

Preliminary Water Quality Management Plan

For:

ROQUET RANCH – TTM 19983

CITY OF COLTON

Prepared for:

SUNMEADOWS, LLC

27127 Calle Arroyo, Suite 1910

San Juan Capistrano, CA 92675

Prepared by:



Engineering, Inc.

357 N. Sheridan Street, Suite 117

Corona, CA 92880

Phone: (951) 279-1800

Fax: (951) 279-4380

JN: 269.335 / 316.452

Submittal Date: February 2016

Revision Date:

Approval Date: _____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for **SUNMEADOWS, LLC** by **K&A Engineering**. The WQMP is intended to comply with the requirements of the City of Colton, County of San Bernardino and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	TTM 19983	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			
Owner's Signature			
Owner Name: Bill Lo			
Title			
Company	Sunmeadows, LLC		
Address	27127 Calle Arroyo, Suite 1910 San Juan Capistrano, CA 92675		
Email	bl@billoconsulting.com		
Telephone #	949 836-2296		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	TTM 19983	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

“The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0036.”

Engineer: James R. Bolton		PE Stamp Below 
Title	Project Manager	
Company	K & A Engineering, Inc.	
Address	357 N. Sheridan St, 117 Corona, CA 92880	
Email	JamesB@kaengineering.com	
Telephone #	951 279-1800	
Signature		
Date		

Table of Contents

Section 1	Discretionary Permits	1-1
Section 2	Project Description	2-1
	2.1 Project Information.....	2-1
	2.2 Property Ownership / Management	2-2
	2.3 Potential Stormwater Pollutants	2-3
	2.4 Water Quality Credits	2-4
Section 3	Site and Watershed Description	3-1
Section 4	Best Management Practices	4-1
	4.1 Source Control BMP	4-1
	4.1.1 Pollution Prevention	4-1
	4.1.2 Preventative LID Site Design Practices.....	4-6
	4.2 Project Performance Criteria.....	4-7
	4.3 Project Conformance Analysis.....	4-12
	4.3.1 Site Design Hydrologic Source Control BMP	4-14
	4.3.2 Infiltration BMP	4-16
	4.3.3 Harvest and Use BMP	4-18
	4.3.4 Biotreatment BMP.....	4-19
	4.3.5 Conformance Summary	4-23
	4.3.6 Hydromodification Control BMP	4-24
	4.4 Alternative Compliance Plan (if applicable).....	4-25
Section 5	Inspection & Maintenance Responsibility Post Construction BMPs.....	5-1
Section 6	Site Plan and Drainage Plan.....	6-1
	6.1. Site Plan and Drainage Plan.....	6-1
	6.2 Electronic Data Submittal	6-1

Forms

Form 1-1	Project Information	1-1
Form 2.1-1	Description of Proposed Project	2-1
Form 2.2-1	Property Ownership/Management	2-2
Form 2.3-1	Pollutants of Concern	2-3
Form 2.4-1	Water Quality Credits	2-4
Form 3-1	Site Location and Hydrologic Features	3-1
Form 3-2	Hydrologic Characteristics.....	3-2
Form 3-3	Watershed Description.....	3-3
Form 4.1-1	Non-Structural Source Control BMP.....	4-2
Form 4.1-2	Structural Source Control BMP	4-4
Form 4.1-3	Site Design Practices Checklist.....	4-6
Form 4.2-1	LID BMP Performance Criteria for Design Capture Volume	4-7
Form 4.2-2	Summary of HCOC Assessment.....	4-8
Form 4.2-3	HCOC Assessment for Runoff Volume	4-9
Form 4.2-4	HCOC Assessment for Time of Concentration	4-10

Form 4.2-5 HCOC Assessment for Peak Runoff.....	4-11
Form 4.3-1 Infiltration BMP Feasibility	4-13
Form 4.3-2 Site Design Hydrologic Source Control BMP	4-14
Form 4.3-3 Infiltration LID BMP.....	4-17
Form 4.3-4 Harvest and Use BMP	4-18
Form 4.3-5 Selection and Evaluation of Biotreatment BMP	4-19
Form 4.3-6 Volume Based Biotreatment - Bioretention and Planter Boxes w/Underdrains	4-20
Form 4.3-7 Volume Based Biotreatment- Constructed Wetlands and Extended Detention	4-21
Form 4.3-8 Flow Based Biotreatment	4-22
Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate	4-23
Form 4.3-10 Hydromodification Control BMP	4-24
Form 5-1 BMP Inspection and Maintenance	5-1

Attachments:

Attachment 1 – Infiltration Results

Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name		Roquet Ranch – TTM 19983			
Project Owner Contact Name:		Sunmeadows, LLC – Bill Lo			
Mailing Address:	27127 Calle Arroyo, Suite 1910 San Juan Capistrano, CA 92675	E-mail Address:	bl@billoconsulting.com	Telephone:	949 218-6023
Permit/Application Number(s):		Tract/Parcel Map Number(s):		TTM 19983	
Additional Information/ Comments:		The proposed project is within Santa Ana River, Reach 4			
Description of Project:		Project located at La Loma Hills, west of La Cadena Drive, east of Santa Ana River and north of County of Riverside boundary in City of Colton. The project bounded on the south by residential development and the Riverside/San Bernardino County Line, on the west by the Santa Ana River, on the north by vacant land, and on the east by residential developments and La Cadena Drive.			
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.		<p>There is NO Preliminary WQMP.</p> <p>With the City of Colton being a co-permittee of the San Bernardino County MS4 permit, Low Impact Development water quality design principles were required to be designed into the project for retention/infiltration of daily nuisance flows and 85th percentile storm event after the project is constructed and homes are occupied.</p> <p>This project will address Site Design Hydrologic Source Control BMP and on-site LID BMPs as much as practical, such as Impervious Area Dispersion BMP, On-lot Infiltration BMPs, and Street Trees. The project also provide modified bio-retention/infiltration basins to intercept full Design Capture Volume from proposed development. Pre-treatment BMPs will be added at immediate upstream of the on-site modified bio-retention/infiltration basins.</p>			

Section 2 Project Description

2.1 Project Information

This section of the WQMP should provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

Form 2.1-1 Description of Proposed Project					
1 Development Category (Select all that apply):					
<input type="checkbox"/> Significant re-development involving the addition or replacement of 5,000 ft ² or more of impervious surface on an already developed site	<input checked="" type="checkbox"/> New development involving the creation of 10,000 ft ² or more of impervious surface collectively over entire site	<input type="checkbox"/> Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	<input type="checkbox"/> Restaurants (with SIC code 5812) where the land area of development is 5,000 ft ² or more		
<input type="checkbox"/> Hillside developments of 5,000 ft ² or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	<input type="checkbox"/> Developments of 2,500 ft ² of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	<input type="checkbox"/> Parking lots of 5,000 ft ² or more exposed to storm water	<input type="checkbox"/> Retail gasoline outlets that are either 5,000 ft ² or more, or have a projected average daily traffic of 100 or more vehicles per day		
<input type="checkbox"/> Non-Priority / Non-Category Project <i>May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements.</i>					
2 Project Area (ft ²):	Approx. 335 Ac	3 Number of Dwelling Units:	900 +/-	4 SIC Code:	
5 Is Project going to be phased? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.</i>					
6 Does Project include roads? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)</i>					

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

The proposed TTM 19983 project is residential development project with school site, neighborhood commercial, park and open spaces.

The proposed project is within Santa Ana River Reach 4. The project gross acreage is approximately 335 acres.

A Master Homeowner Association (HOA) will be formed for Roquet Ranch development. The HOAs or other designated entity will be responsible for the inspection and maintenance of structural BMPs.

The property ownership/management has not yet been finalized, as it will be in the next future. There will be a setup that will maintain the private streets and drainage systems.

SUNMEADOWS, LLC

27127 Calle Arroyo, Suite 1910

San Juan Capistrano, CA 92675

(949) 836-2296

2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Pathogens (Bacterial / Virus)	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Nutrients - Phosphorous	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Nutrients - Nitrogen	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Noxious Aquatic Plants	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Sediment	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Total suspended solids
Metals	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Aluminum, Cadmium, Copper, Lead, Zinc and Nickel
Oil and Grease	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Hydrocarbons, Polycyclic Aromatic Hydrocarbons
Trash/Debris	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Pesticides / Herbicides	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Organic Compounds	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	

2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

Form 2.4-1 Water Quality Credits			
¹ Project Types that Qualify for Water Quality Credits: <i>Select all that apply</i>			
<input type="checkbox"/> Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	Higher density development projects <input type="checkbox"/> Vertical density [20%] <input checked="" type="checkbox"/> 7 units/ acre [5%]	<input type="checkbox"/> Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	<input type="checkbox"/> Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
<input type="checkbox"/> Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	<input type="checkbox"/> Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	<input type="checkbox"/> In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	<input type="checkbox"/> Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]
² Total Credit % 5 percents <i>(Total all credit percentages up to a maximum allowable credit of 50 percent)</i>			
Description of Water Quality Credit Eligibility (if applicable)	This project is within Santa Ana River, Reach 4		

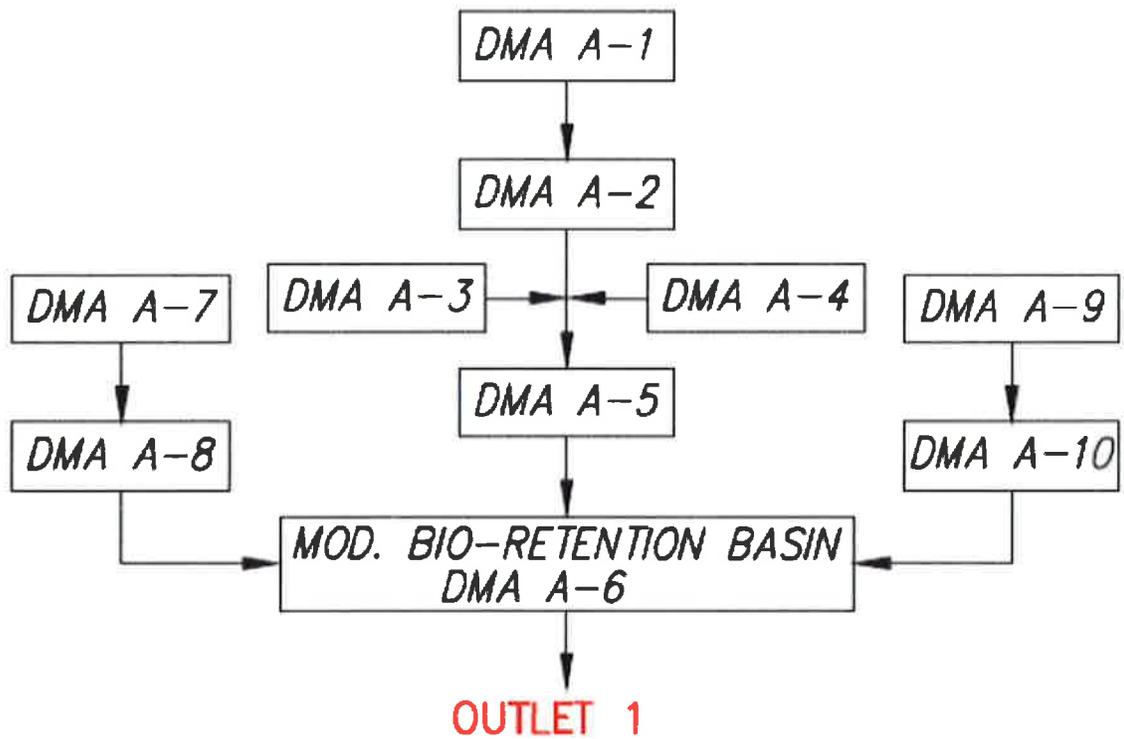
Section 3 Site and Watershed Description

Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example.

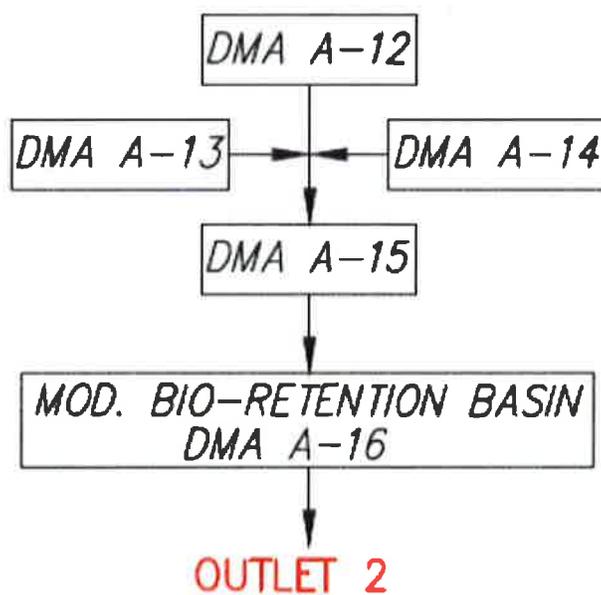
Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Form 3-1 Site Location and Hydrologic Features			
Site coordinates <i>take GPS measurement at approximate center of site</i>	Latitude 34.025632	Longitude -117.347803	Thomas Bros Map page
<p>1 San Bernardino County climatic region: <input checked="" type="checkbox"/> Valley <input type="checkbox"/> Mountain</p>			
<p>2 Does the site have more than one drainage area (DA): Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached</i></p>			
<pre> graph TD DA1DMAA[DA1 DMA A] --> Outlet1[Outlet 1] DA1DMAB[DA1 DMA B] --> Outlet1 DA1DMAB --> Outlet2[Outlet 2] DA2[DA2] --> Outlet2 DA1DMAC[DA1 DMA C] --> DA1DMAA </pre>			
<p>Example only – modify for project specific WQMP using additional form</p>			
Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA		
DA1 DMA C flows to DA1 DMA A	<i>Ex. Bioretention overflow to vegetated bioswale with 4' bottom width, 5:1 side slopes and bed slope of 0.01. Conveys runoff for 1000' through DMA 1 to existing catch basin on SE corner of property</i>		
DA1 DMA A to Outlet 1	<i>See below:</i>		
DA1 DMA B to Outlet 1			
DA2 to Outlet 2			

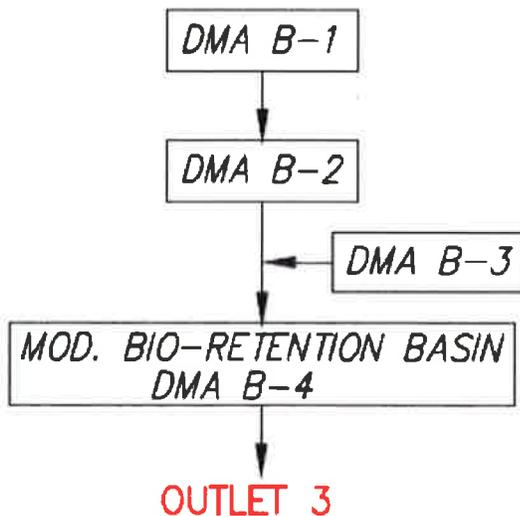
FORM 3-1:



FORM 3-1:

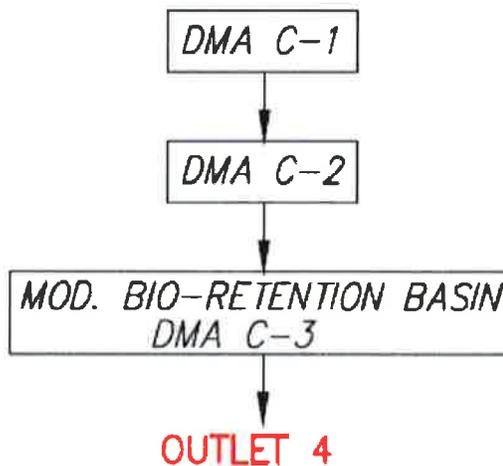
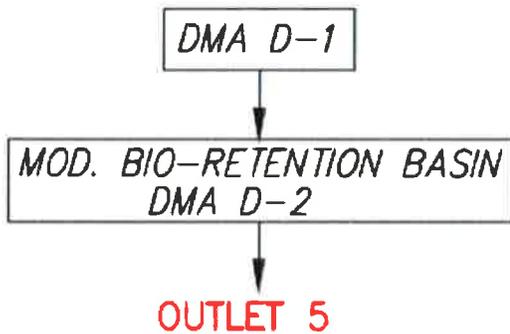


FORM 3-1:

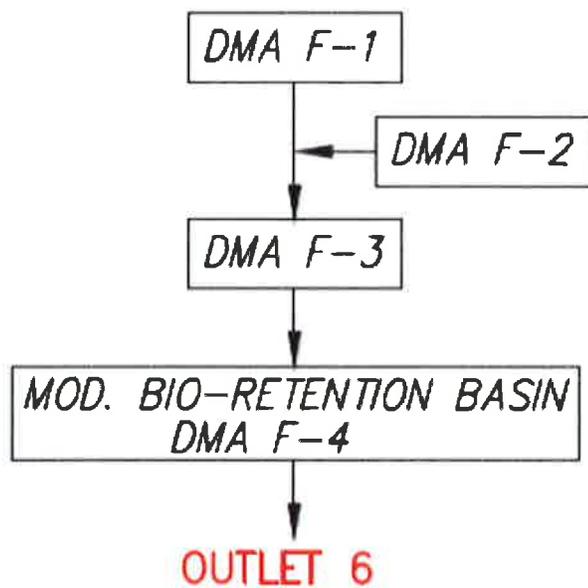


FORM 3-1:

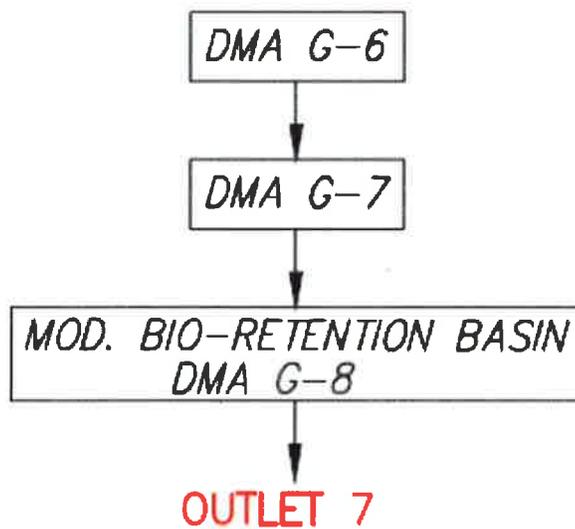
FORM 3-1:



FORM 3-1:



FORM 3-1:



Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	DMA D
1 DMA drainage area (ft ²)	<i>See below:</i>	<i>See below:</i>	N/A	
2 Existing site impervious area (ft ²)				
3 Antecedent moisture condition <i>For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf</i>				
4 Hydrologic soil group <i>Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/</i>				
5 Longest flowpath length (ft)				
6 Longest flowpath slope (ft/ft)				
7 Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>				
8 Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>				

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1 (use only as needed for additional DMA w/in DA 1)				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA E	DMA F	DMA G	DMA H
1 DMA drainage area (ft ²)	N/A			
2 Existing site impervious area (ft ²)				
3 Antecedent moisture condition <i>For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf</i>				
4 Hydrologic soil group <i>Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/</i>				
5 Longest flowpath length (ft)				
6 Longest flowpath slope (ft/ft)				
7 Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>				
8 Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>				

The Roquet Ranch – TTM 19983 projects comprises approximately 335 acres and is located at La Loma Hills, west of La Cadena Drive, east of Santa Ana River and north of County of Riverside boundary in City of Colton, California. The majority of the site is currently vacant with an overhead electric power transmission line that generally bisects the property, trending southeast in the northern portion of the property and north-south in the central portion of the site. Along the southern boundary of the site, the transmission line turns to the east and exits the site at the eastern boundary.

Numerous dirt access roads and trails cross the site. Numerous dirt access roads and trails cross the site. There are a few piles of stockpiled material as well as debris and trash in the central portion of the site. Various equipment and stockpiles of asphalt grindings associated with Roquet Paving operations were observed in the southeastern portion of the site.

Plant growth currently consists of an assortment of native grasses and brush, with very heavy vegetation in some areas, as well as a few mature trees occurring in the southwestern portion of the site. The steeper hillside areas of the site have little to no vegetation due to the rock outcrops. Some of the gently sloping low lying areas appear to have been recently disked.

There are two (2) watersheds drainage areas in this study, Drainage Area A drains to Highgrove Channel along the southern boundary of the project side. Drainage Area B drains to northwest toward Santa Ana River.

The first watershed Drainage Area A is approximately 184 acres, consists of several streams (sub-drainage areas AA through AI) tributary to the majority of the project site except the northern portion. Drainage Area A is tributary to existing Highgrove Channel along the south side of the project boundary.

The second watershed Drainage Area B is approximately 157 acres, tributary to the northern portion of the project site. Drainage Area B is tributary to Santa Ana River.



Aerial Picture Current Condition

Form 3-3 Watershed Description for Drainage Area	
<p>Receiving waters</p> <p><i>Refer to Watershed Mapping Tool -</i> http://permitrack.sbcounty.gov/wap/ See "Drainage Facilities" link at this website</p>	<p>The Receiving Waters for the project site are Santa Ana River Reach 4, Prado Dam and Pacific Ocean.</p> <p>The Regional Water Quality Santa Ana River Reach 4, Prado Dam mitigate the HCOC aspect of the this development, therefore this project is NOT potentially susceptible to hydromodification impacts, and hydromodification does not need to be considered further.</p>
<p>Applicable TMDLs</p> <p><i>Refer to Local Implementation Plan</i></p>	<p>TMDLs established for Santa Ana River, Reach 4 is Pathogens from unknown non-point sources</p>
<p>303(d) listed impairments</p> <p><i>Refer to Local Implementation Plan and Watershed Mapping Tool -</i> http://permitrack.sbcounty.gov/wap/ and State Water Resources Control Board website - http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml</p>	<p style="text-align: center;">Pathogens</p>
<p>Environmentally Sensitive Areas (ESA)</p> <p><i>Refer to Watershed Mapping Tool -</i> http://permitrack.sbcounty.gov/wap/</p>	<p>There are no Environmentally Sensitive and Special Biological Significant Areas designations adjacent to the project.</p>
<p>Unlined Downstream Water Bodies</p> <p><i>Refer to Watershed Mapping Tool -</i> http://permitrack.sbcounty.gov/wap/</p>	<p style="text-align: center;">Prado Dam</p>
<p>Hydrologic Conditions of Concern</p>	<p><input type="checkbox"/> Yes Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal</p> <p><input checked="" type="checkbox"/> No</p>
<p>Watershed-based BMP included in a RWQCB approved WAP</p>	<p><input type="checkbox"/> Yes Attach verification of regional BMP evaluation criteria in WAP</p> <ul style="list-style-type: none"> • More Effective than On-site LID • Remaining Capacity for Project DCV • Upstream of any Water of the US • Operational at Project Completion • Long-Term Maintenance Plan <p><input checked="" type="checkbox"/> No</p>

2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) — Statewide

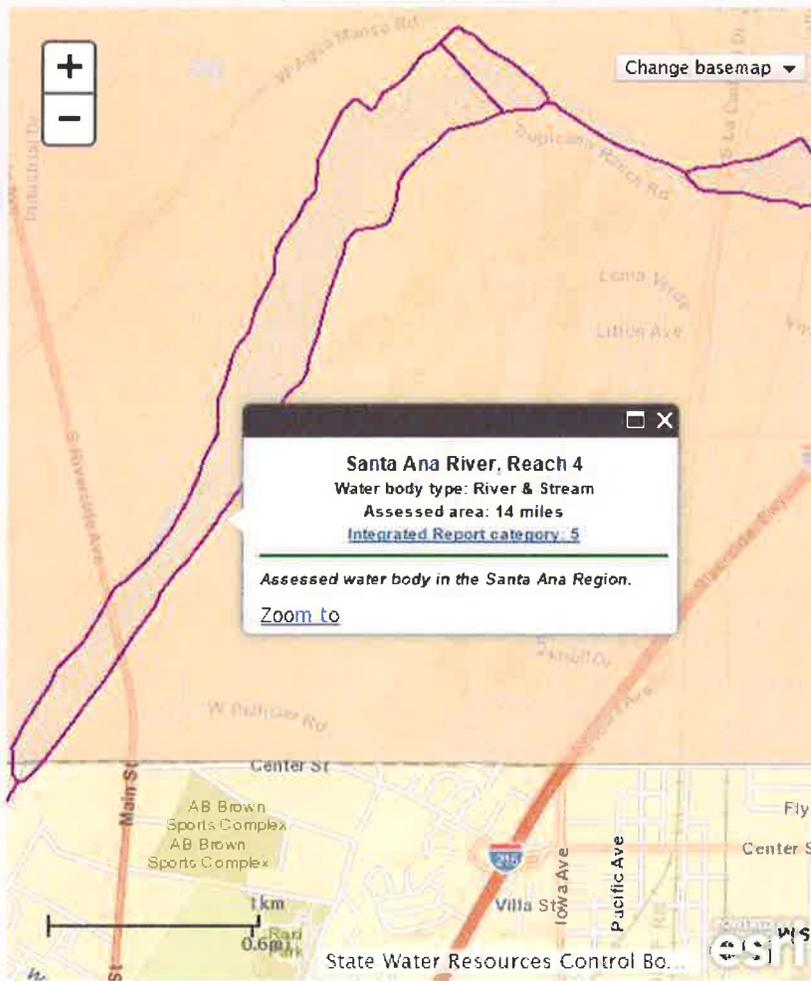
2010 Integrated Report **Map** 303(d) List Admin. Record Data Download Past Reports Contact Us

2010 INTEGRATED REPORT — ALL ASSESSED WATERS

Zoom to county: San Bernardino Zoom to Regional Board: All
 Show county Show Regional Board

Map Help

Zoom to water body: (Filter: All) Filter list by: Reset list



Santa Ana River, Reach 4 Pollutant assessments	
Pollutants	Listing Decision Report Link Potential Sources Schedule Comments
Pathogens	List on 303(d) list (TMDL required list) 20514 n/a Est. TMDL completion: 2019

This [Webinar](#) walks the user through the Integrated Report and its geospatial information system.

REGION	WATER BODY NAME	WATER TYPE	WATERSHED CALWATER/USGS HUC	POLLUTANT POTENTIAL SOURCES	ESTIMATED AREA ASSESSED	FIRST YEAR LISTED	TMDL REQUIREMENT STATUS	DATE
				<ul style="list-style-type: none"> Pathogens Dairies 	26 Miles	1994	5B	2007
8	Santa Ana River, Reach 4	River & Stream	80127000 / 18070203	<ul style="list-style-type: none"> Pathogens Nonpoint Source 	14 Miles	1994	5A	2019

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

Form 4.1-1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Educational materials and training will be provided to property owner, HOA staff members including education materials and restrictions to reduce pollutants from reaching the storm drain system.
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Encourage home owners with fliers explaining that not to wash vehicle and other equipment in the street areas. Prohibit maintenance or repair vehicle outdoors.
N3	Landscape Management BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Landscape maintenance crews shall regularly clean and remove landscape waste and litter and prevent discharges of mowing, trimmings, cuttings, fertilizers and pesticides into the MS4.
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Maintenance personnel shall maintain the non-structural BMPs as needed.
N5	Title 22 CCR Compliance (How development will comply)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hazardous materials shall not be handled or store at this project site.
N6	Local Water Quality Ordinances	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Shall be responsible for applying and complying with appropriate local water quality permits for stormwater discharges, will include in CC&R.
N7	Spill Contingency Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No hazardous compounds will be stored at this project site.
N8	Underground Storage Tank Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No underground tank in the project
N9	Hazardous Materials Disclosure Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Hazardous Material storage in the project

Form 4.1-1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Flammable, corrosive or reactive materials shall not be handled, stored or used on this project site.
N11	Litter/Debris Control Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Landscape maintenance crews shall regularly clean and remove landscape waste and litter, otherwise City street sweeping will clean street bi-weekly.
N12	Employee Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Educational materials and training will be provided to HOA maintenance staff members including education materials and restrictions to reduce pollutants from reaching the storm drain system.
N13	Housekeeping of Loading Docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No loading docks in the project
N14	Catch Basin Inspection Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The City of Colton Public Works Agency will inspect and clean all public catch basins within project.
N15	Vacuum Sweeping of Private Streets and Parking Lots	<input type="checkbox"/>	<input checked="" type="checkbox"/>	City of Colton shall sweep all streets at least bi-weekly.
N16	Other Non-structural Measures for Public Agency Projects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Private owned project
N17	Comply with all other applicable NPDES permits	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stenciling and signage (CASQA New Development BMP Handbook SD-13)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All storm drain inlets shall be placarded with an almetek stainless steel plaque (see attached) with the words "No Dumping - Drains to River".
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No outdoor material storage
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Dumpsters or other commercial type receptacles outdoors should be covered to prevent runoff or run-off from area.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The irrigation system will include devices to prevent low head drainage, overspray and runoff through the use of pressure regulating devices, check valves, flow sensors, proper spacing and ET or weather based controllers. Recycled water shall be used to irrigate parks and parkways. Employ rain-trigger shut-off devices to prevent irrigation after precipitation. Design irrigation system to each landscape area's specific water requirements.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	<input checked="" type="checkbox"/>	<input type="checkbox"/>	All landscaped areas within the project shall be finish graded at 2" below pavement grade, adjacent to paved areas.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No dock areas
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Maintenance bays within the project site
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Vehicle wash areas within the project site

Water Quality Management Plan (WQMP)

S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Outdoor processing areas within the project site
Form 4.1-2 Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Equipment wash areas within the project site
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Fueling areas within the project site
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Stabilize temporary and permanent slope as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the slope.
S14	Wash water control for food preparation areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No wash water control for food preparation areas within the project site
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Community car wash racks within the project site

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Preventative LID Site Design Practices Checklist
<p>Site Design Practices <i>If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets</i></p>
<p>Minimize impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>The proposed project includes over 10 ac. of park and landscape open spaces. City of Colton street design guidelines were utilized in order to determine the min. pavement width for streets, sidewalks and min. width for driveways</i></p>
<p>Maximize natural infiltration capacity: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>In order to encourage evapotranspiration of storm water runoff, the proposed project incorporates bio-retention depressed landscape areas which provide ponding areas and promote infiltration/evapotranspiration as well.</i></p>
<p>Preserve existing drainage patterns and time of concentration: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>The drainage system is following the existing drainage patterns as much as practical.</i></p>
<p>Disconnect impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>Downspout disconnect, Parkway landscape, Parks and Open spaces</i></p>
<p>Protect existing vegetation and sensitive areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>Proposed open spaces</i></p>
<p>Re-vegetate disturbed areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>Proposed landscape, open space and local park</i></p>
<p>Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>In order to encourage evapotranspiration of storm water runoff, the proposed project incorporates bio-retention depressed landscape which provide ponding areas and promote infiltration/evapotranspiration as well.</i></p>
<p>Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>Yes, in proposed landscape areas and park. Encourage the builder to provide vegetated swales as part of the home owner landscape</i></p>
<p>Stake off areas that will be used for landscaping to minimize compaction during construction : Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: <i>Yes, in proposed landscape areas and park.</i></p>

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P₆ method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi²), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)		
1 Project area DA 1 (ft ²): See below:	2 Imperviousness after applying preventative site design practices (Imp%):	3 Runoff Coefficient (Rc): <u> </u> $R_c = 0.858(\text{Imp}\%)^{1.3} - 0.78(\text{Imp}\%)^{0.2} + 0.774(\text{Imp}\%) + 0.04$
4 Determine 1-hour rainfall depth for a 2-year return period P _{2yr-1hr} (in): 0.54 http://hdsc.nws.noaa.gov/hdsc/pfds/so/sca_pfds.html		
5 Compute P ₆ , Mean 6-hr Precipitation (inches): 0.79 <i>P₆ = Item 4 * C₁, where C₁ is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)</i>		
6 Drawdown Rate <i>Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.</i>		24-hrs <input type="checkbox"/> 48-hrs <input checked="" type="checkbox"/>
7 Compute design capture volume, DCV (ft ³): $DCV = 1/12 * [\text{Item 1} * \text{Item 3} * \text{Item 5} * C_2]$, where C ₂ is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963) <i>Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2</i>		

Form 4.2-1:

Roquet Ranch – BMP AA1 City of Colton San Bernardino Volume-Based BMP Design Calculations

Composite Runoff Coefficient (C_{BMP})

Drainage-Area	DMA-A-1 thru A-10	<i>Mix Surfaces</i>
Acres (Ac)	38.41	
% Impervious	60	
$i =$	0.6	
$C_{BMP} =$	0.41	

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Regression Coefficient

Region	Valley
Regression Coefficient	1.4807

Valley	1.4807
Mountain	1.909
Desert	1.2371

Area-Averaged "6-hour Mean Storm Rainfall" (P_6)

2 Year, 1 Hour Isohyet	0.536
$P_6 =$	0.793655

24 Hour	1.582
48 Hour	1.963

$$P_6 = 2 \text{ Yr } 1\text{-hr} * \text{Regression Coefficient}$$

Maximized Detention Volume (P_0)

Drawdown Time	48
Regression Constant (a)	1.963
P_0 (in inches) =	0.64

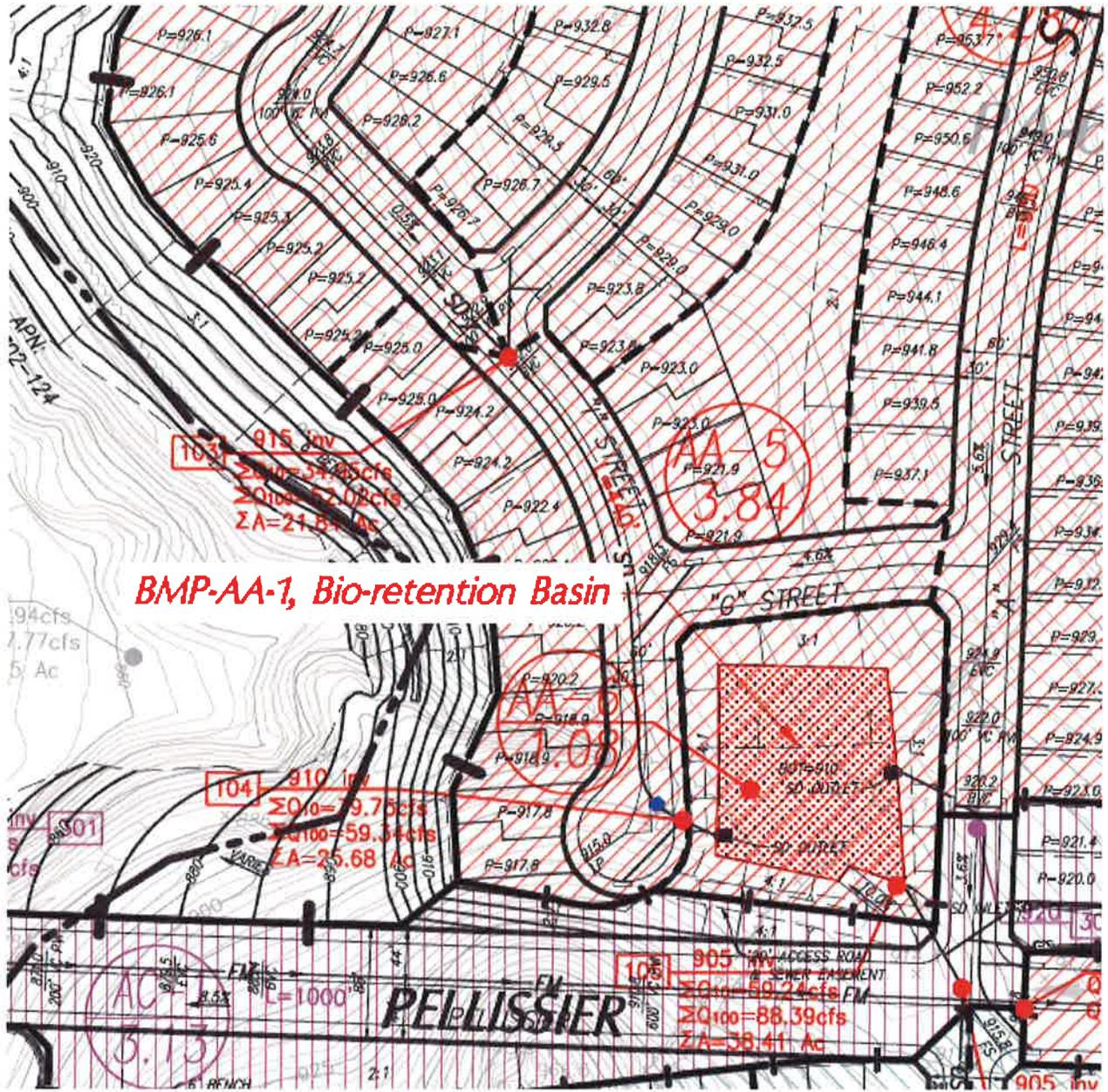
$i =$	Valley	0.2787
	Mountain	0.3614
	Desert	0.325

$$P_0 = a * C_{BMP} * P_6$$

Design Capture Volume (V_0)

V_0 (A in acres) =	2.04	acre-foot
$V_0 =$	88828	cu-ft

$$V_0 = P_0 * A$$



Form 4.2-1:

Roquet Ranch – BMP AA2 City of Colton San Bernardino Volume-Based BMP Design Calculations

Composite Runoff Coefficient (C_{BMP})

Drainage-Area	DMA-A-12 thru A-16	<i>Mix Surfaces</i>
Acres (Ac)	22.88	
% Impervious	60	
i =	0.6	
C_{BMP} =	0.41	

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Regression Coefficient

Region	Valley
Regression Coefficient	1.4807

Valley	1.4807
Mountain	1.909
Desert	1.2371

Area-Averaged "6-hour Mean Storm Rainfall" (P_6)

2 Year, 1 Hour Isohyet	0.536
P_6 =	0.7936552

24 Hour	1.582
48 Hour	1.963

$$P_6 = 2 \text{ Yr } 1\text{-hr} * \text{Regression Coefficient}$$

Maximized Detention Volume (P_0)

Drawdown Time	48
Regression Constant (a)	1.963
P_0 (in inches) =	0.64

i =	Valley	0.2787
	Mountain	0.3614
	Desert	0.325

$$P_0 = a * C_{BMP} * P_6$$

Design Capture Volume (V_0)

V_0 (A in acres) =	1.21	acre-feet
V_0 =	52913	cu-ft

$$V_0 = P_0 * A$$

Form 4.2-1:

Roquet Ranch – BMP AB City of Colton San Bernardino Volume-Based BMP Design Calculations

Composite Runoff Coefficient (C_{BMP})

Drainage-Area	DMA-AB-1 thru AB-4	<i>Mix Surfaces</i>
Acres (Ac)	23.45	
% Impervious	60	
i =	0.6	
C_{BMP} =	0.41	

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Regression Coefficient

Region	Valley
Regression Coefficient	1.4807

Valley	1.4807
Mountain	1.909
Desert	1.2371

Area-Averaged "6-hour Mean Storm Rainfall" (P_6)

2 Year, 1 Hour Isohyet	0.536
P_6 =	0.7936552

24 Hour	1.582
48 Hour	1.963

$$P_6 = 2 \text{ Yr } 1\text{-hr} * \text{Regression Coefficient}$$

Maximized Detention Volume (P_0)

Drawdown Time	48
Regression Constant (a)	1.963
P_0 (in inches) =	0.64

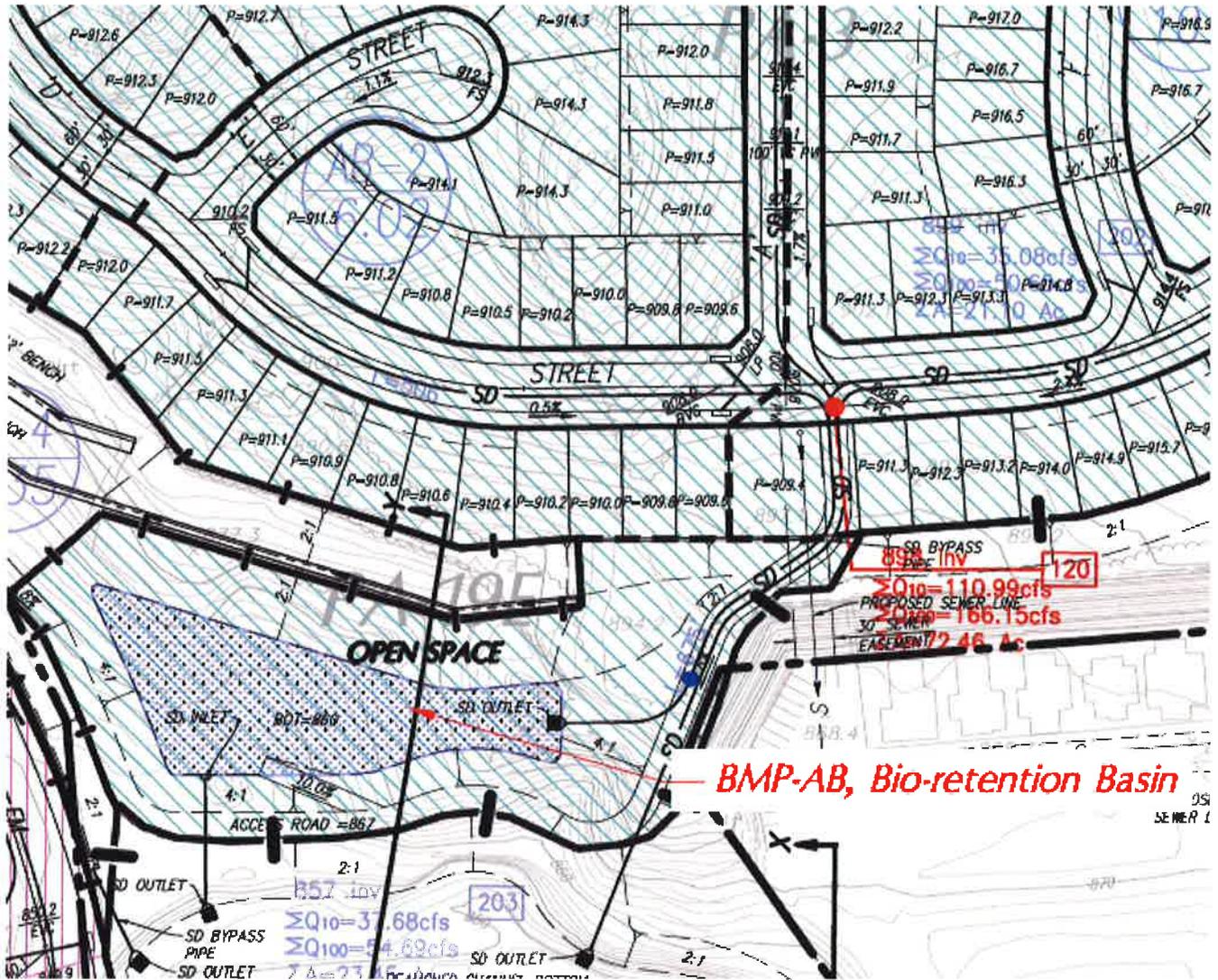
i =	Valley	0.2787
	Mountain	0.3614
	Desert	0.325

$$P_0 = a * C_{BMP} * P_6$$

Target Capture Volume (V_0)

V_0 (A in acres) =	1.24	acre-foot
V_0 =	54231	cu-ft

$$V_0 = P_0 * A$$



Form 4.2-1:

Roquet Ranch – BMP AC City of Colton San Bernardino Volume-Based BMP Design Calculations

Composite Runoff Coefficient (C_{BMP})

Drainage-Area	DMA-AC-1 thru AC-3	<i>Mix Surfaces</i>
Acres (Ac)	7.34	
% Impervious	85	
i =	0.85	
C _{BMP} =	0.66	

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Regression Coefficient

Region	Valley
Regression Coefficient	1.4807

Valley	1.4807
Mountain	1.909
Desert	1.2371

Area-Averaged "6-hour Mean Storm Rainfall" (P₆)

2 Year, 1 Hour Isohyet	0.536
P ₆ =	0.793655

24 Hour	1.582
48 Hour	1.963

$$P_6 = 2 \text{ Yr } 1\text{-hr} * \text{Regression Coefficient}$$

Maximized Detention Volume (P₀)

Drawdown Time	48
Regression Constant (a)	1.963
P ₀ (in inches) =	1.03

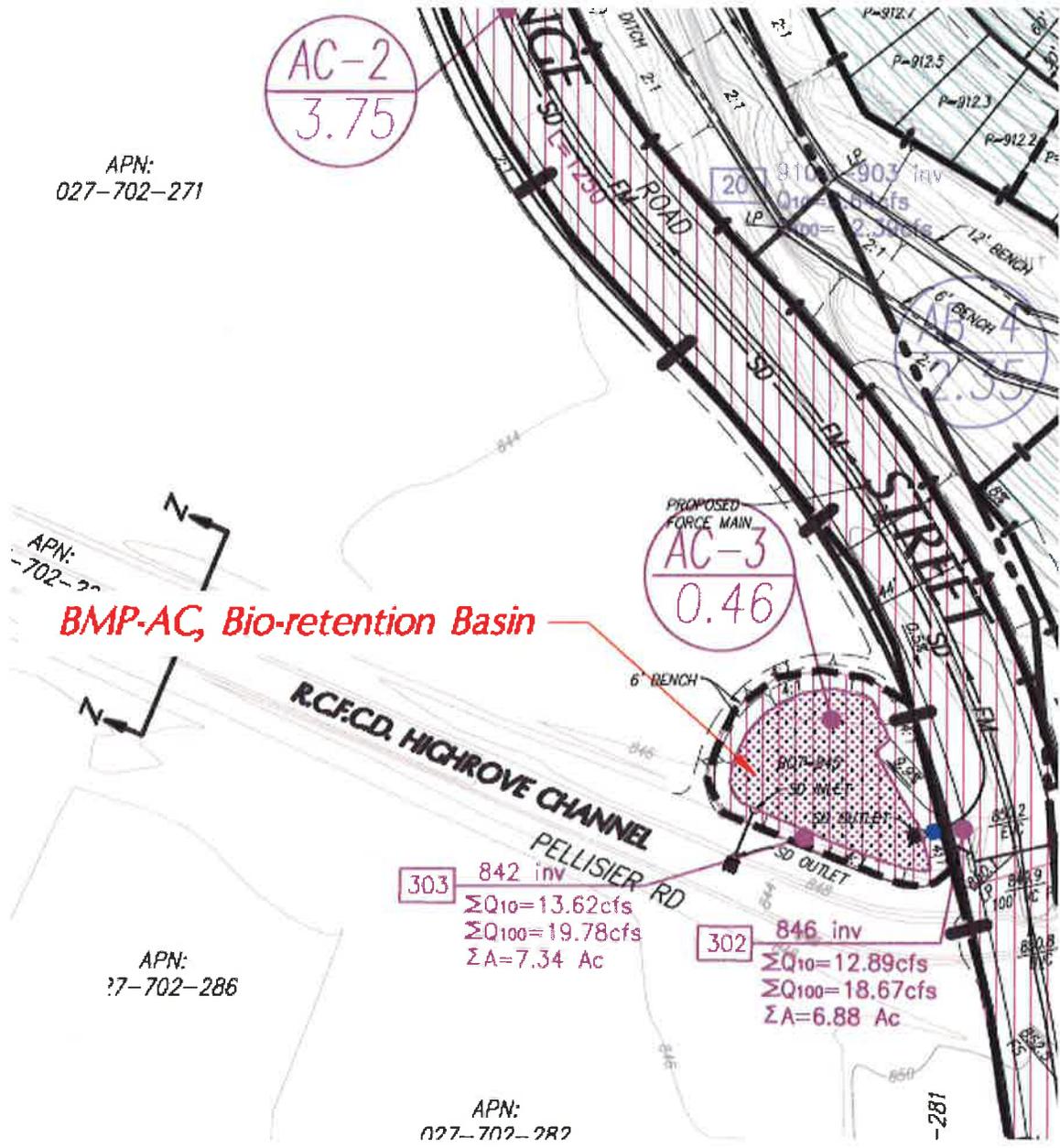
I =	Valley	0.2787
	Mountain	0.3614
	Desert	0.325

$$P_0 = a * C_{BMP} * P_6$$

Target Capture Volume (V₀)

V ₀ (A in acres) =	0.63	acre-foot
V ₀ =	27449	cu-ft

$$V_0 = P_0 * A$$



Form 4.2-1:

Roquet Ranch – BMP AD City of Colton San Bernardino Volume-Based BMP Design Calculations

Composite Runoff Coefficient (C_{BMP})

Drainage-Area	DMA-AD1	<i>Mix Surfaces</i>
Acres (Ac)	2.24	
% Impervious	70	
i =	0.7	
C _{BMP} =	0.49	

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Regression Coefficient

Region	Valley
Regression Coefficient	1.4807

Valley	1.4807
Mountain	1.909
Desert	1.2371

Area-Averaged "6-hour Mean Storm Rainfall" (P₆)

2 Year, 1 Hour Isohyet	0.536
P ₆ =	0.793655

24 Hour	1.582
48 Hour	1.963

$$P_6 = 2 \text{ Yr } 1\text{-hr} * \text{Regression Coefficient}$$

Maximized Detention Volume (P₀)

Drawdown Time	48
Regression Constant (a)	1.963
P ₀ (in inches) =	0.77

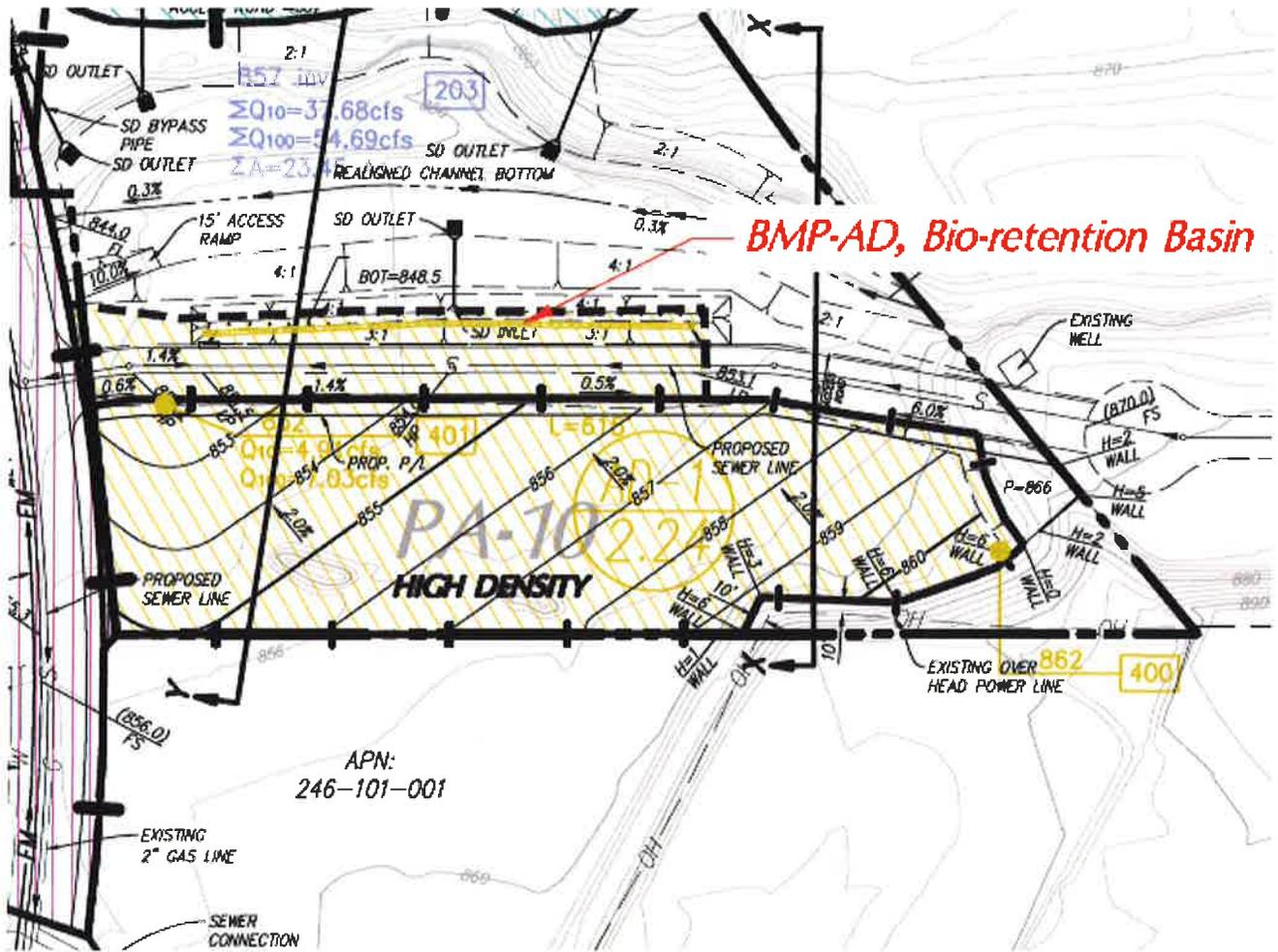
i =	Valley	0.2787
	Mountain	0.3614
	Desert	0.325

$$P_0 = a * C_{BMP} * P_6$$

Target Capture Volume (V₀)

V ₀ (A in acres) =	0.14	acre-feet
V ₀ =	6257	cu-ft

$$V_0 = P_0 * A$$



Form 4.2-1:

Roquet Ranch – BMP AF City of Colton San Bernardino Volume-Based BMP Design Calculations

Composite Runoff Coefficient (C_{BMP})

Drainage-Area	DMA-AF-1 thru AF-4	<i>Mix Surfaces</i>
Acres (Ac)	20.41	
% Impervious	70	
$i =$	0.7	
$C_{BMP} =$	0.49	

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Regression Coefficient

Region	Valley
Regression Coefficient	1.4807

Valley	1.4807
Mountain	1.909
Desert	1.2371

Area-Averaged "6-hour Mean Storm Rainfall" (P_6)

2 Year, 1 Hour Isohyet	0.536
$P_6 =$	0.793655

24 Hour	1.582
48 Hour	1.963

$$P_6 = 2 \text{ Yr } 1\text{-hr} * \text{Regression Coefficient}$$

Maximized Detention Volume (P_0)

Drawdown Time	48
Regression Constant (a)	1.963
P_0 (in inches) =	0.77

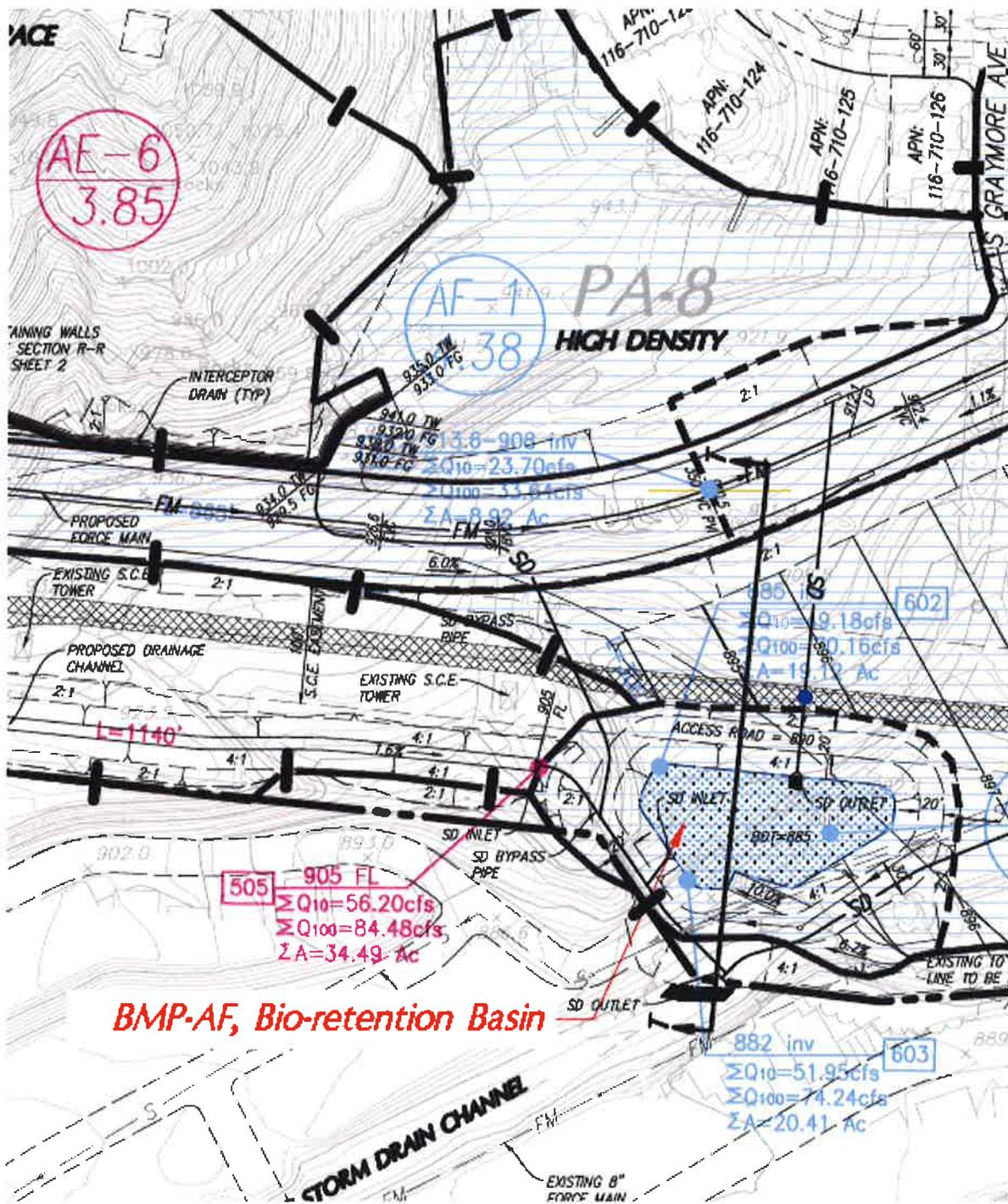
$i =$	Valley	0.2787
	Mountain	0.3614
	Desert	0.325

$$P_0 = a * C_{BMP} * P_6$$

Target Capture Volume (V_0)

V_0 (A in acres) =	1.31	acre-feet
$V_0 =$	57008	cu-ft

$$V_0 = P_0 * A$$



Form 4.2-1:

Roquet Ranch – BMP AG City of Colton San Bernardino Volume-Based BMP Design Calculations

Composite Runoff Coefficient (C_{BMP})

Drainage-Area	DMA-AG-6 thru AG-8	<i>Mix Surfaces</i>
Acres (Ac)	12.23	
% Impervious	55	
i =	0.55	
C_{BMP} =	0.37	

$$C_{BMP} = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Regression Coefficient

Region	Valley
Regression Coefficient	1.4807

Valley	1.4807
Mountain	1.909
Desert	1.2371

Area-Averaged "6-hour Mean Storm Rainfall" (P_6)

2 Year, 1 Hour Isohyet	0.536
P_6 =	0.793655

24 Hour	1.582
48 Hour	1.963

$$P_6 = 2 \text{ Yr } 1\text{-hr} * \text{Regression Coefficient}$$

Maximized Detention Volume (P_0)

Drawdown Time	48
Regression Constant (a)	1.963
P_0 (in inches) =	0.58

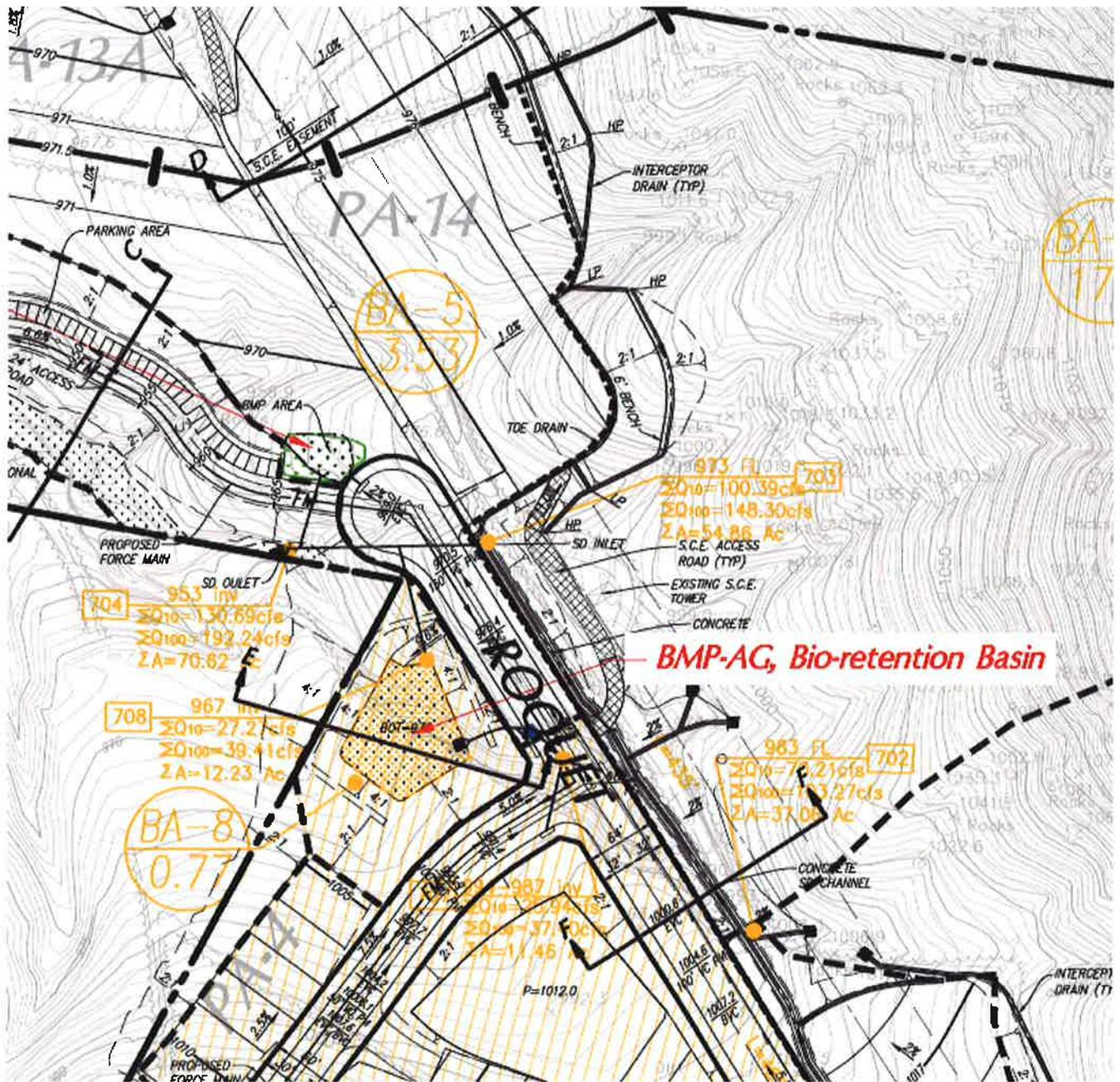
I =	Valley	0.2787
	Mountain	0.3614
	Desert	0.325

$$P_0 = a * C_{BMP} * P_6$$

Target Capture Volume (V_0)

V_0 (A in acres) =	0.59	acre-feet
V_0 =	25764	cu-ft

$$V_0 = P_0 * A$$



Form 4.2-2 Summary of HCOC Assessment (DA 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes No

Go to: <http://permitrack.sbcounty.gov/wap/>

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below
(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft ³)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	1 N/A <i>Form 4.2-3 Item 12</i>	2 <i>Form 4.2-4 Item 13</i>	3 <i>Form 4.2-5 Item 10</i>
Post-developed	4 N/A <i>Form 4.2-3 Item 13</i>	5 <i>Form 4.2-4 Item 14</i>	6 <i>Form 4.2-5 Item 14</i>
Difference	7 N/A <i>Item 4 – Item 1</i>	8 <i>Item 2 – Item 5</i>	9 <i>Item 6 – Item 3</i>
Difference (as % of pre-developed)	10 % <i>Item 7 / Item 1</i>	11 % <i>Item 8 / Item 2</i>	12 % <i>Item 9 / Item 3</i>

Form 4.2-3 HCOC Assessment for Runoff Volume (DA 1)

Weighted Curve Number Determination for: Pre-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type	N/A							
2a Hydrologic Soil Group (HSG)								
3a DMA Area, ft ² sum of areas of DMA should equal area of DA								
4a Curve Number (CN) use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
Weighted Curve Number Determination for: Post-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type								
2b Hydrologic Soil Group (HSG)								
3b DMA Area, ft ² sum of areas of DMA should equal area of DA								
4b Curve Number (CN) use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
5 Pre-Developed area-weighted CN:	7 Pre-developed soil storage capacity, S (in): $S = (1000 / \text{Item 5}) - 10$				9 Initial abstraction, I _a (in): $I_a = 0.2 * \text{Item 7}$			
6 Post-Developed area-weighted CN:	8 Post-developed soil storage capacity, S (in): $S = (1000 / \text{Item 6}) - 10$				10 Initial abstraction, I _a (in): $I_a = 0.2 * \text{Item 8}$			
11 Precipitation for 2 yr, 24 hr storm (in): Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/so/sca_pfds.html								
12 Pre-developed Volume (ft ³): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 9})^2 / ((\text{Item 11} - \text{Item 9} + \text{Item 7}))]$								
13 Post-developed Volume (ft ³): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 10})^2 / ((\text{Item 11} - \text{Item 10} + \text{Item 8}))]$								
14 Volume Reduction needed to meet HCOC Requirement, (ft ³): $V_{HCOC} = (\text{Item 13} * 0.95) - \text{Item 12}$								

Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1)

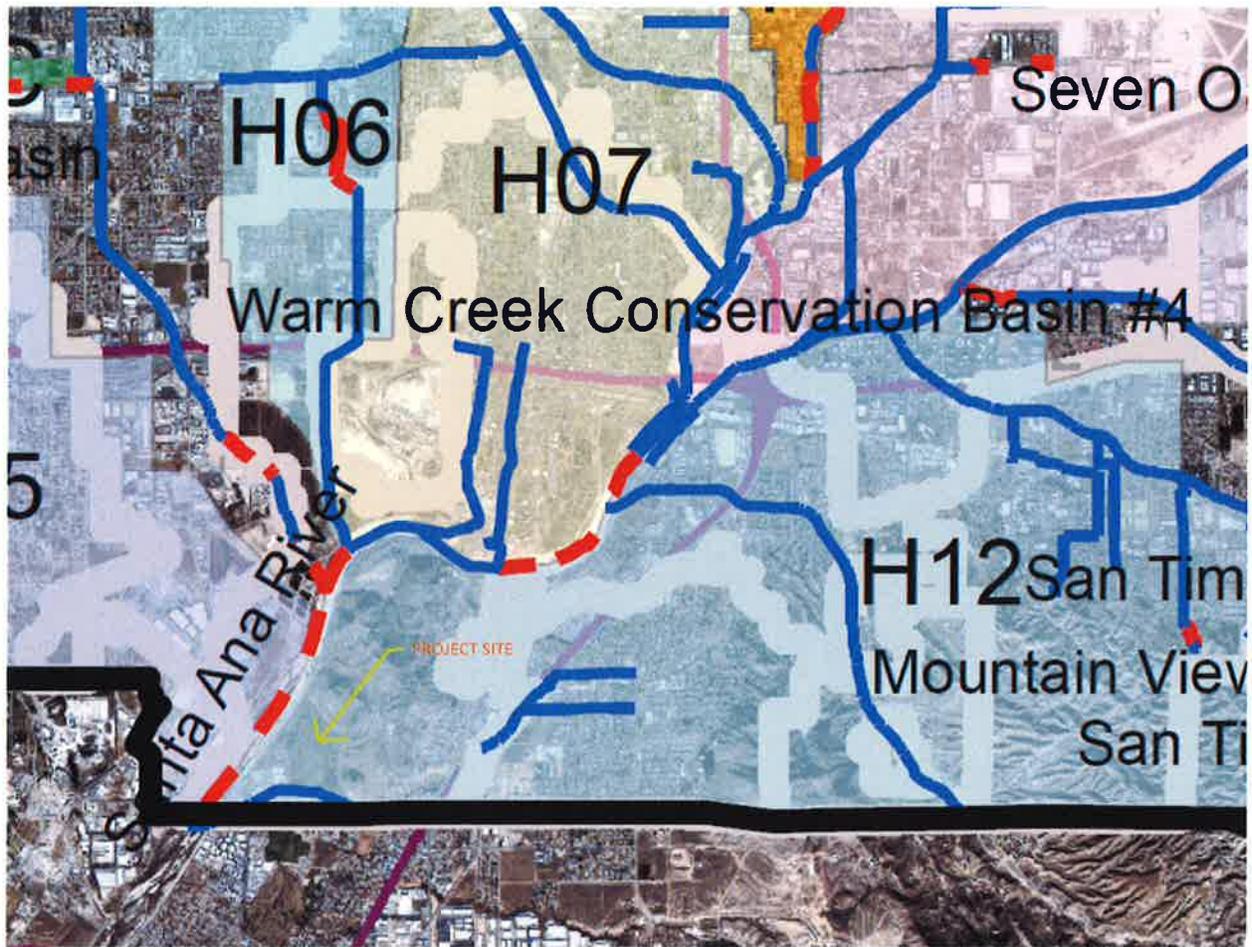
Compute time of concentration for pre and post developed conditions for each DA (For projects using the Hydrology Manual complete the form below)

Variables	Pre-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>				Post-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>			
	DMA A	DMA B	DMA C	DMA D	DMA A	DMA B	DMA C	DMA D
1 Length of flowpath (ft) <i>Use Form 3-2 Item 5 for pre-developed condition</i>	N/A							
2 Change in elevation (ft)								
3 Slope (ft/ft), $S_o = \text{Item 2} / \text{Item 1}$								
4 Land cover								
5 Initial DMA Time of Concentration (min) <i>Appendix C-1 of the TGD for WQMP</i>								
6 Length of conveyance from DMA outlet to project site outlet (ft) <i>May be zero if DMA outlet is at project site outlet</i>								
7 Cross-sectional area of channel (ft ²)								
8 Wetted perimeter of channel (ft)								
9 Manning's roughness of channel (n)								
10 Channel flow velocity (ft/sec) $V_{fps} = (1.49 / \text{Item 9}) * (\text{Item 7} / \text{Item 8})^{0.67} * (\text{Item 3})^{0.5}$								
11 Travel time to outlet (min) $T_t = \text{Item 6} / (\text{Item 10} * 60)$								
12 Total time of concentration (min) $T_c = \text{Item 5} + \text{Item 11}$								
13 Pre-developed time of concentration (min):	<i>Minimum of Item 12 pre-developed DMA</i>							
14 Post-developed time of concentration (min):	<i>Minimum of Item 12 post-developed DMA</i>							
15 Additional time of concentration needed to meet HCOC requirement (min):	$T_{C-HCOC} = (\text{Item 13} * 0.95) - \text{Item 14}$							

Form 4.2-5 HCOC Assessment for Peak Runoff (DA 1)

Compute peak runoff for pre- and post-developed conditions

Variables	Pre-developed DA to Project Outlet (Use additional forms if more than 3 DMA)			Post-developed DA to Project Outlet (Use additional forms if more than 3 DMA)		
	DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
1 Rainfall Intensity for storm duration equal to time of concentration $I_{peak} = 10^{(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 / 60)}$	N/A					
2 Drainage Area of each DMA (Acres) For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)						
3 Ratio of pervious area to total area For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)						
4 Pervious area infiltration rate (in/hr) Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP						
5 Maximum loss rate (in/hr) $F_m = Item 3 * Item 4$ Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)						
6 Peak Flow from DMA (cfs) $Q_p = Item 2 * 0.9 * (Item 1 - Item 5)$						
7 Time of concentration adjustment factor for other DMA to site discharge point Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)	DMA A	n/a		n/a		
	DMA B		n/a		n/a	
	DMA C		n/a			n/a
8 Pre-developed Q_p at T_c for DMA A: $Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAA/2}] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAA/3}]$	9 Pre-developed Q_p at T_c for DMA B: $Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAB/1}] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC}) / (Item 1_{DMAC} - Item 5_{DMAC}) * Item 7_{DMAB/3}]$			10 Pre-developed Q_p at T_c for DMA C: $Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA}) / (Item 1_{DMAA} - Item 5_{DMAA}) * Item 7_{DMAC/1}] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB}) / (Item 1_{DMAB} - Item 5_{DMAB}) * Item 7_{DMAC/2}]$		
10 Peak runoff from pre-developed condition confluence analysis (cfs): Maximum of Item 8, 9, and 10 (including additional forms as needed)						
11 Post-developed Q_p at T_c for DMA A: Same as Item 8 for post-developed values	12 Post-developed Q_p at T_c for DMA B: Same as Item 9 for post-developed values			13 Post-developed Q_p at T_c for DMA C: Same as Item 10 for post-developed values		
14 Peak runoff from post-developed condition confluence analysis (cfs): Maximum of Item 11, 12, and 13 (including additional forms as needed)						
15 Peak runoff reduction needed to meet HCOC Requirement (cfs): $Q_{p-HCOC} = (Item 14 * 0.95) - Item 10$						



HCOC Exempt Areas

None Exempt	F	H03	H09	III	VI
HCOC Exempt	G	H04	H10	IV	VII
A	H01	H05	H11	IX	VIII
B	H02	H06	H12	J	W
C	H02A	H07	I	U	X
E	H02B	H08	II	V	XIII

Summary of HCOC Exempted Area

	HCOC Exemption reasoning				
	1	2	3	4	5
Area					
A			X		X
B			X		
C					X
E			X		
F					X
G			X		X
H01	X		X		
H02	X		X		
H02A	X		X		
H02B			X		
H03			X		
H04	X		X		
H05	X				
H06			X		
H07	X				
H08	X		X		
H09	X				
H10	X		X		
H11	X		X		
H12	X				
J			X		
U			X		
W			X;		
I			X		
II			X		
III					X
IV			X		X
V			X*		
VI					X
VII					X
VIII			X		
IX					X
X			X		
XIII			X		

*Detention/Conservation Basin

Hydromodification

A.1 Hydrologic Conditions of Concern (HCOC) Analysis

HCOC Exemption:

1. **Sump Condition:** All downstream conveyance channel to an adequate sump (for example, Prado Dam, Santa Ana River, or other Lake, Reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Therefore, this project **is not** potentially susceptible to hydromodification impacts, an HCOC does not exist and hydromodification **does not** need to be considered further.

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is “Yes,” provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable HSC BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2).

Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

¹ Would infiltration BMP pose significant risk for groundwater related concerns? Yes No
Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

² Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes No
 (Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

³ Would infiltration of runoff on a Project site violate downstream water rights? Yes No

If Yes, Provide basis: (attach)

⁴ Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes No

If Yes, Provide basis: (attach)

⁵ Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes No

If Yes, Provide basis: (attach)

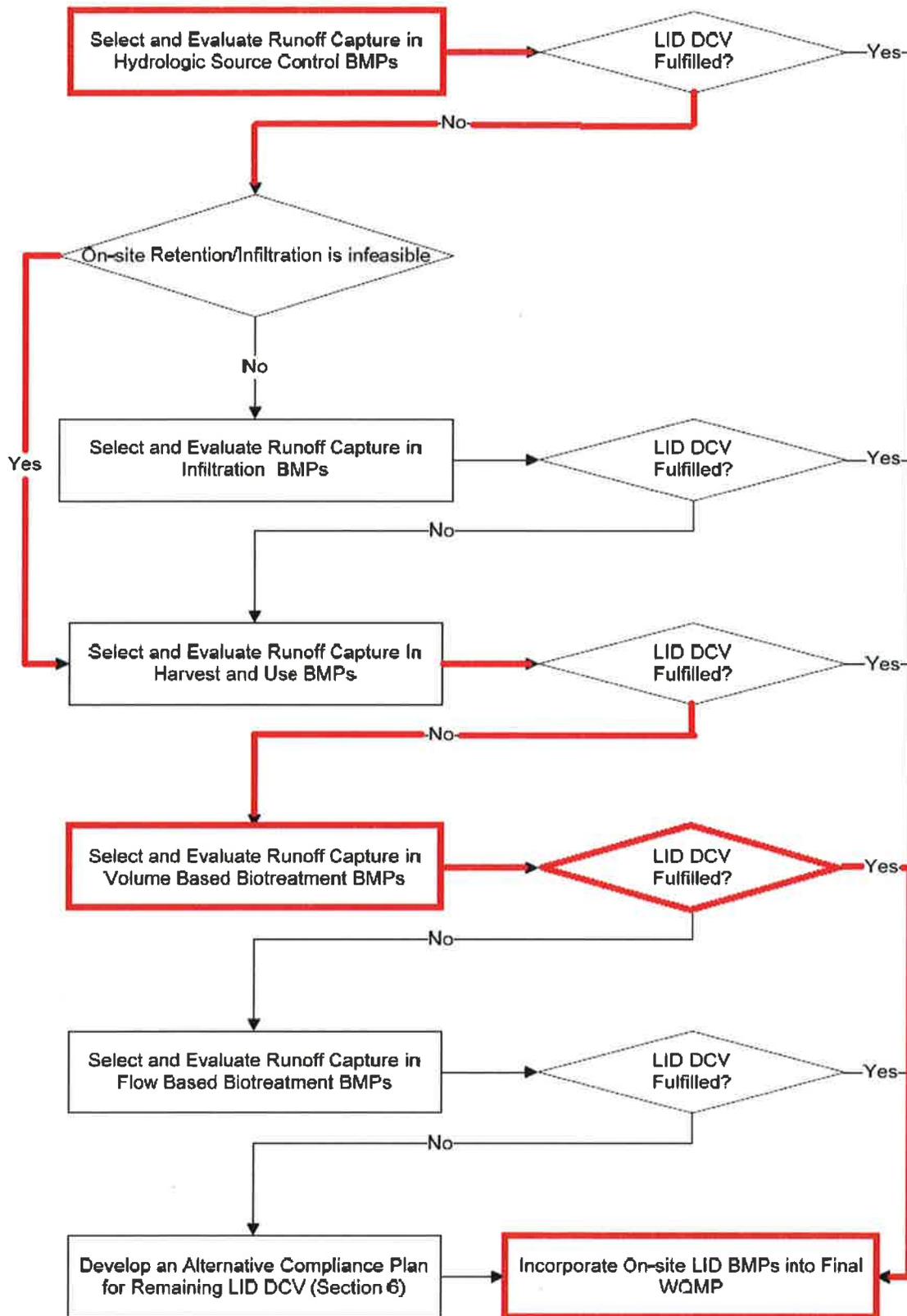
⁶ Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes No
See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

⁷ Any answer from Item 1 through Item 3 is “Yes”: Yes No
If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 8 below.

⁸ Any answer from Item 4 through Item 6 is “Yes”: Yes No
If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP. If no, then proceed to Item 9, below.

⁹ All answers to Item 1 through Item 6 are “No”:
Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP. Proceed to Form 4.3-2, Hydrologic Source Control BMP.



On-site LID BMP Selection and Evaluation Flowchart

Jim,

We completed the infiltration testing and the results are not very good. Much of the site is underlain by granitic bedrock that does not perc well (Infiltration rate of 0.1 in/hr). Of the 5 locations tested, only one provided acceptable results (WP-5, 4 in/hr), but our borings showed that granitic bedrock is only 5 feet or so below our test elevation and thus while it tested okay, it may not infiltrate well once larger quantities of water are involved. County guidelines state that if an impermeable layer is present at shallow depth below the infiltration facility, we should consider this and reduce the design infiltration rate. So depending on the volume of water to be infiltrated in this area, this value may be reduced

The area of WP3 is underlain by uncontrolled artificial fill. To conduct these test we drilled through the fill to bedrock. We attempted to test on the bedrock, but the hole caved. The bedrock did not infiltrate well. The artificial fill will need to be completely removed and replaced as compacted fill during construction.

The results are summarized on the attached (see the far right column on each sheet for the infiltration rate). The test locations are shown on the map.

Let me know if you have questions.

Thanks

Phil

Philip A. Buchiarelli

Principal Geologist

10532 Acacia Street, Suite B6

Rancho Cucamonga, CA 91730

951-907-6872 Cell

909-527-8778 Direct

Leighton

Solutions You Can Build On

See Infiltration test result in the end of this report

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)				
1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, complete Items 2-5; If no, proceed to Item 6	DA BMP Type	DMA BMP Type	DA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
2 Total impervious area draining to pervious area (ft ²)				
3 Ratio of pervious area receiving runoff to impervious area				
4 Retention volume achieved from impervious area dispersion (ft ³) $V = \text{Item 2} * \text{Item 3} * (0.5/12)$, assuming retention of 0.5 inches of runoff				
5 Sum of retention volume achieved from impervious area dispersion (ft ³):		$V_{\text{retention}} = \text{Sum of Item 4 for all BMPs}$		
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14	DA BMP Type	DMA BMP Type	DA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
7 Ponding surface area (ft ²)				
8 Ponding depth (ft)				
9 Surface area of amended soil/gravel (ft ²)				
10 Average depth of amended soil/gravel (ft)				
11 Average porosity of amended soil/gravel				
12 Retention volume achieved from on-lot infiltration (ft ³) $V_{\text{retention}} = (\text{Item 7} * \text{Item 8}) + (\text{Item 9} * \text{Item 10} * \text{Item 11})$				
13 Runoff volume retention from on-lot infiltration (ft ³):		$V_{\text{retention}} = \text{Sum of Item 12 for all BMPs}$		

Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs (DA 1)

<p>14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 15-20. If no, proceed to Item 21</i></p>	<p>DA DMA BMP Type</p>	<p>DA DMA BMP Type</p>	<p>DA DMA BMP Type <i>(Use additional forms for more BMPs)</i></p>
<p>15 Rooftop area planned for ET BMP (ft²)</p>			
<p>16 Average wet season ET demand (in/day) <i>Use local values, typical ~ 0.1</i></p>			
<p>17 Daily ET demand (ft³/day) <i>Item 15 * (Item 16 / 12)</i></p>			
<p>18 Drawdown time (hrs) <i>Copy Item 6 in Form 4.2-1</i></p>			
<p>19 Retention Volume (ft³) <i>V_{retention} = Item 17 * (Item 18 / 24)</i></p>			
<p>20 Runoff volume retention from evapotranspiration BMPs (ft³): <i>V_{retention} = Sum of Item 19 for all BMPs</i></p>			
<p>21 Implementation of Street Trees: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, complete Items 22-25. If no, proceed to Item 26</i></p>	<p>DA DMA BMP Type</p>	<p>DA DMA BMP Type</p>	<p>DA DMA BMP Type <i>(Use additional forms for more BMPs)</i></p>
<p>22 Number of Street Trees</p>	<p>Later at design phase</p>		
<p>23 Average canopy cover over impervious area (ft²)</p>			
<p>24 Runoff volume retention from street trees (ft³) <i>V_{retention} = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches</i></p>			
<p>25 Runoff volume retention from street tree BMPs (ft³): <i>V_{retention} = Sum of Item 24 for all BMPs</i></p>			
<p>26 Implementation of residential rain barrel/cisterns: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, complete Items 27-29; If no, proceed to Item 30</i></p>	<p>DA DMA BMP Type</p>	<p>DA DMA BMP Type</p>	<p>DA DMA BMP Type <i>(Use additional forms for more BMPs)</i></p>
<p>27 Number of rain barrels/cisterns</p>			
<p>28 Runoff volume retention from rain barrels/cisterns (ft³) <i>V_{retention} = Item 27 * 3</i></p>			
<p>29 Runoff volume retention from residential rain barrels/Cisterns (ft³): <i>V_{retention} = Sum of Item 28 for all BMPs</i></p>			
<p>30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: see attached Form 4.2-1 <i>Sum of Items 5, 13, 20, 25 and 29</i></p>			

4.3.2 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix D of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)				
1 Remaining LID DCV not met by site design HSC BMP (ft ³): full DCV to proposed BMP $V_{unmet} = \text{Form 4.2-1 Item 7} - \text{Form 4.3-2 Item 30}$				
BMP Type <i>Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs</i>	DA BMP Type	DMA	DA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
2 Infiltration rate of underlying soils (in/hr) <i>See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods</i>				
3 Infiltration safety factor <i>See TGD Section 5.4.2 and Appendix D</i>				
4 Design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$				
5 Pondered water drawdown time (hr) <i>Copy Item 6 in Form 4.2-1</i>				
6 Maximum ponding depth (ft) <i>BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details</i>				
7 Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$				
8 Infiltrating surface area, SA_{BMP} (ft ²) <i>the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP</i>				
9 Amended soil depth, d_{media} (ft) <i>Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details</i>				
10 Amended soil porosity				
11 Gravel depth, d_{media} (ft) <i>Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details</i>				
12 Gravel porosity				
13 Duration of storm as basin is filling (hrs) <i>Typical ~ 3hrs</i>				
14 Above Ground Retention Volume (ft ³) $V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$				
15 Underground Retention Volume (ft ³) <i>Volume determined using manufacturer's specifications and calculations</i>				
16 Total Retention Volume from LID Infiltration BMPs: <i>(Sum of Items 14 and 15 for all infiltration BMP included in plan)</i>				
17 Fraction of DCV achieved with infiltration BMP: $\% \text{ Retention\%} = \text{Item 16} / \text{Form 4.2-1 Item 7}$				
18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, demonstrate conformance using Form 4.3-10; if no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.</i>				

4.3.3 Harvest and Use BMP

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Use Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

Form 4.3-4 Harvest and Use BMPs (DA 1)			
1 Remaining LID DCV not met by site design HSC or infiltration BMP (ft ³): full DCV to proposed BMP <i>V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 - Form 4.3-3 Item 16</i>			
BMP Type(s) <i>Compute runoff volume retention from proposed harvest and use BMP (Select BMPs from Table 5-4 of the TGD for WQMP) - Use additional forms for more BMPs</i>	DA BMP Type	DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
2 Describe cistern or runoff detention facility			
3 Storage volume for proposed detention type (ft ³) <i>Volume of cistern</i>			
4 Landscaped area planned for use of harvested stormwater (ft ²)			
5 Average wet season daily irrigation demand (in/day) <i>Use local values, typical ~ 0.1 in/day</i>			
6 Daily water demand (ft ³ /day) <i>Item 4 * (Item 5 / 12)</i>			
7 Drawdown time (hrs) <i>Copy Item 6 from Form 4.2-1</i>			
8 Retention Volume (ft ³) <i>V_{retention} = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))</i>			
9 Total Retention Volume (ft ³) from Harvest and Use BMP		<i>Sum of Item 8 for all harvest and use BMP included in plan</i>	
10 Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest & use BMPs? Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, demonstrate conformance using Form 4.3-10. If no, then re-evaluate combinations of all LID BMP and optimize their implementation such that the maximum portion of the DCV is retained on-site (using a single BMP type or combination of BMP types). If the full DCV cannot be mitigated after this optimization process, proceed to Section 4.3.4.</i>			

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

- Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1)		
<p>1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft³): see note on the right Form 4.2-1 Item 7 - Form 4.3-2 Item 30 - Form 4.3-3 Item 16- Form 4.3-4 Item 9</p>	<p>List pollutants of concern Copy from Form 2.3-1. POC are sediment and nutrients.</p>	
<p>2 Biotreatment BMP Selected <i>(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)</i></p>	<p style="text-align: center;">Volume-based biotreatment <i>Use Forms 4.3-6 and 4.3-7 to compute treated volume</i></p> <p><input checked="" type="checkbox"/> Bioretention with underdrain <input type="checkbox"/> Planter box with underdrain <input type="checkbox"/> Constructed wetlands <input type="checkbox"/> Wet extended detention <input type="checkbox"/> Dry extended detention</p>	<p style="text-align: center;">Flow-based biotreatment <i>Use Form 4.3-8 to compute treated volume</i></p> <p><input type="checkbox"/> Vegetated swale <input type="checkbox"/> Vegetated filter strip <input type="checkbox"/> Proprietary biotreatment</p>
<p>3 Volume biotreated in volume based biotreatment BMP (ft³): full DCV to proposed BMP Form 4.3-6 Item 15 + Form 4.3-7 Item 13</p>	<p>4 Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft³): Item 1 - Item 3</p>	<p>5 Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % Item 4 / Item 1</p>
<p>6 Flow-based biotreatment BMP capacity provided (cfs): Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)</p>		
<p>7 Metrics for MEP determination:</p> <ul style="list-style-type: none"> • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: <input type="checkbox"/> If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP. 		

Form 4.3-6 Volume Based Biotreatment (DA 1) – Bioretention and Planter Boxes with Underdrains

Biotreatment BMP Type <i>(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)</i>	DA A DMA BMP Type	DA B DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>			
2 Amended soil infiltration rate <i>Typical ~ 5.0</i>			
3 Amended soil infiltration safety factor <i>Typical ~ 2.0</i>			
4 Amended soil design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$			
5 Ponded water drawdown time (hr) <i>Copy Item 6 from Form 4.2-1</i>			
6 Maximum ponding depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
7 Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$			
8 Amended soil surface area (ft ²)			
9 Amended soil depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
10 Amended soil porosity, <i>n</i>			
11 Gravel depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
12 Gravel porosity, <i>n</i>			
13 Duration of storm as basin is filling (hrs) <i>Typical ~ 3hrs</i>			
14 Biotreated Volume (ft ³) $V_{biotreated} = \text{Item 8} * \{(\text{Item 7}/2) + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))\}$			
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: <i>Sum of Item 14 for all volume-based BMPs included in this form</i>			

Form 4.3-7 Volume Based Biotreatment (DA 1) – Constructed Wetlands and Extended Detention

Biotreatment BMP Type <i>Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.</i>	DA DMA BMP Type		DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>				
2 Bottom width (ft)				
3 Bottom length (ft)				
4 Bottom area (ft ²) <i>A_{bottom} = Item 2 * Item 3</i>				
5 Side slope (ft/ft)				
6 Depth of storage (ft)				
7 Water surface area (ft ²) <i>A_{surface} = (Item 2 + (2 * Item 5 * Item 6)) * (Item 3 + (2 * Item 5 * Item 6))</i>				
8 Storage volume (ft ³) <i>For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i> <i>V = Item 6 / 3 * [Item 4 + Item 7 + (Item 4 * Item 7)^{0.5}]</i>				
9 Drawdown Time (hrs) <i>Copy Item 6 from Form 2.1</i>				
10 Outflow rate (cfs) <i>Q_{BMP} = (Item 8_{forebay} + Item 8_{basin}) / (Item 9 * 3600)</i>				
11 Duration of design storm event (hrs)				
12 Biotreated Volume (ft ³) <i>V_{biotreated} = (Item 8_{forebay} + Item 8_{basin}) + (Item 10 * Item 11 * 3600)</i>				
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : <i>(Sum of Item 12 for all BMP included in plan)</i>				

Form 4.3-8 Flow Based Biotreatment (DA 1)			
Biotreatment BMP Type <i>Vegetated swale, vegetated filter strip, or other comparable proprietary BMP</i>	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5</i>	For pre-treatment: Proposed VortSentry HS		
2 Flow depth for water quality treatment (ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
3 Bed slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
4 Manning's roughness coefficient			
5 Bottom width (ft) $b_w = (\text{Form 4.3-5 Item 6} * \text{Item 4}) / (1.49 * \text{Item 2}^{1.67} * \text{Item 3}^{0.5})$			
6 Side Slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
7 Cross sectional area (ft ²) $A = (\text{Item 5} * \text{Item 2}) + (\text{Item 6} * \text{Item 2}^2)$			
8 Water quality flow velocity (ft/sec) $V = \text{Form 4.3-5 Item 6} / \text{Item 7}$			
9 Hydraulic residence time (min) <i>Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
10 Length of flow based BMP (ft) $L = \text{Item 8} * \text{Item 9} * 60$			
11 Water surface area at water quality flow depth (ft ²) $SA_{top} = (\text{Item 5} + (2 * \text{Item 2} * \text{Item 6})) * \text{Item 10}$			

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)	
1	Total LID DCV for the Project DA-1 (ft ³): see <i>Copy Item 7 in Form 4.2-1</i>
2	On-site retention with site design hydrologic source control LID BMP (ft ³): full DCV to proposed BMP <i>Copy Item 30 in Form 4.3-2</i>
3	On-site retention with LID infiltration BMP (ft ³): <i>Copy Item 16 in Form 4.3-3</i>
4	On-site retention with LID harvest and use BMP (ft ³): <i>Copy Item 9 in Form 4.3-4</i>
5	On-site biotreatment with volume based biotreatment BMP (ft ³): <i>Copy Item 3 in Form 4.3-5</i>
6	Flow capacity provided by flow based biotreatment BMP (cfs): <i>Copy Item 6 in Form 4.3-5</i>
7	<p>LID BMP performance criteria are achieved if answer to any of the following is "Yes":</p> <ul style="list-style-type: none"> • Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, sum of Items 2, 3, and 4 is greater than Item 1</i> • Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3-5 Item 6 and Items 2, 3 and 4 are maximized</i> ▪ On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, Form 4.3-1 Items 7 and 8 were both checked yes</i>
8	<p>If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:</p> <ul style="list-style-type: none"> • Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: <input checked="" type="checkbox"/> <i>Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, $V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%$</i> • An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: <input type="checkbox"/> <i>Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed</i>

4.3.6 Hydromodification Control BMP

Use Form 4.3-10 to compute the remaining runoff volume retention, after LID BMP are implemented, needed to address HCOC, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential HCOC. Describe hydromodification control BMP that address HCOC, which may include off-site BMP and/or in-stream controls. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-10 Hydromodification Control BMPs (DA 1)	
<p>1 Volume reduction needed for HCOC performance criteria (ft³): N/A (Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1</p>	<p>2 On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft³): <i>Sum of Form 4.3-9 Items 2, 3, and 4 Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving HCOC volume reduction</i></p>
<p>3 Remaining volume for HCOC volume capture (ft³): <i>Item 1 – Item 2</i></p>	<p>4 Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft³): <i>Existing downstream BMP may be used to demonstrate additional volume capture (if so, attach to this WQMP a hydrologic analysis showing how the additional volume would be retained during a 2-yr storm event for the regional watershed)</i></p>
<p>5 If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification <input type="checkbox"/> <i>Attach in-stream control BMP selection and evaluation to this WQMP</i></p>	
<p>6 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i></p> <ul style="list-style-type: none"> • Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP <input type="checkbox"/> <i>BMP upstream of a waterbody segment with a potential HCOC may be used to demonstrate increased time of concentration through hydrograph attenuation (if so, show that the hydraulic residence time provided in BMP for a 2-year storm event is equal or greater than the addition time of concentration requirement in Form 4.2-4 Item 15)</i> • Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities <input type="checkbox"/> • Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California <input type="checkbox"/> 	
<p>7 Form 4.2-2 Item 12 less than or equal to 5%: Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i></p> <ul style="list-style-type: none"> • Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs <input type="checkbox"/> <i>BMPs upstream of a waterbody segment with a potential HCOC may be used to demonstrate additional peak runoff reduction through hydrograph attenuation (if so, attach to this WQMP, a hydrograph analysis showing how the peak runoff would be reduced during a 2-yr storm event)</i> • Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California <input type="checkbox"/> 	

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance. Alternative compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)			
BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
N1. Education For Property Owners, Tenants and Occupants	Property Owners/HOA	Educational materials and training will be provided to property owners, tenants, staff members and contracted maintenance crews if any, including education materials and restrictions to reduce pollutants from reaching the storm drain system.	Training and education program must be provided within 1 month of hire date and annually thereafter. Materials are included in the Project WQMP.
N2. Activity Restriction	Property Owners/HOA	The project will establish the following policies prohibiting activities during operations: <ul style="list-style-type: none"> - Prohibit discharge of fertilizer, pesticide, or animal waste to street or storm drain. - Prohibit blowing or sweeping of debris (leaf litter, grass clippings, litter, etc.) into street or storm drain. - Require trash bin lid to be closed at all times. - Prohibit discharge of paint or masonry waste to street or storm drain. - Prohibit vehicle maintenance or repair outdoors. 	Daily management of Operation
N3. Common Area	Property Owners/HOA	The owner or HOA shall direct maintenance staff to employ landscaping practices consistent with	Quarterly, as seasonal changes.

Water Quality Management Plan (WQMP)

Landscape Management		the CASQA BMP SC-41 requirements for use of fertilizer, pesticides, and City ordinances for water conservation.	
N4. BMP Maintenance	Property Owners/HOA	<p>The following BMPs and practices shall be employed and regularly maintained:</p> <p>Site Design BMPs:</p> <ul style="list-style-type: none"> - SD-10 Site Design & Landscape Planning. - SD-12 Efficient Irrigation. - SD-13 Storm Drain Signage. - SD-32 Trash Storage Areas. <p>Source Control BMPs:</p> <ul style="list-style-type: none"> - SC-10 Non-Stormwater Discharges. - SC 41 Buildings & Grounds Maintenance. - SC-44 Drainage System Maintenance. 	Varies by BMP.
N11. Common Area Litter Control	Property Owners/HOA	<p>The owner shall direct maintenance staff to implement trash management and litter control procedures in common areas aimed to reduce pollution of drainage water.</p> <p>Activities entail litter patrol, emptying of trash receptacles, noting trash disposal violations and reporting violation for investigation.</p>	Daily / Weekly
N12. Employee Training	Property Owners/HOA	<p>The owner shall provide employee training for protection of stormwater.</p> <p>Employee training shall be provided within 30 days of employment and annually thereafter. Training materials will entail review of WQMP information and BMP fact sheets.</p>	Upon initial employment, Annually thereafter
N14. Catch Basin Inspection	City of Colton	Catch basins shall be inspected, cleaned, and maintained annually. Cleaning shall be conducted prior to rainy season (October 1 through April 30). Drainage facilities include catch basins / storm drain inlets.	Annually.

Water Quality Management Plan (WQMP)

<p>N15. Street Sweeping Alleys and Parking spaces around park.</p>	<p>Property Owners/HOA</p>	<p>Street sweeping shall be conducted in alleys and parking areas once each month. Waste shall be disposed in trash receptacle which is emptied, at minimum once a week. Public streets shall be swept by the City on a bi-weekly schedule.</p>	<p>Street sweeping: Bi-weekly. Litter removal: Weekly.</p>
--	----------------------------	---	--

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

6.2 Electronic Data Submittal

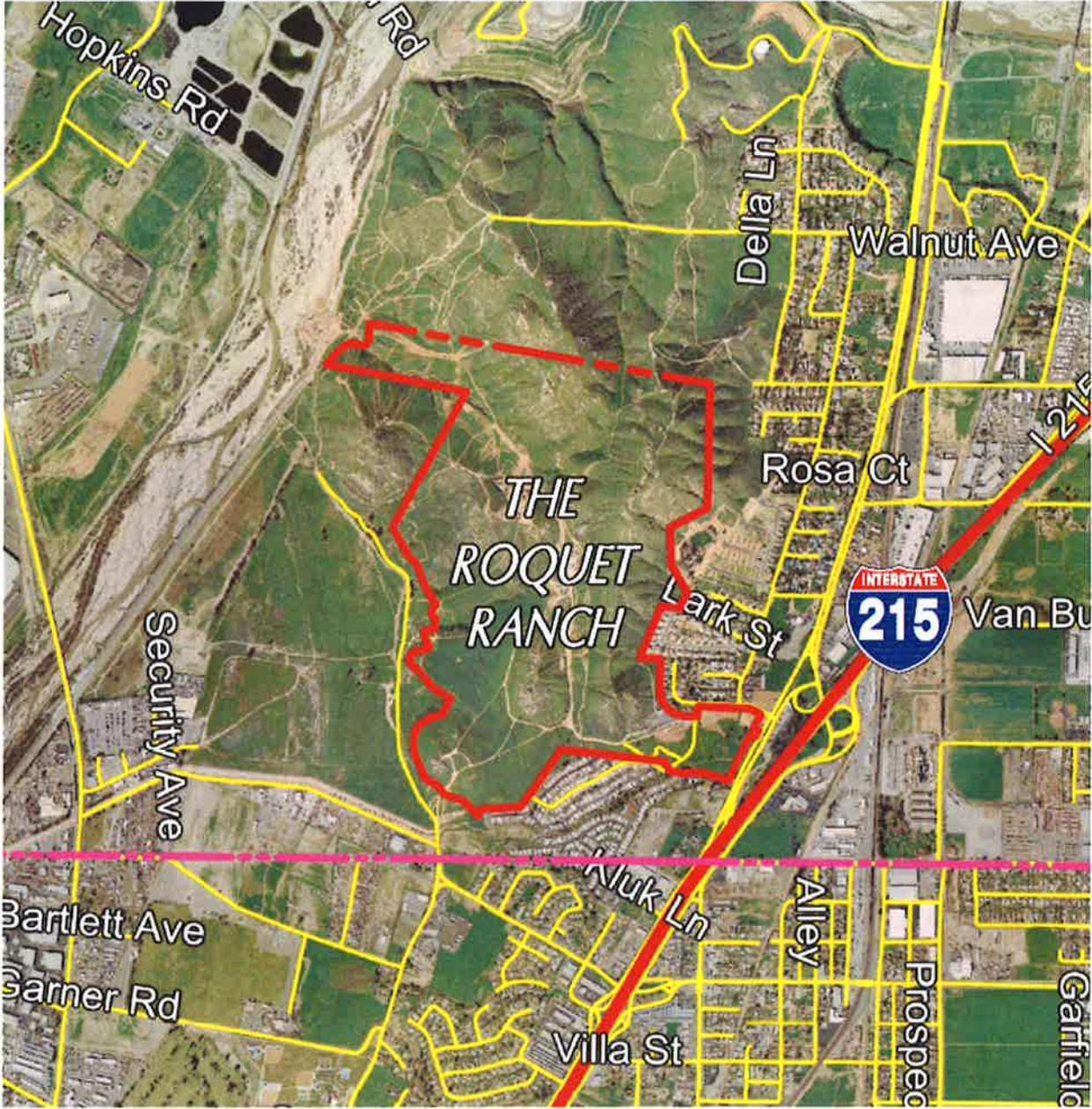
Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their local Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

6.4 Other Supporting Documentation

- BMP Educational Materials
- Activity Restriction – C, C&R's & Lease Agreements



Vicinity Map

Get Latitude and Longitude

To make a search, use the name of a place, city, state or address, or click the location on the map to **get lat long coordinates**.

Place Name
colton, ca [Find](#)

Add the country code for better results Ex: London UK

Latitude Longitude
34.025632 -117.347803

[Like](#) [Share](#) 2.7K [G+](#) 1.4k [Tweet](#)


START DOWNLOAD

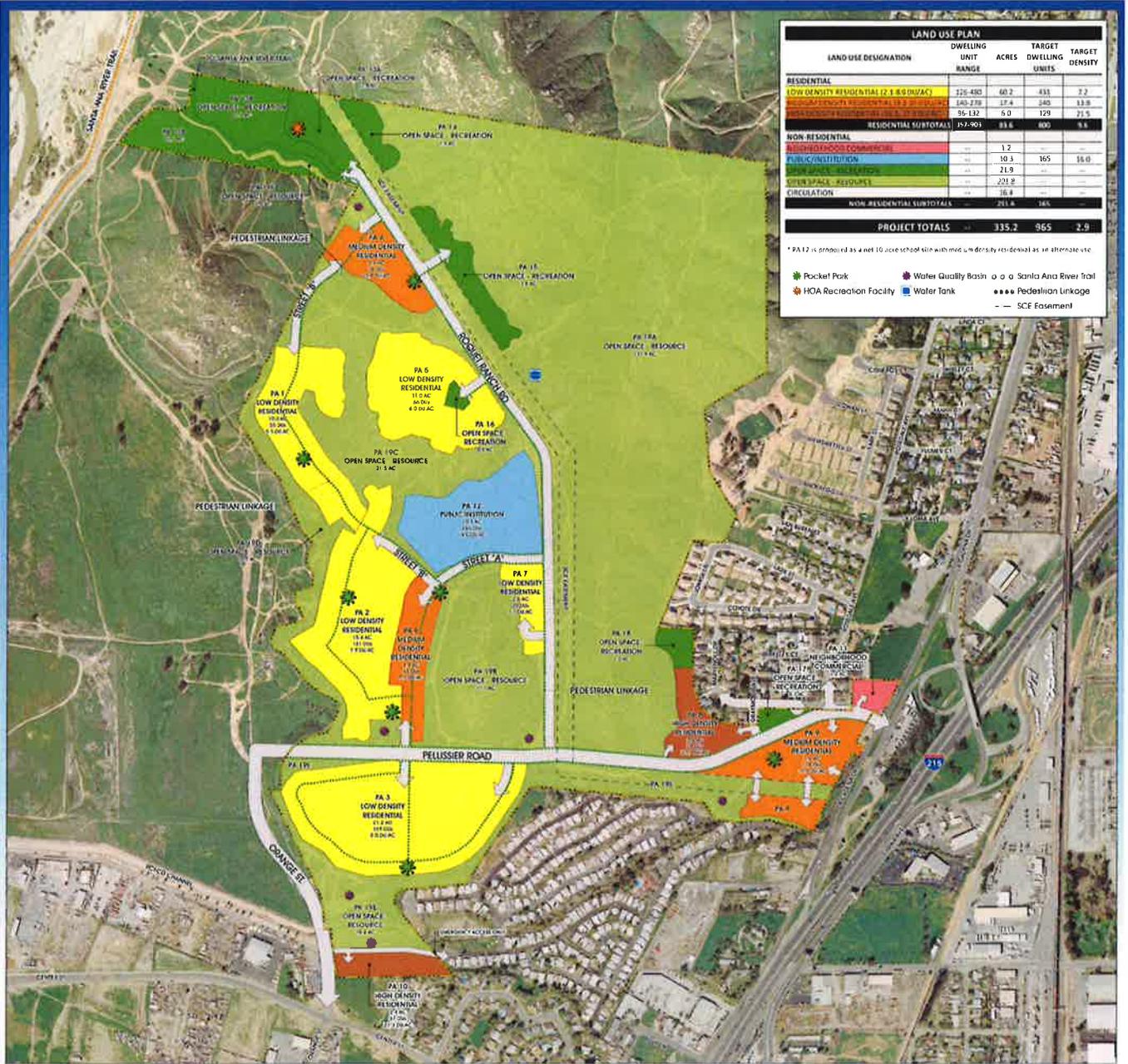
3 steps to Fast Maps & Directions

- 1 **Click** Start Download
- 2 **Free Access** - No Sign up!
- 3 **Get Free** Directions & Maps





Lat Long	GPS Coordinates	Map Mouse Over Location
(34.025632, -117.347803)	34° 1' 32.2752" N 117° 20' 52.0908" W	(34.042988, -117.242403)



LAND USE PLAN				
LAND USE DESIGNATION	DWELLING	ACRES	TARGET	TARGET DENSITY
	UNIT RANGE		DWELLING UNITS	
RESIDENTIAL				
LOW DENSITY RESIDENTIAL (2.5 & 6.0 U/AC)	225-480	60.2	835	2.2
MEDIUM DENSITY RESIDENTIAL (12.5 U/AC)	140-270	17.4	240	13.8
HIGH DENSITY RESIDENTIAL (20 U/AC)	95-132	6.0	129	21.5
RESIDENTIAL SUBTOTALS	460-900	83.6	1000	8.6
NON-RESIDENTIAL				
RECREATION	---	1.2	---	---
PUBLIC/INSTITUTION	---	10.3	165	16.0
OPEN SPACE - RECREATION	---	21.9	---	---
OPEN SPACE - RESOURCE	---	291.8	---	---
CIRCULATION	---	16.8	---	---
NON-RESIDENTIAL SUBTOTALS	---	291.8	165	---
PROJECT TOTALS	---	335.2	965	2.9

* PA 12 is proposed as a net 10 acre school site with med. low density residential as an alternate use.

ROQUET RANCH SPECIFIC PLAN

LAND USE PLAN

Sun Meadows, LLC TAB PLANNING, INC. 17015 170th Street, Suite 100, Kent, WA 98148

DATE: 09/21/18

Land Use Map

NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

DATA DESCRIPTION

Data type: precipitation depth Units: english Time series type: partial duration

SELECT LOCATION

1. Manually:

a) Enter location (decimal degrees, use "-" for S and W): latitude: longitude: submit

b) Select station (click here for a list of stations used in frequency analysis for CA): SANTA ANA RIVER P H 3 (04-7891)

2. Use map:



a) Select location (move crosshair or double click)

b) Click on station icon (show stations on map)

LOCATION INFORMATION:
Name: Highland, California, US*
Station Name: SANTA ANA RIVER P H 3
Site ID: 04-7891
Latitude: 34.1017°
Longitude: -117.1061°
Elevation: 1984 ft

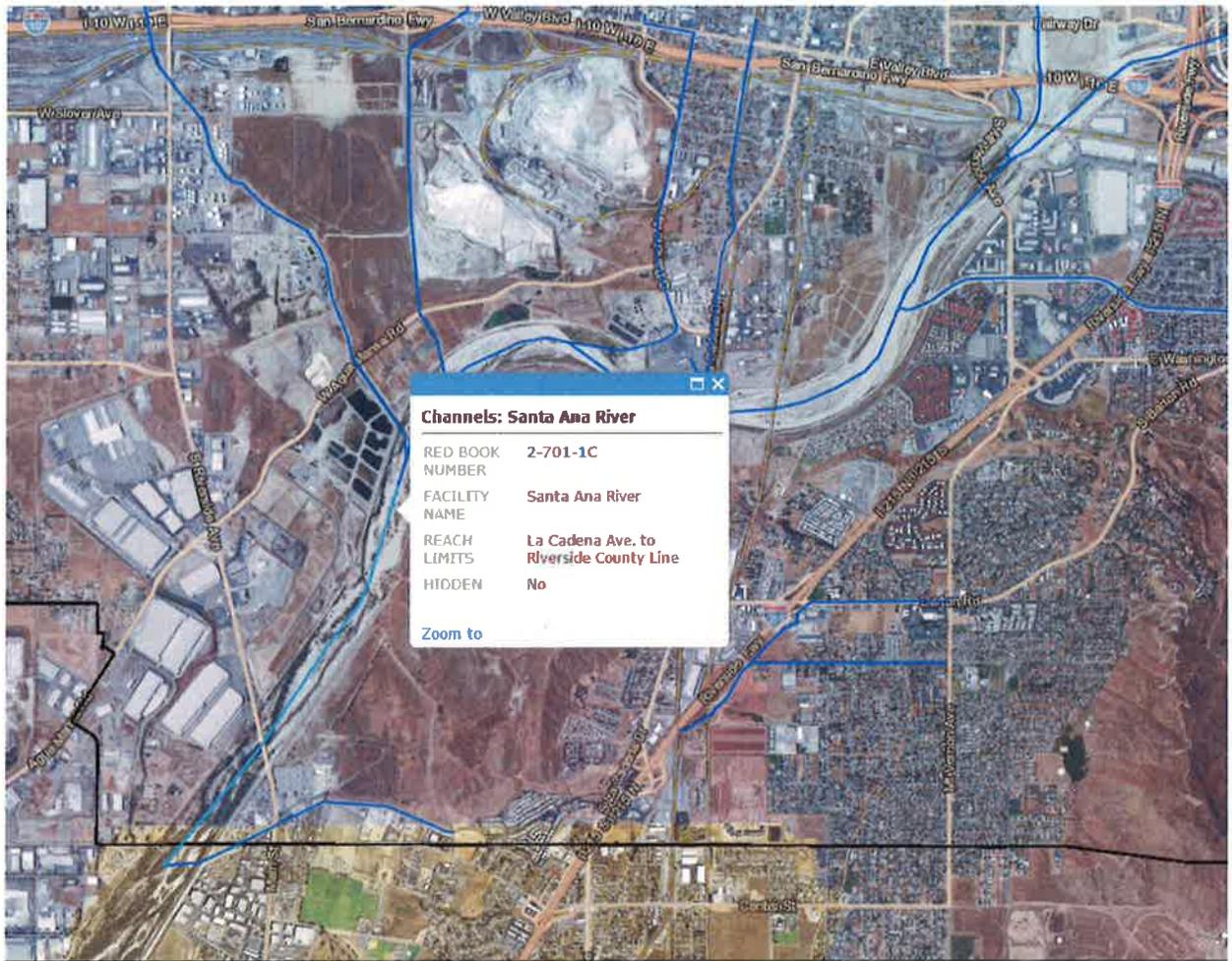
* source: Google Maps

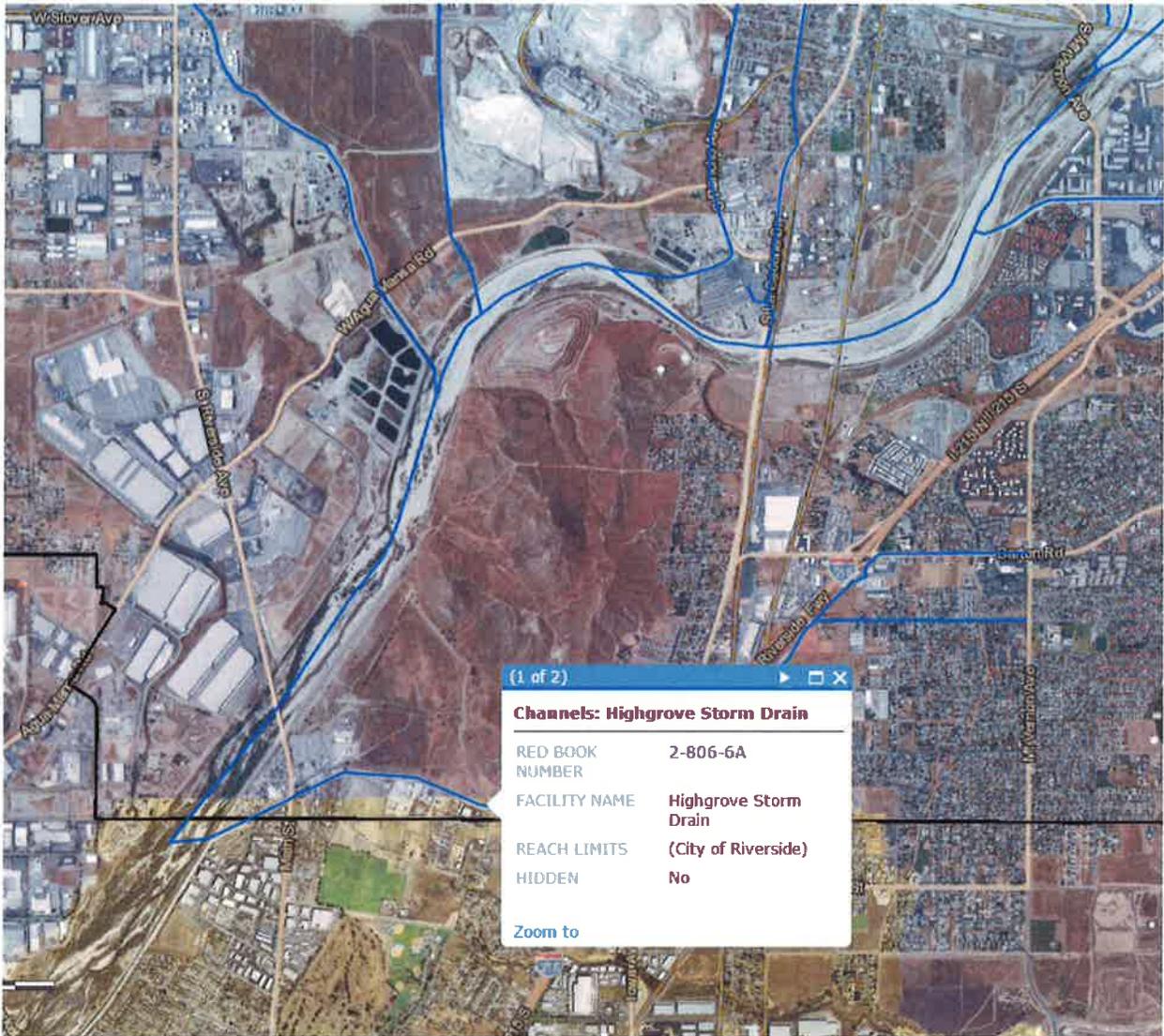
POINT PRECIPITATION FREQUENCY (PF) ESTIMATES WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION NOAA Atlas 14, Volume 6, Version 2

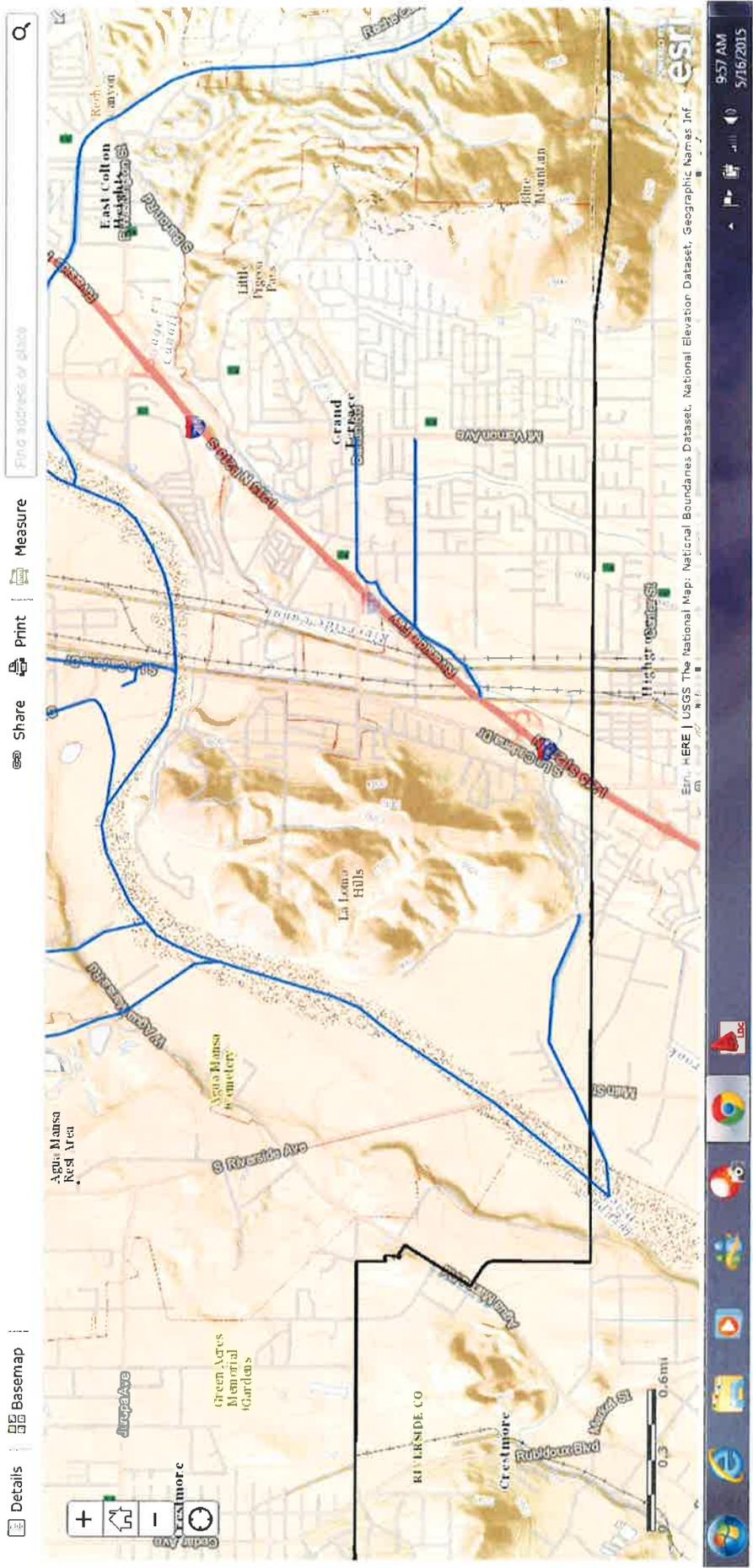
PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)¹

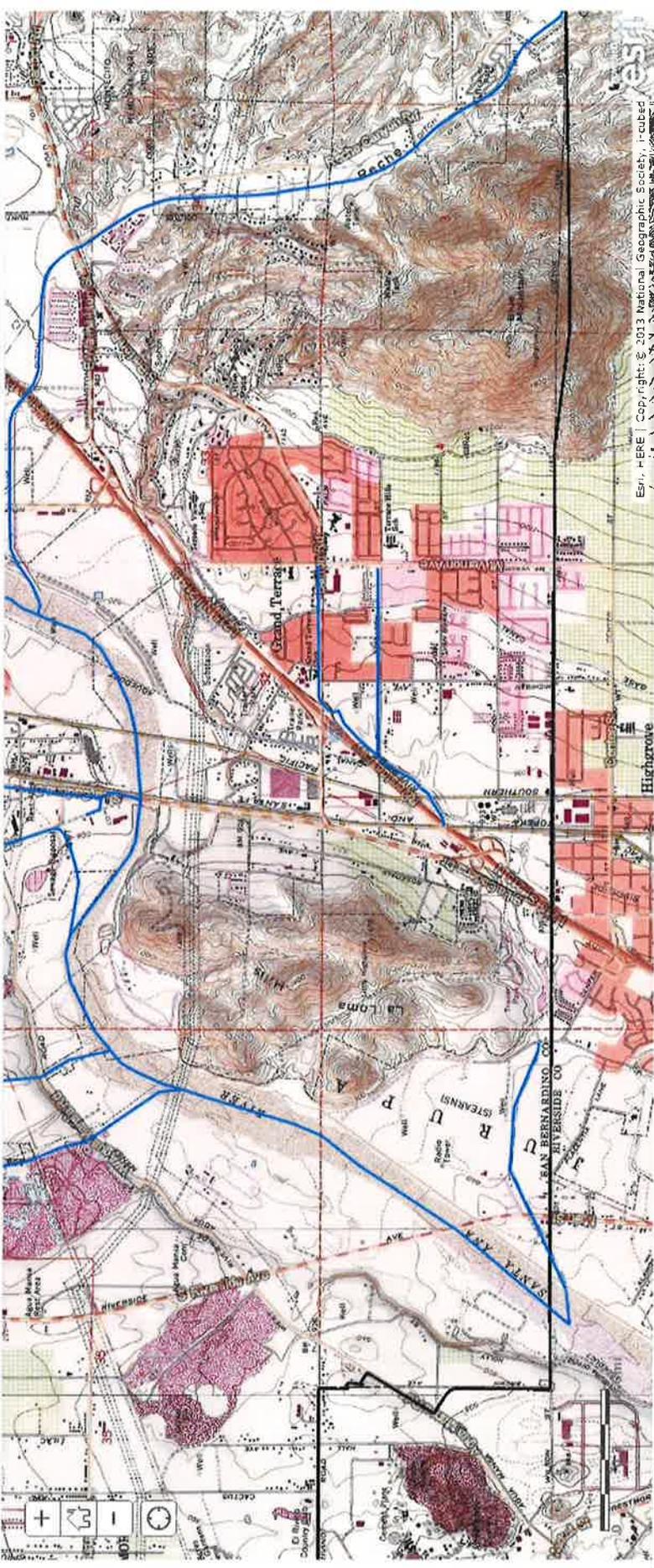
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.122 (0.102-0.149)	0.156 (0.129-0.189)	0.204 (0.169-0.249)	0.247 (0.203-0.304)	0.313 (0.248-0.398)	0.368 (0.286-0.479)	0.430 (0.326-0.573)	0.499 (0.368-0.685)	0.603 (0.426-0.863)	0.806 (0.549-1.19)
10-min	0.175 (0.146-0.213)	0.223 (0.185-0.271)	0.292 (0.242-0.357)	0.354 (0.291-0.436)	0.448 (0.355-0.570)	0.528 (0.410-0.686)	0.616 (0.467-0.821)	0.716 (0.527-0.981)	0.865 (0.610-1.24)	1.16 (0.787-1.71)
15-min	0.212 (0.176-0.258)	0.270 (0.224-0.328)	0.354 (0.293-0.431)	0.429 (0.352-0.527)	0.542 (0.430-0.689)	0.638 (0.496-0.830)	0.745 (0.584-0.993)	0.865 (0.637-1.19)	1.05 (0.738-1.50)	1.40 (0.952-2.07)
30-min	0.310 (0.258-0.377)	0.395 (0.328-0.480)	0.517 (0.428-0.631)	0.627 (0.515-0.771)	0.793 (0.629-1.01)	0.934 (0.725-1.21)	1.09 (0.826-1.45)	1.27 (0.932-1.74)	1.53 (1.08-2.19)	2.04 (1.39-3.03)
60-min	0.421 (0.350-0.512)	0.536 (0.445-0.652)	0.703 (0.582-0.857)	0.852 (0.699-1.05)	1.08 (0.854-1.37)	1.27 (0.985-1.65)	1.48 (1.12-1.97)	1.72 (1.27-2.36)	2.08 (1.47-2.97)	2.78 (1.89-4.11)
2-hr	0.594 (0.494-0.722)	0.752 (0.625-0.915)	0.970 (0.803-1.18)	1.16 (0.949-1.42)	1.42 (1.13-1.81)	1.63 (1.27-2.13)	1.86 (1.41-2.48)	2.10 (1.55-2.89)	2.45 (1.73-3.51)	2.80 (1.91-4.18)
3-hr	0.726 (0.604-0.882)	0.916 (0.761-1.11)	1.17 (0.971-1.43)	1.39 (1.14-1.71)	1.69 (1.34-2.15)	1.92 (1.49-2.50)	2.17 (1.64-2.89)	2.43 (1.79-3.33)	2.79 (1.97-3.99)	3.08 (2.10-4.58)
6-hr	0.983 (0.817-1.19)	1.24 (1.03-1.51)	1.58 (1.30-1.92)	1.85 (1.52-2.28)	2.23 (1.77-2.83)	2.52 (1.96-3.27)	2.81 (2.13-3.75)	3.11 (2.29-4.27)	3.53 (2.49-5.05)	3.85 (2.62-5.70)
12-hr	1.34 (1.12-1.63)	1.71 (1.42-2.08)	2.18 (1.80-2.66)	2.56 (2.10-3.15)	3.08 (2.44-3.92)	3.48 (2.70-4.52)	3.87 (2.94-5.17)	4.28 (3.15-5.87)	4.83 (3.41-6.91)	5.25 (3.58-7.79)
24-hr	1.84 (1.63-2.12)	2.38 (2.10-2.74)	3.07 (2.71-3.55)	3.64 (3.19-4.24)	4.41 (3.73-5.31)	5.00 (4.15-6.14)	5.59 (4.53-7.04)	6.21 (4.89-8.04)	7.04 (5.33-9.49)	7.68 (5.62-10.7)
2-day	2.11 (1.87-2.43)	2.79 (2.46-3.21)	3.69 (3.25-4.26)	4.43 (3.88-5.17)	5.47 (4.63-6.58)	6.28 (5.21-7.72)	7.12 (5.77-8.96)	8.00 (6.31-10.4)	9.21 (6.97-12.4)	10.2 (7.45-14.2)
3-day	2.25 (1.99-2.59)	3.00 (2.65-3.46)	4.02 (3.54-4.65)	4.88 (4.27-5.68)	6.08 (5.15-7.33)	7.04 (5.84-8.66)	8.05 (6.52-10.1)	9.12 (7.19-11.8)	10.6 (8.03-14.3)	11.8 (8.65-16.5)
4-day	2.42 (2.14-2.79)	3.24 (2.87-3.74)	4.37 (3.85-5.05)	5.31 (4.65-6.19)	6.64 (5.63-8.00)	7.71 (6.40-9.48)	8.82 (7.15-11.1)	10.0 (7.89-13.0)	11.7 (8.84-15.7)	13.0 (9.52-18.2)
7-day	2.81 (2.49-3.24)	3.75 (3.32-4.33)	5.02 (4.43-5.80)	6.08 (5.32-7.09)	7.56 (6.40-9.11)	8.73 (7.25-10.7)	9.95 (8.06-12.5)	11.2 (8.86-14.5)	13.0 (9.86-17.6)	14.4 (10.6-20.1)
10-day	3.11 (2.76-3.59)	4.14 (3.66-4.77)	5.51 (4.86-6.38)	6.66 (5.83-7.76)	8.25 (6.99-9.94)	9.50 (7.89-11.7)	10.8 (8.75-13.6)	12.2 (9.59-15.7)	14.0 (10.6-18.9)	15.5 (11.4-21.7)
20-day	3.84 (3.40-4.43)	5.13 (4.54-5.92)	6.86 (6.05-7.93)	8.28 (7.25-9.66)	10.3 (8.69-12.4)	11.8 (9.80-14.5)	13.4 (10.9-16.9)	15.1 (11.9-19.5)	17.3 (13.1-23.4)	19.1 (14.0-26.7)
30-day	4.56 (4.04-5.26)	6.11 (5.41-7.05)	8.18 (7.22-9.46)	9.90 (8.66-11.5)	12.3 (10.4-14.8)	14.1 (11.7-17.4)	16.0 (13.0-20.2)	18.0 (14.2-23.3)	20.8 (15.7-28.0)	22.9 (16.8-32.0)
45-day	5.47 (4.85-6.30)	7.33 (6.48-8.45)	9.81 (8.65-11.3)	11.9 (10.4-13.8)	14.7 (12.5-17.7)	17.0 (14.1-20.9)	19.3 (15.6-24.3)	21.7 (17.1-28.1)	25.0 (18.9-33.8)	27.7 (20.2-38.6)
60-day	6.34 (5.62-7.30)	8.46 (7.48-9.76)	11.3 (9.97-13.1)	13.7 (12.0-15.9)	16.9 (14.4-20.4)	19.5 (16.2-24.0)	22.2 (18.0-27.9)	25.0 (19.7-32.3)	28.8 (21.8-38.9)	31.9 (23.3-44.5)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.









HOME ~ Flood Control Right of Way

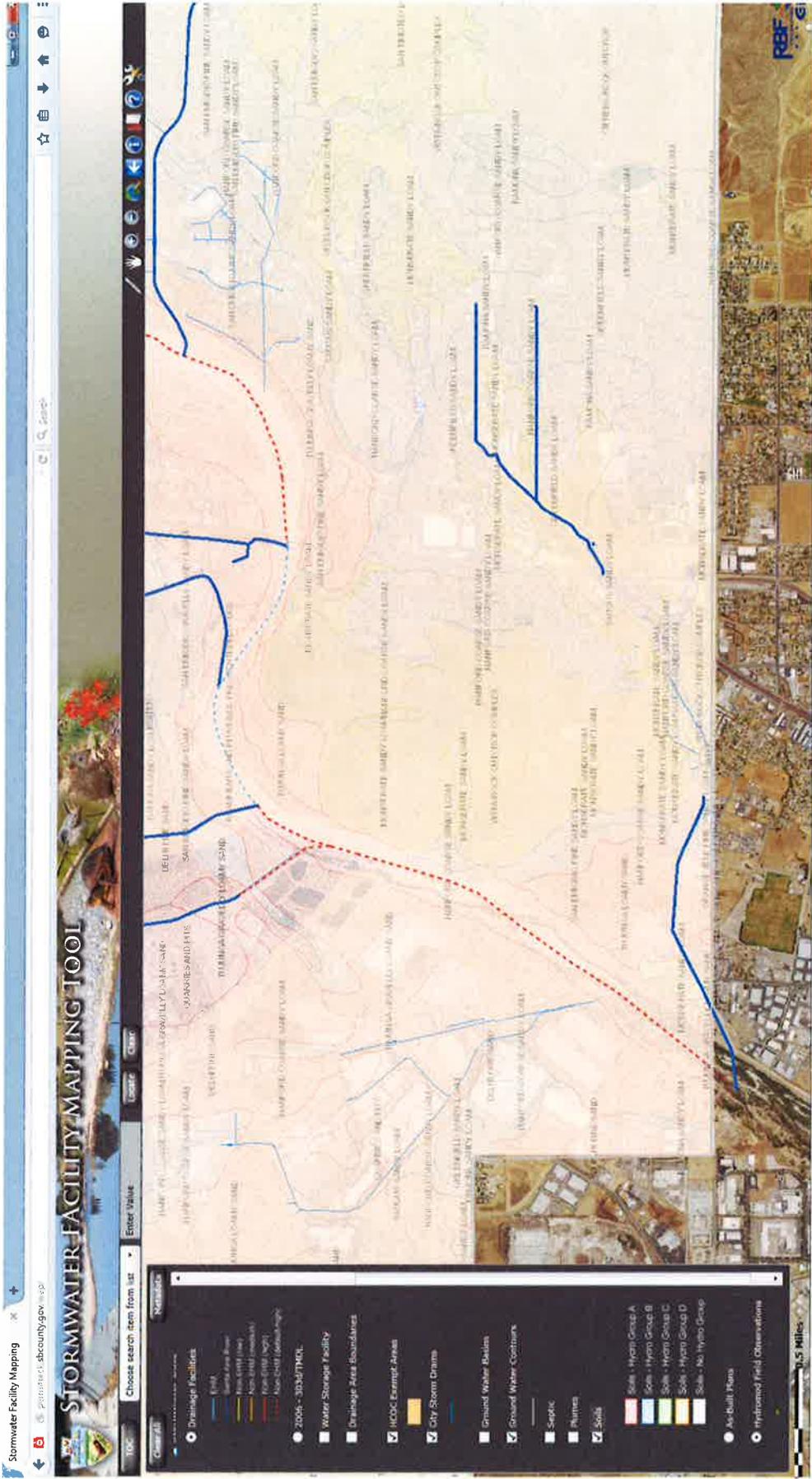
Details Basemap Content Legend About Content Legend

Right of Way

- Easement given to Other
- Easement granted to Flood Control
- Fee Owned Parcel

World Transportation
World Transportation





ACTUAL IMPERVIOUS COVER		
Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

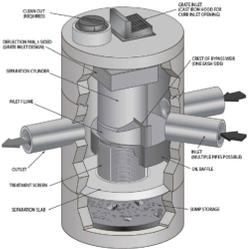
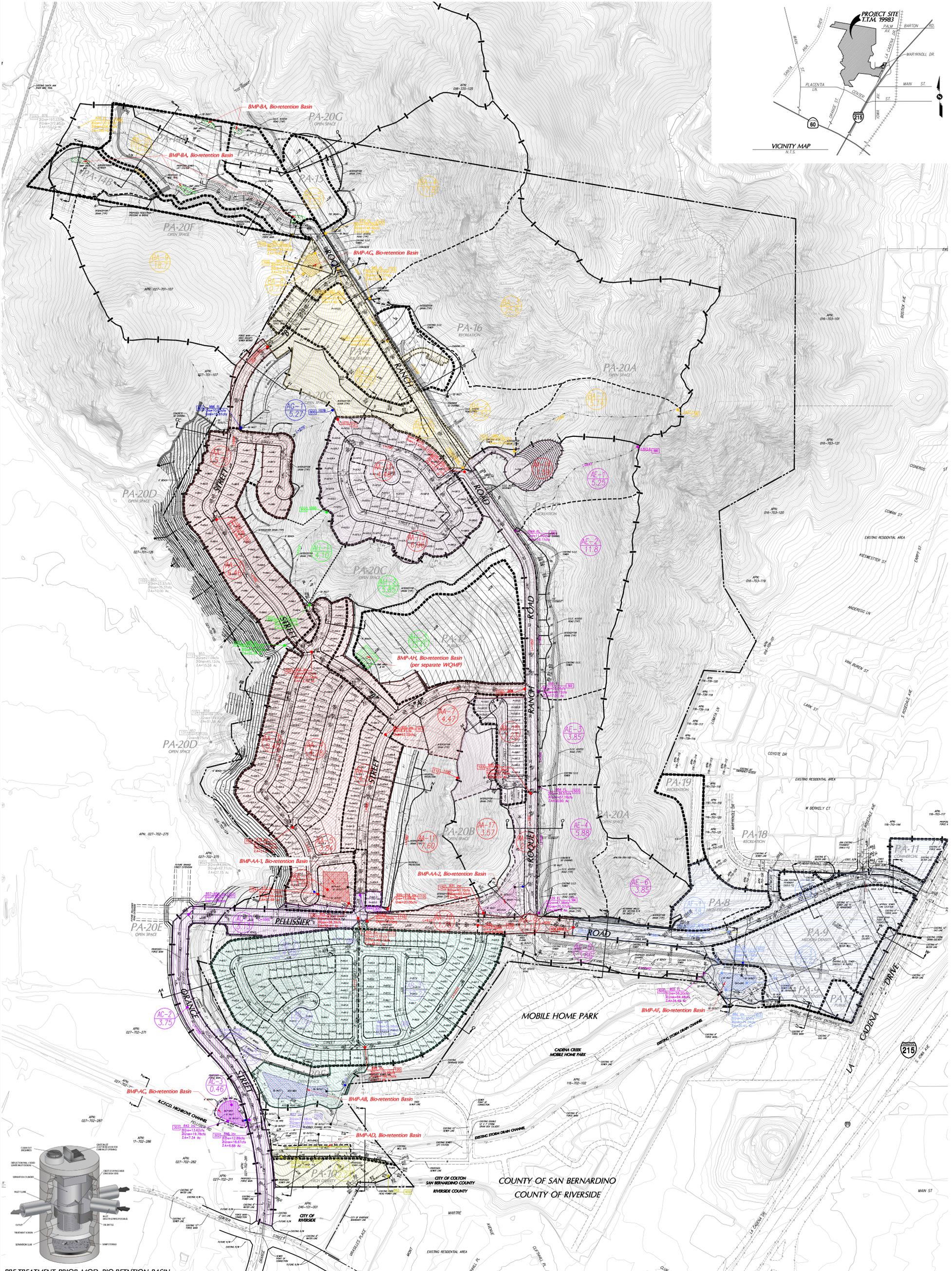
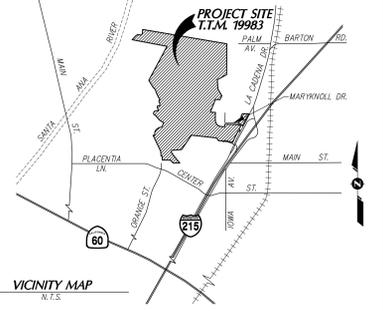
Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.
2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.
3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

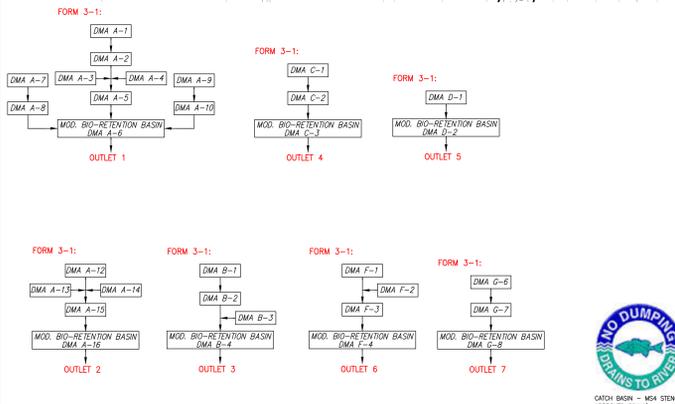
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

**ACTUAL IMPERVIOUS COVER
FOR
DEVELOPED AREAS**

ATTACHMENT 1
INFILTRATION RESULTS



PRE-TREATMENT PRIOR MOD. BIO-RETENTION BASIN

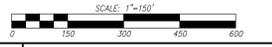


- AREA A:**
- DMA = AA1-AA10
 - DMA = AA12-AA16
 - DMA = AB1-AB4
 - DMA = AC1-AC3
 - DMA = AD1
 - DMA = AF1-AF4
 - DMA = AG6-AG8
- AREA B:**
- DMA = BA
- BMP Legend:**
- BMP-AA1, MOD. BIO-RETENTION BASIN
 - BMP-AA2, MOD. BIO-RETENTION BASIN
 - BMP-AB, MOD. BIO-RETENTION BASIN
 - BMP-AC, MOD. BIO-RETENTION BASIN
 - BMP-AD, MOD. BIO-RETENTION BASIN
 - BMP-AF, MOD. BIO-RETENTION BASIN
 - BMP-AG, MOD. BIO-RETENTION BASIN
 - BMP-BA, MOD. BIO-RETENTION BASIN

- LID PRACTICES TO BE IMPLEMENTED FOR THIS PROJECT:**
- VEGETATION BUFFER ALONG PASEOS
 - CATCH BASIN - M54 STENCILING AND SIGNAGE
 - SLOPE LANDSCAPE AND IRRIGATION SYSTEM
 - OPEN SPACE AND PARK AREAS
 - STREET TREES AND PARKWAY
 - CONSERVATION DESIGN
 - RUNOFF CONVEYANCE
 - ROOF DOWNSPOUT DISCONNECTION
 - EFFICIENT / LOW IMPACT LANDSCAPING



CATCH BASIN - M54 STENCILING AND SIGNAGE (SAMPLE OR APPROVED EQUAL)



ROQUET RANCH - TTM 19983
BMPs SITE PLAN

KA ENGINEERING
LAND PLANNING
SURVEYING
357 N. SHERIDAN STREET
SUITE 117
CORONA, CALIFORNIA 92680
TEL: (951) 279-1600
FAX: (951) 279-4380

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004

Exploration #/Location: WP-1a

Depth Boring drilled to (ft): 7

Tested by: BER

USCS Soil Type:

Weather (start to finish): Sunny

Liquid Used/pH: Well water

Diameter of barrel (in.): 22.5

No. of Supply barrels: 1

Measured boring diameter: 7.25 in.

Approx Depth to GW below GS: 100 ft

Well Prep:

397.4 Total Area of barrels (in.^2):
3.625 Well Radius, "r"

Approx Ht from water surface to top of float assembly (in.): #N/A
Approx float assem length (w/out extension), in.: #N/A

	a.*	b.*
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

*a. Est. by measurements from top of float assem.
*b. Est. by measurements from top of sand

- Depth to Bot of well (or top of soil over Bentonite)
- Depth to top of dry sand before casing install
- Length of casing
- Casing stickup (+ is above ground)
- Depth to Top of Sand from top of casing
- Pilot Tube stickup (+ is above ground)
- Depth to top of float assembly from top of pilot tube
- Float Assembly ID
- Float assembly Extension length (in.)

ft	in.	(total)	
5. ft	7. in.	67	
5. ft	3. in.	63	4 sand thickness
		0	
		0	67 sand thickness
	0. in.	0	0 check by casing length
	61. in.	61	
	61. in.	61	0 Depth below GS (in.)
D			
	34		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
7/7/2015	8:25								#N/A	#N/A	←est. from setup measurements									
7/7/15	8:25	26.25	6.87		78		0	21.4	45.6											
7/7/15	8:33	28.25	6.67		78		8	8	19.0	48.0	2.4	47	795	-50	745	93	5588	0.9	0.77	4.30
7/7/15	10:03	27.5	6.7		78		90	98	19.4	47.6	-0.36	48	298	7	306	3	204	0.9	0.03	0.15
7/7/15	11:56	26.75	6.69		85		113	211	19.3	47.7	0.12	48	298	-2	296	3	157	0.8	0.02	0.11
7/7/15	12:43	26.375	6.7		86		47	258	19.4	47.6	-0.12	48	149	2	152	3	193	0.8	0.02	0.13
7/7/15	14:53	25.375	6.75		93		130	388	20.0	47.0	-0.6	47	397	12	410	3	189	0.7	0.02	0.12

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004

Exploration #/Location: WP-1b

Depth Boring drilled to (ft): 7

Tested by: BER

USCS Soil Type:

Weather (start to finish): Sunny

Liquid Used/pH: Well water

Diameter of barrel (in.): 22.5

No. of Supply barrels: 1

Measured boring diameter: 7.25 in.

Approx Depth to GW below GS: 100 ft

Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A

Approx float assem length (w/out extension), in.: #N/A

	a.*	b.*
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

397.4 Total Area of barrels (in.^2):

3.625 Well Radius, "r"

*a. Est. by measurements from top of float assem.

*b. Est. by measurements from top of sand

- Depth to Bot of well (or top of soil over Bentonite)
- Depth to top of dry sand before casing install
- Length of casing
- Casing stickup (+ is above ground)
- Depth to Top of Sand from top of casing
- Pilot Tube stickup (+ is above ground)
- Depth to top of float assembly from top of pilot tube
- Float Assembly ID
- Float assembly Extension length (in.)

ft	in.	(total)	
6. ft	0. in.	72	
5. ft	6. in.	66	6 sand thickness
		0	
		0	72 sand thickness
	0. in.	0	0 check by casing length
	59. in.	59	
	57. in.	57	
			-2 Depth below GS (in.)
	30		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
7/7/2015	8:19								#N/A	#N/A	←est. from setup measurements									
7/7/15	8:19	28.625	7.19		78		0	27.3	44.7											
7/7/15	8:31	28.375	7.15		78		12	26.8	45.2	0.48	45	99	-10	89	7	447	0.9	0.07	0.36	
7/7/15	10:04	27.75	7.17		78		93	27.0	45.0	-0.24	45	248	5	253	3	163	0.9	0.03	0.13	
7/7/15	11:57	27	7.2		85		113	27.4	44.6	-0.36	45	298	7	306	3	162	0.8	0.02	0.12	
7/7/15	12:44	26.75	7.18		86		47	27.2	44.8	0.24	45	99	-5	94	2	120	0.8	0.02	0.09	
7/7/15	14:55	25.875	7.19		93		131	27.3	44.7	-0.12	45	348	2	350	3	160	0.7	0.02	0.11	

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004
Exploration #/Location: WP-2a
Depth Boring drilled to (ft):
Tested by: JMD
USCS Soil Type:
Weather (start to finish): Overcast
Liquid Used/pH: Garden hose water
Diameter of barrel (in.): 22.5
No. of Supply barrels: 1
Measured boring diameter: 7.25 in.
Approx Depth to GW below GS: 100 ft
Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A
 Approx float assem length (w/out extension), in.: #N/A

	<i>a.*</i>	<i>b.*</i>
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

397.4 Total Area of barrels (in.^2):
 3.625 Well Radius, "r"

*a. Est. by measurements from top of float assem.
 *b. Est. by measurements from top of sand

Depth to Bot of well (or top of soil over Bentonite)
 Depth to top of dry sand before casing install
 Length of casing
 Casing stickup (+ is above ground)
 Depth to Top of Sand from top of casing
Pilot Tube stickup (+ is above ground)
 Depth to top of float assembly from top of pilot tube
 Float Assembly ID
 Float assembly Extension length (in.)

ft	in.	(total)	
6. ft	5. in.	77	
6. ft	3. in.	75	2 sand thickness
		0	
0. ft	-5. in.	-5	70 sand thickness
0. ft	2. in.	2	5 check by casing length
4. ft	0.25 in.	48.3	
0. ft	62.25 in.	62.3	14 Depth below GS (in.)
E			
	34		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
6/29/2015	8:39																			
-									#N/A	#N/A	←est. from setup measurements									
6/29/15	8:45	27.875	6.96		86		6	35.3	41.7											
6/29/15	9:07	27.5	6.93		87		22	28	34.9	42.1	0.36	42	149	-7	142	6	386	0.8	0.06	0.30
6/29/15	12:25	26.625	6.94		91		198	226	35.0	42.0	-0.12	42	348	2	350	2	106	0.7	0.02	0.08
6/29/15	13:50	26.375	6.96		94		85	311	35.3	41.7	-0.24	42	99	5	104	1	74	0.7	0.01	0.05

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004
Exploration #/Location: WP-2b
Depth Boring drilled to (ft):
Tested by: JMD
USCS Soil Type:
Weather (start to finish): Overcast
Liquid Used/pH: Garden hose water
Diameter of barrel (in.): 22.5
No. of Supply barrels: 1
Measured boring diameter: 7.25 in.
Approx Depth to GW below GS: 100 ft
Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A
 Approx float assem length (w/out extension), in.: #N/A

	<i>a.*</i>	<i>b.*</i>
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

397.4 Total Area of barrels (in.^2):
 3.625 Well Radius, "r"

*a. Est. by measurements from top of float assem.
 *b. Est. by measurements from top of sand

Depth to Bot of well (or top of soil over Bentonite)
 Depth to top of dry sand before casing install
 Length of casing
 Casing stickup (+ is above ground)
 Depth to Top of Sand from top of casing
Pilot Tube stickup (+ is above ground)
 Depth to top of float assembly from top of pilot tube
 Float Assembly ID
 Float assembly Extension length (in.)

ft	in.	(total)	
5. ft	8. in.	68	
5. ft	5. in.	65	3 sand thickness
		0	
0. ft	4. in.	4	65 sand thickness
0. ft	7. in.	7	3 -4 check by casing length
0. ft	57. in.	57	
0. ft	61. in.	61	4 Depth below GS (in.)
F			
	34		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
6/29/2015	8:40																			
-								#N/A	#N/A	←est. from setup measurements										
6/29/15	8:44	27.75	6.73		86		4	23.8	44.2											
6/29/15	9:08	27.125	6.68		86		24	28	23.2	44.8	0.6	45	248	-12	236	10	590	0.8	0.08	0.44
6/29/15	12:25	25	6.72		88		197	225	23.6	44.4	-0.48	45	844	10	854	4	260	0.8	0.04	0.19
6/29/15	13:51	24.125	6.73		90		86	311	23.8	44.2	-0.12	44	348	2	350	4	244	0.8	0.03	0.18

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004
Exploration #/Location: WP-3a
Depth Boring drilled to (ft):
Tested by: JMD
USCS Soil Type:
Weather (start to finish): Overcast
Liquid Used/pH: Garden hose water
Diameter of barrel (in.): 22.5
No. of Supply barrels: 1
Measured boring diameter: 8 in.
Approx Depth to GW below GS: 100 ft
Well Prep:

397.4 Total Area of barrels (in.²):
 4 Well Radius, "r"

Approx Ht from water surface to top of float assembly (in.): #N/A
 Approx float assem length (w/out extension), in.: #N/A
 a.* b.*
 Initial estimated Depth to Water Surface (in.): #N/A #N/A
 Initial est. depth of water in well, "h" (in.): #N/A #N/A
 approx. h/r (prelim): #N/A #N/A
 Tu (Fig. 8): #N/A
 Tu>3h?: #N/A

*a. Est. by measurements from top of float assem.
 *b. Est. by measurements from top of sand

	ft	in.	(total)	
Depth to Bot of well (or top of soil over Bentonite)	11. ft	3. in.	135	
Depth to top of dry sand before casing install	10. ft	7. in.	127	8 sand thickness
Length of casing approx.			0	
Casing stickup (+ is above ground)	0. ft	7.5 in.	7.5	86 sand thickness
Depth to Top of Sand from top of casing	0. ft	56.5 in.	56.5	49 -7.5 check by casing length
Pilot Tube stickup (+ is above ground)	0. ft	32. in.	32	
Depth to top of float assembly from top of pilot tube	0. ft	82.25 in.	82.3	50.25 Depth below GS (in.)
Float Assembly ID				
Float assembly Extension length (in.)		34		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in. ³)			Flow (in ³ /min)	q, Flow (in ³ /hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
6/29/2015	10:07	28.375	8.58		87		0	71.0	64.0											
6/29/15	10:20	27	8.33		87		13	13	68.0	67.0	3	66	546	-73	473	36	2185	0.8	0.15	1.00
6/29/15	11:57	21.5	8.36		90		97	110	68.3	66.7	-0.36	67	2186	9	2194	23	1357	0.8	0.09	0.59
6/29/15	12:05	31.875	8.32		90			118	67.8	67.2										
6/29/15	12:39	30.25	8.34		92		34	152	68.1	66.9	-0.24	67	646	6	652	19	1150	0.7	0.08	0.49
6/29/15	13:13	28.75	8.39		92		34	186	68.7	66.3	-0.6	67	596	15	611	18	1078	0.7	0.07	0.46
6/29/15	14:32	25.125	8.38		96		79	265	68.6	66.4	0.12	66	1441	-3	1438	18	1092	0.7	0.07	0.46
6/29/15	15:25	22.625	8.41		98		53	318	68.9	66.1	-0.36	66	994	9	1002	19	1135	0.7	0.08	0.48
TESTED ZONE IS IN Afu. BEDROCK IS BELOW APPROX 12' BUT WE COULDN'T GET THE BORING TO STAY OPEN TO THAT DEPTH.																				

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004
Exploration #/Location: WP-3b
Depth Boring drilled to (ft):
Tested by: JMD
USCS Soil Type:
Weather (start to finish): Overcast
Liquid Used/pH: Garden hose water
Diameter of barrel (in.): 22.5
No. of Supply barrels: 1
Measured boring diameter: 7.75 in.
Approx Depth to GW below GS: 100 ft
Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A
 Approx float assem length (w/out extension), in.: #N/A
 a.* b.*
Initial estimated Depth to Water Surface (in.): #N/A #N/A
Initial est. depth of water in well, "h" (in.): #N/A #N/A
 approx. h/r (prelim): #N/A #N/A
 Tu (Fig. 8): #N/A
 Tu>3h?: #N/A
 397.4 Total Area of barrels (in.^2):
 3.875 Well Radius, "r"

Depth to Bot of well (or top of soil over Bentonite)
 Depth to top of dry sand before casing install
 Length of casing approx.
 Casing stickup (+ is above ground)
 Depth to Top of Sand from top of casing
Pilot Tube stickup (+ is above ground)
 Depth to top of float assembly from top of pilot tube
 Float Assembly ID
 Float assembly Extension length (in.)

	ft	in.	(total)	
Depth to Bot of well	11. ft	8. in.	140	
Depth to top of dry sand before casing install	11. ft	3. in.	135	5 sand thickness
Length of casing approx.			0	
Casing stickup (+ is above ground)	0. ft	2.5 in.	2.5	78 sand thickness
Depth to Top of Sand from top of casing	0. ft	64.5 in.	64.5	62 -2.5 check by casing length
Pilot Tube stickup (+ is above ground)	0. ft	47.25 in.	47.3	
Depth to top of float assembly from top of pilot tube	0. ft	117.25 in.	117	70 Depth below GS (in.)
Float Assembly ID				
Float assembly Extension length (in.)		30		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
6/29/2015	10:09	30	11.95		88		0	96.2	43.9											
6/29/15	10:09	30	11.95		88		0	96.2	43.9											
6/29/15	10:23	28.375	12.23		87		14	14	99.5	40.5	-3.36	42	646	78	723	52	3100	0.8	0.51	2.23
6/29/15	11:58	14.875	12.26		90		95	109	99.9	40.1	-0.36	40	5365	8	5373	57	3394	0.8	0.54	2.49
6/29/15	12:06	32.5	12.1		90			117	98.0	42.1										
6/29/15	12:41	27.625	12.29		92		35	152	100.2	39.8	-2.28	41	1937	53	1990	57	3411	0.7	0.55	2.43
6/29/15	13:14	23	12.3		92		33	185	100.4	39.7	-0.12	40	1838	3	1841	56	3347	0.7	0.53	2.45
6/29/15	14:33	11.5	12.29		96		79	264	100.2	39.8	0.12	40	4570	-3	4567	58	3469	0.7	0.54	2.49
6/29/15	14:44	31.875	12.21		97			275	99.3	40.7										
6/29/15	15:26	25.5	12.28		100		42	317	100.1	39.9	-0.84	40	2533	19	2553	61	3647	0.7	0.56	2.54
TESTED ZONE IS IN Afu. BEDROCK IS BELOW APPROX 12' BUT WE COULDN'T GET THE BORING TO STAY OPEN TO THAT DEPTH.																				

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004
Exploration #/Location: WP-4a
Depth Boring drilled to (ft):
Tested by: JMD
USCS Soil Type:
Weather (start to finish): Overcast
Liquid Used/pH: Garden hose water
Diameter of barrel (in.): 22.5
No. of Supply barrels: 1
Measured boring diameter: 7.5 in.
Approx Depth to GW below GS: 100 ft
Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A
 Approx float assem length (w/out extension), in.: #N/A

	<i>a.*</i>	<i>b.*</i>
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

397.4 Total Area of barrels (in.^2):
 3.75 Well Radius, "r"

*a. Est. by measurements from top of float assem.
 *b. Est. by measurements from top of sand

Depth to Bot of well (or top of soil over Bentonite)
 Depth to top of dry sand before casing install
 Length of casing
 Casing stickup (+ is above ground)
 Depth to Top of Sand from top of casing
Pilot Tube stickup (+ is above ground)
 Depth to top of float assembly from top of pilot tube
 Float Assembly ID
 Float assembly Extension length (in.)

	ft	in.	(total)	
Depth to Bot of well	7. ft	6. in.	90	
Depth to top of dry sand before casing install	6. ft	10. in.	82	8 sand thickness
Length of casing			0	
Casing stickup (+ is above ground)	0. ft	12. in.	12	73.5 sand thickness
Depth to Top of Sand from top of casing	0. ft	28.5 in.	28.5	16.5 -12 check by casing length
Pilot Tube stickup (+ is above ground)	0. ft	12. in.	12	
Depth to top of float assembly from top of pilot tube	0. ft	28.25 in.	28.3	16.25 Depth below GS (in.)
Float Assembly ID	A			
Float assembly Extension length (in.)		30		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
6/29/2015	11:44								#N/A	#N/A	←est. from setup measurements									
6/29/15	11:44	28.25	4.82		91		0	45.8	44.2											
6/29/15	13:27	24.375	4.75		94		103	103	45.0	45.0	0.84	45	1540	-18	1522	15	886	0.7	0.12	0.59
6/29/15	14:54	22	4.66		98		87	190	43.9	46.1	1.08	46	944	-24	920	11	635	0.7	0.08	0.41
6/29/15	15:54	20.5	4.81		100		60	250	45.7	44.3	-1.8	45	596	39	636	11	636	0.7	0.08	0.41

Results of Well Permeameter, from USBR 7300-89 Method.



Project: WP-4b

Exploration #/Location: JMD

Depth Boring drilled to (ft):

Tested by:

USCS Soil Type: Overcast

Weather (start to finish): Garden hose water

Liquid Used/pH: 22.5

Diameter of barrel (in.): 1

No. of Supply barrels: 7.75

Measured boring diameter: 100 in.

Approx Depth to GW below GS: ft

Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A

Approx float assem length (w/out extension), in.: #N/A

	a.*	b.*
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

6.084 Total Area of barrels (in.^2):
50 Well Radius, "r"

*a. Est. by measurements from top of float assem.
*b. Est. by measurements from top of sand

Depth to Bot of well (or top of soil over Bentonite)

Depth to top of dry sand before casing install

Length of casing

Casing stickup (+ is above ground)

Depth to Top of Sand from top of casing

Pilot Tube stickup (+ is above ground)

Depth to top of float assembly from top of pilot tube

Float Assembly ID

Float assembly Extension length (in.)

ft	in.	(total)	
8. ft	4. in.	100	
7. ft	0. in.	84	16 sand thickness
		0	
0. ft	12.5 in.	12.5	75 sand thickness
0. ft	37.5 in.	37.5	25 -12.5 check by casing length
0. ft	35.5 in.	35.5	
0. ft	61. in.	61	25.5 Depth below GS (in.)
	34		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
6/29/2015	11:45	28.625	6.81		90				#N/A	#N/A	←est. from setup measurements									
6/29/15	11:45	28.625	6.81		90		0	46.2	53.8											
6/29/15	13:28	25	6.71		93		103	103	45.0	55.0	1.2	54	22	-3773	-3751	-36	-2185	0.7	-0.04	-0.06
6/29/15	14:55	22.5	6.76		98		87	190	45.6	54.4	-0.6	55	15	1887	1902	22	1312	0.7	0.03	0.04
6/29/15	15:56	20.625	6.81		99		61	251	46.2	53.8	-0.6	54	11	1887	1898	31	1867	0.7	0.04	0.05

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004

Exploration #/Location: WP-5a

Depth Boring drilled to (ft): 10

Tested by: BER

USCS Soil Type:

Weather (start to finish): Sunny

Liquid Used/pH: Well water

Diameter of barrel (in.): 22.5

No. of Supply barrels: 1

Measured boring diameter: 7.5 in.

Approx Depth to GW below GS: 100 ft

Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A

Approx float assem length (w/out extension), in.: #N/A

	a.*	b.*
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

397.4 Total Area of barrels (in.^2):

3.75 Well Radius, "r"

*a. Est. by measurements from top of float assem.

*b. Est. by measurements from top of sand

Depth to Bot of well (or top of soil over Bentonite): 7. ft

Depth to top of dry sand before casing install: 6. ft

Length of casing: 0

Casing stickup (+ is above ground): -22. in.

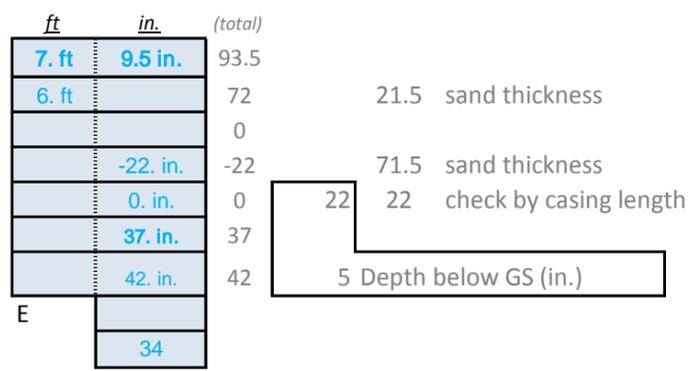
Depth to Top of Sand from top of casing: 0. in.

Pilot Tube stickup (+ is above ground): 37. in.

Depth to top of float assembly from top of pilot tube: 42. in.

Float Assembly ID: E

Float assembly Extension length (in.): 34



Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
7/7/2015	9:16	27	7.09		78		0	48.1	45.4											
7/7/15	9:30	21.5	6.9		78		14	45.8	47.7	2.28	47	2186	-50	2136	153	9153	0.9	1.25	6.83	
7/7/15	9:44	17.125	6.9		78		14	45.8	47.7	0	48	1739	0	1739	124	7451	0.9	1.03	5.43	
7/7/15	9:49	28.625	6.85		78		33	45.2	48.3											
7/7/15	10:14	21.625	6.9		78		25	45.8	47.7	-0.6	48	2782	13	2795	112	6708	0.9	0.93	4.86	
7/7/15	10:38	15.25	6.8		87		24	44.6	48.9	1.2	48	2533	-26	2507	104	6268	0.8	0.75	4.10	
7/7/15	10:45	28.375	6.85		79		89	45.2	48.3											
7/7/15	11:16	20.25	6.75		80		31	44.0	49.5	1.2	49	3229	-26	3203	103	6199	0.8	0.78	4.31	
7/7/15	11:30	16.5	6.75		81		14	44.0	49.5	0	50	1490	0	1490	106	6387	0.8	0.80	4.34	
7/7/15	11:37	27.375	6.85		81		141	45.2	48.3											
7/7/15	12:07	19.5	6.79		83		30	44.5	49.0	0.72	49	3130	-16	3114	104	6228	0.8	0.77	4.21	
7/7/15	12:13	29	6.9		82		177	45.8	47.7											
7/7/15	12:52	18.375	6.76		84		39	44.1	49.4	1.68	49	4222	-37	4186	107	6439	0.8	0.78	4.31	
7/7/15	12:57	28.5	6.85		83		221	45.2	48.3											
7/7/15	13:44	15.375	6.75		86		47	44.0	49.5	1.2	49	5216	-26	5190	110	6625	0.8	0.78	4.32	
7/7/15	13:54	27	6.85		84		278	45.2	48.3											
7/7/15	14:18	20.25	6.75		86		24	44.0	49.5	1.2	49	2682	-26	2656	111	6641	0.8	0.79	4.33	
7/7/15	14:25	18.375	6.75		86		7	44.0	49.5	0	50	745	0	745	106	6387	0.8	0.76	4.12	

Results of Well Permeameter, from USBR 7300-89 Method.



Project: Sunmeadows Roquet Ranch #10813.004

Exploration #/Location: WP-5b

Depth Boring drilled to (ft): 10

Tested by: BER

USCS Soil Type:

Weather (start to finish): Sunny

Liquid Used/pH: Well water

Diameter of barrel (in.): 22.5

No. of Supply barrels: 1

Measured boring diameter: 7.5 in.

Approx Depth to GW below GS: 100 ft

Well Prep:

Approx Ht from water surface to top of float assembly (in.): #N/A

Approx float assem length (w/out extension), in.: #N/A

	<i>a.*</i>	<i>b.*</i>
Initial estimated Depth to Water Surface (in.):	#N/A	#N/A
Initial est. depth of water in well, "h" (in.):	#N/A	#N/A
approx. h/r (prelim):	#N/A	#N/A
Tu (Fig. 8):	#N/A	
Tu>3h?:	#N/A	

397.4 Total Area of barrels (in.^2):

3.75 Well Radius, "r"

*a. Est. by measurements from top of float assem.

*b. Est. by measurements from top of sand

Depth to Bot of well (or top of soil over Bentonite)

Depth to top of dry sand before casing install

Length of casing

Casing stickup (+ is above ground)

Depth to Top of Sand from top of casing

Pilot Tube stickup (+ is above ground)

Depth to top of float assembly from top of pilot tube

Float Assembly ID

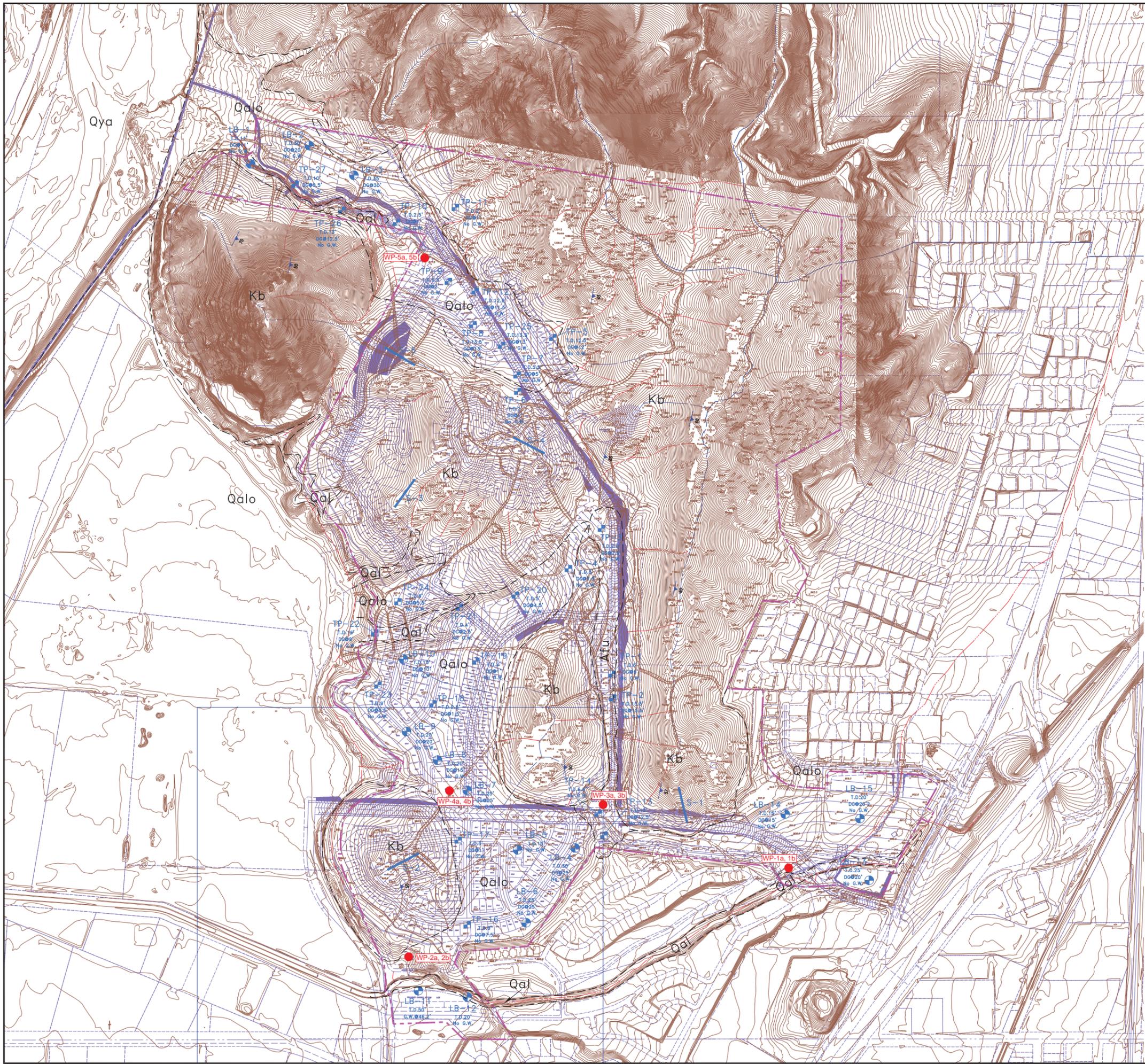
Float assembly Extension length (in.)

ft	in.	(total)	
7. ft	7. in.	91	
6. ft	9. in.	81	10 sand thickness
		0	
	-7. in.	-7	75 sand thickness
	9. in.	9	16 7 check by casing length
	-9. in.	-9	
	16. in.	16	25 Depth below GS (in.)
F			
	34		

Field Data

Calculations

Date	Time	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube)		Water Temp (deg F)	Comments (or "y" for DL interpretation)	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3)			Flow (in^3/min)	q, Flow (in^3/hr)	V (Fig 9)	K20, Coef. Of Permeability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
			ft	in.									from barrels	from Δh	Total					
7/7/2015	9:17	25.375	3.43		78		0	50.2	40.8											
								#N/A	#N/A	←est. from setup measurements										
7/7/15	9:17	25.375	3.43		78		0	50.2	40.8											
7/7/15	9:31	18.75	3.35		78		14	14	49.2	41.8	0.96	41	2633	-21	2612	187	11193	0.9	1.89	9.37
7/7/15	9:45	12.75	3.37		78		14	28	49.4	41.6	-0.24	42	2384	5	2390	171	10242	0.9	1.76	8.50
7/7/15	9:51	28.5	3.14		78			34	46.7	44.3										
7/7/15	10:15	18	3.15		78		24	58	46.8	44.2	-0.12	44	4173	3	4175	174	10438	0.9	1.63	8.18
7/7/15	10:39	7.875	3.2		78		24	82	47.4	43.6	-0.6	44	4024	13	4037	168	10092	0.9	1.61	7.97
7/7/15	10:47	27.125	3.19		79			90	47.3	43.7										
7/7/15	11:14	15	3.16		81		27	117	46.9	44.1	0.36	44	4819	-8	4811	178	10690	0.8	1.61	8.15
7/7/15	11:31	7.625	3.24		82		17	134	47.9	43.1	-0.96	44	2931	21	2952	174	10418	0.8	1.62	7.90
7/7/15	11:36	28.25	3.17		80			139	47.0	44.0										
7/7/15	12:08	13.5	3.25		82		32	171	48.0	43.0	-0.96	43	5862	21	5883	184	11030	0.8	1.72	8.39
7/7/15	12:12	27.875	3.25		83			175	48.0	43.0										
7/7/15	12:51	9.5	3.19		86		39	214	47.3	43.7	0.72	43	7302	-16	7287	187	11210	0.8	1.62	8.21
7/7/15	12:58	28.125	3.2		84			221	47.4	43.6										
7/7/15	13:45	5.5	3.25		88		47	268	48.0	43.0	-0.6	43	8991	13	9004	192	11495	0.8	1.69	8.28
7/7/15	13:53	26.875	3.26		86			276	48.1	42.9										
7/7/15	14:19	14	3.3		88		26	302	48.6	42.4	-0.48	43	5117	11	5127	197	11832	0.8	1.77	8.65
7/7/15	14:26	11.125	3.29		88		7	309	48.5	42.5	0.12	42	1143	-3	1140	163	9771	0.8	1.45	7.17



- LEGEND**
- Afu UNDOCUMENTED FILL
 - Qal VERY YOUNG ALLUVIAL FAN DEPOSITS
 - Qalo OLD ALLUVIAL FAN DEPOSITS
 - Kb BOX SPRINGS PLUTONIC COMPLEX
 - Qya YOUNG AXIAL-CHANNEL DEPOSIT
 - STRIKE & DIP OF METAMORPHIC OR IGNEOUS ROCK FOLIATION OR FLOW BANDING OR COMPOSITIONAL LAYERS
 - TP-26 T.D.13' DØ12.5' No G.W. APPROXIMATE LOCATION OF TEST PIT
 - LB-10 T.D.15' DØ10' No G.W. APPROXIMATE LOCATION OF BORING
 - S-5 APPROXIMATE SEISMIC LINE LOCATIONS

GEOTECHNICAL & TEST LOCATION MAP
 Sunnyside Roquet Ranch
 La Loma Hills
 City of Colton, California

Proj: 10813.004	Eng/Geo: JDH/PB
Scale: 1"=200'	Date: 06/2015