28, 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 undocumented Fill and Old Fan Deposits and Granitic Bedrock. 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 Alluvial Channel Deposits (map symbol Qya): Quaternary Alluvial Fan 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 dense.

GROUNDWATER

Groundwater was not observed within the exploratory boringsexcavated to a depth of 15 feet.

INFILTRATION TESTING

The double ring infiltrometer test method was utilized to perform a total of two (2) infiltration tests on February 15, 2017 to evaluate near surface infiltration rates in order to estimate the amount of storm water runoff that can infiltrate into the onsite WQMP areas. The infiltration tests were performed in general accordance with the requirements of double ring infiltration testing, ASTM D3385-03 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 2 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.

(4.05+1.35)/2=2.7 in/hr

INFILTRATION TEST SUMMARY

TEST NUMBER	INFILTRATION HOLE DEPTH (ft.)	INFILTRATION RATE (in/hr)	DESCRIPTION
DR-1	2	4.05	Silty SAND
DR-2	2	1.35	Silty SAND with Clay

The infiltration test rates ranged from 1.35 to 4.05 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 that the water quality treatment areas can be designed for an average insitu infiltration rate of 2.7 inches per hour.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **Mr. Reza James** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth Strata 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 not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

Earth Strata 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 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/jmr

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)*

FIGURE 1

VICINITY MAP

APPENDIX A

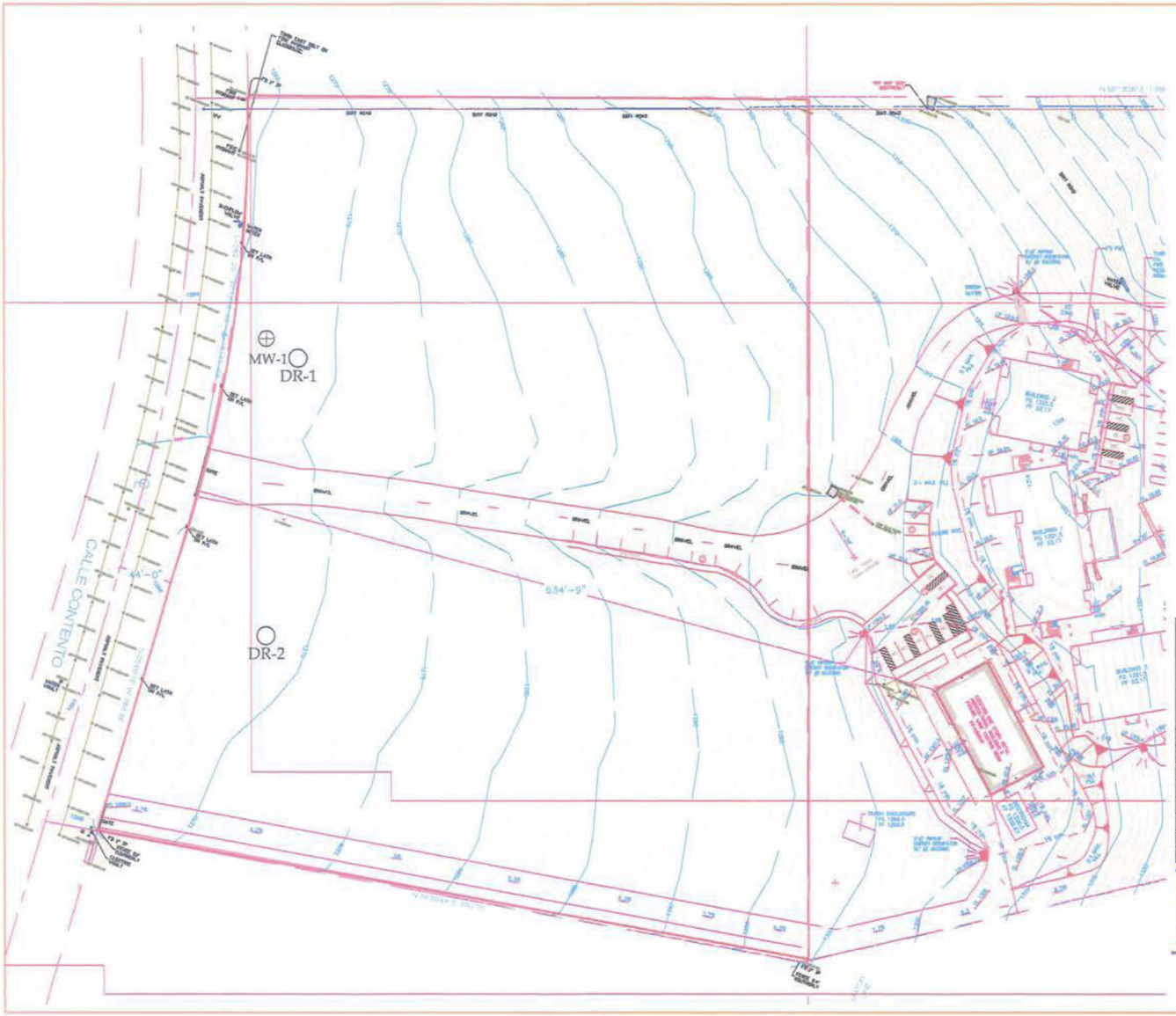
EXPLORATORY LOGS

APPENDIX B

INFILTRATION TEST SHEETS

Appendix 4: Historical Site Conditions

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



LEGEND

Locations are Approximate

Symbols

- Limits of Report
- DR-2 - Double Ring Test Location
- MW-1 - Montering Well Location

INFILTRATION LOCATION MAP

LOCATED AT 39730 CALLE CONTENTO
CITY OF TEMECULA, RIVERSIDE COUNTY, CALIFORNIA
APN 943-210-012

PROJECT	CALLE CONTENTO		
CLIENT	MR. REZA JAMES		
PROJECT NO.	171654-12A		
DATE	MARCH 2017		
SCALE	1:80		
DWG XREFS			
REVISION			
DRAWN BY	JDG	PLATE	1 OF 1

ESGS INC.
Geotechnical, Environmental, and Materials Testing Consultants

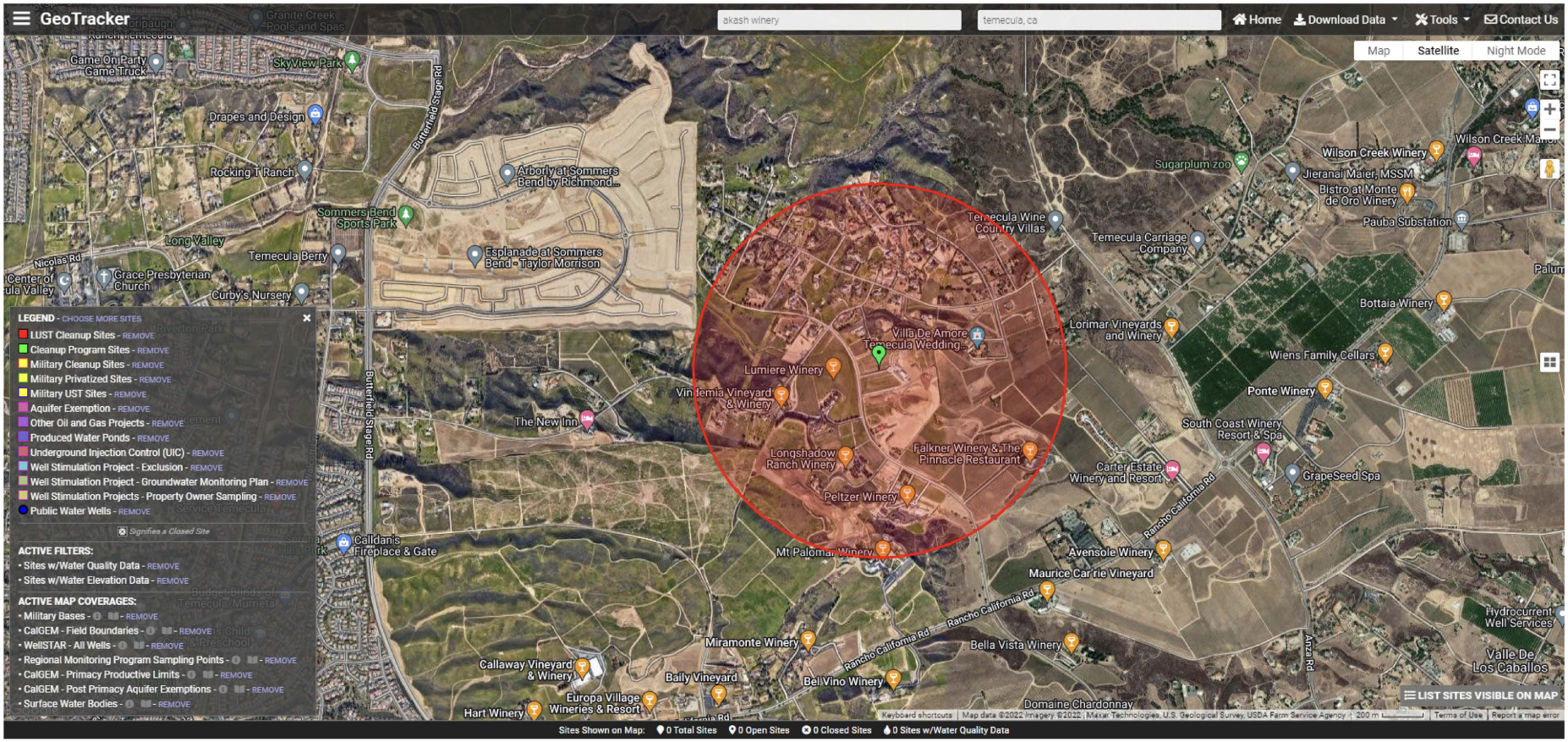
Appendix 4: Historical Site Conditions

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.


GeoTracker
akash winery
temecula, ca
Home
Download Data
Tools
Contact Us
Map
Satellite
Night Mode
LEGEND - CHOOSE MORE SITES
LUST Cleanup Sites - REMOVE
Cleanup Program Sites - REMOVE
Military Cleanup Sites - REMOVE
Military Privatized Sites - REMOVE
Military UST Sites - REMOVE
Aquifer Exemption - REMOVE
Other Oil and Gas Projects - REMOVE
Produced Water Ponds - REMOVE
Underground Injection Control (UIC) - REMOVE
Well Stimulation Project - Exclusion - REMOVE
Well Stimulation Project - Groundwater Monitoring Plan - REMOVE
Well Stimulation Projects - Property Owner Sampling - REMOVE
Public Water Wells - REMOVE
Signifies a Closed Site
ACTIVE FILTERS:
• Sites w/Water Quality Data - REMOVE
• Sites w/Water Elevation Data - REMOVE
ACTIVE MAP COVERAGES:
• Military Bases - REMOVE
• CalGEM - Field Boundaries - REMOVE
• WellSTAR - All Wells - REMOVE
• Regional Monitoring Program Sampling Points - REMOVE
• CalGEM - Primacy Productive Limits - REMOVE
• CalGEM - Post Primacy Aquifer Exemptions - REMOVE
• Surface Water Bodies - REMOVE
Game On Party Game Truck
SkyView Park
Granite Creek Pools and Spas
Drapes and Design
Rocking T Ranch
Butterfield Stage Rd
Arborly at Sommers Bend by Richmond...
Sommers Bend Sports Park
Long Valley
Temecula Berry
Esplanade at Sommers Bend - Taylor Morrison
Nicolas Rd
Grace Presbyterian Church
Curby's Nursery
Temecula Wine Country Villas
Temecula Carriage Company
Sugarplum zoo
Wilson Creek Winery
Jieranai Maier, MSSM
Bistro at Monte de Oro Winery
Pauba Substation
Villa De Amore Temecula Wedding...
Lumiere Winery
Vintemia Vineyard & Winery
The New Inn
Longshadow Ranch Winery
Falkner Winery & The Pinnacle Restaurant
Peltzer Winery
Mt Palomar Winery
Calldan's Fireplace & Gate
Lorimar Vineyards and Winery
Bottaia Winery
Wiens Family Cellars
Ponte Winery
South Coast Winery Resort & Spa
Carter Estate Winery and Resort
GrapeSeed Spa
Rancho California Rd
Avensole Winery
Maurice Carrie Vineyard
Hydrocurrent Well Services
Miramonte Winery
Bella Vista Winery
Callaway Vineyard & Winery
Baily Vineyard
Bel Vino Winery
Europa Village Wineries & Resort
Hart Winery
Domaine Chardonnay
Anza Rd
Valle De Los Caballos
LIST SITES VISIBLE ON MAP
Keyboard shortcuts
Map data ©2022 Imagery ©2022, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency
200 m
Terms of Use
Report a map error
Sites Shown on Map:
0 Total Sites
0 Open Sites
0 Closed Sites
0 Sites w/Water Quality Data

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.

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.

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	DSB Engineering	Date	5/4/2023
Designed by	Dino San Buenaventura	County/City Case No	County of Riverside
Company Project Number/Name			
Drainage Area Number/Name	DMA 1A		

Enter the Area Tributary to this Feature A_T = 0.28 acres

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

Site Location

Township

Range

Section

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.70

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

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 = 0.62 (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} = 630 ft^3

Notes: Drains to BMP 1A

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	DSB Engineering	Date	5/4/2023
Designed by	Dino San Buenaventura	County/City Case No	County of Riverside
Company Project Number/Name			
Drainage Area Number/Name	DMA 2A		

Enter the Area Tributary to this Feature A_T = 3.33 acres

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

Site Location

Township

Range

Section

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.70

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.12

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 = 0.12

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.09 (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} = 1,088 ft^3

Notes: Drains to BMP 2A

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	DSB Engineering	Date	5/4/2023
Designed by	Dino San Buenaventura	County/City Case No	County of Riverside
Company Project Number/Name			
Drainage Area Number/Name	DMA 3A		

Enter the Area Tributary to this Feature A_T = 0.97 acres

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

Site Location

Township

Range

Section

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.70

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.65

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 = 0.45

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$

V_u = 0.31 (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} = 1,092 ft^3

Notes: Drains to BMP 3A

Project: **Akash Winery - BMP 1A**



Chamber Model -	MC-4500	
Units -	Imperial	
Number of Chambers -	36	
Number of End Caps -	8	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	0.00	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	9	in

Area of system - 1741 sf Min. Area - 1587 sf min. area

StormTech MC-4500 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Single End Cap *(cubic feet)*	Incremental Chambers *(cubic feet)*	Incremental End Cap *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch, EC and Stone *(cubic feet)*	Cumulative System (cubic feet)	Elevation (feet)
81	0.00	0.00	0.00	0.00	58.02	58.02	7190.08	6.75
80	0.00	0.00	0.00	0.00	58.02	58.02	7132.06	6.67
79	0.00	0.00	0.00	0.00	58.02	58.02	7074.04	6.58
78	0.00	0.00	0.00	0.00	58.02	58.02	7016.02	6.50
77	0.00	0.00	0.00	0.00	58.02	58.02	6958.00	6.42
76	0.00	0.00	0.00	0.00	58.02	58.02	6899.98	6.33
75	0.00	0.00	0.00	0.00	58.02	58.02	6841.95	6.25
74	0.00	0.00	0.00	0.00	58.02	58.02	6783.93	6.17
73	0.00	0.00	0.00	0.00	58.02	58.02	6725.91	6.08
72	0.00	0.00	0.00	0.00	58.02	58.02	6667.89	6.00
71	0.00	0.00	0.00	0.00	58.02	58.02	6609.87	5.92
70	0.00	0.00	0.00	0.00	58.02	58.02	6551.85	5.83
69	0.04	0.01	1.47	0.10	57.39	58.97	6493.83	5.75
68	0.12	0.03	4.18	0.27	56.24	60.69	6434.86	5.67
67	0.16	0.05	5.93	0.41	55.48	61.83	6374.17	5.58
66	0.21	0.07	7.51	0.53	54.80	62.85	6312.34	5.50
65	0.27	0.08	9.66	0.66	53.89	64.22	6249.49	5.42
64	0.45	0.11	16.30	0.84	51.16	68.31	6185.28	5.33
63	0.67	0.13	23.95	1.06	48.02	73.03	6116.97	5.25
62	0.80	0.16	28.76	1.29	46.00	76.05	6043.94	5.17
61	0.91	0.19	32.69	1.51	44.34	78.54	5967.89	5.08
60	1.00	0.22	36.10	1.75	42.88	80.73	5889.35	5.00
59	1.09	0.25	39.14	1.98	41.57	82.69	5808.61	4.92
58	1.16	0.28	41.89	2.20	40.39	84.47	5725.92	4.83
57	1.23	0.30	44.42	2.41	39.29	86.12	5641.45	4.75
56	1.30	0.33	46.79	2.62	38.26	87.67	5555.32	4.67
55	1.36	0.35	49.00	2.84	37.29	89.12	5467.65	4.58
54	1.42	0.38	51.07	3.07	36.36	90.51	5378.53	4.50
53	1.47	0.41	53.04	3.27	35.50	91.81	5288.03	4.42
52	1.53	0.44	54.91	3.53	34.65	93.08	5196.22	4.33
51	1.57	0.47	56.68	3.75	33.85	94.28	5103.14	4.25
50	1.62	0.50	58.37	3.96	33.09	95.42	5008.86	4.17
49	1.67	0.52	59.98	4.17	32.36	96.51	4913.44	4.08
48	1.71	0.54	61.53	4.36	31.67	97.55	4816.92	4.00
47	1.75	0.57	63.00	4.53	31.01	98.54	4719.37	3.92
46	1.79	0.59	64.41	4.71	30.37	99.50	4620.83	3.83
45	1.83	0.61	65.78	4.88	29.76	100.42	4521.33	3.75
44	1.86	0.63	67.08	5.06	29.16	101.31	4420.92	3.67
43	1.90	0.64	68.34	5.14	28.63	102.11	4319.61	3.58
42	1.93	0.68	69.55	5.42	28.04	103.00	4217.50	3.50
41	1.96	0.70	70.71	5.60	27.50	103.80	4114.50	3.42
40	2.00	0.72	71.82	5.78	26.98	104.58	4010.69	3.33
39	2.03	0.74	72.90	5.95	26.48	105.33	3906.11	3.25
38	2.05	0.76	73.94	6.12	26.00	106.05	3800.78	3.17
37	2.08	0.79	74.93	6.28	25.53	106.75	3694.73	3.08
36	2.11	0.80	75.89	6.42	25.10	107.41	3587.97	3.00
35	2.13	0.82	76.82	6.56	24.67	108.05	3480.57	2.92
34	2.16	0.84	77.71	6.71	24.25	108.67	3372.52	2.83
33	2.18	0.85	78.57	6.81	23.87	109.25	3263.84	2.75
32	2.21	0.86	79.40	6.88	23.51	109.79	3154.59	2.67
31	2.23	0.89	80.20	7.12	23.10	110.41	3044.81	2.58
30	2.25	0.90	80.96	7.23	22.74	110.94	2934.40	2.50
29	2.27	0.92	81.70	7.34	22.41	111.44	2823.46	2.42
28	2.29	0.92	82.40	7.36	22.12	111.88	2712.02	2.33
27	2.31	0.94	83.08	7.55	21.77	112.40	2600.14	2.25
26	2.33	0.96	83.73	7.65	21.47	112.85	2487.74	2.17
25	2.34	0.97	84.36	7.75	21.18	113.29	2374.89	2.08
24	2.36	0.98	84.96	7.85	20.90	113.71	2261.60	2.00
23	2.38	0.97	85.53	7.77	20.70	114.00	2147.90	1.92
22	2.39	1.00	86.08	8.03	20.38	114.48	2033.90	1.83
21	2.41	1.01	86.60	8.09	20.15	114.83	1919.42	1.75
20	2.42	1.02	87.09	8.16	19.92	115.18	1804.58	1.67
19	2.43	1.03	87.57	8.24	19.70	115.51	1689.41	1.58
18	2.44	1.04	88.01	8.31	19.49	115.82	1573.90	1.50
17	2.46	1.05	88.44	8.37	19.30	116.11	1458.09	1.42
16	2.47	1.05	88.84	8.43	19.11	116.38	1341.98	1.33
15	2.48	1.05	89.22	8.40	18.97	116.59	1225.59	1.25
14	2.49	1.06	89.58	8.45	18.81	116.84	1109.00	1.17
13	2.50	1.08	89.92	8.60	18.61	117.13	992.16	1.08
12	2.51	1.08	90.23	8.66	18.46	117.36	875.03	1.00
11	2.51	1.09	90.53	8.70	18.33	117.56	757.67	0.92
10	2.53	1.11	90.97	8.85	18.09	117.91	640.11	0.83
9	0.00	0.00	0.00	0.00	58.02	58.02	522.19	0.75
8	0.00	0.00	0.00	0.00	58.02	58.02	464.17	0.67
7	0.00	0.00	0.00	0.00	58.02	58.02	406.15	0.58
6	0.00	0.00	0.00	0.00	58.02	58.02	348.13	0.50
5	0.00	0.00	0.00	0.00	58.02	58.02	290.11	0.42
4	0.00	0.00	0.00	0.00	58.02	58.02	232.09	0.33
3	0.00	0.00	0.00	0.00	58.02	58.02	174.06	0.25
2	0.00	0.00	0.00	0.00	58.02	58.02	116.04	0.17
1	0.00	0.00	0.00	0.00	58.02	58.02	58.02	0.08

Project: **Akash Winery - BMP 2A**



Chamber Model -	MC-4500	
Units -	Imperial	
Number of Chambers -	36	
Number of End Caps -	8	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	0.00	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	9	in

Area of system - 1739 sf Min. Area - 1587 sf min. area

StormTech MC-4500 Cumulative Storage Volumes

Height of System (inches)	Incremental Single Chamber (cubic feet)	Incremental Single End Cap (cubic feet)	Incremental Chambers (cubic feet)	Incremental End Cap (cubic feet)	Incremental Stone (cubic feet)	Incremental Ch, EC and Stone (cubic feet)	Cumulative System (cubic feet)	Elevation (feet)
81	0.00	0.00	0.00	0.00	57.97	57.97	7185.65	6.75
80	0.00	0.00	0.00	0.00	57.97	57.97	7127.69	6.67
79	0.00	0.00	0.00	0.00	57.97	57.97	7069.72	6.58
78	0.00	0.00	0.00	0.00	57.97	57.97	7011.75	6.50
77	0.00	0.00	0.00	0.00	57.97	57.97	6953.79	6.42
76	0.00	0.00	0.00	0.00	57.97	57.97	6895.82	6.33
75	0.00	0.00	0.00	0.00	57.97	57.97	6837.85	6.25
74	0.00	0.00	0.00	0.00	57.97	57.97	6779.89	6.17
73	0.00	0.00	0.00	0.00	57.97	57.97	6721.92	6.08
72	0.00	0.00	0.00	0.00	57.97	57.97	6663.95	6.00
71	0.00	0.00	0.00	0.00	57.97	57.97	6605.99	5.92
70	0.00	0.00	0.00	0.00	57.97	57.97	6548.02	5.83
69	0.04	0.01	1.47	0.10	57.34	58.91	6490.05	5.75
68	0.12	0.03	4.18	0.27	56.19	60.64	6431.14	5.67
67	0.16	0.05	5.93	0.41	55.43	61.77	6370.50	5.58
66	0.21	0.07	7.51	0.53	54.75	62.79	6308.73	5.50
65	0.27	0.08	9.66	0.66	53.84	64.16	6245.94	5.42
64	0.45	0.11	16.30	0.84	51.11	68.25	6181.78	5.33
63	0.67	0.13	23.95	1.06	47.96	72.97	6113.52	5.25
62	0.80	0.16	28.76	1.29	45.95	76.00	6040.55	5.17
61	0.91	0.19	32.69	1.51	44.29	78.49	5964.55	5.08
60	1.00	0.22	36.10	1.75	42.83	80.68	5886.07	5.00
59	1.09	0.25	39.14	1.98	41.52	82.64	5805.39	4.92
58	1.16	0.28	41.89	2.20	40.33	84.42	5722.75	4.83
57	1.23	0.30	44.42	2.41	39.23	86.07	5638.33	4.75
56	1.30	0.33	46.79	2.62	38.20	87.61	5552.26	4.67
55	1.36	0.35	49.00	2.84	37.23	89.07	5464.65	4.58
54	1.42	0.38	51.07	3.07	36.31	90.45	5375.58	4.50
53	1.47	0.41	53.04	3.27	35.44	91.75	5285.13	4.42
52	1.53	0.44	54.91	3.53	34.59	93.03	5193.37	4.33
51	1.57	0.47	56.68	3.75	33.79	94.23	5100.35	4.25
50	1.62	0.50	58.37	3.96	33.03	95.37	5006.12	4.17
49	1.67	0.52	59.98	4.17	32.31	96.46	4910.76	4.08
48	1.71	0.54	61.53	4.36	31.61	97.50	4814.30	4.00
47	1.75	0.57	63.00	4.53	30.95	98.49	4716.80	3.92
46	1.79	0.59	64.41	4.71	30.32	99.44	4618.31	3.83
45	1.83	0.61	65.78	4.88	29.70	100.36	4518.87	3.75
44	1.86	0.63	67.08	5.06	29.11	101.25	4418.51	3.67
43	1.90	0.64	68.34	5.14	28.57	102.06	4317.26	3.58
42	1.93	0.68	69.55	5.42	27.98	102.95	4215.20	3.50
41	1.96	0.70	70.71	5.60	27.44	103.75	4112.26	3.42
40	2.00	0.72	71.82	5.78	26.93	104.53	4008.51	3.33
39	2.03	0.74	72.90	5.95	26.43	105.28	3903.98	3.25
38	2.05	0.76	73.94	6.12	25.95	106.00	3798.70	3.17
37	2.08	0.79	74.93	6.28	25.48	106.70	3692.70	3.08
36	2.11	0.80	75.89	6.42	25.04	107.35	3586.01	3.00
35	2.13	0.82	76.82	6.56	24.62	107.99	3478.65	2.92
34	2.16	0.84	77.71	6.71	24.20	108.62	3370.66	2.83
33	2.18	0.85	78.57	6.81	23.81	109.20	3262.04	2.75
32	2.21	0.86	79.40	6.88	23.46	109.73	3152.84	2.67
31	2.23	0.89	80.20	7.12	23.04	110.35	3043.11	2.58
30	2.25	0.90	80.96	7.23	22.69	110.88	2932.76	2.50
29	2.27	0.92	81.70	7.34	22.35	111.39	2821.88	2.42
28	2.29	0.92	82.40	7.36	22.06	111.82	2710.49	2.33
27	2.31	0.94	83.08	7.55	21.71	112.34	2598.67	2.25
26	2.33	0.96	83.73	7.65	21.41	112.80	2486.32	2.17
25	2.34	0.97	84.36	7.75	21.12	113.23	2373.52	2.08
24	2.36	0.98	84.96	7.85	20.84	113.65	2260.29	2.00
23	2.38	0.97	85.53	7.77	20.65	113.95	2146.64	1.92
22	2.39	1.00	86.08	8.03	20.33	114.43	2032.70	1.83
21	2.41	1.01	86.60	8.09	20.09	114.78	1918.27	1.75
20	2.42	1.02	87.09	8.16	19.86	115.12	1803.49	1.67
19	2.43	1.03	87.57	8.24	19.64	115.45	1688.37	1.58
18	2.44	1.04	88.01	8.31	19.44	115.76	1572.92	1.50
17	2.46	1.05	88.44	8.37	19.24	116.05	1457.16	1.42
16	2.47	1.05	88.84	8.43	19.06	116.33	1341.10	1.33
15	2.48	1.05	89.22	8.40	18.92	116.54	1224.77	1.25
14	2.49	1.06	89.58	8.45	18.75	116.78	1108.23	1.17
13	2.50	1.08	89.92	8.60	18.56	117.08	991.45	1.08
12	2.51	1.08	90.23	8.66	18.41	117.30	874.37	1.00
11	2.51	1.09	90.53	8.70	18.27	117.51	757.07	0.92
10	2.53	1.11	90.97	8.85	18.04	117.86	639.56	0.83
9	0.00	0.00	0.00	0.00	57.97	57.97	521.70	0.75
8	0.00	0.00	0.00	0.00	57.97	57.97	463.73	0.67
7	0.00	0.00	0.00	0.00	57.97	57.97	405.77	0.58
6	0.00	0.00	0.00	0.00	57.97	57.97	347.80	0.50
5	0.00	0.00	0.00	0.00	57.97	57.97	289.83	0.42
4	0.00	0.00	0.00	0.00	57.97	57.97	231.87	0.33
3	0.00	0.00	0.00	0.00	57.97	57.97	173.90	0.25
2	0.00	0.00	0.00	0.00	57.97	57.97	115.93	0.17
1	0.00	0.00	0.00	0.00	57.97	57.97	57.97	0.08

Project: **Akash Winery - BMP 3A**



Chamber Model -	MC-4500	
Units -	Imperial	
Number of Chambers -	44	
Number of End Caps -	4	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	0.00	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	9	in

Area of system - 1987 sf Min. Area - 1744 sf min. area

StormTech MC-4500 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Single End Cap *(cubic feet)*	Incremental Chambers *(cubic feet)*	Incremental End Cap *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch, EC and Stone *(cubic feet)*	Cumulative System (cubic feet)	Elevation (feet)
81	0.00	0.00	0.00	0.00	66.25	66.25	8272.54	6.75
80	0.00	0.00	0.00	0.00	66.25	66.25	8206.29	6.67
79	0.00	0.00	0.00	0.00	66.25	66.25	8140.05	6.58
78	0.00	0.00	0.00	0.00	66.25	66.25	8073.80	6.50
77	0.00	0.00	0.00	0.00	66.25	66.25	8007.56	6.42
76	0.00	0.00	0.00	0.00	66.25	66.25	7941.31	6.33
75	0.00	0.00	0.00	0.00	66.25	66.25	7875.07	6.25
74	0.00	0.00	0.00	0.00	66.25	66.25	7808.82	6.17
73	0.00	0.00	0.00	0.00	66.25	66.25	7742.57	6.08
72	0.00	0.00	0.00	0.00	66.25	66.25	7676.33	6.00
71	0.00	0.00	0.00	0.00	66.25	66.25	7610.08	5.92
70	0.00	0.00	0.00	0.00	66.25	66.25	7543.84	5.83
69	0.04	0.01	1.80	0.05	65.50	67.36	7477.59	5.75
68	0.12	0.03	5.11	0.14	64.15	69.39	7410.24	5.67
67	0.16	0.05	7.25	0.21	63.26	70.72	7340.85	5.58
66	0.21	0.07	9.18	0.26	62.47	71.91	7270.13	5.50
65	0.27	0.08	11.81	0.33	61.39	73.53	7198.21	5.42
64	0.45	0.11	19.92	0.42	58.11	78.45	7124.68	5.33
63	0.67	0.13	29.27	0.53	54.32	84.13	7046.23	5.25
62	0.80	0.16	35.16	0.64	51.92	87.73	6962.11	5.17
61	0.91	0.19	39.96	0.75	49.96	90.67	6874.38	5.08
60	1.00	0.22	44.13	0.87	48.24	93.25	6783.71	5.00
59	1.09	0.25	47.84	0.99	46.71	95.54	6690.46	4.92
58	1.16	0.28	51.19	1.10	45.33	97.62	6594.92	4.83
57	1.23	0.30	54.30	1.21	44.04	99.55	6497.30	4.75
56	1.30	0.33	57.19	1.31	42.85	101.34	6397.75	4.67
55	1.36	0.35	59.89	1.42	41.72	103.03	6296.41	4.58
54	1.42	0.38	62.42	1.53	40.66	104.62	6193.38	4.50
53	1.47	0.41	64.83	1.64	39.66	106.12	6088.76	4.42
52	1.53	0.44	67.11	1.76	38.70	107.57	5982.64	4.33
51	1.57	0.47	69.28	1.88	37.78	108.94	5875.07	4.25
50	1.62	0.50	71.34	1.98	36.92	110.24	5766.13	4.17
49	1.67	0.52	73.31	2.08	36.09	111.48	5655.89	4.08
48	1.71	0.54	75.20	2.18	35.29	112.67	5544.41	4.00
47	1.75	0.57	77.00	2.27	34.54	113.81	5431.74	3.92
46	1.79	0.59	78.73	2.35	33.81	114.89	5317.93	3.83
45	1.83	0.61	80.40	2.44	33.11	115.95	5203.04	3.75
44	1.86	0.63	81.99	2.53	32.44	116.96	5087.09	3.67
43	1.90	0.64	83.53	2.57	31.81	117.90	4970.13	3.58
42	1.93	0.68	85.00	2.71	31.16	118.87	4852.23	3.50
41	1.96	0.70	86.42	2.80	30.56	119.78	4733.36	3.42
40	2.00	0.72	87.79	2.89	29.98	120.65	4613.58	3.33
39	2.03	0.74	89.10	2.97	29.42	121.49	4492.93	3.25
38	2.05	0.76	90.37	3.06	28.88	122.30	4371.44	3.17
37	2.08	0.79	91.59	3.14	28.35	123.08	4249.14	3.08
36	2.11	0.80	92.76	3.21	27.86	123.82	4126.06	3.00
35	2.13	0.82	93.89	3.28	27.38	124.55	4002.23	2.92
34	2.16	0.84	94.98	3.35	26.91	125.25	3877.69	2.83
33	2.18	0.85	96.03	3.41	26.47	125.91	3752.44	2.75
32	2.21	0.86	97.04	3.44	26.05	126.53	3626.53	2.67
31	2.23	0.89	98.02	3.56	25.62	127.19	3500.00	2.58
30	2.25	0.90	98.95	3.62	25.22	127.79	3372.81	2.50
29	2.27	0.92	99.85	3.67	24.84	128.36	3245.02	2.42
28	2.29	0.92	100.72	3.68	24.49	128.88	3116.67	2.33
27	2.31	0.94	101.55	3.77	24.12	129.44	2987.78	2.25
26	2.33	0.96	102.34	3.83	23.78	129.95	2858.35	2.17
25	2.34	0.97	103.10	3.87	23.45	130.43	2728.40	2.08
24	2.36	0.98	103.84	3.93	23.14	130.90	2597.97	2.00
23	2.38	0.97	104.54	3.88	22.88	131.30	2467.07	1.92
22	2.39	1.00	105.20	4.01	22.56	131.77	2335.77	1.83
21	2.41	1.01	105.84	4.04	22.29	132.18	2204.00	1.75
20	2.42	1.02	106.45	4.08	22.03	132.56	2071.82	1.67
19	2.43	1.03	107.02	4.12	21.79	132.93	1939.26	1.58
18	2.44	1.04	107.57	4.15	21.55	133.28	1806.32	1.50
17	2.46	1.05	108.09	4.19	21.33	133.61	1673.04	1.42
16	2.47	1.05	108.58	4.22	21.13	133.92	1539.43	1.33
15	2.48	1.05	109.04	4.20	20.95	134.19	1405.51	1.25
14	2.49	1.06	109.48	4.23	20.76	134.47	1271.31	1.17
13	2.50	1.08	109.90	4.30	20.57	134.77	1136.84	1.08
12	2.51	1.08	110.29	4.33	20.40	135.02	1002.08	1.00
11	2.51	1.09	110.65	4.35	20.25	135.25	867.06	0.92
10	2.53	1.11	111.18	4.43	20.00	135.61	731.82	0.83
9	0.00	0.00	0.00	0.00	66.25	66.25	596.21	0.75
8	0.00	0.00	0.00	0.00	66.25	66.25	529.96	0.67
7	0.00	0.00	0.00	0.00	66.25	66.25	463.72	0.58
6	0.00	0.00	0.00	0.00	66.25	66.25	397.47	0.50
5	0.00	0.00	0.00	0.00	66.25	66.25	331.23	0.42
4	0.00	0.00	0.00	0.00	66.25	66.25	264.98	0.33
3	0.00	0.00	0.00	0.00	66.25	66.25	198.74	0.25
2	0.00	0.00	0.00	0.00	66.25	66.25	132.49	0.17
1	0.00	0.00	0.00	0.00	66.25	66.25	66.25	0.08

Infiltration Basin - Design Procedure (Rev. 03-2012)	BMP ID 1A	Legend:	Required Entries / Calculated Cells

Company Name: DSB Engineering — Date: 5/5/2023

Designed by: Dino San Buenaventura — County/City Case No.:

Design Volume

a) Tributary area (BMP subarea)	A_T =	0.28	acres
b) Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	630	ft^3

Maximum Depth

a) Measured infiltration rate	I =	2.7	in/hr
b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook)	FS =	3	
c) Calculate D_1 $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$	D_1 =	5.4	ft
d) Enter the depth of freeboard (at least 1 ft)		1	ft
e) Enter depth to historic high ground water (measured from **top** of basin)		15	ft
f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin)		15	ft
g) D_2 is the smaller of: Depth to groundwater - (10 ft + freeboard) and Depth to impermeable layer - (5 ft + freeboard)	D_2 =	4.0	ft
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet	D_{MAX} =	4.0	ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1)	z =	4	:1
b) Proposed basin depth (excluding freeboard)	d_B =	4	ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)	A_S =	158	ft^2
d) Proposed Design Surface Area	A_D =	1741	ft^2

Forebay

a) Forebay volume (minimum 0.5% V_{BMP})	Volume =	3	ft^3
b) Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =	1	ft
c) Forebay surface area (minimum)	Area =	3	ft^2
d) Full height notch-type weir	Width (W) =	1.5	in

Notes:

Infiltration Basin - Design Procedure (Rev. 03-2012)	BMP ID 2A	Legend:	Required Entries / Calculated Cells

Company Name: DSB Engineering — Date: 5/5/2023

Designed by: Dino San Buenaventura — County/City Case No.:

Design Volume

a) Tributary area (BMP subarea)	A_T =	3.33	acres
b) Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,088	ft^3

Maximum Depth

a) Measured infiltration rate	I =	2.7	in/hr
b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook)	FS =	3	
c) Calculate D_1 $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$	D_1 =	5.4	ft
d) Enter the depth of freeboard (at least 1 ft)		1	ft
e) Enter depth to historic high ground water (measured from **top** of basin)		15	ft
f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin)		15	ft
g) D_2 is the smaller of: Depth to groundwater - (10 ft + freeboard) and Depth to impermeable layer - (5 ft + freeboard)	D_2 =	4.0	ft
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet	D_{MAX} =	4.0	ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1)	z =	4	:1
b) Proposed basin depth (excluding freeboard)	d_B =	1	ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)	A_S =	1088	ft^2
d) Proposed Design Surface Area	A_D =	1739	ft^2

Forebay

a) Forebay volume (minimum 0.5% V_{BMP})	Volume =	5	ft^3
b) Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =	1	ft
c) Forebay surface area (minimum)	Area =	5	ft^2
d) Full height notch-type weir	Width (W) =	1.5	in

Notes:

Infiltration Basin - Design Procedure (Rev. 03-2012)	BMP ID 3A	Legend:	Required Entries / Calculated Cells
Company Name: DSB Engineering			Date: 5/5/2023
Designed by: Dino San Buenaventura			County/City Case No.:

Design Volume			
a) Tributary area (BMP subarea)	A_T =	0.97	acres
b) Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,092	ft^3
Maximum Depth			
a) Measured infiltration rate	I =	2.7	in/hr
b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook)	FS =	3	
c) Calculate D_1 $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$	D_1 =	5.4	ft
d) Enter the depth of freeboard (at least 1 ft)		1	ft
e) Enter depth to historic high ground water (measured from **top** of basin)		15	ft
f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin)		15	ft
g) D_2 is the smaller of: Depth to groundwater - (10 ft + freeboard) and Depth to impermeable layer - (5 ft + freeboard)	D_2 =	4.0	ft
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet	D_{MAX} =	4.0	ft
Basin Geometry			
a) Basin side slopes (no steeper than 4:1)	z =	4	:1
b) Proposed basin depth (excluding freeboard)	d_B =	4	ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)	A_S =	273	ft^2
d) Proposed Design Surface Area	A_D =	1987	ft^2
Forebay			
a) Forebay volume (minimum 0.5% V_{BMP})	Volume =	5	ft^3
b) Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =	1	ft
c) Forebay surface area (minimum)	Area =	5	ft^2
d) Full height notch-type weir	Width (W) =		in

Notes:

MC-4500 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.



STORMTECH MC-4500 CHAMBER
(not to scale)

Nominal Chamber Specifications

Size (L x W x H)
52” x 100” x 60”
1321 mm x 2540 mm x 1524 mm

Chamber Storage
106.5 ft³ (3.01 m³)

Min. Installed Storage*
162.6 ft³ (4.60 m³)

Weight
Nominal 125 lbs (56.7 kg)

Shipping
7 chambers/pallet
5 end caps/pallet
11 pallets/truck

*Assumes a minimum of 12” (300 mm) of stone above, 9” (230 mm) of stone below chambers, 9” (230 mm) of stone between chambers/end caps and 40% stone porosity.

STORMTECH MC-4500 END CAP
(not to scale)

Nominal End Cap Specifications

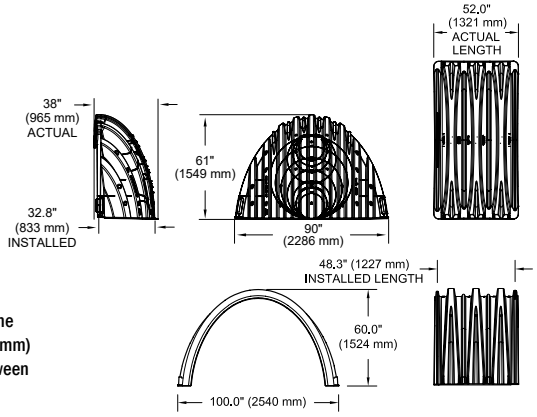
Size (L x W x H)
38” x 90” x 61”
965 mm x 2286 mm x 1549 mm

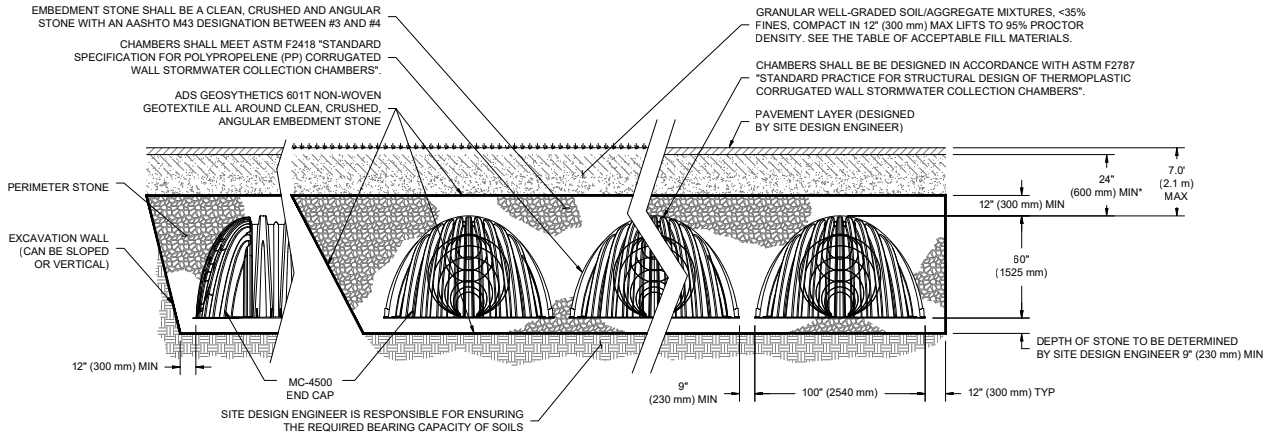
End Cap Storage
39.5 ft³ (1.12 m³)

Min. Installed Storage*
115.3 ft³ (3.26 m³)

Weight
Nominal 90.0 lbs (40.8 kg)

*Assumes a minimum of 12” (300 mm) of stone above, 9” (230 mm) of stone below, 12” (300 mm) of stone perimeter, 9” (230 mm) of stone between chambers/end caps and 40% stone porosity.





*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 30" (750 mm).

MC-4500 CHAMBER SPECIFICATIONS

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft³ (m³)	Chamber and Stone Foundation Depth in. (mm)			
		9" (230 mm)	12" (300 mm)	15" (375 mm)	18" (450 mm)
MC-4500 Chamber	106.5 (3.01)	162.6 (4.60)	166.3 (4.71)	169.9 (4.81)	173.6 (4.91)
MC-4500 End Cap	39.5 (1.12)	115.3 (3.26)	118.6 (3.36)	121.9 (3.45)	125.2 (3.54)

Note: Assumes 9" (230 mm) row spacing, 40% stone porosity, 12" (300 mm) stone above and includes the bare chamber/end cap volume. End cap volume assumes 12" (300 mm) stone perimeter in front of end cap.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds³)	Stone Foundation Depth			
	9"	12"	15"	18"
MC-4500 Chamber	7.4 (5.2)	7.8 (5.5)	8.3 (5.9)	8.8 (6.2)
MC-4500 End Cap	9.8 (7.0)	10.2 (7.3)	10.6 (7.6)	11.1 (7.9)
METRIC KILOGRAMS (m³)	230 mm	300 mm	375 mm	450 mm
MC-4500 Chamber	6713 (4.0)	7076 (4.2)	7529 (4.5)	7983 (4.7)
MC-4500 End Cap	8890 (5.3)	9253 (5.5)	9616 (5.8)	10069 (6.0)

Note: Assumes 12" (300 mm) of stone above and 9" (230 mm) row spacing and 12" (300 mm) of perimeter stone in front of end caps.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth			
	9" (230 mm)	12" (300 mm)	15" (375mm)	18" (450 mm)
MC-4500 Chamber	10.5 (8.0)	10.8 (8.3)	11.2 (8.5)	11.5 (8.8)
MC-4500 End Cap	9.7 (7.4)	10.0 (7.6)	10.3 (7.9)	10.6 (8.1)

Note: Assumes 9" (230 mm) of separation between chamber rows, 12" (300 mm) of perimeter in front of the end caps, and 24" (600 mm) of cover. The volume of excavation will vary as depth of cover increases.



Working on a project?
Visit us at www.stormtech.com
and utilize the StormTech Design Tool

For more information on the StormTech MC-4500 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

*THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™*

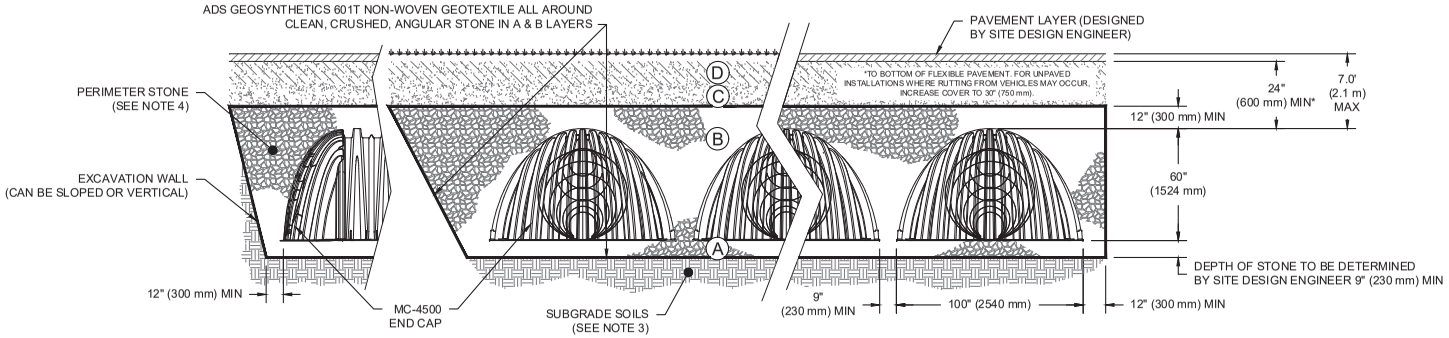
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ACCEPTABLE FILL MATERIALS: STORMTECH MC-4500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[1] A-1, A-2-4, A-3 OR AASHTO M43[1] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43[1] 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]

PLEASE NOTE:
1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
3. WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
4. ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



*FOR COVER DEPTHS GREATER THAN 7.0' (2.1 m) PLEASE CONTACT STORMTECH

NOTES:

1. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
2. MC-4500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
3. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
4. PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
5. REQUIREMENTS FOR HANDLING AND INSTALLATION:
   - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
   - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
   - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

MC-4500
STANDARD CROSS SECTION
DATE: 05-10-19 DRAWN: KR CHECKED: KR
PROJECT #:

DATE	DRWN	CHKD	DESCRIPTION

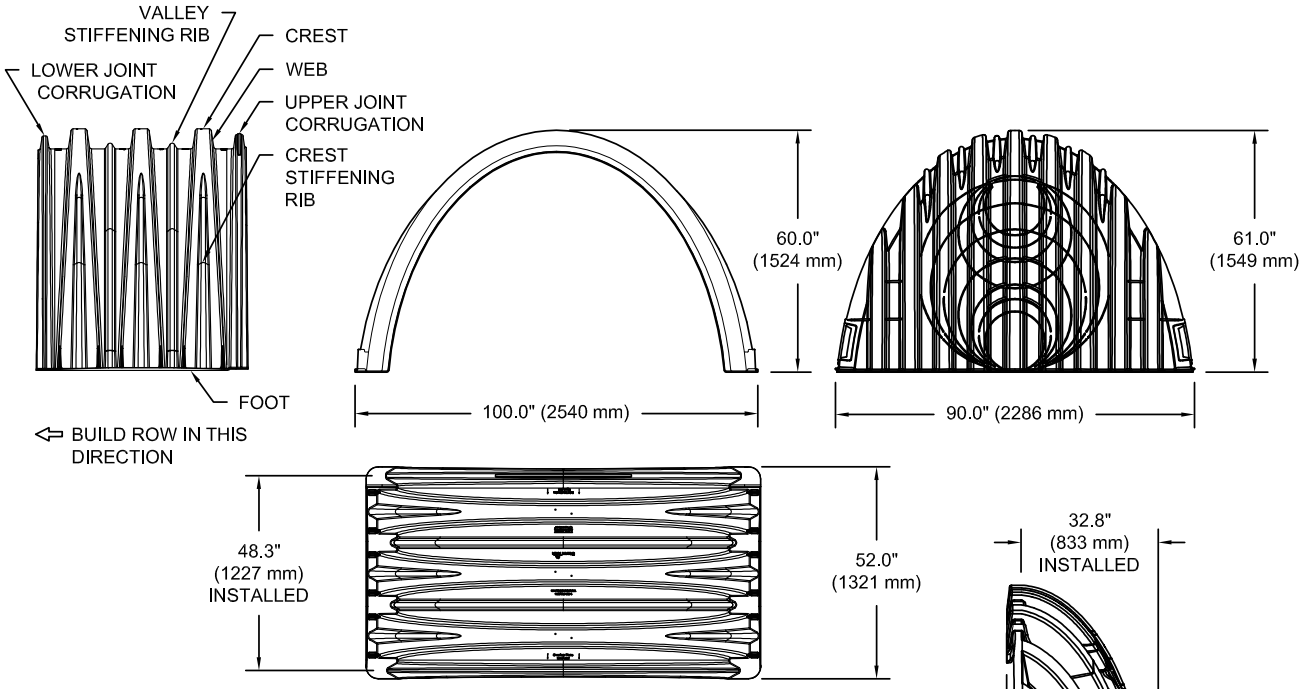
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HILLIARD, OH 43026
ADVANCED DRAINAGE SYSTEMS, INC.

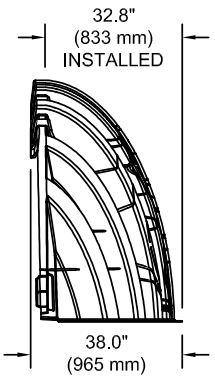
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MC-4500 TECHNICAL SPECIFICATION

NTS





NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

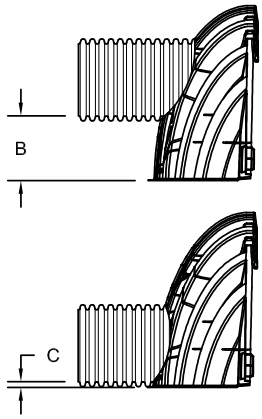
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

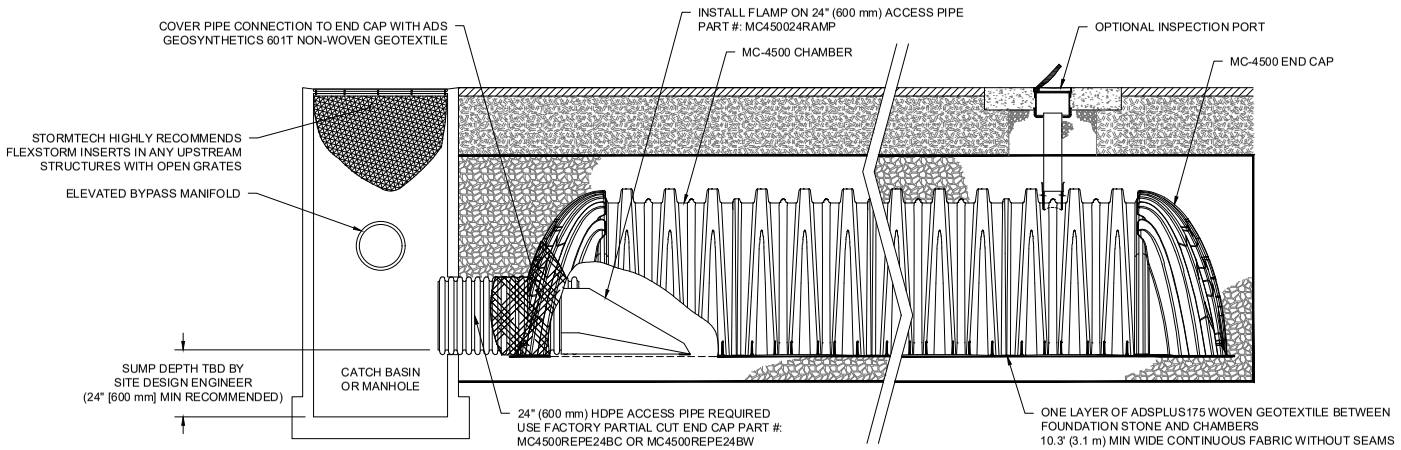
PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.



MC-4500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
  - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
  - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- B. ALL ISOLATOR PLUS ROWS
  - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
  - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
    - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
  - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.

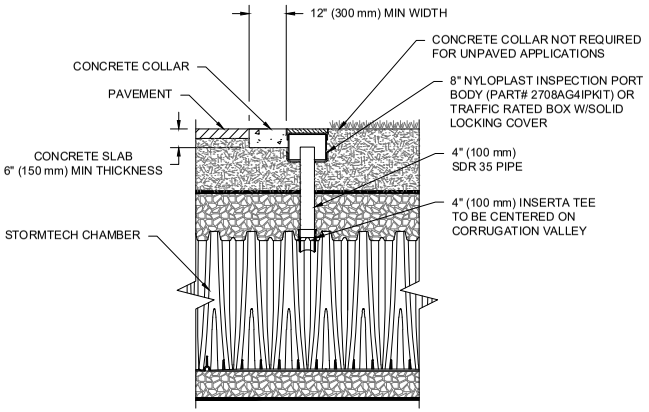
STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
- B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
- C. VACUUM STRUCTURE SUMP AS REQUIRED

STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.

STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

4" PVC INSPECTION PORT DETAIL (MC SERIES CHAMBER)
NTS

MC-4500
ISOLATOR ROW PLUS DETAILS
DATE: 08/26/20 | DRAWN: ALI | CHECKED: ALI | PROJECT #: ---

DATE	DRWN	CHKD	DESCRIPTION

StormTech
Detention/Retention/Water Quality
520 CROMWELL AVENUE | ROCKY HILL | CT | 06067
860-529-8188 | 888-892-2694 | WWW.STORMTECH.COM

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OH 43026

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

StormTech
Detention • Retention • Water Quality
An ADS company

Isolator® Row PLUS O&M Manual


SC-740


MC-3500


FLAMP

THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS®

ADS

THE ISOLATOR® ROW PLUS

INTRODUCTION

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row PLUS is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

THE ISOLATOR ROW PLUS

The Isolator Row PLUS is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-4500 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for settling and filtration of sediment as storm water rises in the Isolator Row PLUS and ultimately passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC- 310-3 and SC-740 models) allow storm water to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row PLUS protecting the storage areas of the adjacent stone and chambers from sediment accumulation.

ADS geotextile fabric is placed between the stone and the Isolator Row PLUS chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the perforations in the sidewall of the chamber. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-4500 models as these chambers do not have perforated side walls.

The Isolator Row PLUS is designed to capture the "first flush" runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole not only provides access to the Isolator Row PLUS but includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row PLUS bypass through a manifold to the other chambers. This is achieved with either an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row PLUS row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row PLUS. After Stormwater flows through the Isolator Row PLUS and into the rest of the StormTech chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

The Isolator Row FLAMP™ (patent pending) is a flared end ramp apparatus that is attached to the inlet pipe on the inside of the chamber end cap. The FLAMP provides a smooth transition from pipe invert to fabric bottom. It is configured to improve chamber function performance over time by enhancing outflow of solid debris that would otherwise collect at an end of the chamber. It also serves to improve the fluid and solid flow into the access pipe during maintenance and cleaning and to guide cleaning and inspection equipment back into the inlet pipe when complete.

The Isolator Row PLUS may be part of a treatment train system. The design of the treatment train and selection of pretreatment devices by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, the Isolator Row PLUS is recommended by StormTech as an effective means to minimize maintenance requirements and maintenance costs.

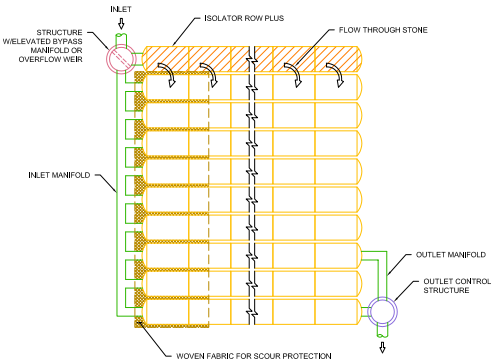
Note: See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row PLUS.



Looking down the Isolator Row PLUS from the manhole opening, ADS PLUS Fabric is shown between the chamber and stone base.



StormTech Isolator Row PLUS with Overflow Spillway (not to scale)





ISOLATOR ROW PLUS INSPECTION/MAINTENANCE

INSPECTION

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the actual frequency of inspection and maintenance practices.

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row PLUS should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row PLUS incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row PLUS, clean-out should be performed.

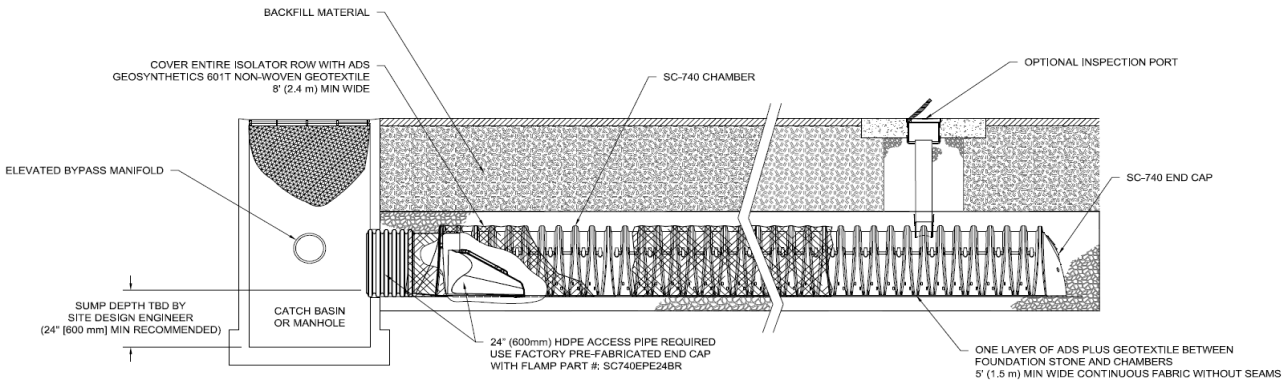
MAINTENANCE

The Isolator Row PLUS was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row PLUS while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45" are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row PLUS up to 50 chambers long. **The JetVac process shall only be performed on StormTech Isolator Row PLUS that have ADS PLUS Fabric (as specified by StormTech) over their angular base stone.**

StormTech Isolator Row PLUS (not to scale)

Note: Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-4500 chamber models and is not required over the entire Isolator Row PLUS.



ISOLATOR ROW PLUS STEP BY STEP MAINTENANCE PROCEDURES

STEP 1
Inspect Isolator Row PLUS for sediment.

A) Inspection ports (if present)
- i. Remove lid from floor box frame
- ii. Remove cap from inspection riser
- iii. Using a flashlight and stadia rod,measure depth of sediment and record results on maintenance log.
- iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

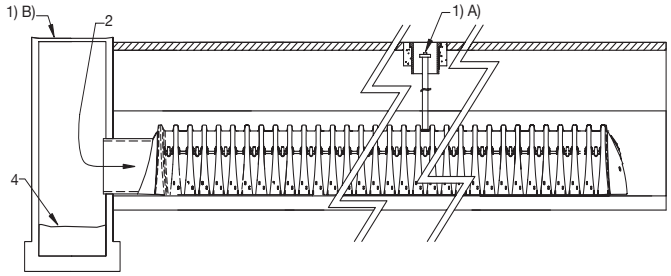
B) All Isolator Row PLUS
- i. Remove cover from manhole at upstream end of Isolator Row PLUS
- ii. Using a flashlight, inspect down Isolator Row PLUS through outlet pipe
  1. Mirrors on poles or cameras may be used to avoid a confined space entry
  2. Follow OSHA regulations for confined space entry if entering manhole
- iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

STEP 2
Clean out Isolator Row PLUS using the JetVac process.

A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
B) Apply multiple passes of JetVac until backflush water is clean
C) Vacuum manhole sump as required

STEP 3
Replace all caps, lids and covers, record observations and actions.

STEP 4
Inspect & clean catch basins and manholes upstream of the StormTech system.



SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)–(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row PLUS, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

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MC-3500/MC-4500

StormTech Construction Guide

StormTech® An ADS company

REQUIRED MATERIALS AND EQUIPMENT LIST

- Acceptable fill materials per Table 1
- ADS PLUS and non-woven geotextile fabrics
- StormTech solid end caps, pre-cored and pre-fabricated end caps
- StormTech chambers, manifolds and fittings

NOTE: MC-3500 chamber pallets are 77” x 90” (2.0 m x 2.3 m) and weigh about 2010 lbs. (912 kg) and MC-4500 pallets are 100” x 52” (2.5 m x 1.3 m) and weigh about 840 lbs. (381 kg). Unloading chambers requires 72” (1.8 m) (min.) forks and/or tie downs (straps, chains, etc).

IMPORTANT NOTES:

A. This installation guide provides the minimum requirements for proper installation of chambers. Nonadherence to this guide may result in damage to chambers during installation. Replacement of damaged chambers during or after backfilling is costly and very time consuming. It is recommended that all installers are familiar with this guide, and that the contractor inspects the chambers for distortion, damage and joint integrity as work progresses.

B. Use of a dozer to push embedment stone between the rows of chambers may cause damage to chambers and is not an acceptable backfill method. Any chambers damaged by using the “dump and push” method are not covered under the StormTech standard warranty.

C. Care should be taken in the handling of chambers and end caps. End caps must be stored standing upright. Avoid dropping, prying or excessive force on chambers during removal from pallet and initial placement.

Requirements for System Installation



Excavate bed and prepare subgrade per engineer’s plans. Plans and specifications should include Best Management Practices (BMPs) to deter contamination of open pits during construction.



Place non-woven geotextile over prepared soils and up excavation walls.



Place clean, crushed, angular stone foundation 9” (230 mm) min. Install underdrains if required. Compact to achieve a flat surface.

Manifold, Scour Fabric and Chamber Assembly



Install manifolds and lay out ADS PLUS fabric at inlet rows [min. 17.5 ft (5.33 m)] at each inlet end cap. Place a continuous piece (no seams) along entire length of Isolator® PLUS Row(s).



Align the first chamber and end cap of each row with inlet pipes. Contractor may choose to postpone stone placement around end chambers and leave ends of rows open for easy inspection of chambers during the backfill process.

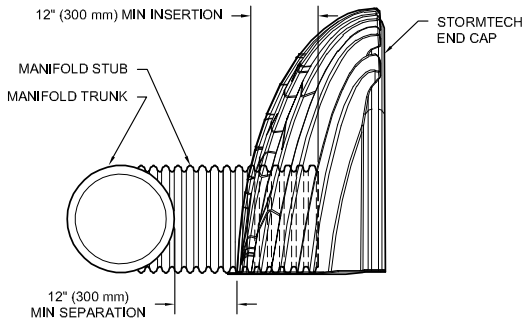


Continue installing chambers by overlapping chamber end corrugations. Chamber joints are labeled “Lower Joint – Overlap Here” and “Build this direction – Upper Joint” Be sure that the chamber placement does not exceed the reach of the construction equipment used to place the stone. Maintain minimum 6” (150 mm) spacing between MC-3500 rows and 9” (230 mm) spacing between MC-4500 rows.



Place a continuous layer of ADS PLUS fabric between the foundation stone and the Isolator Row PLUS chambers, making sure the fabric lays flat and extends the entire width of the chamber feet.
When used on an Isolator Row PLUS, a 24” FLAMP (flared end ramp) is attached to the inside of the inlet pipe with a provided threaded rod and bolt. The FLAMP then lays on top of the ADS PLUS fabric.

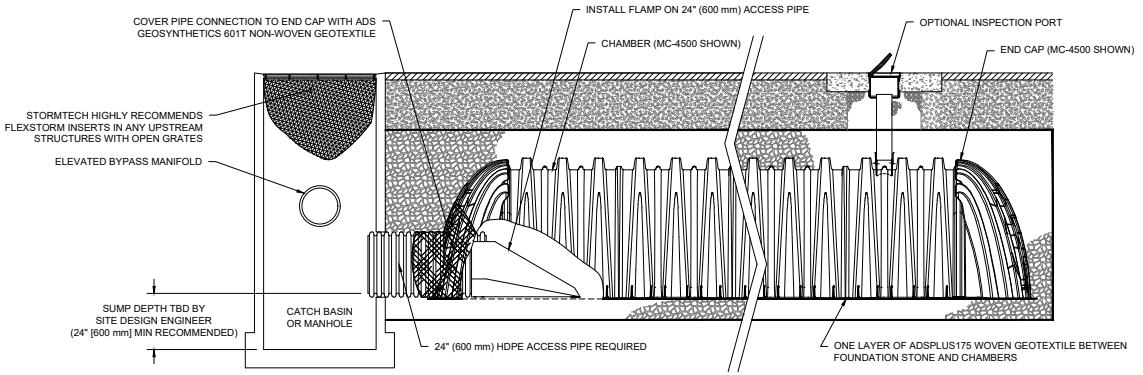
Manifold Insertion



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

Insert inlet and outlet manifolds a minimum 12” (300 mm) into chamber end caps. Manifold header should be a minimum 12” (300 mm) from base of end cap.

StormTech Isolator Row PLUS Detail



Initial Anchoring of Chambers – Embedment Stone

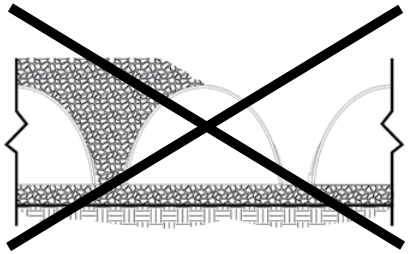


Initial embedment shall be spotted along the centerline of the chamber evenly anchoring the lower portion of the chamber. This is best accomplished with a stone conveyor or excavator reaching along the row.

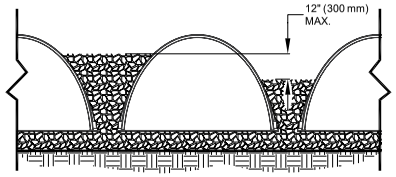


No equipment shall be operated on the bed at this stage of the installation. Excavators must be located off the bed. Dump trucks shall not dump stone directly on to the bed. Dozers or loaders are not allowed on the bed at this time.

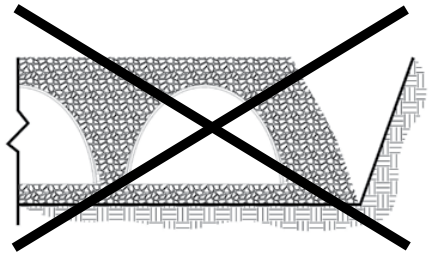
Backfill of Chambers – Embedment Stone



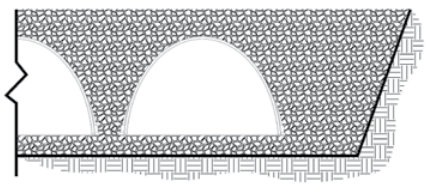
UNEVEN BACKFILL



EVEN BACKFILL



PERIMETER NOT BACKFILLED



PERIMETER FULLY BACKFILLED

Backfill chambers evenly. Stone column height should never differ by more than 12” (300 mm) between adjacent chamber rows or between chamber rows and perimeter.

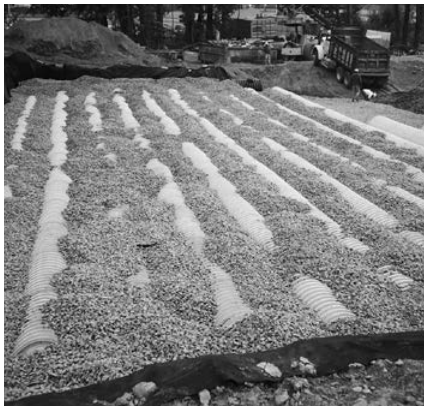
Perimeter stone must be brought up evenly with chamber rows. Perimeter must be fully backfilled, with stone extended horizontally to the excavation wall.

Backfill of Chambers – Embedment Stone and Cover Stone





Continue evenly backfilling between rows and around perimeter until embedment stone reaches tops of chambers and a minimum 12” (300 mm) of cover stone is in place. Perimeter stone must extend horizontally to the excavation wall for both straight or sloped sidewalls. The recommended backfill methods are with a stone conveyor outside of the bed or build as you go with an excavator inside the bed reaching along the rows. Backfilling while assembling chambers rows as shown in the picture will help to ensure that equipment reach is not exceeded.





Only after chambers have been backfilled to top of chamber and with a minimum 12” (300 mm) of cover stone on top of chambers can skid loaders and small LGP dozers be used to final grade cover stone and backfill material in accordance with ground pressure limits in Table 2. Equipment must push material parallel to rows only. Never push perpendicular to rows. StormTech recommends the contractor inspect chamber rows before placing final backfill. Any chambers damaged by construction equipment shall be removed and replaced.

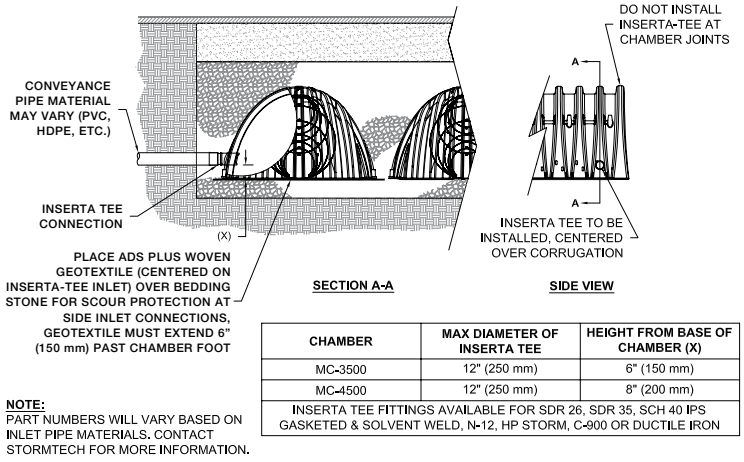
Final Backfill of Chambers – Fill Material





Install non-woven geotextile over stone. Geotextile must overlap 24” (600 mm) where edges meet. Compact at 24” (600 mm) of fill. Roller travel parallel with rows.

Inserta Tee Detail



CHAMBER	MAX DIAMETER OF INSERTA TEE	HEIGHT FROM BASE OF CHAMBER (X)
MC-3500	12" (250 mm)	6" (150 mm)
MC-4500	12" (250 mm)	8" (200 mm)
INSERTA TEE FITTINGS AVAILABLE FOR SDR 26, SDR 35, SCH 40 IPS GASKETED & SOLVENT WELD, N-12, HP STORM, C-900 OR DUCTILE IRON		

NOTE:
PART NUMBERS WILL VARY BASED ON INLET PIPE MATERIALS. CONTACT STORMTECH FOR MORE INFORMATION.

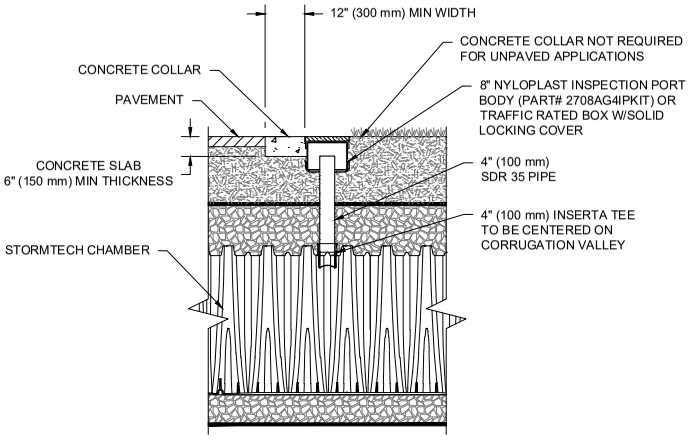
Table 1- Acceptable Fill Materials

Material Location	Description	AASHTO M43 Designation[1]	Compaction/Density Requirement
Ⓓ **Final Fill:** Fill Material for layer 'D' starts from the top of the 'C' layer to the bottom of flexible pavement or unpaved finished grade above. Note that the pavement subbase may be part of the 'D' layer.	Any soil/rock materials, native soils or per engineer's plans. Check plans for pavement subgrade requirements.	N/A	Prepare per site design engineer's plans. Paved installations may have stringent material and preparation requirements.
Ⓒ **Initial Fill:** Fill Material for layer 'C' starts from the top of the embedment stone ('B' layer) to 24" (600 mm) above the top of the chamber. Note that pavement subbase may be part of the 'C' layer.	Granular well-graded soil/ aggregate mixtures, <35% fines or processed aggregate. Most pavement subbase materials can be used in lieu of this layer.	AASHTO M145 A-1, A-2-4, A-3 or AASHTO M431 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	Begin compaction after min. 24" (600 mm) of material over the chambers is reached. Compact additional layers in 12" (300 mm) max. lifts to a min. 95% Proctor density for well-graded material and 95% relative density for processed aggregate materials.
Ⓑ **Embedment Stone:** Fill the surrounding chambers from the foundation stone ('A' layer) to the 'C' layer above.	Clean, crushed, angular stone	AASHTO M43[1] 3, 357, 4	No compaction required.
Ⓐ **Foundation Stone:** Fill below chambers from the subgrade up to the foot (bottom) of the chamber.	Clean, crushed, angular stone,	AASHTO M43[1] 3, 357, 4	Place and compact in 9" (230 mm) max lifts using two full coverages with a vibratory compactor.[2,3]

PLEASE NOTE:

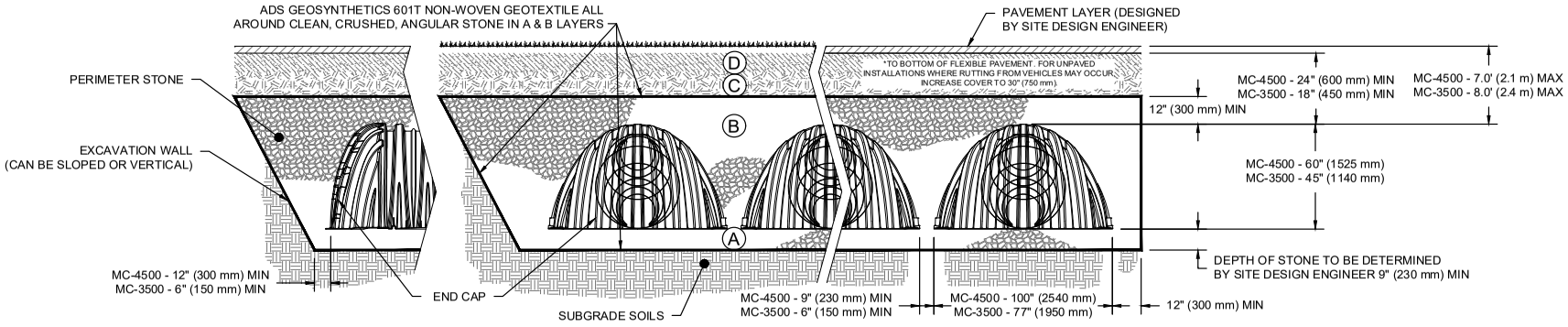
1. ***The listed AASHTO designations are for gradations only. The stone must also be clean, crushed, angular. For example, a specification for #4 stone would state: "clean, crushed, angular no. 4 (AASHTO M43) stone".***
2. ***StormTech compaction requirements are met for 'A' location materials when placed and compacted in 9" (230 mm) (max) lifts using two full coverages with a vibratory compactor.***
3. ***Where infiltration surfaces may be comprised by compaction, for standard installations and standard design load conditions, a flat surface may be achieved by raking or dragging without compaction equipment. For special load designs, contact StormTech for compaction requirements.***

Figure 1- Inspection Port Detail



NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

Figure 2 - Fill Material Locations



NOTES:

1. ***36" (900 mm) of stabilized cover materials over the chambers is required for full dump truck travel and dumping.***
2. ***During paving operations, dump truck axle loads on 24" (600mm) for MC-4500s or 18" (450mm) for MC-3500s of cover may be necessary. Precautions should be taken to avoid rutting of the road base layer, to ensure that compaction requirements have been met, and that a minimum of 24" (600 mm) for MC-4500s or 18" (450mm) for MC-3500s of cover exists over the chambers. Contact StormTech for additional guidance on allowable axle loads during paving.***
3. ***Ground pressure for track dozers is the vehicle operating weight divided by total ground contact area for both tracks. Excavators will exert higher ground pressures based on loaded bucket weight and boom extension.***
4. ***Mini-excavators (<8,000lbs/3,628 kg) can be used with at least 12" (300 mm) of stone over the chambers and are limited by the maximum ground pressures in Table 2 based on a full bucket at maximum boom extension.***
5. ***StormTech does not require compaction of initial fill at 18" (450 mm) of cover. However, requirements by others for 6" (150 mm) lifts may necessitate the use of small compactors at 18" (450 mm) of cover.***
6. ***Storage of materials such as construction materials, equipment, spoils, etc. should not be located over the StormTech system. The use of equipment over the StormTech system not covered in Table 2 (ex. soil mixing equipment, cranes, etc) is limited. Please contact StormTech for more information.***
7. ***Allowable track loads based on vehicle travel only. Excavators shall not operate on chamber beds until the total backfill reaches 3 feet (900 mm) over the entire bed.***

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Table 2 - Maximum Allowable Construction Vehicle Loads[6]

Material Location	Fill Depth over Chambers in. [mm]	Maximum Allowable Wheel Loads		Maximum Allowable Track Loads[6]		Maximum Allowable Roller Loads
		Max Axle Load for Trucks lbs [kN]	Max Wheel Load for Loaders lbs [kN]	Track Width in. [mm]	Max Ground Pressure psf [kPa]	Max Drum Weight or Dynamic Force lbs [kN]
Ⓓ **Final Fill Material**	36" [900] Compacted	32,000 [142]	16,000 [71]	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	3420 [164] 2350 [113] 1850 [89] 1510 [72] 1310 [63]	38,000 [169]
Ⓒ **Initial Fill Material**	24" [600] Compacted	32,000 [142]	16,000 [71]	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	2480 [119] 1770 [85] 1430 [68] 1210 [58] 1070 [51]	20,000 [89]
	24" [600] Loose/Dumped	24,000 [107]	12,000 [53]	12" [305] 18" [457] 24" [610] 30" [762] 36" [914]	2245 [107] 1625 [78] 1325 [63] 1135 [54] 1010 [48]	16,000 [71]
	18" [450]	24,000 [107]	12,000 [53]	12" [305] 18" [457] 24" [610] 30" [762]	2010 [96] 1480 [71] 1220 [58] 1060 [51]	5,000 [22] (static loads only)[5]
Ⓑ **Embedment Stone**	12" [300]	NOT ALLOWED	NOT ALLOWED	12" [305] 18" [457] 24" [610] 30" [762]	1100 [53] 715 [34] 660 [32] 580 [28]	NOT ALLOWED
	6" [150]	NOT ALLOWED	NOT ALLOWED	NOT ALLOWED	NOT ALLOWED	NOT ALLOWED

Table 3 - Placement Methods and Descriptions

Material Location	Placement Methods/ Restrictions	Wheel Load Restrictions	Track Load Restrictions	Roller Load Restrictions
		See Table 2 for Maximum Construction Loads		
Ⓓ **Final Fill Material**	A variety of placement methods may be used. All construction loads must not exceed the maximum limits in Table 2.	36" (900 mm) minimum cover required for dump trucks to dump over chambers.	Dozers to push parallel to rows.[4]	Roller travel parallel to rows only until 36" (900 mm) compacted cover is reached.
Ⓒ **Initial Fill Material**	Excavator positioned off bed recommended. Small excavator allowed over chambers. Small dozer allowed.	Asphalt can be dumped into paver when compacted pavement subbase reaches 24" (600 mm) above top of chambers.	Small LGP track dozers & skid loaders allowed to grade cover stone with at least 12" (300 mm) stone under tracks at all times. Equipment must push parallel to rows at all times.	Use dynamic force of roller only after compacted fill depth reaches 24" (600 mm) over chambers. Roller travel parallel to chamber rows only.
Ⓑ **Embedment Stone**	No equipment allowed on bare chambers. Use excavator or stone conveyor positioned off bed or on foundation stone to evenly fill around all chambers to at least the top of chambers.	No wheel loads allowed. Material must be placed outside the limits of the chamber bed.	No tracked equipment is allowed on chambers until a min. 12" (300 mm) cover stone is in place.	No rollers allowed.
Ⓐ **Foundation Stone**	No StormTech restrictions. Contractor responsible for any conditions or requirements by others relative to subgrade bearing capacity, dewatering or protection of subgrade.			

17.0 Standard Limited Warranty

STANDARD LIMITED WARRANTY OF STORMTECH LLC ("STORMTECH"): PRODUCTS

(A) This Limited Warranty applies solely to the StormTech chambers and end plates manufactured by StormTech and sold to the original purchaser (the "Purchaser"). The chambers and end plates are collectively referred to as the "Products."

(B) The structural integrity of the Products, when installed strictly in accordance with StormTech's written installation instructions at the time of installation, are warranted to the Purchaser against defective materials and workmanship for one (1) year from the date of purchase. Should a defect appear in the Limited Warranty period, the Purchaser shall provide StormTech with written notice of the alleged defect at StormTech's corporate headquarters within ten (10) days of the discovery of the defect. The notice shall describe the alleged defect in reasonable detail. StormTech agrees to supply replacements for those Products determined by StormTech to be defective and covered by this Limited Warranty. The supply of replacement products is the sole remedy of the Purchaser for breaches of this Limited Warranty. StormTech's liability specifically excludes the cost of removal and/or installation of the Products.

(C) **THIS LIMITED WARRANTY IS EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCTS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.**

(D) This Limited Warranty only applies to the Products when the Products are installed in a single layer. **UNDER NO CIRCUMSTANCES, SHALL THE PRODUCTS BE INSTALLED IN A MULTI-LAYER CONFIGURATION.**

(E) No representative of StormTech has the authority to change this Limited Warranty in any manner or to extend this Limited Warranty. This Limited Warranty does not apply to any person other than to the Purchaser.

(F) Under no circumstances shall StormTech be liable to the Purchaser or to any third party for product liability claims; claims arising from the design, shipment, or installation of the Products, or the cost of other goods or services related to the purchase and installation of the Products. For this Limited Warranty to apply, the Products must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and StormTech's written installation instructions.

(G) **THE LIMITED WARRANTY DOES NOT EXTEND TO INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES. STORMTECH SHALL NOT BE LIABLE FOR PENALTIES OR LIQUIDATED DAMAGES, INCLUDING LOSS OF PRODUCTION AND PROFITS; LABOR AND MATERIALS; OVERHEAD COSTS; OR OTHER LOSS OR EXPENSE INCURRED BY THE PURCHASER OR ANY THIRD PARTY. SPECIFICALLY EXCLUDED FROM LIMITED WARRANTY COVERAGE ARE DAMAGE TO THE PRODUCTS ARISING FROM ORDINARY WEAR AND TEAR; ALTERATION, ACCIDENT, MISUSE, ABUSE OR NEGLECT; THE PRODUCTS BEING SUBJECTED TO VEHICLE TRAFFIC OR OTHER CONDITIONS WHICH ARE NOT PERMITTED BY STORMTECH'S WRITTEN SPECIFICATIONS OR INSTALLATION INSTRUCTIONS; FAILURE TO MAINTAIN THE MINIMUM GROUND COVERS SET FORTH IN THE INSTALLATION INSTRUCTIONS; THE PLACEMENT OF IMPROPER MATERIALS INTO THE PRODUCTS; FAILURE OF THE PRODUCTS DUE TO IMPROPER SITING OR IMPROPER SIZING; OR ANY OTHER EVENT NOT CAUSED BY STORMTECH. A PRODUCT ALSO IS EXCLUDED FROM LIMITED WARRANTY COVERAGE IF SUCH PRODUCT IS USED IN A PROJECT OR SYSTEM IN WHICH ANY GEOTEXTILE PRODUCTS OTHER THAN THOSE PROVIDED BY ADVANCED DRAINAGE SYSTEMS ARE USED. THIS LIMITED WARRANTY REPRESENTS STORMTECH'S SOLE LIABILITY TO THE PURCHASER FOR CLAIMS RELATED TO THE PRODUCTS, WHETHER THE CLAIM IS BASED UPON CONTRACT, TORT, OR OTHER LEGAL THEORY.**

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ADS GEOSYNTHETICS 0601T NONWOVEN GEOTEXTILE

Scope

This specification describes ADS Geosynthetics 6.0 oz (0601T) nonwoven geotextile.

Filter Fabric Requirements

ADS Geosynthetics 6.0 oz (0601T) is a needle-punched nonwoven geotextile made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. ADS Geosynthetics 6.0 oz (0601T) resists ultraviolet deterioration, rotting, biological degradation, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. ADS Geosynthetics 6.0 oz (0601T) conforms to the physical property values listed below:

Filter Fabric Properties

PROPERTY	TEST METHOD	UNIT	M.A.R.V. (Minimum Average Roll Value)
Weight (Typical)	ASTM D 5261	oz/yd^2 (g/m^2)	6.0 (203)
Grab Tensile	ASTM D 4632	lbs (kN)	160 (0.711)
Grab Elongation	ASTM D 4632	%	50
Trapezoid Tear Strength	ASTM D 4533	lbs (kN)	60 (0.267)
CBR Puncture Resistance	ASTM D 6241	lbs (kN)	410 (1.82)
Permittivity*	ASTM D 4491	sec^{-1}	1.5
Water Flow*	ASTM D 4491	gpm/ft^2 ($l/min/m^2$)	110 (4480)
AOS*	ASTM D 4751	US Sieve (mm)	70 (0.212)
UV Resistance	ASTM D 4355	%/hrs	70/500

PACKAGING	
Roll Dimensions (W x L) – ft	12.5 x 360 / 15 x 300
Square Yards Per Roll	500
Estimated Roll Weight – lbs	195

* At the time of manufacturing. Handling may change these properties.

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ADS GEOSYNTHETICS 315W WOVEN GEOTEXTILE

Scope

This specification describes ADS Geosynthetics 315W woven geotextile.

Filter Fabric Requirements

ADS Geosynthetics 315W is manufactured using high tenacity polypropylene yarns that are woven to form a dimensionally stable network, which allows the yarns to maintain their relative position. ADS Geosynthetics 315W resists ultraviolet deterioration, rotting and biological degradation and is inert to commonly encountered soil chemicals. ADS Geosynthetics 315W conforms to the physical property values listed below:

Filter Fabric Properties

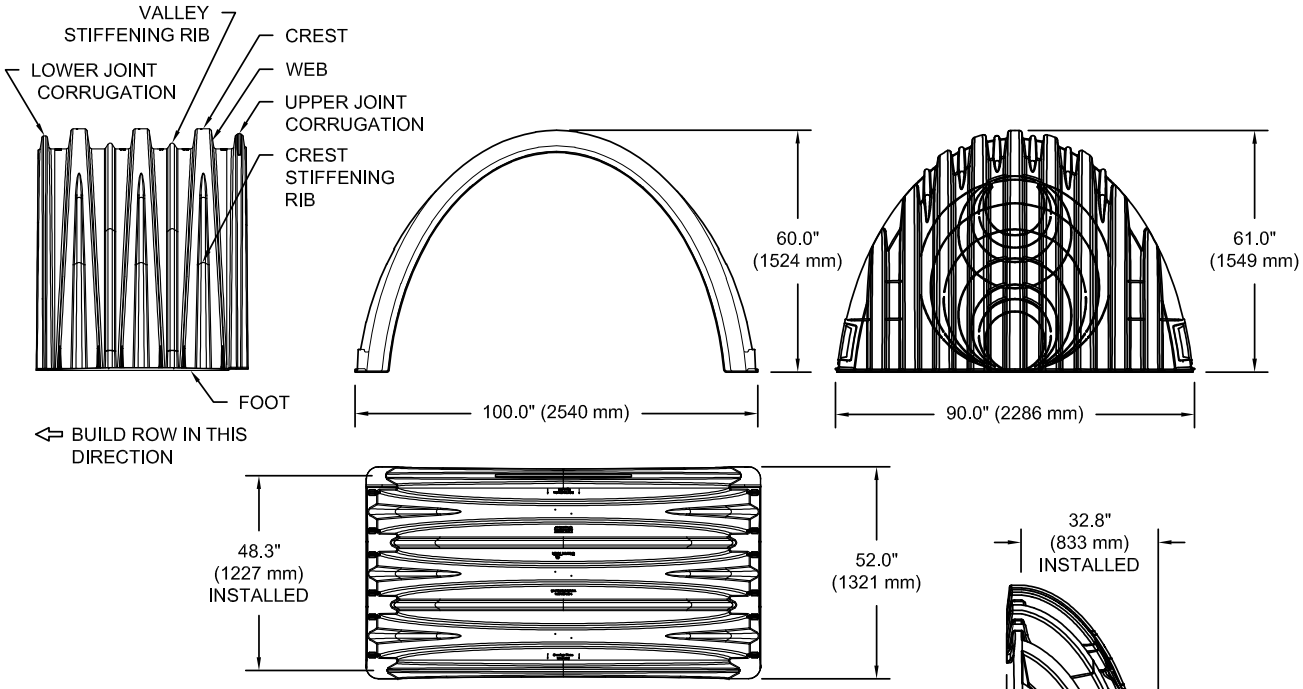
PROPERTY	TEST METHOD	ENGLISH M.A.R.V. (Minimum Average Roll Value)	METRIC M.A.R.V. (Minimum Average Roll Value)
Tensile Strength (Grab)	ASTM D-4632	315 lbs	1400 N
Elongation	ASTM D-4632	15%	15%
CBR Puncture	ASTM D-6241	900 lbs	4005 N
Puncture	ASTM D-4833	150 lbs	667 N
Mullen Burst	ASTM D-3786	600 psi	4134 kPa
Trapezoidal Tear	ASTM D-4533	120 lbs	533 N
UV Resistance (at 500 hrs)	ASTM D-4355	70%	70%
Apparent Opening Size (AOS)*	ASTM D-4751	40 US Std. Sieve	0.425 mm
Permittivity	ASTM D-4491	.05 sec^{-1}	.05 sec^{-1}
Water Flow Rate	ASTM D-4491	4 gpm/ft^2	163 $l/min/m^2$
Roll Sizes		12.5' x 360' 15.0' x 300' 17.5' x 258'	3.81 m x 109.8 m 4.57 m x 91.5 m 5.33 m x 78.6 m

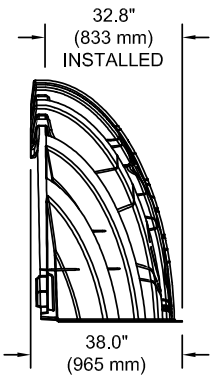
*Maximum average roll value.

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MC-4500 TECHNICAL SPECIFICATION

NTS





NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 48.3"	(2540 mm X 1524 mm X 1227 mm)
CHAMBER STORAGE	106.5 CUBIC FEET	(3.01 m³)
MINIMUM INSTALLED STORAGE*	162.6 CUBIC FEET	(4.60 m³)
WEIGHT (NOMINAL)	125.0 lbs.	(56.7 kg)

NOMINAL END CAP SPECIFICATIONS

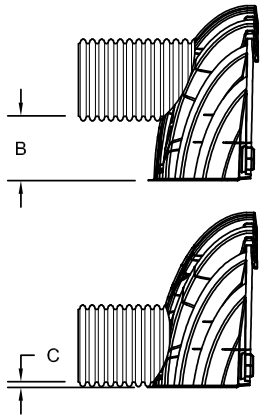
SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m³)
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m³)
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC4500IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC4500IEPP06B		---	0.86" (22 mm)
MC4500IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC4500IEPP08B		---	1.01" (26 mm)
MC4500IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC4500IEPP10B		---	1.33" (34 mm)
MC4500IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC4500IEPP12B		---	1.55" (39 mm)
MC4500IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC4500IEPP15B		---	1.70" (43 mm)
MC4500IEPP18T	18" (450 mm)	29.36" (746 mm)	---
MC4500IEPP18TW			
MC4500IEPP18B		---	1.97" (50 mm)
MC4500IEPP18BW			
MC4500IEPP24T	24" (600 mm)	23.05" (585 mm)	---
MC4500IEPP24TW			
MC4500IEPP24B		---	2.26" (57 mm)
MC4500IEPP24BW			
MC4500IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC4500IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC4500IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-4500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

CONTECH®
ENGINEERED SOLUTIONS

Debris Separating Baffle Box



The experts you need to solve your stormwater challenges



Contech is the leader in stormwater solutions, helping engineers, contractors and owners with infrastructure and land development projects throughout North America.

With our responsive team of stormwater experts, local regulatory expertise and flexible solutions, Contech is the trusted partner you can count on for stormwater management solutions.

Your Contech Team



STORMWATER CONSULTANT

It's my job to recommend the best solution to meet permitting requirements.



STORMWATER DESIGN ENGINEER

I work with consultants to design the best approved solution to meet your project's needs.



REGULATORY MANAGER

I understand the local stormwater regulations and what solutions will be approved.



SALES ENGINEER

I make sure our solutions meet the needs of the contractor during construction.

Contech is your partner in stormwater management solutions



Debris Separating Baffle Box (DSBB) - An Advanced Stormwater Treatment Solution

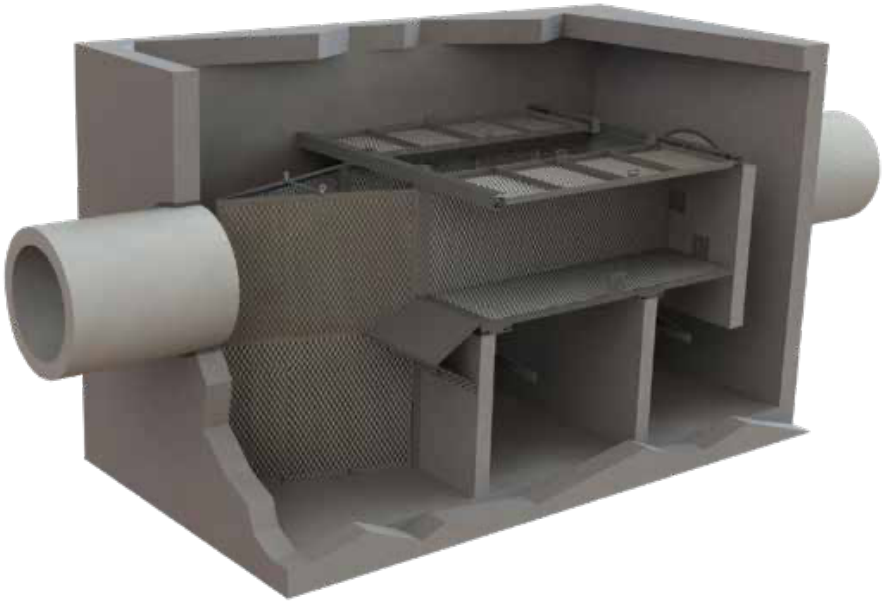
NJCAT Verified, NJDEP Certified, and Full Capture Approved by the California Water Resources Control Board.

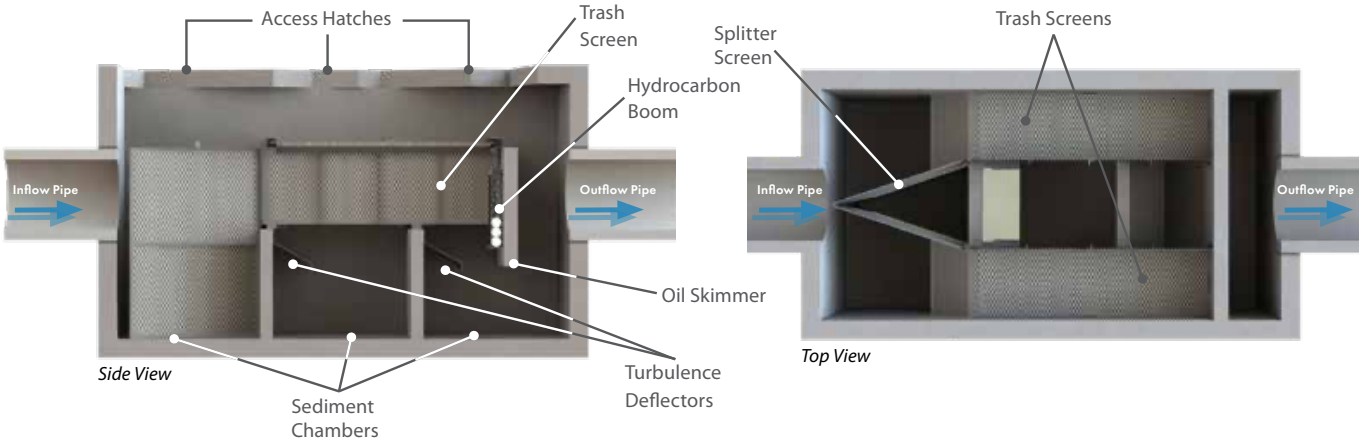
The DSBB combines gravity separation and non-blocking screen technology to capture trash, sediment, and hydrocarbons from stormwater.

The DSBB captures and retains 100% of trash and debris equal to or greater than 5 mm in diameter and meets the California Regional Water Quality Control Board Full Capture Certification Requirements. Floating trash and debris are stored above the static water level where it can dry out between storms and can be easily removed during maintenance events.

With internal high-flow bypass, shallow vault design, and multiple sizes, it is the ideal product for sites with groundwater, utility, or bedrock constraints.

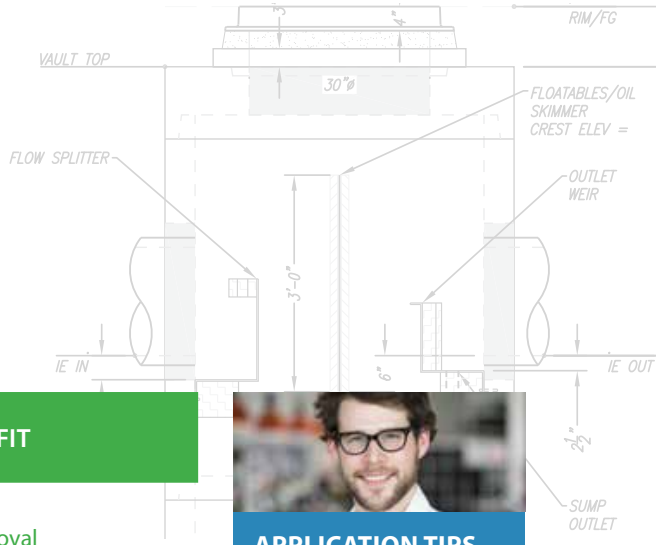
How the DSBB Works





1. As runoff enters the vault, the splitter screen directs flows to the filtration screens and provides additional screen flow capacity.
2. The trash screens collect and store trash, debris, organics, and oxygen demanding substances above the standing water.
3. The turbulence deflectors located below the screens prevent the resuspension of captured pollutants.
4. Sediment is collected in the sediment chambers, maximizing TSS removal and minimizing scouring during extreme flow rates.
5. The skimmer and boom collect hydrocarbons and control flow velocity which improves removal efficiency.

Triple-chambered design provides higher removals of pollutants



DSBB Features and Benefits

FEATURE	BENEFIT
Dual-stage treatment system - separation and screening	Superior pollutant removal
Trash and debris stored above water	Easier maintenance while minimizing nutrient leaching, bacterial growth, and bad odors
Unimpeded high-flow path	In-line installation, eliminating the need for a diversion structure
Oil skimmer and optional hydrocarbon booms	Superior hydrocarbon capture
Turbulence deflectors	Minimizes scour, especially during high flows

APPLICATION TIPS

- Look for systems that provide higher loading rates to reduce size and costs.
- Pretreating detention, infiltration, and green infrastructure practices with a hydrodynamic separator can protect downstream structures and provide for easy maintenance.

DSBB System Sizing

MODEL #	100% TRASH CAPTURE 5 MM[1]	80% TSS REMOVAL (231 µm d50)[2]	80% TSS REMOVAL (126 µm d50)[3]	50% TSS REMOVAL (75 µm d50)[4]
DSBB-4-6	14.9	3.09	1.73	2.11
DSBB-5-10	30.25	6.45	3.6	4.4
DSBB-6-12	35.08	9.28	5.18	6.34
DSBB-8-16		16.51	9.21	11.26
DSBB-10-20		25.79	14.4	17.6
Hydraulic Loading Rate (gpm/sf)		57.88	32.31	39.5

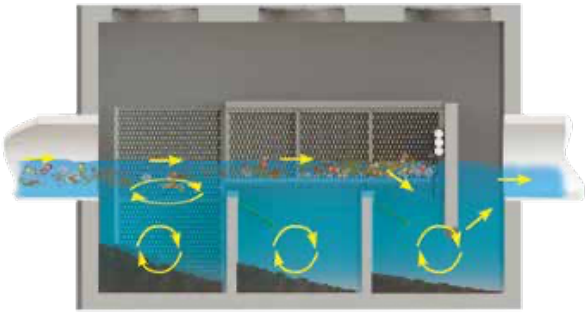
1. Based on California Water Board Full Capture Trash Requirements.
2. 3rd party independent laboratory results utilizing a modified NJDEP HDS protocol.
3. 3rd party independent laboratory results utilizing the NJDEP protocol. NJCAT Verified.
4. 3rd party independent laboratory results utilizing the NJDEP protocol. NJCAT Verified & NJDEP Certified.

DSBB Applications

DSBB is commonly used in the following stormwater applications:

- Stormwater quality control – trash, debris, sediment, and hydrocarbon removal
- Urban retrofit and redevelopment
- Pretreatment for reuse systems, detention/infiltration systems, bioretention, and media filters

DURING STORM EVENTS



Trash and debris are captured in the filtration screen as sediments settle to the bottom chambers. Hydrocarbons are removed and absorbed by the boom.

BETWEEN STORM EVENTS

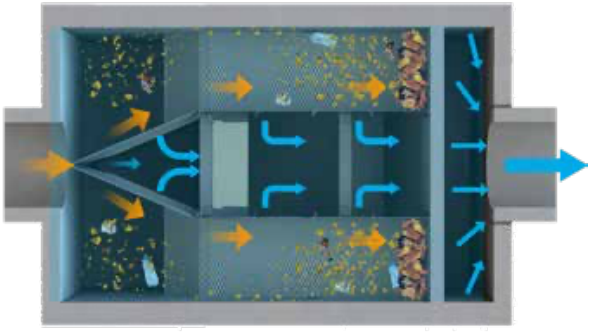


Trash and debris are stored in a suspended screen system allowing pollutants to dry out between storm events. This eliminates septic conditions and prevents leaching of plant-based organics into water.

Select DSBB Certifications and Verifications

DSBB has been evaluated by some of the most stringent stormwater technology evaluation organizations in North America, including:

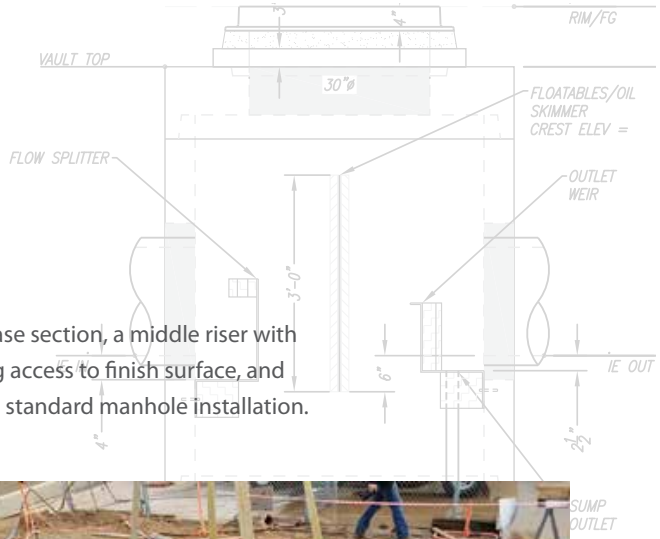
- New Jersey Department of Environmental Protection (NJDEP) Certification
- New Jersey Department of Environmental Protection (NJDEP) Scour Testing
- New Jersey Corporation for Advanced Technology (NJCAT) Verification
- California Water Resources Control Board, Full Capture Certification



Flow is split upon entering the system and directed to the filtration screens along each side.

A breakthrough system for underground storage treatment

Select DSBB Installation



Installation of the DSBB is quick and easy. The system is composed of a base section, a middle riser with holes for pipe connections and internals preinstalled, a top, risers to bring access to finish surface, and access covers. Installation of the system follows the same procedures as a standard manhole installation.



Minimum excavation is required and the unit is delivered in with a bottom and top slap to minimize weight.



Internal components are installed prior to delivery, reducing installation time.

DSBB Maintenance

Maintenance can be conducted above ground with a standard vacuum truck through a manhole or hatch.

The screen system allows gross solids to be removed without vacuuming out water or sediment chambers. The screens are hinged for easy access to sediment collected in the lower chambers.

Contech has a network of Certified Maintenance Providers to provide maintenance on the DSBB and other stormwater BMP's.



The entire sump of the DSBB is accessible and can be viewed from the finish surface.

A partner you can rely on



STORMWATER SOLUTIONS

PIPE SOLUTIONS

STRUCTURES SOLUTIONS

Few companies offer the wide range of high-quality stormwater resources you can find with us — state-of-the-art products, decades of expertise, and all the maintenance support you need to operate your system cost-effectively.

THE CONTECH WAY

Contech® Engineered Solutions provides innovative, cost-effective site solutions to engineers, contractors, and developers on projects across North America. Our portfolio includes bridges, drainage, erosion control, retaining wall, sanitary sewer and stormwater management products.

TAKE THE NEXT STEP

For more information: www.ContechES.com

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SITE SPECIFIC DATA*

PROJECT NUMBER	----
PROJECT NAME	----
PROJECT LOCATION	----
STRUCTURE ID	DSBB
WATER QUALITY FLOW RATE (CFS)	---
FULL CAPTURE TRASH FLOW RATE (CFS)	---
PEAK FLOW RATE (CFS)	---
PEAK STORM DURATION (YEARS)	---

PIPE DATA	I.E.	MATERIAL	DIAMETER
INFLOW PIPE 1	----	RCP	24"
OUTFLOW PIPE 1	----	RCP	24"
RIM ELEVATION	----		
SURFACE LOADING REQUIREMENT			HS20
FRAME AND COVER		(1) 36"x60"	
CORROSIVE SOIL CONDITIONS			NA
KNOWN GROUNDWATER ELEVATION			NA

NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.
STANDARD INTERNAL CAGE.

*PER ENGINEER OF RECORD

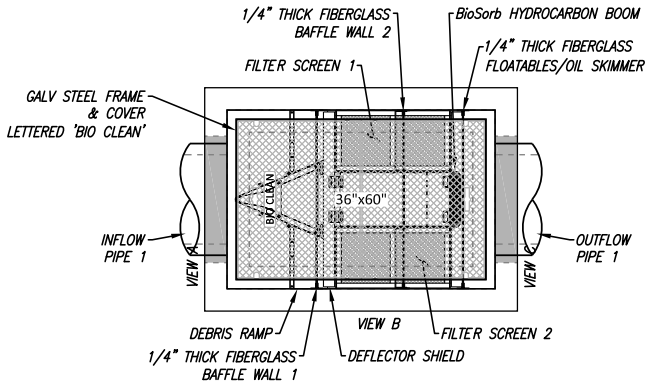
DSBB PERFORMANCE DATA

TREATMENT FLOW RATE (CFS)	---
FULL CAPTURE TRASH FLOW RATE (CFS)	---
SETTLING AREA (SF)	24.00
LOADING RATE (GPM/SF)	#####
SCREEN SYSTEM STORAGE CAPACITY (CF)	12.26
SEDIMENT STORAGE CAPACITY (CF)	71.50
FULL CAPTURE	

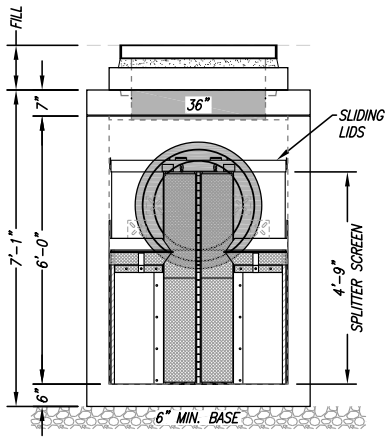
DSBB STORAGE CAPACITIES

CAGE SCREEN CAPACITY

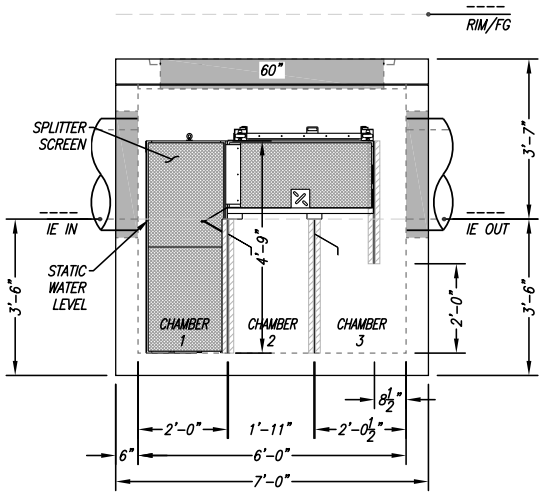
	LENGTH (FT)	WIDTH (FT)	HEIGHT (FT)	TOTAL (CF)
SCREEN 1	3.27	1.25	1.50	6.13
SCREEN 2	3.27	1.25	1.50	6.13
SEDIMENT CHAMBER CAPACITY				
CHAMBER 1	2.00	4.00	3.00	24.00
CHAMBER 2	1.92	4.00	3.00	23.00
CHAMBER 3	2.04	4.00	3.00	24.50



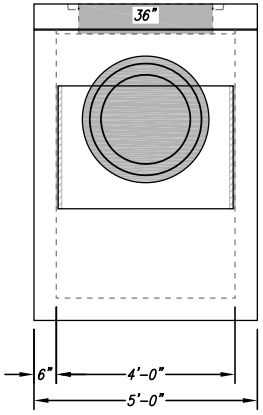
PLAN VIEW



INLET
ELEVATION VIEW A



ELEVATION VIEW B



OUTLET
ELEVATION VIEW C

GENERAL NOTES

1. BIO CLEAN TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS, AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS, AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS, AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE DEBRIS SEPARATING BAFFLE BOX AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. MANUFACTURER RECOMMENDS A 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PROJECT ENGINEER'S RECOMMENDED BASE SPECIFICATIONS.
3. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH).
4. ALL GAPS AROUND PIPES SHALL BE SEALED WATERTIGHT WITH A NON-SHRINK GROUT PER MANUFACTURER'S STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL PIPES, RISERS AND COVERS. ALL COVERS SHALL BE SHIPPED LOOSE. CONTRACTOR TO USE GROUT AND/OR BRICKS TO MATCH COVERS WITH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.

1:30 SCALE

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 6,428,692; 7,294,256; 7,846,327; 7,153,417; 7,270,747. RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:
THE INFORMATION CONTAINED IN THIS DOCUMENT IS THE SOLE PROPERTY OF FORTERRA AND ITS COMPANIES. THIS DOCUMENT, NOR ANY PART THEREOF, MAY BE USED, REPRODUCED OR MODIFIED IN ANY MANNER WITH OUT THE WRITTEN CONSENT OF FORTERRA.

Bio Clean
A Forterra Company

DSBB-4-6-72
DUAL STAGE HYDRODYNAMIC SEPARATOR
STANDARD DETAIL

3/30/2020SCOTT

Appendix 7:
Hydromodification & Critical Coarse Sediment

Supporting Detail for Hydromodification compliance & Exhibit G - CCSY & PSS Areas with the project location.

The preparer shall include the following in this Appendix (Refer to Section 2.4 and 3.6 of the SMR WQMP and Sections E of this Template):

- Hydromodification Exemption Exhibit (if the project is in an area exempt from Hydromod)
- Potential Critical Coarse Sediment Yield Area Mapping (to show if the site is out of a CCSYA)
- Hydromodification BMP sizing calculations (i.e. County Hydromod Spreadsheet – Hydromod, and BMP Design tabs, SMRHM report files, or other acceptable Hydromod calculations)
- Site-Specific Critical Coarse Sediment Analysis (if a project impacts a CCSYA)
- Design details/drawings from manufacturers for proprietary BMPs (if proprietary BMPs are proposed)

In addition, the project shall comply with drainage law and good practices:

- Protect the Site and Roads from Q100yr, without impacting adjacent property owners.
- Pad elevations must be above the Q100yr water surface at all locations.

I. Identify Offsite Hydrology

A. If the project intends to allow the flows to pass through the project uninterrupted, the flows must remain along its natural flow-path and natural condition. The project must also:
   (1) Ensure that the existing stream is stable. If not, the design must include stabilization.
   (2) Does the 100 year flow path affect proposed project elements, such as streets and fill slopes? If so, the project must properly design for impingements, provide revetment, etc. If the water surface changes due to impingements on neighbor's properties, Permission to pond letters must be provided.

B. If the project intends to collect and convey the offsite flows, see the next section:

II. Hydraulics

A. Project must provide collection inlets that can be accessed for maintenance. If located outside of the project boundary, the project must provide a Permission Letter or drainage easement. If the inlet creates new ponding on private property, the project must provide a Permission to Pond letter or easement.

B. The project should not divert watershed areas over 1 acre. If so, Permission Letter to accept project's diversion and drainage concept must be received by the project.

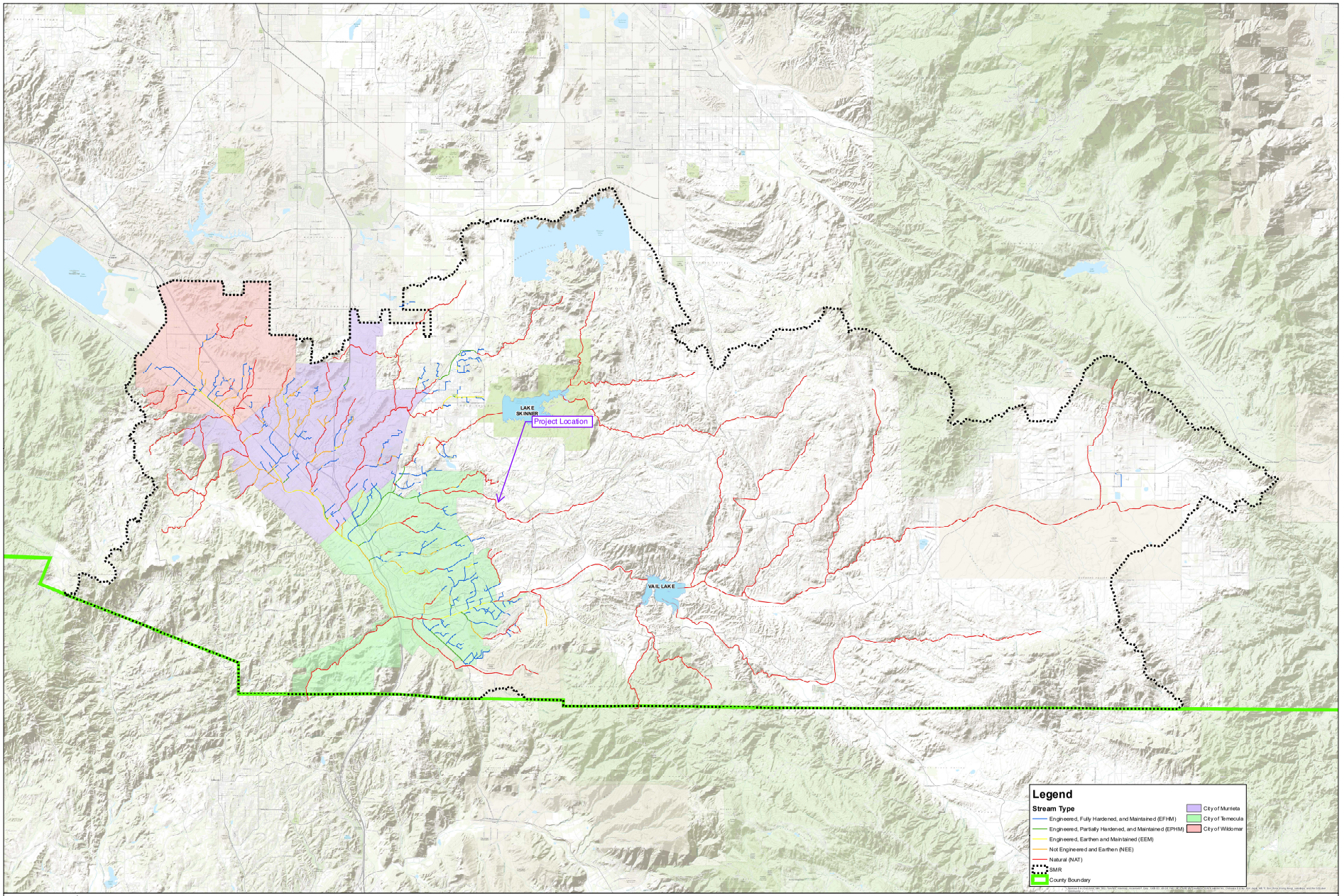
C. The project should have an adequate outlet. If not, include Permission Letters and implement Increased Runoff criteria (2, 5,10 year storm events and the 1, 3, 6 and 24 hour durations). 100 year storm routing is not to be used. Runoff from the offsite plus onsite must be returned to its natural (existing) condition of velocity, peak flow-rate, flow-width and location/right of way, if permission letters have not been obtained.

D. The project must adequately convey the 100 year storm between the combination of street flow and pipe flow per County Ordinance.

E. The project should use the downstream connection as the Q100yr water surface control elevation, to ensure 6 inches minimum of freeboard in proposed drainage system.

III. Basin Layout

A. Implement Basin Guidelines as best as possible from Appendix C, Design Handbook for LID BMPs.



Existing Stream Channel Delineation Map

Hydromodification Susceptibility Documentation Report and Mapping
SMR Copermittees

Santa Margarita Region - Map 1

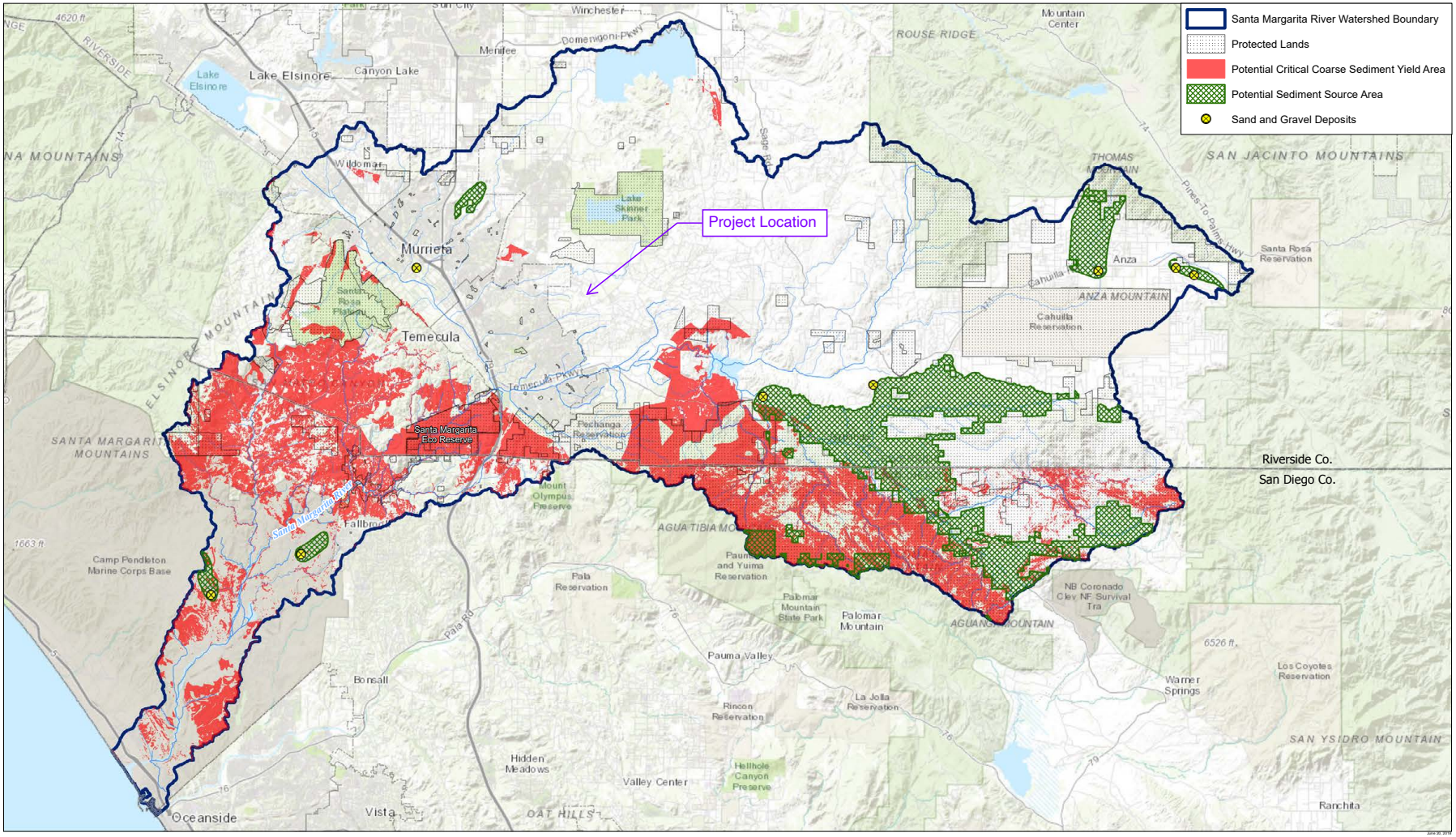


Exhibit G-1

SANTA MARGARITA RIVER WATERSHED
POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS AND POTENTIAL SEDIMENT SOURCE AREAS

SMRHM

PROJECT REPORT

General Model Information

Project Name: HCOC Analysis
Site Name:
Site Address:
City:
Report Date: 6/2/2023
Gage: Eastern Slopes
Data Start: 1949/10/01
Data End: 2011/09/30
Timestep: 15 Minute
Precip Scale: 1.000
Version Date: 2021/06/14

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data

Predeveloped Land Use

DMA A1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Grass,Mod(5-10%)	0.59
A,Grass,Flat(0-5%)	2.2
A,Grass,Stee(10-20%)	0.43
A,Grass,Very S(>20%)	1.56
Pervious Total	4.78

Impervious Land Use	acre
Impervious Total	0
Basin Total	4.78

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

DMA 1A

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
Roof Area	0.28
Impervious Total	0.28
Basin Total	0.28

Element Flows To:

Surface	Interflow	Groundwater
BMP-1A	BMP-1A	

DMA 3A

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Urban,Flat(0-5%)	0.1
A,Grass,Stee(10-20%)	0.35
Pervious Total	0.45

Impervious Land Use	acre
Driveways,Flat(0-5%)	0.6
Driveways,St(10-20%)	0.12
Impervious Total	0.72
Basin Total	1.17

Element Flows To:

Surface	Interflow	Groundwater
BMP-3A	BMP-3A	

DMA 2A-(Lowr Park+DG Dwy)

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Urban,Flat(0-5%)	0.04
A,Urban,Very S(>20%)	0.37
Pervious Total	0.41

Impervious Land Use	acre
Driveways,Flat(0-5%)	0.3
Driveways,St(10-20%)	0.1
Parking,Flat(0-5%)	0.18
Impervious Total	0.58
Basin Total	0.99

Element Flows To:

Surface	Interflow	Groundwater
BMP-2A	BMP-2A	

DMA 2A-(Upp. ParkingArea)

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A,Grass,Very S(>20%)	0.72
A,Grass,Flat(0-5%)	1.62
Pervious Total	2.34

Impervious Land Use	acre
Impervious Total	0
Basin Total	2.34

Element Flows To:

Surface	Interflow	Groundwater
BMP-2A	BMP-2A	

Routing Elements
Predeveloped Routing

Mitigated Routing

BMP-1A

Depth: 6.75 ft.
Discharge Structure: 1
Riser Height: 4.7 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 1 in. Elevation:1.2 ft.
Orifice 2 Diameter: 2.5 in. Elevation:3.5 ft.
Orifice 3 Diameter: 3 in. Elevation:4 ft.
Element Flows To:
Outlet 1 Outlet 2

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Outlet Struct	Infilt (cfs)	NotUsed	NotUsed	NotUsed
0.000	0.040	0.000	0.000	0.036	0.000	0.000	0.000
0.080	0.040	0.001	0.000	0.036	0.000	0.000	0.000
0.170	0.040	0.003	0.000	0.036	0.000	0.000	0.000
0.250	0.040	0.004	0.000	0.036	0.000	0.000	0.000
0.330	0.040	0.005	0.000	0.036	0.000	0.000	0.000
0.420	0.040	0.007	0.000	0.036	0.000	0.000	0.000
0.500	0.040	0.008	0.000	0.036	0.000	0.000	0.000
0.580	0.040	0.009	0.000	0.036	0.000	0.000	0.000
0.670	0.040	0.011	0.000	0.036	0.000	0.000	0.000
0.750	0.040	0.012	0.000	0.036	0.000	0.000	0.000
0.830	0.040	0.015	0.000	0.036	0.000	0.000	0.000
0.920	0.040	0.017	0.000	0.036	0.000	0.000	0.000
1.000	0.040	0.020	0.000	0.036	0.000	0.000	0.000
1.080	0.040	0.023	0.000	0.036	0.000	0.000	0.000
1.170	0.040	0.025	0.000	0.036	0.000	0.000	0.000
1.250	0.040	0.028	0.006	0.036	0.000	0.000	0.000
1.330	0.040	0.031	0.010	0.036	0.000	0.000	0.000
1.420	0.040	0.034	0.013	0.036	0.000	0.000	0.000
1.500	0.040	0.036	0.015	0.036	0.000	0.000	0.000
1.580	0.040	0.039	0.017	0.036	0.000	0.000	0.000
1.670	0.040	0.041	0.019	0.036	0.000	0.000	0.000
1.750	0.040	0.044	0.020	0.036	0.000	0.000	0.000
1.830	0.040	0.047	0.022	0.036	0.000	0.000	0.000
1.920	0.040	0.049	0.023	0.036	0.000	0.000	0.000
2.000	0.040	0.052	0.024	0.036	0.000	0.000	0.000
2.080	0.040	0.055	0.025	0.036	0.000	0.000	0.000
2.170	0.040	0.057	0.027	0.036	0.000	0.000	0.000
2.250	0.040	0.060	0.028	0.036	0.000	0.000	0.000
2.330	0.040	0.062	0.029	0.036	0.000	0.000	0.000
2.420	0.040	0.065	0.030	0.036	0.000	0.000	0.000
2.500	0.040	0.067	0.031	0.036	0.000	0.000	0.000
2.580	0.040	0.070	0.032	0.036	0.000	0.000	0.000
2.670	0.040	0.072	0.033	0.036	0.000	0.000	0.000
2.750	0.040	0.075	0.034	0.036	0.000	0.000	0.000
2.830	0.040	0.077	0.035	0.036	0.000	0.000	0.000
2.920	0.040	0.080	0.036	0.036	0.000	0.000	0.000
3.000	0.040	0.082	0.036	0.036	0.000	0.000	0.000
3.080	0.040	0.085	0.037	0.036	0.000	0.000	0.000
3.170	0.040	0.087	0.038	0.036	0.000	0.000	0.000

3.250	0.040	0.090	0.039	0.036	0.000	0.000	0.000
3.330	0.040	0.092	0.040	0.036	0.000	0.000	0.000
3.420	0.040	0.095	0.040	0.036	0.000	0.000	0.000
3.500	0.040	0.097	0.041	0.036	0.000	0.000	0.000
3.580	0.040	0.099	0.090	0.036	0.000	0.000	0.000
3.670	0.040	0.102	0.113	0.036	0.000	0.000	0.000
3.750	0.040	0.104	0.128	0.036	0.000	0.000	0.000
3.830	0.040	0.106	0.141	0.036	0.000	0.000	0.000
3.920	0.040	0.108	0.155	0.036	0.000	0.000	0.000
4.000	0.040	0.111	0.165	0.036	0.000	0.000	0.000
4.080	0.040	0.113	0.244	0.036	0.000	0.000	0.000
4.170	0.040	0.115	0.286	0.036	0.000	0.000	0.000
4.250	0.040	0.117	0.316	0.036	0.000	0.000	0.000
4.330	0.040	0.119	0.343	0.036	0.000	0.000	0.000
4.420	0.040	0.122	0.370	0.036	0.000	0.000	0.000
4.500	0.040	0.124	0.392	0.036	0.000	0.000	0.000
4.580	0.040	0.126	0.412	0.036	0.000	0.000	0.000
4.670	0.040	0.128	0.434	0.036	0.000	0.000	0.000
4.750	0.040	0.130	0.630	0.036	0.000	0.000	0.000
4.830	0.040	0.132	1.213	0.036	0.000	0.000	0.000
4.920	0.040	0.133	2.102	0.036	0.000	0.000	0.000
5.000	0.040	0.135	3.006	0.036	0.000	0.000	0.000
5.080	0.040	0.137	3.932	0.036	0.000	0.000	0.000
5.170	0.040	0.139	4.896	0.036	0.000	0.000	0.000
5.250	0.040	0.141	5.607	0.036	0.000	0.000	0.000
5.330	0.040	0.142	6.141	0.036	0.000	0.000	0.000
5.420	0.040	0.144	6.549	0.036	0.000	0.000	0.000
5.500	0.040	0.145	6.934	0.036	0.000	0.000	0.000
5.580	0.040	0.146	7.256	0.036	0.000	0.000	0.000
5.670	0.040	0.148	7.602	0.036	0.000	0.000	0.000
5.750	0.040	0.149	7.897	0.036	0.000	0.000	0.000
5.830	0.040	0.151	8.181	0.036	0.000	0.000	0.000
5.920	0.040	0.152	8.489	0.036	0.000	0.000	0.000
6.000	0.040	0.153	8.753	0.036	0.000	0.000	0.000
6.080	0.040	0.155	9.010	0.036	0.000	0.000	0.000
6.170	0.040	0.156	9.290	0.036	0.000	0.000	0.000
6.250	0.040	0.157	9.531	0.036	0.000	0.000	0.000
6.330	0.040	0.159	9.767	0.036	0.000	0.000	0.000
6.420	0.040	0.160	10.03	0.036	0.000	0.000	0.000
6.500	0.040	0.161	10.25	0.036	0.000	0.000	0.000
6.580	0.040	0.163	10.47	0.036	0.000	0.000	0.000
6.670	0.040	0.164	10.71	0.036	0.000	0.000	0.000
6.750	0.040	0.165	10.92	0.036	0.000	0.000	0.000

BMP-3A

Depth: 6.75 ft.
Discharge Structure: 1
Riser Height: 4.7 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 1 in. Elevation:1.2 ft.
Orifice 2 Diameter: 2.5 in. Elevation:3.5 ft.
Orifice 3 Diameter: 3 in. Elevation:4 ft.
Element Flows To:
Outlet 1 Outlet 2

SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Outlet Struct	Infilt (cfs)	NotUsed	NotUsed	NotUsed
0.000	0.046	0.000	0.000	0.041	0.000	0.000	0.000
0.080	0.046	0.002	0.000	0.041	0.000	0.000	0.000
0.170	0.046	0.003	0.000	0.041	0.000	0.000	0.000
0.250	0.046	0.005	0.000	0.041	0.000	0.000	0.000
0.330	0.046	0.006	0.000	0.041	0.000	0.000	0.000
0.420	0.046	0.008	0.000	0.041	0.000	0.000	0.000
0.500	0.046	0.009	0.000	0.041	0.000	0.000	0.000
0.580	0.046	0.011	0.000	0.041	0.000	0.000	0.000
0.670	0.046	0.012	0.000	0.041	0.000	0.000	0.000
0.750	0.046	0.014	0.000	0.041	0.000	0.000	0.000
0.830	0.046	0.017	0.000	0.041	0.000	0.000	0.000
0.920	0.046	0.020	0.000	0.041	0.000	0.000	0.000
1.000	0.046	0.023	0.000	0.041	0.000	0.000	0.000
1.080	0.046	0.026	0.000	0.041	0.000	0.000	0.000
1.170	0.046	0.029	0.000	0.041	0.000	0.000	0.000
1.250	0.046	0.032	0.006	0.041	0.000	0.000	0.000
1.330	0.046	0.035	0.010	0.041	0.000	0.000	0.000
1.420	0.046	0.038	0.013	0.041	0.000	0.000	0.000
1.500	0.046	0.041	0.015	0.041	0.000	0.000	0.000
1.580	0.046	0.045	0.017	0.041	0.000	0.000	0.000
1.670	0.046	0.048	0.019	0.041	0.000	0.000	0.000
1.750	0.046	0.051	0.020	0.041	0.000	0.000	0.000
1.830	0.046	0.054	0.022	0.041	0.000	0.000	0.000
1.920	0.046	0.057	0.023	0.041	0.000	0.000	0.000
2.000	0.046	0.060	0.024	0.041	0.000	0.000	0.000
2.080	0.046	0.063	0.025	0.041	0.000	0.000	0.000
2.170	0.046	0.066	0.027	0.041	0.000	0.000	0.000
2.250	0.046	0.069	0.028	0.041	0.000	0.000	0.000
2.330	0.046	0.072	0.029	0.041	0.000	0.000	0.000
2.420	0.046	0.074	0.030	0.041	0.000	0.000	0.000
2.500	0.046	0.077	0.031	0.041	0.000	0.000	0.000
2.580	0.046	0.080	0.032	0.041	0.000	0.000	0.000
2.670	0.046	0.083	0.033	0.041	0.000	0.000	0.000
2.750	0.046	0.086	0.034	0.041	0.000	0.000	0.000
2.830	0.046	0.089	0.035	0.041	0.000	0.000	0.000
2.920	0.046	0.092	0.036	0.041	0.000	0.000	0.000
3.000	0.046	0.095	0.036	0.041	0.000	0.000	0.000
3.080	0.046	0.098	0.037	0.041	0.000	0.000	0.000
3.170	0.046	0.100	0.038	0.041	0.000	0.000	0.000
3.250	0.046	0.103	0.039	0.041	0.000	0.000	0.000
3.330	0.046	0.106	0.040	0.041	0.000	0.000	0.000

3.420	0.046	0.109	0.040	0.041	0.000	0.000	0.000
3.500	0.046	0.111	0.041	0.041	0.000	0.000	0.000
3.580	0.046	0.114	0.090	0.041	0.000	0.000	0.000
3.670	0.046	0.117	0.113	0.041	0.000	0.000	0.000
3.750	0.046	0.119	0.128	0.041	0.000	0.000	0.000
3.830	0.046	0.122	0.141	0.041	0.000	0.000	0.000
3.920	0.046	0.125	0.155	0.041	0.000	0.000	0.000
4.000	0.046	0.127	0.165	0.041	0.000	0.000	0.000
4.080	0.046	0.130	0.244	0.041	0.000	0.000	0.000
4.170	0.046	0.132	0.286	0.041	0.000	0.000	0.000
4.250	0.046	0.135	0.316	0.041	0.000	0.000	0.000
4.330	0.046	0.137	0.343	0.041	0.000	0.000	0.000
4.420	0.046	0.140	0.370	0.041	0.000	0.000	0.000
4.500	0.046	0.142	0.392	0.041	0.000	0.000	0.000
4.580	0.046	0.145	0.412	0.041	0.000	0.000	0.000
4.670	0.046	0.147	0.434	0.041	0.000	0.000	0.000
4.750	0.046	0.149	0.630	0.041	0.000	0.000	0.000
4.830	0.046	0.151	1.213	0.041	0.000	0.000	0.000
4.920	0.046	0.154	2.102	0.041	0.000	0.000	0.000
5.000	0.046	0.156	3.006	0.041	0.000	0.000	0.000
5.080	0.046	0.158	3.932	0.041	0.000	0.000	0.000
5.170	0.046	0.160	4.896	0.041	0.000	0.000	0.000
5.250	0.046	0.162	5.607	0.041	0.000	0.000	0.000
5.330	0.046	0.164	6.141	0.041	0.000	0.000	0.000
5.420	0.046	0.165	6.549	0.041	0.000	0.000	0.000
5.500	0.046	0.167	6.934	0.041	0.000	0.000	0.000
5.580	0.046	0.169	7.256	0.041	0.000	0.000	0.000
5.670	0.046	0.170	7.602	0.041	0.000	0.000	0.000
5.750	0.046	0.172	7.897	0.041	0.000	0.000	0.000
5.830	0.046	0.173	8.181	0.041	0.000	0.000	0.000
5.920	0.046	0.175	8.489	0.041	0.000	0.000	0.000
6.000	0.046	0.176	8.753	0.041	0.000	0.000	0.000
6.080	0.046	0.178	9.010	0.041	0.000	0.000	0.000
6.170	0.046	0.179	9.290	0.041	0.000	0.000	0.000
6.250	0.046	0.181	9.531	0.041	0.000	0.000	0.000
6.330	0.046	0.182	9.767	0.041	0.000	0.000	0.000
6.420	0.046	0.184	10.03	0.041	0.000	0.000	0.000
6.500	0.046	0.185	10.25	0.041	0.000	0.000	0.000
6.580	0.046	0.187	10.47	0.041	0.000	0.000	0.000
6.670	0.046	0.188	10.71	0.041	0.000	0.000	0.000
6.750	0.046	0.190	10.92	0.041	0.000	0.000	0.000

BMP-2A

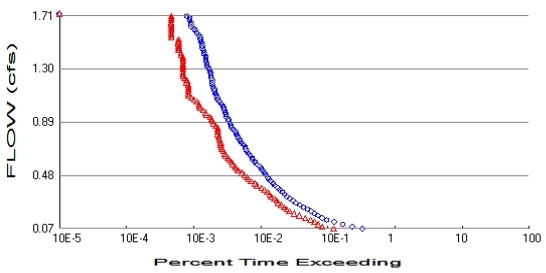
Depth: 6.75 ft.
Discharge Structure: 1
Riser Height: 4.7 ft.
Riser Diameter: 18 in.
Orifice 1 Diameter: 1 in. Elevation:1.2 ft.
Orifice 2 Diameter: 2.5 in. Elevation:3.5 ft.
Orifice 3 Diameter: 3 in. Elevation:4 ft.
Element Flows To:
Outlet 1 Outlet 2

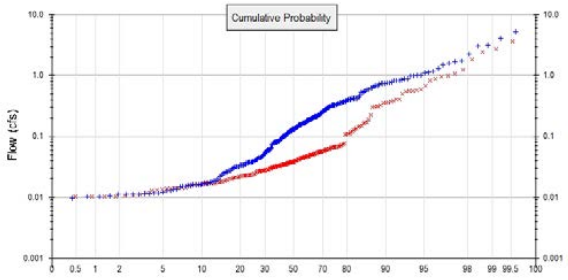
SSD Table Hydraulic Table

Stage (feet)	Area (ac.)	Volume (ac-ft.)	Outlet Struct	Infilt (cfs)	NotUsed	NotUsed	NotUsed
0.000	0.040	0.000	0.000	0.036	0.000	0.000	0.000
0.083	0.040	0.001	0.000	0.036	0.000	0.000	0.000
0.167	0.040	0.003	0.000	0.036	0.000	0.000	0.000
0.250	0.040	0.004	0.000	0.036	0.000	0.000	0.000
0.333	0.040	0.005	0.000	0.036	0.000	0.000	0.000
0.417	0.040	0.007	0.000	0.036	0.000	0.000	0.000
0.500	0.040	0.008	0.000	0.036	0.000	0.000	0.000
0.583	0.040	0.009	0.000	0.036	0.000	0.000	0.000
0.667	0.040	0.011	0.000	0.036	0.000	0.000	0.000
0.750	0.040	0.012	0.000	0.036	0.000	0.000	0.000
0.833	0.040	0.015	0.000	0.036	0.000	0.000	0.000
0.917	0.040	0.017	0.000	0.036	0.000	0.000	0.000
1.000	0.040	0.020	0.000	0.036	0.000	0.000	0.000
1.083	0.040	0.023	0.000	0.036	0.000	0.000	0.000
1.167	0.040	0.025	0.000	0.036	0.000	0.000	0.000
1.250	0.040	0.028	0.006	0.036	0.000	0.000	0.000
1.333	0.040	0.031	0.010	0.036	0.000	0.000	0.000
1.417	0.040	0.033	0.013	0.036	0.000	0.000	0.000
1.500	0.040	0.036	0.015	0.036	0.000	0.000	0.000
1.583	0.040	0.039	0.017	0.036	0.000	0.000	0.000
1.667	0.040	0.041	0.019	0.036	0.000	0.000	0.000
1.750	0.040	0.044	0.020	0.036	0.000	0.000	0.000
1.833	0.040	0.047	0.022	0.036	0.000	0.000	0.000
1.917	0.040	0.049	0.023	0.036	0.000	0.000	0.000
2.000	0.040	0.052	0.024	0.036	0.000	0.000	0.000
2.083	0.040	0.054	0.026	0.036	0.000	0.000	0.000
2.167	0.040	0.057	0.027	0.036	0.000	0.000	0.000
2.250	0.040	0.060	0.028	0.036	0.000	0.000	0.000
2.333	0.040	0.062	0.029	0.036	0.000	0.000	0.000
2.417	0.040	0.065	0.030	0.036	0.000	0.000	0.000
2.500	0.040	0.067	0.031	0.036	0.000	0.000	0.000
2.583	0.040	0.070	0.032	0.036	0.000	0.000	0.000
2.667	0.040	0.072	0.033	0.036	0.000	0.000	0.000
2.750	0.040	0.075	0.034	0.036	0.000	0.000	0.000
2.833	0.040	0.077	0.035	0.036	0.000	0.000	0.000
2.917	0.040	0.080	0.036	0.036	0.000	0.000	0.000
3.000	0.040	0.082	0.036	0.036	0.000	0.000	0.000
3.083	0.040	0.085	0.037	0.036	0.000	0.000	0.000
3.167	0.040	0.087	0.038	0.036	0.000	0.000	0.000
3.250	0.040	0.090	0.039	0.036	0.000	0.000	0.000
3.333	0.040	0.092	0.040	0.036	0.000	0.000	0.000

3.417	0.040	0.094	0.040	0.036	0.000	0.000	0.000
3.500	0.040	0.097	0.041	0.036	0.000	0.000	0.000
3.583	0.040	0.099	0.091	0.036	0.000	0.000	0.000
3.667	0.040	0.101	0.112	0.036	0.000	0.000	0.000
3.750	0.040	0.104	0.128	0.036	0.000	0.000	0.000
3.833	0.040	0.106	0.142	0.036	0.000	0.000	0.000
3.917	0.040	0.108	0.154	0.036	0.000	0.000	0.000
4.000	0.040	0.111	0.165	0.036	0.000	0.000	0.000
4.083	0.040	0.113	0.246	0.036	0.000	0.000	0.000
4.167	0.040	0.115	0.285	0.036	0.000	0.000	0.000
4.250	0.040	0.117	0.316	0.036	0.000	0.000	0.000
4.333	0.040	0.119	0.344	0.036	0.000	0.000	0.000
4.417	0.040	0.121	0.369	0.036	0.000	0.000	0.000
4.500	0.040	0.123	0.392	0.036	0.000	0.000	0.000
4.583	0.040	0.125	0.413	0.036	0.000	0.000	0.000
4.667	0.040	0.127	0.433	0.036	0.000	0.000	0.000
4.750	0.040	0.129	0.630	0.036	0.000	0.000	0.000
4.833	0.040	0.131	1.242	0.036	0.000	0.000	0.000
4.917	0.040	0.133	2.066	0.036	0.000	0.000	0.000
5.000	0.040	0.135	3.006	0.036	0.000	0.000	0.000
5.083	0.040	0.137	3.969	0.036	0.000	0.000	0.000
5.167	0.040	0.139	4.863	0.036	0.000	0.000	0.000
5.250	0.040	0.140	5.607	0.036	0.000	0.000	0.000
5.333	0.040	0.142	6.159	0.036	0.000	0.000	0.000
5.417	0.040	0.143	6.536	0.036	0.000	0.000	0.000
5.500	0.040	0.145	6.934	0.036	0.000	0.000	0.000
5.583	0.040	0.146	7.269	0.036	0.000	0.000	0.000
5.667	0.040	0.148	7.590	0.036	0.000	0.000	0.000
5.750	0.040	0.149	7.897	0.036	0.000	0.000	0.000
5.833	0.040	0.150	8.193	0.036	0.000	0.000	0.000
5.917	0.040	0.152	8.477	0.036	0.000	0.000	0.000
6.000	0.040	0.153	8.753	0.036	0.000	0.000	0.000
6.083	0.040	0.154	9.020	0.036	0.000	0.000	0.000
6.167	0.040	0.156	9.279	0.036	0.000	0.000	0.000
6.250	0.040	0.157	9.531	0.036	0.000	0.000	0.000
6.333	0.040	0.158	9.777	0.036	0.000	0.000	0.000
6.417	0.040	0.160	10.02	0.036	0.000	0.000	0.000
6.500	0.040	0.161	10.25	0.036	0.000	0.000	0.000
6.583	0.040	0.162	10.48	0.036	0.000	0.000	0.000
6.667	0.040	0.164	10.70	0.036	0.000	0.000	0.000
6.750	0.040	0.165	10.92	0.036	0.000	0.000	0.000

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 4.78
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 3.2
Total Impervious Area: 1.58

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.680718
5 year	1.09923
10 year	1.711489
25 year	3.244442

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.179732
5 year	0.581017
10 year	1.015266
25 year	2.454096

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0681	7076	2657	37	Pass
0.0847	4963	1792	36	Pass
0.1013	3600	1558	43	Pass
0.1179	2685	1366	50	Pass
0.1345	2081	1190	57	Pass
0.1511	1759	988	56	Pass
0.1677	1562	821	52	Pass
0.1843	1374	677	49	Pass
0.2009	1225	578	47	Pass
0.2175	1083	525	48	Pass
0.2341	942	480	50	Pass
0.2507	836	438	52	Pass
0.2673	726	396	54	Pass
0.2839	647	373	57	Pass
0.3005	583	343	58	Pass
0.3171	534	310	58	Pass
0.3337	494	292	59	Pass
0.3503	454	271	59	Pass
0.3669	418	243	58	Pass
0.3835	385	223	57	Pass
0.4001	353	190	53	Pass
0.4167	333	179	53	Pass
0.4333	308	155	50	Pass
0.4499	288	142	49	Pass
0.4665	275	134	48	Pass
0.4831	259	123	47	Pass
0.4997	247	113	45	Pass
0.5163	232	99	42	Pass
0.5329	220	94	42	Pass
0.5495	209	90	43	Pass
0.5661	188	83	44	Pass
0.5827	178	79	44	Pass
0.5993	164	74	45	Pass
0.6159	161	70	43	Pass
0.6325	150	65	43	Pass
0.6491	142	63	44	Pass
0.6657	134	60	44	Pass
0.6823	128	57	44	Pass
0.6989	126	56	44	Pass
0.7155	120	55	45	Pass
0.7321	112	55	49	Pass
0.7487	106	53	50	Pass
0.7653	102	52	50	Pass
0.7819	97	51	52	Pass
0.7985	94	50	53	Pass
0.8151	92	50	54	Pass
0.8317	86	49	56	Pass
0.8483	80	49	61	Pass
0.8649	78	46	58	Pass
0.8815	75	43	57	Pass
0.8981	72	41	56	Pass
0.9147	71	40	56	Pass
0.9313	67	38	56	Pass

0.9479	66	34	51	Pass
0.9645	65	33	50	Pass
0.9811	62	30	48	Pass
0.9977	61	27	44	Pass
1.0143	59	26	44	Pass
1.0309	56	26	46	Pass
1.0475	53	24	45	Pass
1.0641	49	22	44	Pass
1.0807	49	20	40	Pass
1.0973	47	18	38	Pass
1.1139	46	18	39	Pass
1.1305	44	18	40	Pass
1.1471	44	18	40	Pass
1.1637	42	18	42	Pass
1.1803	41	18	43	Pass
1.1969	41	17	41	Pass
1.2135	41	17	41	Pass
1.2301	40	16	40	Pass
1.2467	39	15	38	Pass
1.2633	39	15	38	Pass
1.2799	38	15	39	Pass
1.2965	37	15	40	Pass
1.3131	36	15	41	Pass
1.3297	34	15	44	Pass
1.3463	34	15	44	Pass
1.3629	33	15	45	Pass
1.3795	33	15	45	Pass
1.3961	33	15	45	Pass
1.4127	31	14	45	Pass
1.4293	31	14	45	Pass
1.4459	30	13	43	Pass
1.4625	29	13	44	Pass
1.4791	29	13	44	Pass
1.4957	29	13	44	Pass
1.5123	28	13	46	Pass
1.5289	27	13	48	Pass
1.5455	27	10	37	Pass
1.5621	26	10	38	Pass
1.5787	24	10	41	Pass
1.5953	23	10	43	Pass
1.6119	22	10	45	Pass
1.6285	20	10	50	Pass
1.6451	20	10	50	Pass
1.6617	20	10	50	Pass
1.6783	19	10	52	Pass
1.6949	19	10	52	Pass
1.7115	17	10	58	Pass

Water Quality

Drawdown Time Results

Pond: BMP-1A

Days	Stage(feet)	Percent of Total Run Time
1	0.015	1.7192
2	0.031	1.3809
3	0.047	1.1663
4	0.063	1.0504
5	0.079	0.9442

Maximum Stage: 4.700 Drawdown Time: 05 00:00:10

Pond: BMP-3A

Days	Stage(feet)	Percent of Total Run Time
1	0.007	3.3506
2	0.015	2.9863
3	0.023	2.8061
4	0.031	2.6628
5	0.039	2.5220

Maximum Stage: 4.700 Drawdown Time: 05 00:00:10

Pond: BMP-2A

Days	Stage(feet)	Percent of Total Run Time
1	0.012	4.2432
2	0.024	3.4759
3	0.037	3.1480
4	0.049	2.9977
5	0.062	2.9222

Maximum Stage: 4.700 Drawdown Time: 05 00:00:10

POC 2

POC #2 was not reported because POC must exist in both scenarios and both scenarios must have been run.

POC 3

POC #3 was not reported because POC must exist in both scenarios and both scenarios must have been run.

POC 4

POC #4 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Rational Method

Company Name
Designed by
Company Project Number/Name
Drainage Area Number/Name
Date
County/City Case No.

Township
Range
Section
85th Percentile

acre	Cover Type
	Roofs
	Concrete or Asphalt
	Grouted or Gapless Paving Blocks
	Compacted Soil (e.g. unpaved parking)
	Decomposed Granite
	Permeable Paving Blocks w/ Sand Filled Gap
	Class 2 Base
	Gravel or Class 2 Permeable Base
	Pervious Concrete / Porous Asphalt
	Open and Porous Pavers
	Turf block
	Ornamental Landscaping
	Natural (A Soil)
	Natural (B Soil)
	Natural (C Soil)
	Natural (D Soil)
	Mixed Surface Types Fraction = 0.00

Calculated Values
C = 0.00
Vu = 0.00 (in * ac)/ac
Vbmp = 0 ft3
Qbmp = 0.0 ft3/s

Model Default Modifications

Total of 0 changes have been made.

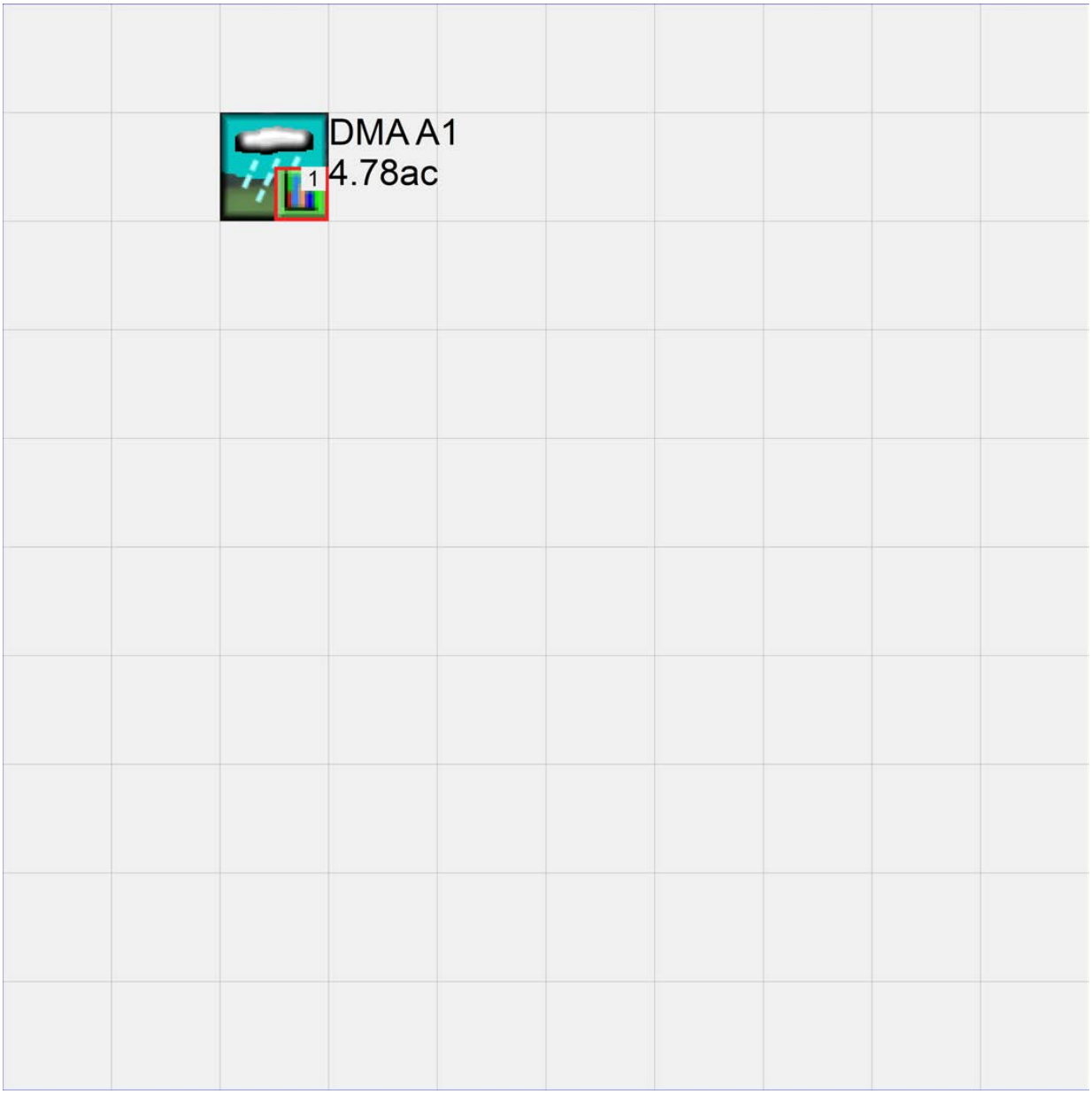
PERLND Changes

No PERLND changes have been made.

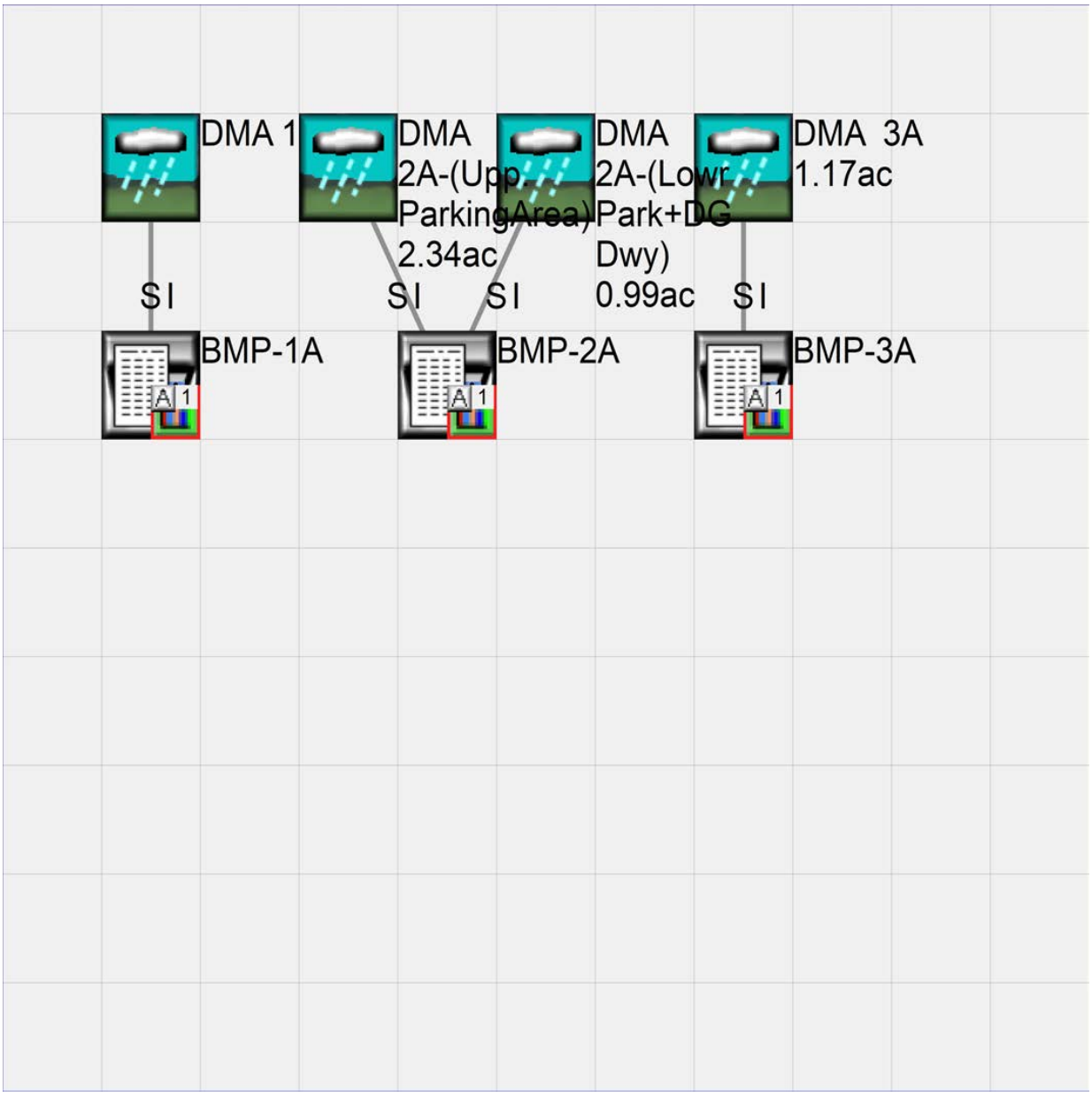
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM         26   HCOC Analysis.wdm
MESSU       25   PreHCOC Analysis.MES
            27   PreHCOC Analysis.L61
            28   PreHCOC Analysis.L62
            30   POCHCOC Analysis1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      PERLND      10
      PERLND       9
      PERLND      11
      PERLND      12
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        DMA A1                     MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                       in  out           ***
   10     A,Grass,Mod(5-10%)      1    1    1    1   27    0
    9     A,Grass,Flat(0-5%)      1    1    1    1   27    0
   11     A,Grass,Stee(10-20%)    1    1    1    1   27    0
   12     A,Grass,Very S(>20%)    1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
    9         0    0    1    0    0    0    0    0    0    0    0    0
   11         0    0    1    0    0    0    0    0    0    0    0    0
```

```
 12         0    0    1    0    0    0    0    0    0    0    0    0
END ACTIVITY

PRINT-INFO
  <PLS > ***************** Print-flags **************************** PIVL  PYR
  # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
 10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  9         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 12         0    0    4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
 10         0    0    0    1    0    0    0    0    1    0    0
  9         0    0    0    1    0    0    0    0    1    0    0
 11         0    0    0    1    0    0    0    0    1    0    0
 12         0    0    0    1    0    0    0    0    1    0    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >      PWATER input info: Part 2         ***
  # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
 10              0       4.8      0.07       350       0.1       0.8     0.955
  9              0       5.2      0.09       400      0.05       0.8     0.955
 11              0       4.5     0.045       300      0.15       0.8     0.955
 12              0       4.2      0.04       200      0.25       0.8     0.955
END PWAT-PARM2

PWAT-PARM3
  <PLS >      PWATER input info: Part 3         ***
  # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
 10             40        35         2         2      0.02      0.03         0
  9             40        35         2         2      0.02      0.03         0
 11             40        35         2         2      0.02      0.03         0
 12             40        35         2         2      0.02      0.03         0
END PWAT-PARM3
PWAT-PARM4
  <PLS >     PWATER input info: Part 4                              ***
  # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
 10             0       0.7      0.25       3.2      0.45         0
  9             0       0.8      0.25         4       0.7         0
 11             0      0.55      0.25       2.6       0.4         0
 12             0       0.3      0.25       1.8      0.35         0
END PWAT-PARM4
MON-LZETPARM
  <PLS >      PWATER input info: Part 3         ***
  # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
 10      0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  9      0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
 11      0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
 12      0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
END MON-LZETPARM
MON-INTERCEP
  <PLS >      PWATER input info: Part 3         ***
  # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
 10     0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
  9     0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
 11     0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
 12     0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
END MON-INTERCEP

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
           ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # -  # ***  CEPS      SURS       UZS       IFWS       LZS       AGWS      GWVS
 10             0         0      0.01          0       0.5        0.3      0.01
  9             0         0      0.01          0       0.5        0.3      0.01
 11             0         0      0.01          0       0.5        0.3      0.01
```

```
   12              0         0      0.01         0       0.5       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

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

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

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

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

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
DMA A1***
PERLND  10                        0.59     COPY   501     12
PERLND  10                        0.59     COPY   501     13
PERLND   9                         2.2     COPY   501     12
PERLND   9                         2.2     COPY   501     13
PERLND  11                        0.43     COPY   501     12
PERLND  11                        0.43     COPY   501     13
PERLND  12                        1.56     COPY   501     12
PERLND  12                        1.56     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



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

```
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13
```

```
END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1949 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM         26   HCOC Analysis.wdm
MESSU       25   MitHCOC Analysis.MES
            27   MitHCOC Analysis.L61
            28   MitHCOC Analysis.L62
            30   POCHCOC Analysis1.dat
END FILES

OPN SEQUENCE
    INGRP               INDELT 00:15
      IMPLND       5
      PERLND      13
      PERLND      11
      IMPLND       6
      IMPLND       8
      PERLND      16
      IMPLND      14
      PERLND      12
      PERLND       9
      RCHRES       1
      RCHRES       2
      RCHRES       3
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        BMP-1A                     MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
   13     A,Urban,Flat(0-5%)      1    1    1    1   27    0
   11     A,Grass,Stee(10-20%)    1    1    1    1   27    0
   16     A,Urban,Very S(>20%)    1    1    1    1   27    0
   12     A,Grass,Very S(>20%)    1    1    1    1   27    0
```

```
  9     A,Grass,Flat(0-5%)      1    1    1    1   27    0
END GEN-INFO
*** Section PWATER***

ACTIVITY
  <PLS > ************* Active Sections ******************************
  # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
 13         0    0    1    0    0    0    0    0    0    0    0    0
 11         0    0    1    0    0    0    0    0    0    0    0    0
 16         0    0    1    0    0    0    0    0    0    0    0    0
 12         0    0    1    0    0    0    0    0    0    0    0    0
  9         0    0    1    0    0    0    0    0    0    0    0    0
END ACTIVITY

PRINT-INFO
  <PLS > ***************** Print-flags **************************** PIVL  PYR
  # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
 13         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 11         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 12         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  9         0    0    4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
 13         0    0    0    1    0    0    0    0    1    0    0
 11         0    0    0    1    0    0    0    0    1    0    0
 16         0    0    0    1    0    0    0    0    1    0    0
 12         0    0    0    1    0    0    0    0    1    0    0
  9         0    0    0    1    0    0    0    0    1    0    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >      PWATER input info: Part 2         ***
  # -  # ***FOREST      LZSN     INFILT      LSUR      SLSUR      KVARY      AGWRC
 13              0         5       0.06       400       0.05        1.2      0.997
 11              0       4.5      0.045       300       0.15        0.8      0.955
 16              0       3.8       0.03       200       0.25        1.2      0.997
 12              0       4.2       0.04       200       0.25        0.8      0.955
  9              0       5.2       0.09       400       0.05        0.8      0.955
END PWAT-PARM2

PWAT-PARM3
  <PLS >      PWATER input info: Part 3         ***
  # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
 13             40        35         2         2      0.06      0.03         0
 11             40        35         2         2      0.02      0.03         0
 16             40        35         2         2      0.06      0.03         0
 12             40        35         2         2      0.02      0.03         0
  9             40        35         2         2      0.02      0.03         0
END PWAT-PARM3
PWAT-PARM4
  <PLS >     PWATER input info: Part 4                              ***
  # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
 13              0       0.7      0.25         3       0.4         0
 11              0      0.55      0.25       2.6       0.4         0
 16              0       0.3      0.25         1       0.3         0
 12              0       0.3      0.25       1.8      0.35         0
  9              0       0.8      0.25         4       0.7         0
END PWAT-PARM4
MON-LZETPARM
  <PLS >      PWATER input info: Part 3         ***
  # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
 13       0.5  0.5  0.5  0.6 0.65 0.65 0.65 0.65 0.65 0.65 0.55  0.5
 11       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
 16       0.5  0.5  0.5  0.6 0.65 0.65 0.65 0.65 0.65 0.65 0.55  0.5
 12       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
  9       0.4  0.4  0.4 0.45  0.5 0.55 0.55 0.55 0.55 0.55 0.45  0.4
```

```
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >       PWATER input info: Part 3          ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
   13      0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11
   11      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
   16      0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11 0.11
   12      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
    9      0.12 0.12 0.12 0.11  0.1  0.1  0.1  0.1  0.1  0.1 0.11 0.12
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   13              0         0      0.01         0       3.5       1.5       0.1
   11              0         0      0.01         0       0.5       0.3      0.01
   16              0         0      0.01         0       3.5       1.5       0.1
   12              0         0      0.01         0       0.5       0.3      0.01
    9              0         0      0.01         0       0.5       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    5     Roof Area               1    1    1   27    0
    6     Driveways,Flat(0-5%)    1    1    1   27    0
    8     Driveways,St(10-20%)    1    1    1   27    0
   14     Parking,Flat(0-5%)      1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    5         0    0    1    0    0    0
    6         0    0    1    0    0    0
    8         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    5         0    0    4    0    0    0    1    9
    6         0    0    4    0    0    0    1    9
    8         0    0    4    0    0    0    1    9
   14         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    5         0    0    0    0    0
    6         0    0    0    0    0
    8         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >       IWATER input info: Part 2          ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    5            100      0.05       0.1       0.1
    6            100      0.05       0.1       0.1
    8            100      0.15       0.1      0.08
   14            100      0.05       0.1       0.1
```

```
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    5              0         0
    6              0         0
    8              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    5              0         0
    6              0         0
    8              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
DMA 1A***
IMPLND   5                        0.28     RCHRES   1      5
DMA  3A***
PERLND  13                         0.1     RCHRES   2      2
PERLND  13                         0.1     RCHRES   2      3
PERLND  11                        0.35     RCHRES   2      2
PERLND  11                        0.35     RCHRES   2      3
IMPLND   6                         0.6     RCHRES   2      5
IMPLND   8                        0.12     RCHRES   2      5
DMA  2A-(Lowr Park+DG Dwy)***
PERLND  13                        0.04     RCHRES   3      2
PERLND  13                        0.04     RCHRES   3      3
PERLND  16                        0.37     RCHRES   3      2
PERLND  16                        0.37     RCHRES   3      3
IMPLND   6                         0.3     RCHRES   3      5
IMPLND   8                         0.1     RCHRES   3      5
IMPLND  14                        0.18     RCHRES   3      5
DMA  2A-(Upp. ParkingArea)***
PERLND  12                        0.72     RCHRES   3      2
PERLND  12                        0.72     RCHRES   3      3
PERLND   9                        1.62     RCHRES   3      2
PERLND   9                        1.62     RCHRES   3      3

******Routing******
IMPLND   5                        0.28     COPY     1     15
PERLND  13                         0.1     COPY     1     12
PERLND  11                        0.35     COPY     1     12
IMPLND   6                         0.6     COPY     1     15
IMPLND   8                        0.12     COPY     1     15
PERLND  13                         0.1     COPY     1     13
PERLND  11                        0.35     COPY     1     13
PERLND  13                        0.04     COPY     1     12
PERLND  16                        0.37     COPY     1     12
IMPLND   6                         0.3     COPY     1     15
IMPLND   8                         0.1     COPY     1     15
IMPLND  14                        0.18     COPY     1     15
PERLND  13                        0.04     COPY     1     13
PERLND  16                        0.37     COPY     1     13
PERLND  12                        0.72     COPY     1     12
PERLND   9                        1.62     COPY     1     12
PERLND  12                        0.72     COPY     1     13
PERLND   9                        1.62     COPY     1     13
RCHRES   1                           1     COPY   501     17
RCHRES   2                           1     COPY   501     17
RCHRES   3                           1     COPY   501     17
```

```
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



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

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                        in  out                              ***
    1     BMP-1A                  2    1    1    1   28    0    1
    2     BMP-3A                  2    1    1    1   28    0    1
    3     BMP-2A                  2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

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

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

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

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS       DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1              1      0.01       0.0       0.0       0.5       0.0
    2              2      0.01       0.0       0.0       0.5       0.0
    3              3      0.01       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
```

```
FTABLES
  FTABLE      1
   62    5
     Depth      Area     Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.040024  0.000000  0.000000  0.000000
  0.080000  0.040024  0.001000  0.000000  0.035959
  0.170000  0.040024  0.003000  0.000000  0.035959
  0.250000  0.040024  0.004000  0.000000  0.035959
  0.330000  0.040024  0.005000  0.000000  0.035959
  0.420000  0.040024  0.007000  0.000000  0.035959
  0.500000  0.040024  0.008000  0.000000  0.035959
  0.580000  0.040024  0.009000  0.000000  0.035959
  0.670000  0.040024  0.011000  0.000000  0.035959
  0.750000  0.040024  0.012000  0.000000  0.035959
  0.830000  0.040024  0.015000  0.000000  0.035959
  0.920000  0.040024  0.017000  0.000000  0.035959
  1.000000  0.040024  0.020000  0.000000  0.035959
  1.080000  0.040024  0.023000  0.000000  0.035959
  1.170000  0.040024  0.025000  0.000000  0.035959
  1.250000  0.040024  0.028000  0.006068  0.035959
  1.330000  0.040024  0.031000  0.009784  0.035959
  1.420000  0.040024  0.034000  0.012728  0.035959
  1.500000  0.040024  0.036000  0.014863  0.035959
  1.580000  0.040024  0.039000  0.016728  0.035959
  1.670000  0.040024  0.041000  0.018604  0.035959
  1.750000  0.040024  0.044000  0.020125  0.035959
  1.830000  0.040024  0.047000  0.021539  0.035959
  1.920000  0.040024  0.049000  0.023026  0.035959
  2.000000  0.040024  0.052000  0.024272  0.035959
  2.080000  0.040024  0.055000  0.025457  0.035959
  2.170000  0.040024  0.057000  0.026727  0.035959
  2.250000  0.040024  0.060000  0.027807  0.035959
  2.330000  0.040024  0.062000  0.028847  0.035959
  2.420000  0.040024  0.065000  0.029974  0.035959
  2.500000  0.040024  0.067000  0.030941  0.035959
  2.580000  0.040024  0.070000  0.031879  0.035959
  2.670000  0.040024  0.072000  0.032902  0.035959
  2.750000  0.040024  0.075000  0.033785  0.035959
  2.830000  0.040024  0.077000  0.034646  0.035959
  2.920000  0.040024  0.080000  0.035590  0.035959
  3.000000  0.040024  0.082000  0.036408  0.035959
  3.080000  0.040024  0.085000  0.037208  0.035959
  3.170000  0.040024  0.087000  0.038088  0.035959
  3.250000  0.040024  0.090000  0.038854  0.035959
  3.330000  0.040024  0.092000  0.039605  0.035959
  3.420000  0.040024  0.095000  0.040433  0.035959
  3.500000  0.040024  0.097000  0.041155  0.035959
  3.580000  0.040024  0.099000  0.089836  0.035959
  3.670000  0.040024  0.102000  0.112579  0.035959
  3.750000  0.040024  0.104000  0.128137  0.035959
  3.830000  0.040024  0.106000  0.141439  0.035959
  3.920000  0.040024  0.108000  0.154672  0.035959
  4.000000  0.040024  0.111000  0.165337  0.035959
  4.080000  0.040024  0.113000  0.244299  0.035959
  4.170000  0.040024  0.115000  0.286294  0.035959
  4.250000  0.040024  0.117000  0.316390  0.035959
  4.330000  0.040024  0.119000  0.342828  0.035959
  4.420000  0.040024  0.122000  0.369655  0.035959
  4.500000  0.040024  0.124000  0.391599  0.035959
  4.580000  0.040024  0.126000  0.412150  0.035959
  4.670000  0.040024  0.128000  0.433918  0.035959
  4.750000  0.040024  0.130000  0.630116  0.035959
  4.830000  0.040024  0.132000  1.212727  0.035959
  4.920000  0.040024  0.133000  2.102019  0.035959
  5.000000  0.040024  0.135000  3.006115  0.035959
  5.080000  0.040024  0.137000  3.931565  0.035959
  END FTABLE  1
  FTABLE      2
   62    5
```

```
   Depth      Area     Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.045614  0.000000  0.000000  0.000000
0.080000  0.045614  0.002000  0.000000  0.040981
0.170000  0.045614  0.003000  0.000000  0.040981
0.250000  0.045614  0.005000  0.000000  0.040981
0.330000  0.045614  0.006000  0.000000  0.040981
0.420000  0.045614  0.008000  0.000000  0.040981
0.500000  0.045614  0.009000  0.000000  0.040981
0.580000  0.045614  0.011000  0.000000  0.040981
0.670000  0.045614  0.012000  0.000000  0.040981
0.750000  0.045614  0.014000  0.000000  0.040981
0.830000  0.045614  0.017000  0.000000  0.040981
0.920000  0.045614  0.020000  0.000000  0.040981
1.000000  0.045614  0.023000  0.000000  0.040981
1.080000  0.045614  0.026000  0.000000  0.040981
1.170000  0.045614  0.029000  0.000000  0.040981
1.250000  0.045614  0.032000  0.006068  0.040981
1.330000  0.045614  0.035000  0.009784  0.040981
1.420000  0.045614  0.038000  0.012728  0.040981
1.500000  0.045614  0.041000  0.014863  0.040981
1.580000  0.045614  0.045000  0.016728  0.040981
1.670000  0.045614  0.048000  0.018604  0.040981
1.750000  0.045614  0.051000  0.020125  0.040981
1.830000  0.045614  0.054000  0.021539  0.040981
1.920000  0.045614  0.057000  0.023026  0.040981
2.000000  0.045614  0.060000  0.024272  0.040981
2.080000  0.045614  0.063000  0.025457  0.040981
2.170000  0.045614  0.066000  0.026727  0.040981
2.250000  0.045614  0.069000  0.027807  0.040981
2.330000  0.045614  0.072000  0.028847  0.040981
2.420000  0.045614  0.074000  0.029974  0.040981
2.500000  0.045614  0.077000  0.030941  0.040981
2.580000  0.045614  0.080000  0.031879  0.040981
2.670000  0.045614  0.083000  0.032902  0.040981
2.750000  0.045614  0.086000  0.033785  0.040981
2.830000  0.045614  0.089000  0.034646  0.040981
2.920000  0.045614  0.092000  0.035590  0.040981
3.000000  0.045614  0.095000  0.036408  0.040981
3.080000  0.045614  0.098000  0.037208  0.040981
3.170000  0.045614  0.100000  0.038088  0.040981
3.250000  0.045614  0.103000  0.038854  0.040981
3.330000  0.045614  0.106000  0.039605  0.040981
3.420000  0.045614  0.109000  0.040433  0.040981
3.500000  0.045614  0.111000  0.041155  0.040981
3.580000  0.045614  0.114000  0.089836  0.040981
3.670000  0.045614  0.117000  0.112579  0.040981
3.750000  0.045614  0.119000  0.128137  0.040981
3.830000  0.045614  0.122000  0.141439  0.040981
3.920000  0.045614  0.125000  0.154672  0.040981
4.000000  0.045614  0.127000  0.165337  0.040981
4.080000  0.045614  0.130000  0.244299  0.040981
4.170000  0.045614  0.132000  0.286294  0.040981
4.250000  0.045614  0.135000  0.316390  0.040981
4.330000  0.045614  0.137000  0.342828  0.040981
4.420000  0.045614  0.140000  0.369655  0.040981
4.500000  0.045614  0.142000  0.391599  0.040981
4.580000  0.045614  0.145000  0.412150  0.040981
4.670000  0.045614  0.147000  0.433918  0.040981
4.750000  0.045614  0.149000  0.630116  0.040981
4.830000  0.045614  0.151000  1.212727  0.040981
4.920000  0.045614  0.154000  2.102019  0.040981
5.000000  0.045614  0.156000  3.006115  0.040981
5.080000  0.045614  0.158000  3.931565  0.040981
END FTABLE  2
FTABLE      3
 82    5
   Depth      Area     Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.039921  0.000000  0.000000  0.000000
```

0.083333	0.039921	0.001330	0.000000	0.035866
0.166666	0.039921	0.002661	0.000000	0.035866
0.250000	0.039921	0.003992	0.000000	0.035866
0.333333	0.039921	0.005322	0.000000	0.035866
0.416666	0.039921	0.006653	0.000000	0.035866
0.500000	0.039921	0.007984	0.000000	0.035866
0.583333	0.039921	0.009315	0.000000	0.035866
0.666666	0.039921	0.010645	0.000000	0.035866
0.750000	0.039921	0.011976	0.000000	0.035866
0.833333	0.039921	0.014682	0.000000	0.035866
0.916666	0.039921	0.017379	0.000000	0.035866
1.000000	0.039921	0.020072	0.000000	0.035866
1.083333	0.039921	0.022760	0.000000	0.035866
1.166666	0.039921	0.025441	0.000000	0.035866
1.250000	0.039921	0.028117	0.006068	0.035866
1.333333	0.039921	0.030787	0.009909	0.035866
1.416666	0.039921	0.033451	0.012631	0.035866
1.500000	0.039921	0.036109	0.014863	0.035866
1.583333	0.039921	0.038759	0.016801	0.035866
1.666666	0.039921	0.041402	0.018538	0.035866
1.750000	0.039921	0.044037	0.020125	0.035866
1.833333	0.039921	0.046664	0.021596	0.035866
1.916666	0.039921	0.049280	0.022973	0.035866
2.000000	0.039921	0.051889	0.024272	0.035866
2.083333	0.039921	0.054488	0.025505	0.035866
2.166666	0.039921	0.057078	0.026681	0.035866
2.250000	0.039921	0.059657	0.027807	0.035866
2.333333	0.039921	0.062224	0.028889	0.035866
2.416666	0.039921	0.064781	0.029933	0.035866
2.500000	0.039921	0.067326	0.030941	0.035866
2.583333	0.039921	0.069860	0.031917	0.035866
2.666666	0.039921	0.072379	0.032864	0.035866
2.750000	0.039921	0.074886	0.033785	0.035866
2.833333	0.039921	0.077379	0.034681	0.035866
2.916666	0.039921	0.079858	0.035555	0.035866
3.000000	0.039921	0.082323	0.036408	0.035866
3.083333	0.039921	0.084772	0.037241	0.035866
3.166666	0.039921	0.087206	0.038056	0.035866
3.250000	0.039921	0.089623	0.038854	0.035866
3.333333	0.039921	0.092022	0.039636	0.035866
3.416666	0.039921	0.094404	0.040403	0.035866
3.500000	0.039921	0.096767	0.041155	0.035866
3.583333	0.039921	0.099110	0.090855	0.035866
3.666666	0.039921	0.101435	0.111861	0.035866
3.750000	0.039921	0.103739	0.128137	0.035866
3.833333	0.039921	0.106021	0.141958	0.035866
3.916666	0.039921	0.108282	0.154207	0.035866
4.000000	0.039921	0.110521	0.165337	0.035866
4.083333	0.039921	0.112735	0.246121	0.035866
4.166666	0.039921	0.114924	0.284929	0.035866
4.250000	0.039921	0.117087	0.316390	0.035866
4.333333	0.039921	0.119223	0.343870	0.035866
4.416666	0.039921	0.121329	0.368705	0.035866
4.500000	0.039921	0.123406	0.391599	0.035866
4.583333	0.039921	0.125451	0.412980	0.035866
4.666666	0.039921	0.127462	0.433134	0.035866
4.750000	0.039921	0.129438	0.630116	0.035866
4.833333	0.039921	0.131376	1.241983	0.035866
4.916666	0.039921	0.133273	2.066031	0.035866
5.000000	0.039921	0.135125	3.006115	0.035866
5.083333	0.039921	0.136927	3.969350	0.035866
5.166666	0.039921	0.138672	4.862826	0.035866
5.250000	0.039921	0.140347	5.607411	0.035866
5.333333	0.039921	0.141914	6.159166	0.035866
5.416666	0.039921	0.143387	6.535971	0.035866
5.500000	0.039921	0.144828	6.933759	0.035866
5.583333	0.039921	0.146246	7.269397	0.035866
5.666666	0.039921	0.147638	7.589858	0.035866
5.750000	0.039921	0.148991	7.897053	0.035866
5.833333	0.039921	0.150321	8.192512	0.035866

```
  5.916666  0.039921  0.151652  8.477497  0.035866
  6.000000  0.039921  0.152983  8.753062  0.035866
  6.083333  0.039921  0.154314  9.020084  0.035866
  6.166666  0.039921  0.155644  9.279318  0.035866
  6.250000  0.039921  0.156975  9.531417  0.035866
  6.333333  0.039921  0.158306  9.776938  0.035866
  6.416666  0.039921  0.159637  10.01637  0.035866
  6.500000  0.039921  0.160967  10.25016  0.035866
  6.583333  0.039921  0.162298  10.47868  0.035866
  6.666666  0.039921  0.163629  10.70228  0.035866
  6.750000  0.039921  0.164959  10.92127  0.035866
  END FTABLE  3
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM     22 IRRG     ENGL    0.7       SAME PERLND  13     EXTNL  SURLI
WDM     22 IRRG     ENGL    0.7       SAME PERLND  16     EXTNL  SURLI

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1         1      WDM   1016 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1         1      WDM   1017 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1         1      WDM   1018 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1         1      WDM   1019 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1      48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1      48.4      WDM    801 FLOW     ENGL      REPL
RCHRES   2 HYDR   RO     1 1         1      WDM   1024 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1         1      WDM   1025 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1         1      WDM   1026 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1         1      WDM   1027 STAG     ENGL      REPL
RCHRES   3 HYDR   RO     1 1         1      WDM   1028 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      1 1         1      WDM   1029 FLOW     ENGL      REPL
RCHRES   3 HYDR   O      2 1         1      WDM   1030 FLOW     ENGL      REPL
RCHRES   3 HYDR   STAGE  1 1         1      WDM   1031 STAG     ENGL      REPL
END EXT TARGETS

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

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

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

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
```

```
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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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.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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☐ **H.** Industrial processes.	☐ Show process area.	☐ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	☐ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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☐ I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

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

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

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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☐ **P.** Plazas, sidewalks, and parking lots.			☑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

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

For the Final WQMP the following information shall be provided:

1. Maintenance Plan per Section 5.3.5 of the WQMP Guidance Document. County will regularly inspect BMPs, so BMPs without access (e.g. backyards, etc) will be rejected. Due to liability, the County does not allow for overlapping private maintenance in the public right-of-way.
2. For all projects, include one wet-signed and notarized hardcopy of the BMP Maintenance agreement. Please note, references to Exhibit A and B on Page 1can be struck out if the entire parcel is mentioned in the "Legal Description" on Page 1 of the agreement. Otherwise see below for Exhibit A and B standards. For BMP agreement, ensure that the name on the agreement matches throughout and the notary sheet, Notary shall be the latest California format, the date of the agreement is the date of the notary, all text does not exceed the margins, then the County will sign, attest & record
3. For Tracts, contact County EDA regarding maintenance determinations/formations. Include a completed Exhibit B.9 - WQMP O&M Cost Sheet.xlsx that is signed by both the preparer (to ensure quantities are correct) and the owner (to understand the maintenance obligations in perpetuity) & an Approved Maintenance Exhibit from EDA.
4. For Tracts or any project , written documentation from the maintenance entity that they are willing to maintain (e.g. CFD, CSA, L&LMD, etc.)

BMP EXHIBIT "A" STANDARDS

1. Use the legal description of the parcel as shown on the tentative exhibit. If not available, use the one in the most current title report.
2. As a backup, if the project is a map the description of the future lot may be included for reference

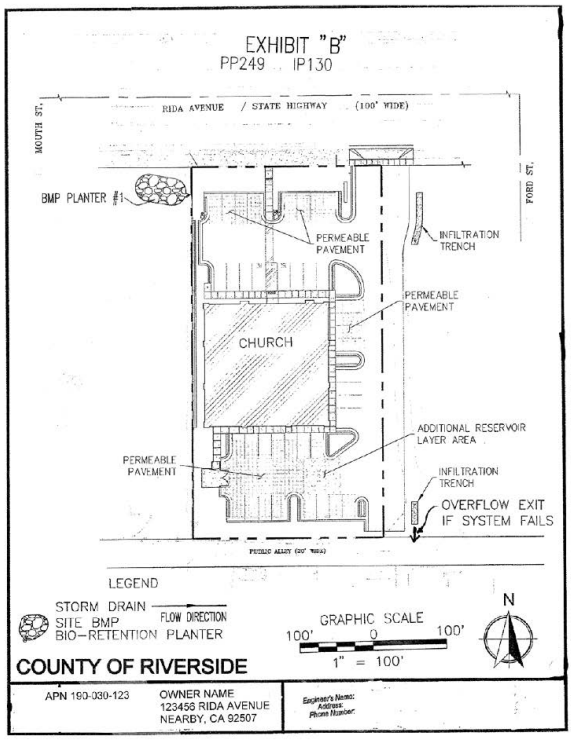
BMP EXHIBIT "B" STANDARDS

1. 0.12" minimum lettering
2. Sheet size must be 8.5" x 11"
3. Show Street names, north arrow
4. Indicate point of flow exit into street if basin system fails
5. Indicate Q100 of flow exit into street
6. Indicate direction of flow exit into street
7. Indicate by notation and/or show nearest downstream drainage facility (catch basin, culvert, riser, etc)
8. Show "Exhibit A", IP and project number (TR, PM, PUP, PP etc)
9. Title block, signature block, engineer seals, USA note is not necessary on Exhibit
10. Show scale used for drawing, provide 4" graphic scale

MAINTENANCE EXHIBIT "B" STANDARDS

1. 0.12" minimum lettering
2. Sheet size must be 8.5" x 11"
3. Show street names, north arrow
4. Show "Exhibit A", IP and project number (TR, PM, PUP, PP etc)
5. Title block, signature block, engineer seals, USA note is not necessary on Exhibit
6. Show scale used for drawing, provide 4" graphic scale

BMP EXHIBIT B EXAMPLE



Operation and Maintenance Manual

Project: Akash Winery Expansion
Att: Akash Patel

Prepared by: DSB Engineering
43460 Ridge Park Drive
Temecula, CA 92590
(951)-440-5703

Table of Contents

1. Discussion 1
2. Maintenance Frequency 2
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1. Discussion

The long-term operation and maintenance of storm water management systems on the Akash Winery property is critical to BMP performance as its design and construction. Proper operation and maintenance practices are outlined in this plan and will ensure that the BMPs will continue to remove and reduce sources of pollutants effectively over the long-term, and therefore, improve water quality. Without proper maintenance, BMPs are likely to fail and no longer provide the necessary Storm water treatment. Common maintenance issues that are encountered include:

- Maintenance that occurs too infrequently
- Owners not understanding the long-term financial burden for the maintenance of a storm water system
- Lack of the knowledge on the maintenance needs of the system and
- Conflicts between municipalities and landowners on who is responsible for maintenance of a storm water system.

To address these issues the following sections have been developed for the project owner

Inspection and Maintenance Log
The inspection and maintenance log provide a form to document inspections and maintenance. This form is a sample form and other forms can be used as long as they provide the minimum information outlined in this sample log.

Maintenance Frequency
Maintenance frequency is outlined in Table 1. This form clearly identifies required inspection activities, the maintenance schedule, and directs provider to use a log sheet to document inspections and maintenance activities. There is the potential that a City or Regional Board inspector could visit this site and request owner to provide Maintenance records.

Maintenance Agreement
The maintenance agreement clearly identifies the project owner as the entity responsible for BMP maintenance and associated costs.

BMP Fact Sheets
BMP Fact sheets are provided to supplement BMP maintenance background and provide general knowledge on BMPs.

BMP Exhibit
The WQMP exhibit illustrates the spatial distribution of BMPS throughout the site and can be cross-referenced with Table 1 to identify where maintenance activities are expected to occur onsite.

2. Maintenance Frequency

Table 1 BMP Inspection and Maintenance (use additional forms as necessary)			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Landscape Management	Owner	Landscaping to be maintained and any erosion stabilized. Inspection and maintenance will be performed by the same personal who are responsible for landscape maintenance.	Inspect Monthly and at the start of the rainy season (October 1)
Roadway and Parking Areas	Owner	Clear and remove accumulated sand and debris in parking lots and along roadway. Sweep pavement in lue of using hose or water spray. Ensure stormwater runoff is not impeded by deposit of debris and accumulated sediment. Inspection and maintenance to be performed by ground maintenance staff.	Inspect after wind storm or minimum monthly. Also, inspect at the start of the rainy season (October 1)
Underground Detention Basin	Owner	Clean when inspection reveals accumulated sediment or trash is clogging.	Inspect during dry weather or after any major storm event
Litter Control	Owner	Site to be inspected and all litter be collected and disposed of in trash containers. Inspection and maintenance to be performed by ground maintenance staff.	Weekly and . inspect at the start of the rainy season (October 1)

3. Inspection and Maintenance Log

- Stormtech Chambers

Stormtech Chamber Inspections and Maintenance Checklist

Stormtech Chamber			Location:		
Date	Depth of Sediment	Accumulated Trash	Maintenance Performed	Maintenance Personnel	Comments
				B	I

4. Maintenance Agreement

Recorded at the request of: COUNTY
OF RIVERSIDE TRANSPORTATION
DEPARTMENT

THIS INSTRUMENT IS FOR THE BENEFIT
OF THE COUNTY OF RIVERSIDE AND
ENTITLED TO BE RECORDED WITHOUT
FEE.(GOV. CODE 6103)

RETURN TO:
RIVERSIDE COUNTY TRANSPORTATION
DEPARTMENT. **STOP NO. 1080**

COVENANT AND AGREEMENT REGARDING WATER QUALITY MANAGEMENT PLAN BMP, CONSENT TO INSPECT, MAINTENANCE AND INDEMNIFICATION

APN: 943-210-012 **PROJECT No.**_____ **IP No.**_____

OWNER(S): Akash Patel

PROPERTY ADDRESS: 39730 Calle Contento, Temecula, CA 92591

LEGAL DESCRIPTION: Parcel 9 P.M. NO. 12027 APN 943-210-012

THIS AGREEMENT is made and entered into in Riverside County, California, this _____ day of _____ Year_____, by and between_____,

(hereinafter referred to as "Covenantor" or "Owner") and the COUNTY OF RIVERSIDE via its Department of Transportation, a political subdivision of the State of California (hereinafter referred to as "County").

RECITALS

WHEREAS, the Covenantor owns real property ("Property") in the County of Riverside, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of these exhibits is attached, and incorporated herein by this reference;

WHEREAS, the County is the owner of interests in that certain real property within the unincorporated area of the County of Riverside, State of California, containing storm drains, pipelines, and related appurtenances constituting the County's municipal separate storm sewer system (the County's "MS4");

WHEREAS, Covenantor intends to develop, improve, and/or use the Property is such a way that approval by the County for such development, improvement, and/or use is required pursuant to applicable laws;

WHEREAS, As a condition for said approval by the County, County required Covenantor, and Covenantor desires to, restrict the use of the Property according to the conditions, covenants, equitable servitudes, and restrictions contained herein for the express benefit of the County's MS4, which include requirements that the Property incorporate post construction on-site stormwater quality control measures;

WHEREAS, the Covenantor/Owner has chosen to install one or more _____, hereinafter referred to as "Device", as the on-site control measure to minimize pollutants in urban runoff;

WHEREAS, said Device has been installed in accordance with plans and specifications accepted by the County;

WHEREAS, said Device, with installation on private property is a private facility with all maintenance or replacement, therefore, the sole responsibility of the Covenantor/Owner in accordance with the terms of this Agreement;

WHEREAS, the Covenantor/Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of Device and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining; to confined space and waste disposal methods, in effect at the time such maintenance occurs;

NOW THEREFORE, incorporating the foregoing Recitals and in consideration of the covenants and conditions contained herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and expressly for the benefit of, and to bind, their sucessors in interest, the parties hereto agree as follows:

1. Covenantor/Owner hereby provides the County or County's designee complete access to the Device and its immediate vicinity and such access onto the property to permit access to the devise at any time, upon twenty-four *(24)* hour advance notice in writing, of any duration for the purpose of inspection, sampling and testing of the Device. County shall make every effort at all times to minimize or avoid interference with Owner's use of the Property.

2. Covenantor/Owner shall use its best efforts diligently to maintain the Device in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of material(s) from the Device and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested

from time to time by the County / Regional Water Quality Control Board (RWQCB), the Owner shall provide the RWQCB with documentation identifying the material(s) removed, the quantity, and disposal destination.

3. In the event Covenantor/Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) days of being given written notice by the County, the County is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense to the Owner or Owner's successors or assigns, including administrative costs and interest thereon at the maximum rate authorized by the Civil Code from the date of notice of expense until paid in full.

4. The County may require the Covenantor/Owner to post security in a form and for a time period satisfactory to the County to guarantee the performance of the obligations stated herein. Should the Owner fail to perform the obligations under this Agreement, the County may, in the case of a cash deposit, certificate of deposit or letter of credit, act for the Owner using the proceeds from it, or in the case of a surety bond, require the sureties to perform the obligations of the Agreement.

5. The County may, but shall not be obligated to, enforce this Agreement by a proceeding at law or in equity against any person or persons violating or attempting to violate any condition, covenant, equitable servitude, or restriction provided for herein, either to restrain such violation or to recover damages.

6. This Agreement constitutes the entire agreement and understanding between the parties with respect to the subject matter of this Agreement and supersedes all prior or contemporaneous agreements and understandings with respect to the subject matter hereof, whether oral or written.

7. If any part of this Agreement is declared by a final decision of a court of competent jurisdiction to be invalid for any reason, such shall not affect the validity of the rest of the Agreement. The other parts of this Agreement shall remain in effect as if this Agreement had been executed without the invalid parts(s). The parties declare that they intend and desire that the remaining parts of this Agreement continue to be effective without any part(s) that have been declared invalid.

8. This Agreement may be executed in counterparts, each of which so executed shall, irrespective of the date of its execution and delivery, be deemed an orginal, and all such counterparts together shall constitute one and the same instrument.

9. This Agreement shall be recorded in the Office of the Recorder of Riverside County, California and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth.

10. In the event of legal action occasioned by any default or action of the Covenantor/Owner, or its successors or assigns, then the Covenantor/Owner and its

successors or assigns agree(s) to pay all costs incurred by the County in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

11. Covenantor/Owner agrees to indemnify, defend, and hold harmless the County, its elected officers, employees, agents, and contractors from and against any and all liability, expense, including costs and reasonable legal fees, and claims of damage of any nature whatsoever including, but not limited to, death, bodily injury, personal injury, or property damage arising from or connected with the County inspection of the Property except where such liability, expense, or claim for damage results from the sole negligence or willful misconduct of the County.

12. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien thereon against.

13. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto and any other present or future interest holders or estate holders in the property. The term "Owner" shall include not only the present Owner, but also its heirs, successors in interest and in title to the property, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the County at the same time such notice is provided to the successor.

14. Time is of the essence in the performance of this Agreement.

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15. Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two *(72)* hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

COVENANTOR/OWNER:

COUNTY:

Riverside County Department of Transportation
Attn: Transportation Director
4080 Lemon Street
Riverside, CA

COUNTY OF RIVERSIDE
TRANSPORTATION DEPARTMENT

Mark Lancaster, P.E.
Director of Transportation

Date

(Attest)

Date

COVENANTOR/OWNER

Company/Corporation/Partnership

(Print Name)

(Print Title)

Attach Notary

5. BMP Fact Sheets

Will be provided in Final Engineering

6. BMP Exhibit

8.5x11 Maintenance Exhibit to be provided in Final Engineering

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.

Trash Storage Areas SD-32

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

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- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Additional Information

Maintenance Considerations

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Site Design & Landscape Planning SD-10



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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SD-10 Site Design & Landscape Planning

Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.

- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.

- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.

- Promote natural vegetation by using parking lot islands and other landscaped areas.

- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.

- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

SD-10 Site Design & Landscape Planning

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Efficient Irrigation SD-12



Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13



Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include “NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.

- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

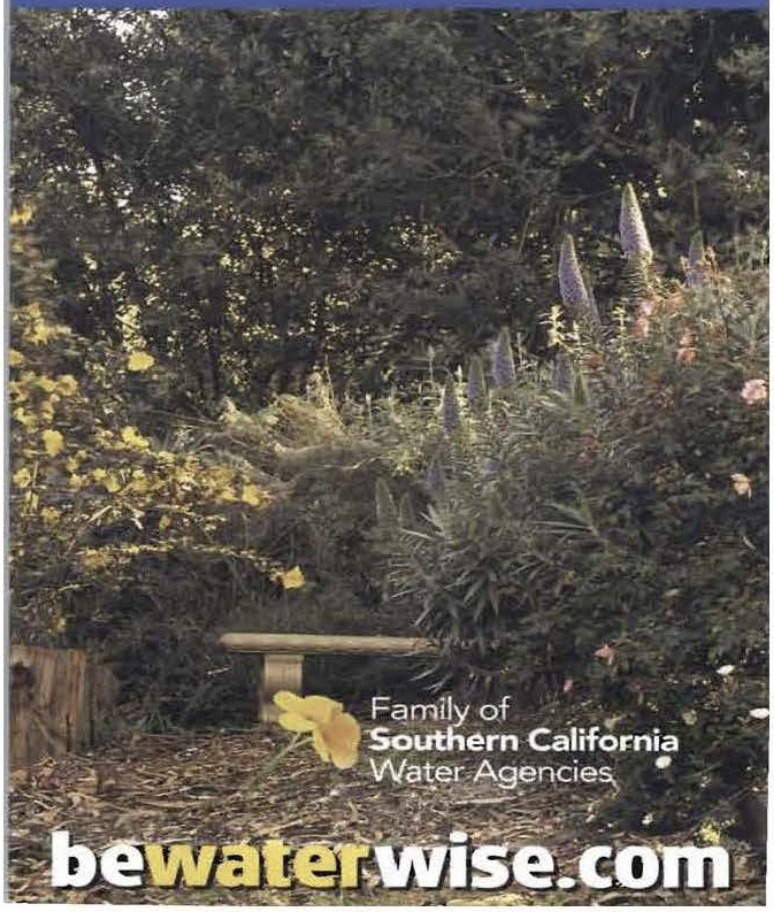
A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

10 Ways to Save Water Outdoors



bewaterwise.com

Helpful telephone numbers and links:

WATER AGENCY LIST in Riverside County

City of Banning	(951) 922-3130
City of Beaumont	(951) 769-8520
City of Blythe	(760) 922-6161
City of Coachella	(760) 398-3502
Coachella Valley Water District	(760) 398-2651
City of Corona	(951) 736-2259
Desert Center, CSA #51	(760) 227-3203
Eastern Municipal Water District	(951) 928-3777
Elsinore Valley MWD	(951) 674-3146
Farm Mutual Water Company	(951) 244-4198
City of Hemet	(951) 765-3712
Idyllwild Water District	(951) 659-2143
Jurupa Community Services District	(951) 360-8795
Lake Hemet MWD	(951) 658-3241
Lee Lake Water District	(951) 277-1414
March Air Force Base	(951) 656-7000
Mission Springs Water District	(760) 329-6448
City of Palm Springs	(760) 323-8253
Rancho Caballero	(951) 780-9272
Rancho California Water District	(951) 296-6900
Ripley, CSA #62	(760) 922-4951
City of Riverside	(951) 351-6170
Rubidoux Services District	(951) 684-7580
Silent Valley Club, Inc	(951) 849-4501
Valley Sanitary District	(760) 347-2356
Western Municipal Water District	(951) 789-5000
Yucaipa Valley Water District	(909) 797-5117

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or online at
www.rcflood.org

Online resources include:

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org
- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.swrcb.ca.gov/
- Power Washers of North America
  www.thepwna.org

StormWater Pollution

What you should know for...

OUTDOOR CLEANING ACTIVITIES AND PROFESSIONAL MOBILE SERVICE PROVIDERS



Storm drain pollution prevention information for:

- **Car Washing / Mobile Detailers**
- **Window and Carpet Cleaners**
- **Power Washers**
- **Waterproofers / Street Sweepers**
- **Equipment cleaners or degreasers and all mobile service providers**

Do you know where street flows actually go?

Storm Drains are NOT connected to sanitary sewer systems and treatment plants!



The primary purpose of storm drains is to carry rain water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills**.** Only emergency **Mechanical** repairs should be done in City streets and use drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Always prevent runoff water from entering storm drains.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use These Guidelines For Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or nearest body of water is ***PROHIBITED*** by law and can bring about stiff penalties.

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. *Each of us* can do our part to keep storm water clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose *small amounts* of power washing waste water to landscaped, gravel or unpaved surfaces.

Do...check with your local sanitary sewer agency's policies on wash water disposal regulations. (See list on reverse side).

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.



Report illegal storm drain disposal,
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them for being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.



When cleaning surfaces with a *high-pressure washer* or *steam cleaner*, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks.

Screening Wash Water

A thorough dry cleanup before washing exterior surfaces, such as buildings and decks *without loose paint*, sidewalks, or plaza areas should be sufficient to protect receiving waters. Keep debris from entering the storm drain after cleaning by first passing the wash water first through a "20 mesh" or finer screen to catch the solid materials, then disposing the mesh in a refuse container.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or rubber mats.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Equipment and Supplies

For special materials, equipment and supplies:

- New Pig — (800) 468-4647
- Lab Safety Supply — (800) 356-0783
- C&H — (800) 558-90966
- W.W. Grainger — (800) 994-9174
- Cleaning Equipment Trade Association — (800) 441-0111

After the Storm

What is stormwater runoff?

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

Why is stormwater runoff a problem?

Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water.

The effects of pollution

Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.
- Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

A Citizen's Guide to Understanding Stormwater

EPA 833-B-03-002

January 2003

For more information contact:

or visit
www.epa.gov/npdes/stormwater
www.epa.gov/nps

Stormwater Pollution Solutions



Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local waterbody.

Residential



Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.

Lawn care



Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- Cover piles of dirt or mulch being used in landscaping projects.

Auto care



Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm sewer system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a waterbody.

- Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.

Septic systems



Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.

- Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- Don't dispose of household hazardous waste in sinks or toilets.

Pet waste



Pet waste can be a major source of bacteria and excess nutrients in local waters.

- When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.



Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.

Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.



Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

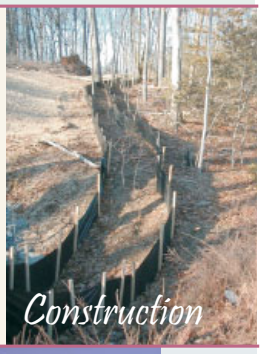
Commercial



Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- Cover grease storage and dumpsters and keep them clean to avoid leaks.
- Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

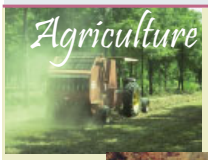
Construction



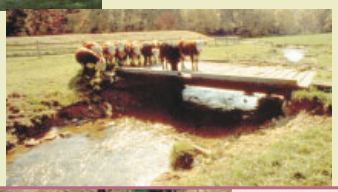
Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- Divert stormwater away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.

Agriculture

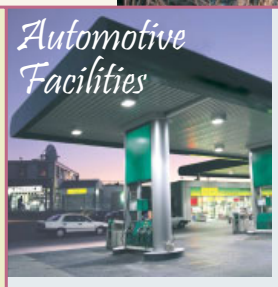


Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.



- Keep livestock away from streambanks and provide them a water source away from waterbodies.
- Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- Vegetate riparian areas along waterways.
- Rotate animal grazing to prevent soil erosion in fields.
- Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.

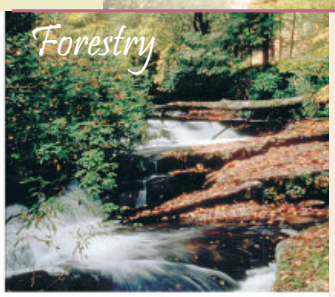
Automotive Facilities



Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- Clean up spills immediately and properly dispose of cleanup materials.
- Provide cover over fueling stations and design or retrofit facilities for spill containment.
- Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- Install and maintain oil/water separators.

Forestry



Improperly managed logging operations can result in erosion and sedimentation.

- Conduct preharvest planning to prevent erosion and lower costs.
- Use logging methods and equipment that minimize soil disturbance.
- Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- Construct stream crossings so that they minimize erosion and physical changes to streams.
- Expedite revegetation of cleared areas.