

Appendix 7

Project Specific Water Quality Management Plan



Project Specific Water Quality Management Plan (WQMP)

A Template for preparing Project Specific Water Quality Management Plans (WQMPs) for Priority Development Projects located in the City of Wildomar.



Attention: This submittal package only applies to "Priority Development Projects" and does not apply to "Other Development Projects". Proceed only if the Applicability Checklist completed for your project categorizes project activities as a "Priority Development Project."

Project Title: Jana Rd Commercial Development

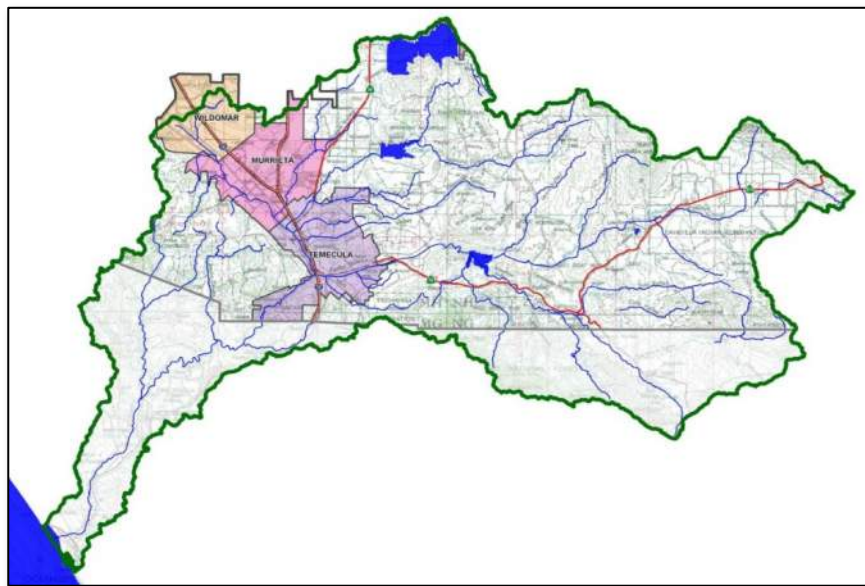
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Development No: #22-0006

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City Project No: #22-0006

WQMP Type: ☒ Preliminary (entitlement submittal)
☐ Final



Original Date Prepared: 3/14/2022

Revision Summary (post WQMP acceptance):

MARK	BY	DATE	REVISIONS	APPRV.	DATE
ENGINEER				CITY	

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**

A Brief Introduction

The Regional Municipal Separate Stormwater Sewer System (MS4) Permit¹ 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 (WQPM). This Project-Specific WQMP Template for Development Projects in the **Santa Margarita Region** has been prepared to help document compliance and prepare a WQMP submittal. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



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

OWNER'S CERTIFICATION

This Project-Specific WQMP has been prepared for Michael Ramirez, Beyond Food Mart Inc by Blue Engineering and Consulting, Inc. for the <Project Name> project.

This WQMP is intended to comply with the requirements of the City of Wildomar for Wildomar Municipal Code Ch. 13.12 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 storm water 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 the City of Wildomar Water Quality Ordinance (Wildomar Municipal Code Ch. 13.12).

"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

Mark Sater

Owner's Printed Name

10/18/2022

Date

Managing Member

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 (BMPs) 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**."

p



Preparer's Signature

Angel Cesar P.E., QSD

Preparer's Printed Name

10/18/2022

Date

President/CEO

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.

PROJECT INFORMATION		
Type of PDP:	New Development	
Type of Project:	Commercial	
Planning Area:	C-1/C-P	
Community Name:	Insert Community Name if known	
Development Name:	Beyond Food Mart - Clinton Keith Rd & Jana Lane	
PROJECT LOCATION		
Latitude & Longitude (DMS):	33.597, -117.226	
Project Watershed and Sub-Watershed:	Santa Margarita River, Murrieta Creek	
24-Hour 85 th Percentile Storm Depth (inches):	0.68	
Is project subject to Hydromodification requirements?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N (Select based on Section A.3)	
APN(s):	380-290-002	
Map Book and Page No.:	PM 25, Pg. 62	
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)	Commercial	
Proposed or Potential SIC Code(s)	1521	
Existing Impervious Area of Project Footprint (SF)		
Total area of <u>proposed</u> Impervious Surfaces within the Project Limits (AC)/or Replacement	3.22	
Total Project Area (ac)	4.04	
Does the project consist of offsite road improvements?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	
Does the project propose to construct unpaved roads?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	
Is the project part of a larger common plan of development (phased project)?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	
Is the project exempt from Hydromodification Performance Standards?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	
Does the project propose the use of Alternative Compliance to satisfy BMP requirements? (note, alternative compliance is not allowed for coarse sediment performance standards)	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	
Has preparation of Project-Specific WQMP included coordination with other site plans?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	
EXISTING SITE CHARACTERISTICS		
Is the project located within any Multi-Species Habitat Conservation Plan area (MSHCP Criteria Cell?)	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N If "Y" insert Cell Number	
Are there any natural hydrologic features on the project site?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	
Is a Geotechnical Report attached?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> 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.	

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

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 storm water 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	Nutrients, Metals, Toxicity, Pesticides and Herbicides	MUN, AGR, IND, PROC, REC1, REC2, WARM, WILD	N/A
Santa Margarita River (Upper)	Nutrients, Toxicity	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE, SPWN	N/A
Santa Margarita River (Lower)	Nutrients, Bacteria and Pathogens	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE, SPWN	N/A

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 River², 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:

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.

- 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 Watershed Management Area Analysis (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
Murrieta Creek	Natural Ground	None	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Santa Margarita River (Upper)	Natural Ground	None	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Santa Margarita River (Lower)	Natural Ground	None	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Summary of Performance Standards			
<input type="checkbox"/> Hydromodification Exempt – Select if “Y” is selected in the Hydromodification Exempt column above, project is exempt from hydromodification requirements. <input checked="" type="checkbox"/> 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.			

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	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
State Water Resources Control Board, Clean Water Act Section 401 Water Quality Certification	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Statewide Construction General Permit Coverage	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Statewide Industrial General Permit Coverage	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Western Riverside Multiple Species Habitat Conservation Plan (MSHCP) Consistency Approval (e.g., Joint Project Review (JPR), Determination of Biological Equivalent or Superior Preservation (DBESP))	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Other (please list in the space below as required)	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> 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 Priority Development Project (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.

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:

☒ Yes ☐ No ☐ N/A

- 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.

The existing ground drains the southwest, ultimately discharging into Santa Margarita River.

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.

☐ Yes ☐ No ☒ N/A

- 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. *There is no existing vegetation to be preserved. The entire site will be disturbed.*

Project- Specific WQMP Site Design BMP Checklist**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.

☐ Yes ☐ No ☒ N/A

- 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. *The soils report indicates that the infiltration rate is of 1.12 inch/hour. With this in mind, the infiltration rate is too low to be taken into account when designing the BMP.*

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.

☐ Yes ☐ No ☒ N/A

- 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. *Run-off generated by development will be completely treated onsite through the proposed underground infiltration system.*

Project- Specific WQMP Site Design BMP Checklist**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.

☐ Yes ☒ No ☐ N/A

- 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. *The entire storm runoff from the site will be discharged into a bioretention system*

Did you utilize native or drought tolerant species in site landscaping?

☒ Yes ☐ No ☐ N/A

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. *Native species are included by following the City of Wildomar Water Efficient / Conservation Landscape Standards Manual in the self retaining area along the southern portion of the project.*

Project- Specific WQMP Site Design BMP Checklist**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.

☐ Yes ☐ No ☒ N/A

The general feasibility and applicability of Harvest and Use BMPs should consider:

- Any downstream impacts related to water rights that could arise from capturing storm water (not common).
- Conflicts with recycled water used – where the project is conditioned to use recycled water for irrigation, this should be given priority over storm water capture as it is a year-round supply of water.
- Code Compliance - If a particular use of captured storm water, and/or available methods for storage of captured storm water 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 [Insert Jurisdiction], that there is adequate demand for harvested water during the wet season to drain the system in a reasonable amount of time.

Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *The demand for non-potable water is not sufficiently large therefore, Harvest and Use is not required.*

Did you keep the runoff from sediment producing pervious area hydrologically separate from developed areas that require treatment?

☐ Yes ☐ No ☒ N/A

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. *Proposed full capture type bioclean catch basin filter to avoid impact to sediment supply and reduce clogging risk to BMPs.*

Section C: Delineate Drainage Management Areas (DMAs)

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 Identification	Name or	Surface Type(s) ¹	Area (Sq. Ft.)	DMA Type
A		Landscape (35,947), Asphalt (92,900), BLDG (27,256), Concrete (18,809)	176,021	Type D

Add Columns as Needed

Step 3: DMA Classification

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

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

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

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

☐ Yes ☒ No

Area is undisturbed from their natural condition or restored with native and/or California Friendly vegetative covers.

- ☐ Yes ☒ No Area is irrigated, if at all, with appropriate low water use irrigation systems to prevent irrigation runoff.
- ☐ Yes ☒ No Runoff from the area will not comingle with runoff from the developed portion of the site.

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 Slopes will be graded toward the center of the pervious area.
- ☐ Yes ☒ No ☐ N/A Soils will be freely draining to not create vector or nuisance conditions.
- ☐ 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 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 Area must be designed to retain the entire Design Storm runoff without

flowing offsite.

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)	Storm Depth (inches)	DMA Name / ID	[C] from Table C-4=	Required Retention Depth (inches)
		[A]	[B]		[C]	$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$
N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

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

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

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

(Tributary Area: Self-Retaining Area)

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-1	Underground Bioretention System

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 principals 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 principals 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, Hydrogeologist, 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?		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 factored infiltration rates of less than 0.8 inches / hour? (Note: on a case-by-case basis, the City may allow a factor of safety as low as 1.0 to support selection of full infiltration BMPs. Therefore, measured infiltration rates could be as low as 0.8 in/hr to support full infiltration. A higher factor of safety would be required for design in accordance with the LID BMP Design Handbook).		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

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

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.

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		DMA-1
Expansive Soil		DMA-1
Slopes		DMA-1
Liquefaction		DMA-1
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 City

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 to Section F to document your alternative compliance measures.

Table D-3 Evaluation of Biofiltration BMP Feasibility

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

Proprietary Biofiltration BMP Approval Criteria

If the project will use proprietary BMPs as biofiltration BMPs, then this section is completed to document that the proprietary BMPs are selected in accordance with Section 2.3.7 of the SMR WQMP. Proprietary Biofiltration BMPs must meet both of the following approval criteria:

1. Approval Criteria for All Proprietary BMPs, and
2. Acceptance Criteria for Proprietary Biofiltration BMPs.

When the use of proprietary biofiltration BMPs is proposed to meet the Pollutant Control performance standards, use Table D-4 to document that appropriate approval criteria have been met for the proposed BMPs. Add additional rows to document approval criteria are met for each type of BMP proposed.

Table D-4 Proprietary BMP Approval Requirement Summary

Proposed Proprietary Biofiltration BMP	Approval Criteria	Notes/Comments
N/A	<input type="checkbox"/> Proposed BMP has an active TAPE GULD Certification for the project pollutants of concern ⁴ or equivalent 3 rd party demonstrated performance.	Insert text here
	<input type="checkbox"/> The BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification.	Insert text here
	<input type="checkbox"/> The BMP includes biological features including vegetation supported by engineered or other growing media.	Describe features here.
	<input type="checkbox"/> The BMP is designed to maximize infiltration, or supplemental infiltration is provided to achieve retention equivalent to Biofiltration with Partial Infiltration BMPs if factored infiltration rate is between 0.1 and 0.8 inches/hour.	Describe supplemental retention practices if applicable.
	<input type="checkbox"/> The BMP is sized using one of two	

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

D.3 Feasibility Assessment Summaries

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

Table D-5 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy			No LID (Alternative Compliance)
	1. Infiltration	2. Biofiltration with Partial Infiltration	3. Biofiltration with No Infiltration	
A	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Insert text here	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insert text here	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insert text here	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Insert text here	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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 Copermittees⁵).

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?	The beginning of entitlement before the design was finalized
b) When in the entitlement process were other investigations conducted (e.g., groundwater quality, water rights) to evaluate infiltration feasibility?	The beginning of entitlement before the design was finalized. During Geotechnical engineer analysis of the site
c) What was the scope and results of testing, if	Soils and Foundation Evaluations and infiltration testing. See Geotech Report in Appendix 3 for additional information.

⁵ <http://www.projectcleanwater.org/download/pdp-infiltration-infeasibility/>

conducted, or rationale for why testing was not needed to reach findings?	
d) What public health and safety requirements affected infiltration locations?	None
e) What were the conclusions and recommendations of the geotechnical engineer and/or other professional responsible for other investigations?	Low infiltration rate and no shallow depth groundwater was encountered. See Geotech Report in Appendix 3 for additional information.
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?	Based on the testing location and slope of the site the bmp was determined to be placed at the low point one of the lower points in order to keep natural drainage path.
g) What site design alternatives were considered to achieve infiltration or partial infiltration on site?	None
h) What physical impairments (i.e., fire road egress, public safety considerations, utilities) and public safety concerns influenced site layout and infiltration feasibility?	None
i) What LID Principles (site design BMPs) were included in the project site design?	Underground Infiltration system at the south west area of the site

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 for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D-7 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Enter BMP Name / Identifier Here		
	[A]		[B]	[C]	[A] x [C]			
1	176,021	Mixed	0.67	0.47	82,730			
	$A_T = \Sigma[A]$ 176,021				$\Sigma = [D]$ 82,730	[E] 0.69	$[F] = \frac{[D] \times [E]}{12}$ 4,757	[G] 8,989

[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)
ADS stormtech MC-3500	1	Underground Bioretention System	4,800	8,989

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 meet biofiltration sizing requirements if the underdrain is uncapped.

Section E: Implement Hydrologic Control BMPs and Sediment Supply BMPs

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.

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 (10% of the 2-year runoff event up to the 10-year runoff event). Select each of the hydrologic control BMP types that are applied to meet the above performance standard on the site.

- ☐ LID principles as defined in Section 3.2 of the SMR WQMP.
- ☐ Structural LID BMPs that may be modified or enlarged, if necessary, beyond the DCV.
- ☒ Structural Hydrologic Control BMPs that are distinct from the LID BMPs above. The LID BMP Design Handbook provides information not only on Hydrologic Control BMP design, but also on BMP design to meet the combined LID requirement and Hydrologic Performance Standard. The Handbook specifies the type of BMPs that can be used to meet the Hydrologic Performance Standard.

E.2 Hydrologic Control BMP Sizing

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

Table E-1 Hydrologic Control BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
DMA	1	Underground Bioretention System	<input checked="" type="checkbox"/>	1.34	0.2	48
			<input type="checkbox"/>			
			<input type="checkbox"/>			
			<input type="checkbox"/>			

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 of the WQMP to determine if there are onsite Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas. Select one of the two options below and include the Potential Critical Coarse Sediment Yield Area Exhibit showing your project location in Appendix 7.

- ☒ There are no mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site. The Sediment Supply Performance Standard is met with no further action.
- ☐ 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 or Option 2 below.

The applicant may refer to Section 3.6.4 of the SMR WQMP for a description of the methodology to meet the Sediment Supply Performance Standard. Select the applicable compliance pathway and

complete the appropriate sections to demonstrate compliance with the Sediment Supply Performance Standard if the second box is selected above:

- ☐ Avoid impacts related to any PDP activities to Potential Critical Coarse Sediment Yield Areas. Proceed to Section E.3.1.
- ☐ Complete a Site-Specific Critical Coarse Sediment Analysis. Proceed to Section E.3.2.

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

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

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

N/A

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

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

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

1. Determine whether the site or a portion of the site is a Significant Source of Bed Sediment Supply to the Receiving Channel (i.e., an actual verified Critical Coarse Sediment Yield Area);
2. Avoid areas identified as actual verified Critical Coarse Sediment Yield Areas in the PDP design and maintain pathways for discharge of Bed Sediment Supply from these areas to receiving waters.

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	<input type="checkbox"/> High (3)	<input type="checkbox"/> Medium (2)	<input type="checkbox"/> Low (1)	
1.B	<input type="checkbox"/> High (3)	<input type="checkbox"/> Medium (2)	<input type="checkbox"/> Low (1)	
1.C	<input type="checkbox"/> High (3)	<input type="checkbox"/> Medium (2)	<input type="checkbox"/> 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 -

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

OR

☐ The project impacts transport pathways of Critical Coarse Sediment from onsite upstream drainages.

(If either of these are the case, the applicant may proceed with the subsequent steps of Section E.3).

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

Identified Channel #3 - Insert narrative description here

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 [Insert Jurisdiction]. It may require extensive documentation and analysis by qualified professionals to support this demonstration.

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

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

N/A

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

Section F: Alternative Compliance

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

- ☐ If it is not feasible to fully implement Infiltration or Biofiltration BMPs at a PDP site, Flow-Through Treatment Control BMPs may be used to treat pollutants contained in the portion of DCV not reliably retained on site and Alternative Compliance measures must also be implemented to mitigate for those pollutants in the DCV that are not retained or removed on site prior to discharging to a receiving water.
- ☒ Alternative Compliance is selected to comply with either pollutant control or hydromodification flow control requirements even if complying with these requirements is potentially feasible on-site. If such voluntary Alternative Compliance is implemented, Flow-Through Treatment Control BMPs must still be used to treat those pollutants in the portion of the DCV not reliably retained on site prior to discharging to a receiving water.

Refer to Section 2.7 of the SMR WQMP and consult the City 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
<input type="checkbox"/>	De Luz Creek	X	X				X	
<input type="checkbox"/>	Long Canyon Creek		X		X	X		
<input checked="" type="checkbox"/>	Murrieta Creek	X	X	X		X		
<input type="checkbox"/>	Redhawk Channel	X	X		X	X		X
<input type="checkbox"/>	Santa Gertudis Creek	X	X		X	X		
<input type="checkbox"/>	Santa Margarita Estuary	X						
<input checked="" type="checkbox"/>	Santa Margarita River (Lower)	X			X			
<input checked="" type="checkbox"/>	Santa Margarita River (Upper)	X		X				
<input type="checkbox"/>	Temecula Creek	X	X	X		X		X
<input type="checkbox"/>	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
<input type="checkbox"/>	Detached Residential Development	P	N	P	P	N	P	P	P	N	N
<input type="checkbox"/>	Attached Residential Development	P	N	P	P	N	P	P	P ⁽²⁾	N	N
<input checked="" type="checkbox"/>	Commercial/Industrial Development	P ⁽³⁾	P ⁽⁷⁾	P ⁽¹⁾	P ⁽¹⁾	P	P ⁽¹⁾	P	P	N	N
<input type="checkbox"/>	Automotive Repair Shops	N	P	N	N	P ^(4, 5)	N	P	P	N	N
<input type="checkbox"/>	Restaurants (>5,000 ft ²)	P	N	N	P ⁽¹⁾	N	N	P	P	N	N
<input type="checkbox"/>	Hillside Development (>5,000 ft ²)	P	N	P	P	N	P	P	P	N	N
<input type="checkbox"/>	Parking Lots (>5,000 ft ²)	P ⁽⁶⁾	P ⁽⁷⁾	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁴⁾	P	P	P	N	N
<input type="checkbox"/>	Streets, Highways, and Freeways	P ⁽⁶⁾	P ⁽⁷⁾	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁴⁾	P	P	P	N	N
<input type="checkbox"/>	Retail Gasoline Outlets	N	P ⁽⁷⁾	N	N	P ⁽⁴⁾	N	P	P	N	N
Project Priority Pollutant(s) of Concern		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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
N/A	N/A	N/A

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]		
N/A	N/A	N/A	N/A	N/A	N/A	Design Storm (in)	Design Flow Rate (cfs)
	A _T = Σ[A]				Σ= [D]	[E]	[F] = $\frac{[D] \times [E]}{[G]}$

[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)
		<input type="checkbox"/>			
		<input type="checkbox"/>			
		<input type="checkbox"/>			
		<input type="checkbox"/>			

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 City may require full trash capture BMPs to be installed as part of the project. Consult with the City to determine applicability.

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]		
	$\Delta_T = \Sigma[A]$				$\Sigma = [D]$	Trash Capture Design Storm Intensity (in)	Trash Capture Design Flow Rate (cubic feet or cfs)
						[E]	$[F] = \frac{[D] \times [E]}{[G]}$

[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)

Section H: Source Control BMPs

Source Control BMPs include permanent, structural features that may be required in your Project plans, such as roofs over and berms around trash and recycling areas, and Operational BMPs, such as regular sweeping and “housekeeping,” that must be implemented by the site’s occupant or user. The 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			
<p>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.</p>			
STEP 1: IDENTIFY POLLUTANT SOURCES			
<p>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.</p>			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	Storm Drain Inlets Floor Drains Sump Pumps Pets Control/Herbicide Application Food Service Areas Trash Storage Areas Industrial Processes Vehicle and Equipment Cleaning and Maintenance/Repair Areas	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	Outdoor storage areas Material storage areas Fueling areas Loading Docks Fire Sprinkler Test/Maintenance water Plazas, Sidewalks and Parking Lots Pools, Spas, Fountains and other water features
STEP 2: REQUIRED SOURCE CONTROL BMPs			
<p>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.</p>			
Pollutant Source	Structural Source Control BMP	Operational Source Control BMP	
A. On-site storm drain inlets	Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, lessees, or operators.	
C. Interior parking garages	State that parking garage floor drains will be pumped to the sanitary sewer.	Inspect and maintain drains to prevent blockages and overflow.	
D2. Landscape/Outdoor Pesticide Use	State that final landscape plans will accomplish all of the following.	Maintain landscaping using minimum or no pesticides.	

	<p>Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.</p> <p>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.</p> <p>Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.</p> <p>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.</p>	
G. Refuse areas	<p>State how site refuse will be handled and provide supporting detail to what is shown on plans.</p> <p>State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.</p>	<p>State how the following will be implemented:</p> <p>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.</p>
O. Miscellaneous Drain or Wash Water or Other Sources – Roofing, gutters, and trim.	Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
P. Plazas, sidewalks, and parking lots.		<p>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.</p>

Section I: Coordinate Submittal with Other Site Plans

Populate Table I-1 below to assist the plan checker in an expeditious review of your project. During construction and at completion, City 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)
A	Bioretention	See WQMP Exhibit & Rough Grading Sheet 4

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	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
State Water Resources Control Board, Clean Water Act Section 401 Water Quality Certification	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Statewide Construction General Permit Coverage	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Statewide Industrial General Permit Coverage	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Other (please list in the space below as required) City of Wildomar Permits	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N

Section J: Operation, Maintenance and Funding

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: All proposed BMPs will be owned and maintained by the Property Owners Association (POA). The BMPs will serve only one site owner and will be accessible to inspectors.

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. 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 siting 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 storm water 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 storm water BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of storm water 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 storm water 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 storm water 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 storm water runoff for later use without negatively impacting downstream water rights or other Beneficial Uses.

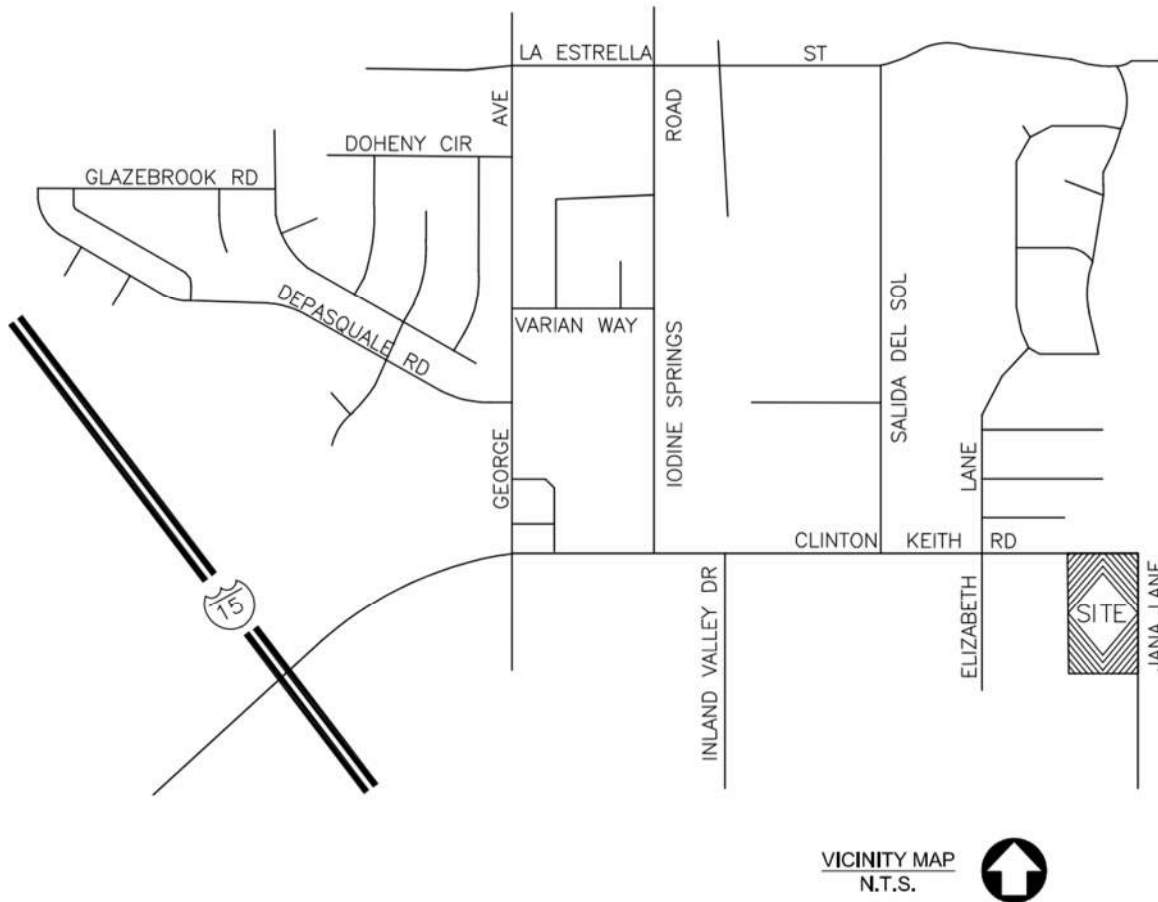
LID Infiltration BMP	BMPs to reduce storm water runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Typical LID Infiltration BMPs include infiltration basins, infiltration trenches and pervious pavements.
LID Retention BMP	BMPs to ensure full onsite retention without 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 Clean Water Act (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 storm water BMPs to control post-construction Pollutants and storm water 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 Copermitees 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



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NOTE: ALL INLETS HAVE TRASH CAPTURE FILTERS

ENGINEERED SOIL MEDIA REQUIREMENTS

THE ENGINEERED SOIL MEDIA SHALL BE COMPROMISED OF 85 PERCENT MINERAL COMPONENT AND 15 PERCENT ORGANIC COMPONENT, BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT. THE MINERAL COMPONENT SHALL BE CLASS A SANDY LOAM TOPSOIL THAT MEETS THE RANGE SPECIFIED IN THE TABLE BELOW. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST, SUCH THAT NITROGEN DOES NOT LEACH MEDIA.

MINERAL COMPONENT RANGE REQUIREMENTS	
Percentage Range	Component
70-80	SAND
15-20	SILT
5-10	CLAY

PROJECT BMP CONFORMANCE ANALYSIS

NAME	AREA (SF)	i	C	DMA AREA	V _{BMP}	BMP	A _{PROVIDED}	V _{PROVIDED}
DA 1	176,021	0.67	0.47	2,608	4,693	BIO 'A'	2,608 SF	4,693 C.F.
TOTAL REQUIRED				2,608 SF	4,693 C.F. TOTAL PROVIDED			

DESIGNED BY: <u>MG</u>	SEAL-DESIGN ENGINEER
DRAWN BY: <u>CG</u>	
CHECKED BY: <u>AC</u>	



BLUE Engineering Consulting, Inc

9320 BASELINE RD, STE. D - RANCHO CUCAMONGA, CA 91701
PHONE: 909-248-8567 - INFO@BLUECIVILENG.COM
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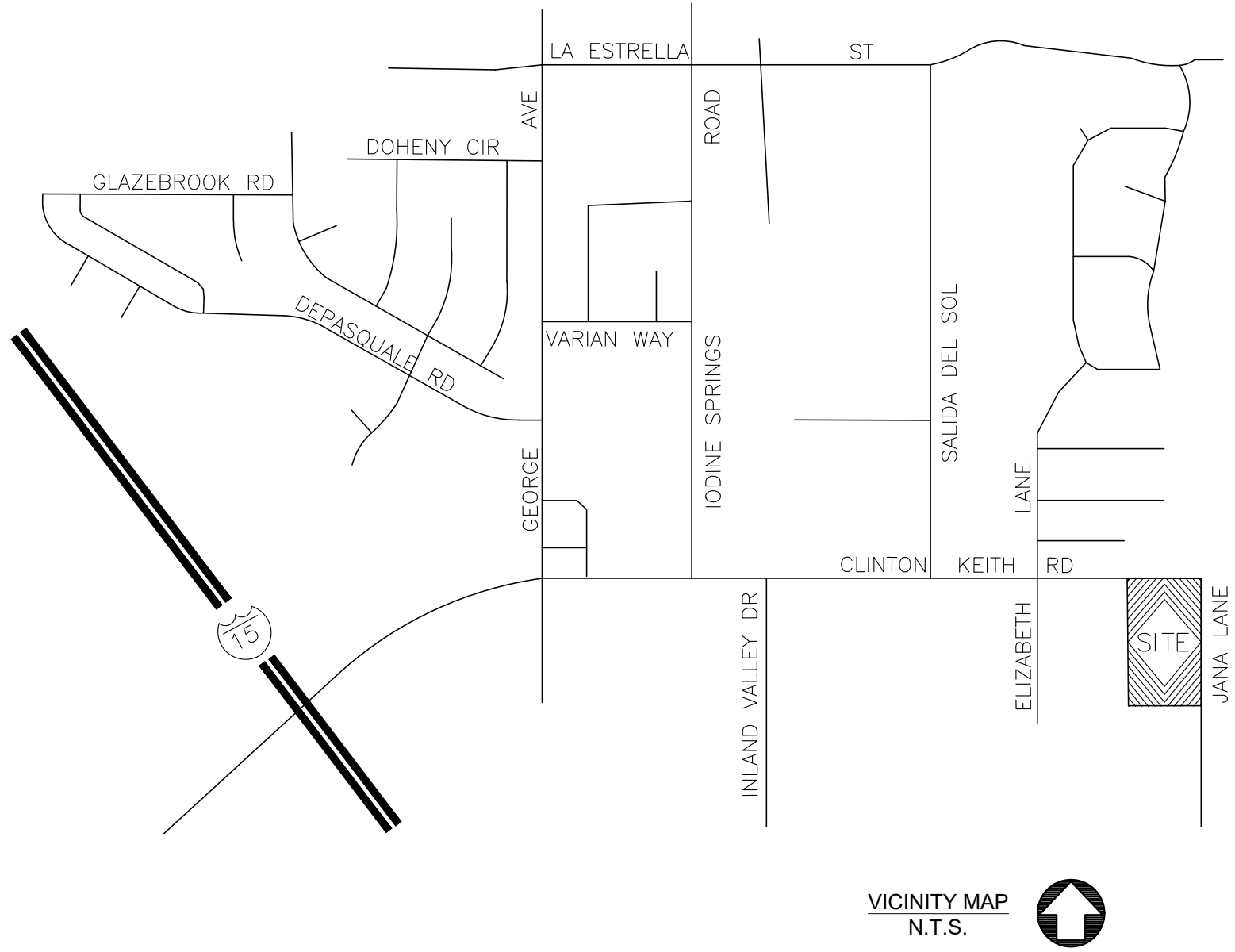
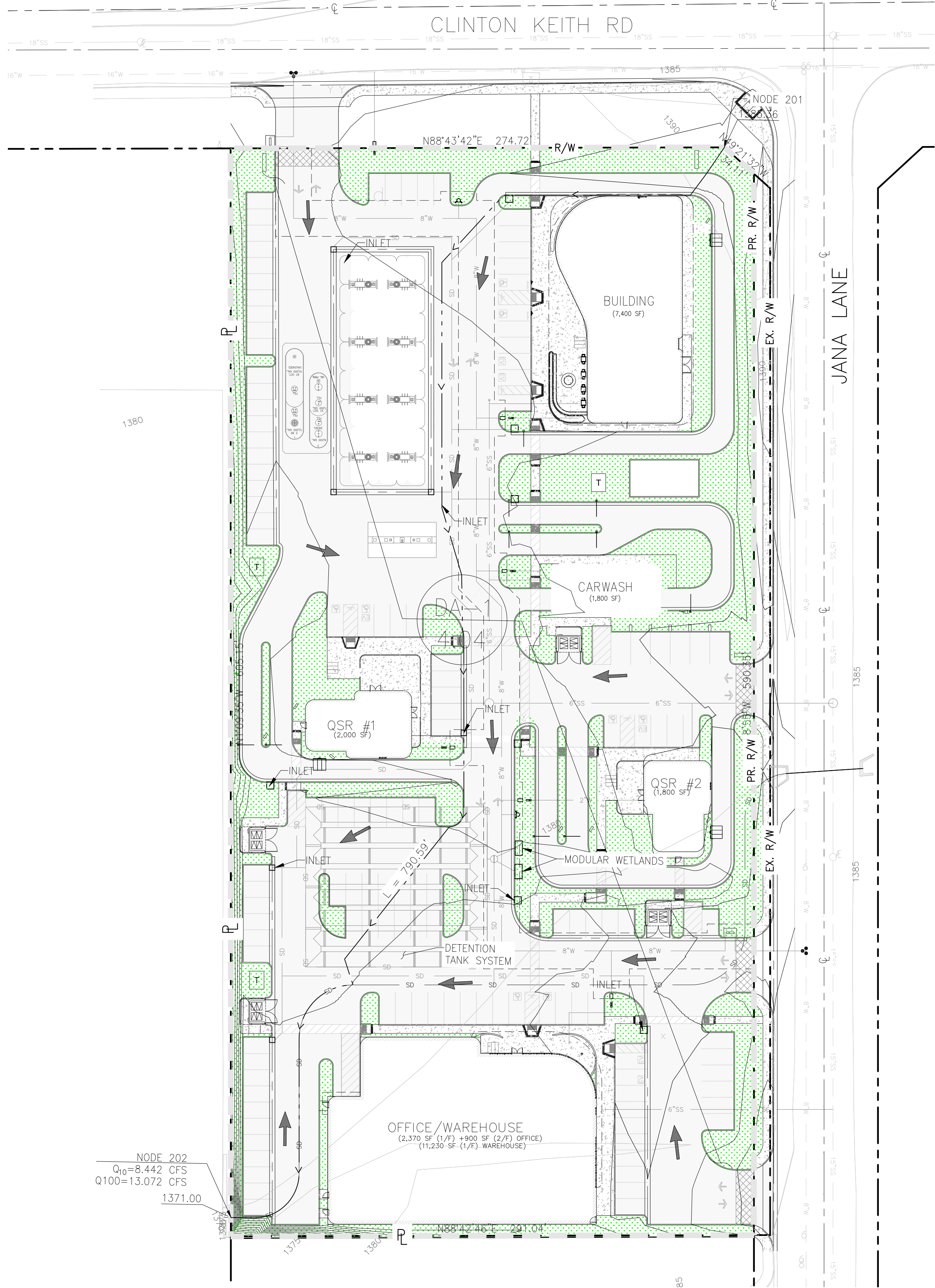
PLANS PREPARED UNDER THE SUPERVISION OF:
ANGEL CESAR, P.E. 87222 EXP. 9/30/23

REV.	REVISION	DESCRIPTION	BY	DATE

CITY OF WILDOMAR 24831 CLINTON KEITH RD, WILDOMAR, CA 92595
REVIEWED BY: _____ DATE _____
XXXXXXXXXX P.E. NO. C-69109 EXP. DATE 6-30-2020

POST-DEVELOPMENT HYDROLOGY EXHIBIT
JANA RD COMMERCIAL DEVELOPMENT CONDITIONAL USE PERMIT

CUP:
LDP:
DATE: October 17, 2022
SHEET 7 OF 7 SHEETS
PROJECT NUMBER:

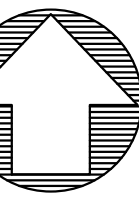
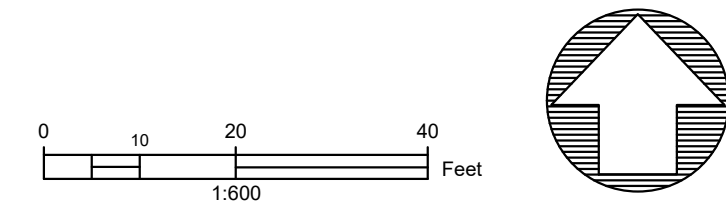


LEGEND

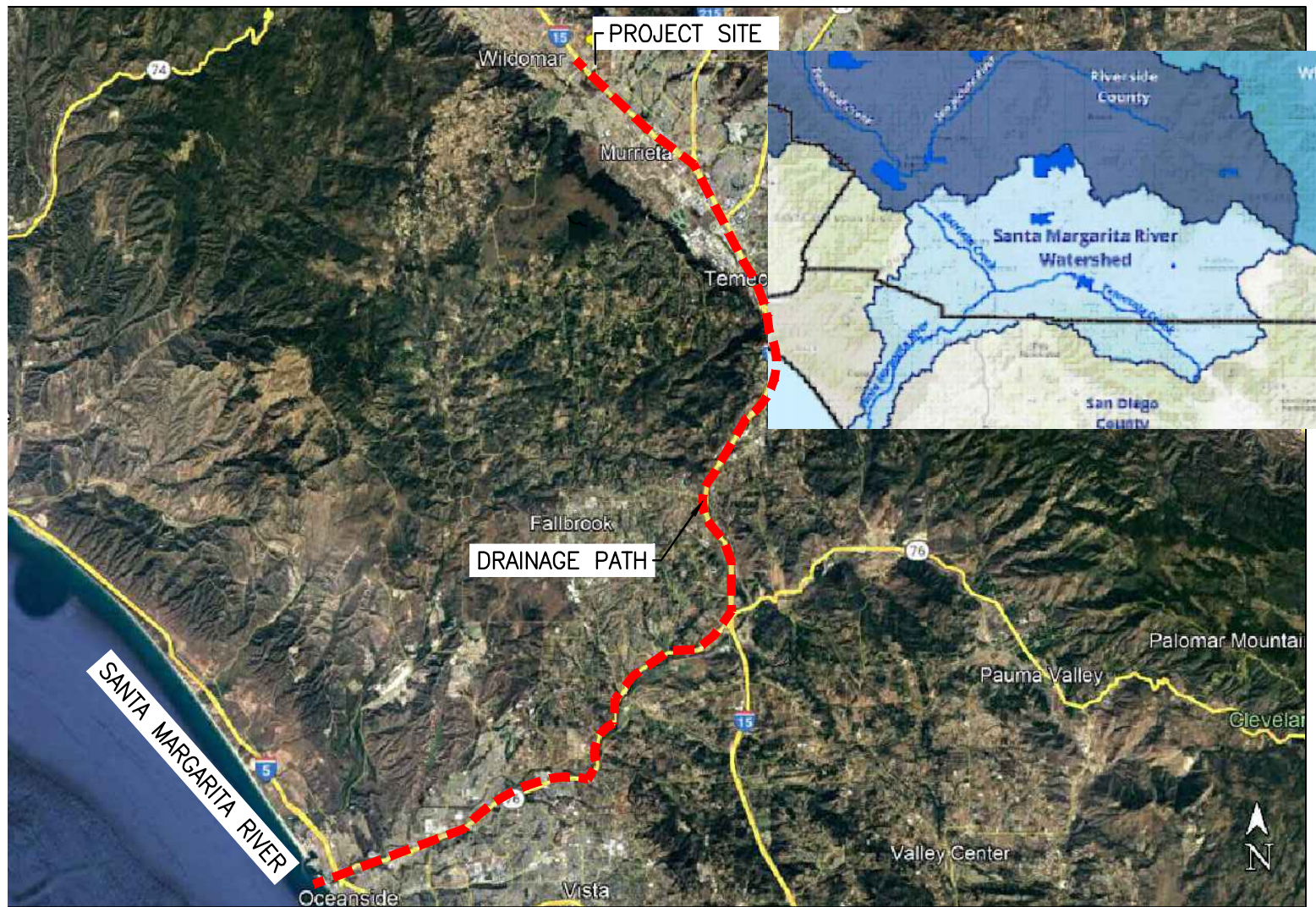
- FLOW LINE
- FLOW DIRECTION
- DRAINAGE AREA BOUNDARY
- DRAINAGE AREA DESIGNATION
- DRAINAGE AREA
- PROPOSED 12" STORM DRAIN LINE
- PROPOSED STORM DRAIN INLET
- LANDSCAPE AREA
- ROOF
- CONCRETE
- ASPHALT

PROJECT BMP RATIOS

NAME	AREA (SF)	LANDSCAPE AREA (SF)	RATIO (%)	IMPERVIOUS AREA RATIO (%)
DA-1	176,021	35,947	20	140,074 80



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RECEIVING WATERS MAP

PLANS PREPARED BY:

BLUE Engineering
&
Consulting, Inc
9320 BASELINE RD - RANCHO CUCAMONGA, CA 91701
PHONE: 909-248-6557 - E-MAIL: ANGEL@BLUECIVILENG.COM WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF:
ANGEL CESAR, P.E. 87222

DATE

Appendix 2: Construction Plans

Grading and Drainage Plans

Appendix 3: Soils Information

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



October 17, 2022

Project No. 22504

Mr. Michael Ramirez
Beyond Food Mart
4300 Edison Avenue
Chino, CA 91710

Subject: Limited Geotechnical Engineering Report
Proposed Commercial Development
24831 Clinton Keith Road, Wildomar, California

Dear Mr. Ramirez:

In accordance with your request and authorization, we have completed a preliminary geotechnical study for the design and construction of the subject structures. We are presenting, herein, our findings and recommendations.

Based on our findings, the proposed project is geotechnically feasible, provided that the recommendations in this report are incorporated into the design and are implemented during construction of the project. This report was prepared in accordance with the requirements of the 2019 California Building Code and the City of Wildomar requirements.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding this report or if we can be of further service, please do not hesitate to contact the undersigned at (657) 888-4608 or info@ntsgeo.com.

Respectfully submitted,
NTS GEOTECHNICAL, INC.

A handwritten signature in blue ink, appearing to read "Nadim Sunna", is written over a light blue horizontal line.

Nadim Sunna, MS, PE, GE 3172
Principal Engineer



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Attachment(s):	Plate 1 – Location Map
	Plate 2 – Geotechnical Map
	Plate 3 – Geotechnical Section
	Appendix A – Field Exploration
	Appendix B – Geotechnical Laboratory Test Result
	Appendix C – Liquefaction Analysis

INTRODUCTION

This report presents results of the limited geotechnical study conducted on the subject site for the proposed commercial development located at 24831 Clinton Keith Road, in the City of Wildomar, County of Riverside, California. The general location of the subject site is indicated on Plate 1 – Location Map.

SITE DESCRIPTION

The subject property comprises approximately 4.35 acres and was nearly rectangular in shape. The subject property is located at 24831 Clinton Keith Road in the City of Wildomar, California.

The subject property is bound by existing self-storage facility on the south and west, by Jana Lane on the east and Clinton Keith Road on the north.

PURPOSE AND SCOPE OF STUDY

The scope of work performed for this study was designed to evaluate the surface and subsurface conditions of the subject site with respect to geotechnical characteristics, including potential geologic hazards that may affect the development of the site, and to provide geotechnical recommendations and criteria for use in the design and construction of the proposed development. The scope of work included the following:

- Review of locally and readily available published and unpublished soils and geologic reports and data for the site and surrounding areas (see References section), Google Earth photographs, flood hazard maps, well data, etc. to ascertain earth material, geologic, and hydrologic conditions of the area.
- Utilize subsurface data performed by others for analysis.
- Utilize previous geotechnical laboratory test results performed by others.
- Define the general geology of the subject site and evaluate potential geologic hazards which would influence the proposed site development.
- Determine seismic classification of the site to meet the requirements of the 2019 California Building Code (CBC).
- Engineering analysis of previous field and laboratory data to provide a basis for geotechnical conclusions and recommendations regarding site grading and foundation, floor slab, retaining wall, etc. design parameters.

- Preparation of this report to present the preliminary geotechnical and geologic conclusions and recommendations for the proposed site development.

This report presents our preliminary conclusions and/or recommendations regarding:

- The geologic setting of the site.
- Potential geologic hazards (including landslides, seismicity, faulting, liquefaction potential, etc.)
- General subsurface earth conditions.
- Presence and effect of expansive and compressible earth materials.
- Groundwater conditions within the depth of our subsurface study.
- Excavation characteristics of the on-site earth materials.
- Characteristics and compaction requirements of proposed fill and backfill materials.
- Recommendations and guide specifications for earthwork.
- Seismic design coefficients for structural design purposes.
- Types and depths of foundations.
- Allowable bearing pressure and lateral resistance for foundations.
- Temporary and permanent cut and fill slope recommendations.
- Slope maintenance and protection recommendations.

The scope of work performed for this report did not include any testing of earth materials or groundwater for environmental purposes, an environmental assessment of the property, or opinions relating to the possibility of surface or subsurface contamination by hazardous or toxic substances.

This study was prepared for the exclusive use of **Beyond Food Mart** and their consultants for specific application to proposed structures in accordance with generally accepted standards of the geotechnical professions and generally accepted geotechnical (soil and foundation) engineering and practices at the time this report was prepared. Other warranties, implied or expressed, are not made. Although reasonable effort has been made to obtain information regarding geotechnical and subsurface conditions of the site, limitations exist with respect to knowledge of unknown regional or

localized off-site conditions which may have an impact at the site. The conclusions and recommendations presented in this report are valid as of the date of this report. However, changes in conditions of a property can occur with passage of time, whether they are due to natural processes or to works of man on this and/or adjacent properties.

If conditions are observed or information becomes available during the design and construction process which are not reflected in this report, NTS, as Geotechnical Consultant of record for the project, should be notified so that supplemental evaluations can be performed and conclusions and recommendations presented in this report can be verified or modified in writing, as necessary. Changes in applicable or appropriate standards of care in the geotechnical professions occur, whether they result from legislation or the broadening of knowledge and experience. Accordingly, the conclusions and recommendations presented in this report may be invalidated, wholly or in part, by changes outside the influence of the project Geotechnical Consultant which occur in the future.

PROPOSED DEVELOPMENT

Based upon information presented to this firm by the client, it is our understanding that the proposed project will consist of construction of new gas station, car wash, fuel pump station, two retail buildings and an office/warehouse building at the southern side of the property. All structures all planned to be 1-story structures and constructed at-grade.

The above project description and assumptions were used as the basis for the field exploration, laboratory testing program, the engineering analysis, and the conclusions and recommendations presented in this report. NTS should be notified if structures, foundation loads, grading, and/or details other than those represented herein are proposed for final development of the site so a review can be performed, a supplemental evaluation made, and revised recommendations submitted, if required.

FIELD EXPLORATION

The field study performed for this report included utilizing existing data from previous study performed by Others.

The subsurface exploration performed by others consisted of excavating ten (10) hollow stem auger borings to a maximum depth of 23 feet below the existing grade. The approximate locations of the exploratory excavations are shown on Plate 2 – Geotechnical Map. Logs of the borings are presented in Appendix A – Field Exploration.

The result of the subsurface soil conditions are presented on Plate 3 – Geotechnical Section.

GEOTECHNICAL LABORATORY TESTING

Laboratory testing was performed on bulk and undisturbed samples collected during the previous subsurface exploration performed by Others. Testing was performed on soil samples and included the following tests:

- Moisture and density
- Maximum density and optimum moisture content
- Sieve analysis; and
- Corrosivity.

Laboratory test results from the previous investigations are presented in Appendix B of this report.

It is recommended that samples be obtained at the completion of rough grading and remolded direct shear, consolidation and expansion index be performed to confirm the foundation recommendations provided in this report.

GEOLOGIC FINDINGS

Regional Geologic Setting

According to the geologic maps, we note that the subject property underlain by Monzogranite to granodiorite bedrock (Kpvg) that consists of pale gray, massive, medium-grained monzogranite rock.

Subsurface Materials

Majority of the materials encountered during the subsurface investigation performed by others consist of alluvium ranging from about 2 to 16 feet in thickness underlain by monzogranite bedrock to the total depth of the exploration.

In general, the alluvium consists light brown to red brown, slightly moist to damp, medium dense to dense, silty sands.

The bedrock consists of pale brown to pale gray, fine- to- medium grained, dense to very dense Monzogranite.

Groundwater

Groundwater was not encountered in the exploratory excavations to the maximum depth explored of approximately 23 feet below existing ground surface at the time the field study was performed for this report.

No groundwater data was found during a literature search pertaining to the subject property. There are no known shallow groundwater bearing soil or rock formations beneath the subject property. No evidence of onsite springs was found during the field study. Based on anticipated lot grading and the inferred groundwater depths, groundwater should not be a factor for project design or long-term performance.

Surface water was not observed on the subject site at the time the field study was performed for this report.

Based on results of our subsurface exploration and experience, variations in the continuity and nature of surface and subsurface conditions should be anticipated. Due to uncertainty involved in the nature and depositional characteristics of earth materials at the site, care should be exercised in extrapolating or interpolating subsurface conditions between and beyond the exploratory excavation locations.

Groundwater conditions may vary across the site due to stratigraphic and hydrologic conditions and may change over time as a consequence of seasonal and meteorological fluctuations, or activities by humans at this site and nearby sites. However, based on the above findings, groundwater is unlikely to impact the proposed development.

GEOLOGIC HAZARDS

Faulting and Seismicity

The site is not located within an Alquist-Priolo Earthquake Fault Zone, and no known active faults are shown on the reviewed geologic maps crossing the site, however, the site is located in the seismically active region of Southern California. The nearest known active fault is the Elsinore fault system, which is located approximately 1.2 mile from the site, and capable of generating a maximum earthquake magnitude of 7.9.

Liquefaction and Seismic Settlement

Liquefaction occurs when the pore pressures generated within a soil mass approach the effective overburden pressure. Liquefaction of soils may be caused by cyclic loading such as that imposed by ground shaking during earthquakes. The increase in pore pressure results in a loss of strength, and the soil then can undergo both horizontal and vertical movements, depending on the site conditions. Other phenomena associated with soil liquefaction include sand boils, ground oscillation, and loss of foundation bearing capacity. Liquefaction is generally known to occur in loose, saturated, relatively clean, fine-grained cohesionless soils at depths shallower than approximately 50 feet. Factors to consider in the evaluation of soil liquefaction potential include groundwater

conditions, soil type, grain size distribution, relative density, degree of saturation, and both the intensity and duration of ground motion.

Based on our review of the County of Riverside Map My County website, approximately the southern $\frac{3}{4}$ of the site is located within a moderate liquefaction hazard zone. Based on lack of shallow groundwater and the presence of shallow bedrock and our liquefaction analysis as presented within Appendix D of this report, it is our professional opinion that the potential for liquefaction to occur is low.

Landslides

The subject site is not located within an earthquake-induced landslide zone. Field reconnaissance did not disclose the presence of older, existing landslides on or near the subject property. In addition, due to the relatively gentle sloping of the site, the potential for landslides to impact the proposed development is considered low.

Flooding

The Federal Emergency Management Agency (FEMA) has prepared flood insurance rate maps (FIRMs) for use in administering the National Flood Insurance Program. Based on our review of the FEMA flood map, the site is located in an area identified as Area of Minimal Flood Hazard (Zone X).

Tsunami and Seiches

Tsunamis are waves generated by massive landslides near or under sea water. The site is not located on any State of California – County of Riverside Tsunami Inundation Map for Emergency Planning. The potential for the site to be adversely impacted by earthquake-induced tsunamis is considered to be negligible because the site is located several miles inland from the Pacific Ocean shore, at an elevation exceeding the maximum height of potential tsunami inundation.

Seiches are standing wave oscillations of an enclosed water body after the original driving force has dissipated. The potential for the site to be adversely impacted by earthquake-induced seiches is considered to be negligible due to the lack of any significant enclosed bodies of water located in the vicinity of the site.

GEOTECHNICAL ENGINEERING FINDINGS

Expansive Soil

Based on our evaluation and experience with similar material types, the soil encountered near the ground surface at the site exhibit a very low expansion potential.

Soil Corrosion

The potential for the on-site materials to corrode buried steel and concrete improvements was evaluated. Laboratory testing was performed on representative soil samples to evaluate pH, minimum resistivity, and soluble chloride and sulfate contents. The results of our corrosivity testing is presented within Appendix B of this report. General recommendations to address the corrosion potential of the on-site soils are provided below. Imported fill materials, if used, should be tested to evaluate whether their corrosion potential is more severe than those assumed.

Structural Concrete

Laboratory tests indicate that the potential of sulfate attack on concrete in contact with the on-site soils is “negligible” or “S0” exposure in accordance with ACI 318, Table 19.3.1.1. Therefore, restriction on the type of cement, water to cement ratio, and compressive strength is not required.

Ferrous Metal

The results of the laboratory chemical tests performed on a sample of soil collected within the site indicate that the on-site soils are mildly corrosive to ferrous metals. Consequently, metal structures which will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal sign posts, etc.) and/or in close proximity to the soil (wrought iron fencing, etc.) may be subject to corrosion. The use of special coatings or cathodic protection around buried metal structures has been shown to be beneficial in reducing corrosion potential. Additional provisions will be required to address high chloride contents of the soil per the 2019 CBC to protect the concrete reinforcement. The laboratory testing program performed for this project does not address the potential for corrosion to copper piping. In this regard, a corrosion engineer should be consulted to perform more detailed testing and develop appropriate mitigation measures (if necessary).

The above discussion is provided for general guidance in regards to the corrosiveness of the on-site soils to typical metal structures used for construction. Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements are beyond our purview. If detailed testing is

required, a corrosion engineer should be consulted to perform the testing and develop appropriate mitigation measures.

Preliminary Infiltration Testing

Two (2) infiltration tests were performed others previously in general conformance with the County of Riverside requirements. The borings were excavated to a depth of 5 and 10 feet below the existing grade using a hollow-stem-auger drill rig. The result of our infiltration testing is summarized in the table below, which includes a factor of safety of 3.

Preliminary Infiltration Rates Summary

Boring No.	Depth Below Existing Grade (feet)	Factored Infiltration Rate (inches/hour)
I-1	5	0.18
I-2	5	0.23

Based on our infiltration testing and due to the presence of very dense bedrock underlying the site, infiltration within the site soils is deemed not feasible from a geotechnical standpoint. Alternate methods of disposing of stormwater should be considered by the project civil engineer.

Excavation Characteristics

The native soil materials underlying the site can be excavated with conventional grading equipment (i.e., backhoes, excavators, or loaders). However, the bedrock materials may be difficult to excavate and will heavy duty equipment or jack hammers.

GEOTECHNICAL ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The conclusions and recommendations presented in this report are based on information provided to this firm, the results of the field and laboratory data obtained from ten (10) exploratory excavations located on the subject property, experience gained from work conducted by this firm on projects within the general vicinity of the subject site, the project description and assumptions presented in the 'Proposed Development' section of this report, engineering analyses, and professional judgement.

Based on a review of the field and laboratory data and the engineering analysis, the proposed development is feasible from a geotechnical standpoint. The

subject property can be developed without adverse impact onto or from adjoining properties providing the recommendations contained within this report are adhered to during project design and construction.

The field observations indicate that the upper 3 feet of the site soils are considered loose and compressible and are not considered suitable for the support of structural fills, foundations, slab-on-grade floor slabs, hardscape, and/or pavement without removal and replacement as compacted fill. On this basis, it is recommended that the upper 3 feet of the site soils be removed and replaced as engineered fill in order to densify the material and to reduce the potential for additional settlement to occur. Additionally, new foundations should not span a cut/fill transition. Wherever a cut/fill transition occurs, the cut portion of the pad should be excavated to at least 3 feet below the bottom of footing and the excavated material be placed as engineered fill to create a uniform blanket of engineered fill and minimize differential movement.

The actual conditions of the near-surface supporting material across the site may vary. The nature and extent of variations of the surface and subsurface conditions between the exploratory excavations may not become evident until construction. If variations of the material become evident during construction of the proposed development, NTS should be notified so that the project Geotechnical Consultant can reevaluate the characteristics of the material and the conclusions and recommendations of this report, and, if needed, revise the conclusions and recommendations presented herein.

Preliminary recommendations for site grading, foundations, slab support, and spa design are presented in the subsequent paragraphs.

Site Preparation

Site preparation should begin with the removal of utility lines, concrete, vegetation, and other deleterious debris from areas to be graded. Tree stumps and roots should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside edges of the proposed excavation and fill areas. We recommend that unsuitable materials such as organic matter or oversized material be selectively removed and disposed offsite. The debris and unsuitable material generated during clearing and grubbing should be removed from areas to be graded and disposed at a legal dump site away from the project areas.

Grading

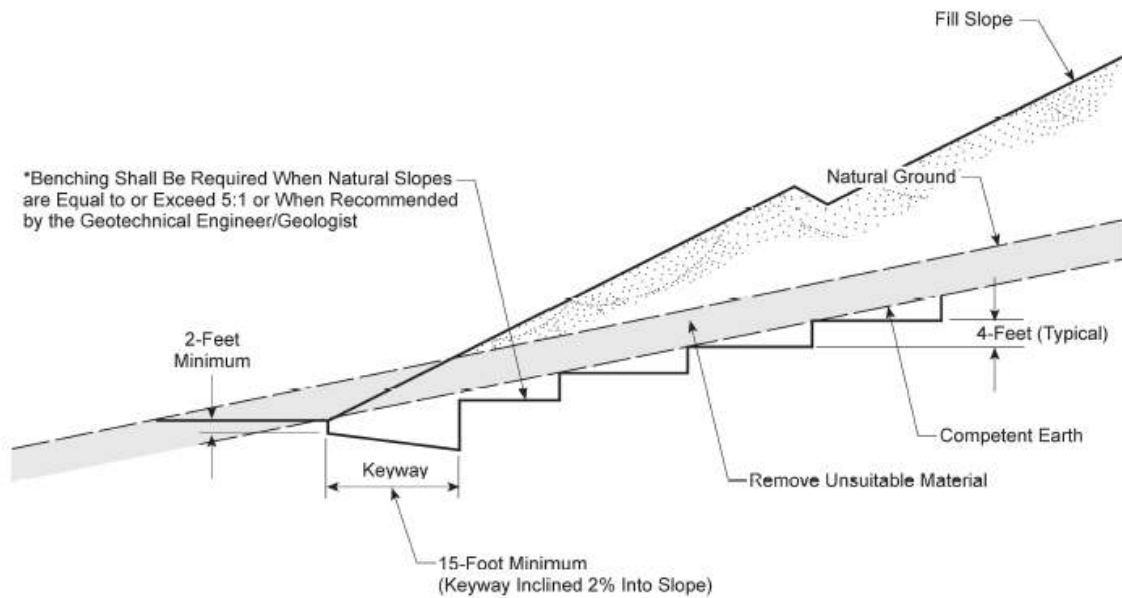
It should be noted that the recommendations provided herein are based on our subsurface exploration and knowledge of the on-site geology. Actual removals

may vary in configuration and volume based on observations of geologic materials and conditions encountered during grading. The bottom of all corrective grading removals should be observed by a representative of NTS to verify the suitability of in-place soil prior to performing scarification and recompaction.

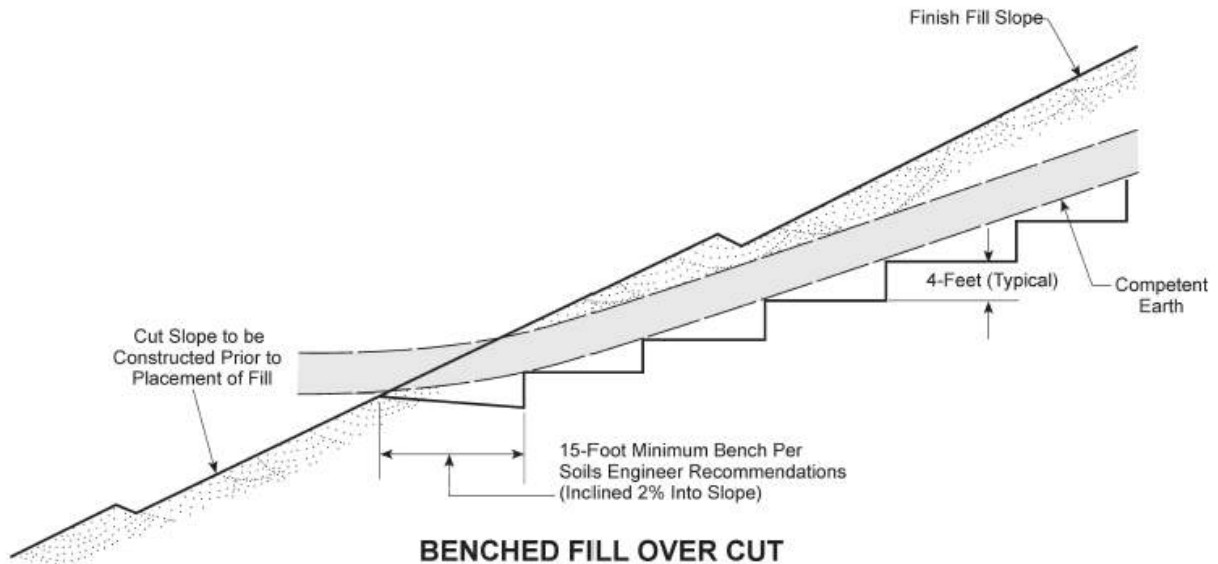
The need for corrective grading, i.e., removal of existing soil materials from areas to receive fill, where exposed at design grade in cut and fill areas

Fill Support Benches:

Benches should be excavated through any non-engineered fill, topsoil, or loose soil wherever the toe of a fill slope is located at a natural ground surface having a gradient of 5 horizontal to 1 vertical, or steeper, or in flatter areas where recommended by the geotechnical consultant. Horizontal benches should also be excavated at the daylight line between cut and fill portions of all graded slopes. The bottom of these keys and initial benches should be 15 feet in minimum width, and any non-engineered fill, topsoil, or native soil should be completely removed to expose undisturbed, in-place rock unit materials. Further benching should be performed uphill from these keys or initial benches simultaneously with fill placement to remove surficial soil materials and provide additional level surfaces for fill support where the natural ground surface is 5 horizontal to 1 vertical, or steeper. Benching detail is provided in the figure below.



BENCHED FILL OVER NATURAL



BENCHED FILL OVER CUT

Warehouse Building Pad:

The proposed warehouse building pad should be supported on engineered fill, a minimum of 4 feet below the footing or 6 feet from existing grade, whichever is deeper.

Other Buildings Pads:

All the other building pads planned onsite should also be supported on engineered fill, a minimum of 3 feet below the footing or 5 feet from existing grade, whichever is deeper.

Pavement:

New pavement should be supported on engineered fill, a minimum of 2 feet below the proposed pavement section (i.e., below the aggregate base section).

Further subexcavation may be necessary depending on the conditions of the underlying soils. The actual depth of removal should be determined at the time of grading by the project geotechnical engineer. The determination will be based on soil conditions exposed within the excavations. At minimum, any undocumented fill, topsoil or other unsuitable materials should be removed and replaced as properly compacted fill.

In-place density tests may be taken in the removal bottom areas where appropriate to provide data to help support and document the engineer's decision.

It is imperative that no clearing and/or grading operations be performed without the presence of a representative of the geotechnical engineer. An on-site, pre-job meeting with the developer, the contractor and the geotechnical engineer should occur prior to all grading-related operations. Operations undertaken at the site without the geotechnical engineer present may result in exclusions of affected areas from the final compaction report for the project.

Grading of the subject site should be performed, at a minimum, in accordance with these recommendations and with applicable portions of the CBC. The following recommendations are presented for your assistance in establishing proper grading criteria.

Materials for Fill

On-site soils with an organic content of less than 3 percent by volume (or 1 percent by weight) are suitable for use as fill. Soil material to be used as fill should not contain contaminated materials, rocks, or lumps over 6 inches in

largest dimension, and not more than 40 percent larger than $\frac{3}{4}$ inch. Utility trench backfill material should not contain rocks or lumps over 3 inches in largest dimension. Larger chunks, if generated during excavation, may be broken into acceptably sized pieces or may be disposed offsite.

Any imported fill material should consist of granular soil having a “low” expansion potential (that is, expansion index of 50 or less). Import material should also have low corrosion potential (that is, chloride content less than 500 parts per million [ppm], soluble sulfate content of less than 0.1 percent, and pH of 5.5 or higher). Materials to be used as fill should be evaluated by a representative of NTS prior to importing or filling.

Compacted Fill

Prior to placement of compacted fill, the contractor should request an evaluation of the exposed excavation bottom by NTS. Unless otherwise recommended, the exposed ground surface should then be scarified to a depth of at least 8 inches and watered or dried, as needed, to achieve generally consistent moisture contents near optimum moisture content. The scarified materials should then be compacted to 90 percent relative compaction in accordance with the latest version of ASTM Test Method D1557.

Compacted fill should be placed in horizontal lifts of approximately 6 to 8 inches in loose thickness. Prior to compaction, each lift should be watered or dried as needed to achieve near optimum moisture condition, mixed, and then compacted to a relative compaction of 90 percent as evaluated by ASTM D1557. Successive lifts should be treated in a like manner until the desired finished grades are achieved.

Personnel from NTS should observe the excavations so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including CalOSHA requirements, should be met.

Temporary Excavations

Temporary excavations for the demolishing, earthwork, footing and utility trench are expected. We anticipate that unsurcharged excavations with vertical side slopes less than 5 feet high will generally be stable; however, sloughing of cohesionless sandy materials encountered at the site should be expected.

Where the space is available, temporary, unsurcharged excavation sides over 5 feet in height should be sloped no steeper than an inclination of 1H:1V (horizontal:vertical). Where sloped excavations are created, the tops of the slopes should be barricaded so that vehicles and storage loads do not encroach within the imaginary zone of 1:1 as measured from the bottom of the excavated

slopes. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes. NTS should be advised of such heavy vehicle loadings so that specific setback requirements can be established. If the temporary construction slopes are to be maintained during the rainy season, berms are recommended to be graded along the tops of the slopes in order to prevent runoff water from entering the excavation and eroding the slope faces. Where space for sloped excavations is not available, temporary shoring may be utilized.

Personnel from NTS should observe the excavation so that any necessary modifications based on variations in the encountered soil conditions can be made. All applicable safety requirements and regulations, including CalOSHA requirements, should be met.

Slope Construction

Slopes should not be steeper than 2(h):1(v). Should steeper inclinations of slopes be required for the project, additional analysis may be warranted. Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction and then roll the final slopes to provide dense, erosion-resistant surfaces.

Where fills are to be placed against existing slopes steeper than 5(h):1(v), and the depth of fill exceeds 5 feet, the existing slopes should be benched into competent bearing materials to provide a series of level benches to seat the fill and to remove potential loose soil or fill soil. The benches should be in accordance with the recommendations provided in the Grading section of this report.

In addition, a shear key should be constructed across the toe of fill slopes. The shear key should be a minimum of 15 feet wide and should penetrate a minimum of 2 feet beneath the toe of the slope into firm and competent bedrock.

Slope Protection

Inasmuch as the native materials are susceptible to erosion by wind and running water, it is our recommendation that the slopes at the project be planted as soon as possible after completion. The use of succulent ground covers, such as iceplant or sedum, is not recommended. If watering is necessary to sustain plant growth on slopes, then the watering operation should be monitored to assure proper operation of the water system and to prevent over watering.

Measures should be provided to prevent surface water from flowing over slope faces.

Rodent infestation can also be a serious issue with respect to slope stability. Rodent tunneling and burrowing alters the strength of the soil and can allow water to infiltrate the soil, resulting in ultimate slope failure. Rodent burrows can also provide direct access for surface water to the slope face, causing surficial slope "blowouts". Although a maintenance issue, we recommend that measures be taken to prevent rodent infestation in slopes.

Slope Structural Setback

As per section 1808.7.2 of the 2019 CBC, which references Figure 1808.7.1 of the 2019 CBC, the distance between the face of the footing from the face of descending slopes should be at least the smaller of $H/3$ and 40 feet, where H is the height of the slope. Footings should be deepened as necessary to meet this requirement.

The distance between the face of the structure and the toe of ascending slopes should be at least the smaller of $H/2$ and 15 feet. The building should be setback from ascending slopes to meet this requirement.

Seismic Design

Our recommendations for seismic design parameters have been developed in accordance with 2019 CBC and ASCE 7-16 (ASCE, 2016) standards. The applicable site class is C based on the results of our field investigation. The table presents the seismic design parameters for the site that are obtained from USGS Design Ground Motions website and are based on the ASCE 7-16 and 2019 California Building Code.

2019 CBC and ASCE 7-16 Seismic Design Parameters

Seismic Item	Design Values ^(a)	2016 ASCE 7-16 or 2019 CBC Reference
Site Class based on soil profile (ASCE 7-16 Table 20.3-1)	C	ASCE 7-16 Table 20.3-1
Short Period Spectral Acceleration S_s	1.598	CBC Figures 1613.2.1 (1-8)
1-sec. Period Spectral Acceleration S_1	0.598	CBC Figures 1613.2.1 (1-8)
Site Coefficient F_a (2019 CBC Table 1613.2.3(1))	1.2	CBC Table 1613.2.3 (1)
Site Coefficient F_v (2019 CBC Table 1613.2.3(2))	1.402	CBC Table 1613.2.3 (2)
Short Period MCE* Spectral Acceleration S_{MS} $S_{MS} = F_a S_s$	1.917	CBC Equation 16-36
1-sec. Period MCE Spectral Acceleration S_{M1} $S_{M1} = F_v S_1$	0.838	CBC Equation 16-37
Short Period Design Spectral Acceleration S_{DS} $S_{DS} = 2/3 S_{MS}$	1.278	CBC Equation 16-38
1-sec. Period Design Spectral Acceleration S_{D1} $S_{D1} = 2/3 S_{M1}$	0.559	CBC Equation 16-39
MCE ^(b) Peak Ground Acceleration (PGA)	0.699	ASCE 7-16 Figures 22-9 to 22-13
Site Coefficient F_{PGA} (ASCE 7-16 Table 11.8-1)	1.2	ASCE 7-16 Table 11.8-1
Modified MCE ^(b) Peak Ground Acceleration (PGA_M)	0.839	ASCE 7-16 Equation 11.8-1
Seismic Design Category	D	ASCE 7-16 Tables 11.6.1 and 11.6.2

(a) Design Values Obtained from USGS Earthquake Hazards Program website that are based on the ASCE-7-16 and 2019 CBC and site coordinates of N33.596774° and W117.226484°.

(b) MCE: Maximum Considered Earthquake.

It should be recognized that much of southern California is subject to some level of damaging ground shaking as a result of movement along the major active (and potentially active) fault zones that characterize this region. Design utilizing the 2019 CBC is not meant to completely protect against damage or loss of function. Therefore, the preceding parameters should be considered as minimum design criteria.

Foundation Design and Construction

The proposed improvements may be safely founded on shallow foundations, either individual spread footings and/or continuous wall footings, bearing on competent engineered fill.

The footings should be designed in accordance with the following recommendations:

Foundation Design Parameters

Bearing Material	<ul style="list-style-type: none"> Competent engineered fill See Grading section
Minimum Footing Size	<ul style="list-style-type: none"> Width: 18 inches Embedment: A minimum of 24 inches
Allowable Bearing Capacity	<ul style="list-style-type: none"> An allowable bearing capacity of 2,500 psf for the minimum footing size given above. The above value may be increased by 1/3 for temporary loads such as wind or earthquake.
Settlement	<ul style="list-style-type: none"> Total static settlement is estimated to be 1 inch with differential settlement estimated to be approximately ½ inch over a span of 30 feet.
Allowable Lateral Passive Resistance	<ul style="list-style-type: none"> 300 pcf (equivalent fluid pressure)
Allowable Coefficient of Friction	<ul style="list-style-type: none"> 0.35

Slab-On-Grade Design and Construction

The slab-on-grade should be designed and constructed with the minimum recommendations presented below, however, final design of the slab should be determined by the project structural engineer.

Minimum Thickness: The minimum slab thickness should be 5 inches.

Minimum Slab Reinforcement: Minimum slab reinforcement shall not be less than No. 4 bars placed at 18 inches on center. Welded wire mesh is not recommended. Care should be taken to position the reinforcement bars in the center of the slab.

Slab Subgrade:

- The upper 24 inches of the slab subgrade should be moisture conditioned to near optimum moisture content and compacted to a minimum relative compaction of compacted to 90 percent relative compaction in accordance with the latest version of ASTM D1557 prior to placement of vapor retarder.

- A moisture vapor retarder should be placed direct blow the slab in accordance with the “Moisture Vapor Retarder” section below.

Moisture Vapor Retarder

A vapor retarder, such as a 10-mil-thick moisture vapor retarder that meets the requirements of ASTM E1745 Class C (Stego Wrap or equivalent) should be placed directly over the prepared soil subgrade to provide protection against vapor transmission through concrete floor slabs that are anticipated to receive carpet, tile or other moisture sensitive coverings. The use of moisture vapor retarder should be determined by the project architect. At minimum, the vapor retarder should be installed as follows:

- Per the manufacture’s specifications as well as with the applicable recognized installation procedures such as ASTM E1643;
- Joints between the sheets and the openings for utility piping should be lapped and taped. If the barrier is not continuously placed across footings/ribs, the barrier should at minimum be lapped into the side of the footing/rib trenches down to the bottom of the trench; and,
- Punctures in the vapor retarder should be repaired prior to concrete placement.

It should be noted that the moisture retarder is intended only to reduce moisture vapor transmissions from the soil beneath the concrete and is consistent with the current standard of the industry in the building construction in Southern California. It is not intended to provide a “waterproof” or “vapor proof” barrier or reduce vapor transmission from sources above the retarder (i.e., concrete). The evaluation of water vapor from any source and its effect on any aspect of the proposed building space above the slab (i.e., floor covering applicability, mold growth, etc.) is beyond our purview and the scope of this report.

Pole Foundations

It is expected that the canopy structures and light poles will be supported on pole foundations. As a minimum, the pole foundations should be at least 18 inches in diameter and at least 4 feet deep; however, the actual dimensions should be determined by the project structural engineer based on the following design parameters.

Bearing Materials: The pole foundations may bear into competent bearing soils approved by a representative from NTS.

Bearing Values: End-bearing capacity may be combined to determine the allowable bearing capacities of the pole foundations. An allowable bearing pressure of 3,000 pounds per square foot (psf) may be used for pole foundations

at least 18 inches in diameter and embedded a minimum of 4 feet below the lowest adjacent grade.

Lateral Load Design: Lateral loads may be resisted by passive resistance within the adjacent earth materials. For passive resistance, an allowable passive earth pressure of 300 pounds per foot of pile diameter per foot of depth into competent bearing material may be used; however, passive resistance should be disregarded within the upper foot due to possible disturbance during drilling. The passive resistance value may be applied over an area equivalent to two pile diameters.

Retaining Walls Design

The following design parameters may be utilized by the structural engineer to design the proposed retaining walls at the subject project. We understand that the retaining walls could retain over 6 feet of soil.

Foundation Recommendations

Retaining walls foundation may be sized based on the recommendations presented in “Foundation Design and Construction” section of this report.

Lateral Earth Pressure

The values presented below assume that the supported grade is level and that surcharge loads are not applied. In addition, the recommended design lateral earth pressure is calculated assuming that a drainage system will be installed behind the retaining walls and that external hydrostatic pressure will not develop. Where adequate drainage is not provided behind the walls, further evaluation should be conducted by the project geotechnical engineer and the lateral earth pressures will need to be adjusted accordingly.

Unrestrained Wall:	40 pcf for level backfill
Unrestrained Wall	60 pcf for 2:1 backfill

The unrestrained values are applicable only when the walls are designed and constructed as cantilevered walls allowing sufficient wall movement to mobilize “active” pressure conditions. This wall movement should be less than 0.01 H (H = height of wall) for the unrestrained values to be applicable.

Vertical surcharge loads within 1:1 project from the bottom of the wall distributed over retained soils should be considered as additional uniform horizontal pressure acting on the wall.

Seismic Earth Pressure

Given the general seismicity and the fact that the basement walls are retaining more than 6 feet of earth, it is recommended that the walls also be designed for seismic earth pressure. The seismic earth pressure distribution may be considered to be a triangle with the maximum pressure at the bottom. The total seismic earth pressure may be represented by an equivalent fluid pressure (EFP) of 25 pcf.

Drainage

The backdrain system should consist of 4-inch perforated pipe surrounded by at least one cubic foot of $\frac{3}{4}$ " – 1.5" open graded gravel wrapped in Mirafi 140N fabric or equivalent. The perforated pipe should consist of SDR-35 or Schedule 40 PVC pipe or approved equivalent laid on at least 2 inch of crushed rock with the perforations laid down. The back drain gradient should not be less than 1 percent. The perforated pipe should outlet into area drains or other suitable outlet points at runs 200 feet or less, if practical. If the back drains cannot be outleted by gravity flow, a sump pump system will need to be designed and constructed. Redundant back-up pumps or components are recommended. Design of the system is outside of the purview of NTS.

Waterproofing

The back side of the retaining walls should be waterproofed prior to placement of subdrains or backfill. Waterproofing is outside of our purview and should be designed by a waterproofing consultant.

Wall Backfill

Backfill behind the wall may consist of onsite soil granular fill material approved by NTS. If select backfill is used, then all select backfill within 2 feet of final grade should consist of free-draining granular material (i.e., SE 30 sand or crushed rock). Crushed rock, if used, should be completely wrapped in filter fabric (Mirafi 140N or equivalent) to minimize the potential for migration of fines into the rock. The select backfill should be moisture conditioned to near optimum moisture content and compacted to achieve at least 90 percent relative compaction in accordance with ASTM D1557. The upper two feet of backfill should consist of fine-grained native soils, moisture conditioned to 4 percent above optimum moisture content and compacted to 90 percent relative compaction in order to cap the select backfill zone.

The select backfill should extend horizontally a minimum of $H/2$ behind the wall, where H is the retained height.

Utility Trench Backfill Considerations

New utility line pipeline trenches should be backfilled with select bedding materials beneath and around the pipes (pipe zone) and compacted soil above the pipe bedding. Recommendations for the types of the materials to be used and the proper placement of these materials are provided in the following sections.

Pipe Zone (Bedding and Shading)

The pipe bedding and shading materials should extend from at least 6 inches below the pipes to at least 12 inches above the crown of the pipes. Pipe bedding and shading should consist of either clean sand with a sand equivalent (SE) of at least 30, or crushed rock. If crushed rock is used, it should consist of $\frac{3}{4}$ -inch crushed rock that conforms to Table 200-1.2.1 (A) of the 2018 "Greenbook." Pipe bedding and shading should also meet the minimum requirements of the City of Los Angeles. If the requirements of the City are more stringent, they should take precedence over the geotechnical recommendations. Sufficient laboratory testing should be performed to verify the bedding and shading meets the minimum requirements of the Greenbook and City of Wildomar grading codes.

Granular pipe bedding and shading material should be properly placed in thicknesses not exceeding 3 feet, and then sufficiently flooded or jetted in place. Crushed rock, if used, should be capped with filter fabric (Mirafi 160N, or equivalent; Mirafi 140N filter fabric is suitable if available) to prevent the migration of fines into the rock.

Trench Backfill

All existing soil material within the limits of the site are considered suitable for use as trench backfill above the pipe bedding and shading zone if care is taken to remove all significant organic and other decomposable debris, moisture condition the soil materials as necessary, and separate and selectively place and/or stockpile any inert materials larger than 6 inches in maximum diameter.

Imported soils are not anticipated for backfill since the on-site soils are suitable. However, if imported soils are used, the soils should consist of clean, granular materials with physical and chemical characteristics similar to or better than those described herein for on-site soils. Any imported soils to be used as backfill should be evaluated and approved by NTS prior to placement.

Soils to be used as trench backfill should be moistened, dried, or blended as necessary to achieve near optimum moisture content, placed in lifts which, prior to compaction shall not exceed the thickness specified in Section 306-12.3 of the 2018 "Greenbook" for various types of equipment, and mechanically

compacted/densified to at least 90 percent relative compaction as determined by ASTM Test Method D 1557. Jetting is not permitted in this trench zone.

No rock or broken concrete greater than 6 inches in maximum diameter should be utilized in the trench backfills.

Asphalt Concrete Pavement Design

In accordance with Chapter 600 of the Caltrans Highway Design Manual, we have performed pavement structural design utilizing assumed traffic indices (TI) of 4.5, 5.5 and 7 and assumed R-value of 30. Based on our analysis, we have developed the pavement structural sections presented in the following table. We note that the assumed TI's should be reviewed by a traffic engineer to confirm their applicability to the project. The assumed R-value should be confirmed by testing at the completion of rough grading.

Asphalt Concrete Pavement Structural Sections

Location	Traffic Index	Asphalt Concrete (in.)	Aggregate Base (in.)*
Parking Stalls	4.5	3.0	4.0
Driveways	5.5	4.0	5.0
Fire lane	7.0	4.0	10.0

The planned pavement structural sections should consist of the following:

- Aggregate Base materials (AB) consisted of either Crushed Aggregate Base (CAB) or Crushed Miscellaneous Base (CMB).
- Asphalt Concrete (AC) material of a type meeting the minimum City of Wildomar standards.
- The subgrade soils should be moisture conditioned to 2 percent above optimum moisture content to a depth of at least 18 inches and compacted to 90 percent relative compaction.
- The AB and AC should be compacted to at least 95 percent relative compaction.

Exterior Flatwork/Hardscape Design Considerations

For exterior flatwork and hardscape planned as part of the proposed development, the following design may be considered by the project civil engineer. These recommendations may be considered as minimal design based

on the soils conditions encountered during our investigation. Final design of the proposed flatwork and hardscape area should be provided by the project civil engineer. Based on the conditions encountered, we recommend that the subgrade for the subject concrete flatwork and hardscape be moisture conditioned to near optimum to a depth of 18 inches below finish subgrade elevation and compacted to 90 percent relative compaction. A Type II/V cement may be used from a geotechnical perspective. Our flatwork and hardscape design considerations are presented in the table below.

Concrete Flatwork Table

Description	Subgrade Preparation ⁽¹⁾	Minimum Concrete Thickness	Cut-Off Barrier Or Edge Thickness	Joint Spacing (Maximum)	Concrete ⁽³⁾
Concrete Sidewalks and Walkways ⁽⁴⁾	1) 2 percent above optimum to 18" ⁽¹⁾ , 2) 2" of sand or well graded rock (i.e., Class II base or equiv.) above moisture conditioned subgrade.	4 inches	Not Required	5 feet	Type II/V

- (1) The moisture content of the subgrade must be verified by the geotechnical consultant prior to sand/rock placement.
- (2) Reinforcement to be placed at or above the mid-point of the slab (i.e., a minimum of 2.0 to 2.5 inches above the prepared subgrade).
- (3) The site has negligible levels of sulfates as defined by the CBC. Concrete mix design is outside the geotechnical engineer's purview.
- (4) Where flatwork is adjacent a stucco surface, a ¼" to ½" foam separation/expansion joint should be used.
- (5) If dowels are placed in cored holes, the core holes shall be placed at alternating in-plane angles (i.e., not cored straight into slab).

Planters and Trees

Where new trees or large shrubs are to be located in close proximity to new concrete flatwork, rigid moisture/root barriers should be placed around the perimeter of the flatwork to at least 12 inches in depth in order to offer protection to the adjacent flatwork against potential root and moisture damage. Existing mature trees near flatwork areas should also incorporate a rigid moisture/root barrier placed at least 2 feet in depth below the top of the flatwork.

Drainage Control

The control of surface water is essential to the satisfactory performance of the site improvements. Surface water should be controlled so that conditions of uniform moisture are maintained beneath the improvements, even during periods of heavy rainfall. The following recommendations are considered minimal:

- Ponding and areas of low flow gradients should be avoided.
- If bare soil within 5 feet of the structure is not avoidable, then a gradient of 5 percent or more should be provided sloping away from the improvement. Corresponding paved surfaces should be provided with a gradient of at least 2 percent.
- The remainder of the unpaved areas should be provided with a drainage gradient of at least 2 percent.
- Positive drainage devices, such as graded swales, paved ditches, and/or catch basins should be employed to accumulate and to convey water to appropriate discharge points.
- Concrete walks and flatwork should not obstruct the free flow of surface water.
- Brick flatwork should be sealed by mortar or be placed over an impermeable membrane.
- Area drains should be recessed below grade to allow free flow of water into the basin.
- Enclosed raised planters should be sealed at the bottom and provided with an ample flow gradient to a drainage device. Recessed planters and landscaped areas should be provided with area inlet and subsurface drain pipes.
- Planters should not be located adjacent to the structures wherever possible. If planters are to be located adjacent to the structures, the planters should be positively sealed, should incorporate a subdrain, and should be provided with free discharge capacity to a drainage device.
- Planting areas at grade should be provided with positive drainage. Wherever possible, the grade of exposed soil areas should be established above adjacent paved grades. Drainage devices and curbing should be provided to prevent runoff from adjacent pavement or walks into planted areas.
- Gutter and downspout systems should be provided to capture discharge from roof areas. The accumulated roof water should be conveyed to off-site disposal areas by a pipe or concrete swale system.
- Landscape watering should be performed judiciously to preclude either soaking or desiccation of soils. The watering should be such that it just sustains plant growth without excessive watering. Sprinkler systems should be checked.

Review, Observation, and Testing

The recommendations presented in this report are contingent upon review of final plans and specifications for the project by NTS. NTS Geotechnical, Inc. should review and verify in writing the compliance of the final grading plan and the final foundation plans with the recommendations presented in this report.

It is recommended that NTS be retained to provide Geotechnical Consulting services during the earthwork operations and foundation installation process. This is to observe compliance with the design concepts, specifications and recommendations and to allow for design changes in the event that subsurface conditions differ from those anticipated during our subsurface investigation.

It is the responsibility of the owner and their representative to bring any deviations or unexpected conditions observed during construction to the attention of NTS Geotechnical, in order for supplemental recommendations can be made with a minimum delay to the project. Construction should be observed and/or testing at the following stages by NTS Geotechnical, Inc.:

- Continuous observation during the excavation and recompaction for the structures.
- During preparation of subgrade for slab-on-grade.
- During installation of foundations.
- Installation of drainage for new retaining walls.
- Backfill of retaining walls.
- Grading for new parking lots.
- Testing of aggregate base for the new parking lot.
- Testing of asphalt concrete for the new parking lot.
- Backfill of utility trenches.
- When unusual conditions are encountered.

If any of these inspections to verify site geotechnical conditions are not performed by NTS Geotechnical, liability for the safety and stability of the project is limited only to the actual portions of the project that is observed and approved by NTS Geotechnical.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgments. Due to the inexact nature of the state of the art of these professions and the possible occurrence of undetected variables in subsurface conditions, we cannot guarantee that the conditions actually encountered during grading and site construction will be identical to those observed, sampled, and interpreted during our study, or that there are no unknown subsurface conditions which could have an adverse effect on the use of the property. We have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of

geotechnical conditions and their probable influence on the grading and use of the property.

Our conclusions and recommendations are based on the assumption that our firm will act as the geotechnical engineer of record during construction and grading of the project to observe the actual conditions exposed, to verify our design concepts and the grading contractor's general compliance with the project geotechnical specifications, and to provide our revised conclusions and recommendations should subsurface conditions differ significantly from those used as the basis for our conclusions and recommendations presented in this report. Since our conclusions and recommendations are based on a limited amount of current and previous geotechnical exploration and analysis, all parties should recognize the need for possible revisions to our conclusions and recommendations during grading of the project.

It should be further noted that the recommendations presented herein are intended solely to minimize the effects of post-construction soil movements. Consequently, minor cracking and/or distortion of all on-site improvements should be anticipated.

This report has not been prepared for the use by other parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

REFERENCES

American Concrete Institute, 2014, Building Code Requirements for Structural Concrete (ACI 318-14).

American Society of Civil Engineers (ASCE), 2017, Minimum Design Loads for Buildings and Other Structures, ASCE 7-16.

California Building Standards Commission, 2019, California Building Code, California Code of Regulations Title 24, Volume 2, dated July.

Coduto, Donald P., 1994, Foundation Design: Principles and Practices: Prentice-Hall, Inc, Englewood Cliffs, New Jersey.

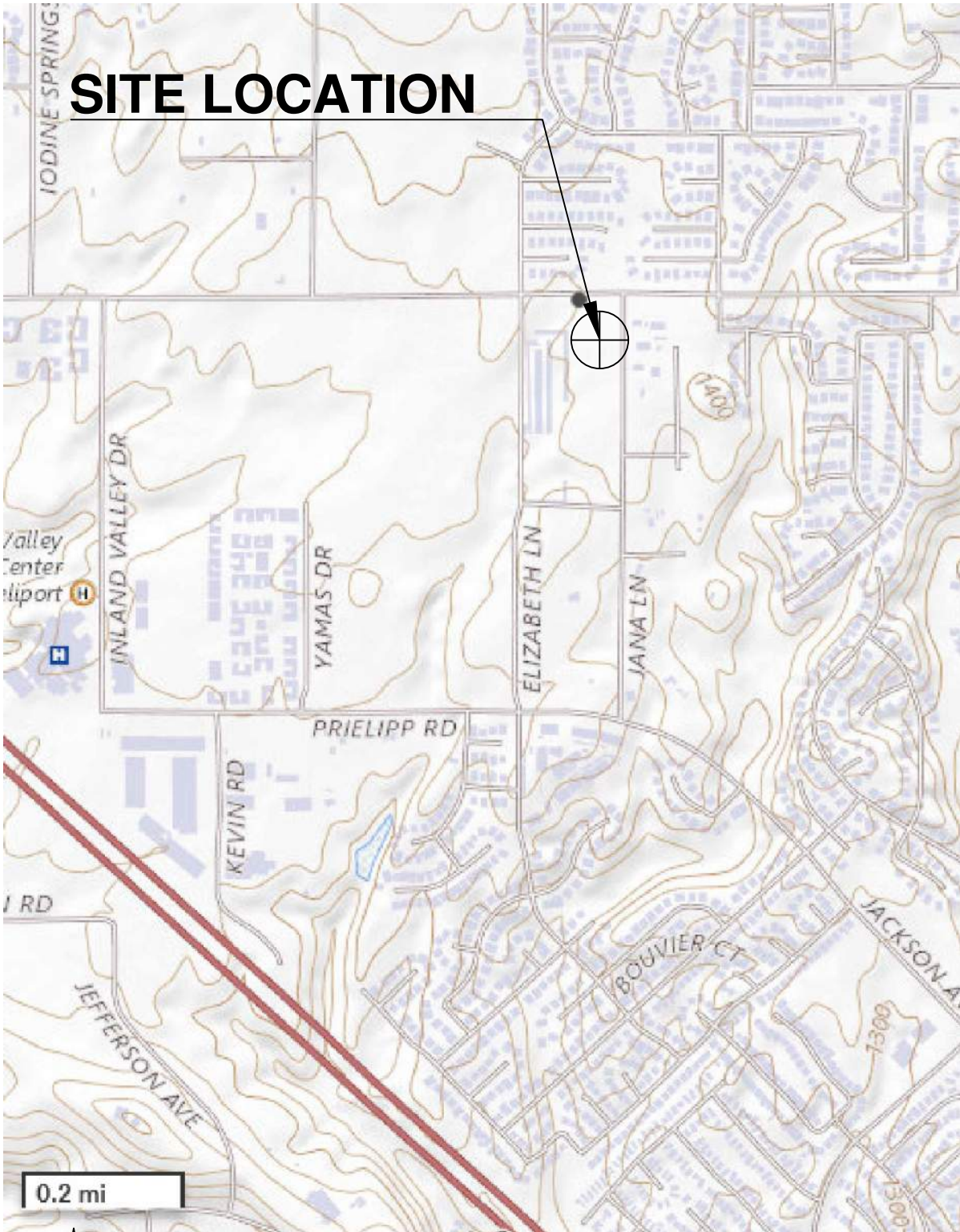
Soil Exploration Company, Inc, "Soil Investigation and Infiltration Tests Report, Proposed Gas Station, Beyond Market and Car Wash, SWC Clinton Keith Road & Jana Lane (APN 380-290-002), City of Wildomar, California," Project NO. 20237-01, dated March 12, 2021.

Geo-Cal, Inc., Geotechnical Engineering Report, Proposed Commercial Development, 24831 Clinton Keith Road, Wildomar, California, dated July 7, 2021.

Naval Facilities Engineering Command, 1986, NAVFAC Design Manual.

United States Geological Survey (USGS), 2008, Unified Hazard Tool, Dynamic: Conterminous U.S. 2014 (update) (v4.2.0), Retrieved May 14, 2020, from: <https://earthquake.usgs.gov/hazards/interactive/>

SITE LOCATION



LOCATION MAP

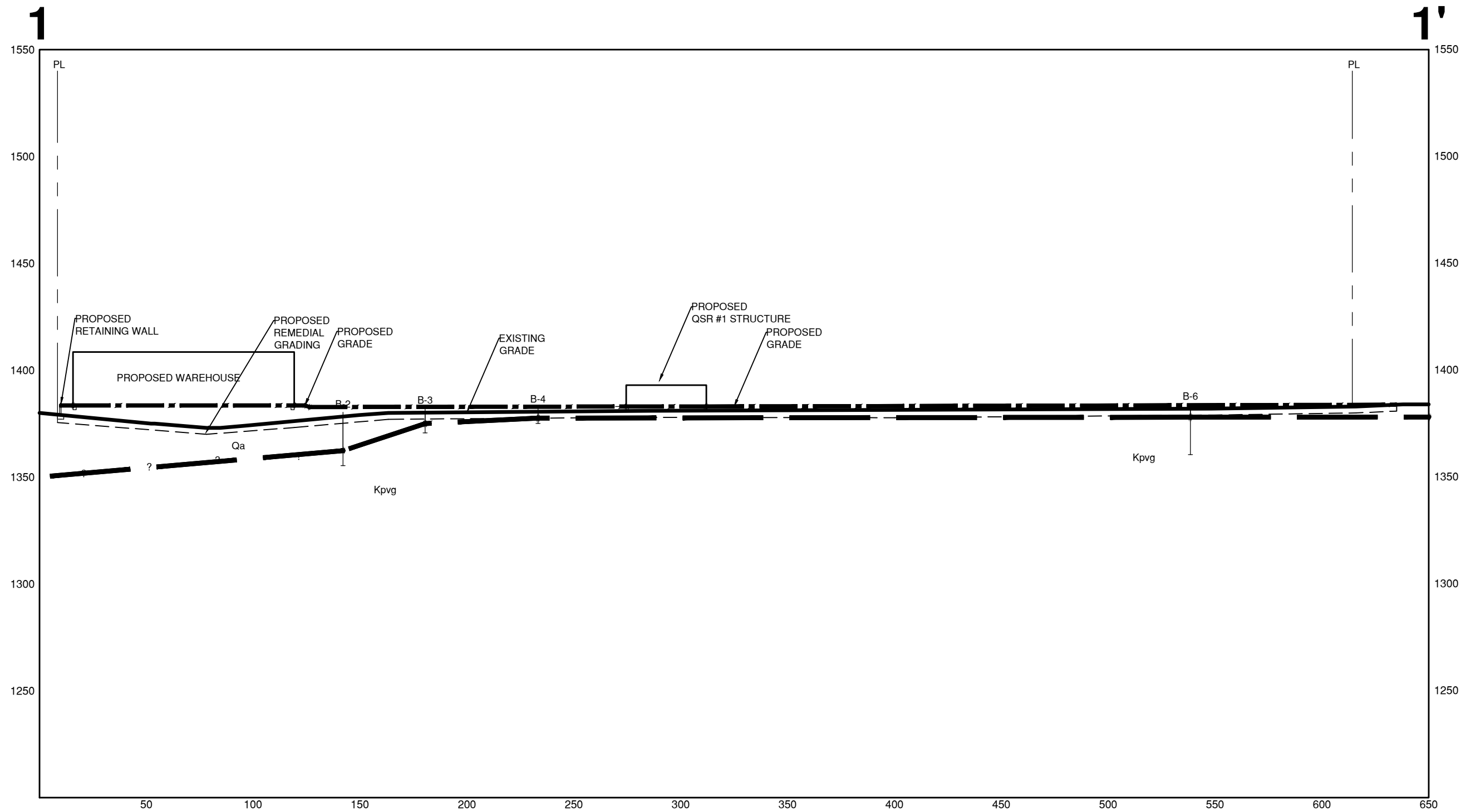
NTS
GEOTECHNICAL


Date: October 17, 2022

Project No.: 22504

Plate
1

DRAWING: c:\users\info\nts\geotechnical\projects - general\2022\22504 - swc jana ln & clinton keith rd. wildomar\reports\plates\plate 3 - geotechnical section.dwg PLOTTED: 10/17/2022 9:26 PM BY: Nadim Suma



Geotechnical Section		
	Date:	October 17, 2022
	Project No.:	22504
		Plate 3

APPENDIX A

Field Exploration

GEOTECHNICAL BORING LOGS

Drill Hole No. B-1 Date: 2/25/21

Drilling Company: Larry Harklerode

Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30"

Project No. 20237-01

Type of Rig: B-53

Elevation: Existing Ground

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: <u>GL</u> SAMPLED BY: <u>GL</u>
1	Alluvium		11/18/18		9.6	SM	SILTY SAND: Light brown, fine to medium grained, slightly moist, dense
2							
3							
4	Bedrock		25/21/35		7.4	Kpvg	MONZOGRANITE: Pale brown, fine to medium grained, medium dense Pale gray, very dense

TOTAL DEPTH = 25'
NO GROUNDWATER
NO CAVING
BORING BACKFILLED

Soil Exploration Co., Inc.

GEOTECHNICAL BORING LOGS

Drill Hole No. B-2

Date: 2/25/21

Drilling Company: Larry Harklerode

Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30"

Project No. 20237-01

Type of Rig: B-53

Elevation: Existing Ground

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: <u>GL</u> SAMPLED BY: <u>GL</u>
1	Alluvium					SM	SILTY SAND: Light brown, fine to medium grained, slightly moist, dense
2	Bedrock					Kpvg	MONZOGRANITE: Pale gray, fine to medium grained, very dense
3			50/4"		6.8		
4							
5							
6			50/1"		2.8		Very dense
7							
8							
9							
10							
11			50/3.5"				
12							
13							
14							
15							
16			50/2"				Very dense
17							
18							
19							
20							
21			50/3"				
22							
23							
24							
25			50/3"				Very dense

TOTAL DEPTH = 25'
NO GROUNDWATER
NO CAVING
BORING BACKFILLED

GEOTECHNICAL BORING LOGS

Drill Hole No. B-3

Date: 2/25/21

Drilling Company: Larry Harklerode

Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30"

Project No. 20237-01

Type of Rig: B-53

Elevation: Existing Ground

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: <u>GL</u> SAMPLED BY: <u>GL</u>
1	Alluvium		30/50/4"	95.4	12.1	SM	SILTY SAND: Light brown, fine to medium grained, dry, very dense
2							
3							Slightly moist, very dense
4							
5							
6	Bedrock		35/50/2.5"	6.3	Kpvg	MONZOGRANITE: yellow, fine to medium grained, very dense	
7							
8							
9							
10							
11			28/25/32			Pale gray, fine to medium grained, very dense	
12							
13							
14							
15			35/50/4"				Very dense
16		TOTAL DEPTH = 15' NO GROUNDWATER NO CAVING BORING BACKFILLED					
17							
18							
19							
20							
21							
22							
23							
24							
25							



Geo-Cal, inc.

Environmental & Geotechnical Engineering

4370 Hallmark Parkway, Suite 101

San Bernardino, CA 92407

(909) 880-1146 FAX (909) 880-1557 email: info@geo-cal.com

LOG OF BORING B-1

(Page 1 of 1)

Project:

24831 Clinton Keith Rd.
Wildomar, CA

Date: 6-23-21.
Drilled By: Cal-Pac Drilling
Equipment: Mobil B-61
Hole Size: 6" HSA
Logged By: Todd Wyland, RCE

Total Depth: 10.5 ft
Groundwater Depth: Not
Encountered

Depth in Feet	Sample ID	Sample Type R=Ring S=SPT, B=Bulk	Blow Count*/6"	Moisture Content (%)	Dry Density (pcf)	Lab Tests **	Graphic	*Automatic Hammer 140 lbs 30-Inch Drop	** SA=Sieve Analysis MDC=(ASTM D 1557) COR= Caltrans Corossivity
								Description	
0	1A (0'-5')	B		4.9	MDC SA			(SM) Silty Sand, fine to medium, traces coarse and subrounded gravel to 3/4", light red brown	
5	1-1	R	37 50/5"	4.3	128			(SM) Silty Sand, fine to medium, traces coarse and subrounded gravel to 3/4", light red brown, very dense	
10	1-2	S	50/6"	4.6				Weathered Bedrock recovered as (SW-SM) Sand, fine to coarse with silt, gray. Very dense End of Boring	
15								Total Depth 10.5 ft. No Groundwater No Fill. No Refusal Boring Backfilled w/ drill spoils Weathered Bedrock at Approximately 7 ft.	
20									
25									
30									

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LOG OF BORING B-2

(Page 1 of 1)

Project:
24831 Clinton Keith Rd.
Wildomar, CA

Date: **6-23-21.**
 Drilled By: **Cal-Pac Drilling**
 Equipment: **Mobil B-61**
 Hole Size: **6" HSA**
 Logged By: **Todd Wyland, RCE**

Total Depth: **23 ft**
 Groundwater Depth: **Not Encountered**

Depth in Feet	Sample ID	Sample Type R=Ring S=SPT, B=Bulk	Blow Count*/6"	Moisture Content (%)	Dry Density (pcf)	Lab Tests **	Graphic	*Automatic Hammer 140 lbs 30-Inch Drop	** SA=Sieve Analysis MDC=(ASTM D 1557) COR= Caltrans Corossivity
								Description	
0								Fill	
	2A (0'-5')	B		4.9		SA MDC		(SM) Silty Sand, fine to medium, trace coarse 3/8" and light brown red.	
5	2-1	R	7 17 24	8.7	120			(SM) Silty Sand, fine to medium, light brown dense.	
10	2-2	S	5 11 16	11.1				(SM) Silty Sand, fine, trace medium, mica, dark to down, medium dense.	
15	2-3	S	8 9 16	13.2				(SM) Silty Sand, fine, trace medium, mica, dark to down, medium dense.	
								Weathered Bedrock	
20		S	-					Lost Sampler	
	2-4	S	50/0"					No Recovery, very dense	
								End of Boring	
25								Refusal @ 23'	
								Fill to 1 ft (estimated)	
								No Groundwater	
								Weathered Bedrock estimated at 16 ft	
								Boring Backfilled w/Drill Spoils	
30									

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LOG OF BORING B-3**(PB-1)**

(Page 1 of 1)

Project:
24831 Clinton Keith Rd.
Wildomar, CA

Date: **6-23-21.**
 Drilled By: **Cal-Pac Drilling**
 Equipment: **Mobil B-61**
 Hole Size: **8" HSA**
 Logged By: **Todd Wyland, RCE**

Total Depth: **9.5 ft**
 Groundwater Depth: **Not Encountered**

Depth in Feet	Sample ID	Sample Type R=Ring S=SPT, B=Bulk	Blow Count*/6"	Moisture Content (%)	Dry Density (pcf)	Lab Tests **	Graphic	*Automatic Hammer 140 lbs 30-Inch Drop	** SA=Sieve Analysis MDC=(ASTM D 1557) COR= Caltrans Corossivity
								Description	
0	3A (0'-5')	B		4.9				(SM) Silty Sand, fine to medium, traces coarse and gravel 1/2", brown	
5								Weathered Bedrock	
	3-1	R	9					(SW) Well Graded Sand, fine to coarse, trace gravel to 3/8", gray, medium dense	
			15	5.1	114	SA		End of Boring	
			18	5.5	118	SA			
10								Total Depth 9.5 ft.	
								3"-Diameter perc pipe packed with gravel to the surface No Fill No groundwater No Refusal	
15									
20									
25									
30									

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LOG OF BORING B-4**(PB-2)**

(Page 1 of 1)

Project:
24831 Clinton Keith Rd.
Wildomar, CA**Date:** 6-23-21.
Drilled By: Cal-Pac Drilling
Equipment: Mobil B-61
Hole Size: 6" HSA
Logged By: Todd Wyland, RCE**Total Depth:** 5.5 ft
Groundwater Depth: Not
Encountered

Depth in Feet	Sample ID	Sample Type R=Ring S=SPT, B=Bulk	Blow Count*/6"	Moisture Content (%)	Dry Density (pcf)	Lab Tests **	Graphic	*Automatic Hammer 140 lbs 30-Inch Drop	** SA=Sieve Analysis MDC=(ASTM D 1557) COR= Caltrans Corossivity
								Description	
0	4A (0'-5')	B		4.8				(SM) Silty Sand, fine to medium, brown	
5	4-1	R	20 50/3"	5.8	129.5	SA		Weathered Bedrock (SW-SM) Well graded Sand, fine to coarse with silt, very dense at 5.5 ft white and less weathered End of Boring	
10								Total Depth 5.5 ft.	
15								No Fill, No Groundwater, No Refusal 3"-Diameter perc pipe packed with gravel to the surface Weathered Bedrock at 3ft.(estimated) Persistent Bedrock at 5.5 ft.	
20									
25									
30									

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LOG OF BORING B-5**(PB-3)**

(Page 1 of 1)

Project:
24831 Clinton Keith Rd.
Wildomar, CA

Date: **6-23-21.**
 Drilled By: **Cal-Pac Drilling**
 Equipment: **Mobil B-61**
 Hole Size: **6" HSA**
 Logged By: **Todd Wyland, RCE**

Total Depth: **6.5 ft**
 Groundwater Depth: **Not**
Encountered

Depth in Feet	Sample ID	Sample Type R=Ring S=SPT, B=Bulk	Blow Count*/6"	Moisture Content (%)	Dry Density (pcf)	Lab Tests **	Graphic	*Automatic Hammer 140 lbs 30-Inch Drop	** SA=Sieve Analysis MDC=(ASTM D 1557) COR= Caltrans Corossivity
								Description	
0								(SM) Silty Sand, fine to medium, brown	
	5A (0'-4')	B		5.5		COR			
5	5-1	R	16 25 31	4.8	134	SA		Weathered Bedrock	
								(SW-SM) Well Graded Sand, fine to coarse with silt and gravel to 3/8", dark gray, dense	
								End of Boring	
10								Total Depth 6.5 ft.	
								3"-Diameter perc pipe	
								packed with gravel to the surface	
								No Fill	
								No Groundwater	
								No Refusal	
								Weathered Bedrock at 4 ft. (estimated)	
15									
20									
25									
30									



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LOG OF BORING B-6

(Page 1 of 1)

Project:
24831 Clinton Keith Rd.
Wildomar, CA

Date: **6-23-21.**
Drilled By: **Cal-Pac Drilling**
Equipment: **Mobil B-61**
Hole Size: **6" HSA**
Logged By: **Todd Wyland, RCE**

Total Depth: **21.5 ft**
Groundwater Depth: **Not**
Encountered

Depth in Feet	Sample ID	Sample Type R=Ring S=SPT, B=Bulk	Blow Count*/6"	Moisture Content (%)	Dry Density (pcf)	Lab Tests **	Graphic	*Automatic Hammer 140 lbs 30-Inch Drop	** SA=Sieve Analysis MDC=(ASTM D 1557) COR= Caltrans Corossivity
								Description	
0	6-A (0'-5')	B		5.6				(SM) Silty Sand, fine to medium trace, gravel to 3/4', brown	
5	6-1	R	8 18 24	4.1				Weathered Bedrock	
10	6-2	S	11 16 18	6.8	126			(SM) Silty Sand, fine to medium, mica, dark gray, dense	
15	6-3	S	24 50/6"	4.8				(SM) Silty Sand, fine to medium, mica, dark gray, very dense	
20	6-4	S	9 20 38	3.4				(SP-SM) Sand, fine to medium, with silt, gray, very dense	
								End of Boring	
25								Total Depth 21.5 ft. No Fill No Groundwater No Refusal Weathered Bedrock at 4 ft(Estimated) Boring Backfilled w/ drill spoils	
30									



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LOG OF BORING B-7

(Page 1 of 1)

Project:
24831 Clinton Keith Rd.
Wildomar, CA

Date: **6-23-21.**
Drilled By: **Cal-Pac Drilling**
Equipment: **Mobil B-61**
Hole Size: **6" HSA**
Logged By: **Todd Wyland, RCE**

Total Depth: **16 ft**
Groundwater Depth: **Not**
Encountered

Depth in Feet	Sample ID	Sample Type R=Ring S=SPT, B=Bulk	Blow Count*/6"	Moisture Content (%)	Dry Density (pcf)	Lab Tests **	Graphic	*Automatic Hammer 140 lbs 30-Inch Drop	** SA=Sieve Analysis MDC=(ASTM D 1557) COR= Caltrans Corrossivity
								Description	
0	7A (0'-5')								(SM) Silty Sand, fine to medium, light red brown, medium dense
5	7-1	S	5 9						
			25	4.2					Weathered Bedrock reducing to (SW) Sand, fine to coarse, gray, dense
10	7-2	S	32 50/3"						(SW) Sand, fine to coarse, gray, very dense
15	7-3	S	26 50/6"						(SW) Sand, fine to coarse, gray, very dense
									End of Boring
20									Total Depth 16 ft. No Groundwater No Fill Weathered Bedrock @ 6' No Refusal Boring Backfilled with Drill Spoils
25									
30									



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Environmental & Geotechnical Engineering

Exploratory Trench No. T-1

Project:
New Development of A Beyond Market
w/Gas Station & Drive-Thru, Plus a
Carwash

**Excavation
Method:** Mini Excavator
w/ 12" bucket

Logged By: Henry Olivier, P.G.

Date: 6/23/2021
Total Depth: 9.5 Ft.
Groundwater:
Not Encountered

Location:
24831 Clinton Keith Rd.
Wildomar, CA

Depth (Ft.)	Description	Graphic
	Top Soil: Silty Sand (SM), fine grained, relatively loose, brown, gravelley, random cobbles (6"-diameter), dry, with rootlets.	
	Weathered Rock (DG), possibly weathered Granodiorite, medium to coarse grain size, dense, relatively friable, gray, dry.	
	Same, but more dense, less weathered, less friable, with caliche stingers	
5'		
10'	Digging refusal at 9.5 ft bgs using mini excavator	
15'		



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Exploratory Trench No. T-2

Project:
New Development of A Beyond Market
w/Gas Station & Drive-Thru, Plus a
Carwash

Excavation
Method: Mini Excavator
w/ 12" bucket

Logged By: Henry Olivier, P.G.

Date: 6/23/2021
Total Depth: 4 Ft.
Groundwater:
Not Encountered

Location:
24831 Clinton Keith Rd.
Wildomar, CA

Depth (Ft.)	Description	Graphic
	Top Soil: Silty Sand (SM) with sparse cobbles ($\geq 6"$), loose to medium dense, light brown, dry, w/ rootlets	
	Weathered Rock (DG), possibly weathered Granodiorite, medium to coarse grain, dense, dry	
	Refusal at 4 ft.	
5'		
10'		
15'		



Geo-Cal, inc.
Environmental & Geotechnical Engineering

Exploratory Trench No. T-3

Project:
New Development of A Beyond Market
w/Gas Station & Drive-Thru, Plus a
Carwash

Excavation
Method: Mini Excavator
w/ 12" bucket

Logged By: Henry Olivier, P.G.

Date: 6/23/2021
Total Depth: 4 Ft.
Groundwater:
Not Encountered

Location:
24831 Clinton Keith Rd.
Wildomar, CA

Depth (Ft.)	Description	Graphic
	Top Soil: Silty Sand (SM) with sparse cobbles ($\geq 6"$), loose to medium dense, light brown, dry, w/ rootlets	
	Weathered Rock (DG), possibly weathered Granodiorite, medium to coarse grain, dense, dry	
	Refusal at 4 ft.	
5'		
10'		
15'		


Project:
 New Development of A Beyond Market
 w/Gas Station & Drive-Thru, Plus a
 Carwash

Excavation
Method: Mini Excavator
 w/ 12" bucket

Logged By: Henry Olivier, P.G.

Date: 6/23/2021
Total Depth: 10.5 Ft.
Groundwater:
 Not Encountered

Location:
 24831 Clinton Keith Rd.
 Wildomar, CA

Depth (Ft.)	Description	Graphic
	Top Soil: Silty Sand (SM) with sparse cobbles ($\geq 6"$), loose , light brown, dry, w/rootlets	
	Gravelly Sand (SP), fine to medium, with random coarse gravel and cobbles ($\geq 6"$), dense, brown, dry	
5'	Silty Sand (SM), with gravel and sparse cobbles, brown, dense, dry	
10'	Digging Refusal at 10.5 ft bgs using mini excavator	
15'		

APPENDIX B

Geotechnical Laboratory Testing

Enviro - Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Soil Exploration Company
7535 Jurupa Ave., Suite C
Riverside, CA 92504
Tel: (909) 374-5429 E-Mail: SoilExploration@yahoo.com

PROJECT: Beyond Food Mart / 20237-01

MATRIX: SOIL

DATE RECEIVED: 03/03/21

SAMPLING DATE: 02/25/21

DATE ANALYZED: 03/03&04/21

REPORT TO: Mr. GENE K. LUU

DATE REPORTED: 03/08/21

SAMPLE I.D.: B-1 @ 0-5'

LAB I.D.: 210303-2

PARAMETER	SAMPLE RESULT	UNIT	PQL	DF	TEST METHOD
RESISTIVITY	11100	OHMS-CM	100000*	--	CALTRANS
SULFATE	13.3	mg/Kg	10	1	EPA 9038
CHLORIDE	20.0	mg/Kg	10	1	EPA 9253
pH	7.45	pH/UNIT	--	--	EPA 9045C

COMMENTS

DF = DILUTION FACTOR

PQL = PRACTICAL QUANTITATION LIMIT

ACTUAL DETECTION LIMIT = DF X PQL

mg/Kg = MILLIGRAM PER KILOGRAM = PPM

OHMS-CM = OHMS-CENTIMETER

RESISTIVITY = 1/CONDUCTIVITY

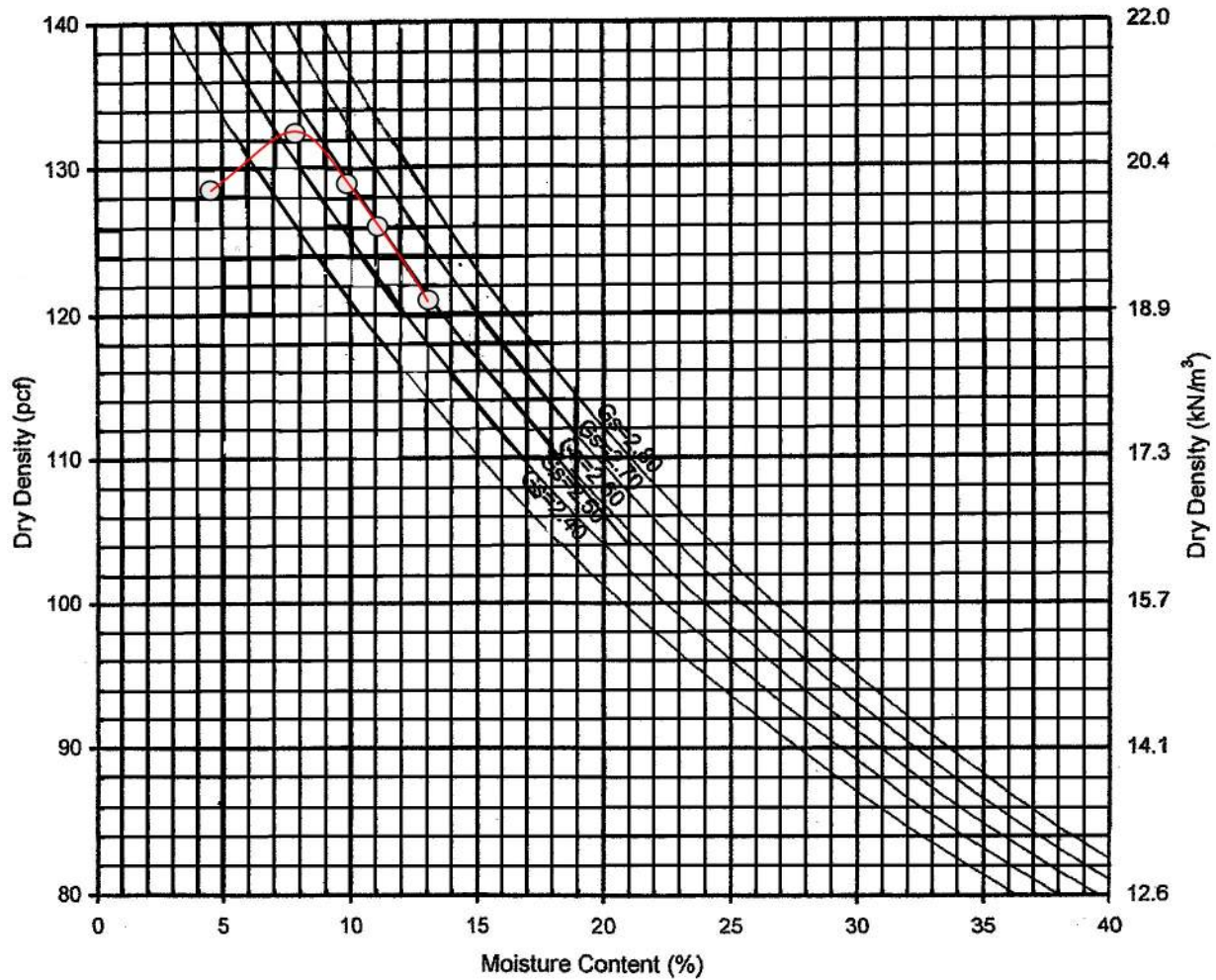
* = HIGH LIMIT

pH ANALYSIS CONDUCTED ON 1:1 SOIL/DEIONIZED WATER EXTRACTION

DATA REVIEWED AND APPROVED BY:

CAL-DHS ELAP CERTIFICATE No.: 1555

MOISTURE DENSITY CURVE



Boring	Depth(ft)	Classification	γ_{max} (pcf)	w_{opt} (%)
B-1 B-2	0'-5'	(SM) Silty Sand, Fine to medium, trace coarse	132	8.0

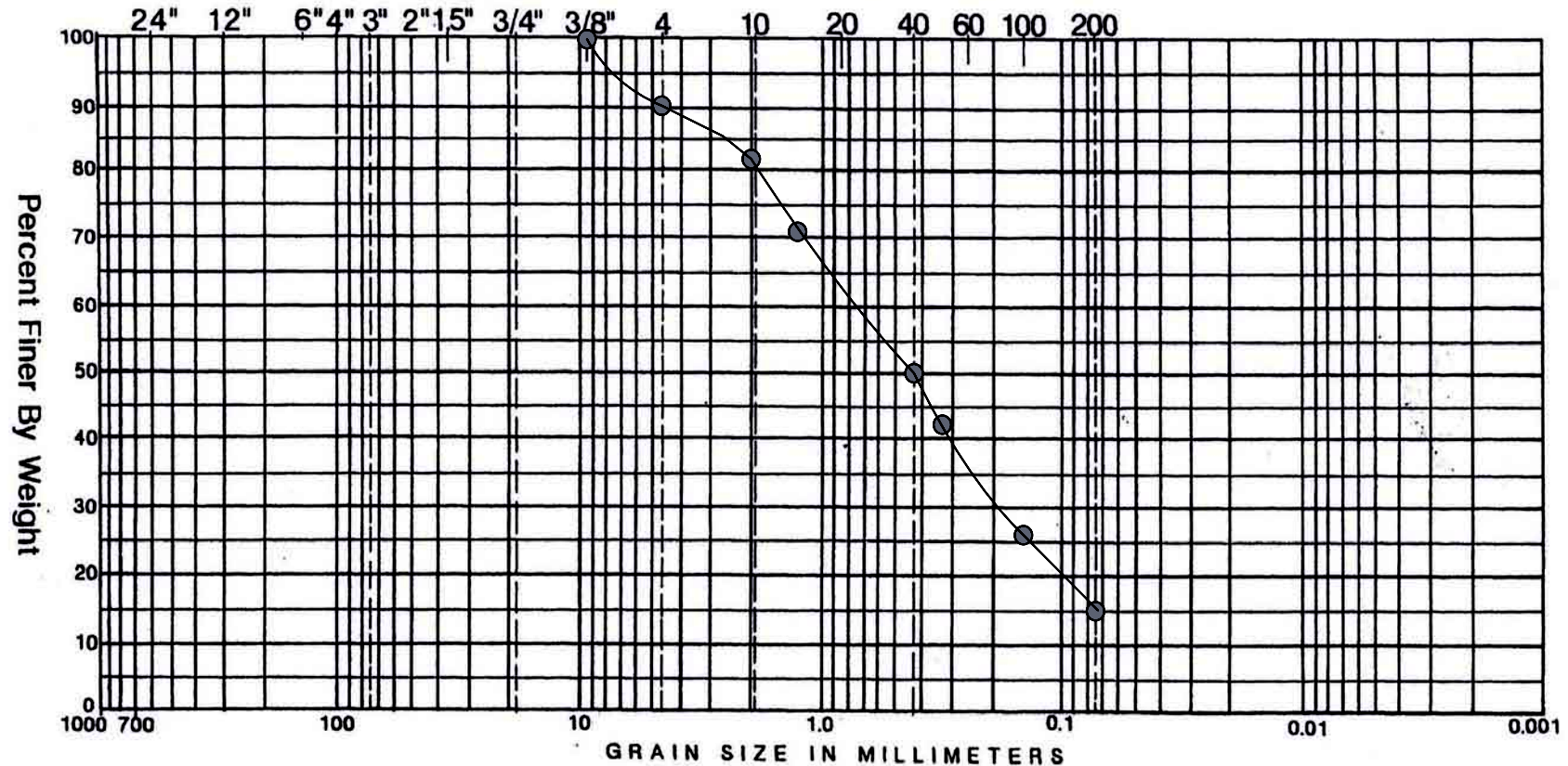
MOISTURE DENSITY CURVE (MDC) ASTM D 1557

Project: 24831 Clinton Keith Rd

Location: Wildomar, CA

Sieve Analysis Results

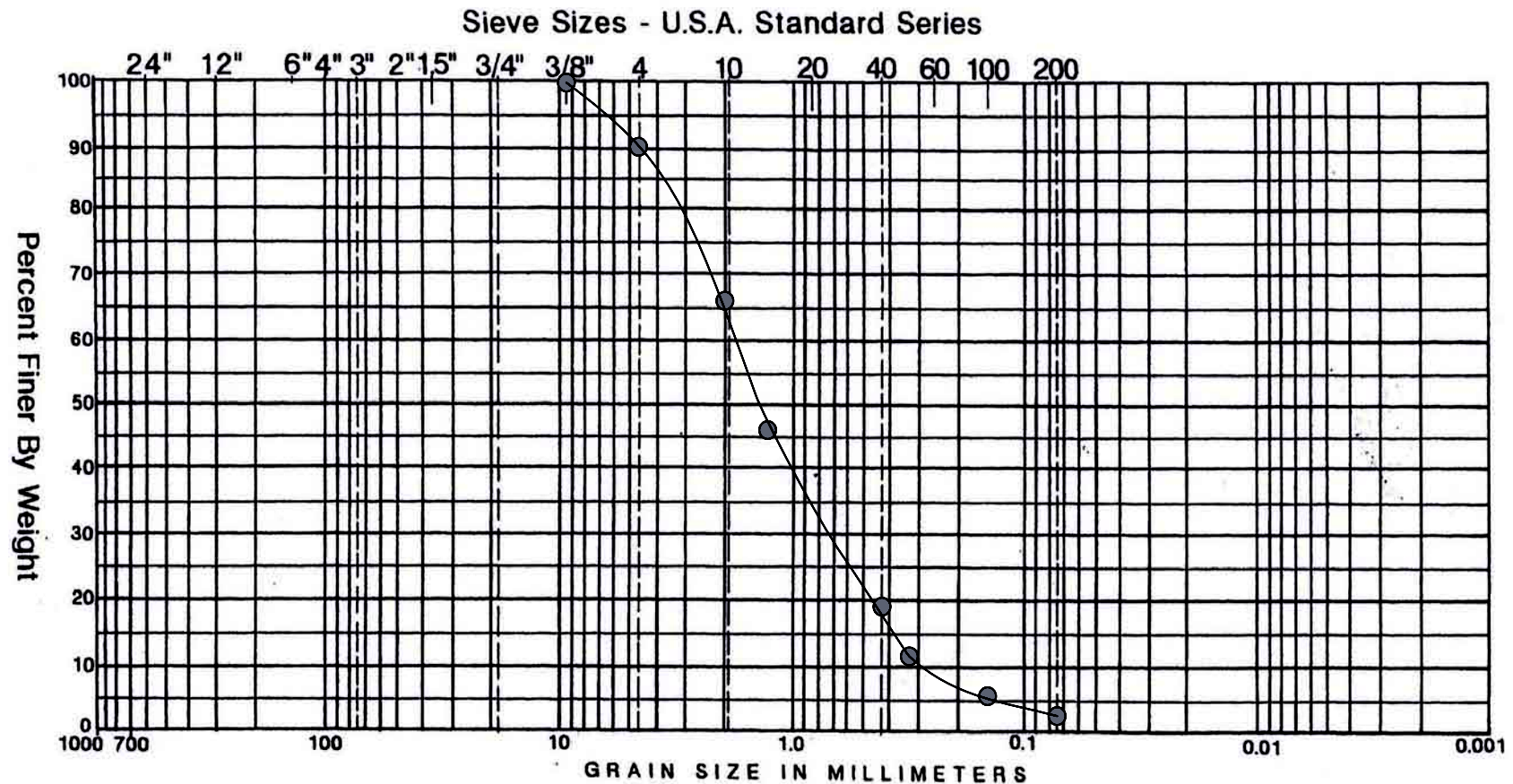
Sieve Sizes - U.S.A. Standard Series



Symbol	Boring	Depth	Classification
●	B-1 + B-2	0'-5'	(SM) Silty Sand, fine to medium, traces coarse and gravel to 3/8"
			15% fines

24831 Clinton Keith Rd
Wildomar, CA

Sieve Analysis Results

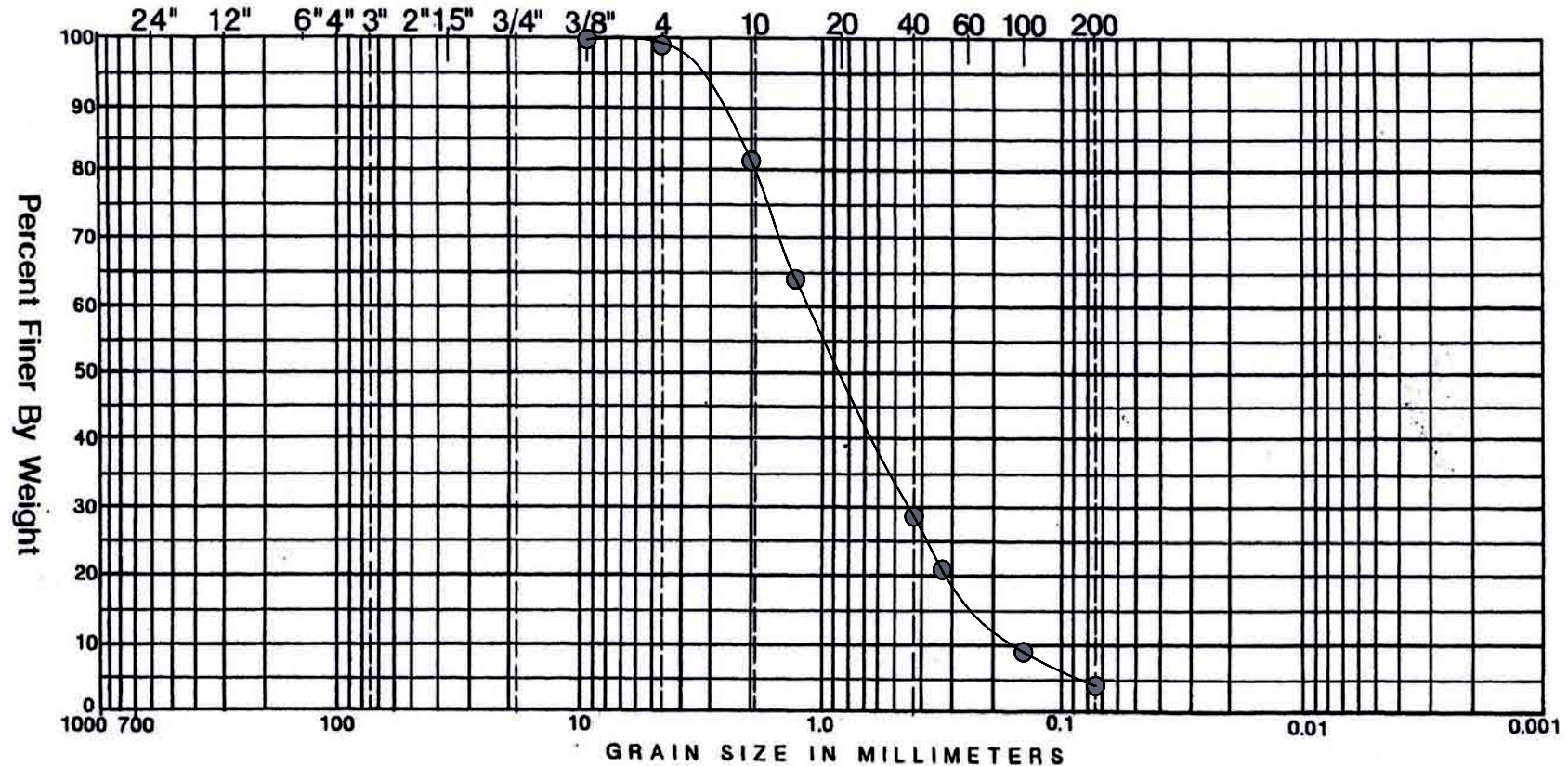


Symbol	Boring	Depth	Classification
●	B-3	8.5'-9.0'	(SW) Well graded Sand, fine to coarse, trace gravel to 3/8" 2% fines,
	(PB-1)		D10=0.29mm,
			Note: Sample Scalped at 3/8'

24831 Clinton Keith Rd
Wildomar, CA

Sieve Analysis Results

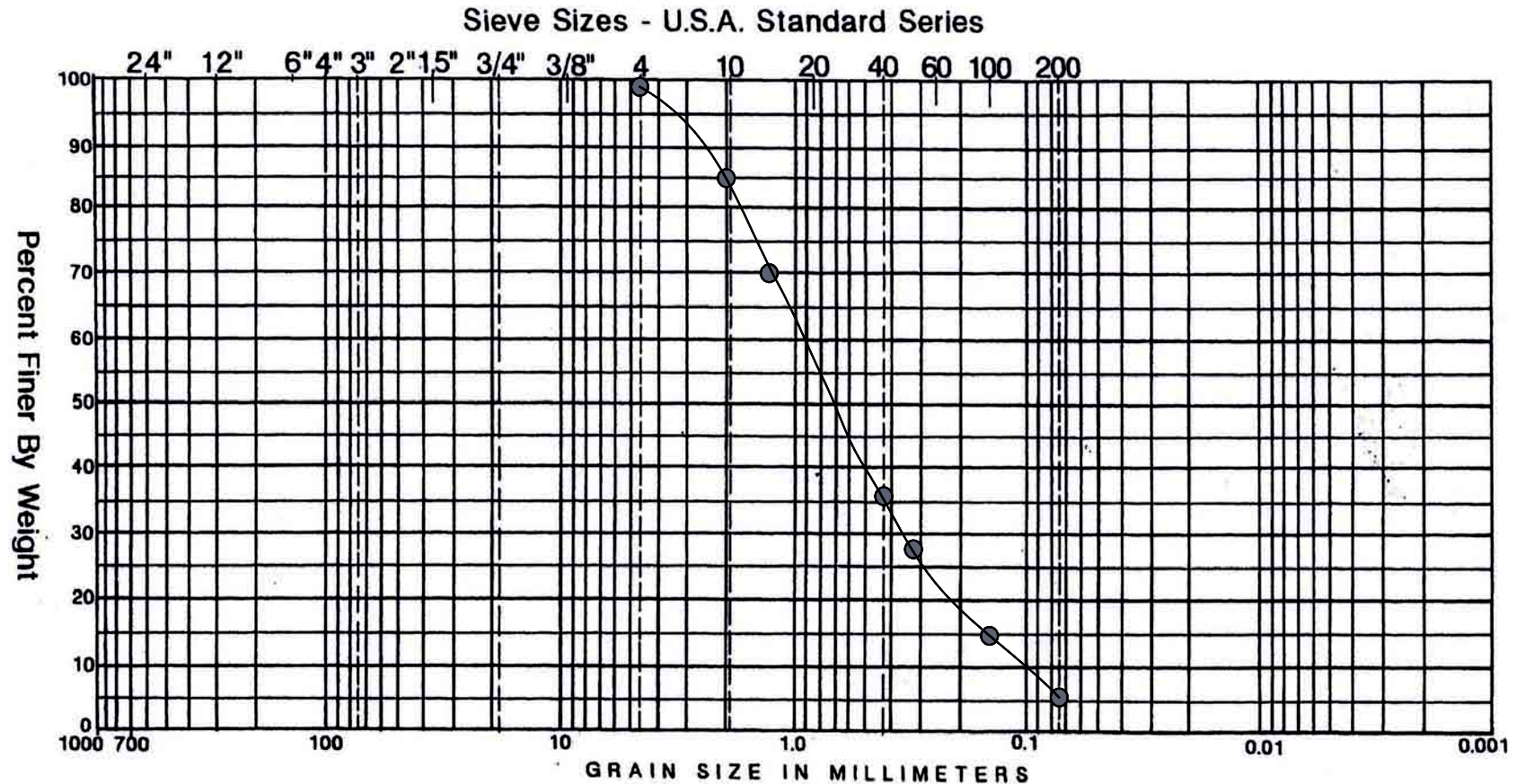
Sieve Sizes - U.S.A. Standard Series



Symbol	Boring	Depth	Classification
●	B-3	9.0'-9.5'	(SW) Well Graded Sand, fine to coarse, 4% fines, $D_{10}=0.18$ mm
	(PB-1)		

24831 Clinton Keith Rd
Wildomar, CA

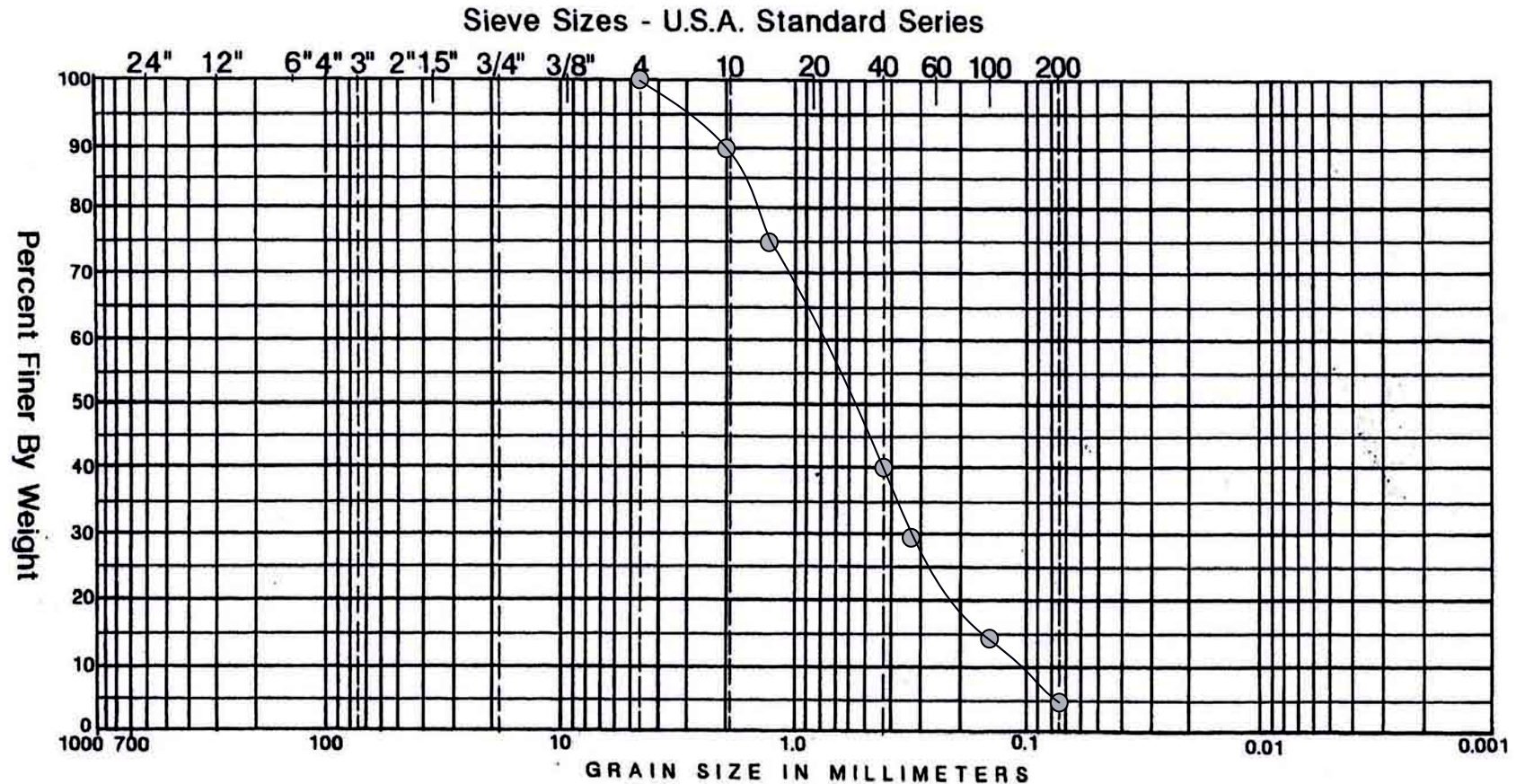
Sieve Analysis Results



Symbol	Boring	Depth	Classification
●	B-4	5.0'-5.5'	(SW-SM) Well Graded Sand, fine to coarse with silt,
	(PB-2)		6% fines D10=0.1mm

24831 Clinton Keith Rd
Wildomar, CA

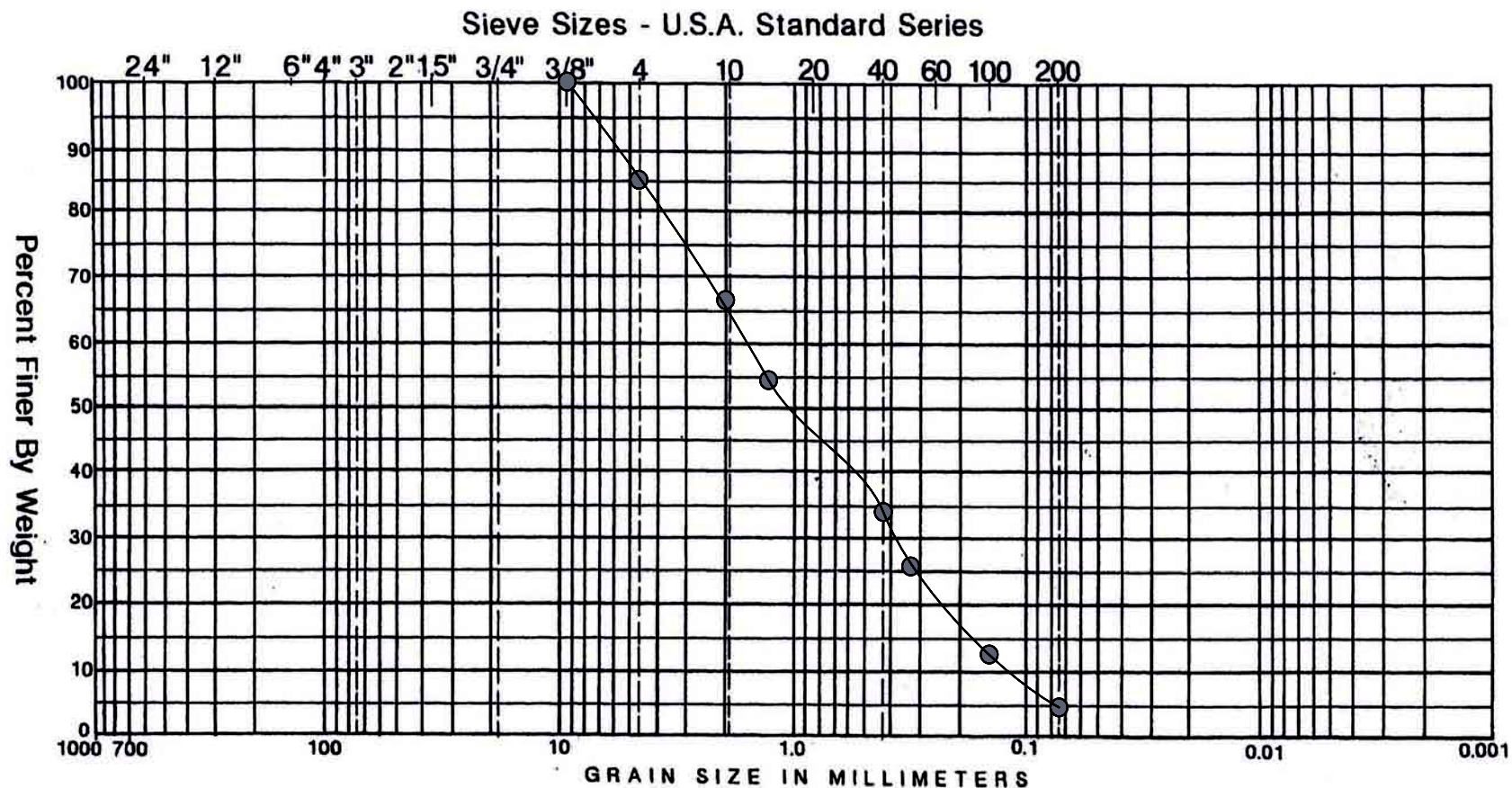
Sieve Analysis Results



Symbol	Boring	Depth	Classification
○	B-5	5.5'-6.0'	(SP-SM) Poorly graded sand, fine to medium with silt, trace coarse
	(PB-3)		5% fines. D ₁₀ =0.12mm

24831 Clinton Keith Rd
Wildomar, CA

Sieve Analysis Results



Symbol	Boring	Depth	Classification
●	B-5	6.0'-6.5'	(SW-SM) Well graded Sand, fine to coarse with silt and gravel to 3/8",
	(PB-3)		5% fines, D10=0.14 mm
			Note: Sample Scalped at 3/8"

24831 Clinton Keith Rd
Wildomar, CA

APPENDIX C

Liquefaction Analysis

SPT BASED LIQUEFACTION ANALYSIS REPORT

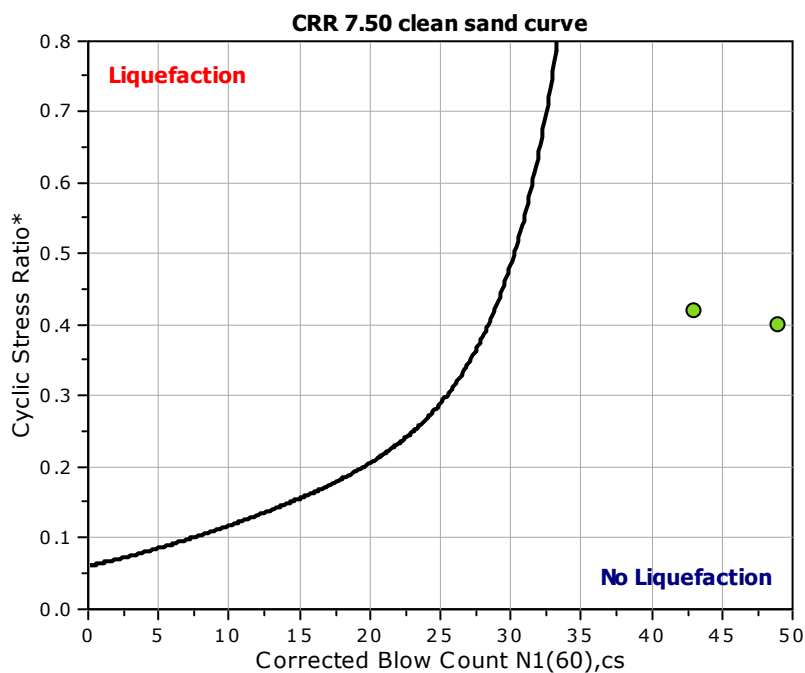
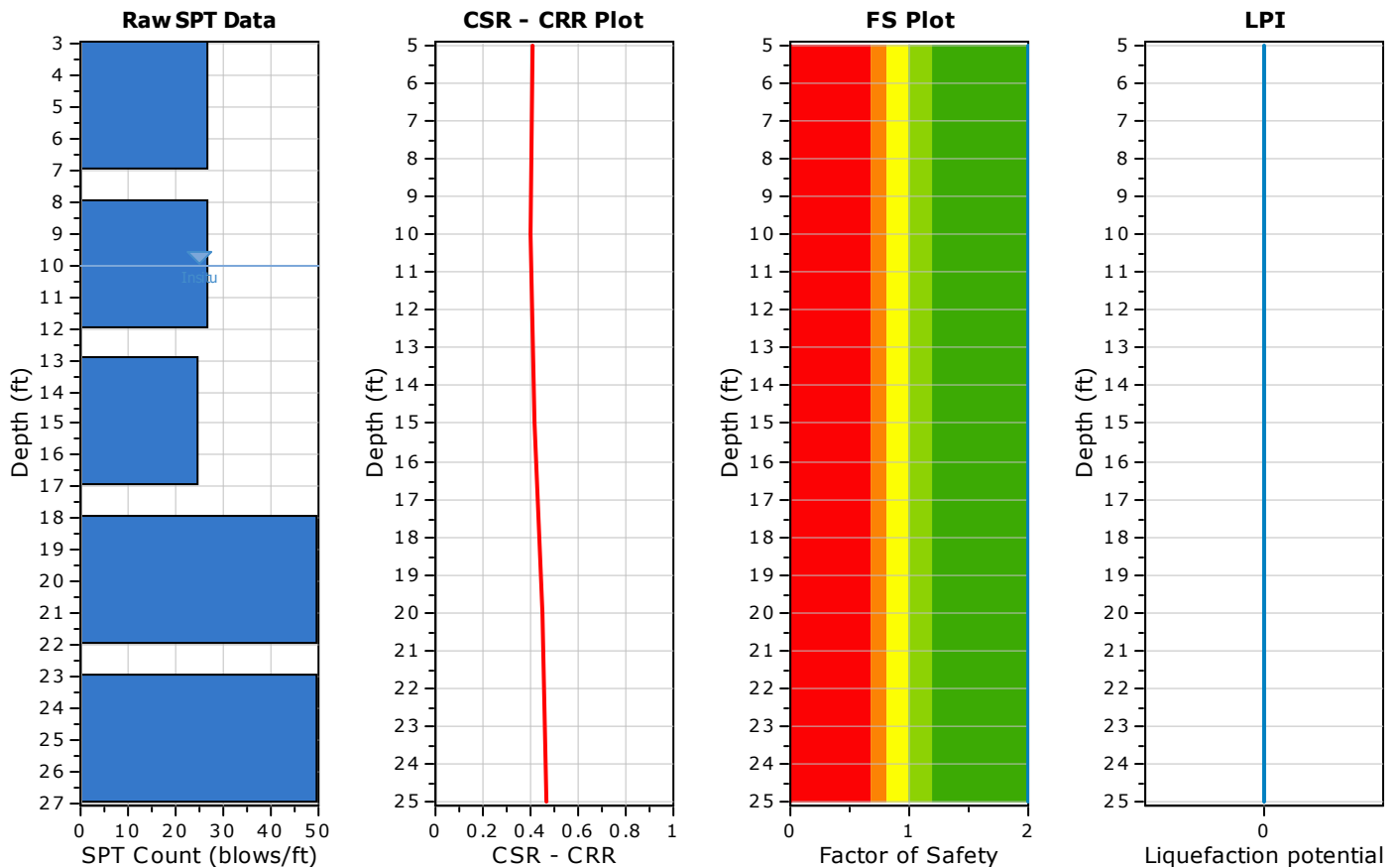
Project title : 24831 Clinton Keith Rd

SPT Name: B-2

Location : Wildomar, CA

:: Input parameters and analysis properties ::

Analysis method:	Boulanger & Idriss, 2014	G.W.T. (in-situ):	10.00 ft
Fines correction method:	Boulanger & Idriss, 2014	G.W.T. (earthq.):	50.00 ft
Sampling method:	Sampler wo liners	Earthquake magnitude M_w :	7.00
Borehole diameter:	200mm	Peak ground acceleration:	0.84 g
Rod length:	3.30 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.28		



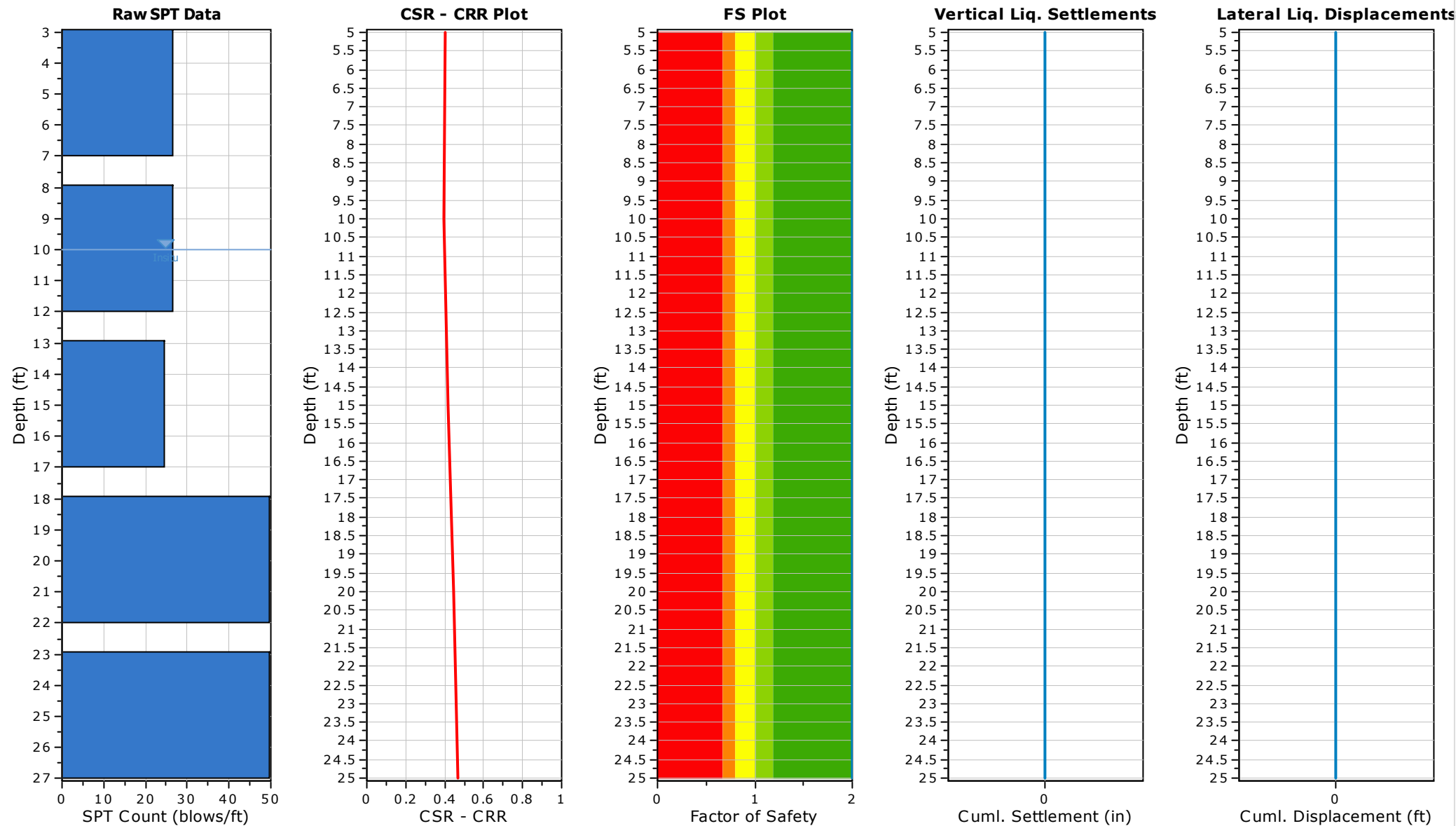
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

:: Overall Liquefaction Assessment Analysis Plots ::



:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
5.00	27	15.00	130.00	5.00	Yes
10.00	27	15.00	130.00	5.00	Yes
15.00	25	15.00	130.00	5.00	Yes
20.00	50	6.00	130.00	5.00	Yes
25.00	50	6.00	130.00	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
 SPT Field Value: Number of blows per foot
 Fines Content: Fines content at test depth (%)
 Unit Weight: Unit weight at test depth (pcf)
 Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
 Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	m	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	FC (%)	$\Delta(N_1)_{60}$	$(N_1)_{60cs}$	CRR _{7.5}
5.00	27	130.00	0.33	0.00	0.33	0.26	1.36	1.28	1.15	0.75	1.20	49	15.00	3.26	52	4.000
10.00	27	130.00	0.65	0.00	0.65	0.26	1.14	1.28	1.15	0.85	1.20	46	15.00	3.26	49	4.000
15.00	25	130.00	0.97	0.16	0.82	0.28	1.07	1.28	1.15	0.85	1.20	40	15.00	3.26	43	4.000
20.00	50	130.00	1.30	0.31	0.99	0.26	1.02	1.28	1.15	0.95	1.20	85	6.00	0.03	85	4.000
25.00	50	130.00	1.63	0.47	1.16	0.26	0.98	1.28	1.15	0.95	1.20	82	6.00	0.03	82	4.000

Abbreviations

σ_v : Total stress during SPT test (tsf)
 u_o : Water pore pressure during SPT test (tsf)
 σ'_{vo} : Effective overburden pressure during SPT test (tsf)
 m: Stress exponent normalization factor
 C_N : Overburden correction factor
 C_E : Energy correction factor
 C_B : Borehole diameter correction factor
 C_R : Rod length correction factor
 C_S : Liner correction factor
 $N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
 $\Delta(N_1)_{60}$: Equivalent clean sand adjustment
 $N_{1(60)cs}$: Corrected $N_{1(60)}$ value for fines content
 CRR_{7.5}: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF _{max}	$(N_1)_{60cs}$	MSF	CSR _{eq,M=7.5}	K _{sigma}	CSR*	FS
5.00	130.00	0.33	0.00	0.33	0.99	1.00	0.542	2.20	52	1.21	0.447	1.10	0.406	2.000 ●
10.00	130.00	0.65	0.00	0.65	0.97	1.00	0.532	2.20	49	1.21	0.439	1.10	0.399	2.000 ●
15.00	130.00	0.97	0.00	0.97	0.95	1.00	0.520	2.20	43	1.21	0.429	1.02	0.419	2.000 ●
20.00	130.00	1.30	0.00	1.30	0.93	1.00	0.508	2.20	85	1.21	0.419	0.94	0.446	2.000 ●
25.00	130.00	1.63	0.00	1.63	0.90	1.00	0.494	2.20	82	1.21	0.408	0.87	0.467	2.000 ●

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF _{max}	$(N_1)_{60cs}$	MSF	CSR _{eq,M=7.5}	K _{sigma}	CSR*	FS
---------------	-------------------------	--------------------------	---------------------	----------------------------	-------	----------	-----	--------------------	----------------	-----	-------------------------	--------------------	------	----

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
 $u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
 $\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
 r_d : Nonlinear shear mass factor
 α : Improvement factor due to stone columns
 CSR : Cyclic Stress Ratio
 MSF : Magnitude Scaling Factor
 CSR_{eq,M=7.5}: CSR adjusted for M=7.5
 K_{sigma}: Effective overburden stress factor
 CSR*: CSR fully adjusted (user FS applied)***
 FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I _L
5.00	2.000	0.00	9.24	5.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00

Overall potential I_L : 0.00I_L = 0.00 - No liquefactionI_L between 0.00 and 5 - Liquefaction not probableI_L between 5 and 15 - Liquefaction probableI_L > 15 - Liquefaction certain**:: Vertical settlements estimation for dry sands ::**

Depth (ft)	$(N_1)_{60}$	T_{av}	p	G _{max} (tsf)	α	b	γ	ϵ_{15}	N _c	ϵ_{Nc} weight factor	ϵ_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.00	0.000
10.00	46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.00	0.000
15.00	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.00	0.000
20.00	85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.00	0.000
25.00	82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	5.00	0.000

Cumulative settlements: 0.000**Abbreviations**

T_{av} : Average cyclic shear stress
 p: Average stress
 G_{max}: Maximum shear modulus (tsf)
 α , b: Shear strain formula variables
 γ : Average shear strain
 ϵ_{15} : Volumetric strain after 15 cycles
 N_c: Number of cycles
 ϵ_{Nc} : Volumetric strain for number of cycles N_c (%)
 Δh : Thickness of soil layer (in)
 ΔS : Settlement of soil layer (in)

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Appendix 4: Historical Site Conditions

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

No historical Conditions



Appendix 5: LID Feasibility Supplemental Information

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

Proprietary Biofiltration Criteria

The applicant shall provide documentation of compliance with each criterion in this checklist as part of the project submittal. Proprietary Biofiltration BMPs shall not be proposed if the BMP will accept undeveloped off-site tributary flows, where potential silt/sediment could clog or otherwise negatively impact the BMP.

1	All BMPs must be sited/designed with the max. feasible infiltration/evapotranspiration⁶.	
	Requirement	Response
1a	What was the development status of the site prior to project application (i.e. raw ungraded land, or redevelopment with existing graded conditions)? – There will be more expectations to infiltrate if the project is a new development.	Raw ungraded land
1b	History of design discussions/coordination for the site proposed project, resulting in the final design determination (i.e. infiltration vs. flow-thru):	Biofiltration
1c	The consideration of site design alternatives to achieve infiltration or partial infiltration on site;	To infiltrate and retain all onsite water flow
1d	The physical impairments (i.e., fire road egress, public safety considerations, sewer lines, etc.) and public safety concerns (impermeable liners only to avoid geotech or contamination issues);	Roads, residential buildings, water lines, sewer lines, curb, sidewalk, and storm drain lines
1e	The extent low impact development BMP requirements were included in the project site design (site design worksheets can be attached).	Site design worksheets attached in appendix 6
1f	When in the development process (e.g. entitlement or plan check, with dates of geotechnical work and development approval dates) did a geotechnical engineer analyze the site for infiltration feasibility?	Entitlement; July 7, 2021
1g	What was the scope of the geotechnical testing?	Soils and Foundation Evaluations and infiltration testing
1h	What are Public Health and Safety requirements	None

⁶ To address San Diego Regional Board letter dated April 28, 2017 regarding documentation to support infeasibility to retain or infiltrate storm water on-site. This document will be used to meet the Regional Board requirements for documentation. As such, not apply or non-responses will not be accepted.

	that affect infiltration locations?	
1i	What are the conclusions and recommendations from the geotechnical engineer, in regards to infiltrating/retaining on-site or allowing some or all of the flows to flow-thru as a proprietary BMP?	Infiltration is feasible and will not increase the risk of geologic hazards
1j	How will the proposed proprietary biofiltration BMPs achieve maximum feasible retention (evapotranspiration and infiltration) of the water quality volume, as required by MS4 Permits?	evapotranspiration and infiltration with any overflow being directed into the public storm drain system

2	Proprietary Biofiltration BMP sizing (all proprietary/compact BMPs require TAPE approval)⁷	
	Requirement	Response
2a	Use Table F-1 and F-2 of the WQMP template to identify and list all the pollutants of concern.	N/A
2b	Attached Active Technology Acceptance Protocol-Ecology (TAPE) certification, with General Use Level Designation (GULD) for all of applicable pollutants of concern	N/A
2c	The most restrictive loading rates outlined in TAPE GULD approval ⁸ for all of the pollutants of concern.	
2d	Attach calculations, and all relevant steps to show that the sizing of the proprietary BMP is based on the flowrate (or volume) used to obtain TAPE/GULD approval (the most restrictive rate).	N/A
2e	Are the infiltration rates are outlet controlled (e.g., via an underdrain and orifice/weir) or controlled by the infiltration rate of the media? Faster infiltration rates thru the media tend to reduce O&M issues.	N/A
2f	Does the water surface drains to at least 12 inches below the media surface within 24 hours from the end of storm event flow to preserve plant health and promote healthy soil structure?	N/A

⁷ Full scale field testing data that has been verified by Washington Department of Ecology and General Use Level Designation is required. <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies>. Otherwise, the County has no obligation to accept the use of any other proprietary flow-thru BMP. Additional guidance can be found at the end of this checklist from the San Diego BMPDM Appendix F.1 for other verified third-party, field scale testing performance criteria that does not meet the Washington Department of Ecology standards.

⁸ E.g. if the BMP was certified/verified with 100 gallons per minute treatment rate, the BMP shall be sized with no more than the equivalent rate).

3	Biofiltration BMPs must be designed to promote appropriate biological activity to support and maintain treatment processes.	
	Requirement	Response
3a	Plants tolerant of project climate, design ponding depths and the treatment media composition.	Provide documentation justifying plant selection. ⁹
3b	Plants that minimize irrigation requirements.	Provide documentation describing irrigation requirements for establishment and long term operation.
3c	Plant location and growth will not impede expected long-term media filtration rates and will enhance long-term infiltration rates to the extent possible.	Provide documentation justifying plant selection. ⁴
3d	If plants are not applicable to the biofiltration design, other biological processes are supported as needed to sustain treatment processes (e.g., biofilm in a subsurface flow wetland). TAPE GULD approval that identifies approval with and without plants can be submitted for approval.	For biofiltration designs without plants, describe the biological processes that will support effective treatment and how they will be sustained.P

4	Biofiltration BMPs must be designed with a hydraulic loading rate to prevent erosion, scour, and channeling within the BMP. Erosion, scour, and/or channeling can disrupt treatment processes and reduce effectiveness.	
	Requirement	Response
4a	What pre-treatment devices (e.g. vegetated buffers, catch basin inserts) and designs (e.g. forebay berms with cutouts) are proposed?	catch basin inserts
4b	Adequate scour protection has been provided for both sheet flow and pipe inflows to the BMP.	Yes
4c	Where scour protection has not been provided, flows into and within the BMP are kept to non-erosive velocities.	3.24 cfs
4d	The BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification (e.g. maximum tributary area, maximum inflow velocities, etc.).	N/A
4e	To preserve permeability, the media should have substantial void ratios and avoidance of choking layers.	40% voids

⁹ See Appendix E.20 of the San Diego BMPDM for initial plan list for consideration for Riverside County.

5	Biofiltration BMP must include operation and maintenance design features and planning considerations for continued effectiveness of pollutant removal and flow control functions. Biofiltration BMPs require regular maintenance in order provide ongoing function as intended. Additionally, it is not possible to foresee and avoid potential issues as part of design; therefore, plans must be in place to correct issues if they arise.	
	Requirement	Response
5a	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, media above gravel that has 40% voids to store and infiltrate
5b	The maintenance plan specific for the proprietary BMP specific inspection activities, regular/periodic maintenance activities and specific corrective actions relating to scour, erosion, channeling, media clogging, vegetation health, and inflow and outflow structures.	This is in addition to the O&M Plan described in the WQMP guidance document, Section 5.
5c	Adequate site area and features have been provided for BMP inspection and maintenance access.	BMPs to be maintained by HOA
5d	For proprietary biofiltration BMPs, the BMP maintenance plan is consistent with manufacturer guidelines and conditions of its third-party certification (i.e., maintenance activities, frequencies).	Yes
5e	Describe all portions of the BMP that may potentially clog or present an O&M issue.	Trash and debris preventing water to infiltrate into the through media into gravel storage
5f	Describe design features to address each of the potential clogging or O&M issues.	HOA to maintain and clean BMPs

By signing below, the preparer certifies all the information provided with this submittal and submittals related to proprietary BMPs for the project is accurate, and relevant information to assess the long term operation and maintenance of this proprietary BMP was not omitted with this submittal.

Prepared by: _____

Title: _____

Signature: _____

Date:

Appendix 6: LID BMP Design Details

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

PROJECT SUMMARY

CALCULATION DETAILS

- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 842 lf.

STORAGE SUMMARY

- STORAGE VOLUME REQUIRED = N/A
- PIPE STORAGE VOLUME = 47,779 cf.
- BACKFILL STORAGE VOLUME = 0 cf.
- TOTAL STORAGE PROVIDED = 47,779 cf.

PIPE DETAILS

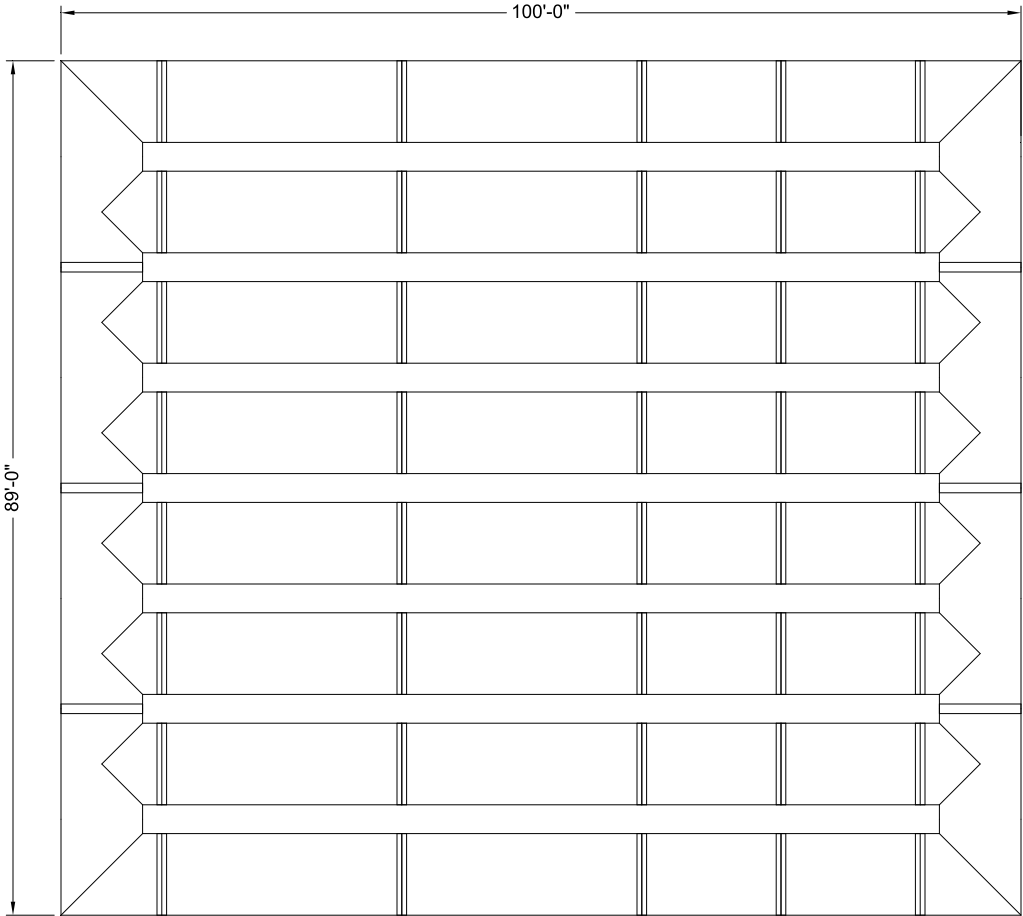
- DIAMETER = 102 IN.
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = Solid
- BARRELL SPACING = 36 IN.

BACKFILL DETAILS

- WIDTH AT ENDS = 12 IN.
- ABOVE PIPE = 0 IN.
- WIDTH AT SIDES = 12 IN.
- BELOW PIPE = 0 IN.

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 22⅓" x 1½" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



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SCALE: 1" = 20'

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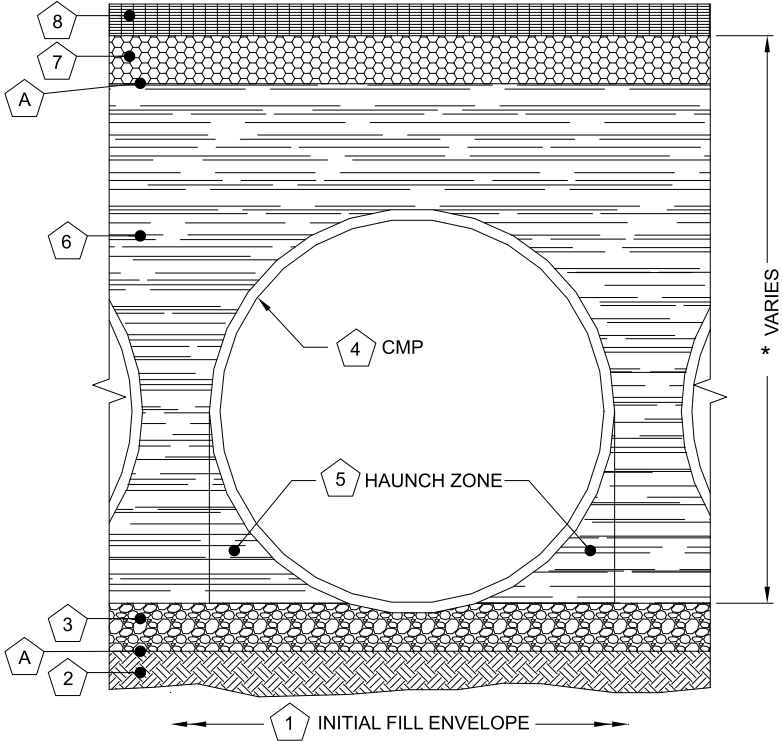


CMP DETENTION SYSTEMS

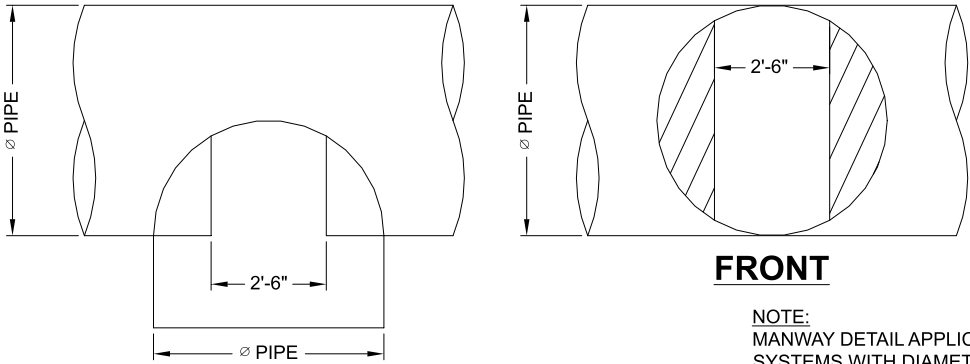
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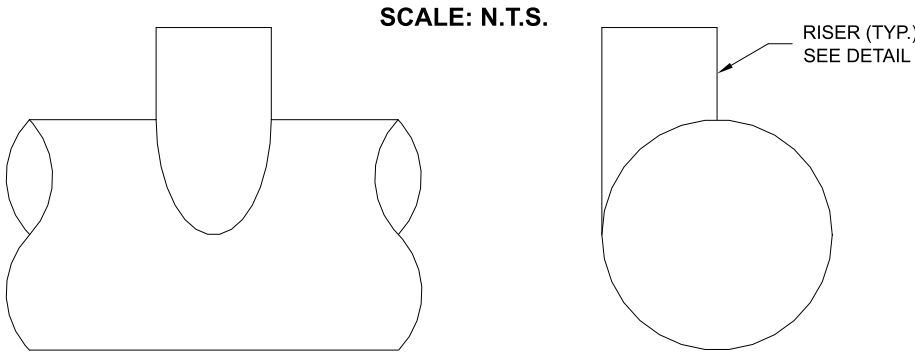
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DESIGNED: DYO		DRAWN: DYO
CHECKED: DYO		APPROVED: DYO
SHEET NO.: D1		



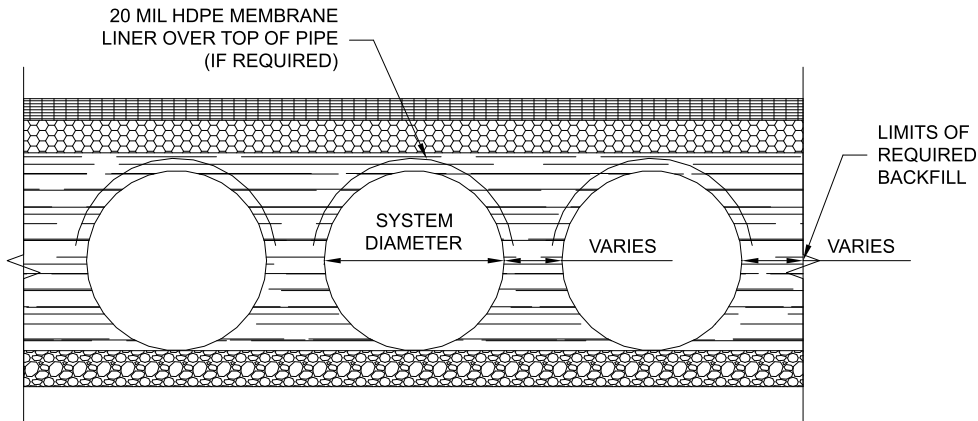
DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE			
Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)		
7	Road Base (if applicable)		
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45
* Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.			



TYPICAL MANWAY DETAIL



TYPICAL RISER DETAIL



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.

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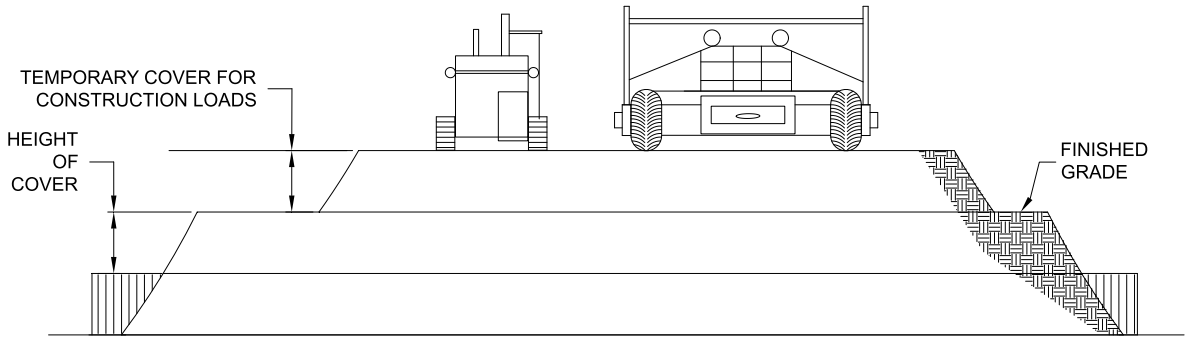
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Rancho Cucamonga, CA
DETENTION SYSTEM

PROJECT No.: 9116	SEQ. No.: 14466	DATE: 3/18/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

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CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
MINIMUM COVER (FT)				
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE

THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL

THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS

CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

NOTE:

THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

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DATE	REVISION DESCRIPTION	BY

PIPE

THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

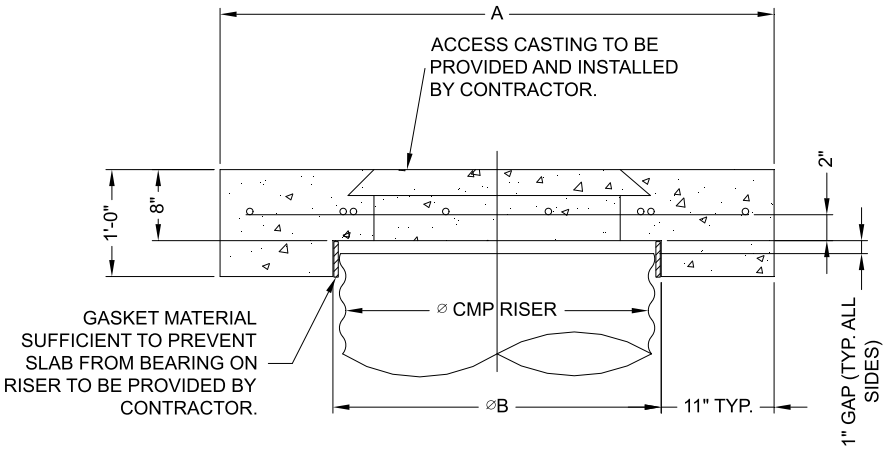
HANDLING AND ASSEMBLY

SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

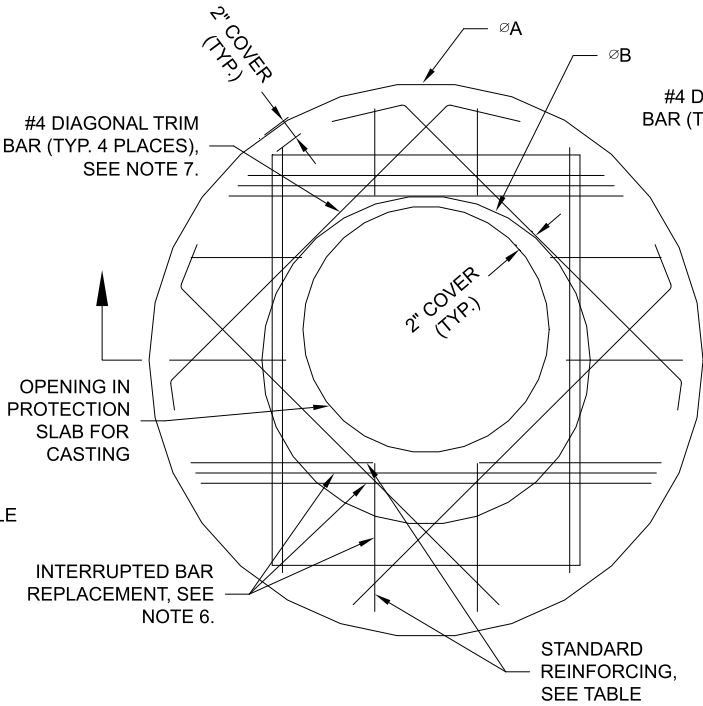
INSTALLATION

SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.



SECTION VIEW



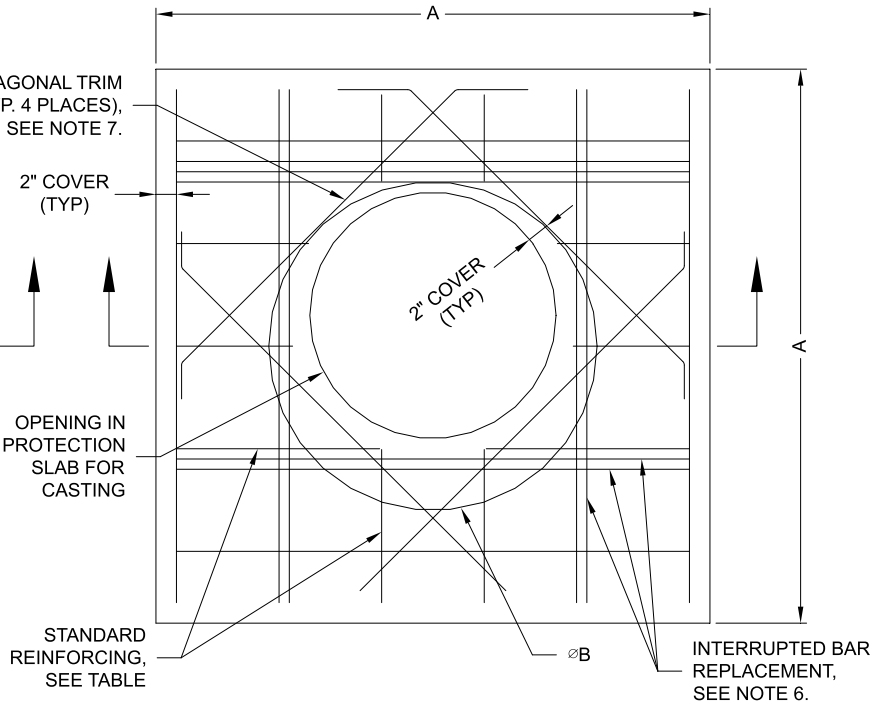
ROUND OPTION PLAN VIEW

NOTES:

- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
- DESIGN LOAD HS25.
- EARTH COVER = 1' MAX.
- CONCRETE STRENGTH = 3,500 psi
- REINFORCING STEEL = ASTM A615, GRADE 60.
- PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.

REINFORCING TABLE				
Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	Ø 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	Ø 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	Ø 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



SQUARE OPTION PLAN VIEW

- TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
- PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
- DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.


MANHOLE CAP DETAIL

SCALE: N.T.S.



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800-338-1122 513-645-7000 513-645-7993 FAX



CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO14466 Jana
jana
Rancho Cucamonga, CA
DETENTION SYSTEM

PROJECT No.: 9116	SEQ. No.: 14466	DATE: 3/18/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		D3

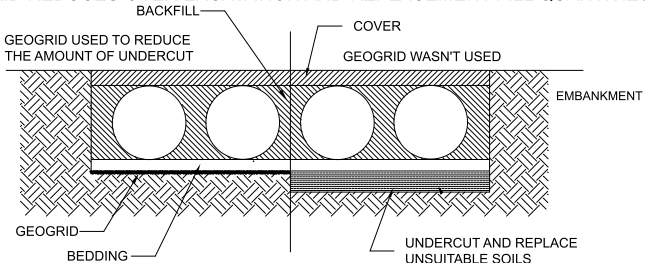
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

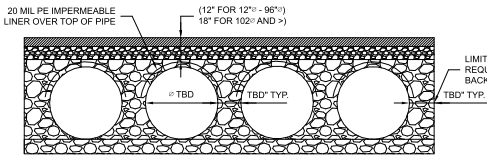


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

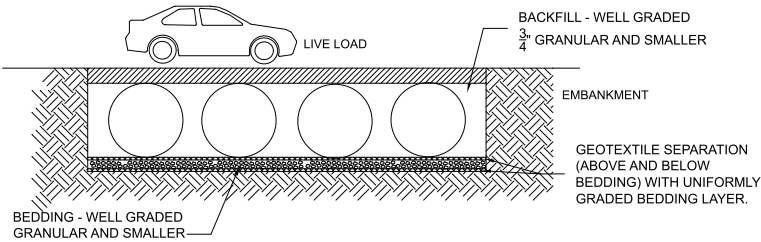
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

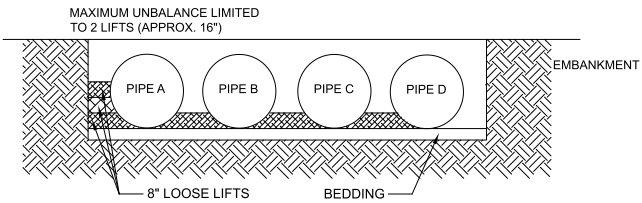
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



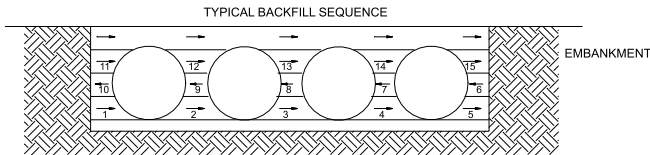
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

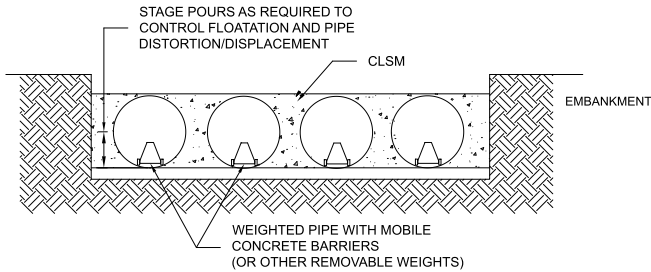


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

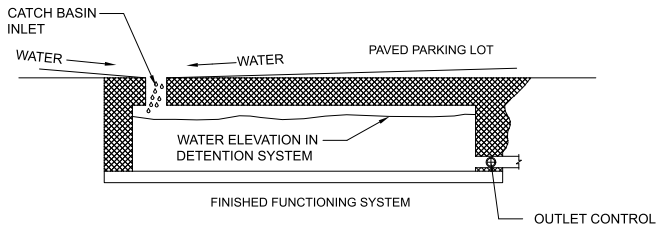


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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CMP DETENTION SYSTEMS

CONTECH
DYODS
DRAWING

DYO14466 Jana
jana
Rancho Cucamonga, CA
DETENTION SYSTEM

PROJECT No.: 9116	SEQ. No.: 14466	DATE: 3/18/2022
DESIGNED: DYO		DRAWN: DYO
CHECKED: DYO		APPROVED: DYO
SHEET NO.: D4		

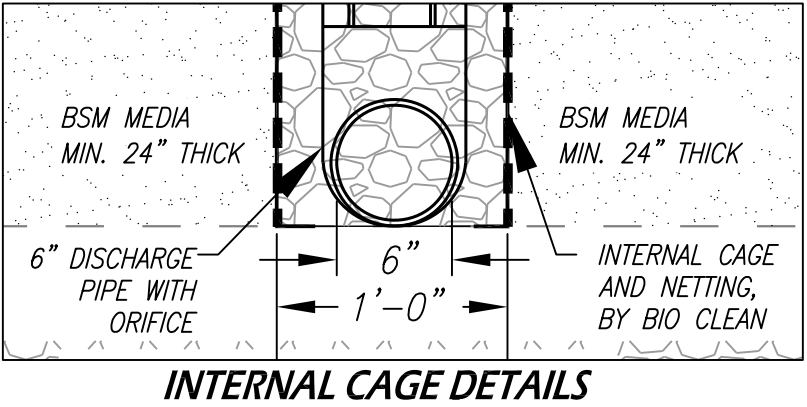
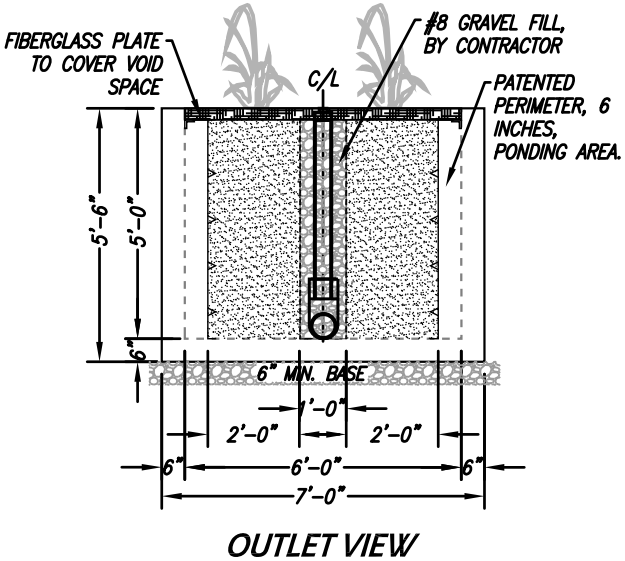
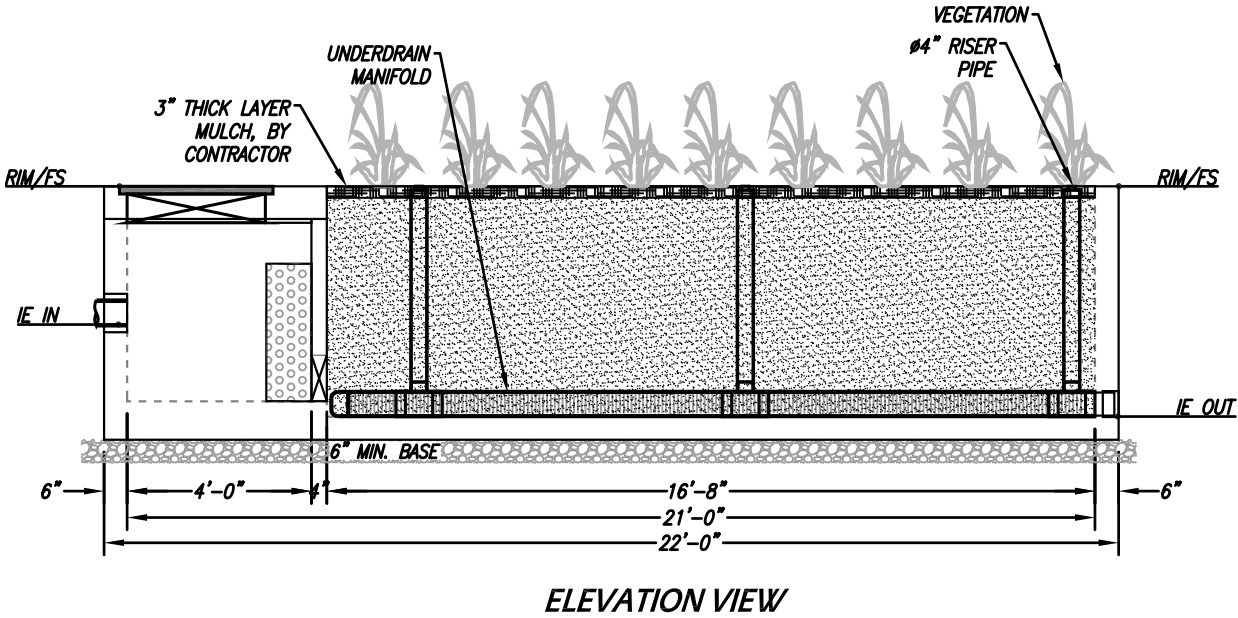
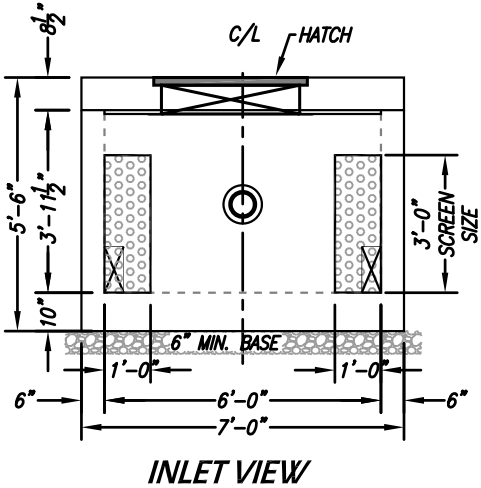
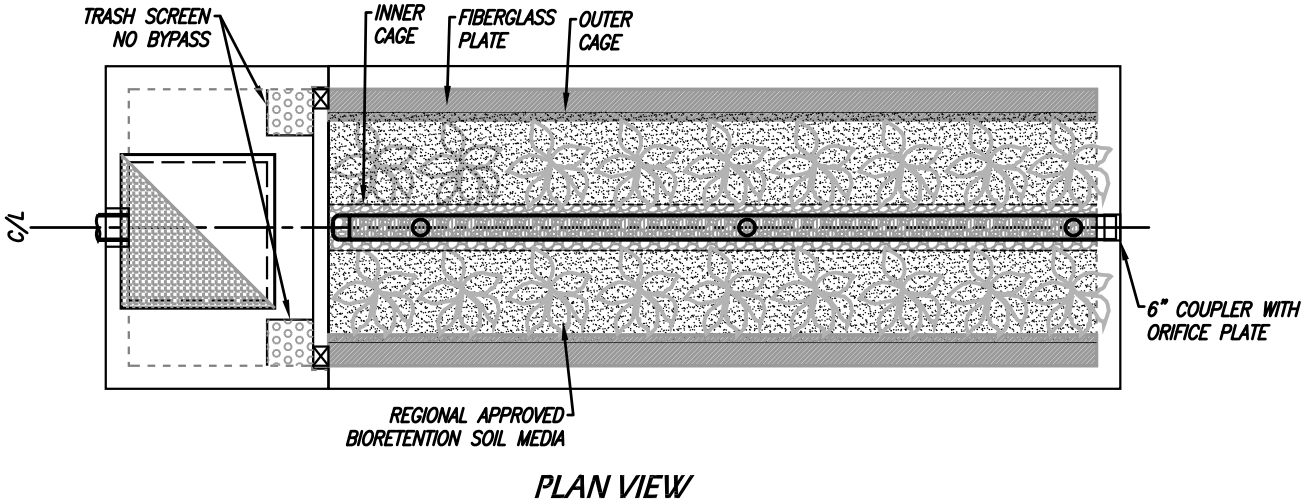
SITE SPECIFIC DATA			
PROJECT ID			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
---		---	
TREATMENT HGL AVAILABLE (FT)			---
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE	N/K	N/K	N/K
INLET PIPE			
OUTLET PIPE	–5.00	PVC–SDR35	6”
	PRETREATMENT	BIOFILTRATION	N/A
RIM ELEVATION	0.00	0.00	0.00
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	N/A
FRAME & COVER	36” X 36”	N/A	N/A
LA COUNTY MEDIA MIX VOLUME (CY)			---
GRAVEL LAYER WITHIN MEDIA CHAMBER (CY)			---
ORIFICE DIAMETER (IN)			---
NOTES: PRELIMINARY, NOT FOR CONSTRUCTION.			

INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURER'S SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURER'S CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 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). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL GAPS AROUND PIPES SHALL BE SEALED WATER TIGHT WITH A NON-SHRINK GROUT PER MANUFACTURER'S STANDARD CONNECTION DETAIL AND SHALL MEET OR EXCEED REGIONAL PIPE CONNECTION STANDARDS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

1. MANUFACTURER 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 MANUFACTURER.



REQUIRED HORIZ. MEDIA THICKNESS (INCHES)	24
TREATMENT VOLUME (CF)	2400
TARGETED DRAINDOWN DURATION (HR)	24
WETLANDMEDIA INFILTRATION RATE (IN/HR)	12
WETLANDMEDIA LOADING RATE (GPM/SF)	OR 0.12
DISCHARGE RATE (CFS)	0.028
REQUIRED TOTAL MEDIA SURFACE AREA (SF)	103.89
PROVIDED TOTAL MEDIA SURFACE AREA (SF)	104.00
NUMBER OF ROW(S)	1

THE PRODUCT DESCRIBED MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:

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WetlandMOD-6-XX-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

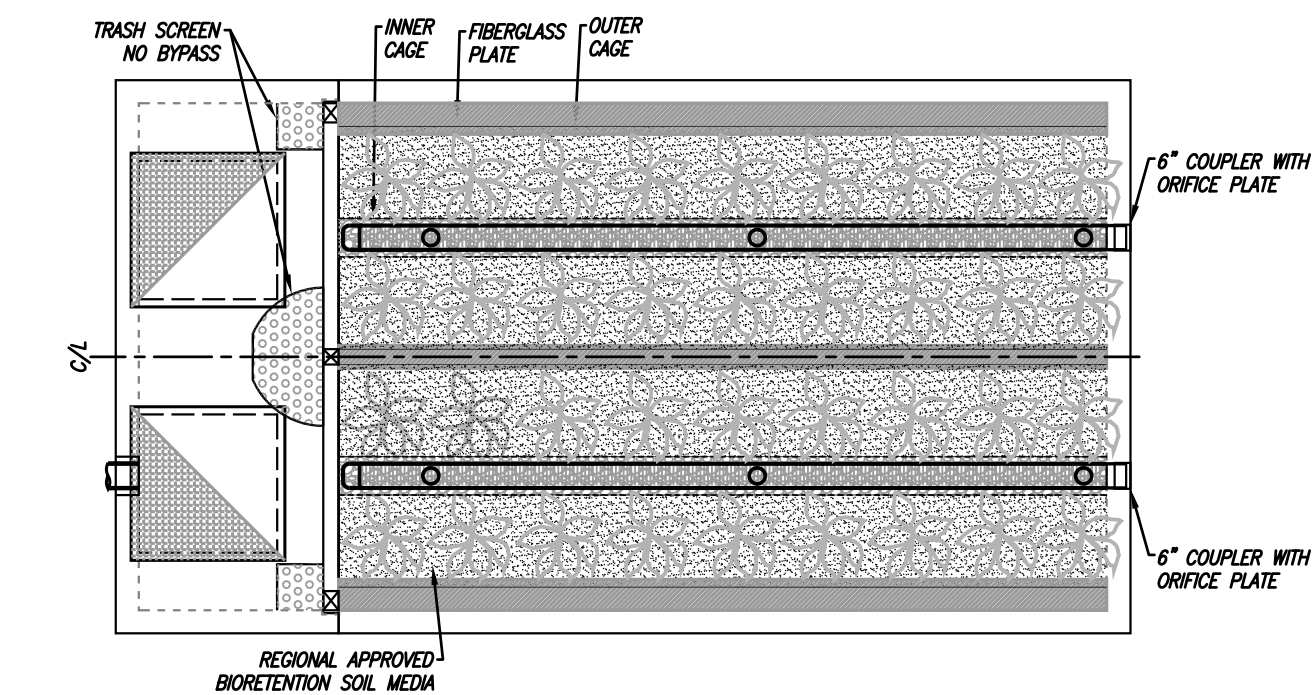
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PROJECT ID			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
---		---	
TREATMENT HGL AVAILABLE (FT)			---
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
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INLET PIPE			
OUTLET PIPE	–5.00	PVC–SDR35	6”
	PRETREATMENT	BIOFILTRATION	N/A
RIM ELEVATION	0.00	0.00	0.00
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	N/A
FRAME & COVER	36” X 36”	N/A	N/A
LA COUNTY MEDIA MIX VOLUME (CY)			---
GRAVEL LAYER WITHIN MEDIA CHAMBER (CY)			---
ORIFICE DIAMETER (IN)			---
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INSTALLATION NOTES

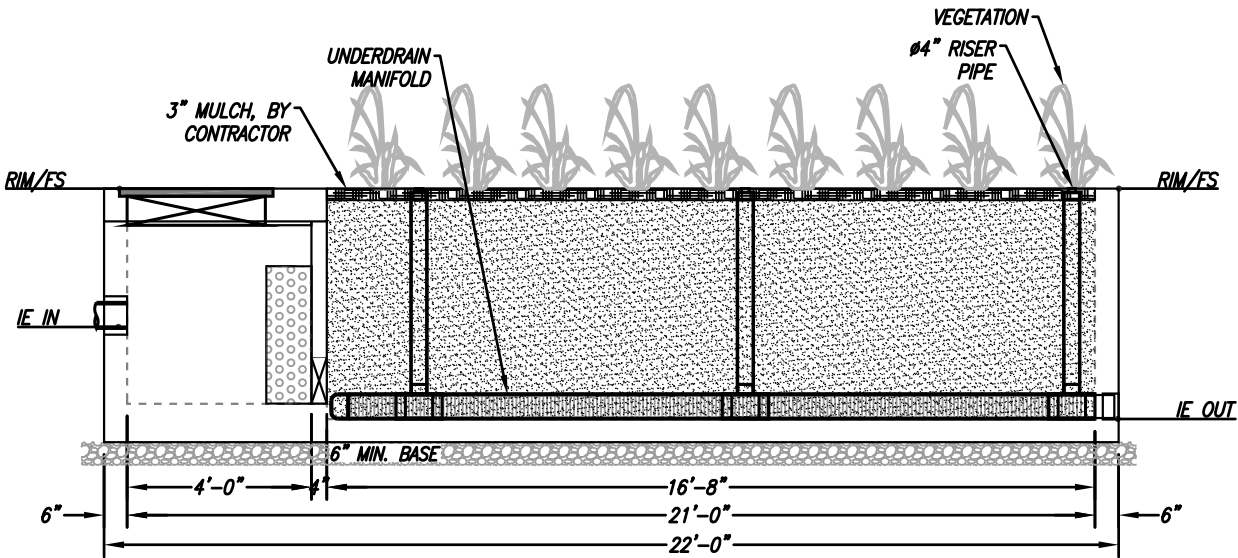
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4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. DRIP OR SPRAY IRRIGATION REQUIRED ON ALL UNITS WITH VEGETATION.

GENERAL NOTES

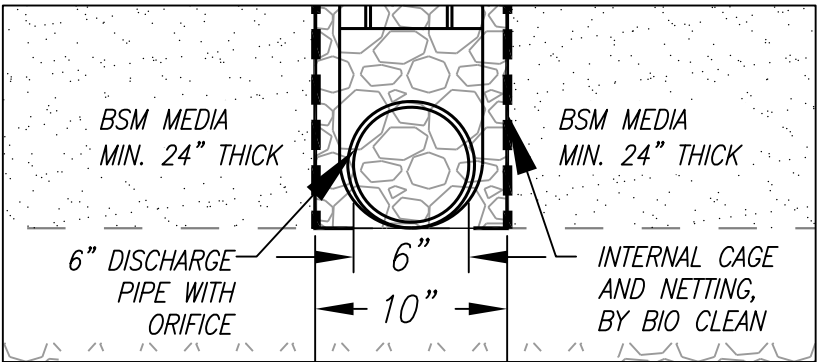
1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT MANUFACTURER.



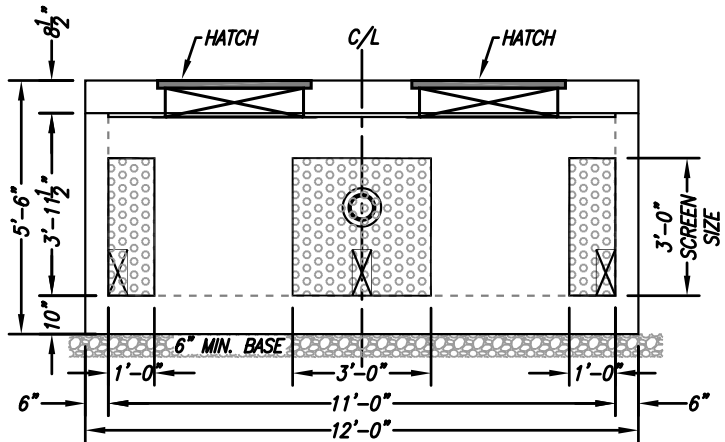
PLAN VIEW



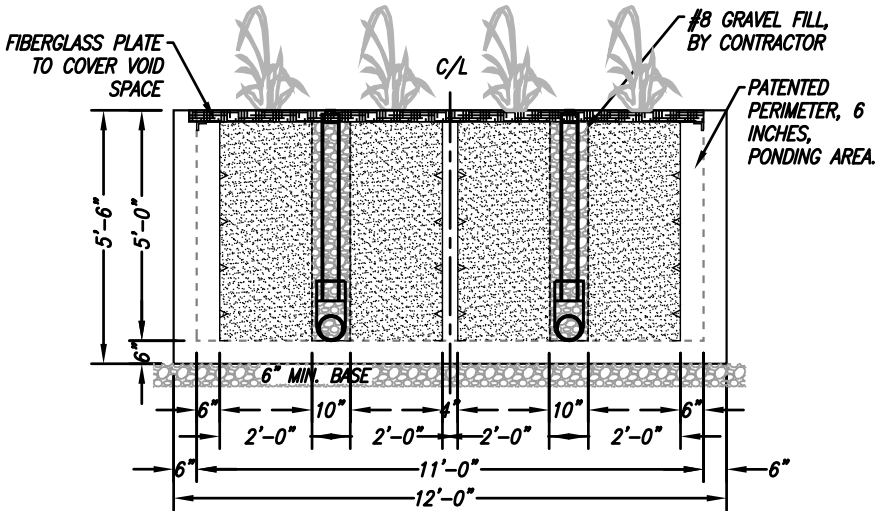
ELEVATION VIEW



INTERNAL CAGE DETAILS



INLET VIEW



OUTLET VIEW

REQUIRED HORIZ. MEDIA THICKNESS (INCHES)	24
TREATMENT VOLUME (CF)	2400
TARGETED DRAINDOWN DURATION (HR)	24
WETLANDMEDIA INFILTRATION RATE (IN/HR)	12
WETLANDMEDIA LOADING RATE (GPM/SF)	OR 0.12
DISCHARGE RATE (CFS)	0.028
REQUIRED TOTAL MEDIA SURFACE AREA (SF)	103.89
PROVIDED TOTAL MEDIA SURFACE AREA (SF)	104.00
NUMBER OF ROW(S)	1

WetlandMOD-11-XX-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

THE PRODUCT DESCRIBED MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:

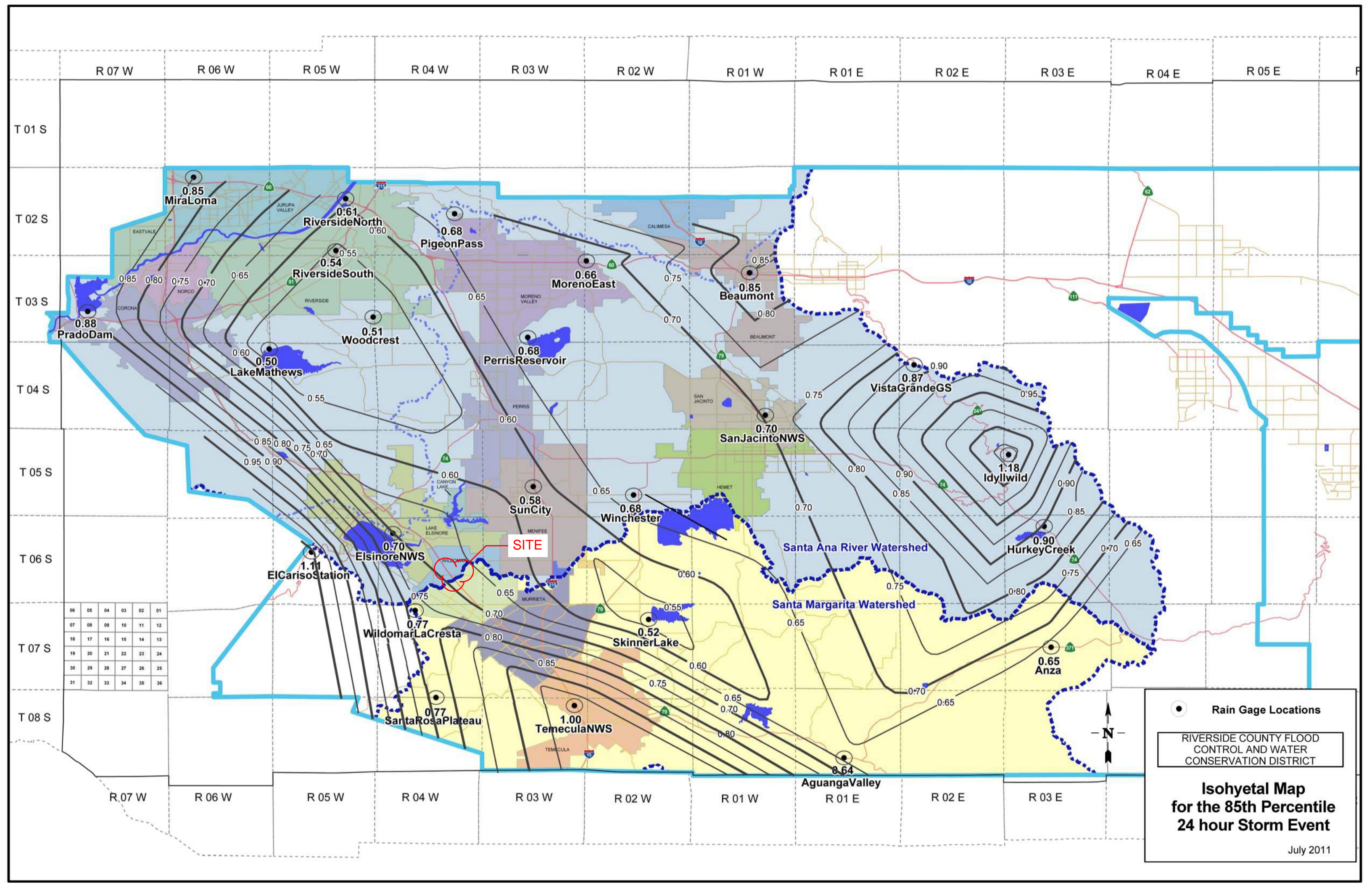
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MODULAR WETLANDS SYSTEMS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MODULAR WETLANDS SYSTEMS IS PROHIBITED.

Bio Clean
A Forterra Company

10/25/19GSINGH

EXHIBIT A:

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



<u>Santa Margarita Watershed</u> 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	Blue Engineering & Consulting, Inc.	Date	3/17/2022
Designed by	Angel Cesar	County/City Case No	
Company Project Number/Name	Jana Rd Commercial Development		
Drainage Area Number/Name	1		
Enter the Area Tributary to this Feature		$A_T =$	4.04 acres
85 th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E			
Site Location	Township	6S	
	Range	4W	
	Section	23	
Enter the 85 th Percentile, 24-hour Rainfall Depth	$D_{85} =$	0.68	
Determine the Effective Impervious Fraction			
Type of post-development surface cover (use pull down menu)	Mixed Surface Types		
Effective Impervious Fraction	$I_f =$	0.67	
Calculate the composite Runoff Coefficient, C for the BMP Tributary Area			
Use the following equation based on the WEF/ASCE Method			
$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$		$C =$	0.47
Determine Design Storage Volume, V_{BMP}			
Calculate V_U , the 85% Unit Storage Volume $V_U = D_{85} \times C$		$V_u =$	0.32 (in*ac)/ac
Calculate the design storage volume of the BMP, V_{BMP} .			
$V_{BMP} (ft^3) = \frac{V_U (in\text{-}ac/ac) \times A_T (ac) \times 43,560 (ft^2/ac)}{12 (in/ft)}$		$V_{BMP} =$	4,693 ft ³
Notes:			

Bioretention Facility - Design Procedure		BMP ID 1	Legend:	Required Entries	
				Calculated Cells	
Company Name:	Blue Engineering & Consulting, Inc.		Date: 3/17/2022		
Designed by:	Angel Cesar		County/City Case No.:		
Design Volume					
Enter the area tributary to this feature			$A_T =$	4.04	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} =$	4,693	ft ³
Type of Bioretention Facility Design					
<input type="radio"/> Side slopes required (parallel to parking spaces or adjacent to walkways) <input checked="" type="radio"/> No side slopes required (perpendicular to parking space or Planter Boxes)					
Bioretention Facility Surface Area					
Depth of Soil Filter Media Layer			$d_s =$	3.0	ft
Top Width of Bioretention Facility, excluding curb			$w_T =$	100.0	ft
Total Effective Depth, d_E					
$d_E = [(0.3) \times d_s + (0.4) \times 1] + 0.5$			$d_E =$	1.80	ft
Minimum Surface Area, A_m					
$A_M (ft^2) = \frac{V_{BMP} (ft^3)}{d_E (ft)}$			$A_M =$	2,608	ft ²
Proposed Surface Area			$A =$	2,608	ft ²
Minimum Required Length of Bioretention Facility, L			$L =$	26.1	ft
Bioretention Facility Properties					
Side Slopes in Bioretention Facility			$z =$	1	:1
Diameter of Underdrain				18	inches
Longitudinal Slope of Site (3% maximum)				0	%
6" Check Dam Spacing				0	feet
Describe Vegetation:					
Notes:					





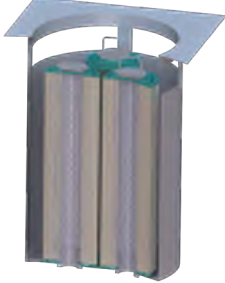

Catch Basin Inlet Filters

A Stormwater Trash Capture Solution



OVERVIEW

The Bio Clean Catch Basin Inlet Filters are insertable systems designed to capture fine to coarse sediments, floatable trash, debris, total suspended solids (TSS), nutrients, metals, and hydrocarbons conveyed in stormwater runoff. The filter system is available in four different model types:

Full Capture Type	Multi-Level Screen Type	Kraken Filter Type	Media Filter Type
			
California Water Board Certified	Verified by the New Jersey Corporation for Advanced Technology	Advanced Pollutant Removal	Design for Industrial Applications
TESTING HIGHLIGHT: California Water Board 100% of Trash	TESTING HIGHLIGHT: NJDEP Testing Protocol 86.6% of TSS (Down to 100 Micron)	TESTING HIGHLIGHT: Third Party Testing 85% of TSS & 72% of TP	TESTING HIGHLIGHT: Port of San Diego Field Testing 82% of TSS

The Catch Basin Inlet Filters are an effective and economical solution to help property owners, developers, and municipalities meet local, state, and federal water quality requirements and regulations, as each filter can be custom built to meet specific project needs, and screen size and media type can be modified to remove specific pollutants.

Constructed of 100% high-grade stainless steel, it is built to last longer than any other filter brand, and the non-clogging screens provide higher levels of filtration and water flow. The filter is equipped with unimpeded high flow bypass to prevent backflow during the largest storm events.

ADVANTAGES

- 1-YEAR WARRANTY
- WORKS IN ANY SIZE CATCH BASIN
*SOME DEPTH RESTRICTIONS MAY APPLY.
- NO NETS OR GEOFABRICS
- 15+ YEARS USER LIFE
- EASIEST TO MAINTAIN TROUGH SYSTEM ALLOWS FOR 15-MINUTE OR LESS SERVICE TIME
- MEETS LEED REQUIREMENTS
- STAINLESS STEEL AND FIBERGLASS CONSTRUCTION

APPLICATIONS

The Catch Basin Inlet Filters have been successfully used on numerous new construction and retrofit projects. The system's superior durability and customization make it ideal for a wide range of stormwater applications. Each filter fits within a shallow catch basin, giving them the ability to integrate with versatile curb inlet trough systems.

- Parking Lot Curb Inlets
- Roadway Curb Inlets
- Bioswale Bypass Structures
- Parking Lot Grate Inlets
- Roadway Grate Inlets
- Stormwater Pretreatment

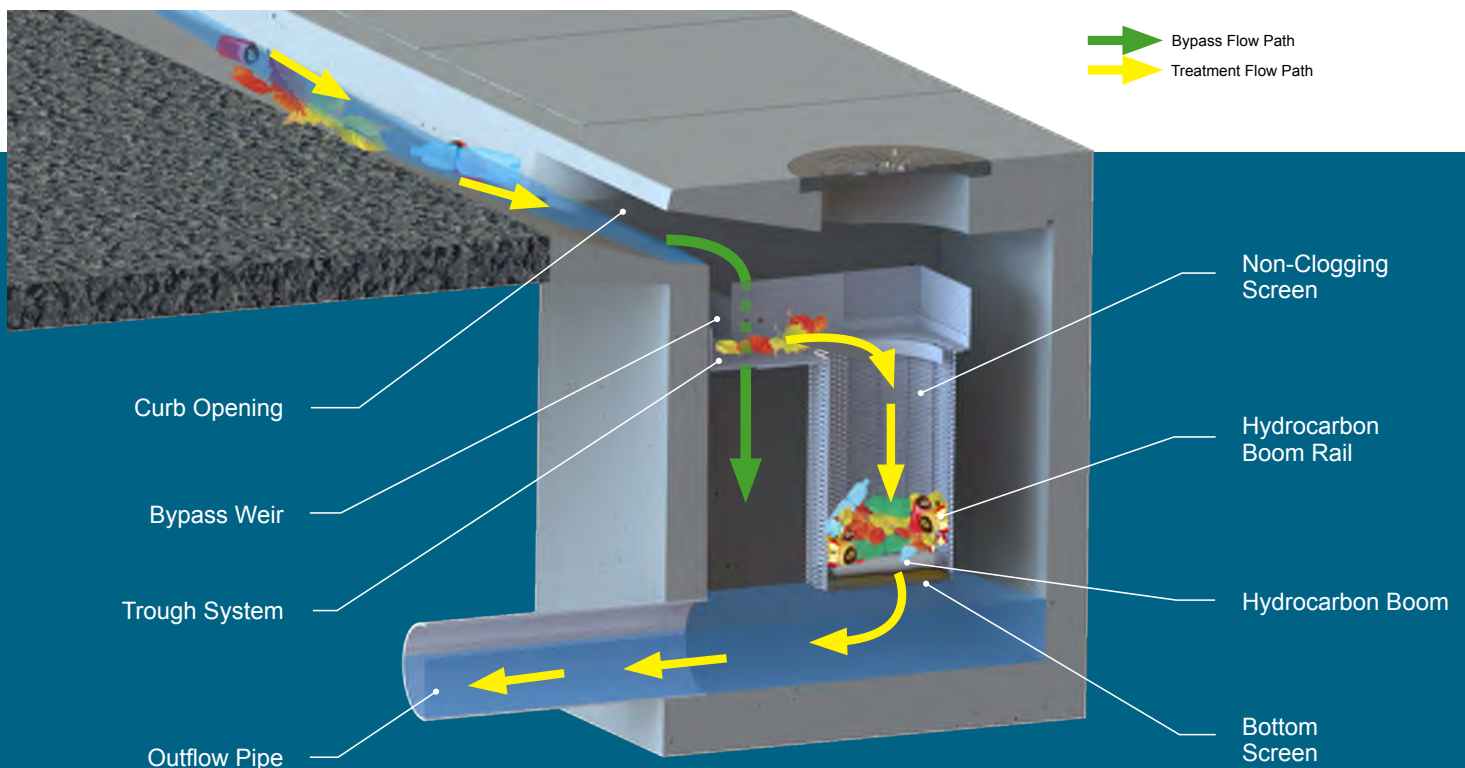
CURB INLET APPLICATION

The curb inlet application or shelf system, provides easy access for maintenance from the surface without having to enter the catch basin. Maintenance service takes about 15 minutes and requires no confined space entry.

Each Catch Basin Inlet Filter is designed to be insertable and the expandable trough system is designed to convey water quality design flows through the filter basket while allowing peak flows to bypass over the trough without resuspending captured pollutants. The modular design of the trough system makes it adaptable to any size* or type of curb inlet catch basin.

*SOME DEPTH RESTRICTIONS MAY APPLY.

OPERATION

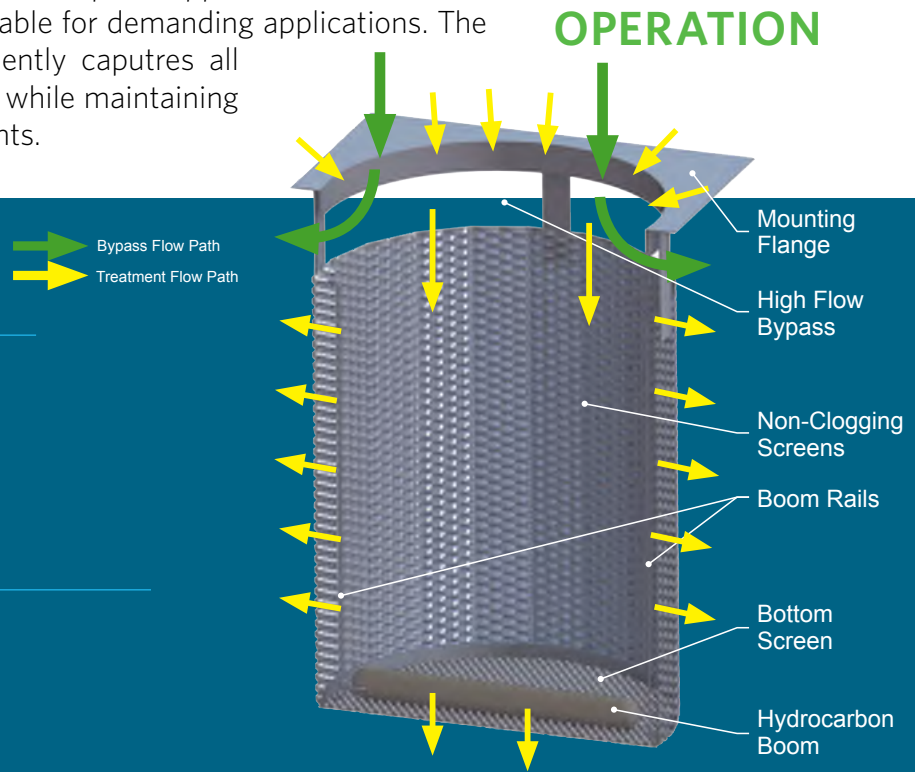


FULL CAPTURE TYPE

The Full Capture type inlet filter is California Full Capture approved and allows for a higher flow of water, making it more applicable for demanding applications. The screen has a specialized design that efficiently captures all trash, but also makes cleaning more efficient while maintaining its ability to meet demanding flow requirements.

PERFORMANCE

100% REMOVAL
OF
TRASH



SPECIFICATIONS

MODEL #	TREATMENT FLOW (cfs)	BYPASS FLOW (cfs)
BIO-CURB-FULL	2.85	UNLIMITED
BIO-GRATE-FULL-12-12-12	1.55	1.55
BIO-GRATE-FULL-18-18-18	4.32	3.68
BIO-GRATE-FULL-24-24-24	7.67	4.83
BIO-GRATE-FULL-30-30-24	12.97	6.21
BIO-GRATE-FULL-25-38-24	13.53	6.59
BIO-GRATE-FULL-36-36-24	19.64	7.60
BIO-GRATE-FULL-48-48-18	25.59	10.13

Note: Curb inlet application treatment flow rate limited to the weir capacity - actual flow rates of the filter basket is greater than 2.85 cfs. Various depth filter baskets available. Treatment and bypass flow rates include a safety factor of 2.

INSTALLATION

CURB INLET FILTER



Bio Clean's Curb Inlet Filters are easily installed under catch basin access for ease of maintenance.

GRATE INLET FILTER



Grate Inlet Filters can be quickly installed directly under grated inlets with no special equipment.

MAINTENANCE

CURB INLET FILTER



Filters can be lifted out by hand for routine maintenance and inspections.

GRATE INLET FILTER



Bio Clean
A Forterra Company

5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

Appendix 7: Hydromodification

Supporting Detail Relating to compliance with the Hydromodification Performance Standards

SMRHM
PROJECT REPORT

General Model Information

Project Name: Jana1
Site Name: Jana
Site Address:
City:
Report Date: 10/13/2022
Gage: Wildomar / North Murrieta
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 1

Bypass: No

GroundWater: No

Pervious Land Use acre
C D,Shrub,Mod(5-10%) 4.15

Pervious Total 4.15

Impervious Land Use acre
Sidewalks,Flat(0-5%) 0.01

Impervious Total 0.01

Basin Total 4.16

Element Flows To:
Surface Interflow Groundwater

Mitigated Land Use

DMA 1

Bypass: No

GroundWater: No

Pervious Land Use acre
C D,Grass,Flat(0-5%) 0.817

Pervious Total 0.817

Impervious Land Use acre
Roads,Flat(0-5%) 2.341
Roof Area 0.626
Sidewalks,Flat(0-5%) 0.276

Impervious Total 3.243

Basin Total 4.06

Element Flows To:

Surface	Interflow	Groundwater
Vault 1	Vault 1	

Routing Elements

Predeveloped Routing

Mitigated Routing

Vault 1

Width: 95 ft.
 Length: 100 ft.
 Depth: 5 ft.
 Infiltration On
 Infiltration rate: 3
 Infiltration safety factor: 1
 Total Volume Infiltrated (ac-ft.): 154.788
 Total Volume Through Riser (ac-ft.): 8.269
 Total Volume Through Facility (ac-ft.): 163.057
 Percent Infiltrated: 94.93
 Total Precip Applied to Facility: 0
 Total Evap From Facility: 0
 Discharge Structure
 Riser Height: 5 ft.
 Riser Diameter: 48 in.
 Orifice 1 Diameter: 2 in. Elevation: 0 ft.
 Orifice 2 Diameter: 3 in. Elevation: 1 ft.
 Orifice 3 Diameter: 6 in. Elevation: 2 ft.
 Element Flows To:
 Outlet 1 Outlet 2

Vault Hydraulic Table

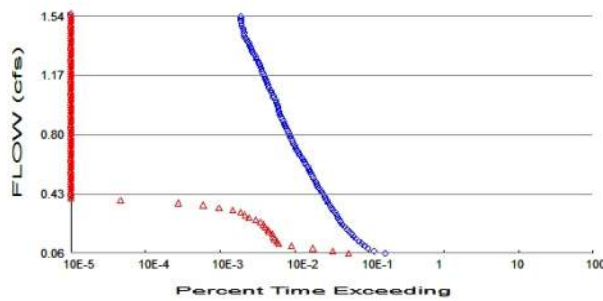
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.218	0.000	0.000	0.000
0.0556	0.218	0.012	0.025	0.659
0.1111	0.218	0.024	0.036	0.659
0.1667	0.218	0.036	0.044	0.659
0.2222	0.218	0.048	0.051	0.659
0.2778	0.218	0.060	0.057	0.659
0.3333	0.218	0.072	0.062	0.659
0.3889	0.218	0.084	0.067	0.659
0.4444	0.218	0.096	0.072	0.659
0.5000	0.218	0.109	0.076	0.659
0.5556	0.218	0.121	0.080	0.659
0.6111	0.218	0.133	0.084	0.659
0.6667	0.218	0.145	0.088	0.659
0.7222	0.218	0.157	0.092	0.659
0.7778	0.218	0.169	0.095	0.659
0.8333	0.218	0.181	0.099	0.659
0.8889	0.218	0.193	0.102	0.659
0.9444	0.218	0.206	0.105	0.659
1.0000	0.218	0.218	0.108	0.659
1.0556	0.218	0.230	0.169	0.659
1.1111	0.218	0.242	0.195	0.659
1.1667	0.218	0.254	0.217	0.659
1.2222	0.218	0.266	0.235	0.659
1.2778	0.218	0.278	0.251	0.659
1.3333	0.218	0.290	0.266	0.659
1.3889	0.218	0.302	0.280	0.659
1.4444	0.218	0.315	0.293	0.659
1.5000	0.218	0.327	0.305	0.659
1.5556	0.218	0.339	0.317	0.659

1.6111	0.218	0.351	0.328	0.659
1.6667	0.218	0.363	0.339	0.659
1.7222	0.218	0.375	0.350	0.659
1.7778	0.218	0.387	0.360	0.659
1.8333	0.218	0.399	0.369	0.659
1.8889	0.218	0.411	0.379	0.659
1.9444	0.218	0.424	0.388	0.659
2.0000	0.218	0.436	0.397	0.659
2.0556	0.218	0.448	0.636	0.659
2.1111	0.218	0.460	0.740	0.659
2.1667	0.218	0.472	0.822	0.659
2.2222	0.218	0.484	0.892	0.659
2.2778	0.218	0.496	0.954	0.659
2.3333	0.218	0.508	1.011	0.659
2.3889	0.218	0.521	1.064	0.659
2.4444	0.218	0.533	1.114	0.659
2.5000	0.218	0.545	1.161	0.659
2.5556	0.218	0.557	1.206	0.659
2.6111	0.218	0.569	1.249	0.659
2.6667	0.218	0.581	1.290	0.659
2.7222	0.218	0.593	1.329	0.659
2.7778	0.218	0.605	1.368	0.659
2.8333	0.218	0.617	1.405	0.659
2.8889	0.218	0.630	1.441	0.659
2.9444	0.218	0.642	1.476	0.659
3.0000	0.218	0.654	1.510	0.659
3.0556	0.218	0.666	1.543	0.659
3.1111	0.218	0.678	1.576	0.659
3.1667	0.218	0.690	1.607	0.659
3.2222	0.218	0.702	1.639	0.659
3.2778	0.218	0.714	1.669	0.659
3.3333	0.218	0.727	1.699	0.659
3.3889	0.218	0.739	1.728	0.659
3.4444	0.218	0.751	1.757	0.659
3.5000	0.218	0.763	1.785	0.659
3.5556	0.218	0.775	1.813	0.659
3.6111	0.218	0.787	1.840	0.659
3.6667	0.218	0.799	1.867	0.659
3.7222	0.218	0.811	1.894	0.659
3.7778	0.218	0.823	1.920	0.659
3.8333	0.218	0.836	1.946	0.659
3.8889	0.218	0.848	1.971	0.659
3.9444	0.218	0.860	1.996	0.659
4.0000	0.218	0.872	2.021	0.659
4.0556	0.218	0.884	2.046	0.659
4.1111	0.218	0.896	2.070	0.659
4.1667	0.218	0.908	2.094	0.659
4.2222	0.218	0.920	2.117	0.659
4.2778	0.218	0.932	2.141	0.659
4.3333	0.218	0.945	2.164	0.659
4.3889	0.218	0.957	2.186	0.659
4.4444	0.218	0.969	2.209	0.659
4.5000	0.218	0.981	2.231	0.659
4.5556	0.218	0.993	2.253	0.659
4.6111	0.218	1.005	2.275	0.659
4.6667	0.218	1.017	2.297	0.659
4.7222	0.218	1.029	2.318	0.659
4.7778	0.218	1.042	2.340	0.659

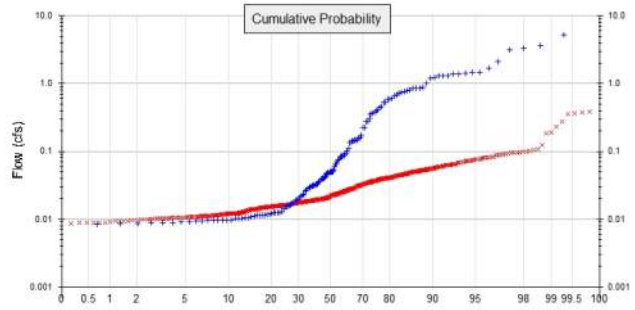
4.8333	0.218	1.054	2.361	0.659
4.8889	0.218	1.066	2.382	0.659
4.9444	0.218	1.078	2.402	0.659
5.0000	0.218	1.090	2.423	0.659
5.0556	0.218	1.102	2.999	0.659
5.1111	0.000	0.000	4.035	0.000

Analysis Results

POC 1



+ Predeveloped x Mitigated



Predeveloped Landuse Totals for POC #1

Total Pervious Area: 4.15
Total Impervious Area: 0.01

Mitigated Landuse Totals for POC #1

Total Pervious Area: 0.817
Total Impervious Area: 3.243

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	Flow(cfs)
2 year	0.554991
5 year	1.299065
10 year	1.538686
25 year	3.310194

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	Flow(cfs)
2 year	0.077822
5 year	0.099462
10 year	0.201221
25 year	0.366835

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0555	3539	1136	32	Pass
0.0705	2524	705	27	Pass
0.0855	2070	383	18	Pass
0.1004	1864	197	10	Pass
0.1154	1715	133	7	Pass
0.1304	1579	125	7	Pass
0.1454	1452	118	8	Pass
0.1604	1352	113	8	Pass
0.1754	1268	109	8	Pass
0.1903	1181	97	8	Pass
0.2053	1094	95	8	Pass
0.2203	1028	88	8	Pass
0.2353	964	83	8	Pass
0.2503	898	75	8	Pass
0.2652	857	65	7	Pass
0.2802	815	53	6	Pass
0.2952	786	47	5	Pass
0.3102	751	41	5	Pass
0.3252	707	32	4	Pass
0.3402	671	21	3	Pass
0.3551	644	13	2	Pass
0.3701	612	6	0	Pass
0.3851	588	1	0	Pass
0.4001	557	0	0	Pass
0.4151	538	0	0	Pass
0.4300	518	0	0	Pass
0.4450	491	0	0	Pass
0.4600	467	0	0	Pass
0.4750	438	0	0	Pass
0.4900	423	0	0	Pass
0.5049	413	0	0	Pass
0.5199	392	0	0	Pass
0.5349	374	0	0	Pass
0.5499	362	0	0	Pass
0.5649	352	0	0	Pass
0.5799	339	0	0	Pass
0.5948	326	0	0	Pass
0.6098	308	0	0	Pass
0.6248	297	0	0	Pass
0.6398	284	0	0	Pass
0.6548	271	0	0	Pass
0.6697	253	0	0	Pass
0.6847	243	0	0	Pass
0.6997	233	0	0	Pass
0.7147	223	0	0	Pass
0.7297	216	0	0	Pass
0.7447	206	0	0	Pass
0.7596	200	0	0	Pass
0.7746	194	0	0	Pass
0.7896	190	0	0	Pass
0.8046	182	0	0	Pass
0.8196	176	0	0	Pass
0.8345	169	0	0	Pass

0.8495	165	0	0	Pass
0.8645	158	0	0	Pass
0.8795	152	0	0	Pass
0.8945	148	0	0	Pass
0.9095	142	0	0	Pass
0.9244	137	0	0	Pass
0.9394	134	0	0	Pass
0.9544	131	0	0	Pass
0.9694	131	0	0	Pass
0.9844	127	0	0	Pass
0.9993	122	0	0	Pass
1.0143	120	0	0	Pass
1.0293	113	0	0	Pass
1.0443	111	0	0	Pass
1.0593	106	0	0	Pass
1.0743	104	0	0	Pass
1.0892	97	0	0	Pass
1.1042	96	0	0	Pass
1.1192	93	0	0	Pass
1.1342	91	0	0	Pass
1.1492	89	0	0	Pass
1.1641	86	0	0	Pass
1.1791	83	0	0	Pass
1.1941	80	0	0	Pass
1.2091	78	0	0	Pass
1.2241	75	0	0	Pass
1.2391	73	0	0	Pass
1.2540	70	0	0	Pass
1.2690	67	0	0	Pass
1.2840	66	0	0	Pass
1.2990	62	0	0	Pass
1.3140	59	0	0	Pass
1.3289	57	0	0	Pass
1.3439	56	0	0	Pass
1.3589	54	0	0	Pass
1.3739	52	0	0	Pass
1.3889	50	0	0	Pass
1.4039	47	0	0	Pass
1.4188	46	0	0	Pass
1.4338	46	0	0	Pass
1.4488	45	0	0	Pass
1.4638	44	0	0	Pass
1.4788	42	0	0	Pass
1.4937	42	0	0	Pass
1.5087	41	0	0	Pass
1.5237	41	0	0	Pass
1.5387	41	0	0	Pass

Rational Method

Data for Rational Method is not available.

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.

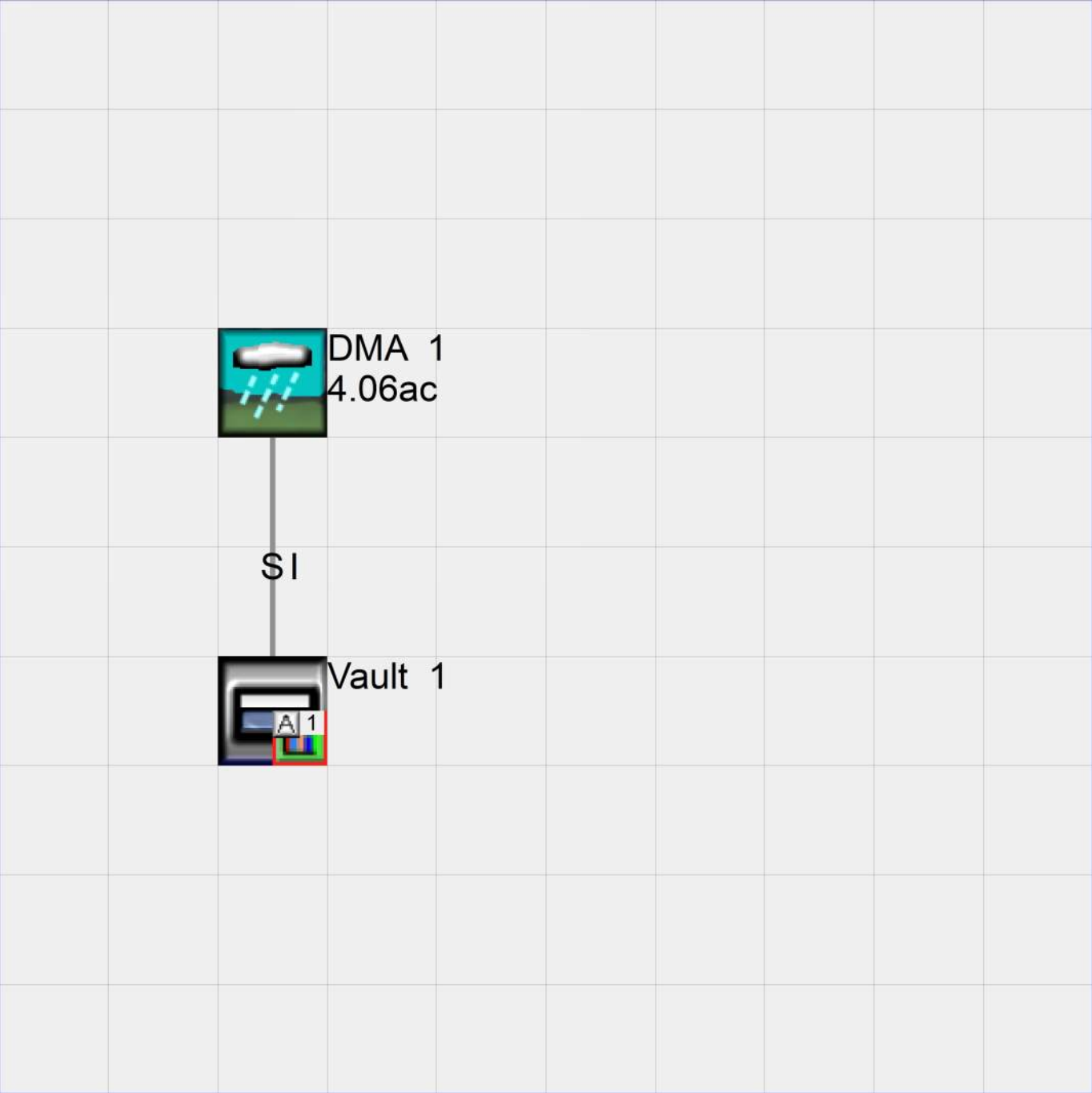
Appendix

Predeveloped Schematic



DMA 1
4.16ac

Mitigated Schematic



Predeveloped UCI File

RUN

GLOBAL

```
WWMH4 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     Janal.wdm
MESSU    25     PreJanal.MES
          27     PreJanal.L61
          28     PreJanal.L62
          30     POCJanal1.dat
```

END FILES

OPN SEQUENCE

```
INGRP                      INDELT 00:15
  PERLND      38
  IMPLND      10
  COPY        501
  DISPLY      1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1   DMA 1                      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          ***
```

```
38      C/D,Shrub,Mod(5-10%)    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 ***
38      0      0      1      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 *****
38      0      0      4      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 ***
  38      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 LRSUR SLSUR KVARV AGWRC
  38      0      4.5      0.04      350      0.1      2      0.95
END PWAT-PARM2

PWAT-PARM3
  <PLS > PWATER input info: Part 3 ***
  # - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
  38      40      35      3      2      0.15      0.15      0
END PWAT-PARM3

PWAT-PARM4
  <PLS > PWATER input info: Part 4 ***
  # - # CEPSC UZSN NSUR INTFW IRC LZETP ***
  38      0      0.7      0.3      1.2      0.45      0
END PWAT-PARM4

MON-LZETPARM
  <PLS > PWATER input info: Part 3 ***
  # - # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
  38      0.5 0.5 0.5 0.6 0.65 0.65 0.65 0.65 0.65 0.55 0.5
END MON-LZETPARM

MON-INTERCEP
  <PLS > PWATER input info: Part 3 ***
  # - # JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC ***
  38      0.13 0.13 0.13 0.14 0.15 0.15 0.15 0.15 0.15 0.14 0.13
END MON-INTERCEP

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # - # *** CEPS SURS UZS IFWS LZS AGWS GWVS
  38      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 ***
  10 Sidewalks,Flat(0-5%) 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

ACTIVITY
  <PLS > ***** Active Sections *****
  # - # ATMP SNOW IWAT SLD IWG IQAL ***
  10      0      0      1      0      0      0
END ACTIVITY

PRINT-INFO
  <ILS > ***** Print-flags ***** PIVL PYR
  # - # ATMP SNOW IWAT SLD IWG IQAL *****
  10      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 ***
  10      0      0      0      0
END IWAT-PARM1

```

```

IWAT-PARM2
<PLS >          IWATER input info: Part 2          ***
# - # ***  LSUR      SLSUR      NSUR      RETSC
10      100      0.05      0.1      0.1
END IWAT-PARM2

IWAT-PARM3
<PLS >          IWATER input info: Part 3          ***
# - # ***PETMAX      PETMIN
10      0      0
END IWAT-PARM3

IWAT-STATE1
<PLS > *** Initial conditions at start of simulation
# - # ***  RETS      SURS
10      0      0
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->          <--Area-->          <-Target->      MBLK      ***
<Name>  #          <-factor->          <Name>  #      Tbl#      ***
DMA  1***
PERLND  38          4.15      COPY  501      12
PERLND  38          4.15      COPY  501      13
IMPLND  10          0.01      COPY  501      15

*****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

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

END MASS-LINK

END RUN

```

Mitigated UCI File

RUN

GLOBAL

```
WWM4 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     Janal.wdm
MESSU    25     MitJanal.MES
          27     MitJanal.L61
          28     MitJanal.L62
          30     POCJanal1.dat
```

END FILES

OPN SEQUENCE

INGRP INDELT 00:15

```
PERLND    41
IMPLND     1
IMPLND     5
IMPLND    10
RCHRES     1
COPY       1
COPY      501
DISPLY     1
```

END INGRP

END OPN SEQUENCE

DISPLY

DISPLY-INFO1

```
# - #<-----Title----->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
1      Vault  1      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
41      C/D,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 ***
41      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 *****
41 0 0 4 0 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 ***
41 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 KVARV AGWRC
41 0 4.8 0.045 400 0.05 2 0.95
END PWAT-PARM2

```

```

PWAT-PARM3
<PLS > PWATER input info: Part 3 ***
# - # ***PETMAX PETMIN INFEXP INFILD DEEPFR BASETP AGWETP
41 40 35 3 2 0.15 0.15 0
END PWAT-PARM3

```

```

PWAT-PARM4
<PLS > PWATER input info: Part 4 ***
# - # CEPSC UZSN NSUR INTFW IRC LZETP ***
41 0 0.8 0.25 2 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 ***
41 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 ***
41 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
41 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 ***
1 Roads,Flat(0-5%) 1 1 1 27 0
5 Roof Area 1 1 1 27 0
10 Sidewalks,Flat(0-5%) 1 1 1 27 0
END GEN-INFO
*** Section IWATER***

```

```

ACTIVITY
<PLS > ***** Active Sections *****
# - # ATMP SNOW IWAT SLD IWG IQAL ***
1 0 0 1 0 0 0
5 0 0 1 0 0 0
10 0 0 1 0 0 0
END ACTIVITY

```

```

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

```

```

5          0    0    4    0    0    0    1    9
10         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   ***
1          0    0    0    0    0
5          0    0    0    0    0
10         0    0    0    0    0
END IWAT-PARM1

```

```

IWAT-PARM2
<PLS >   IWATER input info: Part 2   ***
# - # *** LSUR SLSUR NSUR RETSC
1          100    0.05    0.1    0.1
5          100    0.05    0.1    0.1
10         100    0.05    0.1    0.1
END IWAT-PARM2

```

```

IWAT-PARM3
<PLS >   IWATER input info: Part 3   ***
# - # ***PETMAX PETMIN
1          0    0
5          0    0
10         0    0
END IWAT-PARM3

```

```

IWAT-STATE1
<PLS >   *** Initial conditions at start of simulation
# - # *** RETS SURS
1          0    0
5          0    0
10         0    0
END IWAT-STATE1

```

END IMPLND

```

SCHEMATIC
<-Source->          <--Area-->          <-Target->          MBLK          ***
<Name>   #          <-factor->          <Name>   #          Tbl#          ***
DMA 1***
PERLND 41          0.817          RCHRES 1          2
PERLND 41          0.817          RCHRES 1          3
IMPLND 1          2.341          RCHRES 1          5
IMPLND 5          0.626          RCHRES 1          5
IMPLND 10         0.276          RCHRES 1          5

```

```

*****Routing*****
PERLND 41          0.817          COPY 1          12
IMPLND 1          2.341          COPY 1          15
IMPLND 5          0.626          COPY 1          15
IMPLND 10         0.276          COPY 1          15
PERLND 41          0.817          COPY 1          13
RCHRES 1          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      Vault  1      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
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
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
END HYDR-PARM1

HYDR-PARM2
# - # FTABNO      LEN      DELTH      STCOR      KS      DB50      ***
<-----><-----><-----><-----><-----><----->      ***
1      1      0.02      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
END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
FTABLE      1
92      5
Depth      Area      Volume      Outflow1      Outflow2      Velocity      Travel Time***
(ft)      (acres) (acre-ft) (cfs)      (cfs)      (ft/sec)      (Minutes)***
0.000000  0.218090  0.000000  0.000000  0.000000
0.055556  0.218090  0.012116  0.025585  0.659722
0.111111  0.218090  0.024232  0.036182  0.659722
0.166667  0.218090  0.036348  0.044314  0.659722
0.222222  0.218090  0.048464  0.051170  0.659722
0.277778  0.218090  0.060581  0.057209  0.659722
0.333333  0.218090  0.072697  0.062670  0.659722
0.388889  0.218090  0.084813  0.067691  0.659722
0.444444  0.218090  0.096929  0.072365  0.659722
0.500000  0.218090  0.109045  0.076754  0.659722
0.555556  0.218090  0.121161  0.080906  0.659722
0.611111  0.218090  0.133277  0.084855  0.659722
0.666667  0.218090  0.145393  0.088628  0.659722
0.722222  0.218090  0.157509  0.092247  0.659722
0.777778  0.218090  0.169626  0.095730  0.659722
0.833333  0.218090  0.181742  0.099090  0.659722
0.888889  0.218090  0.193858  0.102339  0.659722
0.944444  0.218090  0.205974  0.105489  0.659722
1.000000  0.218090  0.218090  0.108547  0.659722
1.055556  0.218090  0.230206  0.169088  0.659722
1.111111  0.218090  0.242322  0.195829  0.659722
1.166667  0.218090  0.254438  0.216951  0.659722

```

1.222222	0.218090	0.266554	0.235135	0.659722
1.277778	0.218090	0.278671	0.251422	0.659722
1.333333	0.218090	0.290787	0.266347	0.659722
1.388889	0.218090	0.302903	0.280229	0.659722
1.444444	0.218090	0.315019	0.293278	0.659722
1.500000	0.218090	0.327135	0.305640	0.659722
1.555556	0.218090	0.339251	0.317421	0.659722
1.611111	0.218090	0.351367	0.328703	0.659722
1.666667	0.218090	0.363483	0.339548	0.659722
1.722222	0.218090	0.375599	0.350007	0.659722
1.777778	0.218090	0.387716	0.360121	0.659722
1.833333	0.218090	0.399832	0.369925	0.659722
1.888889	0.218090	0.411948	0.379447	0.659722
1.944444	0.218090	0.424064	0.388712	0.659722
2.000000	0.218090	0.436180	0.397740	0.659722
2.055556	0.218090	0.448296	0.636814	0.659722
2.111111	0.218090	0.460412	0.740799	0.659722
2.166667	0.218090	0.472528	0.822405	0.659722
2.222222	0.218090	0.484644	0.892347	0.659722
2.277778	0.218090	0.496761	0.954784	0.659722
2.333333	0.218090	0.508877	1.011850	0.659722
2.388889	0.218090	0.520993	1.064820	0.659722
2.444444	0.218090	0.533109	1.114523	0.659722
2.500000	0.218090	0.545225	1.161539	0.659722
2.555556	0.218090	0.557341	1.206292	0.659722
2.611111	0.218090	0.569457	1.249100	0.659722
2.666667	0.218090	0.581573	1.290214	0.659722
2.722222	0.218090	0.593689	1.329834	0.659722
2.777778	0.218090	0.605806	1.368121	0.659722
2.833333	0.218090	0.617922	1.405209	0.659722
2.888889	0.218090	0.630038	1.441212	0.659722
2.944444	0.218090	0.642154	1.476225	0.659722
3.000000	0.218090	0.654270	1.510329	0.659722
3.055556	0.218090	0.666386	1.543597	0.659722
3.111111	0.218090	0.678502	1.576088	0.659722
3.166667	0.218090	0.690618	1.607859	0.659722
3.222222	0.218090	0.702734	1.638958	0.659722
3.277778	0.218090	0.714851	1.669427	0.659722
3.333333	0.218090	0.726967	1.699304	0.659722
3.388889	0.218090	0.739083	1.728626	0.659722
3.444444	0.218090	0.751199	1.757422	0.659722
3.500000	0.218090	0.763315	1.785721	0.659722
3.555556	0.218090	0.775431	1.813549	0.659722
3.611111	0.218090	0.787547	1.840930	0.659722
3.666667	0.218090	0.799663	1.867885	0.659722
3.722222	0.218090	0.811779	1.894434	0.659722
3.777778	0.218090	0.823896	1.920597	0.659722
3.833333	0.218090	0.836012	1.946389	0.659722
3.888889	0.218090	0.848128	1.971826	0.659722
3.944444	0.218090	0.860244	1.996924	0.659722
4.000000	0.218090	0.872360	2.021696	0.659722
4.055556	0.218090	0.884476	2.046154	0.659722
4.111111	0.218090	0.896592	2.070312	0.659722
4.166667	0.218090	0.908708	2.094178	0.659722
4.222222	0.218090	0.920824	2.117766	0.659722
4.277778	0.218090	0.932941	2.141083	0.659722
4.333333	0.218090	0.945057	2.164140	0.659722
4.388889	0.218090	0.957173	2.186945	0.659722
4.444444	0.218090	0.969289	2.209506	0.659722
4.500000	0.218090	0.981405	2.231832	0.659722
4.555556	0.218090	0.993521	2.253930	0.659722
4.611111	0.218090	1.005637	2.275806	0.659722
4.666667	0.218090	1.017753	2.297468	0.659722
4.722222	0.218090	1.029869	2.318921	0.659722
4.777778	0.218090	1.041986	2.340172	0.659722
4.833333	0.218090	1.054102	2.361227	0.659722
4.888889	0.218090	1.066218	2.382091	0.659722
4.944444	0.218090	1.078334	2.402768	0.659722
5.000000	0.218090	1.090450	2.423265	0.659722
5.055556	0.218090	1.102566	2.999507	0.659722

END FTABLE 1
END FTABLES

EXT SOURCES

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

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	1000	FLOW	ENGL	REPL
RCHRES	1	HYDR	O	1 1	1	WDM	1002	FLOW	ENGL	REPL
RCHRES	1	HYDR	O	2 1	1	WDM	1003	FLOW	ENGL	REPL
RCHRES	1	HYDR	STAGE	1 1	1	WDM	1001	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

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

Disclaimer

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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Appendix 8
STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section H of the 2018 SMR WQMP Template):

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

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

Appendix 8
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
<input type="checkbox"/> D1. Need for future indoor & structural pest control		<input type="checkbox"/> Note building design features that discourage entry of pests.	<input type="checkbox"/> Provide Integrated Pest Management information to owners, lessees, and operators.
<input type="checkbox"/> D2. Landscape/ Outdoor Pesticide Use	<input type="checkbox"/> Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. <input type="checkbox"/> Show self-retaining landscape areas, if any. <input type="checkbox"/> Show stormwater treatment and hydrograph modification management BMPs.	State that final landscape plans will accomplish all of the following. <input type="checkbox"/> Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. <input type="checkbox"/> 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. <input type="checkbox"/> Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. <input type="checkbox"/> 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.	<input type="checkbox"/> Maintain landscaping using minimum or no pesticides. <input type="checkbox"/> See applicable operational BMPs in “What you should know for.....Landscape and Gardening” at: http://www.rcwatershed.org/about/materials-library/#1450469138395-bb76dd39-d810 <input type="checkbox"/> Provide IPM information to new owners, lessees and operators.

Appendix 8
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
<input type="checkbox"/> E. Pools, spas, ponds, decorative fountains, and other water features.	<input type="checkbox"/> 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.	<input type="checkbox"/> See applicable operational BMPs in “Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain” at: http://www.rcwatershed.org/about/materials-library/#1450469201433-f5b358c9-6008
<input type="checkbox"/> F. Food service	<input type="checkbox"/> 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. <input type="checkbox"/> On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	<input type="checkbox"/> Describe the location and features of the designated cleaning area. <input type="checkbox"/> Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	<input type="checkbox"/> See the brochure, “The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries” at http://www.rcwatershed.org/about/materials-library/#1450389926766-61e8a0b-53a9 Provide this brochure to new site owners, lessees, and operators.
<input type="checkbox"/> G. Refuse areas	<input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	<input type="checkbox"/> State how site refuse will be handled and provide supporting detail to what is shown on plans. <input type="checkbox"/> State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.	<input type="checkbox"/> 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

Appendix 8
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
<input type="checkbox"/> H. Industrial processes.	<input type="checkbox"/> Show process area.	<input type="checkbox"/> 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."	<input type="checkbox"/> 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://www.rcwatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9
<input type="checkbox"/> I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	<input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> 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.	<input type="checkbox"/> 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: <ul style="list-style-type: none"> ▪ 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/	<input type="checkbox"/> 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

Appendix 8
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
<input type="checkbox"/> J. Vehicle and Equipment Cleaning	<input type="checkbox"/> 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.	<input type="checkbox"/> 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): <input type="checkbox"/> 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://www.rcwatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9 <input type="checkbox"/> Car dealerships and similar may rinse cars with water only.

Appendix 8
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
<input type="checkbox"/> K. Vehicle/Equipment Repair and Maintenance	<input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> 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.	<input type="checkbox"/> State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. <input type="checkbox"/> 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. <input type="checkbox"/> 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.	<p>In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:</p> <input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> 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. <p>Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations; "Outdoor Cleaning Activities;" and "Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants. Brochures can be found at: http://www.rewatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9</p>

Appendix 8
STORMWATER POLLUTANT SOURCES / SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
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<input type="checkbox"/> L. Fuel Dispensing Areas	<input type="checkbox"/> 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. <input type="checkbox"/> 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.		<input type="checkbox"/> The property owner shall dry sweep the fueling area routinely. <input type="checkbox"/> 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.

Appendix 8
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
<input type="checkbox"/> M. Loading Docks	<input type="checkbox"/> 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. <input type="checkbox"/> 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. <input type="checkbox"/> Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		<input type="checkbox"/> Move loaded and unloaded items indoors as soon as possible. <input type="checkbox"/> See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

Appendix 8
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
<input type="checkbox"/> N. Fire Sprinkler Test Water		<input type="checkbox"/> Provide a means to drain fire sprinkler test water to the sanitary sewer.	<input type="checkbox"/> See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
<p><input type="checkbox"/> O. Miscellaneous Drain or Wash Water or Other Sources</p> <p><input type="checkbox"/> Boiler drain lines</p> <p><input type="checkbox"/> Condensate drain lines</p> <p><input type="checkbox"/> Rooftop equipment</p> <p><input type="checkbox"/> Drainage sumps</p> <p><input type="checkbox"/> Roofing, gutters, and trim.</p> <p><input type="checkbox"/> Other sources</p>		<p><input type="checkbox"/> Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.</p> <p><input type="checkbox"/> 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.</p> <p><input type="checkbox"/> Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.</p> <p><input type="checkbox"/> Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.</p> <p><input type="checkbox"/> Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.</p> <p><input type="checkbox"/> Include controls for other sources as specified by local reviewer.</p>	

Appendix 8
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
<input type="checkbox"/> P. Plazas, sidewalks, and parking lots.			<input type="checkbox"/> 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

Operation and Maintenance Plan

Project Title: Jana Rd Commercial Development

Contact Information:

Original Date Prepared: March 18, 2022

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Revision Date(s): _____

Prepared for: Beyond Food Mart Inc

4301 Edison Ave

Chino, CA 91710

(760) 810-8548

Prepared by: Blue Engineering and Consulting, Inc

9320 Baseline Rd., Ste. D

Rancho Cucamonga, CA 91739

(909)-248-6557

Contact: Angel Cesar, P.E.

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- Appendix 7: Manufacturer Information
- Appendix 8: Service Agreement Information

I. Inspection and Maintenance Log

[illegible]

II. Updates, Revisions and Errata

See Appendix 2

III. Introduction

The proposed project Jana Rd Commercial Development is a 4 acres site located on the southwest corner of Clinton Keith Rd & Jana Ln in the City of Wildomar, County of Riverside, State of California. The site is currently undeveloped and bordered by commercial storage unit commercial development on its west and south borders. The proposed project contains a Foodmart 7250 sq feet, carwash tunnel 1790 sq ft, office warehouse with office 14,500 sq ft (3720 sq ft office) and two QSR 2000 and 1800 sq ft.

IV. Responsibility for Maintenance

General

Funding will be provided by the owner:

Michael Ramirez

Beyond Food Mart Inc

4301 Edison Ave, Chino, CA 91710

(760) 810-8548

Records

Maintenance records are to be inserted chronologically in Appendix 1 of this O&M Plan

Safety

All maintenance procedures shall comply with the latest OSHA standards.

Replacement Cost

The Modular wet-lands and Storage tanks are bioretention manufactured BMPs. When the bmp constant fails to infiltrate the mitigated volume within the allowable time The cost to replace the infiltration basin would be the cost to remove approximately the top 2 feet of soil and replace with native as a minimal compaction to allow for infiltration. That cost can vary depending on time, approximation of native sand. Replacement cost can be \$10,000-\$30,000.

V. Summary of Drainage Management Areas and Stormwater BMPs.

Drainage Areas

See Appendix 5 of this O&M Plan for WQMP Site map.

DMA Name or ID	Surface Type(s)	Area (Sq.Ft.)	Area (Acres)
A	Roofs/Conc/Asphalt and landscaping	175,982	4.04

Geo-location of the BMPs using latitude and longitude coordinates.

BMP No. or ID	BMP Identifier and Description	Corresponding plan Sheet(s)	Latitude	Longitude
1	Modular Wet-lands	WQMP Site Map		
2	Detention tanks	WQMP Site Map		

IB #1	Pervious	35,947 sf (0.82 ac)		
	Impervious	140,074 sf (3.22 ac)		

Structural Post-Construction BMPs

See Appendix 5 of this O&M Plan for WQMP Site map.

Self-Retaining Areas or Other

VI. Stormwater BMP Design Documentation

“As-Built” Drawings of each Stormwater BMP

See Appendix 6 of this O&M Plan for “as-built” drawings.

Manufacturer’s Data, Manuals, and Maintenance Requirements

Not applicable, there are no manufactured stormwater BMPs.

Specific Operation and Maintenance Concerns and Troubleshooting

Not applicable.

VII. Maintenance Schedule or Matrix

Maintenance Schedule

Schedule	Inspection and Maintenance Activity
Semi-monthly including just before the annual storm season and following rainfall events.	<ul style="list-style-type: none">• Routine maintenance and inspection.• Remove debris and litter from the entire basin to minimize filter clogging and to improve aesthetics.• Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water.• Check for erosion and sediment laden areas in the basins. Repair as needed. Clean forebay of debris, litter, sediment, etc upon discovery.• Revegetate side slopes where needed.
Annually. Schedule these inspections within 72 hours after a significant rainfall and prior to the rainy season (October 1st). "Significant rainfall" is defined as 0.5 inches or greater of rainfall: http://www.wrh.noaa.gov/forecast/wxtables/	<ul style="list-style-type: none">• Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element.• Check side slopes and embankments for erosion, slumping and overgrowth.• Inspect the sand media at the filter drain to verify it is allowing acceptable infiltration. Scarify the top 3 inches by raking the filter drain's sand surface annually.• Check the filter drain underdrains for damage or clogging. Repair as needed.• Repair basin inlets, outlets, forebays, and energy dissipaters whenever damage is discovered.• No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed.
Every 5 years or sooner depending on the observed drain times (no more than 72 hours to empty the basin)	<ul style="list-style-type: none">• Remove the top 3 inches of sand from the filter drain and backfill with 3 inches of new sand to return the sand layer to its original depth. When scarification or removal of the top 3 inches of sand is no longer effective, remove and replace sand filter layer.

VII.B Service Agreement Information

See Appendix 8 of this O&M Plan for service agreement information with any contractors regarding the O&M of BMPs at the site, if any.

Appendix 1: Inspection and Maintenance Logs

Insert Additional Inspection or Maintenance Logs Here

[illegible]

Appendix 2: Updates, Revisions, and Errata

Insert Additional Updates, Revisions, and Errata Logs Here

[illegible]

Appendix 3: Maintenance and Recording Mechanism

Copy of Covenant Agreement Establishing Notification Process And Responsibility For Water Quality
Management Plan Implementation And Maintenance

Notification Process and Responsibility

1. Name: _____
Title: _____
Phone No.: _____

WQMP Responsibilities:

- (1) Routine inspections to evaluate BMP effectiveness.
- (2) Identifying when BMPs require maintenance.
- (3) Working with qualified contractors to maintain the BMP.
- (4) Recordkeeping of inspections and maintenance activities.

2. Name: _____
Title: _____
Phone No.: _____

WQMP Responsibilities:

- (1) Cleaning, repairing, servicing, and maintenance of BMP.

3. Name: _____
Title: _____
Phone No.: _____

WQMP Responsibilities:

- (1) In event of failure, and with City Engineer's authorization, modify or replace with an upgraded BMP to prevent future failure.
- (2) Notify successors of BMPs and maintenance requirements.

Appendix 4: Training Records

Insert Training Records with Brief Discussion Here

Appendix 5: Site Plan and Details

WQMP Site Map and BMP Details

Appendix 6: “As-Built” Drawings

Insert “As-Built” Here When Available

Appendix 7: Manufacturer Information

Brochures, Manuals, and Maintenance Requirements

Appendix 8: Service Agreement Information

Insert Contractor Information (if any)

Appendix 10: Educational Materials

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

Appendix 10: Educational Materials

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

Saltwater Pools

- Salt water pools, although different from regular pools, are in fact, sanitized using chlorine. A salt-chlorine generator separates the chlorine and sodium molecules in salt and reintroduces them into the pool water. The same harmful effects of chlorine still apply.
- A salt water pool is still maintained with chemicals such as Muriatic acid, soda ash and sodium carbonate to help keep a proper pH, total Alkalinity, Calcium Hardness and Stabilizer levels.



- It may be illegal to discharge salt water to land. The salt may kill plants and the build-up of salt in soil puts animals, plants, and groundwater at risk. Consult your city representatives to determine local requirements regarding salt water drainage.

NEVER put unused chemicals into the trash, onto the ground or down a storm drain.

IMPORTANT: The discharge of pollutants into the street, gutter, storm drain system or waterways - without a permit or waiver - is strictly prohibited by local ordinances, state and federal law. Violations may result in monetary fines and enforcement actions.

Helpful telephone numbers and links

RIVERSIDE COUNTY WATER AGENCIES:

City of Banning.....	(951) 922-3130
City of Beaumont/Cherry Valley.....	(951) 845-9581
City of Blythe.....	(760) 922-6161
City of Coachella.....	(760) 398-3502
City of Corona.....	(951) 736-2263
City of Hemet.....	(951) 765-3710
City of Norco.....	(951) 270 5607
City of Riverside Public Works.....	(951) 351-6140
City of San Jacinto.....	(951) 654-4041
Coachella Valley Water District.....	(760) 398-2651
Desert Water Agency (Palm Springs).....	(760) 323-4971
Eastern Municipal Water District.....	(951) 928-3777
Elsinore Valley Municipal Water District.....	(951) 674 3146
Elsinore Water District.....	(951) 674-2168
Farm Mutual Water Company.....	(951) 244-4198
Idyllwild Water District.....	(951) 659-2143
Indio Water Authority.....	(760) 391-4129
Jurupa Community Services District.....	(951) 685-7434
Lee Lake Water.....	(951) 658-3241
Mission Springs Water.....	(760) 329-6448
Rancho California Water District.....	(951) 296-6900
Ripley, CSA #62.....	(760) 922-4951
Riverside Co. Service Area #51.....	(760) 227-3203
Rubidoux Community Services District.....	(951) 684-7580
Valley Sanitary District.....	(760) 347-2356
Western Municipal Water District.....	(951) 789-5000
Yucaipa Valley Water District.....	(909) 797-5117

CALL 1-800-506-2555 to:

- Report clogged storm drains or illegal storm drain disposal from residential, industrial, construction and commercial sites into public streets, storm drains and/or water bodies.
- Find out about our various storm drain pollution prevention materials.
- Locate the dates and times of Household Hazardous Waste (HHW) Collection Events.
- Request adult, neighborhood, or classroom presentations.
- Locate other County environmental services.
- Receive grasscycling information and composting workshop information.

Or visit our

Riverside County Flood Control and Water Conservation District
website at: www.rcflood.org

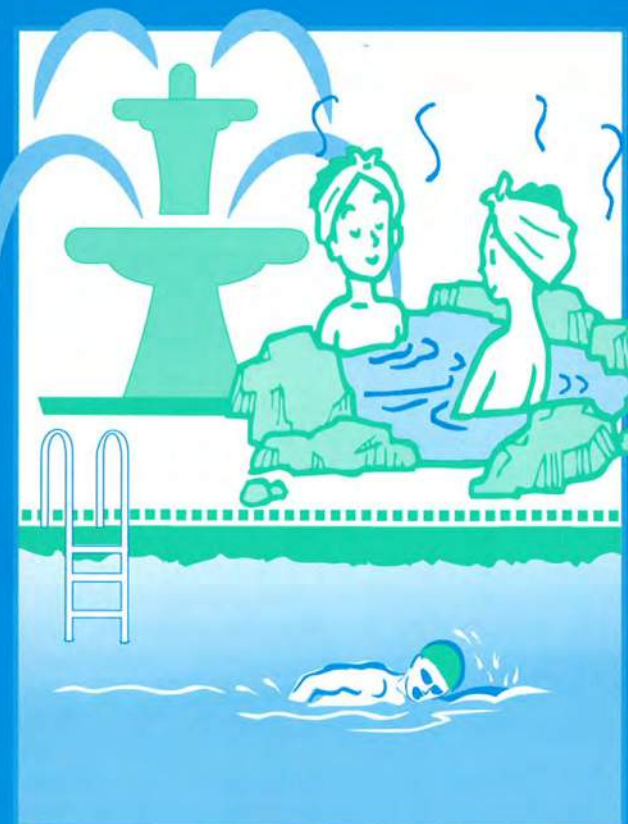
Other links to additional storm drain pollution information:

- County of Riverside Environmental Health: www.rivcoeh.org
- State Water Resources Control Board: www.waterboards.ca.gov
- California Stormwater Quality Association: www.casqa.org
- United States Environmental Protection Agency (EPA):
www.epa.gov/compliance/assistance (compliance assistance information)



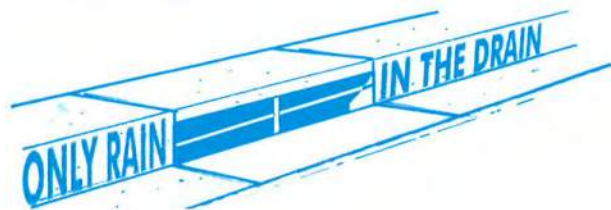
Riverside County's, "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges the Bay Area Stormwater Management Agencies Association and the Cleaning Equipment Trade Association for information provided in this brochure.

Guidelines for Maintaining your...



Swimming Pool, Jacuzzi and Garden Fountain

Where does the water go?



Pool, Jacuzzi and Fountain wastewater and rain water runoff (also called stormwater) that reach streets can enter the storm drain and be conveyed directly into local streams, rivers and lakes.



A storm drain's purpose is to prevent flooding by carrying rain water away from developed areas. Storm drains are not connected to sanitary sewers systems and treatment plants!

Wastewater, from residential swimming pools, Jacuzzis, fishponds and fountains, often contains chemicals used for sanitizing or cleansing purposes. Toxic chemicals (such as chlorine or copper-based algaecides) may pollute the environment when discharged into a storm drain system.

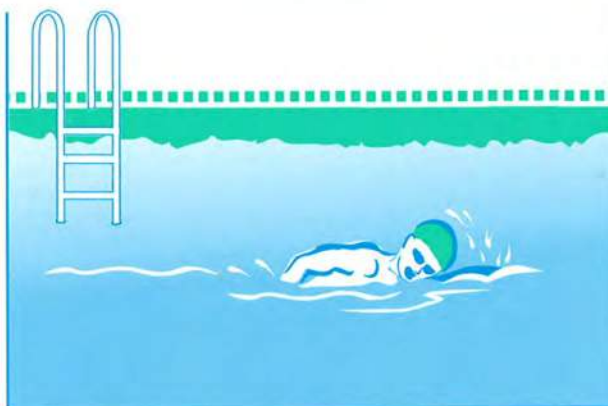
The Cities and County of Riverside have adopted ordinances that prohibit the discharge of wastewater to the street and storm drain system.



Discharge Regulations

Regulatory requirements for discharging wastewater from your pool may differ from city to city. Chlorinated water should not be discharged into the street, storm drain or surface waters. Check with your water agency to see if disposal to the sanitary sewer line is allowed for pool discharges (see reverse for Riverside County sewer agencies).

If allowed, a hose can be run from the pool Jacuzzi, or fountain to the private sewer cleanout, washing machine drain or a sink or bathtub.



If you cannot discharge to the sewer, you may drain your fountain, pool, or jacuzzi to your landscaping by following these guidelines:

First, reduce or eliminate solids (e.g. debris, leaves or dirt) in the pool water and allow the chemicals in the pool water to dissipate before draining the pool (this could take up to 7 days, verify using a home pool test kit).

Second, slowly drain to a landscaped area away from buildings or structures. Control the flow to prevent soil erosion; it may take more than one day to empty. Do not allow sediment to enter the street, gutter or storm drain.

Maintenance & Chemicals

Cleaning Filters

Filter rinse water and backwash must be discharged to the sanitary sewer, on-site septic tank and drain field system (if properly designed and adequately sized), or a seepage pit. Alternatively, rinse water or backwash may be diverted to landscaped or dirt areas. Filter media and other non-hazardous solids should be picked up and disposed of in the trash.



Algaecides

Avoid using copper-based algaecides unless absolutely necessary. Control algae with chlorine, organic polymers or other alternatives to copper-based pool chemicals. Copper is a heavy metal that can be toxic to aquatic life when you drain your pool.

Chemical Storage and Handling

- Use only the amount indicated on product labels
- Store chlorine and other chemicals in a covered area to prevent runoff. Keep out of reach of children and pets.
- Chlorine kits, available at retail swimming pool equipment and supply stores, should be used to monitor the chlorine and pH levels before draining your pool.
- Chlorine and other pool chemicals should never be allowed to flow into the gutter or storm drain system.

Take unwanted chemicals to a Household Hazardous Waste (HHW) Collection Event. There's no cost for taking HHW items to collection events – it's FREE! Call 1-800-506-2555 for a schedule of HHW events in your community.





The Complete Guide to Residential Recycling



Southwest Riverside County

Canyon Lake, Hemet, Lake Elsinore, Menifee,
Murrieta, Perris, San Jacinto, Temecula, Wildomar

Used Oil and Filters


Recycling used motor oil and filters is easy!
Simply take them to one of the certified
collection centers below. **It's free!**




Used Oil and Filters

You can also find Certified Collection
Centers on the Cal Recycle Website:
www.calrecycle.ca.gov/recycle

Hemet

AutoZone #2820
1550 W. Florida Ave.
(951) 929-0807 

AutoZone #5556
3100 E. Florida Ave.
(951) 652-1308 

EZ Lube #112
532 W. Florida Ave.
(951) 766-1996

Firestone Store #2233
350 W. Florida St.
(951) 929-2424

Inland Chevrolet
350 Carriage Circle
(951) 658-4401

Integrity Tire
3223 W. Florida Ave.
(951) 658-3145

Jiffy Lube #3187
330 N Sanderson Ave.
(951) 487-2001


Masterlube #101
3615 W. Florida St.
(951) 766-7055

O'Reilly Autoparts #1332
849 W. Florida Ave.
(951) 929-2210

Pep Boys #866
2050 W. Florida Ave.
(951) 766-1477

Ramona Tire
2350 W. Menlo Ave.
(951) 925-6659

Synfast Oil Change
3615 W. Florida Ave.
(951) 766-7055


**Valvoline Instant
Oil Change**
532 W. Florida Ave.
(951) 766-1996 

Idyllwild

Idyllwild Garage
25015 Hwy. 243
(951) 659-2613

Lake Elsinore

AutoZone #5558
30870 Riverside Dr.
(951) 674-7806

AutoZone #5559
32231 Mission Trail
(951) 245-1012 


Express Tire
300 Diamond Dr.
(951) 674-0794

EZ Lube #96
29285 Central Ave.
(951) 253-5200


Firestone Store #2238
31748 Mission Trail
(951) 674-0633

Jiffy Lube #2681
311 Summerhill Dr.
(951) 471-8445

O'Reilly Autoparts #1429
31660 Grape St.
(951) 245-8389

Valvoline Instant Oil Change
29285 Central Ave.
(951) 253-5200 

Menifee

AutoZone #5561
30123 Antelope Rd.
(951) 301-7240 


**One Stop Lube & Oil
Center**
26825 Newport Rd.
(951) 301-7479

Murrieta

AutoZone #5566
40950 California Oaks Rd.
(951) 677-6206


Express Tire
40615 California Oaks Rd.
(951) 696-5200

EZ Lube #115
40430 California Oaks Rd.
(951) 696-2882

**Mountain View Tire and
Service**
27584 Clinton Keith Rd.
(888) 860-0535 

Murrieta Volkswagen
41300 Date St.
(951) 634-5434

O'Reilly Autoparts #1430
40951 California Oaks Rd.
(951) 696-2991

Valvoline Instant Oil Change
40430 California Oaks Rd.
(951) 696-2882 

Perris

AutoZone #5570
401 E. 4th St.
(951) 657-0696


AutoZone #5571
1675 Perris Blvd.
(951) 943-5998

Jiffy Lube #3294
118 E. Ramona Expressway
(951) 943-2200

Jiffy Lube #3361
3150 Case Rd., Bldg. J.
(951) 284-0922

O'Reilly Autoparts #1046
119 W. Nuevo Rd.
(951) 657-1488


San Jacinto


AutoZone #5581
1540 San Jacinto Ave.
(951) 654-2216 


Jiffy Lube #3186
635 S. State St.
(951) 487-2001

Ramona Auto Services, Inc.
2447 S. San Jacinto Ave.
(951) 925-5117

Temecula

AutoZone #5582
31837 US Hwy. 79
(951) 302-8334 

AutoZone #5936
40345 Winchester Rd.
(951) 296-3973 

DCH Acura of Temecula
26705 Ynez Rd.
(951) 491-2451 

Used Oil and Filters



Used Oil and Filters

Temecula

DCH Chrysler Jeep Dodge of Temecula

26845 Ynez Rd.
(951) 491-2151

DCH Honda of Temecula

26755 Ynez Rd.
(951) 491-2351

Express Tire

40915 Winchester Rd.
(951) 296-6699

Express Tire

44092 Margarita Rd.
(951) 302-5033

Express Tire

29095 Front St.
(951) 695-0555

EZ Lube #85

30625 Highway 79 South
(951) 553-7399

Jiffy Lube #1878

30690 Rancho California Rd.
(951) 694-5460

John Hine Temecula Mazda

42050 DLR Dr.
(951) 553-2000

O'Reilly Autoparts #0483

41125 Winchester Rd., #C1
(951) 296-5530

O'Reilly Autoparts #4291

33417 Temecula Pkwy.
(951) 302-1351

Paradise Chevrolet Cadillac

27360 Ynez Rd.
(951) 506-0058

Pep Boys #800

40605 Winchester Rd.
(951) 695-2322

Precision Tune Auto Care

26673 Ynez Rd., #A
(951) 699-6969

Promethean Biofuels Cooperative

27635 Diaz Rd.
(626) 232-7608

Quality Nissan

41895 Motor Car Pkwy.
(951) 676-6601

Ramona Auto Services, Inc.

40385 Winchester Rd.
(951) 719-1600

Ramona Auto Services, Inc.

31955 Via Rio Rd.
(951) 303-3584

Ramona Tire

40385 Winchester Rd.
(951) 719-1600

Rancho Car Wash and Quick Lube

27378 Jefferson Ave.
(951) 296-5644

Temecula Hyundai

27430 Ynez Rd.
(951) 699-6807

Temecula Quick Lube

29764 Rancho California Rd.
(951) 587-6624

Valvoline Instant Oil Change

30625 Highway 79 South
(951) 553-7399

Wildomar

Grease Monkey

32120 Clinton Keith Rd.
(951) 609-3000

Jiffy Lube #3412

32374 Clinton Keith Rd.
(951) 678-5300



Winchester

Mountain View Tire/Goodyear

30664 Benton Rd.
(877) 872-1021

Curbside pickup of used oil is available in some cities in Riverside County. Contact your waste hauler for more information. Waste hauler contact information is provided on the back page of this guide.

You may not need to change your oil every 3000 miles! Save time, money, and the environment by visiting www.checkyournumber.org to find out what your manufacturer recommended oil change interval is.

Locations marked with a  also accept oil filters.

Please DO NOT drop off oil when the location is closed. For more information about used oil collection centers call 800-350-4OIL.

Household Hazardous Waste

Examples of household waste that are considered hazardous include:

- Batteries (all types)
- Electronic Waste
- Paint
- Used Oil and Antifreeze
- Sharps/ Needles



Permanent Household Hazardous Waste Collection Centers

Lake Elsinore Area (Closed January and December)

Lake Elsinore Regional Permanent HHW Collection Facility
512 N. Langstaff Street, Lake Elsinore, 92530

Open first Saturday of the month*, 9:00 a.m. to 2:00 p.m.

*Except holiday weekends and during inclement weather.

Riverside Area

Agua Mansa Regional Permanent HHW Collection Facility
1780 Agua Mansa Road, Riverside, 92509

Open non-holiday Saturdays*, 9:00 a.m. to 2:00 p.m.

*Except during inclement weather.

Regional ABOP Collection Centers (Antifreeze, Batteries, Oil and Oil Filters, and Latex Paint ONLY)

Murrieta Area

County Road Yard

25315 Jefferson Avenue, Murrieta, 92562

Open Non-Holiday Saturdays, 9:00 a.m. to 2:00 p.m.

These sites accept residential waste only. For more information, contact the Riverside County Household Hazardous Waste Department Hotline at **800-304-2226 or 951-486-3200**, or visit, www.rivcowm.org/opencms/hhw/index.html

Household Hazardous Waste

Below is a list of materials accepted at permanent HHW collection sites.*

Chemicals and Cleaners

Adhesives
Air Freshener
Aluminum Cleaners
Ammonia
Antifreeze
Brake Fluid
Carburetor Cleaner
Caulking
Chlorine Bleach
Chrome Polish
Disinfectant
Drain Cleaner
Engine Degreaser
Fertilizer
Fiberglass and Resins

Flea Powder
Floor / Surface Cleaners
Fungicides
Furniture Polish
Gas / Diesel Fuel
Glue
Gun Cleaner
Hair Dye
Hobby Chemicals
Insecticides / Pesticides
Kerosene / Lamp Oil
Lighter Fluid
Motor Oil
Mercury Devices
Oven Cleaner

Paint - Latex / Oil Based
Paint Stripper / Thinner
Photo Chemicals
Pool / Spa Chemicals
Rodent Bait / Poison
Roof Coating
Shoe Dye
Spot Remover
Transmission Fluid
Turpentine
Varnish
Weed Killer / Herbicide
Wood Preservative

Aerosols and Tanks

Aerosol Insecticides
Aerosol Cans
BBQ Propane Tanks
Camp Propane Tanks

E-Waste and Batteries

Batteries (all types)
Electronic Devices
Fluorescent Bulbs / Tubes
Old TVs and Computers

Medical Waste

Sharps / Needles

Please **DO NOT** bring the following types of materials (If you have any of these wastes please call (951) 486-3200):

Unacceptable Materials

Business, Non-Profit, or Out-of-County Waste
Explosives / Ammunition
Radioactive or Remediation Materials
Medical / Infectious Waste (Except Sharps)
Asbestos

Appliances
Tires
55 or 30 Gallon Drums
Compressed Gas Cylinders >40 lbs
Trash

*Maximum Chemical Load: 5 Gallons or 50lbs per trip. Residential waste only, no business waste accepted.

Recycling

What can go into your curbside recycling bins? Not sure what you can recycle? Check out the list below.

Paper and Cardboard

- Books and Coloring Books
- Cardboard
- Cardstock and Construction Paper
- Office Paper
- Egg Cartons
- Clean Food Boxes
- Junk Mail and Envelopes
- Magazines and Newspapers
- Notebook Paper
- Paper Bags
- Telephone Books



Metal

- Aluminum and Steel Cans
- Clean Aluminum Foil
- Scrap Metal

Glass Jars and Bottles

- Glass Jars
- Beverage Bottles



Plastic Bottles and Grocery Bags

- Plastic Milk Jugs
- Plastic Beverage Containers
- Plastic Grocery Bags



Recycling

Used Tires

Used tires are accepted at various locations in Riverside County. There is generally a fee to dispose of tires. The following locations accept tires:

Badlands Landfill

31125 Ironwood Ave., Moreno Valley, 92553

Lamb Canyon Landfill

16411 Lamb Canyon Rd., Beaumont, 92223



Visit www.rivcowm.org/opencms/landfill_info/landfill_fees.html for information on current landfill pricing.

BAS Recycling, Inc.

14050 Day St., Moreno Valley, 92553

(909) 383-7050

Call facility for pricing.

Electronic Waste Recyclers

Badlands, Lamb Canyon, and El Sobrante Landfills accept up to 2 CRT devices (e.g. computer monitors or TVs) per day for recycling at **no cost** during operating hours. The following recyclers also accept electronic waste:

The Green Guys Recycling, Hemet - (951) 757-9156

Starsurplus.com, Murrieta - (951) 677-5696

XIT Communications, Murrieta - (951) 691-5138

CR&R, Perris - (800) 755-8112

Tire Stop & Recycling, Sun City - (951) 928-9600

GKAT, INC. dba Temecula Recycling, Temecula - (951) 693-1500

Heavy Metal Scrap & Recycling, Inc., Temecula - (951) 693-4677

Other Recycling Facilities

For a complete list of recycling facilities visit www.calrecycle.ca.gov and click on the "Recycle Tab."

Earth911.com also provides valuable information and resources about recycling and recycling facilities.

Recycling Centers

What should you do with those empty cans and bottles? Below is a list of centers that accept beverage containers for recycling*.

Hemet

EarthWize Recycling
1231 S. Sanderson Ave.
(909) 933-2773

Menlo Recycle Center
445 E. Menlo Ave.
(951) 766-8520

NexCycle
1295 S. State St.
(800) 969-2020

NexCycle
3125 W. Florida Ave.
(800) 969-2020

rePlanet
43396 US Hwy 74
(877) 737-5263

The Green Guys Recycling
100 N. State St., #101
(951) 757-9156

Valley Metals
342 N. Juanita St.
(951) 925-8577

Lake Elsinore

Cans Plus Recycling
29170 Riverside Dr., #1
(951) 245-1178

Downtown Elsinore Recycling
217 N. Main St.
(323) 204-8308

Lake Elsinore Recycling Center
1315 W. Flint St.
(951) 579-4102

Love Earth Recycling
31949 Corydon Rd., #160
(951) 230-6580

NexCycle
31564 Grape St.
(909) 796-2210

rePlanet
32281 Mission Tr.
(951) 520-1700

rePlanet
16750 Lakeshore Dr.
(877) 737-5263

Menifee

rePlanet
30125 Antelope Rd.
(951) 520-1700

rePlanet
25904 Newport Rd.
(877) 737-5263

Neill's Recycling
26026 Sherman Rd.
(951) 514-8656

NexCycle
27220 Sun City Blvd.
(909) 796-2210

Tire Stop and Recycling
27491 Ethanac Rd.
(888) 515-1376

Murrieta

EarthWize Recycling
27826 Clinton Keith Rd.
(909) 933-2773

Go Green Murrieta Recycling
40645 Cal. Oaks Rd.
(818) 220-9540

Murrieta Recycling
38365 Innovation Ct., #1102-1105
(951) 894-3094

rePlanet
40473 Murrieta Hot Springs Rd.
(951) 520-1700

rePlanet
23801 Washington Ave.
(951) 520-1700

rePlanet
4100 Cal. Oaks Rd.
(951) 520-1700

rePlanet
39140 Winchester Ave.
(951) 520-1700

rePlanet
28047 Scott Rd.
(877) 737-5263

SA Recycling
41400 Date St.
(951) 677-8586

Perris

A-1
24440 Hwy 74
(951) 940-4224

Ecology Auto Parts
23332 Cajalco Rd.
(951) 657-7725

Go Green Recycling
164 Malbert St., #A-2
(951) 487-5875

Harb Family Market Recycling
22707 San Jacinto Ave.
(951) 657-7733

4th Street Recycling
510 W. 4th St.
(323) 204-8308

Menlo Recycle Center
151 W. 7th St.
(951) 657-8200

RecycleWise
200 Sinclair St. #4
(951) 443-1894

Recycling Depot
1320 W. Oleander Ave.
(951) 442-5221

rePlanet
47 W. Nuevo Rd.
(877) 737-5263

San Jacinto

CA Recycling
762 S. San Jacinto Ave.
(951) 651-0010

rePlanet
1271 N. State St.
(877) 737-5263

San Jacinto Recycling Center
658 W. Esplanade Ave.
(951) 654-1399

Temecula

Heavy Metal Scrap Recycling Inc.
43136 Rancho Way
(951) 693-4677

NexCycle
29530 Rancho California Rd.
(909) 796-2210

NexCycle
26419 Ynez Rd.
(909) 796-2210

rePlanet
30530 Rancho California Rd.
(951) 520-1700

rePlanet
33293 Temecula Pkwy.
(951) 520-1700

rePlanet
31813 Temecula Pkwy.
(877) 737-5263

Temecula Recycling
27635 Diaz Rd., #120
(951) 693-1500

Wildomar

rePlanet
23893 Clinton Keith Rd.
(951) 520-1700

rePlanet
30712 Benton Rd.
(877) 737-5263

*Some recycling centers may accept other recyclable materials. It is advisable to call the center and confirm this, as well as operating hours, before visiting.

For more information about local recycling centers visit the **CalRecycle** website: www.calrecycle.ca.gov.

Types of Plastic

Confused about the types of plastic and if they can be recycled? Many plastic containers display an identification code that indicates what they are made from. Below are the 7 codes.



#1: Polyethylene Terephthalate (PETE or PET)
Used to create 2-liter soda bottles, water bottles, cooking oil bottles, peanut butter jars.
The most commonly accepted plastic for recycling.



#2: High Density Polyethylene
Used to create detergent bottles, milk and water jugs, grocery bags, yogurt cups.
Commonly accepted for recycling. Bags can be recycled at some large grocery stores.



#3: Polyvinyl Chloride
Used to create plastic pipes, outdoor furniture, shrink-wrap, liquid detergent containers, flooring, showercurtains.
Not currently accepted for recycling.



#4: Low Density Polyethylene
Used to create food storage containers, cellophane wrap, dry cleaning bags, produce bags, trash can liners.
Not commonly recycled, some large grocery stores accept LDPE bags.



#5: Polypropylene
Used to create ketchup bottles, aerosol caps, drinking straws, yogurt containers.
Not commonly accepted for recycling.



#6: Polystyrene
Also known as "Styrofoam." Used to make coffee cups, take-out food packaging, egg cartons, and packaging "peanuts."
Sometimes accepted for recycling and made into the same products.



#7: Other
All other plastic resins or a mixture of resins used to make reusable water bottles, Tupperware, biodegradable and compostable plastics.
Not commonly accepted for recycling.

Composting Basics

Got food scraps and yardwaste? Below is a quick guide to Backyard Composting.

1. Select a good spot for composting

- Sun or shade
- Convenient to kitchen or garden, and close to a source of water
- Keep away from structures and wood, as moisture can hasten decay
- Place only on bare ground, as organisms from soil are needed

2. Know the Ingredients

Nitrogen - Green materials - grass clippings, fresh leaves and twigs, vegetable and fruit trimmings, coffee grounds and filters, and non-meat eating animal manures.

Carbon - Brown materials that have released their nitrogen - dry and brittle leaves and grasses, straw, wood chips, corn stalks, shredded newspaper, paper towels, napkins, and cardboard.

Water - The correct moisture level should be about the same as a damp wrung out sponge. A few drops should fall when squeezed in your hand.

Air - Oxygen is very important to the bacteria, fungi, and microorganisms that are working in the pile to breakdown the organic material.

Do Not Add - Meat, dairy products, fats, oils, waste from meat eating animals (dogs and cats), thorny plant material, or diseased plant material.

2. Know the Methods

Aerobic - Pile equal parts green and brown material on ground or in a bin in a 3'x3'x3' heap, water well, and cover with a tarp, carpet or opaque plastic sheet. The pile will heat up (120 to 160 degrees), and needs to be turned after a few days, once it has cooled. Turn the pile weekly and continue composting until the pile has a dark rich look like chocolate cake and the things you put in don't look like their original form. After the compost is done, water well, cover, and let it rest for one to two weeks to make sure it is completely done and the nitrogen has a chance to stabilize. If the compost is used too soon it could rob nutrients from the surrounding plants. Remove large chunks and add them to the next compost pile.

Anerobic - Similar to the Aerobic method, but there is no need to actively turn the material. It may take longer (1-2 years), but is still beneficial to your garden. Just pile the stuff, water, cover, and wait.

For more detailed information on composting, free workshops, or other methods, such as **Vermicomposting**, visit www.rivcowm.org and search for composting.

Source Reduction

The best way to reduce waste is to prevent it!

Buy Responsibly

Reduce packaging waste - Look for products that reduce packaging, or purchase in bulk to reduce the amount of packaging needed.

Look for products containing recycled material - Recycled paper products, motor oil, and even pens and pencils are just a few examples of products that reduce waste.

Consider reusable products - Buy reusable water bottles and sturdy utensils and plates that can be washed and used again.

Get it “For Here,” or bring your own - Many coffee shops will provide drinks to their customers in ceramic mugs rather than paper cups if requested. Just ask! Reusable tumblers are also a great alternative to paper cups, and many establishments will even give a small discount to those who bring their own!

Borrow, rent, or share - Why buy something if you are only going to use it once? Items such as tools, party decorations, and even newspapers and magazines can be shared with your friends, family, and/or community.

Purchase rebuilt, remanufactured, or refurbished - Many electronics such as cell phones, computers, and media players can be purchased “refurbished” at a sometimes substantial price reduction. This conserves the resources needed to manufacture a new product.

Choose Non-Toxic

Choose products that contain only non-toxic materials, or try one of these **homemade alternatives**:

- Instead of glass cleaner, dilute 1 cup of vinegar in 1 quart of water.
- To open clogged drains, flush with a mixture of boiling water, and equal parts baking soda and vinegar.

For more information on non-toxic alternatives, visit the California Coastal Commission website:

<http://www.coastal.ca.gov/ccbn/lesstoxic.html>

Source Reduction

Plastic bags and junk mail contribute to a significant amount of un-needed waste. You can lessen their impact by Reducing, Reusing, and Recycling.



Plastic Bags

Reduce: BYOB (Bring Your Own Bag) - Use reusable canvas or cloth bags rather than plastic bags, and keep them in your car. Not all items need a bag, just say “no, thank you.”

Reuse - Plastic grocery bags can serve multiple purposes, such as trash can liners or for pet waste.

Recycle - If you find that you must use a plastic bag, recycle it when you are finished. Most large supermarkets and pharmacies offer free recycling of plastic bags.

Junk Mail Reduction

You can reduce the amount of unwanted junk mail in your mailbox by simply mailing a postcard to the following addresses, requesting your name be removed from their mailing list. Be sure to include your full name, your address(es), your signature, and the date.

Mail Preference Service
Attn.: Dept. 10088342
PO Box 282
Carmel, NY 10512

ADVO
Consumer Assistance
PO Box 249
Windsor, CT 06095

Harte-Hanks Circulation
C/O Pennysaver
2830 Orbiter St.
Brea, CA 92821

Valpak Direct Marketing Systems, Inc.
8605 Largo Lakes Dr.
Largo, FL 33773

Credit Card Junk Mail
Call (888)5-OPT OUT (888-567-8688)

City / County Resources

City of Canyon Lake - Waste and Recycling | (800) 755-8112

<http://www.cityofcanyonlake.com/recycling.asp>

City of Hemet - Integrated Waste Management | (951) 765-3712

<http://www.cityofhemet.org/index.aspx?nid=93>

City of Lake Elsinore - Recycling | (951) 674-3124

<http://www.lake-elsinore.org/index.aspx?page=751>

City of Menifee - Public Works Department | (951) 672-6777

<http://www.cityofmenifee.us/index.aspx?nid=99>

City of Murrieta - Trash & Recycling | (951) 461-6007

<http://www.murrieta.org/services/trash>

City of Perris - Waste & Recycling | (951) 943-6100

<http://www.cityofperris.org/residents/waste-recycle.html>

City of San Jacinto - Waste & Recycling | (951) 487-7330

<http://www.san-jacinto.ca.us/residents/waste.html>

City of Temecula - Trash & Recycling | 951-694-6444

<http://www.cityoftemecula.org/temecula/residents/trashrecycling/recycling.htm>

City of Wildomar - Trash Hauling and Recycling | (951) 677-7751

<http://www.cityofwildomar.org/trash-hauling-recycling.asp>

County of Riverside - Riverside County Waste Management Department

<http://www.rivcowm.org> | (951) 486-3200

Western Riverside Council of Governments

<http://www.wrcog.cog.ca.us> | (800) 350-4645

Waste Haulers

Waste Management, Inc. - (951) 280-5400 - www.wm.com

Serves: Menifee, Murrieta, and Wildomar

CR&R Disposal - (951) 943-1991 - www.crrwasteservices.com

Serves: Canyon Lake, Hemet, Lake Elsinore, Perris, San Jacinto, and Temecula

The Complete Guide to Residential Recycling is sponsored by:



water efficient

L A N D S C A P E S

In California, the largest use of all urban water is watering landscapes. When a landscape or irrigation system is poorly designed or poorly maintained, or the landscape consists of plants not suited to the dry and often hot California climate, water demand increases as a result of excessive evaporation, leaks, and runoff. Water consumption can be greatly reduced with careful planning, good plant selection, efficient irrigation systems, and good water management and maintenance practices.

Since California experiences frequent and sometimes prolonged droughts together with an ever increasing demand, there is a great need for us to use water efficiently. But this doesn't mean we have to give up our gardens. We can use water more efficiently and still have colorful, esthetically pleasing landscapes—including some turf areas for recreation.

This brochure is intended to help you create a landscape that is not only water efficient, but attractive, colorful, and low maintenance.

The designs illustrated here are typical back yards, but the principles of water efficient gardening apply to front yards as well.



Planning ahead

Planning is the key to a successful water wise landscape. It is very tempting to go to a garden center and buy plants because they catch your eye, but not knowing where to place them and how much water they need are the beginnings of an unnecessarily high water using landscape. By planning ahead, costly mistakes can be avoided.

Contact your local water provider to see if they offer any services such as water audits or landscape planning. Some agencies offer landscaping classes and provide water conservation devices. Some also have demonstration gardens where you can witness water efficient gardens in person, see how attractive they can be, and get ideas for your own site.

To get started, measure the landscape and draw the area and any existing landscape features to scale. This will give you an idea of the numbers of plants you will need, the size of the lawn and how much irrigation pipe, sprinkler heads, and mulch you will need to buy.

Consider the size, sun exposure, and slope of the area to be landscaped. Avoid lawns on slopes that are difficult to mow and water. If possible, reduce slopes in the landscape that encourage runoff and waste water.

Think about who will use the landscape and how they will use it. These factors determine the type of plants required and how it will be maintained. Don't forget the need for shade and privacy screening.

When drawing the actual planting plan, avoid the temptation to place too many plants for the area. A crowded garden will use more water, cost more, be prone to diseases, and require more maintenance.

Consult books such as *Sunset Western Landscaping Book* about garden design. Many books available are very good for useful advice and ideas. Some are written with the dry west in mind and focus on landscaping with the proper types of plants for warm, dry climates.

If this phase of the project is too difficult, hire a licensed landscape architect or designer. A landscape architect might be able to design the irrigation system for you or you can consult with an irrigation design specialist. Be sure to keep a copy of the landscape plans for future reference.

How much grass do you need?

Lawns use more water than any other part of a landscape and they cover large amounts of acreage statewide. Oftentimes lawns are installed because an alternative was never considered. There are alternatives to lawns, so in the planning stage decide if lawn is really a requirement in your yard. Think of who will use it and how often, who will mow it, fertilize it, remove the thatch, etc.

Perhaps a lawn is not needed at all. If a grass area is really just space filler, consider alternatives such as hardscapes, rock gardens or an unthirsty groundcover. This is especially important on areas with slopes that tend to shed water faster than it can soak in. Water draining into street gutters and storm drains often discharges directly into streams and this runoff from landscapes frequently contains fertilizers, pesticides, and other pollutants.

If you choose to plant a turf area after considering these factors, minimize the size of the lawn and choose a grass type that doesn't require lots of water and fertilizer.

Warm season grasses such as Hybrid Bermuda Grass and St. Augustine Grass use much less water than cool-season grass such as Kentucky Bluegrass. Certain Dwarf Tall Fescues use somewhat less water than Bluegrass.

Warm season grasses typically have a short winter dormant period, but winter dormancy occurs when many people are not actively using their gardens and even dormant, warm season grass provides a usable surface for people and pets. If the look of dormant grass is objectionable, it can be overseeded with another type of grass for the winter.

Good choices make good landscapes

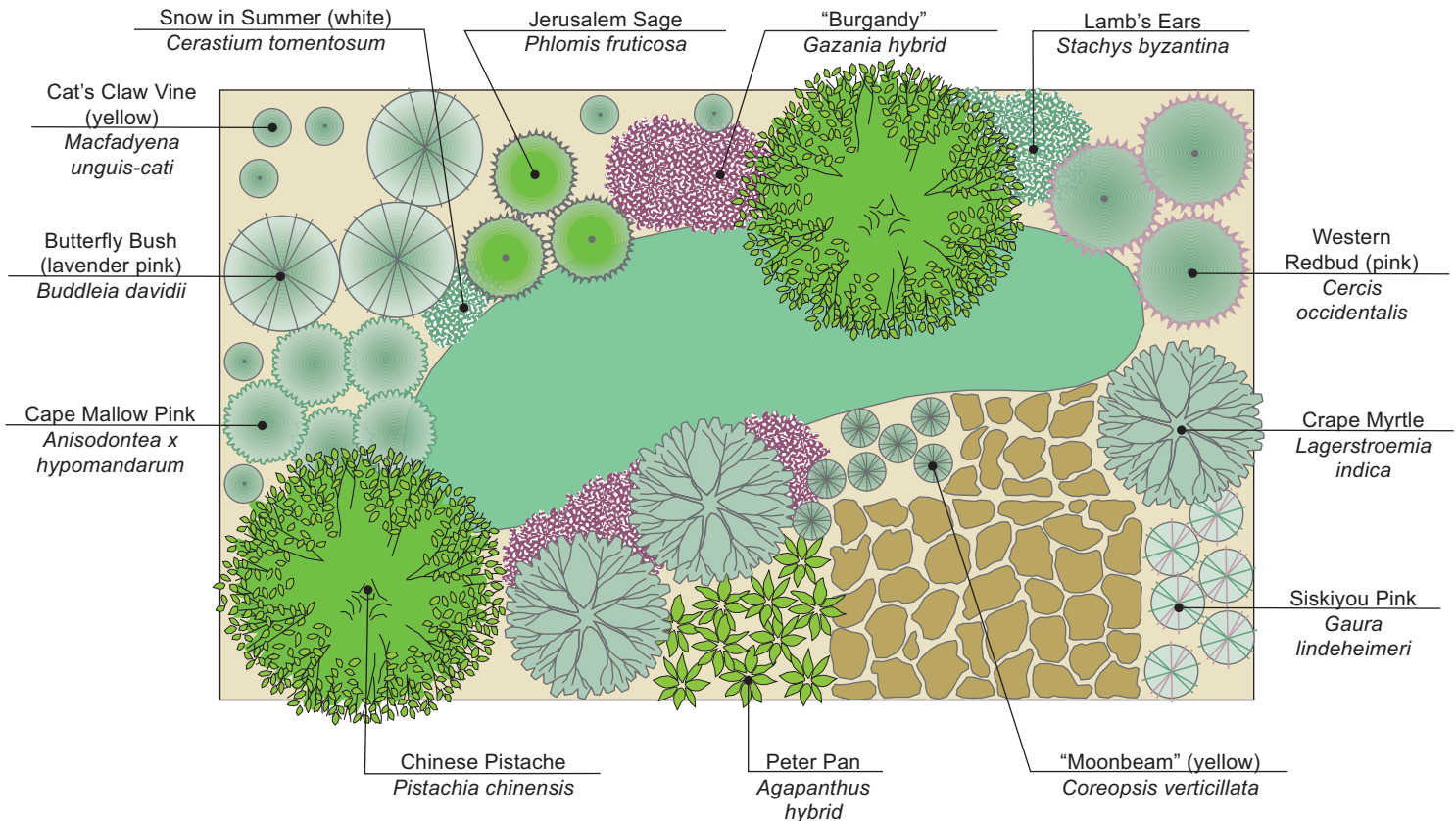
Once a decision regarding the turf area has been made, choose trees and large shrubs next. Make these choices carefully, they are the "backbone" of any landscape and poor choices will result in high water use, poor performance, and frequently costly maintenance or removal.

When selecting trees and large shrubs, choose varieties that will still fit into your yard when they mature. Learn what your climate zone is and buy plants that are suited to it. Choose deciduous trees for shade and evergreen trees for screening.

water efficient landscape

What's right about this landscape?

Warm-season grass, permeable surface patio, water efficient plants with nearly year-round color, mulch in shrub areas, deciduous trees for summer shade and winter sun, a California native, shrubs attractive to hummingbirds and butterflies. This garden, with a landscaped area of 1,800 sq. ft., requires about 5,800 gallons of water to irrigate for the month of July in the Central Valley. A smaller lawn would make this landscape even more water efficient. A landscape of the same size with thirsty plants and a bluegrass lawn would require an additional 2,000 to 3,000 gallons of water for the month of July.



Try to group plants by water requirements, such as very low (e.g. drought tolerant California natives, such as Blue Oaks, Western Redbud), low (e.g. Rosemary, Lavender), medium (e.g. Photinia, Euonymus), and high (e.g. Australian Tree Fern, Umbrella Sedge). Keep the high water-using plants to a minimum as focal points.

For help with selecting trees, shrubs, and groundcovers consult a good gardening encyclopedia such as *Sunset Western Garden Book*, your local Cooperative Extension, or a reputable nursery. Your local Urban Forester or tree foundation can give valuable advice about which trees grow well in your area.

Another excellent reference is *A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California*, which is available on the Department of Water Resources Web site at:

<http://www.owue.water.ca.gov/docs/wucols00.pdf>

Beginning on page 45, this publication gives the water needs of landscape plants in the six major climate regions of California. Guides of this type are valuable in the design stage by aiding in the selection of plants for groupings with similar water needs. These groupings of plants of similar water requirements are also known as hydrozones.

Irrigation

After the plants are chosen, design and install an efficient irrigation system—one that will deliver a sufficient amount of water where it's needed. If you need information or help to design an irrigation system, ask at an irrigation supply store or hire a licensed landscape contractor who specializes in irrigation systems to design and install it.

Several of the major irrigation equipment manufacturers sell inexpensive irrigation design manuals online and at supply stores. A good irrigation design manual will

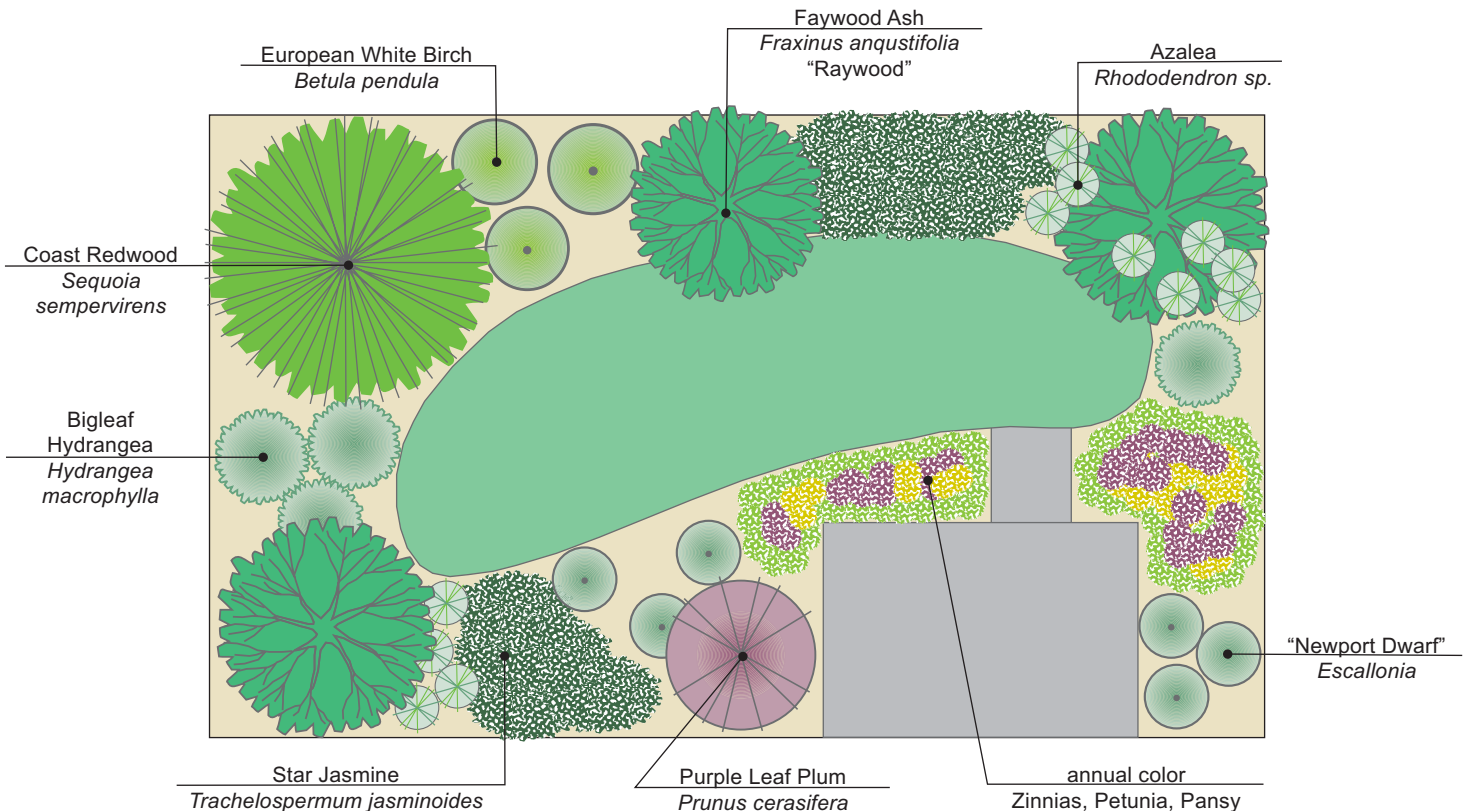
typical landscape

What's wrong with this landscape? (from a water conservation point of view)

Large lawn with cool-season grass, impervious patio, and a lot of high water using plants (Hydrangea, Azaleas, Birches, Annual color and Coast Redwood). This garden, with a 1,600 sq. ft. landscaped area, requires about 8,400 gallons of water to irrigate for the month of July in the Central Valley. This landscape requires over 2,500 gallons of water more per month (in July) than the previous example.

What could be a better version?

Although this landscape uses several water efficient plants, the water use is still high. Smaller lawn, warm season grass, less high water using plants, mulch, and avoiding large trees in smaller yards make landscapes much more resource efficient. For example, Redwoods need a lot of moisture and grow too large.



address important aspects of sprinkler design such as sprinkler layout, water pressure, choosing the right sprinkler for the job, head to head coverage, and matching precipitation rates. Some manufacturers offer free irrigation design services.

Always be sure to keep a drawing of the sprinkler layout and a list of parts used (including brand names and model numbers) for future reference. This will make any future repairs or additions much easier.

Use sprinklers that will apply water evenly. Use stream rotors on lawns and bubblers in shrub and tree areas. The better quality pop-up spray sprinklers work well in smaller areas, but avoid using sprinklers that create a fine mist because much of that water is lost to evaporation and overspray.

Check the operating pressure with a pressure gauge at an outdoor faucet so that you can select the right sprinkler for the job. Sprinklers are labeled to show how far they spray at different pressures. Operation at too high of pressure will create a lot of water-wasting mist and too little pressure will cause uneven coverage.

Microspray and drip irrigation are other good choices for tree and shrub areas. Microspray and drip also work well on container gardens and window boxes. Microspray and drip systems apply water slowly and just where it's needed.

When you water, apply it infrequently, deeply (throughout the root zone), and evenly. This will encourage deep rooting, which will make plants better able to withstand hot, dry spells.

Lawns require water about once or twice a week in warm weather. Trees and shrubs require watering less frequently. Because of this shrubs and trees should always be on separate zones from turf.

In the spring, fall, and winter all plants need much less water than is required in summer. Consequently, watering time should be much shorter and less frequently in the off peak seasons.

One way to make watering much easier is by using an irrigation controller, also called a sprinkler timer or clock. Timers can save gardeners a lot of time by watering automatically, but they can waste a lot of water if not reprogrammed to water less as the seasons change.

If an irrigation controller is to be used, be sure to purchase one with multiple functions. Buy one with extra stations in case you need to add irrigation zones later. Most importantly, adjust the timer monthly, weekly if needed, so that the irrigation time set for the summer is not set during the rest of the year.

During hot or cool spells most controllers can be easily adjusted without disturbing the original program. By using the "seasonal adjust" or "budget adjust" feature, frequent changes to the amount of time watering can easily be accomplished simply by pushing a button.

The amount of water applied can be increased or decreased in 10% increments. When considering that July is usually the peak demand for water, it can be considered to be the 100% mark.

For example, during April the irrigation could be turned on and the controller set for 60% of the amount it will be watered in July. This can be accomplished by pushing the seasonal adjust button until the display shows 60%. The controller can be adjusted upwards gradually as the weather warms.

Likewise in fall, the season adjust can be adjusted downward beginning in August for most areas of California. This can continue through October or November. By November the irrigation system can be turned off in most places in the state.

Rainfall may be enough for most areas, but if supplemental irrigation is required during the winter, use the manual "on" switch to run the irrigation when the landscape shows signs of water stress. The controller can also be reprogrammed to run less frequently than it would during the rest of the year. Consider installing a rain shut-off switch to prevent watering while it's raining.

Use a soil probe or large screwdriver to check the soil moisture. It may look dry on the surface, but be moist underneath. If the soil is still moist, plants probably won't need to be irrigated yet. Always observe how a change in the irrigation schedule affects the landscape.

water wise plants

There are many water wise plants to choose from that thrive in California's mostly moderate climate. These include both many attractive natives and plants introduced from other Mediterranean-like climates. These unthirsty plants enable any gardener to create a water conserving landscape. In addition to the plants shown in these water efficient landscape designs, here is a list of a few more of the many water wise plants available.

SHRUBS

Blue Hibiscus, *Alyogyne huegelii*
Coyote Brush, *Baccharis pilularis*
Barberry, *Berberis x stenophylla*
Bush Anemone, *Carpenteria californica*
Bush Morning Glory, *Convolvulus cneorum*
Smoke Tree, *Cotinus coggygria*
Euryops, *Euryops pectinatus*
Pineapple Guava, *Feijoa sellowiana*
Texas Ranger, *Leucophyllum* sp.
Pomegranate, *Punica granatum*

TREES

Madrone, *Arbutus menziesii*
Bottle Tree, *Brachychiton populneus*
Pindo Palm, *Butia capitata*
Australian Beefwood, *Casuarina stricta*
Honey Locust, *Gleditsia triacanthos*
Sweet Bay, *Laurus nobilis*
Interior Live Oak, *Quercus wislizenii*
Locust, *Robinia x ambigua*
Texas Mountain Laurel, *Sophora secundiflora*
Chaste Tree, *Vitex agnus-castus*

GROUNDCOVERS

Bearberry, *Arctostaphylos uva-ursi*
Carmel Creeper, *Ceanothus griseus horizontalis*
Red Spike Ice Plant, *Cephalophyllum* sp.
Chamomile, *Chamaemelum nobile*
Creeping Coprosma, *Coprosma x kirkii*
Trailing Lantana, *Lantana montedivensis*
Creeping Mahonia, *Mahonia repens*
Pork and Beans, *Sedum rubrotinctum*
Australian Bluebell Creeper, *Sollya heterophylla*
Wooly Thyme, *Thymus pseudolanuginosus*

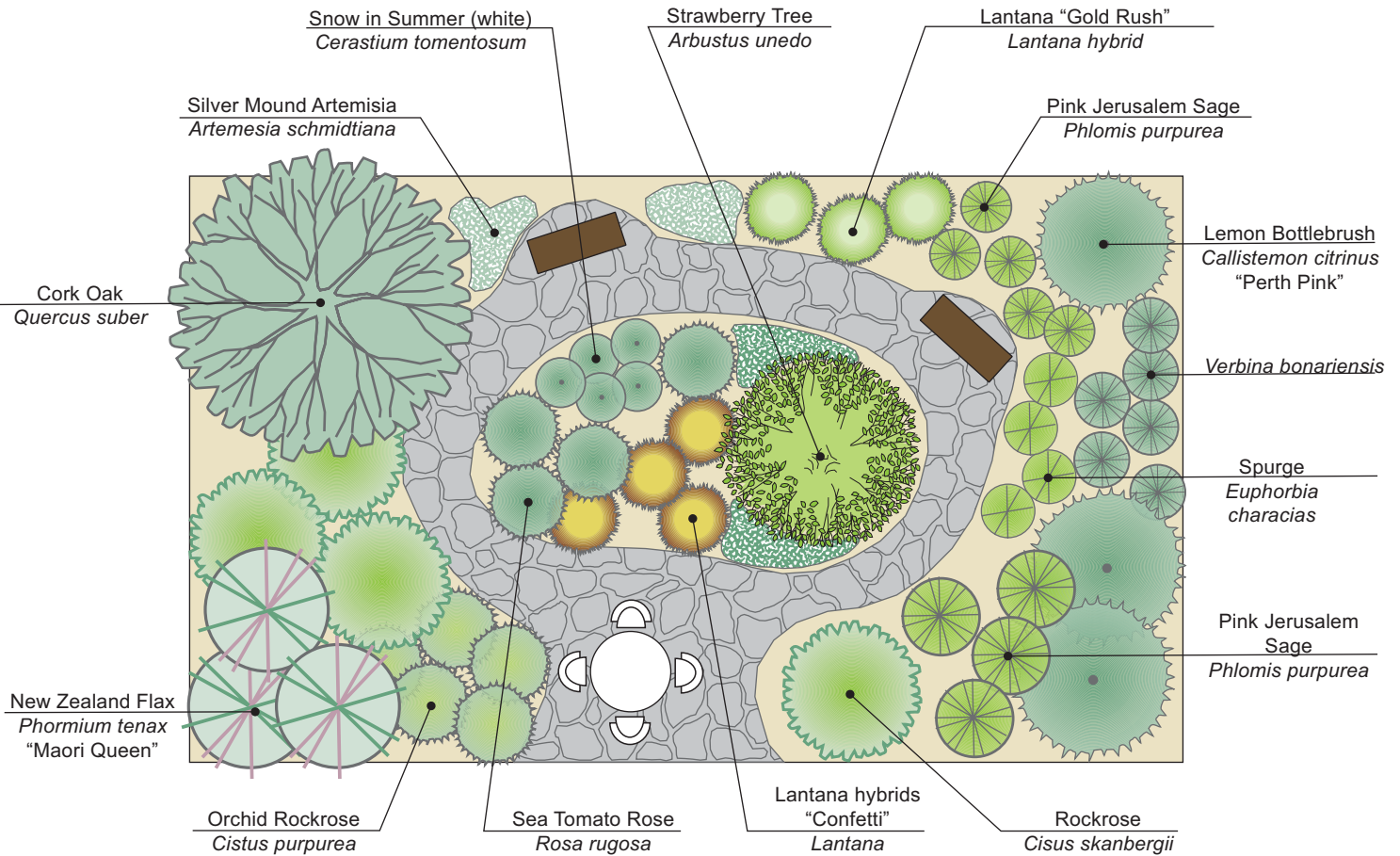
PERENNIALS

Yarrow, *Achillea millefolium*
Columbine, *Aquilegia hybrids*
Wormwood, *Artemisia "Powis Castle"*
Italian Arum, *Arum italicum*
Cast Iron Plant, *Aspidistra elatior*
Fortnight Lily, *Dietes iridioides*
Siberian Wallflower, *Erysimum x allionii*
Blanketflower, *Gaillardia grandiflora*
Sunrose, *Helianthemum nummularium*
Crown Pink, *Lychnis coronaria*

strolling garden

Turfless is effortless—well, almost.

If you don't need grass, just a quiet place to enjoy nature and be outside, try installing a strolling garden. Many water efficient plants are not fussy and don't require a lot of maintenance. Occasional pruning to rejuvenate and improve shape is all that many of these plants need. Unthirsty plants, organic mulch, and a permeable gravel path make this garden a real water saver. This garden, with a landscaped area of about 900 sq. ft., requires about 1,550 gallons for July in the Central Valley and only about 1,000 gallons on the Coast during July.



Some features to look for in irrigation controllers are:

- multiple independent programs (for different types of plant zones)
- several start times, cycle and soak (for heavy or compacted soil or sloped areas)
- nonvolatile memory and battery backup (to keep the schedule current after a power failure)
- water budgeting in percentage (%) increments (to water according to what the plants really need)
- rain shut-off device (to save water when the landscape is watered by rain)

These irrigation guidelines are general and may not always reflect the needs of your particular site.

The fun part

Once the irrigation system is installed, the lawn, trees, and shrubs can be planted. If your site has very sandy or heavy clay soil, amend the soil to increase the fertility and water holding capacity or to improve drainage. Plant shrubs according to the plan so that their leaves will just touch once they become established. This will ensure that the ground will be shaded by foliage but there will be adequate air circulation. This "room to breathe" will make appreciating the foliage and flowers much easier.

Set all shrubs and tree root balls somewhat high in the planting hole so that the top of the root ball will not settle below grade.

If young trees need staking, use two or three stakes tied loosely and just high enough on the trunk to keep the trunk from bending over. Remove them once the trees can stand on their own. While stakes can support a newly planted tree, if left too long, they will actually cause the tree to grow weakly. Shorten the staking poles so that they will not rub the bark of the new tree.

New lawns can be seeded, hydroseeded or planted with sod. There are advantages to all of these methods; therefore, budget, time of year, and availability of products will determine the right grass planting method for your landscape. A good landscaping book will outline the steps to preparing, planting, and maintaining a lawn.

After the plants are planted, cover the ground around trees and shrubs with a two-to-three-inch layer of organic mulch, keeping it away from the plant stems. Mulch will keep the soil cool and moist in warm weather and insulate it during winter. Mulch also has the added benefit of controlling weeds and enriching the soil by adding organic matter.

Routine maintenance keeps a landscape looking great

Regular maintenance of a landscape will keep it looking great and resource efficient. By working on small tasks on a continuous basis the large tasks will be limited.

- Check the irrigation system frequently for leaks, broken sprinklers, and clogged emitters; repair with the correct parts.
- Adjust the sprinklers as needed. If water runs off the landscaped area before the irrigation cycle is complete, adjust the timer to run several times with a shorter duration each time. For example, instead of running it for 15 minutes continuously, adjust the timer to run three times that day for 5 minutes each time, with an interval in between to let the water soak in. This is especially important on slopes and high traffic areas.
- Check the soil moisture depth with a soil probe or large screwdriver. If you use a screwdriver, push it in to the soil until you feel resistance. That is the approximate depth of where the soil is dry. If the moisture extends well below the root zone cut back on the water somewhat by shortening the time of an irrigation cycle or adding more time between cycles.

- Observe how a decrease in water affects the landscape and make adjustments as needed.
- Refresh the mulch layer in the spring.
- Prune only when necessary to shape the plant or remove dead or diseased parts.
- If fertilizer is necessary, use a balanced fertilizer, avoiding high Nitrogen mixtures that will cause excessive growth and could impact groundwater quality.
- When you mow, "grasscycle" the clippings. The clippings left behind on the grass will break down without causing a buildup of thatch.
- Aerate lawns occasionally to improve water infiltration.
- In times of drought, deep soak shrubs and trees only after they show signs of water stress, and water only in off peak hours. If a drought becomes severe, community leaders may ask people to stop watering their lawns, but any trees planted in lawn areas will still need an occasional soaking to survive. Deep soak these trees as you would any other tree in the landscape by drip, bubbler or garden hose.

If a garden is comprised mostly of water efficient plants, the landscape can be sustained on minimal irrigation through a drought and will be able to recover when water conditions improve.

The big picture

If good horticultural practices are followed, the dependence on chemicals in the garden can be reduced significantly. Mulching and grasscycling can greatly reduce the need for chemical fertilizers. Likewise, when less water is used, fertilizers and pesticides are not washed away. Less water controls excessive growth and reduces the amount of succulent new growth that is attractive to insect pests.

Since too much water causes many problems with plants, it makes sense to be water wise. It will save money and time, as well as give the gardener the satisfaction of doing his or her part in solving California's real water challenge.

State of California
The Resources Agency
Department of Water Resources
OFFICE OF WATER USE EFFICIENCY
P.O. Box 942836
Sacramento, CA 94236-0001

Phone: (916) 651-9676

Web site: www.owue.water.ca.gov/landscape

e-mail: landscape@water.ca.gov

(A copy of this brochure is available in PDF format at
www.owue.water.ca.gov/landscape/pubs/pubs.cfm)



This brochure was written by Julie Saare-Edmonds, landscape specialist for DWR's Office of Water Use Efficiency. Design and layout was provided by Alice Dyer of DWR's Division of Planning and Local Assistance.

For Information:

To report illegal dumping or a clogged storm drain
1-800-506-2555

Hazardous Materials Disposal,
Recycling/Disposal Vendors call:
951-486-3200 or 1-800-506-2555

County Code Enforcement Offices
(unincorporated area)
Lake Elsinore/Mead Valley951-245-3186
Jurupa Valley951-275-8739
Moreno Valley/Banning951-485-5840
Murrieta So. County951-600-6140
Thousand Palms District760-343-4150

Environmental Crimes
1-800-304-6100

Spill Response Agency
1-800-304-2226 or 951-358-5172

Recycling and Hazardous Waste Disposal
1-800-366-SAVE

For pollution prevention brochures or to obtain
information on other County Environmental
Services, call 1-800-506-2555

Popular links:
www.rcflood.org
www.cabmphandbooks.com
www.cfpub.epa.gov/npdes

ONLY RAIN DOWN THE
STORM DRAIN
POLLUTION PREVENTION
PROGRAM
1-800-506-2555



Riverside County's "Only Rain Down the Storm Drain"
Pollution Prevention Program members include:

Banning	Desert Hot Springs	Palm Desert
Beaumont	Hemet	Palm Springs
Calimesa	Indian Wells	Perris
Canyon Lake	Indio	Rancho Mirage
Cathedral City	Lake Elsinore	Riverside County
City of Riverside	La Quinta	San Jacinto
Corona	Menifee	Temecula
Coachella	Murrieta	Wildomar
Coachella Valley	Moreno Valley	
Water District	Norco	

Stormwater Pollution

What you should know for...

Automotive Maintenance and Car Care

Best Management Practices (BMPS)
for:

- Auto Body Shops
- Auto Repair Shops
- Car Dealerships
- Gas Stations
- Fleet Service Operations



Stormwater Pollution...What You Should Know

Riverside County has three major river systems, or watersheds, that are important to our communities and the environment. Improper automotive maintenance, storage and washing activities can cause pollution that endangers the health of these rivers.

Pollutants that can collect on the ground from automotive repair, storage and washing areas such as antifreeze, oil, grease, gas, lubricants, soaps and dirt can be washed into the street by rain, over-irrigation or wash water runoff. Once these pollutants are in the streets they can be carried to these rivers by the storm drain system. Unlike the sewer system, the storm drain system carries water (and pollution) to our rivers without treatment. Pollution from storm drains is a form of storm water pollution.

A common storm water pollution problem associated with automotive shops and businesses is the activity of hosing down service bays without proper capture of runoff water, illegal dumping of fluids to the street or storm drain inlets and not properly storing hazardous materials. Examples of pollutants that can be mobilized by these activities include oil and grease from cars, copper and asbestos from worn break linings, zinc from tires and toxics from spilled fluids.

The Cities and County of Riverside have adopted ordinances, in accordance with state and federal law, which prohibit the discharge of pollutants into the storm drain system or local lakes, rivers or streams. This brochure provides common practices that can prevent storm water pollution and keep your shop in compliance with the law.

Best Management Practices for Auto Body & Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations

Changing Automotive Fluids

- Locate storm drains on or near your property. Do not allow material to flow to these drains.
- Collect, and separately recycle motor oil, antifreeze, transmission fluid and gear oil. Combining waste fluid prevents recycling.
- Drain brake fluid and other non-recyclables into a proper container and handle as a hazardous waste.
- Use a recyclable radiator flushing fluid and discard safely.

Only rain is allowed down the storm drain! Don't be an offender!! Violations of local ordinances are prosecuted to the fullest extent of the law.

Identify specific activities with the potential to cause spills or release pollutants such as oil, grease, fuel, etc. Post signs and train employees on how to prevent and clean up spills during activities.

YOU can prevent Stormwater Pollution following these practices...

Working on Transmissions, Engines and Miscellaneous Repairs

- Keep a drip pan or a wide low-rimmed container under vehicles to catch fluids whenever you unclip hoses, unscrew filters, or change parts, to contain unexpected leaks.
- Drain all fluids from wrecked vehicles into proper containers before disassembly or repair.
- Store batteries indoors, on an open rack.
- Return used batteries to a battery vendor.
- Contain cracked batteries to prevent hazardous spills.
- Catch metal filings in an enclosed unit or on a tarpaulin.
- Sweep filing areas to prevent washing metals into floor drains.

Cleaning Parts

- Clean parts in a self-contained unit, solvent sink, or parts washer to prevent solvents and grease from entering a storm drain.



Fueling Vehicles

- Clean-up minor spills with a dry absorbent, rather than allowing them to evaporate.
- Use a damp cloth and a damp mop to keep the area clean rather than a hose or a wet mop.



Keeping your shop or work area pollutant clean and environmentally safe

- Never hose down your work area, as pollutants could be washed into the storm drain.
- Sweep or vacuum the shop floor frequently.
- Routinely check equipment. Wipe up spills and repair leaks.
- Use large pans or an inflatable portable berm under wrecked cars.
- Avoid spills by emptying and wiping drip pans, when they are half-full.
- Keep dry absorbent materials and/or a wet/dry vacuum cleaner on hand for mid-sized spills.
- Train your employees to be familiar with hazardous spill response plans and emergency procedures.

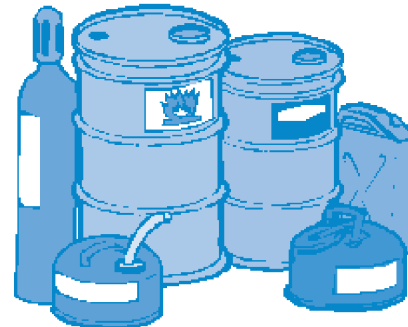
- Immediately report hazardous material spills that have entered the street or storm drain to OES and local authorities.

Outdoor Parking and Auto Maintenance

- Use covered or controlled areas to prevent offsite spills.
- Sweep-up trash and dirt from outdoor parking and maintenance areas. Do not hose down areas. All non-stormwater discharges to the street or storm drain are prohibited.

Storing and Disposing of Waste

- Store recyclable and non-recyclable waste separately.
- Place liquid waste (hazardous or otherwise) in proper containers with secondary containment.
- Cover outdoor storage areas to prevent contact with rain water.
- Collect used parts for delivery to a scrap metal dealer.



Washing vehicles and steam cleaning equipment

- For car washing, minimize wash water used and use designated areas. Never discharge wash water to the street, gutters or storm drain.
- Be sure to keep waste water from engine parts cleaning or steam cleaning from being discharged to the street, gutter or storm drain.
- Wash vehicles and steam clean with environmentally friendly soaps and polishes.



Selecting and Controlling Inventory

- Purchase recyclable or non-toxic materials.
- Select “closed-loop” suppliers and purchase supplies in bulk.



ILLEGAL DUMPING IS RUBBISH

Properly dump your garbage to reduce
California's stormwater pollution!
Five easy tips to reduce pollutants:



APPLIANCES



When illegally dumped, appliances can release toxins that get washed away with rain and end up in our water bodies, polluting our water.

- TIP 1: Donate or recycle appliances.**
TIP 2: Properly dispose at your local dump.



FURNITURE



When dumped on the side of the roadway all furniture not only causes a safety hazard, but can also breakdown and get into local water bodies, causing pollution.

- TIP 3: Contact local waste management for bulky pick-up or locate a dump for drop-off.**



VEGETATION



Improperly dumped vegetation can flow to waterways, creating an imbalance of nitrates in water and thus harm aquatic life.

- TIP 4: Tarp loads to reduce biodegradable waste on highways.**
TIP 5: Use a green waste bin or consider composting biodegradable waste.

Don't risk a \$10k fine
& up to
6 months in jail

Simple changes in disposal of rubbish can help keep California's highways, waterways and bodies of water clean!

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#ProtectEveryDrop

**FIND US
ONLINE**



www.protecteverydrop.com



STORMWATER POLLUTION

Metal Pollution Is More Common Than You Think



- Clean waterways start with clean storm drains.
- Clean storm drains start with clean highways.
- Clean highways start with you.

DID YOU KNOW?

- Metals add to stormwater pollution by entering our waterways via stormwater runoff. They can cause a variety of negative effects on our health and the environment.
- Vehicle tires and brakes are a source of metal pollution.
- Road and highway runoff flow into storm drains often leading directly to waterways.

COMMON METALS IN HIGHWAY RUNOFF

- Lead: leaded gasoline, lubricating oils and grease
- Zinc: tire wear, motor oil and grease
- Copper: brakes and engine wear



REDUCE POLLUTION AT THE SOURCE

Take steps to reduce metal pollution from stormwater

- Maintain your vehicle and protect the quality of our water. Well-maintained vehicles pollute less; even a small leak of oil, antifreeze or other toxic auto fluids can find their way into a storm drain.
- Consider alternative transportation. Exercise your commuting options by carpooling, using public transportation or riding a bicycle. Fewer vehicles on California's highways and roadways reduce pollution that can flow into storm drains.
- Learn More! Go online and check out tips and simple solutions to prevent stormwater pollution at www.protecteverydrop.com.

WWW.PROTECTEVERYDROP.COM



- A CLEAN CAR GOES FAR -

WASH YOUR CAR TO
KEEP OUR WATERWAYS CLEAN &
PROTECT WATER QUALITY



PROTECT OUR WATER

Pollutants from storm drains make their way to our waterways, including streams, rivers, lakes & the ocean.

SPOT THE SPOTS

Dirty vehicles carry pollutants.



WHEN IT RAINS

Rain washes pollutants off your vehicle & onto roadways. These pollutants go into storm drains & flow into waterways.

WASH GRIME AWAY

Washing your car regularly at a facility that recycles water helps reduce pollutants from entering the storm drain and ultimately our water ways.



WASH, PROTECT, REPEAT

Do your part to reduce pollution & protect water quality!



rcwatershed.org

RIVERSIDE COUNTY WATERSHED PROTECTION

27 Cities + One County + Two Districts = A Team Effort.

Water pollution degrades surface waters which can cause them to be unsafe for drinking, fishing, swimming, and other activities. The Riverside County Watershed Protection program was established to reduce the pollution carried by stormwater into local creeks and waterways that lead to the ocean. The program is managed by the Riverside County Flood Control & Water Conservation District in partnership with 27 Cities, the County of Riverside and the Coachella Valley Water District.

What is a watershed and how do I affect it?

A watershed is an area of land that catches and drains water into a creek, stream or tributary and eventually ends up in a large body of water such as our lakes, rivers or the ocean. As stormwater flows over land and across the watershed into a waterway, it carries urban runoff such as used motor oil and grease, pesticides, trash and other harmful debris. This is where the public comes in. The more we can prevent polluting the watershed, the healthier our waterways will be and the habitat it supports.

What is stormwater?

Stormwater runoff is any water, either through rain, sprinklers, or irrigation of yards/gardens, that falls and is transported over land and pavement into local waterbodies through the storm drain system. All water that flows into a storm drain is deposited into creeks, rivers or the ocean without treatment.



Is there a difference between the storm drain and sewer system?

Yes, an important difference. Stormwater and all the pollutants that flow from our homes, parking lots and streets to the gutter into the storm drains flow directly into our creeks and other water bodies untreated. Water and pollutants that flow into the sanitary sewer, such as water from our sinks, bathtubs and toilets, are sent to a wastewater treatment facility before the water is discharged to the Bay or Ocean.

Doo Good

Pick up dog doo. Protect streams

Dog doo can pollute our waterways. Rain flows across yards and trails, collecting in storm drains that lead directly to streams without being treated!

Bacteria Problems

A single gram of dog doo can contain 23 million fecal coliform bacteria and can spread diseases like Giardia and Salmonella.

Bacteria from dog doo accounts for up to **20%** of the bacteria in urban waterways.

Nutrient Problems

Nutrients like nitrogen and phosphorus that are found in dog doo act like a fertilizer in streams. They cause algae to grow which reduces the available oxygen for fish. The more poop, the bigger the potential problem. Locally there are over **90,000** dogs that make **11,700 tons** of poop a year.

Be a "Doo Gooder"

You can make a difference by being a responsible pet owner. Being a "Doo Gooder" means being a model for others and picking up your dog doo. Here are **5 tips** every dog owner should know:

- Be prepared: carry poop bags with you.
- Take extra bags so you don't run out and you can help someone else in need.
- Make sure the bag ends up in a trash can.
- When you hike, never leave a bag on the trail – take it with you.
- Scoop your poop at home or hire someone to keep your yard healthy and to protect streams.



rcwatershed.org
RIVERSIDE COUNTY
WATERSHED PROTECTION

OUR MISSION

"To protect, preserve and enhance the quality of Riverside County Watersheds by fostering a community-wide commitment to clean water."

@RivCoWatershed





A Citizen's Guide to Understanding Stormwater



EPA
United States
Environmental Protection
Agency

EPA 833-B-03-002

January 2003

Internet Address (URL) • HTTP://www.epa.gov
Recycled/Recyclable • Printed With Vegetable
Oil Based Inks on 100% Postconsumer,
Process Chlorine Free Recycled Paper

For more information contact:
www.epa.gov/nps/stormwater
or visit
www.epa.gov/nps

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.

Stormwater Pollution Solutions

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.



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.



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.



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

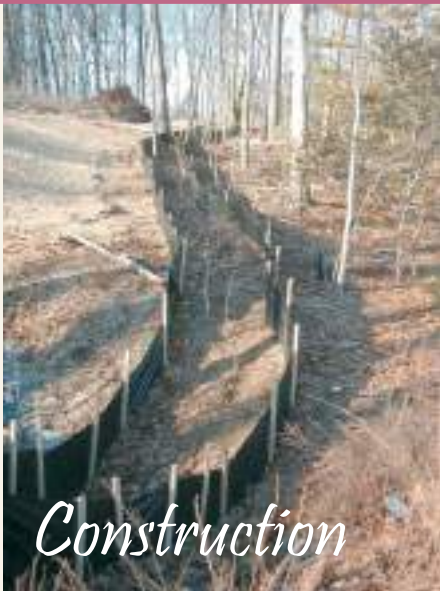
Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- ◆ 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.

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.

Construction



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.



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.



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.



Stormwater Pollution

What you should know...

If not properly managed, rainfall and runoff that come into contact with manure, horse care products, and wash water can carry nutrients, sediment, bacteria, salts, and toxic pollutants to storm

drains and streams, negatively affecting water quality and the environment. Listed below are some environmentally responsible steps to keep in mind when caring for your horses, barns and pastures.

Grooming

- Only use pest control and grooming products (*saddle and tack cleaning and conditioning products, shampoos and conditioners, show shine, hoof polish, etc.*) where needed and avoid use in areas exposed to runoff. Spot-apply pesticides and fungicides to avoid over use and keep from areas exposed to stormwater. Follow instructions on products, use sparingly and clean up spills.
- Store all pest control, grooming, and horse and tack care products in covered areas where they will not come into contact with stormwater, and post signs reminding boarders and staff not to dump any excess products. For proper disposal of unused horse care products, please call **1-800-304-2226** or visit the Riverside County Waste Management Department at **www.rivcowm.org**.
- For indoor wash stalls, ensure that floor drains are connected to septic system or drain to areas where the washwater can soak into the ground. Outside, ensure that washwater can seep into the ground. Always prevent washwater from entering a storm drain or stream. Creating a small berm around the area can prevent washwater from leaving the area.
- Conserving water is an important way to protect streams. Conserve water by using a spray nozzle with an automatic shut-off. Turn off the water when not in use.



Manure Management

Store manure in a covered, enclosed compost bin located in an area that will not result in any drainage or runoff. Where enclosed bins aren't feasible, manure storage sites should be located under a covered area on a nearly flat surface, 50 - 100 feet from any stream or storm drain.

Pasture Management

- Sweep or shovel horse holding areas daily to reduce the tracking of manure and soil. ***Do not wash down these areas!***
- Fencing horses out of streams is important to protect surface waters. Locate paddock areas and fencing so horses are kept away from streams. Wherever possible, choose paddock areas where runoff will drain into the ground.
- Plant or allow vegetation to grow around the perimeter of paddock areas to provide for natural filtration of runoff.

Grazing

Over-grazing in a paddock or pasture can lead to exposed soil and soil erosion, which increases runoff to streams and surface waters; allow about one acre per horse and rotate pasturing where possible.

Responsibility for water quality begins with **YOU**



Using and Disposing of Manure and Bedding

- Compost used bedding and manure. See <http://compostingcouncil.org> for more information.
- Composted bedding and manure may be donated to local greenhouses, nurseries, botanical parks, topsoil companies or composting centers.
- Contact your municipality regarding disposal programs and requirements.
- Always protect stables, storage, and compost stockpiles from runoff by keeping them out of stream courses.

Barn and Stable Design

Have your engineer check with your City or County building department for information about stable design requirements and best practices, such as good surfacing materials, manure and care product storage areas, and locating wash and storage areas away from areas that could affect water quality.

Resources

Contact your city or county stormwater representative for any applicable local ordinances.

For more information, Please call Riverside County's "Only Rain Down the Storm Drain" at 1-800-506-2555 or visit the website at rcstormwater.org

IRRIGATION RUNOFF

STORMWATER FACT SHEET



Report Irrigation Runoff or Stormwater Pollution:
800.506.2555

RIVERSIDE COUNTY
WATERSHED PROTECTION

OVERWATERING

Overwatering causes irrigation runoff that may contain pollutants such as pesticides, herbicides, fertilizers, pet waste, yard waste, and sediments which can be hazardous to residents and harmful to our environment. Runoff can also serve as a transport mechanism for other pollutants already on the ground or in the curb gutter. Irrigation runoff entering the storm drain system is an illicit discharge.

BEST PRACTICES

Urban runoff begins when yards and landscaped areas are over-irrigated. Irrigation systems require regular maintenance and visual inspection of the system should be performed to prevent over-spray, leaks, and other problems that result in runoff to storm drains, curbs and gutters.

You can **prevent pollution** by conserving water on your property. Water during cooler times of the day (before 10am and after 6pm).

- Adjust sprinklers to stop overspray and runoff.
- Make needed repairs immediately.
- Use drip irrigation, soaker hoses, or micro-spray systems.
- Use an irrigation timer to pre-set watering times.
- Use a control nozzle or similar mechanism when watering by hand.
- Switch to a water-wise landscape - native plants need less fertilizers, herbicides, pesticides and water.



PROTECT OUR WATERSHED

Many people think that when water flows into a storm drain it is treated, but the storm drain system and the sanitary sewer system are not connected. Everything that enters storm drains flows untreated directly into our creeks, rivers, lakes, beaches and ultimately the ocean. Storm water often contains pollutants, including chemicals, trash, and automobile fluids, all of which pollute our watershed and harm fish and wildlife.

Whether at home or work, you can help reduce pollution and improve water quality by using the above Best Management Practices (BMP's) as part of your daily clean up and maintenance routine.





Landscaping and garden maintenance activities can be major contributors to water pollution. Soils, yard wastes, over-watering and garden chemicals become part of the urban runoff mix that winds its way through streets, gutters and storm drains before entering lakes, rivers, streams, etc. Urban runoff pollution contaminates water and harms aquatic life!

In Riverside County, report illegal discharges into the storm drain, call
1-800-506-2555
"Only Rain Down the Storm Drain"

Important Links:

Riverside County Household Hazardous Waste Collection Information
1-800-304-2226 or www.rivcowm.org

Riverside County Backyard Composting Program
1-800-366-SAVE

Integrated Pest Management (IPM) Solutions
www.ipm.ucdavis.edu

California Master Gardener Programs
www.mastergardeners.org
www.camastergardeners.ucdavis.edu

California Native Plant Society
www.cnps.org

The Riverside County "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges Orange County's Storm Water Program for their contribution to this brochure.

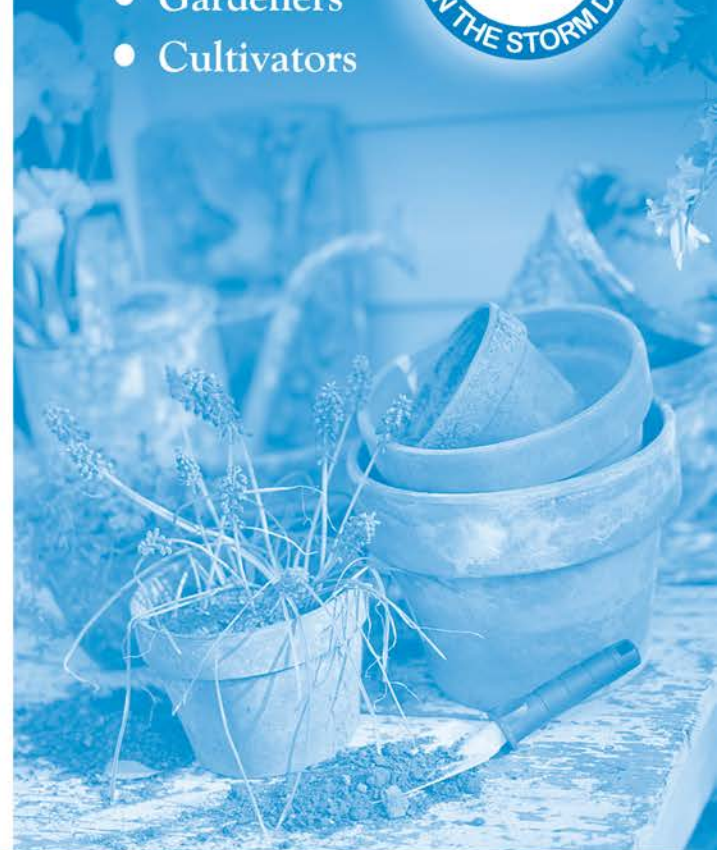


...Only Rain Down ...the Storm Drain

*What you should know for...
Landscape and Gardening*

Best Management tips for:

- Professionals
- Novices
- Landscapers
- Gardeners
- Cultivators



Tips for Landscape & Gardening

This brochure will help you to get the most of your lawn and gardening efforts and keep our waterways clean. Clean waterways provide recreation, establish thriving fish habitats, secure safe sanctuaries for wildlife, and add beauty to our communities. NEVER allow gardening products or waste water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers and pesticides applied to the landscape.
- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.



Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers.

- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.



- Consider recycling your green waste and adding "nature's own fertilizer" to your lawn or garden.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.
- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains or sewers. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting.

- Try natural long-term common sense solutions first. Integrated Pest Management (IPM) can provide landscaping guidance and solutions, such as:

- ◆ **Physical Controls** - Try hand picking, barriers, traps or caulking holes to control weeds and pests.
- ◆ **Biological Controls** - Use predatory insects to control harmful pests.
- ◆ **Chemical Controls** - Check out www.ipm.ucdavis.edu before using chemicals. Remember, all chemicals should be used cautiously and in moderation.

- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Waste Collection Center to be recycled.
- *Dumping toxics into the street, gutter or storm drain is illegal!*

www.bewaterwise.com Great water conservation tips and drought tolerant garden designs.

www.ourwaterourworld.com Learn how to safely manage home and garden pests.

Additional information can also be found on the back of this brochure.

Description

Vortex separators: (alternatively, swirl concentrators) are gravity separators, and in principle are essentially wet vaults. The difference from wet vaults, however, is that the vortex separator is round, rather than rectangular, and the water moves in a centrifugal fashion before exiting. By having the water move in a circular fashion, rather than a straight line as is the case with a standard wet vault, it is possible to obtain significant removal of suspended sediments and attached pollutants with less space. Vortex separators were originally developed for combined sewer overflows (CSOs), where it is used primarily to remove coarse inorganic solids. Vortex separation has been adapted to stormwater treatment by several manufacturers.

California Experience

There are currently about 100 installations in California.

Advantages

- May provide the desired performance in less space and therefore less cost.
- May be more cost-effective pre-treatment devices than traditional wet or dry basins.
- Mosquito control may be less of an issue than with traditional wet basins.

Limitations

- As some of the systems have standing water that remains between storms, there is concern about mosquito breeding.
- It is likely that vortex separators are not as effective as wet vaults at removing fine sediments, on the order 50 to 100 microns in diameter and less.
- The area served is limited by the capacity of the largest models.
- As the products come in standard sizes, the facilities will be oversized in many cases relative to the design treatment storm, increasing the cost.
- The non-steady flows of stormwater decreases the efficiency of vortex separators from what may be estimated or determined from testing under constant flow.
- Do not remove dissolved pollutants.

Design Considerations

- Service Area
- Settling Velocity
- Appropriate Sizing
- Inlet Pipe Diameter

Targeted Constituents

<input checked="" type="checkbox"/>	Sediment	▲
<input checked="" type="checkbox"/>	Nutrients	●
<input checked="" type="checkbox"/>	Trash	
<input checked="" type="checkbox"/>	Metals	●
	Bacteria	
<input checked="" type="checkbox"/>	Oil and Grease	
<input checked="" type="checkbox"/>	Organics	

Legend (Removal Effectiveness)

- Low ■ High
▲ Medium



- A loss of dissolved pollutants may occur as accumulated organic matter (e.g., leaves) decomposes in the units.

Design and Sizing Guidelines

The stormwater enters, typically below the effluent line, tangentially into the basin, thereby imparting a circular motion in the system. Due to centrifugal forces created by the circular motion, the suspended particles move to the center of the device where they settle to the bottom. There are two general types of vortex separation: free vortex and dampened (or impeded) vortex. Free vortex separation becomes dampened vortex separation by the placement of radial baffles on the weir-plate that impede the free vortex-flow pattern.

It has been stated with respect to CSOs that the practical lower limit of vortex separation is a particle with a settling velocity of 12 to 16.5 feet per hour (0.10 to 0.14 cm/s). As such, the focus for vortex separation in CSOs has been with settleable solids generally 200 microns and larger, given the presence of the lighter organic solids. For inorganic sediment, the above settling velocity range represents a particle diameter of 50 to 100 microns. Head loss is a function of the size of the target particle. At 200 microns it is normally minor but increases significantly if the goal is to remove smaller particles.

The commercial separators applied to stormwater treatment vary considerably with respect to geometry, and the inclusion of radial baffles and internal circular chambers. At one extreme is the inclusion of a chamber within the round concentrator. Water flows initially around the perimeter between the inner and outer chambers, and then into the inner chamber, giving rise to a sudden change in velocity that purportedly enhances removal efficiency. The opposite extreme is to introduce the water tangentially into a round manhole with no internal parts of any kind except for an outlet hood. Whether the inclusion of chambers and baffles gives better performance is unknown. Some contend that free vortex, also identified as swirl concentration, creates less turbulence thereby increasing removal efficiency. One product is unique in that it includes a static separator screen.

- Sizing is based on the peak flow of the design treatment event as specified by local government.
- If an in-line facility, the design peak flow is four times the peak of the design treatment event.
- If an off-line facility, the design peak flow is equal to the peak of the design treatment event.
- Headloss differs with the product and the model but is generally on the order of one foot or less in most cases.

Construction/Inspection Considerations

No special considerations.

Performance

Manufacturer's differ with respect to performance claims, but a general statement is that the manufacturer's design and rated capacity (cfs) for each model is based on and believed to achieve an aggregate reduction of 90% of all particles with a specific gravity of 2.65 (glacial sand) down to 150 microns, and to capture the floatables, and oil and grease. Laboratory tests of

two products support this claim. The stated performance expectation therefore implies that a lesser removal efficiency is obtained with particles less than 150 microns, and the lighter, organic settleables. Laboratory tests of one of the products found about 60% removal of 50 micron sand at the expected average operating flow rate

Experience with the use of vortex separators for treating combined sewer overflows (CSOs), the original application of this technology, suggests that the lower practical limit for particle removal are particles with a settling velocity of 12 feet per hour (Sullivan, 1982), which represents a particle diameter of 100 to 200 microns, depending on the specific gravity of the particle. The CSO experience therefore seems consistent with the limited experience with treating stormwater, summarized above

Traditional treatment technologies such as wet ponds and extended detention basins are generally believed to be more effective at removing very small particles, down to the range of 10 to 20 microns. Hence, it is intuitively expected that vortex separators do not perform as well as the traditional wet and dry basins, and filters. Whether this matters depends on the particle size distribution of the sediments in stormwater. If the distribution leans towards small material, there should be a marked difference between vortex separators and, say, traditional wet vaults. There are little data to support this conjecture

In comparison to other treatment technologies, such as wet ponds and grass swales, there are few studies of vortex separators. Only two of manufactured products currently available have been field tested. Two field studies have been conducted. Both achieved in excess of 80% removal of TSS. However, the test was conducted in the Northeast (New York state and Maine) where it is possible the stormwater contained significant quantities of deicing sand. Consequently, the influent TSS concentrations and particle size are both likely considerably higher than is found in California stormwater. These data suggest that if the stormwater particles are for the most part fine (i.e., less than 50 microns), vortex separators will not be as efficient as traditional treatment BMPs such as wet ponds and swales, if the latter are sized according to the recommendations of this handbook.

There are no equations that provide a straightforward determination of efficiency as a function of unit configuration and size. Design specifications of commercial separators are derived from empirical equations that are unique and proprietary to each manufacturer. However, some general relationships between performance and the geometry of a separator have been developed. CSO studies have found that the primary determinants of performance of vortex separators are the diameters of the inlet pipe and chamber with all other geometry proportional to these two.

Sullivan et al. (1982) found that performance is related to the ratios of chamber to inlet diameters, D_2/D_1 , and height between the inlet and outlet and the inlet diameter, H_1/D_1 , shown in Figure 3. The relationships are: as D_2/D_1 approaches one, the efficiency decreases; and, as the H_1/D_1 ratio decreases, the efficiency decreases. These relationships may allow qualitative comparisons of the alternative designs of manufacturers. Engineers who wish to apply these concepts should review relevant publications presented in the References.

Siting Criteria

There are no particularly unique siting criteria. The size of the drainage area that can be served by vortex separators is directly related to the capacities of the largest models.

Additional Design Guidelines

Vortex separators have two capacities if positioned as in-line facilities, a treatment capacity and a hydraulic capacity. Failure to recognize the difference between the two may lead to significant under sizing; i.e., too small a model is selected. This observation is relevant to three of the five products. These three technologies all are designed to experience a unit flow rate of about 24 gallons/square foot of separator footprint at the peak of the design treatment event. This is the horizontal area of the separator zone within the container, not the total footprint of the unit. At this unit flow rate, laboratory tests by these manufacturers have established that the performance will meet the general claims previously described. However, the units are sized to handle 100 gallons/square foot at the peak of the hydraulic event. Hence, in selecting a particular model the design engineer must be certain to match the peak flow of the design event to the stated treatment capacity, not the hydraulic capacity. The former is one-fourth the latter. If the unit is positioned as an off-line facility, the model selected is based on the capacity equal to the peak of the design treatment event.

Maintenance

Maintenance consists of the removal of accumulated material with an eductor truck. It may be necessary to remove and dispose the floatables separately due to the presence of petroleum product.

Maintenance Requirements

Remove all accumulated sediment, and litter and other floatables, annually, unless experience indicates the need for more or less frequent maintenance.

Cost

Manufacturers provide costs for the units including delivery. Installation costs are generally on the order of 50 to 100 % of the manufacturer's cost. For most sites the units are cleaned annually.

Cost Considerations

The different geometry of the several manufactured separators suggests that when comparing the costs of these systems to each other, that local conditions (e.g., groundwater levels) may affect the relative cost-effectiveness.

References and Sources of Additional Information

Field, R., 1972, The swirl concentrator as a combined sewer overflow regulator facility, EPA/R2-72-008, U.S. Environmental Protection Agency, Washington, D.C.

Field, R., D. Averill, T.P. O'Connor, and P. Steel, 1997, Vortex separation technology, Water Qual. Res. J. Canada, 32, 1, 185

Manufacturers technical materials

Sullivan, R.H., et al., 1982, Design manual – swirl and helical bend pollution control devices, EPA-600/8-82/013, U.S. Environmental Protection Agency, Washington, D.C.

Sullivan, R.H., M.M. Cohn, J.E. Ure, F.F. Parkinson, and G. Caliana, 1974, Relationship between diameter and height for the design of a swirl concentrator as a combined sewer overflow regulator, EPA 670/2-74-039, U.S. Environmental Protection Agency, Washington, D.C.

Sullivan, R.H., M.M. Cohn, J.E. Ure, F.F. Parkinson, and G. Caliana, 1974, The swirl concentrator as a grit separator device, EPA670/2-74-026, U.S. Environmental Protection Agency, Washington, D.C.

Sullivan, R.H., M.M. Cohn, J.E. Ure, F.F. Parkinson, and G. Caliana, 1978, Swirl primary separator device and pilot demonstration, EPA600/2-78-126, U.S. Environmental Protection Agency, Washington, D.C.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL

1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
www.rcflood.org

Online resources include:

- California Storm Water Quality Association
www.casqa.org
- State Water Resources Control Board
www.waterboards.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?

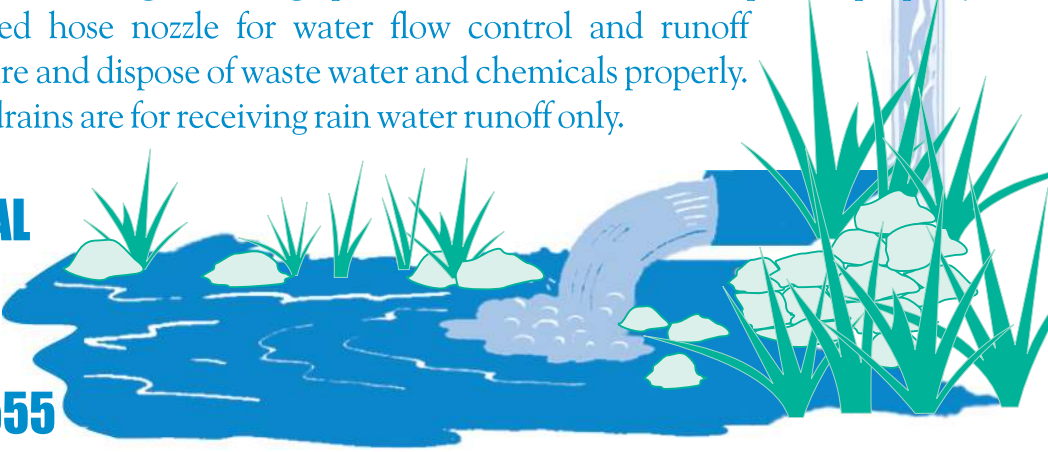
Storm drains are NOT connected to sanitary sewer systems and treatment plants!



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, using 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. Remember, storm drains are for receiving rain water runoff only.

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 body of water is **PROHIBITED** by law and can result in 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 stormwater 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 of *small amounts* of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (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...check to see if local ordinances prevent certain activities.

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 with 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. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks *with loose paint*, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

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 other appropriate materials.
- 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.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.