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June 6, 2013

Ken Brazell
County of San Diego
PSD
5510 Overland Avenue, Suite 310
San Diego, CA 92123

RE: Montecito Ranch – SWMM Modeling Response to RBF

Dear Ken,

Here are the responses to RBF's comments:

- *Based on Figure 4-1 of the HMP, the closest rainfall station to the project site is Ramona. The applicant should either use the Ramona station or provide a detailed explanation of why they feel that a different station is more appropriate.*

  REC: The revised SWMM analysis uses the Ramona Rain Gage

- *The report should specify the methodology that was used to combine the output for the individual SWMM models into one flow duration curve.*

  REC: Please see updated report under Key Assumptions for explanation of methodology.

- *The report should discuss and graphically show the Point of Compliance (POC) for the analysis. The report should more specifically address the proposed improvements for Montecito Ranch Road and any required mitigation for HMP compliance. The majority of Montecito Ranch Road discharges to the southwest and does not appear to drain to the same POC as the residential portion of the development. An additional POC will likely be required.*

  REC: Please see updated report for POC Map. There are to POC's, one to the north and one to the south. The SWMM model analyzes the Point Of Compliance to the north. The Brown and Caldwell Calculator was used to analyze the point of compliance to the south. See revised attachment H of the SWMP.

- *Backup should be provided for the determination of the number of BMPs for each of the 8 categories. The detail would suggest 1 BMP per lot for the BMPs located in the street, but the table shows significantly more.*

SDC PDS RCVD 6-18-13
TM5250R

REC: Please see updated report under Key Assumptions for explanation.

- *Additional clarification should be provided in Attachment 4 for the discharge orifice calculations. Equations should be provided and variables should be identified. There are also a few inconsistencies between the orifice diameters shown in Attachment 4 and those on the summary table.*

  REC: Please see updated report. Attachment 4 now provides explanation of variables. Note that the revised report has added explanation of variables for this and other areas for clarification purposes.

- *The detail and section in Attachment 6 are not consistent with the VTM or the Grading Plans. Either the plans or the calculations should be revised for consistency.*

  REC: Plans will be updated for consistency

- *Backup should be provided for the rating curves on the SWMM input files in Attachment 7.*

  REC: Rating curves are not part of this SWMM Model and have been deleted. The rating curve had no effectt on previous runs. Thanks for taking note of that.

- *Titles should be added to the SWMM input/output reports to clarify to which of the 8 categories they are applicable.*

  REC: Please see updated report. Titles had been added for clarification.

Sincerely,

Alex Parra
Director of Engineering
REC Consultants Inc.

Major Stormwater Management Plan
(Major SWMP)
For
Montecito Ranch
TM 5250 RPL7

Preparation: 4-24-2013

Prepared for:

Montecito Ranch , LLC
402 W. Broadway, Suite 1320
San Diego, Ca 92101
Telephone:619-696-7355

Prepared by:

Bruce Robertson
REC Consultants, Inc
2442 Second Avenue
San Diego, CA 92101
Telephone:619-232-9200

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan have been prepared under the direction of the following Registered Civil Engineer and meet the requirements of Regional Water Quality Control Board Order R9-2007-0001 and subsequent amendments.

Bruce Robertson, RCE # 48529

Date

The Major Stormwater Management Plan (Major SWMP) must be completed in its entirety and accompany applications to the County for a permit or approval associated with certain types of development projects. To determine whether your project is required to submit a Major or Minor SWMP, please reference the County's Stormwater Intake Form for Development Projects.

Project Name:	Montecito Ranch
Project Location:	
Permit Number (Land Development Projects):	TM 52510 RPL7
Work Authorization Number (**CIP only**):	
Applicant:	Montecito Ranch, LLC
Applicant's Address:	402 W. Broadway, Suite 1320 San Diego, Ca 92101
Plan Prepared By (*Leave blank if same as applicant*):	REC Consultants, Inc
Preparer's Address:	2442 Second Avenue San Diego, CA 92101
Date:	04-24-2013

The County of San Diego Watershed Protection, Storm Water Management, and Discharge Control Ordinance (WPO) (Ordinance No. 9926) requires all applications for a permit or approval associated with a Land Disturbance Activity to be accompanied by a Storm Water Management Plan (SWMP) (section 67.806.b). The purpose of the SWMP is to describe how the project will minimize the short and long-term impacts on receiving water quality. Projects that meet the criteria for a priority development project are required to prepare a Major SWMP.

Since the SWMP is a living document, revisions may be necessary during various stages of approval by the County. Please provide the approval information requested below.

Project Stages	Does the SWMP need revisions?		If YES, Provide Revision Date	County Reviewer
	YES	NO		

Instructions for a Major SWMP can be downloaded at
http://www.sdcounty.ca.gov/dpw/watersheds/susmp/susmp.html

Completion of the following checklists and attachments will fulfill the requirements of a Major SWMP for the project listed above.

STEP 1

PRIORITY DEVELOPMENT PROJECT DETERMINATION

TABLE 1: IS THE PROJECT IN ANY OF THESE CATEGORIES?

Yes ☒	No ☐	A	Housing subdivisions of 10 or more dwelling units. Examples: single-family homes, multi-family homes, condominiums, and apartments.
Yes ☐	No ☒	B	Commercial—greater than one acre. Any development other than heavy industry or residential. Examples: hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; airfields; and other light industrial facilities.
Yes ☐	No ☒	C	Heavy industry—greater than one acre. Examples: manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas (bus, truck, etc.).
Yes ☐	No ☒	D	Automotive repair shops. A facility categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.
Yes ☐	No ☒	E	Restaurants. Any facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), where the land area for development is greater than 5,000 square feet. Restaurants where land development is less than 5,000 square feet shall meet all SUSMP requirements except for structural treatment BMP and numeric sizing criteria requirements and hydromodification requirements.
Yes ☐	No ☒	F	Hillside development greater than 5,000 square feet. Any development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions, where the development will grade on any natural slope that is twenty-five percent or greater.
Yes ☐	No ☒	G	Environmentally Sensitive Areas (ESAs). All development located within or directly adjacent to or discharging directly to an ESA (where discharges from the development or redevelopment will enter receiving waters within the ESA), which either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. "Directly adjacent" means situated within 200 feet of the ESA. "Discharging directly to" means outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands.
Yes ☒	No ☐	H	Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff.
Yes ☒	No ☐	I	Street, roads, highways, and freeways. Any paved surface that is 5,000 square feet or greater used for the transportation of automobiles, trucks, motorcycles, and other vehicles.
Yes ☐	No ☒	J	Retail Gasoline Outlets (RGOs) that are: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.

To use the table, review each definition A through K. If any of the definitions match, the project is a Priority Development Project. Note some thresholds are defined by square footage of impervious area created; others by the total area of the development. Please see special requirements for previously developed sites and project exemptions on page 6 of the County SUSMP.

STEP 2

PROJECT STORMWATER QUALITY DETERMINATION

Total Project Site Area 935 (Acres or ft^2)

Estimated amount of disturbed area: 332 (Acres or ft^2)
(If >1 acre, you must also provide a WDID number from the SWRCB) WDID: TBD

Complete A through C and the calculations below to determine the amount of impervious surface on your project before and after construction.

A. Total size of project site: 935 (Acres or ft^2)

B. Total impervious area (including roof tops) before construction 2 (Acres)

C. Total impervious area (including roof tops) after construction 188 (Acres)

Calculate percent impervious before construction: B/A = 0.2%
Calculate percent impervious after construction: C/A = 20%

Please provide detailed descriptions regarding the following questions:

TABLE 2: PROJECT SPECIFIC STORMWATER ANALYSIS

1.	Please provide a brief description of the project.
The proposed Montecito Ranch subdivision is a rural residential community consisting of 417 single-family residential lots in the community of Ramona, County of San Diego, California (Proposed Tract 5250). The project is bound by the Rancho Santa Maria line to the north-west, Highway 78 to the north, and the project is generally west of Pine Street and north of Cedar Street. The project contains 935 acres and is generally a portion of Sections 5,7,8,9, and 17, Township 13 South, Range 1 East The proposed subdivision will contain 432 lots: 417 single-family residential lots (20,000 square-foot minimum in size), 15 lots which include uses for open space and drainage and infrastructure requirements, a park, a historic park site, and a wastewater facility. Park and school permanent post-construction BMPs shall be required and are to be determined by proposed developments/ developers at the building permit stage. The project will be developed in two map units. The rural type lots have a developed foot print which minimizes disturbance to the natural environment, as well as minimizing the impervious surface area, by consolidating graded areas and building areas at the extreme front of each lot adjacent to the public street. Public access to open space will be provided through the incorporation of trail systems. The Santa Ysabel Creek is not listed in the latest 303d list.	

2.	Describe the current and proposed zoning and land use designation.

Existing zoning: S-88
Immediate surrounding land uses consist of semi-rural and estate residential development to the north, east, and south, and the Lemurian Fellowship religious facility and orchards to the northwest. The Ramona Airport lies approximately 0.5 mile south of the project site.

The proposed land use for the site is a mix development, with the following uses: single family dwelling units, trail staging area, pump station area, park areas and open space area.

The adjacent area is of rural and vacant land.

3.	Describe the pre-project and post-project topography of the project. (Show on Plan)

The project area is composed of a variety of topographic features including relatively steep slopes, rolling hills and relatively flat plains. The northern and eastern portions of the site generally slope to the north and east and are comprised of rolling hills with some relatively steep slopes and natural drainages that drain to Clevenger Canyon and Santa Ysabel Creek, a tributary of the San Dieguito River. The southern and western portions of the site are comprised of rolling hills to flat plain areas and generally slope to the south. This area drains to Santa Maria Creek, also a tributary of the San Dieguito River.
The property has historically been used for agricultural purposes. Approximately 250 to 300 acres of the site have been disturbed for farming. Previous agricultural use is an oat hay crop that failed due to the ongoing drought. An existing unoccupied ranch house is the only dwelling on-site and will be preserved with the proposed Montecito Historical Park. Other existing site features include rock outcroppings, isolated areas of "steep" slopes and various biological features are located on the site.

4.	Describe the soil classification, permeability, erodibility, and depth to groundwater for LID and Treatment BMP consideration. (Show on Plan) If infiltration BMPs are proposed, a Geotechnical Engineer must certify infiltration BMPs in Attachment E.

Soil Type 'B' (Approximately 60% of the site) Soils have moderate infiltration rate when thoroughly wetted; chiefly soils that are moderately deep to deep, moderately well drained to well drained, and moderately coarse textured. Rate of water transmission is moderate.

Soil Type 'C' (Approximately 30% of the site) Soils have slow infiltration rate when thoroughly wetted; chiefly soils that have a layer impeding downward movement of water, or moderately fine to fine textured soils that have a slow infiltration rate. Rate of water transmission is slow.

Soil Type 'D' (Approximately 10% of the site) Soils have very slow infiltration rate when thoroughly wetted; chiefly clays that have a high shrink-swell potential, soils that have a high permanent water table, soils that have a clay pan or clay layer at or near the surface, or soils that are shallow over nearly impervious material. Rate of water transmission is very slow.

No groundwater was encountered

5.	Describe if contaminated or hazardous soils are within the project area. (Show on Plan)

None

6.	Describe the existing site drainage and natural hydrologic features. (Show on Plan).

Montecito Ranch is located in the San Dieguito Watershed. This Watershed is tributary to the San Dieguito River. The northeast 56 percent of the site is contained in hydrologic area Santa Ysabel (905.5), hydrologic sub-area Boden (905.51), and the remaining southwest 44 percent is contained in hydrologic area Santa Maria Valley (905.4), hydrologic sub-area Ramona (905.41).
The north and east portion of the existing site drains northerly through Clevenger Canyon and is Tributary to Santa Ysabel Creek. The south and west portion of the site drains south to Santa Maria Creek. Storm runoff captured by numerous storm drain systems for this project will discharge, after treatment to the above described creeks in the above percentages. Site runoff within hydrologic areas 905.41 and 905.51 are conveyed northwest via Santa Maria Creek and Santa Ysabel Creek respectively. Ultimately these creeks, and others, confluence in the San Pasqual Valley and flow southwest to Lake Hodges. Downstream of Lake Hodges, the San Dieguito River course discharges flow to the Pacific Ocean at Del Mar. Off-site storm runoff historically conveyed through the site will continue to pass through the project and not be detained or treated. The runoff velocities will be reduced to existing value to the MEP. Overall, the project area represents 0.4% of the watershed.

7.	Describe site features and conditions that constrain, or provide opportunities for stormwater control, such as LID features.

The overall stomrwater design for this provides extensive LID, hydromodification management, and high-flow runoff detention. Small bioretention basins are proposed along private street and on some lots for the residential lot/pad areas. Runoff from roof, hardscape, and portions of driveway areas will be routed to these bioretention basins that will remove pollutants and provide attenuation of flows up to the 10-yr peak flow. The majority of low flow stormwater runoff from Montecito Ranch Road (Public Streets) will be routed into Bio-Clean Round R-GISB Media Filters.
Offsite drainage will be collected in brow ditches and piped directly to the storm drain system.

8.	Is this project within the environmentally sensitive areas as defined on the maps in Appendix A of the *County of San Diego Standard Urban Storm Water Mitigation Plan for Land Development and Public Improvement Projects?*	
Yes		<u>No</u>
9.	Is this an emergency project? If yes, please provide a description below.	
Yes		<u>No</u>

CHANNELS & DRAINAGES

Complete the following checklist to determine if the project includes work in channels.

TABLE 3: PROJECT SPECIFIC STORMWATER ANALYSIS

No.	CRITERIA	YES	NO	N/A	COMMENTS
1.	Will the project include work in channels?	X			If YES go to 2 If NO go to 13.
2.	Will the project increase velocity or volume of downstream flow?		X		If YES go to 6.
3.	Will the project discharge to unlined channels?	X			If YES go to. 6.
4.	Will the project increase potential sediment load of downstream flow?	X			If YES go to 6.
5.	Will the project encroach, cross, realign, or cause other hydraulic changes to a stream that may affect downstream channel stability?		X		If YES go to 8.
6.	Review channel lining materials and design for stream bank erosion.	X			Continue to 7.
7.	Consider channel erosion control measures within the project limits as well as downstream. Consider scour velocity.	X			Continue to 8.
8.	Include, where appropriate, energy dissipation devices at culverts.	X			Continue to 9.
9.	Ensure all transitions between culvert outlets/headwalls/wingwalls and channels are smooth to reduce turbulence and scour.	X			Continue to 10.
10.	Include, if appropriate, detention facilities to reduce peak discharges.	X			Continue to 11.
11.	"Hardening" natural downstream areas to prevent erosion is not an acceptable technique for protecting channel slopes, unless pre-development conditions are determined to be so erosive that hardening would be required even in the absence of the proposed development.		X		Continue to 12.
12.	Provide other design principles that are comparable and equally effective.	X			Continue to 13.
13.	End				

TEMPORARY CONSTRUCTION BMPS

Please check the construction BMPs that may be implemented during construction of the project. The applicant will be responsible for the placement and maintenance of the BMPs incorporated into the final project design.

- ☒ Silt Fence
- ☒ Fiber Rolls
- ☒ Street Sweeping and Vacuuming
- ☒ Storm Drain Inlet Protection
- ☒ Stockpile Management
- ☒ Solid Waste Management
- ☒ Stabilized Construction Entrance/Exit
- ☒ Dewatering Operations
- ☒ Vehicle and Equipment Maintenance
- ☒ Desilting Basin
- ☒ Gravel Bag Berm
- ☒ Sandbag Barrier
- ☒ Material Delivery and Storage
- ☒ Spill Prevention and Control
- ☒ Concrete Waste Management
- ☒ Water Conservation Practices
- ☒ Paving and Grinding Operations
- ☒ Any minor slopes created incidental to construction and not subject to a major or minor grading permit shall be protected by covering with plastic or tarp prior to a rain event, and shall have vegetative cover reestablished within 180 days of completion of the slope and prior to final building approval.

EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

Complete the checklist below to determine if a proposed project will pose an "exceptional threat to water quality," and therefore require Advanced Treatment Best Management Practices during the construction phase.

TABLE 4: EXCEPTIONAL THREAT TO WATER QUALITY DETERMINATION

No.	CRITERIA	YES	NO	INFORMATION
1.	Is all or part of the proposed project site within 200 feet of waters named on the Clean Water Act (CWA) Section 303(d) list of Water Quality Limited Segments as impaired for sedimentation and/or turbidity? Current 303d list may be obtained from the following site: http://www.swrcb.ca.gov/tmdl/docs/303dlists2006/approved/r9_06_303d_reqtmdls.pdf		X	If YES, continue to 2. If NO, go to 5.
2.	Will the project disturb more than 5 acres, including all phases of the development?			If YES, continue to 3. If NO, go to 5.
3.	Will the project disturb slopes that are steeper than 4:1 (horizontal: vertical) with at least 10 feet of relief, and that drain toward the 303(d) listed receiving water for sedimentation and/or turbidity?			If YES, continue to 4. If NO, go to 5.
4.	Will the project disturb soils with a predominance of USDA-NRCS Erosion factors k_f greater than or equal to 0.4?			If YES, continue to 6. If NO, go to 5.
5.	Project is not required to use Advanced Treatment BMPs.		X	Document for Project Files by referencing this checklist.
6.	Project poses an "exceptional threat to water quality" and is required to use Advanced Treatment BMPs.			Advanced Treatment BMPs must be consistent with WPO section 67.811(b)(20)(D) performance criteria

Exemption potentially available for projects that require advanced treatment: Project proponent may perform a Revised Universal Soil Loss Equation, Version 2 (RUSLE 2), Modified Universal Soil Loss Equation (MUSLE), or similar analysis that demonstrates (to the County official's satisfaction) that advanced treatment is not required.

STEP 3

HYDROMODIFICATION DETERMINATION

The following questions provide a guide to collecting information relevant to hydromodification management plan (HMP) issues. If the project is exempt from the HMP criteria, please provide the supporting documentation in Attachment H. Please reference the full descriptions of the HMP exemptions located in Figure 1-1 of the County SUSMP.

TABLE 5: HYDROMODIFICATION DETERMINATION

	QUESTIONS	YES	NO	Information
1.	Will the project reduce the pre-project impervious area and are the unmitigated post-project outflows (outflows without detention routing) to each outlet location less as compared to the pre-project condition?		X	If NO, continue to 2. If YES, go to 7.
2.	Would the project site discharge runoff directly to an exempt receiving water, such as the Pacific Ocean, San Diego Bay, an exempt reservoir, or a tidally-influenced area?		X	If NO, continue to 3. If YES, go to 7.
3.	Would the project site discharge to a stabilized conveyance system, which has the capacity for the ultimate Q_{10}, and extends to the Pacific Ocean, San Diego Bay, a tidally-influenced area, an exempt river reach or reservoir?		X	If NO, continue to 4. If YES, go to 7.
4.	Does the contributing watershed area to which the project discharges have an impervious area percentage greater than 70 percent?		X	If NO, continue to 5. If YES, go to 7.
5.	Is this an urban infill project which discharges to an existing hardened or rehabilitated conveyance system that extends beyond the "domain of analysis," where the potential for cumulative impacts in the watershed are low, and the ultimate receiving channel has a "Low" susceptibility to erosion as defined in the SCCWRP channel assessment tool?		X	If NO, continue to 6. If YES, go to 7.
6.	Project is required to manage hydromodification impacts.	X		Reference Appendix G "Hydromodification Management Plan" of the County SUSMP.
7.	Project is not required to manage hydromodification impacts.			Hydromodification Exempt. Keep on file.

Reference the County SUSMP "HMP Applicability Requirements" in Chapter 1 for further discussion of the questions presented in Table 5. The County SUSMP is located at: http://www.sdcounty.ca.gov/dpw/watersheds/susmp/susmp.html

STEP 4

POLLUTANTS OF CONCERN DETERMINATION

WATERSHED

Please check the watershed(s) for the project.

San Juan 901	Santa Margarita 902	San Luis Rey 903	Carlsbad 904
☒ San Dieguito 905	Penasquitos 906	San Diego 907	Sweetwater 909
Otay 910	Tijuana 911	Whitewater 719*	Clark 720*
West Salton 721*	Anza Borrego 722*	Imperial 723*	

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

*Projects located fully within these watersheds require only a Minor SWMP.

HYDROLOGIC SUB-AREA NAME AND BASIN NUMBER(S)

Basin Number	Sub-Area Name
905.51	Boden
905.41	Ramona

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

SURFACE WATERS that each project discharge point proposes to discharge to.

SURFACE WATERS (river, creek, stream, etc.)	Hydrologic Unit Basin Number	Impairment(s) listed [303(d) listed waters or waters with established TMDLs]. List the impairments identified in **Table 7**.	Distance to Project
Santa Ysabel Creek	905.51	None	
Santa Maria Creek	905.41	None	

http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/r9_06_303d_reqtmdls.pdf

GROUND WATERS

Ground Waters	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
	905.51	●	●													
	905.41	●	●	○	○											

http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/index.shtml

+ Excepted from Municipal ● Existing Beneficial Use ○ Potential Beneficial Use

PROJECT ANTICIPATED AND POTENTIAL POLLUTANTS

Using Table 6, identify pollutants that are anticipated to be generated from the proposed priority project categories. Pollutants associated with any hazardous material sites that have been remediated or are not threatened by the proposed project are not considered a pollutant of concern.

TABLE 6: ANTICIPATED AND POTENTIAL POLLUTANTS GENERATED BY LAND USE TYPE

	General Pollutant Categories								
PDP Categories	Sediments	Nutrients	Heavy Metals	Organic Compounds	Trash & Debris	Oxygen Demanding Substances	Oil & Grease	Bacteria & Viruses	Pesticides
Detached Residential Development	X	X			X	X	X	X	X
Attached Residential Development	X	X			X	P(1)	P(2)	P	X
Commercial Development 1 acre or greater	P(1)	P(1)		P(2)	X	P(5)	X	P(3)	P(5)
Heavy industry /industrial development	X		X	X	X	X	X		
Automotive Repair Shops			X	X(4)(5)	X		X		
Restaurants					X	X	X	X	
Hillside Development >5,000 ft²	X	X			X	X	X		X
Parking Lots	P(1)	P(1)	X		X	P(1)	X		P(1)
Retail Gasoline Outlets			X	X	X	X	X		
Streets, Highways & Freeways	X	P(1)	X	X(4)	X	P(5)	X		

X = anticipated
P = potential
(1) A potential pollutant if landscaping exists on-site.
(2) A potential pollutant if the project includes uncovered parking areas.
(3) A potential pollutant if land use involves food or animal waste products.
(4) Including petroleum hydrocarbons.
(5) Including solvents.

PROJECT POLLUTANTS OF CONCERN SUMMARY TABLE

Please summarize the identified project pollutants-of-concern by checking the appropriate boxes in the table below and list any surface water impairments identified. Pollutants anticipated to be generated by the project, which are also causing impairment of receiving waters, shall be considered the primary pollutants of concern. For projects where no primary pollutants of concern exist, those pollutants identified as anticipated shall be considered secondary pollutants of concern.

TABLE 7: PROJECT POLLUTANTS OF CONCERN

Pollutant Category	Anticipated (X)	Potential (P)	Surface Water Impairments
Sediments	(X)		
Nutrients	(X)		
Heavy Metals	(X)		
Organic Compounds	(X)		
Trash & Debris	(X)		
Oxygen Demanding Substances	(X)		
Oil & Grease	(X)		
Bacteria & Viruses	(X)		
Pesticides	(X)		

STEP 5

LID AND SITE DESIGN STRATEGIES

Each numbered item below is a Low Impact Development (LID) requirement of the WPO. Please check the box(s) under each number that best describes the LID BMP(s) and Site Design Strategies selected for this project. LID BMPs selected on this table will be typically represented as a self-retaining area, self-treating area, pervious pavement and greenroof, which, should be delineated in the Drainage Management Area map in Attachment C.

TABLE 8: LID AND SITE DESIGN

1. Conserve natural Areas, Soils, and Vegetation
☒ Preserve well draining soils (Type A or B)
Preserve Significant Trees
☒ Preserve critical (or problematic) areas such as floodplains, steep slopes, wetlands, and areas with erosive or unstable soil conditions
Other. Description:
2. Minimize Disturbance to Natural Drainages
☒ Set-back development envelope from drainages
☒ Restrict heavy construction equipment access to planned green/open space areas
Other. Description:
3. Minimize and Disconnect Impervious Surfaces (see 5)
Clustered Lot Design
☒ Items checked in 5
Other. Description:
4. Minimize Soil Compaction
☒ Restrict heavy construction equipment access to planned green/open space areas
Re-till soils compacted by construction vehicles/equipment
☐ Collect & re-use upper soil layers of development site containing organic materials
Other. Description:
5. Drain Runoff from Impervious Surfaces to Pervious Areas
LID Street & Road Design
☒ Curb-cuts to landscaping
Rural Swales
Concave Median
Cul-de-sac Landscaping Design
Other. Description:
LID Parking Lot Design

	Permeable Pavements
☒	Curb-cuts to landscaping
	Other. Description:
	LID Driveway, Sidewalk, Bike-path Design
	Permeable Pavements
☒	Pitch pavements toward landscaping
	Other. Description:
	LID Building Design
	Cisterns & Rain Barrels
☒	Downspout to swale or landscaping
	Vegetated Roofs
	Other. Description:
	LID Landscaping Design
☒	Soil Amendments
	Reuse of Native Soils
☒	Smart Irrigation Systems
☒	Street Trees
	Other. Description:
6.	Minimize erosion from slopes
☒	Disturb existing slopes only when necessary
	Minimize cut and fill areas to reduce slope lengths
☒	Incorporate retaining walls to reduce steepness of slopes or to shorten slopes
☒	Provide benches or terraces on high cut and fill slopes to reduce concentration of flows
☒	Rounding and shaping slopes to reduce concentrated flow
☒	Collect concentrated flows in stabilized drains and channels
	Other. Description:

STEP 6

SOURCE CONTROL

Please complete the checklist on the following pages to determine Source Control BMPs. Below is instruction on how to use the checklist. (Also see instructions on page 60 of the *SUSMP)*

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies and list in Table 9.

2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your Source Control Exhibit in Attachment B.

3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs into Table 9.

4. Use the format in Table 9 below to summarize the project Source Control BMPs. Incorporate all identified Source Control BMPs in your Source Control Exhibit in Attachment B.

TABLE 9: PROJECT SOURCE CONTROL BMPS

Potential source of runoff pollutants	*Permanent source control BMPs*	*Operational source control BMPs*
Onsite Storm Drains	Mark all inlets with the words "No Dumping! Flows to Bay" or similar where feasible	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, lessees, or operators.
Landscaped Areas	Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. To insure successful establishment, select plants	Maintain landscaping using minimum or no pesticides. Provide IPM information to new owners, lessees and operators.

	appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	
Pools, spas, ponds, decorative fountains, and other water features	If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Plazas, sidewalks, and parking lots.		Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

Describe your specific Source Control BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting Source Control BMPs or substituting alternatives.

Source Control BMPs listed in Table 9 cover the proposed development associated with the grading permit and to the best of our knowledge the possible future uses of all graded areas. Future developments should process separate SWMPs specific to the scope of the permit. (Building and/or Grading)

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants – List in Table 9**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in Table 9 and Narrative**	4 **Operational BMPs—Include in Table 9 and Narrative**
☒ **A.** On-site storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words "No Dumping! Flows to Bay" or similar where feasible.	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☒ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☐ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
☒ **D1.** Need for future indoor & structural pest control		☒ Note building design features that discourage entry of pests.	☒ Provide Integrated Pest Management information to owners, lessees, and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPs		
1 **Potential Sources of Runoff Pollutants - List in Table 9**	2 **Permanent Controls—Show on Source Control Exhibit, Attachment B**	3 **Permanent Controls—List in Table 9 and Narrative**	4 **Operational BMPs—Include in Table 9 and Narrative**
☒ **D2.** Landscape/ Outdoor Pesticide Use Note: Should be consistent with project landscape plan (if applicable).	☒ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☐ Show self-retaining landscape areas, if any. ☒ Show stormwater treatment facilities.	State that final landscape plans will accomplish all of the following: ☒ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☒ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Provide IPM information to new owners, lessees and operators.

☒ **P.** Plazas, sidewalks, and parking lots.			☒ Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

STEP 7

LID AND TREATMENT CONTROL SELECTION

A treatment control BMP and/or LID IMP must be selected to treat the project pollutants of concern identified in Table 7 "Project Pollutants of Concern". A treatment control facility with a high or medium pollutant removal efficiency for the project's most significant pollutant of concern shall be selected. It is recommended to use the design procedure in Chapter 4 of the SUSMP to meet NPDES permit LID requirements, treatment requirements, and flow control requirements. If your project does not utilize this approach, the project will need to demonstrate compliance with LID, treatment and hydromodification flow control requirements. Review Chapter 2 "Selection of Stormwater Treatment Facilities" in the SUSMP to assist in determining the appropriate treatment facility for your project.

Will this project be utilizing the unified LID design procedure as described in Chapter 4 of the Local SUSMP? *(If yes, please document in Attachment D following the steps in Chapter 4 of the County SUSMP)*	
Yes	No
If this project is not utilizing the unified LID design procedure, please describe how the alternative treatment facilities will comply with applicable LID criteria, stormwater treatment criteria, and hydromodification management criteria.	

➢ Indicate the project pollutants of concern (POCs) from Table 7 in Column 2 below.

TABLE 10: GROUPING OF POTENTIAL POLLUTANTS of Concern (POCs) by fate during stormwater treatment

Pollutant	Check Project Specific POCs	Coarse Sediment and Trash	Pollutants that tend to associate with fine particles during treatment	Pollutants that tend to be dissolved following treatment
Sediment		X	X	
Nutrients			X	X
Heavy Metals			X	
Organic Compounds			X	
Trash & Debris		X		
Oxygen Demanding			X	
Bacteria			X	
Oil & Grease			X	
Pesticides			X	

➢ Indicate the treatment facility(s) chosen for this project in the following table.

TABLE 11: GROUPS OF POLLUTANTS and relative effectiveness of treatment facilities

Pollutants of Concern	Bioretention Facilities (LID)	Settling Basins (Dry Ponds)	Wet Ponds and Constructed Wetlands	Infiltration Devices (LID)	Media Filters	Higher-rate biofilters	Higher-rate media filters	Trash Racks & Hydro-dynamic Devices	Vegetated Swales
Coarse Sediment and Trash	High	High	High	High	High	High	High	High	High
Pollutants that tend to associate with fine particles during treatment	High	High	High	High	High	Medium	Medium	Low	Medium
Pollutants that tend to be dissolved following treatment	Medium	Low	Medium	High	Low	Low	Low	Low	Low

➢ Please check the box(s) that best describes the Treatment Control BMP(s) and/or LID IMP selected for this project. Please check if the treatment facility is designed for water quality or hydromodification flow control.

TABLE 12: PROJECT LID AND TC-BMPS

LID and TC-BMP Type	Water Quality Treatment Only	Hydromodification Flow Control
Bioretention Facilites (LID)		
☒ Bioretention area	X	X
☒ Flow-through Planter		
Cistern with Bioretention		
Settling Basins (Dry Ponds)		
Extended/dry detention basin with grass/vegetated lining	X	X
Extended/dry detention basin with impervious lining		
Underground Vault		
Cistern		
Infiltration Devices (LID)		
Infiltration basin		
Infiltration trench		
Other_____		

Wet Ponds and Constructed Wetlands		
Wet pond/basin (permanent pool)		
Constructed wetland		
Vegetated Swales (LID[1])		
Vegetated Swale		
Media Filters		
Austin Sand Filter		
Delaware Sand Filter		
Multi-Chambered Treatment Train (MCTT)		
Higher-rate Biofilters		
Tree-pit-style unit		
Other_____		
Higher-rate Media Filters		
Vault-based filtration unit with replaceable cartridges		
Other_____		
Hydrodynamic Separator Systems		
Swirl Concentrator		
Cyclone Separator		
Trash Racks		
Catch Basin Insert		
Catch Basin Insert w/ Hydrocarbon boom		
Other_____		
Self-Retaining Areas		
Permeable Pavements		
Self-Retaining		
Vegetated Roof		

[1] Must be designed per SUSMP "Vegetated Swales" design criteria for water quality treatment credit (p. 65).

For design guidelines and calculations refer to Chapter 4 "Low Impact Development Design Guide" in the SUSMP. Please show all calculations and design sheets for all treatment control BMPs proposed in Attachment D.

➢ Create a Construction Plan SWMP Checklist for your project.

Instructions on how to fill out table

1. Number and list each measure or BMP you have specified in your SWMP in Columns 1 and Maintenance Category in Column 3 of the table. Leave Column 2 blank.

2. When you submit construction plans, duplicate the table (by photocopy or electronically). Now fill in Column 2, identifying the plan sheets where the BMPs are shown. List all plan sheets on which the BMP appears. **This table must be shown on the front sheet of the grading and improvement plans.**

Stormwater Treatment Control BMPs and LID BMPs			
Description / Type	Sheet	Maintenance Category	Revisions
Bioretention Facility		1	
Bio-Clean Round R-GISB Media Filters		1	
1 BMPs designed to treat stormwater (e.g., LID and hydromod) shall be considered TCBMPs			

BMP's approved as part of Stormwater Management Plan (SWMP) dated xx/xx/xx on file with DPW. Any changes to the above BMP's will require SWMP revision and Plan Change approvals.

➢ Please describe why the chosen treatment control BMP(s) was selected for this project. For projects utilizing a low performing BMP, please provide a **feasibility analysis** that demonstrates utilization of a treatment control BMP with a high or medium removal efficiency ranking is infeasible.

Bioretention facilities are a very effective approach for runoff water treatment and flow control. The facilities have at least medim effectiveness for pollutants that tend to be dissolved and high effectiveness for course sedunent and trash, and pollutants that tend to associate with fine particles.

Bio-Clean Round R-GISB Media Filters. They have high effectiveness for course sediment and trash, low to medium effectiveness for pollutants and tend to be dissolved, and medium effectiveness for pollutants that tend to associate with fine particles during treatment.

Please provide the sizing design calculations for each Drainage Management Area in Attachment D. Guidelines for design calculations are located in Chapter 4 of the County SUSMP. To assist in these calculations a BMP sizing calculator is available for use at the following location: http://www.projectcleanwater.org/html/wg_susmp.html

STEP 8

OPERATION AND MAINTENANCE

➢ Please check the box that best describes the maintenance mechanism(s) for this project.

TABLE 13: PROJECT BMP CATEGORY

CATEGORY	SELECTED		BMP Description
	YES	NO	
First[1]	X		Bioretention
Second[2]			
Third[3]			
Fourth[4]			

Note:

1. A maintenance notification will be required.

Please list all individual Treatment Control BMPs (TCBMPs) incorporated into the project. Please attach the record plan sheets upon completion of project and amend the Major SWMP where appropriate. For each type of TCBMP provide an inspection sheet in Attachment F "Maintenance Plan". Replicate Table 14 in Attachment G once the TCBMP has been constructed.

TABLE 14: PROJECT SPECIFIC LID AND TC-BMPS

Treatment Control BMPs (TCBMPs)[1,2] (List all from SWMP)		
Lot Number Or Location	Description/Type	Sheet
Side of Road	Linear Bioretention	x
Back of Lot	Bioretention Facility	x

1 All Priority Development Projects (PDPs) require a TCBMP.
2 BMPs designed to treat stormwater (e.g. LID and hydromod) shall be considered TCBMPs.

➢ Responsible Party for the Construction Phase:

Identify the parties responsible for maintenance during the construction phase of the BMPs identified above and Source Controls specified in Attachment B.

Developer's Name: _____

Address: _____

City _____ State _____ Zip_____

Email Address: _____

Phone Number: _____

Engineer of Work: _____

Engineer's Phone Number: _____

➢ Responsible Party for Ongoing Maintenance:

Identify the parties responsible for long-term maintenance of the BMPs identified above and Source Controls specified in Attachment B. Include the appropriate written agreement with the entities responsible for O&M in Attachment F. Please see Chapter 5 "Stormwater Facility Maintenance" of the County SUSMP for appropriate maintenance mechanisms.

Owner's Name: Montecito Ranch, LLC

Address: 402 W, Broadway, Suite 1320

City: San Diego State: California Zip: 92101

Email Address: _____

Phone Number: 619-696-7355

* Note: If a corporation or LLC, provide information for principal partner or Agent for Service of Process. If an HOA, provide information for the Board or property manager at time of project closeout.

➢ Funding Source:

Provide the funding source or sources for long-term operation and maintenance of each BMP identified above. Please see Chapter 5 "Stormwater Facility Maintenance" of the County SUSMP for the appropriate funding source options. By certifying the Major SWMP the applicant is certifying that the funding responsibilities have been addressed and will be transferred to future owners.

See Attachment F

ATTACHMENTS

Please include the following attachments.

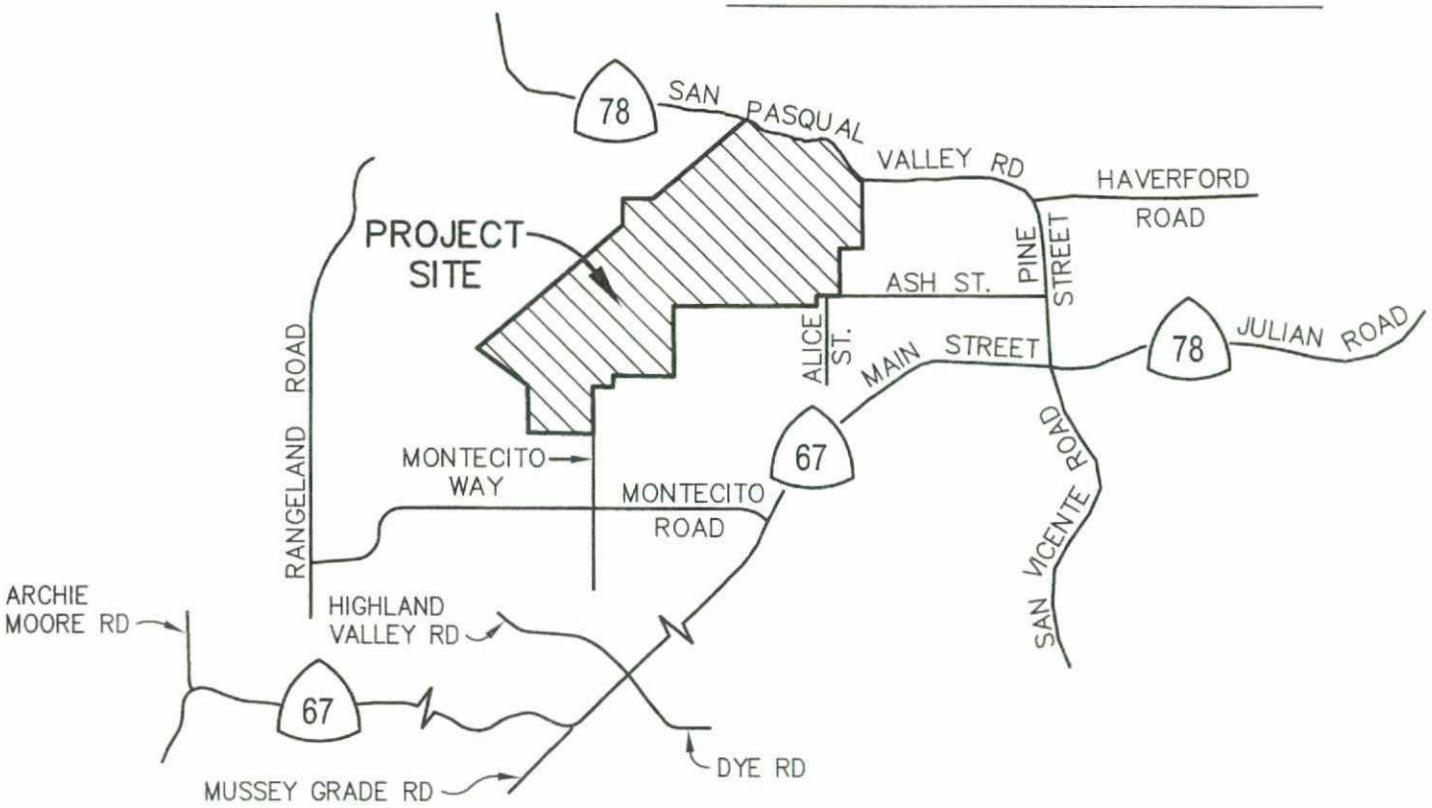
ATTACHMENT		COMPLETED	N/A
A	Project Location Map	X	
B	Source Control Exhibit	X	
C	Drainage Management Area (DMA)Exhibit	X	
D	BMP Sizing Design Calculations (Water Quality and Hydromodification) and TC-BMP/IMP Design Details	X	
E	Geotechnical Certification Sheet	X	
F	Maintenance Plan	X	
G	Treatment Control BMP Certification (Due at project completion	X	
H	HMP Study	X	
I	Geomorphic Assesment		X
J	HMP Exemption Documentation		X
K	Addendum		

Note: Attachments B and C may be combined.

ATTACHMENT A

Project Location Map

MONTECITO RANCH



VICINITY MAP

NOT TO SCALE

Regional Location Map

R·E·C Consultants, Inc. | MONTECITO RANCH

0 3 6 Miles

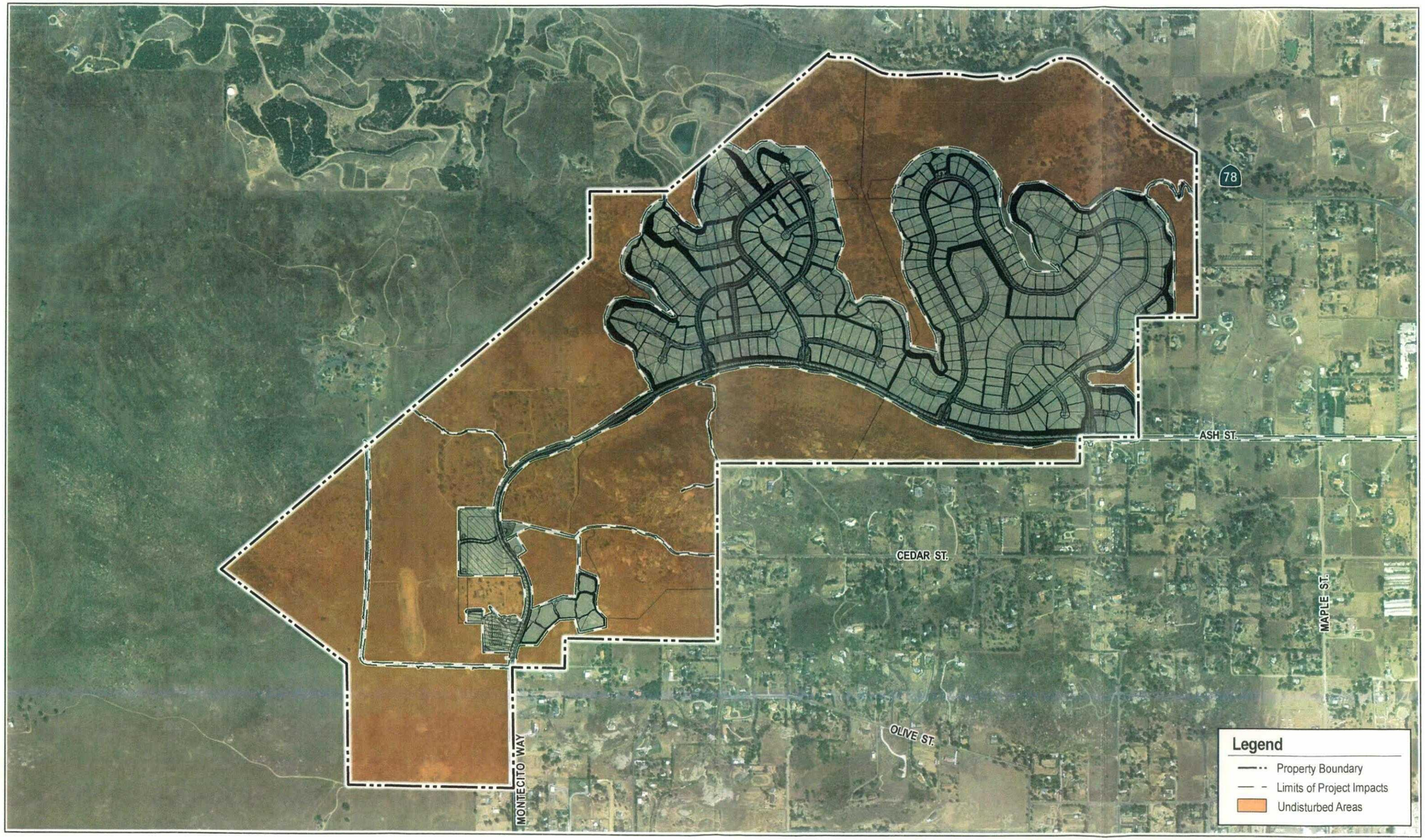
FIGURE 1

Source: SANGIS Data, 2011.

April 2013

ATTACHMENT B

Source Control Exhibit



REC Consultants, Inc.

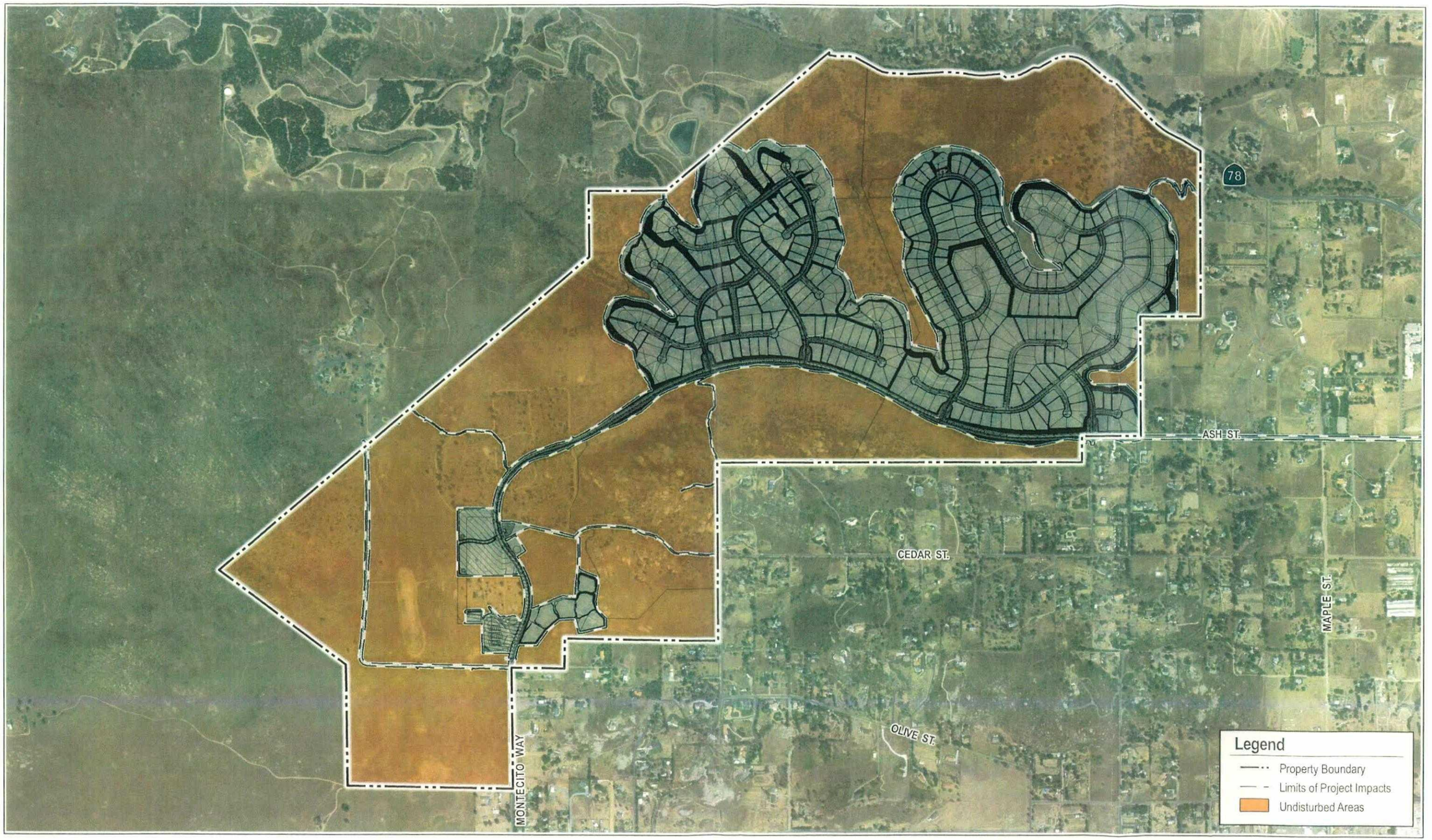
Site Plan

MONTECITO RANCH

0 500 1,000 Feet

Aerial Source: Google, 2010

April 2013



R·E·C Consultants, Inc. | Source Control

MONTECITO RANCH

0 500 1,000 Feet

Aerial Source: Google, 2010

June 2013

ATTACHMENT C

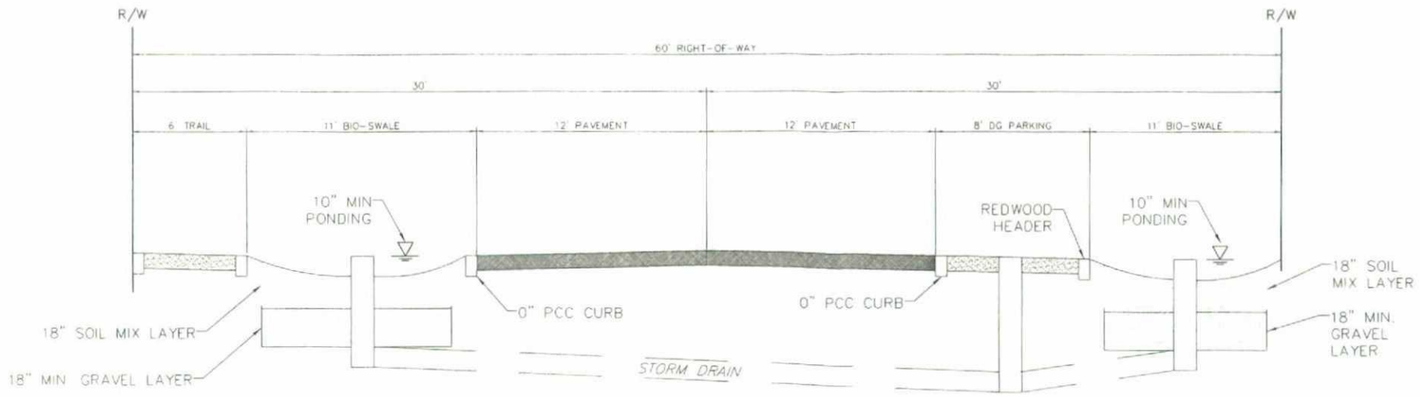
Drainage Management Area (DMA) Exhibit

DRAINAGE MANAGEMENT AREA
MONTECITO RANCH
TYPICAL RESIDENTIAL LOT LAYOUT

TYPICAL LOT SIZE (20,00 FT^2)

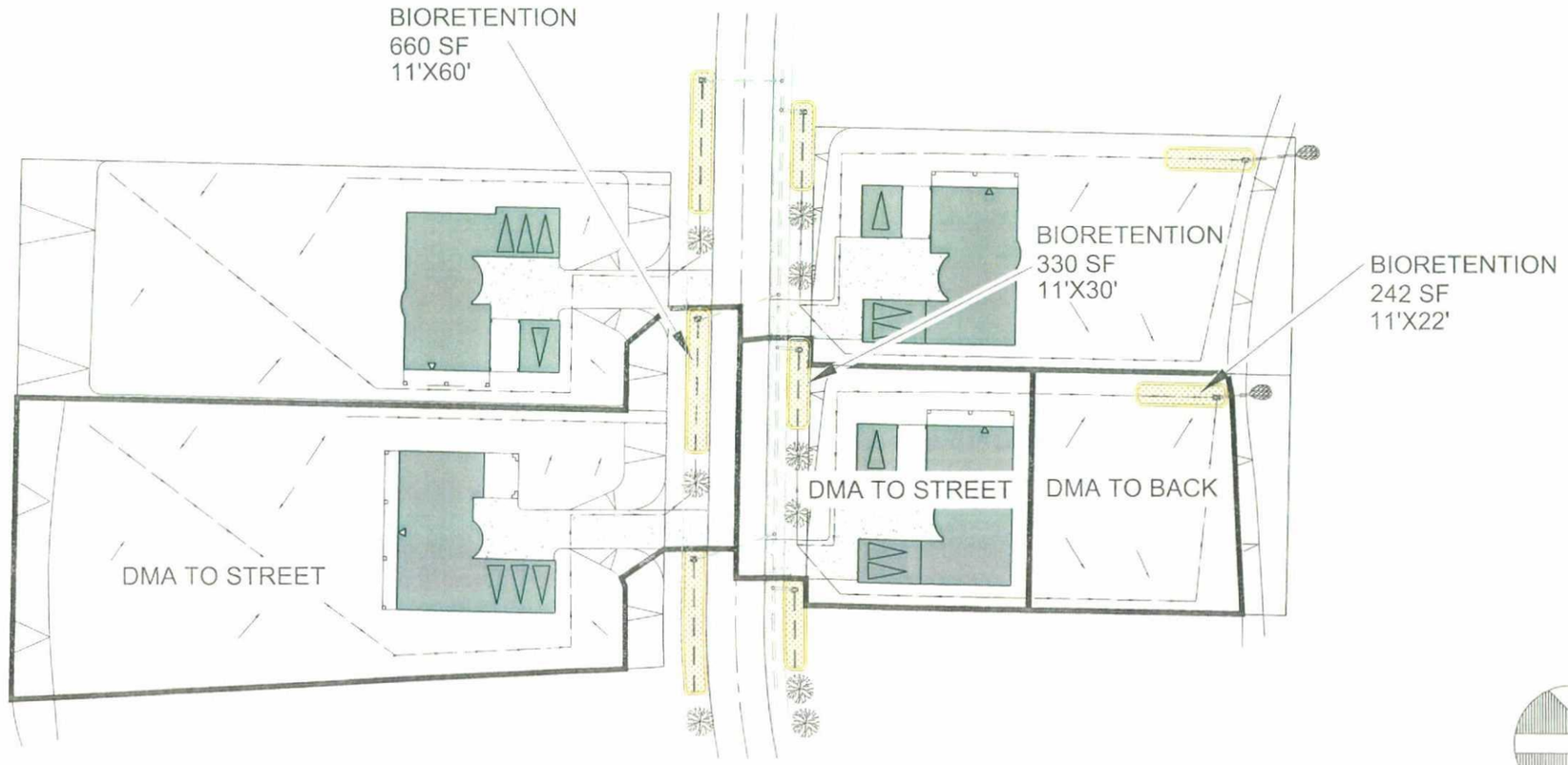
DMA Name	*DMA Area (square feet)*	*Post-project surface type*	*DMA Runoff factor*	*DMA Area X Runoff factor*		***IMP***			
DMA STREET	*11000*	*impervious*	*1*	*11000*	*IMP Sizing factor*		*Minimum Area*	*Proposed Area*	
DMA STREET	*9000*	*pervious*	*0.1*	*900*					
		Total		***11900***	***0.04***		476	**660**	*IMP Area*

DMA Name	*DMA Area (square feet)*	*Post-project surface type*	*DMA Runoff factor*	*DMA Area X Runoff factor*		***IMP***			
DMA BACK OF LOT	*5500*	*impervious*	*1*	*5500*	*IMP Sizing factor*		*Minimum Area*	*Proposed Area*	
DMA BACK OF LOT	*5000*	*pervious*	*0.1*	*500*					
		Total		***6000***	***0.04***		240	**330**	*IMP Area*



TYPICAL SECTION
NEIGHBORHOOD STREETS (PRIVATE)

NOT TO SCALE



TYPICAL RESIDENTIAL LOT DMA

NO SCALE

NTS

REVISIONS

NO.	DESCRIPTION	DATE	APP'D

Civil Engineering · Environmental
Land Surveying
REC Consultants, Inc
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

DATE: 03-01-13
SCALE: 1" = 20'
DRAWN: REC
CHECKED: AP

SHEET TITLE: TYPICAL DMA
PROJECT: MONTECITO RANCH
TBD
COUNTY OF SAN DIEGO

SHEET 1 OF 1 SHEETS

ATTACHMENT D

Sizing Design Calculations and TC-BMP/LID Design Details

(Provide BMP Sizing Calculator results and/or continuous simulation modeling results, if applicable)

ATTACHMENT E

Geotechnical Certification Sheet

(if applicable)

The design of stormwater treatment and other control measures proposed in this plan requiring specific soil infiltration characteristics and/or geological conditions has been reviewed and approved by a registered Civil Engineer, Geotechnical Engineer, or Geologist in the State of California.

_____ _____

Name and registration # Date

ATTACHMENT F

Maintenance Plan

(Use Chapter 5 of the SUSMP as guidance in developing your Maintenance Plan)

I. Inspection, Maintenance Log and Self-Verification Forms

The proposed Bioretention facilities and Infiltration facility shall be inspected and maintained according to the attached County Verification Form and according to the County of San Diego SUSMP LID Fact Sheets.

See Attachment 1

II. Updates, Revisions and Errata

This is a living document and should be updated and revised as needed during the life of the project.

III. Introduction

The proposed Montecito Ranch subdivision is a rural residential community consisting of 417 single-family residential lots in the community of Ramona, County of San Diego, California (Proposed Tract 5250). The project is bound by the Rancho Santa Maria line to the north-west,
Highway 78 to the north, and the project is generally west of Pine Street and north of Cedar
Street. The project contains 935 acres and is generally a portion of Sections 5,7,8,9, and 17, Township 13 South, Range 1 East
The proposed subdivision will contain 432 lots: 417 single-family residential lots (20,000 square-foot minimum in size), 15 lots which include uses for open space and drainage and infrastructure requirements, a park, a historic park site, and a wastewater facility.

Park and school permanent post-construction BMPs shall be required and are to be determined by proposed developments/ developers at the building permit stage. The project will be developed in two map units.

The rural type lots have a developed foot print which minimizes disturbance to the natural environment, as well as minimizing the impervious surface area, by consolidating graded areas and building areas at the extreme front of each lot adjacent to the public street. Public access to open space will be provided through the incorporation of trail systems.

1. Side of road and onsite Bioretention facilities will treat most of the runoff for water quality and flow control.

IV. Responsibility for Maintenance

Owner:

Passerelle, LLC
402 W. Broadway, Suite 2175
San Diego, Ca 92101
Telephone:619-696-7355

Operation and Maintenance Agreement

See Attachment 2 (TBD if needed)

Maintenance Funding

The proposed extended detention basin (category 2 BMP) requires the creation and execution of an agreement by the owner(s) to maintain the facility as well as an access easement and annual inspection fee determined by the County of San Diego.

BMP Maintenance Agreement with Easement and Covenant: An agreement will be entered into with the County, which will function three ways:

(a) It will commit the land to being used only for purposes of the BMP;

(b) It will include an agreement by the landowner, to maintain the BMPs in accordance with the maintenance plan (this obligation would be passed on to future purchasers or successors of the landowner, as a covenant); and

(c) It will include an easement giving the County the right to enter onto the land (and any necessary adjacent land needed for access) to maintain the BMPs.

Funding:

Developer would provide the County with security to substantiate the maintenance agreement; security would remain in place for an interim period of 5 years. The amount of the security would equal the estimated cost of 2 years of maintenance activities. The security can be a Cash Deposit, Letter of Credit or other form acceptable to the County. If at any time, owners fail to maintain BMPs and the County must perform any of the maintenance activities, then owners shall pay all of County's costs incurred in performing the maintenance as defined in the maintenance agreement.

(4) Training Program

The current owner and subsequent ownership individual and/or groups must read the project SWMP to get informed on the operation and maintenance of the

different post construction BMPs. The report will list possible operational problems that the owner should rectify as soon as possible.

V. Summary of Drainage Areas and Stormwater Facilities

A. Drainage Areas DMA

(1) Drawings showing pervious and impervious areas (copied or adapted from initial SWMP).

(2) Designation and description of each drainage area and how flow is routed to the corresponding facility.

See Attachment 3

Treatment and Flow-Control Facilities

The project proposes the use of a linear bioretention facility.

Bioretention is a terrestrial-based, water quality and water quantity control practice using the chemical, biological, and physical properties of plants, microbes, and soils for removal of pollutants from stormwater runoff. Some of the processes that may take place in a bioretention facility include sedimentation, adsorption, filtration, volatilization, ion exchange, decomposition, phytoremediation, bioremediation, and storage capacity. Bioretention can also be designed to mimic predevelopment hydrology.

The project proposes the use of a dry detention pond facility.

Dry detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, and extended detention ponds) are basins whose outlets have been designed to detain stormwater runoff for some minimum time (e.g., 24 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool of water. However, they are often designed with small pools at the inlet and outlet of the basin. They can also be used to provide flood control by including additional flood detention storage.

See Attachment 4

VI. Facility Documentation

Included Copy of Site Plan showing location of TC BMPs

See Attachment 4

VII. Maintenance Schedule

A. Maintenance Schedule for each facility with specific requirements for:

(1) Routine inspection and maintenance

(2) Annual inspection and maintenance

(3) Inspection and maintenance after major storms

See Attachments 1, 3 & 4

Important Note- Service Agreement Information

Assemble and make copies of your maintenance plan. One copy must be submitted to the County, and at least one copy kept on-site.

- Format plans to 8½" x 11" to facilitate duplication, filing, and handling.
- Include the revision date in the footer on each page.
- Scan graphics and incorporate with text into a single electronic file. Keep the electronic file backed-up so that copies of the maintenance plan can be made if the hard copy is lost or damaged.

Attachment 1

BIORETENTION CELLS

Most of the newly created impervious surfaces will drain to the proposed *Bioretention cells*. The proposed bioretention facilities will detain the runoff in a surface reservoir, filter it through plant roots and a biologically active soil mix and through a gravel layer and then partially infiltrate it into the ground. The site soils are not that permeable therefore an under drain will convey treated runoff to the proposed storm drain.

Operation and Maintenance (Bioretention Cell)

The proper functioning of the bioretention cells depends on their long-term maintenance. While maintenance is relatively minimal and similar to regular landscaped areas, extra care must be taken to maintain the area's pollutant removal and infiltration capacity. This is accomplished by maintaining soil structure, caring for soil invertebrates, mulching as needed, and periodic removal of debris.

General Maintenance

- *Trash and Debris*. During each inspection and maintenance visit to the site, debris and trash removal will be conducted to reduce the potential for outlet pipes and other components from becoming clogged and inoperable during storm events.

- *Sediment Removal*. Sediment accumulation, as part of the operation and maintenance program at a bioretention cell will be monitored once a month during the dry season and after every large storm (0.50 inch). Specifically, if sediment reaches a level at or near plant height, or could interfere with flow or operation, the sediment will be removed. If accumulation of debris or sediment is determined to be the cause of decline in design performance, prompt action (i.e., within ten working days) will be taken to restore the self-retaining area to design performance standards. Actions will include using additional fill and vegetation and/or removing accumulated sediment to correct channeling or ponding. Characterization and Appropriate disposal of sediment will comply with applicable local, county, state, or federal requirements.

- *Removal of Standing Water*. Standing water must be removed if it contributes to the development of aquatic plant communities or mosquito breeding areas.

- *Damage to structural components such as weirs, inlet, or outlet structures. Obstructed inlet or outlet structure. Damage to check dam.* Repair or replace all damaged structural components as needed. Repair side slopes as needed due to erosion. Examine cell height to ensure a minimum of 9" at all times.

Inspection Frequency and Requirements

Frequency

- Prior to rainy season (Oct. 1st) Annually.
- Once a month at a minimum.
- 72 hours (for drawdown time) after every large storm (after every storm monitored or those storms with more than 0.50 inch of precipitation.)
- On a weekly basis during extended periods of wet weather.

Requirements (Visual Observation)

- Inspect the bioretention area for proper drawdown or evidence of clogging
- Inspect for debris accumulation.
- Inspect for accumulated sediment around yard drains.
- Inspect low flow outlet orifice for clogging.

Maintenance Frequency and Requirements

Frequency

- Once a month at a minimum during peak growing season (late spring and early fall).

Requirements

- Removal of debris and sediment accumulation.
- Check condition of soil mix and replace as necessary
- Check condition of the outlet pipe and replace if cracked or damaged.
- Remove debris and sediment around and inside the low flow outlet orifice.

STORM DRAIN STENCILING

- In order to discourage deliberate waste dumping, the four proposed grated inlets shall be stenciled and clearly marked with the following sign *"No Dumping! Flows to Ocean"*
- Place the message in a visible area within the exposed concrete face of the catch basin.

General Maintenance

- Legibility of markers or signs should be maintained.
- Remove accumulated debris or sediment around the catch basin to prevent blockage of message.

Inspection/Maintenance Frequency and Requrements

Frequency

- Inspect once a year at a minimum and replace marker if necessary.

Requirements (Visual Observation)

- Inspect for accumulated sediment or debris around catch basins.
- Inspect for discoloring of message.

PRIVATE TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE VERIFICATION FORM

BIORETENTION FACILITIES, VEGETATED SWALES & HIGHER RATE BIOFILTERS

1. Transcribe the following information from your notification letter and make corrections as necessary:

Permit No.: _____

BMP Location: _____

Responsible Party: _____

Phone Number: ( ) **Email:** _____

Responsible Party Address: _____
Number Street Name & Suffix City/Zip

☐ *Check here for Address or phone number change*

2. Using the Table below, please describe the inspections and maintenance activities that have been conducted during the fiscal year (July 1 – June 30), and date(s) maintenance was performed. Under "Results of Inspection," indicate whether maintenance was required based on each inspection, and if so, what type of maintenance. If maintenance was required, provide the date maintenance was conducted and a description of the maintenance. ***REFER TO THE BACK OF THIS SHEET FOR MORE INFORMATION DESCRIBING TYPICAL MAINTENANCE INDICATORS AND MAINTENANCE ACTIVITIES****. If no maintenance was required based on the inspection results, state "no maintenance required."*

What To Look For?	Date Inspected	Results of Inspection: Work needed? (Yes/No)	Date Maintenance Completed and Description of Maintenance Conducted
Accumulation of Sediment, Litter, Grease			
Standing Water Erosion Overgrown Vegetation Poor Vegetation Establishment			
Structural Damage			

3. Attach copies of available supporting documents (photographs, copies of maintenance contracts, and/or maintenance records).

4. Sign the bottom of the form and return to:

County of San Diego Watershed Protection Program
Treatment Control BMP Tracking
5201 Ruffin Road, Suite P, MS 0326
San Diego, CA 92123 ***OR***
Email: Watersheds@sdcounty.ca.gov

_____

Signature of Responsible Party **Print Name** **Date**

PRIVATE TREATMENT CONTROL BMP
OPERATION AND MAINTENANCE VERIFICATION FORM

BIORETENTION FACILITIES, VEGETATED SWALES & HIGHER RATE BIOFILTERS-SIDE 2

This guide sheet provides general indicators for maintenance only and for a wide array of treatment control BMPs. Your developer prepared maintenance plans specifically for your treatment control BMP as an appendix to the Stormwater Management Plan. Also, if you have a manufactured structure, please refer to the manufacturer's maintenance instructions.

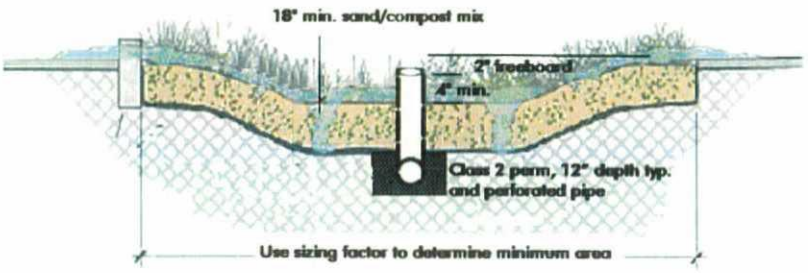
Biofilters include the following :

☐ **Vegetated Filter Strip/Swale** ☐ **Bioswale** ☐ **Bioretention Facility** ☐ **Planter Boxes**
☐ **Manufactered Higher-Flow-Rate Biofilters, such as Tree-Pit-Style Units.**

Routine maintenance is needed to ensure that flow is unobstructed, that erosion is prevented, and that soils are held together by plant roots and are biologically active. Typical maintenance consists of the following:

Bioretention BMPs Inspection and Maintenance Checklist	
Typical Maintenance Indicators	**Typical Maintenance Actions**
Accumulation of sediment (over 2 inches deep or covers vegetation), litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation. Confirm that soil is not clogging and that the area drains after a storm event. Till or replace soil as necessary.
Poor vegetation establishment	Ensure vegetation is healthy and dense enough to provide filtering and to protect soils from erosion. Replenish mulch as necessary (if less than 3 inches deep), remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas.
Overgrown vegetation—woody vegetation not part of design is present and grass excessively tall (greater than 10 inches)	Mow or trim as appropriate, but not less than the design height of the vegetation (typically 4-6 inches for grass). Confirm that irrigation is adequate and not excessive and that sprays do not directly enter overflow grates. Replace dead plants and remove noxious and invasive weeds.
Erosion due to concentrated irrigation flow	Repair/re-seed eroded areas and adjust the irrigation.
Erosion due to concentrated stormwater runoff flow	Repair/re-seed eroded areas and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or re-grading where necessary.Remove obstructions and sediment accumulations so water disperses.
Standing water (BMP not draining) . If mosquito larvae are present and persistent, contact the San Diego County Vector Control Program at (858) 694-2888. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.	Where there is an underdrain, such as in planter boxes and manufactured biofilters, check the underdrain piping to make sure it is intact and unobstructed. Abate any potential vectors by filling holes in the ground in and around the biofilter facility and by insuring that there are no areas where water stands longer than 96 hours following a storm .
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet, or outlet structures	Repair or replace as applicable.
Before the wet season and after rain events: remove sediment and debris from screens and overflow drains and downspouts; ensure pumps are functioning, where applicable; check integrity of mosquito screens; and; check that covers are properly seated and locked.	Where cisterns are part of the system
For manufactured high-flow-rate biofilters, see manufacturer's maintenance guidelines	

Bioretention Facilities



Bioretention facility configured for treatment-only requirements. Bioretention facilities can rectangular, linear, or nearly any shape.

Bioretention detains runoff in a surface reservoir, filters it through plant roots and a biologically active soil mix, and then infiltrates it into the ground. Where native soils are less permeable, an underdrain conveys treated runoff to storm drain or surface drainage.

Bioretention facilities can be configured in nearly any shape. When configured as linear **swales**, they can convey high flows while percolating and treating lower flows.

Bioretention facilities can be configured as in-ground or above-ground planter boxes, with the bottom open to allow infiltration to native soils underneath. If infiltration cannot be allowed, use the sizing factors and criteria for the Flow-Through Planter.

► CRITERIA

For development projects subject only to runoff treatment requirements, the following criteria apply:

Parameter	Criterion
Soil mix depth	18 inches minimum
Soil mix minimum percolation rate	5 inches per hour minimum sustained (10 inches per hour initial rate recommended)
Soil mix surface area	0.04 times tributary impervious area (or equivalent)

Best Uses

- Commercial areas
- Residential subdivisions
- Industrial developments
- Roadways
- Parking lots
- Fit in setbacks, medians, and other landscaped areas

Advantages

- Can be any shape
- Low maintenance
- Can be landscaped

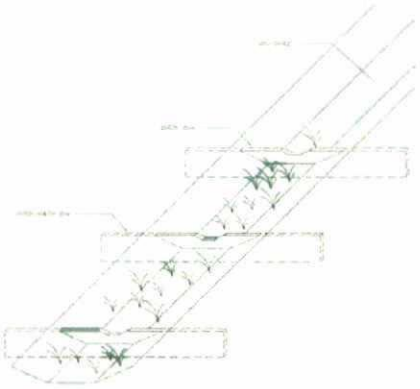
Limitations

- Require 4% of tributary impervious square footage
- Typically requires 3-4 feet of head
- Irrigation typically required

Parameter	Criterion
Surface reservoir depth	6 inches minimum; may be sloped to 4 inches where adjoining walkways.
Underdrain	Required in Group "C" and "D" soils. Perforated pipe embedded in gravel ("Class 2 permeable" recommended), connected to storm drain or other accepted discharge point.

► DETAILS

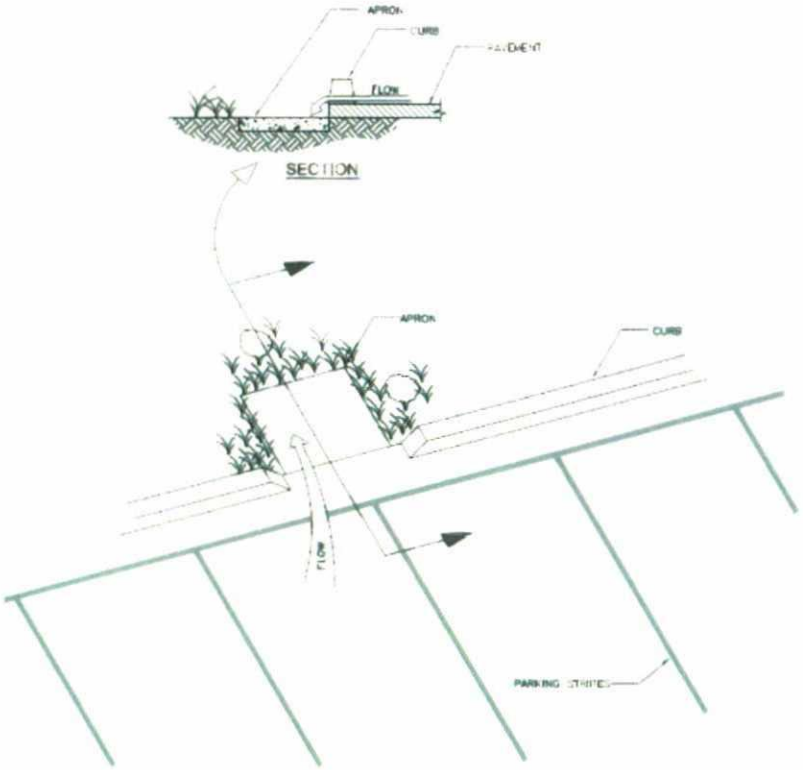
Plan. On the surface, a bioretention facility should be one level, shallow basin—or a series of basins. As runoff enters each basin, it should flood and fill throughout before runoff overflows to the outlet or to the next downstream basin. This will help prevent movement of surface mulch and soil mix.



Use check dams for linear bioretention facilities (swales) on a slope.

In a linear swale, check dams should be placed so that the lip of each dam is at least as high as the toe of the next upstream dam. A similar principle applies to bioretention facilities built as terraced roadway shoulders.

Inlets. Paved areas draining to the facility should be graded, and inlets should be placed, so that runoff remains as sheet flow or as dispersed as possible. Curb cuts should be wide (12" is recommended) to avoid clogging with leaves or debris. Allow for a minimum reveal of 4"-6" between the inlet and soil mix elevations to ensure turf or mulch buildup does not block the inlet. In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet.



Where runoff is collected in pipes or gutters and conveyed to the facility, protect the landscaping from high-velocity flows with energy-dissipating rocks. In larger installations, provide cobble-lined channels to better distribute flows throughout the facility.

Upturned pipe outlets can be used to dissipate energy when runoff is piped from roofs and upgradient paved areas.

Soil mix. The required soil mix is similar to a loamy sand. It must maintain a minimum percolation rate of 5" per hour throughout the life of the facility, and it must be suitable for maintaining plant life. Typically, on-site soils will not be suitable due to clay content.

Storage and drainage layer. "Class 2 permeable," Caltrans specification 68-1.025, is recommended. Open-graded crushed rock, washed, may be used, but requires 4"-6" washed pea gravel be substituted at the top of the crushed rock gravel layers. **Do not use filter fabric** to separate the soil mix from the gravel drainage layer or the gravel drainage layer from the native soil.

Underdrains. No underdrain is required where native soils beneath the facility are Hydrologic Soil Group A or B. For treatment-only facilities where native soils are Group C or D, a

perforated pipe must be bedded in the gravel layer and must terminate at a storm drain or other approved discharge point.

Outlets. In treatment-only facilities, outlets must be set high enough to ensure the surface reservoir fills and the entire surface area of soil mix is flooded before the outlet elevation is reached. In swales, this can be achieved with appropriately placed check dams.

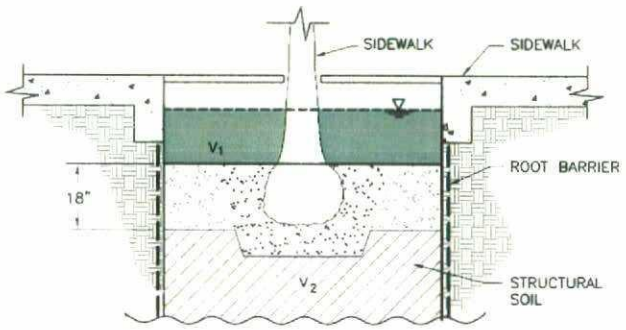
The outlet should be designed to exclude floating mulch and debris.

Vaults, utility boxes and light standards. It is best to locate utilities outside the bioretention facility—in adjacent walkways or in a separate area set aside for this purpose. If utility structures are to be placed within the facility, the locations should be anticipated and adjustments made to ensure the minimum bioretention surface area and volumes are achieved. Leaving the final locations to each individual utility can produce a haphazard, unaesthetic appearance and make the bioretention facility more difficult to maintain.

Emergency overflow. The site grading plan should anticipate extreme events and potential clogging of the overflow and route emergency overflows safely.

Trees. Bioretention areas can accommodate small or large trees. There is no need to subtract the area taken up by roots from the effective area of the facility. Extensive tree roots maintain soil permeability and help retain runoff. Normal maintenance of a bioretention facility should not affect tree lifespan.

The bioretention facility can be integrated with a tree pit of the required depth and filled with structural soil. If a root barrier is used, it can be located to allow tree roots to spread throughout the bioretention facility while protecting adjacent pavement. Locations and planting elevations should be selected to avoid blocking the facility's inlets and outlets.



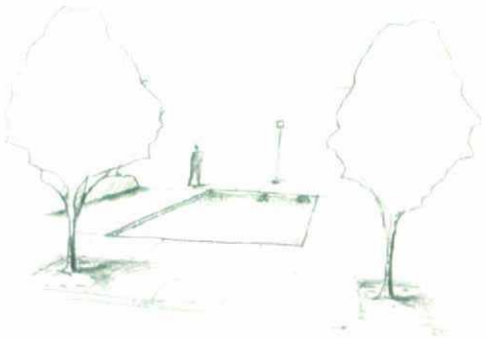
Bioretention facility configured as a tree well.
The root barrier is optional.

▶ APPLICATIONS

Multi-purpose landscaped areas. Bioretention facilities are easily adapted to serve multiple purposes. The loamy sand soil mix will support turf or a plant palette suitable to the location and a well-drained soil.

Example landscape treatments:

- Lawn with sloped transition to adjacent landscaping.
- Swale in setback area
- Swale in parking median
- Lawn with hardscaped edge treatment
- Decorative garden with formal or informal plantings
- Traffic island with low-maintenance landscaping
- Raised planter with seating
- Bioretention on a terraced slope

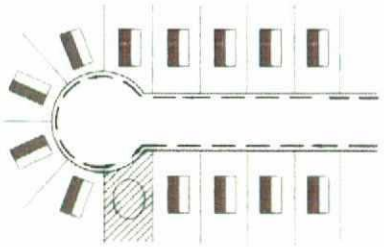


Bioretention facility configured as a recessed decorative lawn with hardscaped edge.

Bioretention facility configured and planted as a lawn/ play area.

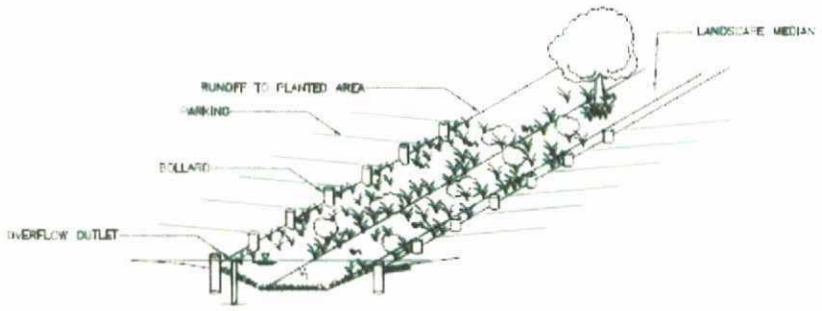
Residential subdivisions. Some subdivisions are designed to drain roofs and driveways to the streets (in the conventional manner) and then drain the streets to bioretention areas, with one bioretention area for each 1 to 6 lots, depending on subdivision layout and topography.

If allowed by the local jurisdiction, bioretention areas can be placed on a separate, dedicated parcel with joint ownership.



Bioretention facility receiving drainage from individual lots and the street in a residential subdivision.

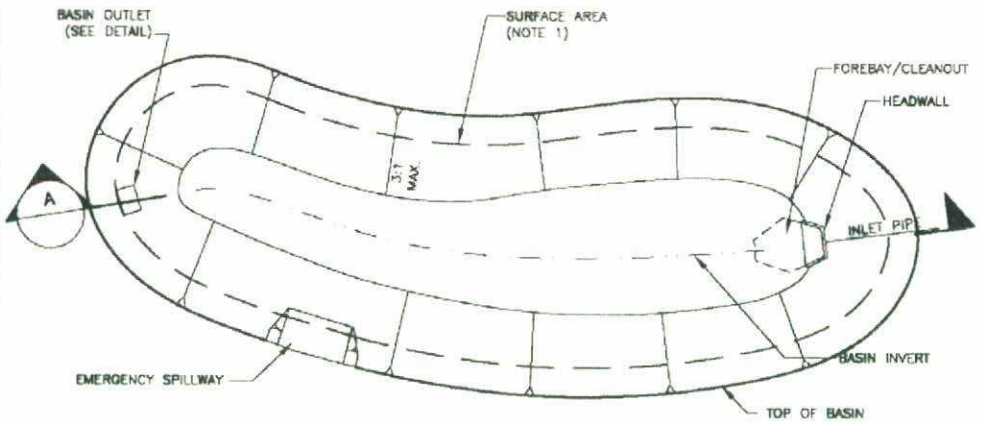
Sloped sites. Bioretention facilities must be constructed as a basin, or series of basins, with the circumference of each basin set level. It may be necessary to add curbs or low retaining walls.



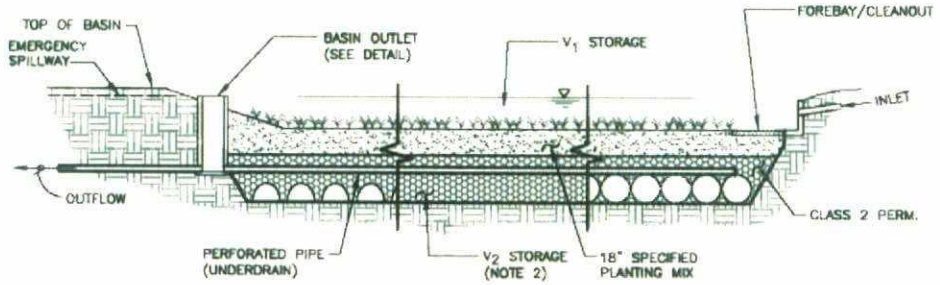
Bioretention facility configured as a parking median.
Note use of bollards in place of curbs, eliminating the need for curb cuts.

Design Checklist for Bioretention

- ❒ Volume or depth of surface reservoir meets or exceeds minimum.
- ❒ 18" depth "loamy sand" soil mix with minimum long-term percolation rate of 5"/hour.
- ❒ Area of soil mix meets or exceeds minimum.
- ❒ Perforated pipe underdrain bedded in "Class 2 perm" with connection and sufficient head to storm drain or discharge point (except in "A" or "B" soils).
- ❒ No filter fabric.
- ❒ Underdrain has a clean-out port consisting of a vertical, rigid, non-perforated PVC pipe, with a minimum diameter of 6 inches and a watertight cap.
- ❒ Location and footprint of facility are shown on site plan and landscaping plan.
- ❒ Bioretention area is designed as a basin (level edges) or a series of basins, and grading plan is consistent with these elevations. If facility is designed as a swale, check dams are set so the lip of each dam is at least as high as the toe of the next upstream dam.
- ❒ Inlets are 12" wide, have 4"-6" reveal and an apron or other provision to prevent blockage when vegetation grows in, and energy dissipation as needed.
- ❒ Overflow connected to a downstream storm drain or approved discharge point.
- ❒ Emergency spillage will be safely conveyed overland.
- ❒ Plantings are suitable to the climate and a well-drained soil.
- ❒ Irrigation system with connection to water supply.
- ❒ Vaults, utility boxes, and light standards are located outside the minimum soil mix surface area.
- ❒ When excavating, avoid smearing of the soils on bottom and side slopes. Minimize compaction of native soils and "rip" soils if clayey and/or compacted. Protect the area from construction site runoff.



PLAN VIEW
NOT TO SCALE

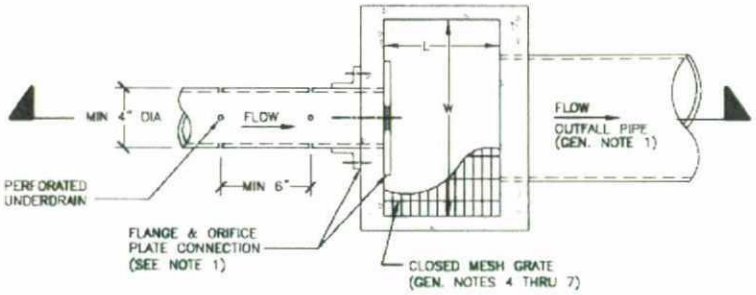


A SECTION
NOT TO SCALE

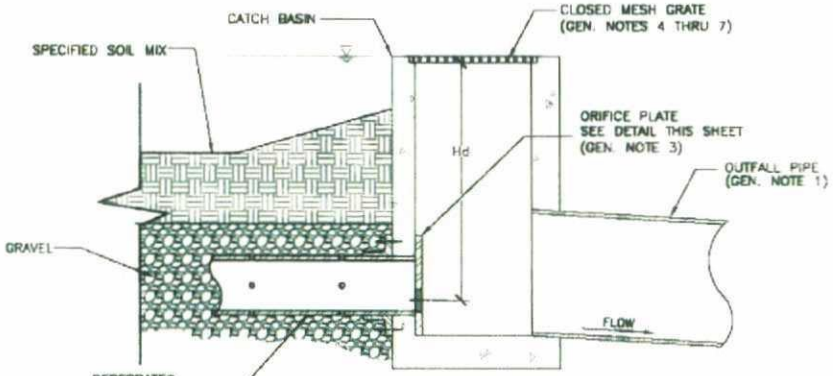
NOTE

1. SURFACE AREA LIMIT DETERMINED BY EXTENT OF SPECIFIED PLANTING MIX, WHICH IS GOVERNED BY THE OUTLET SPILL ELEVATION. FOR REQUIRED SURFACE AREA REFER TO THE FACTORS AND EQUATIONS IN THE STORMWATER C.3 GUIDEBOOK.
2. V_2 STORAGE ACCOMPLISHED WITH INFILTRATION ARCHES, PERFORATED PIPES, CLASS 2 PERM OR OTHER AT THE DESIGNERS DISCRETION.

Bioretention Facility



PLAN
N.T.S.



SECTION
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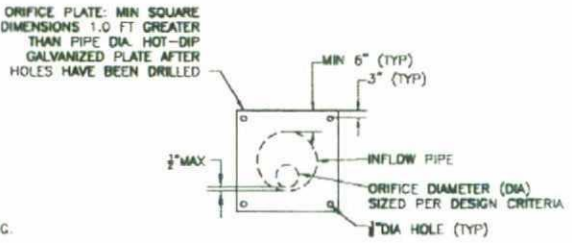


NOTE

1. ORIFICE PLATE & FLANGE CONNECTION TO CONCRETE SHALL BE FITTED WITH 30 DUROMETER NEOPRENE RING.

FLOW CONTROL ORIFICE PLATE

Bioretention Facility Outlet Detail - A

BIO CLEAN
ENVIRONMENTAL SERVICES, INC

Overview

The Bio Clean Round Curb Inlet Filter (R-GISB) is a favorite amongst cities and municipalities nationwide. Many agencies have chosen this system as their standard due to its quick cleaning time and large storage capacity.

Its patented 'Shelf System' allows cleaning to be done in less than 15 minutes, and its larger storage capacity of 3.85 cubic feet allows for maximized cleaning intervals and minimized attention required by maintenance crews.

The modularized design of the 'Shelf System' for curb inlets makes it adaptable to any size or type catch basin.

Its multi-stage filtration screens allow this device to meet "full trash capture" requirements by removing 100% of trash & debris 5 mm and greater. Made of marine grade fiberglass and high grade stainless steel these filters come in standard and custom designs.

This filtration system addresses a wide array of pollutants including trash & debris, sediments, TSS, nutrients, metals, and hydrocarbons.

www.BioCleanEnvironmental.com

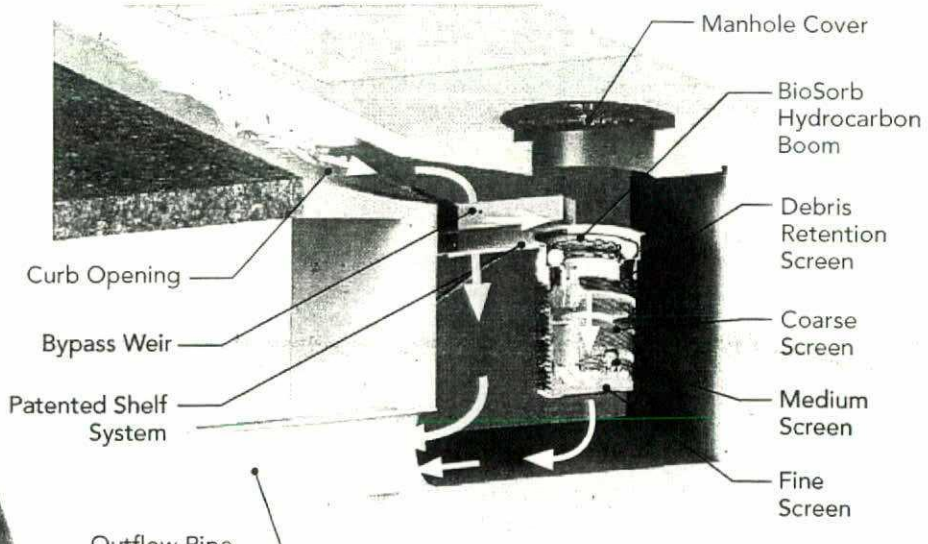
Includes the Patented 'Shelf System'

Higher Storage Capacity, Same 15 Minute Service Time

- 5 Year Warranty
- Works in Any Size Catch Basin
- No Nets or Geofabrics
- 15+ Year User Life
- Meets LEED Requirements
- Patented Shelf System
- Fiberglass Construction

Model #	Treatment Flow (CFS)	Bypass Flow (CFS)
BC-RGISB-22-24	2.4	Unlimited

- 74%-86% Removal of TSS
- 54% Removal of Oils & Grease
- 57%-71% Removal of Phosphorus
- 56%-60% Removal of Nitrogen



Round Curb Inlet Filter (R-GISB)

PROVEN STORMWATER TREATMENT TECHNOLOGY

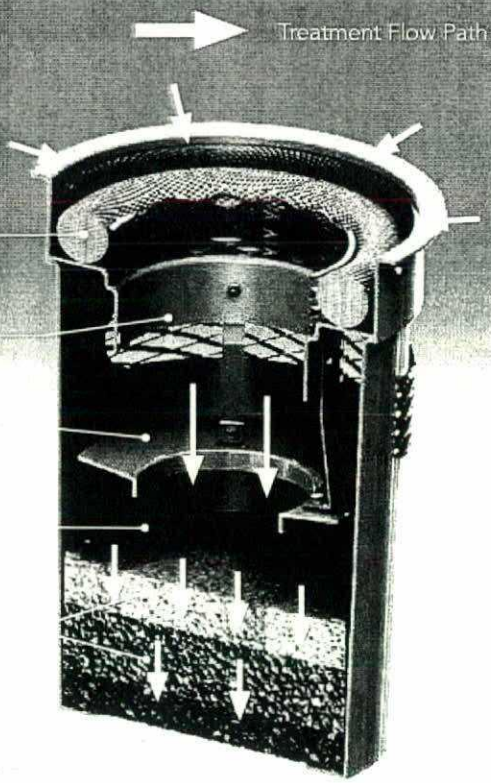
Media Filter

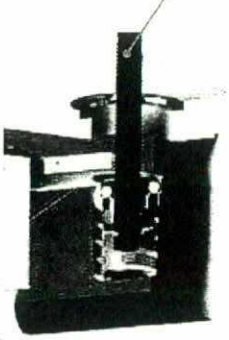
The Bio Clean Round Curb Inlet Media Filter (RGISB-MF) is an advanced level filtration device designed with a multi-layered media filter for increased removal efficiencies.

Performance

- 85% Removal of Fine TSS
- 69% Removal of Dissolved Phosphorus
- 95% Removal of Copper
- 87% Removal of Lead

Operation



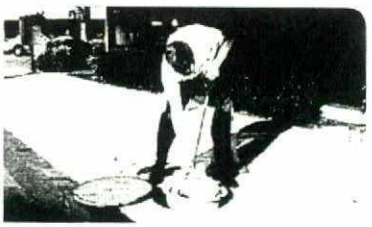


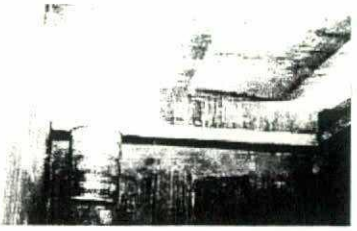
Cleaned Without Catch Basin Entry

Cleaned Easily With Vac Truck

15 Minute Service Time

- Parking Lots
- Roadways





City and County of Honolulu

County of San Diego

Meets Full Capture Requirements

2972 San Luis Rey Rd
Oceanside, CA 92058
p 760.433.7640 f 760.433.3176
www.BioCleanEnvironmental.com

BIO CLEAN

Curb Inlet Basket

I. Specifications

Coverage: The curb inlet basket provides full coverage of inlets such that all catch basin influent, at rated flows, is conveyed to the filter. The filter will retain all windblown and swept debris entering the drain.

Shelf System: The filter basket is located in the catch basin directly beneath a manhole opening for direct service/access from the manhole. The filter provides a shelf system made of UV protected marine grade fiberglass to direct water flow from the curb inlet to the filter, which is located directly under the manhole.

Non-Corrosive Materials: All components of the filter system, including mounting hardware, fasteners, support brackets, filtration material, and support frame are constructed of non-corrosive materials (316 stainless steel, and UV/marine grade fiberglass). Fasteners are stainless steel. Primary filter mesh is 316 stainless steel welded screens. Filtration basket screens for coarse, medium and fine filtration is ¾" x 1 ¾"expanded, 10 x 10 mesh, and 35 x 35 mesh with optional 50 x 50 mesh and 200 x 200 mesh, respectively. No polypropylene, monofilament netting or fabrics shall be used in the products.

Durability: Filter (excluding oil absorbent media) and support structures are of proven durability, with an expected service life of 10 to 15 years. The filter and mounting structures are of sufficient strength to support water, sediment, and debris loads when the filter is full, with no slippage, breaking, or tearing. All filters are warranted for a minimum of five (5) years.

Oil Absorbent Media: The Filter is fitted with an absorbent media for removal of petroleum hydrocarbons from influent, and so placed in the filter assembly to treat influent at rated flow. Absorbent media is easily replaceable in the filter, without the necessity of removing fixed mounting brackets or mounting hardware.

Overflow Protection: The drain filter is designed so that it does not inhibit storm flows entering the curb inlet, or obstruct flow through the catch basin during peak storm flows.

Filter Bypass: Water will not bypass the filter at low flows, nor bypass through attachment and inlet contact surfaces at low flows.

Pollutant Removal Efficiency: The filter is designed to capture high levels of trash and litter, grass and foliage, sediments, hydrocarbons, grease and oil.

POLLUTANT	**Curb Inlet** Basket
Trash & Litter	90 to 95%
Oil & Grease	54 to 96%
Sediments/TSS	93.54%
Organics	79.3%
Total Nitrogen	65 to 96%
Total Phosphorus	71 to 96%

Non-Scouring: During heavy storm flows or other flows that bypass the filter, the filter screen design prevents washout of debris and floatables in the filter basket.

Filter Removal: The filter basket is readily removable from the mounting/support frame for maintenance or replacement. Removal and replacement of filter screens is accomplished without the necessity of removing mounting bolts, support frames, etc., but by lift out through the manhole.

II. Installation

Installation: The filter will be securely installed in the catch basin or curb inlet opening, with contact surfaces sufficiently joined together so that no filter bypass can occur at low flow. All anchoring devices and fasteners are installed within the interior of the drain inlet. The filter basket is located in the catch basin directly beneath a

manhole opening for direct service/access from the manhole. The filter system provides a shelf system to direct water flow from the inlet to the filter, which is located under the manhole.

Installation Notes:

1. Bio Clean Environmental Services, Inc notes the Curb Inlet Basket shall be installed pursuant to the manufacturer's recommendations and the details on this sheet.
2. The patented shelf system shall provide coverage of entire inlet opening, including inlet wing(s) where applicable, to direct all flow to basket(s).
3. Attachments to inlet walls shall be made of non-corrosive hardware.
4. Shelf system shall be installed so that filtration basket is located under manhole access.
5. For the Continuous Curb Inlet Basket(No Shelf System), install bracket under curb opening and hang basket on bracket

III. Maintenance

Maintenance: The filter is designed to allow for the use of vacuum removal of captured materials in the filter basket, serviceable by centrifugal compressor vacuum units without causing damage to the filter or any part of the mounting and attachment hardware during normal cleaning and maintenance. Filters can be cleaned and vacuumed from the manhole-opening. Entering the catch basin to clean the filters is not necessary.

Maintenance Notes:

1. Bio Clean Environmental Services, Inc. recommends cleaning and maintenance of the Curb Inlet Basket a minimum of four times per year or following a significant rain event that would potentially accumulate a large amount of debris to the system. The hydrocarbon boom should be replaced a minimum of twice per year or at each service as needed.
2. Any person performing maintenance activities that require entering the catch basin or handle a toxic substance have completed the proper training as required by OSHA.
3. Remove manhole lid to gain access to inlet filter insert. The filter basket should be located directly under the manhole lid. Under normal conditions, cleaning and maintenance of the Curb Inlet Basket will be performed from above ground surface.
4. Special Note: entry into an underground manhole, catch basin and stormwater vault requires training in an approved Confined Space Entry Program.
5. Remove all trash, debris, organics, and sediments collected by the inlet filter insert. Removal of the trash and debris can be done manually or with the use of a vactor truck. Manual removal of debris may be done by lifting the basket from the shelf and pulling the basket from the catch basin and dumping out the collected debris.
6. Any debris located on the shelf system can be either removed from the shelf or can be pushed into the basket and retrieved from basket.
7. Evaluation of the hydrocarbon boom shall be performed at each cleaning. If the boom is filled with hydrocarbons and oils it should be replaced. Removed boom by cutting plastic ties and remove boom. Attach new boom to basket with plastic ties through pre-drilled holes in basket.
8. Place manhole lid back on manhole opening.
9. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements. The hydrocarbon boom with adsorbed hydrocarbons is considered hazardous waste and need to be handled and disposed of as hazardous material. Please refer to state and local regulations for the proper disposal of used motor oil/filters.
10. Following maintenance and/or inspection, the maintenance operator shall prepare a maintenance/inspection record. The record shall include any maintenance activities performed, amount and description of debris collected, and condition of filter. The owner shall retain the maintenance/inspection record for a minimum of five years from the date of maintenance. These records shall be made available to the governing municipality for inspection upon request at any time.
11. Any toxic substance or item found in the filter is considered as hazardous material can only be handled by a certified hazardous waste trained person (minimum 24-hour hazwoper).

BIO CLEAN
ENVIRONMENTAL SERVICES, INC.

P O Box 869, Oceanside, CA 92049
(760 433-7640 Fax (760) 433-3176
www.biocleanenvironmental.net

Attachment 2

Table 5.1 Determination of Appropriate Maintenance Mechanism(s)

Increased risk, complexity, cost or other maintenance factors				
	(Private Responsibility)		(Public Responsibility)	
	First Category	Second Category	Third Category	Fourth Category
Importance of Maintenance	Minimal maintenance; inherent in BMP or property stewardship. Minimum, annual maintenance verification is required	Need to make sure private owners maintain, and provide County ability to step in & perform maintenance through easement	Warrants County Flood Control to assume responsibility, with funding related to project	County responsibility for maintenance and funding (beyond project)
Typical BMPs	Vegetated Swales; Bioretention; Flow-through Planter; Cistern with Bioretention; Trash Racks; Private Road Drain Inserts.	[First category plus:] Settling Basins; Infiltration Devices; Media Filters; High-rate Biofilters; Hydrodynamic Separator Systems.	[Second category plus:] Settling Basins; Wet Ponds and Constructed Wetlands.	Any County owned and maintained treatment control BMP.
Mechanisms	1. Stormwater Ordinance* requirement [section 67.813(a)&(b)], with code enforcement 2. Nuisance abatement with costs charged back to property owner 3. Condition in ongoing permit such as a Major Use Permit (if project has MUP) 4. Notice to new purchasers [67.813(e)] 5. Subdivision public report "white papers" to include notice of maintenance responsibility		1. Easement dedication to FCD. 2. Inclusion into a watershed specific Community Facility District (CFD) or individual formation of benefit area/CFD 3. County Flood Control maintenance documentation	1. Land owned or dedicated to County or Flood Control District (FCD). 2. FCD / County maintenance documentation
	6. Recorded Maintenance Notification	6. Recorded easement agreement with covenant binding on successors		
Funding Source(s)	None necessary	Security (Cash deposit, Letter of Credit, or other acceptable to County) for interim period. Agreement for security to contain provisions for release or refund, if not used.	**Start-up interim:** Developer fee covering 24 months of costs **Permanent:** FCD Tax Assessment per FCD Act Sec 105-17.5	Varies: gas tax for BMP in road ROW, Transnet for CIP projects, Special funding or General funding for others.

* County of San Diego Watershed Protection, Stormwater Management, and Discharge Control Ordinance (S.D.Co.Code Sec 67.801 et seq.)

RECORDING REQUESTED BY:

WHEN RECORDED MAIL TO:

(property owner)

SPACE ABOVE THIS LINE FOR RECORDER'S USE

MAINTENANCE NOTIFICATION AGREEMENT FOR CATEGORY 1 STORMWATER TREATMENT CONTROL BMP's

THIS AGREEMENT is made on the _____ day of _____, 20_____.
_____, the Owner(s) of the hereinafter described real property:
Address_____ Post Office _____ Zip Code _____
Assessor Parcel No.(s) _____

List, identify, locate (plan/drawing number) and describe the TC BMP(s)

_____

_____

Owner(s) of the above property acknowledge the existence of the stormwater Treatment Control Best Management Practice (TC BMP) structure(s) on the said property. Perpetual maintenance of the TC BMP(s) is the requirement of the State NPDES Permit, Order No. R9-2007-0001, Section D.1.d.(6) and the County of San Diego Watershed Protection Ordinance (WPO) Ordinance No. 10096 Section 67.812 through Section 67.814, and County Standard Urban Stormwater Mitigation Plan (SUSMP) Chapter 5. In consideration of the requirement to construct and maintain TC BMP(s), as conditioned by Discretionary Permit, Grading Permit, and/or Building Permit (as may be applicable), I/we hereby covenant and agree that:

1. I/We are the owner(s) of the existing (or to be constructed concurrently) premises located on the above described property.
2. I/We shall take the responsibility for the perpetual maintenance of the TC BMP(s) as listed above in accordance with the maintenance plan and in compliance with County's self inspection reporting and verification for as long as I/we have ownership of said property(ies).
3. I/We shall cooperate with and allow the County staff to come onto said property(ies) and perform inspection duties as prescribed by local and state regulators.
4. I/We shall inform future buyer(s) or successors of said property(ies) of the existence and perpetual maintenance requirement responsibilities for TC BMP(s) as listed above and to ensure that such responsibility shall transfer to the future owner(s).
5. I/We will abide by all of the requirements and standards of Section 67.812 through Section 67.814 of the WPO (or renumbering thereof) as it exists on the date of this Agreement, and which hereby is incorporated herein by reference.

This Agreement shall run with the land. If the subject property is conveyed to any other person, firm, or corporation, the instrument that conveys title or any interest in or to said property, or any portion thereof, shall contain a provision transferring maintenance responsibility for TC BMP(s) to the successive owner according to the terms of this Agreement. Any violation of this Agreement is grounds for the County to impose penalties upon the property owner as prescribed in County Code of Regulatory Ordinances, Title 1, Division 8, Chapter 1 Administrative Citations §§18.101-18.116.

_____ _____
Owner(s) Signature(s)

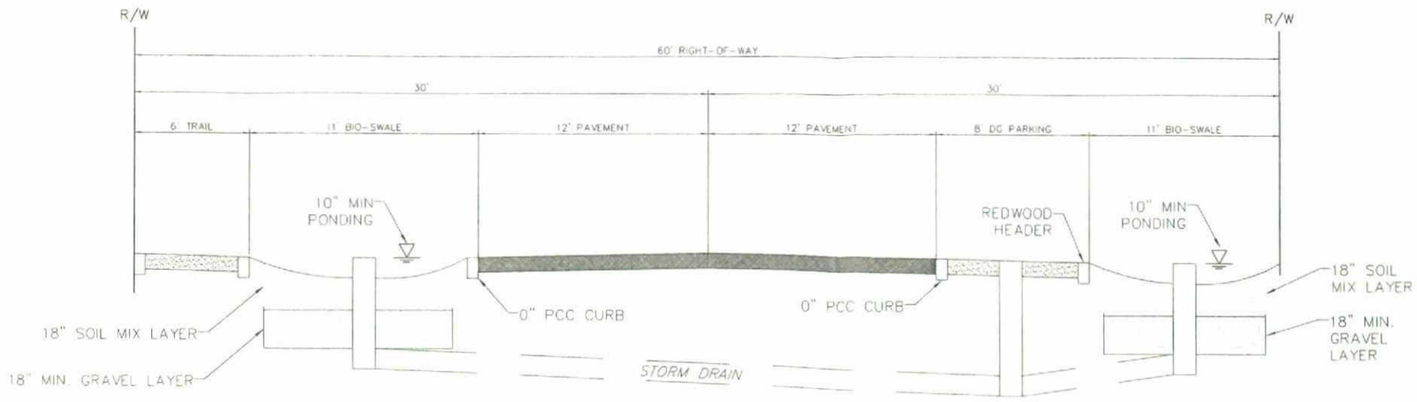
_____ _____
Print Owner(s) Name(s) and Title

STATE OF CALIFORNIA)
COUNTY OF _____)

On _____ before me, _____Notary Public,
personally appeared _____ who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s) or the entity upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

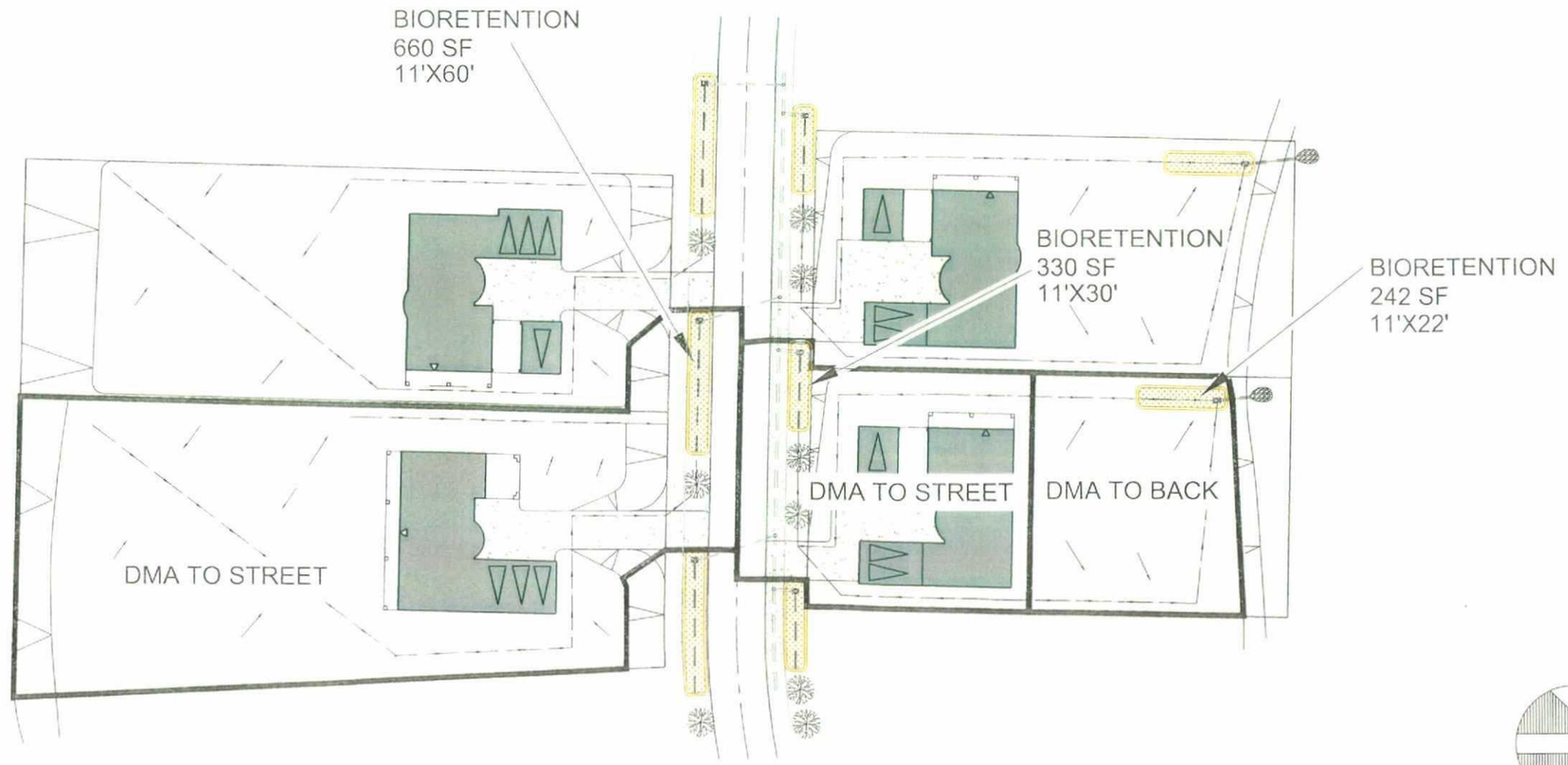
Signature _____

Attachment 3



TYPICAL SECTION
NEIGHBORHOOD STREETS (PRIVATE)

NOT TO SCALE



TYPICAL RESIDENTIAL LOT DMA

NO SCALE

NTS

REVISIONS

NO.	DESCRIPTION	DATE	APP'D

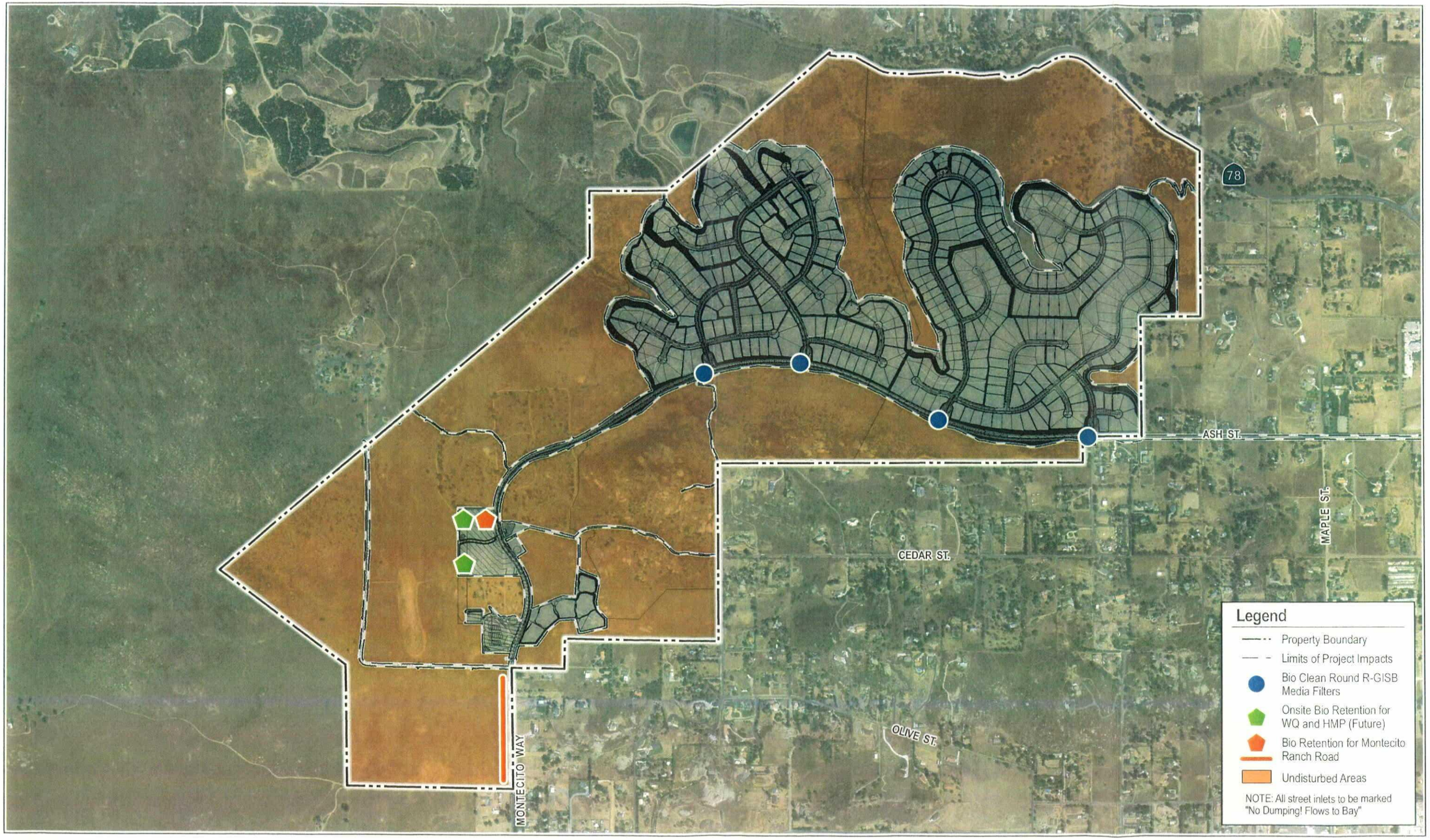
Civil Engineering · Environmental
Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax
R·E·C Consultants, Inc.

DATE: 03-01-13
SCALE: 1" = 20'
DRAWN: REC
CHECKED: AP

SHEET TITLE: TYPICAL DMA
PROJECT: MONTECITO RANCH
TBD
COUNTY OF SAN DIEGO

SHEET 1 OF 1 SHEETS

Attachment 4



R·E·C Consultants, Inc.

BMP Map

MONTECITO RANCH

0 500 1,000 Feet

Aerial Source: Google, 2010

June 2013

ATTACHMENT G

Treatment Control BMP Certification for DPW Permitted Land Development Projects

After TCBMP construction, complete a TCBMP Certification form to verify with County staff that all constructed TCBMPs on the record plans match the approved TCBMPs in the most current SWMP. TCBMP Certification must be completed and verified for permit closure.

DEPARTMENT OF PUBLIC WORKS

County of San Diego

Treatment Control BMP Certification for DPW Permitted Land Development Projects

Permit Number (e.g. L-grading) _____ HSU Watershed _____

Project Name _____

Location / Address _____

Maintenance Notification/Agreement No.: _____

Responsible Party for Construction Phase

Developer's Name: _____

Address: _____

City _____ State _____ Zip _____

Email Address: _____

Phone Number: _____

Engineer of Work: _____

Engineer's Phone Number: _____

Responsible Party for Ongoing Maintenance

Owner's Name(s)* _____

Address: _____

City _____ State _____ Zip _____

Email Address: _____

Phone Number: _____

* Note: If a corporation or LLC, provide information for principal partner or Agent for Service of Process. If an HOA, provide information for the Board or property manager at time of project closeout.

Treatment Control BMPs (TCBMPs)[1,2] (List all from SWMP)		
Lot Number Or Location	**Description/Type**	**Sheet**

1 All Priority Development Projects (PDPs) require a TCBMP.
2 BMPs designed to treat stormwater (e.g. LID and hydromod) shall be considered TCBMPs.

For Applicant to submit to PDCI:

- Copy of the final accepted SWMP and any accepted addendum.
- Copy of the most current plan showing the Stormwater TCBMP Table, plans/cross-section sheets of the TCBMPs and the location of each verified as-built TCBMP.
- Photograph of each TCBMP.
- Copy of the approved TCBMP maintenance agreement and associated security

By signing below, I certify that the treatment control BMP(s) for this project have been constructed and all BMPs are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance. Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Please sign your name and seal. [SEAL]

Professional Engineer's Printed Name:

_____

Professional Engineer's Signed Name:

_____

Date: _____

COUNTY - OFFICIAL USE ONLY:

For PDCI:

PDCI Inspector: _____

Date Project has/expects to close: _____

Date Certification received from EOW: _____

By signing below, PDCI Inspector concurs that every noted TCBMP has been installed per plan.

PDCI Inspector's Signature: _____ Date: _____

FOR WPP:

Date Received from PDCI: _____

WPP Submittal Reviewer: _____

WPP Reviewer concurs that the information provided for the following TCBMPs is acceptable to enter into the TCBMP Maintenance verification inventory:

List **acceptable** TCBMPs:

WPP Reviewer's Signature: _____ Date: _____

- ○ Provide a copy of the certification sheet to DPLU.

ATTACHMENT H

Preliminary HMP Study

TECHNICAL MEMORANDUM

A. Preliminary SWMM Modeling for Hydromodification Compliance for POC #1
B. Brown and Caldwell Calculator Modeling for Hydromodification Compliance for POC #2

MONTECITO RANCH

PREPARED BY:

REC Consultants Inc
2442 Second Avenue
San Diego, CA 92101

Revised 6-14-2013

A. Preliminary SWMM Modeling for Hydromodification Compliance for POC #1

INTRODUCTION

This memorandum summarizes the approach used to model the proposed Montecito Ranch Site in Ramona, California using the EPA Storm Water Management Model 5.0 (SWMM). The technical memo was prepared under the guidance of Tory Walker Engineering.

General SWMM models were prepared for the existing and proposed conditions at the site in order to determine if the proposed bioretention areas had a sufficient footprint and storage capacity to meet the current Hydromodification Management Plan Requirements (HMP) from the Regional Water Quality Control Board. The bioretention area footprints for this site were designed using a 4%, 5% and 6% sizing factors to meet the County of San Diego storm water quality requirements and the hydromodification requirements via SWMM modeling. SWMM was used to optimize the cross-section and outlet orifice structure design.

SWMM MODEL DEVELOPMENT

Sixteen prototypical SWMM models were prepared for this study, eight for existing conditions and eight for the proposed conditions. The different models cover different watershed characteristics encounter at the proposed site. SWMM was used for this study for two reasons. First, the SWMM has an EPA developed bioretention modeling routine that can handle all of the specific inputs necessary to model bioretention cells that are used to meet HMP criteria in San Diego County. Secondly, the SWMM model has been tested and shown to return long-term rainfall to runoff ratios that closely replicate the ratios for gauged San Diego Watersheds. For both SWMM models, flow duration curves were prepared to determine if the proposed bioretention footprint was sufficient to meet HMP requirements.

The inputs required to develop SWMM models include rainfall, watershed characteristics, and BMP configurations. The Ramona Rain Gage from the Project Clean Water website was used for this study. Evaporation for the site was modeled using average monthly values from the county hourly dataset. The site was modeled as having three hydrologic soil groups, B, C & D types, following both the San Diego County Hydrology Manual soil map and the USGS Survey web-based Soil Survey Map. The SWMM input files for this study are included in Attachment 7, and the electronic files are also included on the attached CD.

BIORETENTION MODELING

The eight prototypical bioretention basins proposed for the site were modeled using the default bioretention LID module within SWMM. The bioretention module can model the gravel underground storage layer, underdrain with an orifice plate, amended soil layer, and a surface storage pond up to the elevation of the outlet riser pipe. This approach is explained in Attachment 4, and details are included in Attachment 6. A simple and conservative approach was taken to model the basins at this preliminary stage. The basins have been overdesign for four reasons. First, to show compliance; second to allow for future optimization if needed during final engineering, third, to balance other areas within the development envelope that have not been accounted for HMP compliance such as public roads and parks. Fourth, to account for potential area with bioretention deficit due to topographic or sidewalk space constraints.

SUMMARY OF DEVELOPED CONDITIONS 1

DMA TYPE[2]	CONTRIBUTING AREA (ac)[3]	IMPERVIOUS PERCENTAGE (%)	MEAN SLOPE (%) EXISTING
B-FLAT	0.4	62.4	8.3
B-MED	0.2	62.4	9.8
B-BACK FLAT	0.2	41.1	9.2
C-FLAT	0.4	62.4	12.6
C-MED	0.2	62.4	14.3
C-BACK FLAT	0.2	41.1	15.2
D-FLAT	0.4	62.4	5.84
D-BACK FLAT	0.2	41.1	4.56

[2] B FLAT= AREA WITHIN SOIL TYPE B DRAINING TO STREET BMP WITHIN FLAT STREET SLOPES (0.5% TO 3.0%)
B MED= AREA WITHIN SOIL TYPE B DRAINING TO STREET BMP WITHIN MILD STREET SLOPES (3.1% TO 5.5%)
B BACK FLAT= AREA WITHIN SOIL TYPE B DRAINING BACK OF LOT
C FLAT= AREA WITHIN SOIL TYPE C DRAINING TO STREET BMP WITHIN FLAT STREET SLOPES (0.5% TO 3.0%)
D MED= AREA WITHIN SOIL TYPE D DRAINING TO STREET BMP WITHIN MILD STREET SLOPES (3.1% TO 5.5%)
C BACK FLAT= AREA WITHIN SOIL TYPE C DRAINING BACK OF LOT
D FLAT= AREA WITHIN SOIL TYPE D DRAINING TO STREET BMP WITHIN FLAT STREET SLOPES (0.5% TO 3.0%)
D BACK FLAT= AREA WITHIN SOIL TYPE D DRAINING BACK OF LOT

[3] IMP AREAS ARE SUBTRACTED FROM THE OVERALL DMA TO ENSURE AREAS ARE NOT DOUBLE COUNTED

SUMMARY OF DEVELOPED CONDITIONS 2

									WATER QUALITY
BMP	% BMP	BMP SIZE (sf)	SURFACE POND (in)	GRAVEL (in)	LOW ORIFICE (in)	TOTAL AREA (ac)	NUMBER OF BMPS[4]	LOCATION OF BMP	AREA REQUIRED	AREA PROVIDED
B-FLAT	6	660	10	18	0.625	67.1	168	STREET	478	660
B-MED	6	330	10	18	0.5	53.7	270	STREET	239	330
B-BACK FLAT	6	240	18	12	0.5	11.1	56	BACK OF LOT	158	240
C-FLAT	6	660	10	18	0.75	24.7	62	STREET	478	660
C-MED	6	330	10	18	0.5	39.56	200	STREET	239	330
C-BACK FLAT	6	240	18	12	0.5	12.1	60	BACK OF LOT	158	240
D-FLAT	4	560	9	18	0.625	7.69	20	STREET	478	560
D-BACK FLAT	6	240	18	12	0.5	0.7	4	BACK OF LOT	158	240

[4] REGARDING THE COMPARISON BETWEEN NUMBER OF LOTS AND NUMBER OF BMPS, SOME LOTS HAVE A BMP IN THE BACK AND OTHERS IN THE FRONT. AS THE AVERAGE AREA OF EACH LOT IS LARGER THAT THE CONTRIBUTING AREA OF THE STANDARD BMPs, IS IS EVIDENT THAT THE NUMBER OF BMPs IS LARGER THAN THE NUMBER OF LOTS.

FLOW DURATION CURVE COMPARISON

The flow duration curves for the site were developed by exporting the 45-year hourly runoff time series results from SWMM to a spreadsheet. The curves were compared between 10% of the existing condition Q_2 up to the existing condition Q_{10}. The Q_2 and Q_{10} were determined using a partial duration statistical analysis of the runoff time series in an Excel spreadsheet using the Cunnane plotting position method, which is the preferred method in the HMP document. The partial duration calculations were performed by separating the flow values in the runoff time series into individual storm events using 24-hour criteria. The peak flows were then separated from the time series and sorted and ranked for analysis. The calculation and lists of the top 45 peak flows for the existing and proposed conditions are attached.

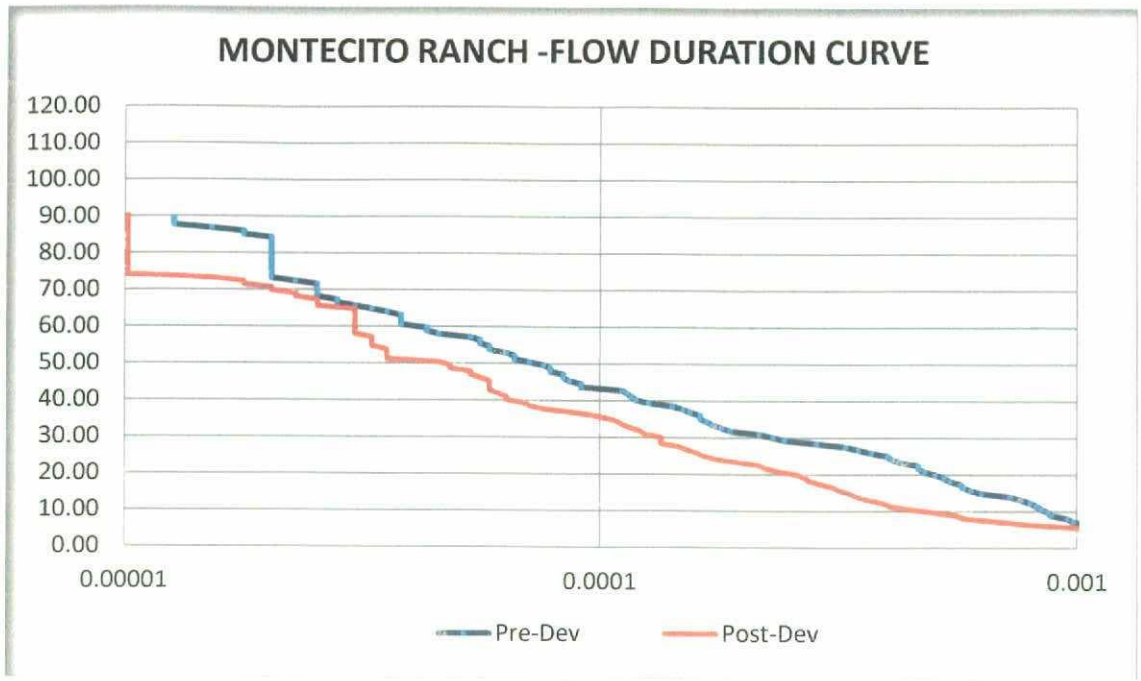
The range between 10% of Q_2 and Q_{10} was divided into 100 equal intervals, and the number of hours that each flow rate was exceeded was counted from the hourly series. Additionally the intermediate peaks with a return period "i" were obtained (Q_i with i=3 to 9). For the purpose of the plot, the values were presented as percentage of time exceeded for each flow rate. Two plots are included, one with a Logarithmic scale on the X-axis and the second with a normal scale. The selection of a logarithmic scale on the "x" axis is preferred, as differences between the pre-development and post-development curves can be seen more clearly in the entire range of analysis.
The Hydromodification requirements for the County of San Diego can be summarized as:

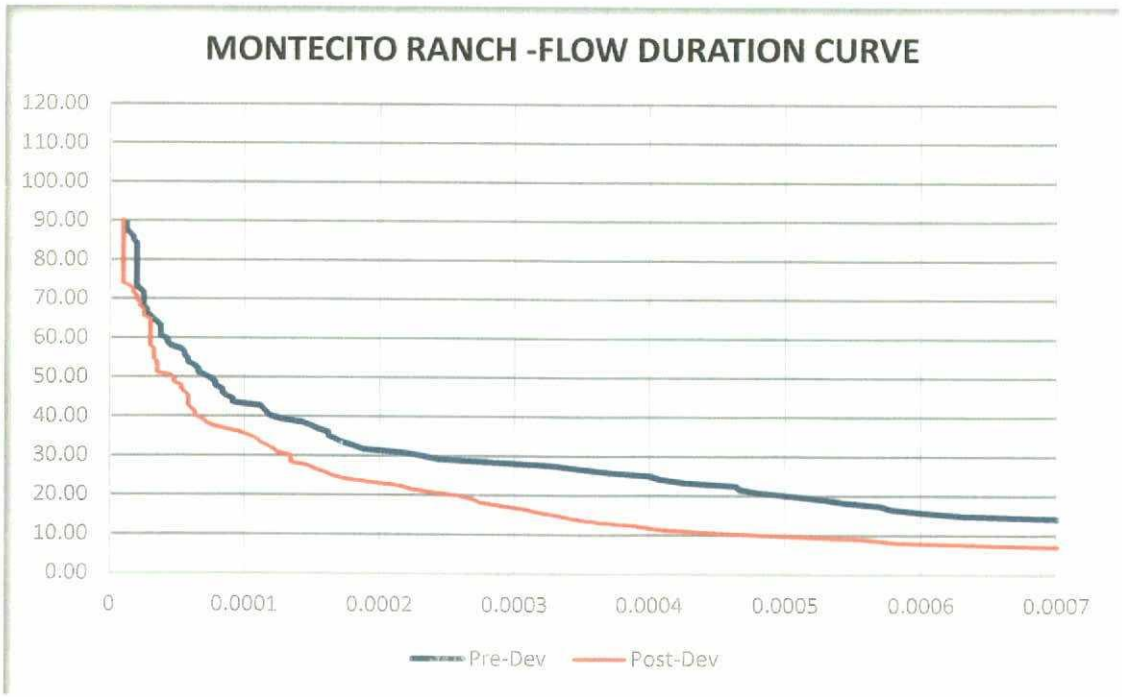
- Mitigated condition flow duration curve shall not exceed the existing condition curve by more than 10% neither in peak flow nor duration.

As can be seen in Figure 1, the overall flow duration curve for the proposed condition with the bioretention basin is always below the curve for the existing condition. The additional runoff volume generated from developing the site will be released to the downstream storm drains at a flow rate below the 10% Q_2 lower threshold. Additionally, the project will also not increase peak flow rates for the intermediate flow rates between the Q_2 and the Q_{10}, as shown in the graphic and also in the attached table.

FDC KEY ASSUMPTIONS

1. FDC is done at hourly level.
2. Travel time between different parcels is smaller than half of the time interval of the continuous simulation. Therefore it is assumed that flows can be added at the same hour for all BMPs discharging into a given POC.
3. The total FDC is simply the linear combination of the hourly runoff discharge of each type of BMP.
4. Let BPM_1, BMP_2, BMP_3,.....BMP_8 be the 8 different types of BMPs. Let Q_1, Q_2, Q_3, ... Q_8 be the time series of flow for each BMP type. Let N_1, N_2, N_3,.....N_8 be the number of BMPs of each type. Then FDC_{TOTAL} is analyzed from the following time series:
   $Q_{TOT} = N_1Q_1 + N_2Q_2 + N_3Q_3$+.....$N_8Q_8$. The total runoff time series corresponds to the total outflow at each hour during 45 years.





Figures 1a and 1b Flow Duration Curve Comparison (Log and Normal Scale)

SUMMARY

This study has demonstrated that the proposed bioretention footprint and storage volume at the Montecito Ranch site are sufficient to meet the current HMP criteria if the bioretention cross-section areas and volumes recommended here are used for the design and the outlet structures are built as recommended.

KEY ASSUMPTIONS

1. For simplicity of calculations the mean slope of the underlying topography for the different soil types was used to model SWMM.
2. Impervious percentage for areas draining to the front of the lot: 62.4%, areas draining to the back 41.1%
3. Type B, C and D soils are representative of the existing condition site.

ATTACHMENTS

1. Q_2 to Q_{10} Comparison Table
2. Flow Duration Analysis and Table.
3. Return Period Calculations (Q2 to Q10)
4. SWMM Bioretention Modeling Inputs
5. Drying Time of the Surface Layer of Bioretention cells
6. Project Maps and Bioretention Details
7. SWMM Input Data in Input Format (Existing and Proposed Models)
8. Report files from the SWMM Model (Existing and Proposed Models)
9. SWMM Screens and Explanation of significant variables
10. CD with rainfall and model input files

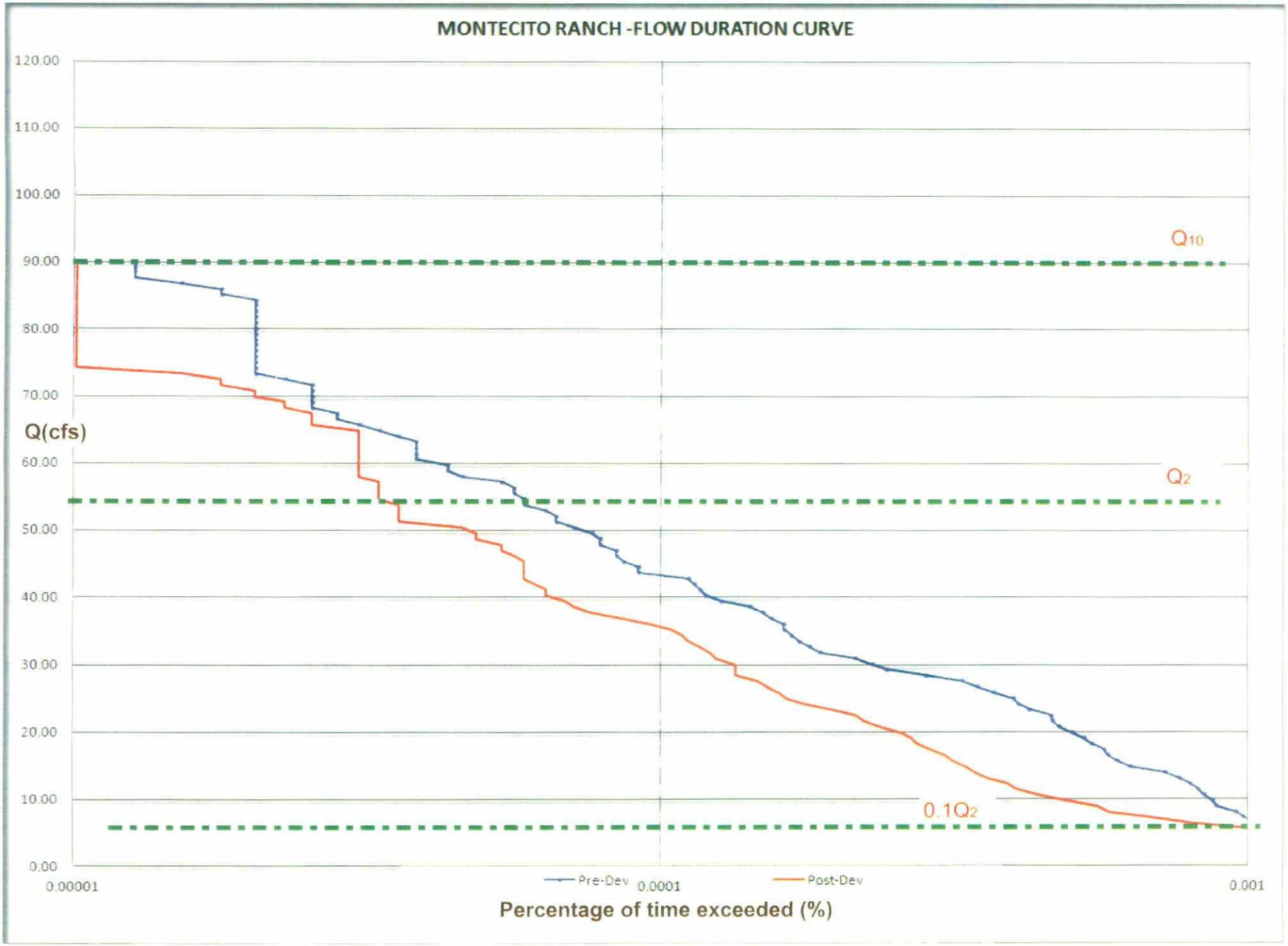
Attachment 1. Q_2 to Q_{10} Comparison Table

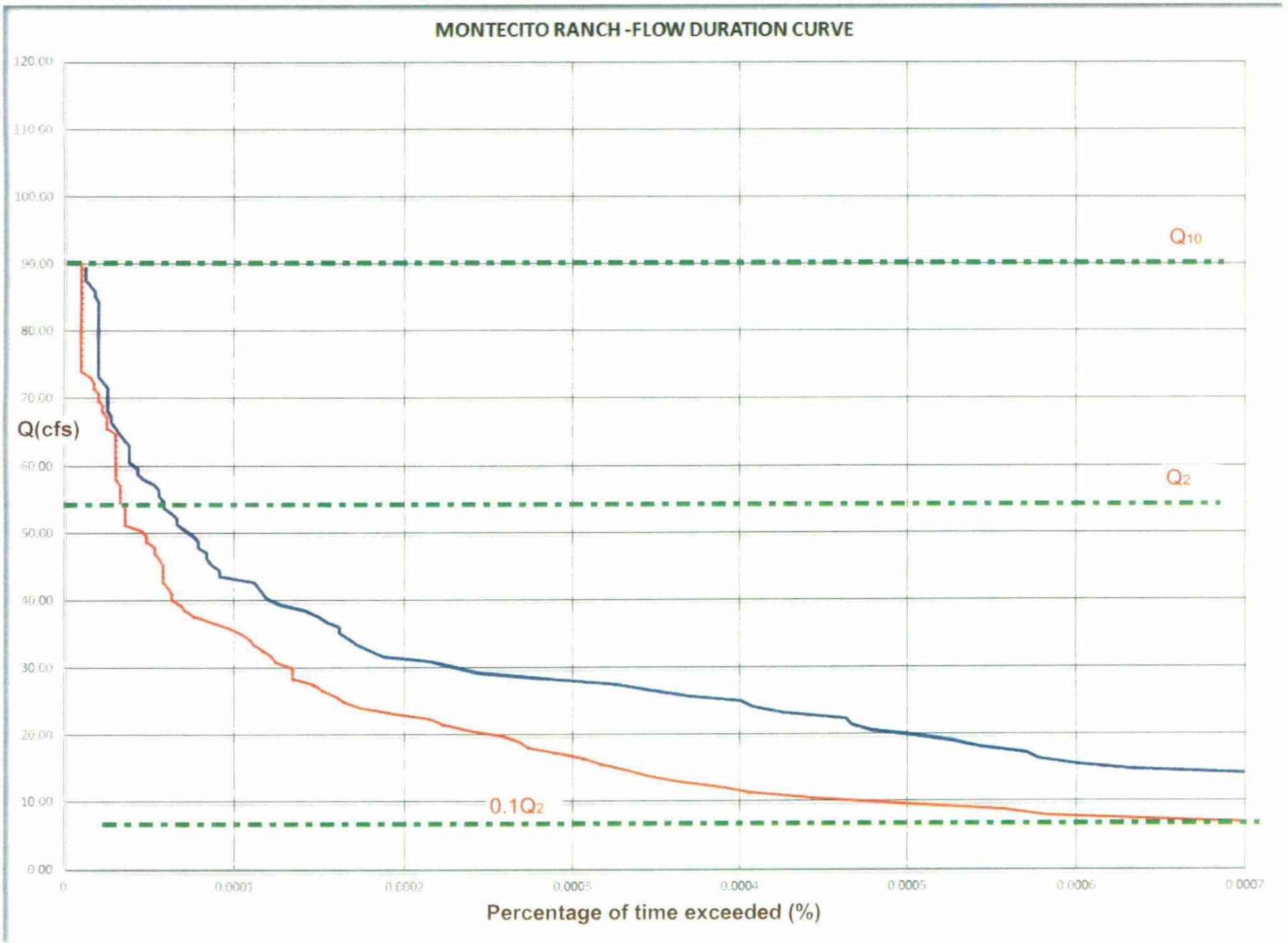
Return Period (yr)	Pre-Development (cfs)	Post-Development (cfs) - Mitigated Condition	Reduction (cfs)
10	90.2	75.0	15.2
9	88.6	73.5	15.1
8	87.0	73.5	13.6
7	86.4	73.1	13.3
6	84.5	71.1	13.4
5	72.5	68.7	3.7
4	66.2	65.2	1.1
3	62.0	51.1	10.9
2	54.8	45.8	8.9

Attachment 2. Flow Duration Curve Analysis

The 45-year hourly runoff time series was exported from SWMM to EXCEL and then analyzed to develop the flow duration curve plot. The following table shows that if the interval from 10% of the existing condition 2-year storm to the existing condition 10-year storm is divided into 100 sub-intervals, then a) the post development divided by pre-development durations are never larger than 110% (the permit allows up to 110%); and b) there are no more than 10 intervals in the range 101%-110% which would imply an excess over 10% of the length of the curve (the permit allows less than 10% of excesses measured as 101-110%). Because the post-development curve meets both of these conditions, the design satisfies the County Of San Diego Hydromodification Requirements.

The flow duration curve can be expressed in the "x" axis as a percentage of time, hours per year, total number of hours, or any other similar tome variable. As those variables only differ by a multiplying constant, their plot in logarithmic scale is going to look exactly the same, and compliance can be observed regardless of the variable selected. The selection of logarithmic scale in lieu of the normal scale is preferred, as differences between the pre-development and post-development curves can be seen more clearly in the entire range analysis.


MONTECITO RANCH -FLOW DURATION CURVE
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Q(cfs)
Q10
Q2
0.1Q2
0.00001
0.0001
0.001
Pre-Dev
Post-Dev
Percentage of time exceeded (%)


MONTECITO RANCH -FLOW DURATION CURVE
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
Q(cfs)
Q10
Q2
0.1Q2
0
0.0001
0.0002
0.0003
0.0004
0.0005
0.0006
0.0007
Percentage of time exceeded (%)

Attachment 3. Return Period Calculation Tables (Q_2 to Q_{10})

Q_2	54.7566
10%Q_2	5.4757
Q_{10}	90.1834
increment	0.847077

	PRE-DEV			POST-DEV		
Interval	Peak (cfs)	#times (hrs)	% time	#times(hrs)	% time	% post/pre
1	5.5	421	0.107%	405	0.103%	96.200%
2	6.3	408	0.103%	314	0.080%	76.961%
3	7.2	388	0.098%	268	0.068%	69.072%
4	8.0	377	0.096%	230	0.058%	61.008%
5	8.9	349	0.088%	220	0.056%	63.037%
6	9.7	343	0.087%	196	0.050%	57.143%
7	10.6	333	0.084%	175	0.044%	52.553%
8	11.4	325	0.082%	160	0.041%	49.231%
9	12.3	315	0.080%	154	0.039%	48.889%
10	13.1	302	0.077%	143	0.036%	47.351%
11	13.9	286	0.073%	136	0.034%	47.552%
12	14.8	249	0.063%	131	0.033%	52.610%
13	15.6	237	0.060%	125	0.032%	52.743%
14	16.5	228	0.058%	121	0.031%	53.070%
15	17.3	225	0.057%	114	0.029%	50.667%
16	18.2	214	0.054%	108	0.027%	50.467%
17	19.0	208	0.053%	106	0.027%	50.962%
18	19.9	199	0.050%	102	0.026%	51.256%
19	20.7	189	0.048%	94	0.024%	49.735%
20	21.6	184	0.047%	88	0.022%	47.826%
21	22.4	183	0.046%	85	0.022%	46.448%
22	23.3	168	0.043%	77	0.020%	45.833%
23	24.1	161	0.041%	69	0.017%	42.857%
24	25.0	158	0.040%	65	0.016%	41.139%
25	25.8	146	0.037%	63	0.016%	43.151%
26	26.7	137	0.035%	60	0.015%	43.796%
27	27.5	129	0.033%	58	0.015%	44.961%
28	28.3	112	0.028%	53	0.013%	47.321%
29	29.2	96	0.024%	53	0.013%	55.208%
30	30.0	91	0.023%	53	0.013%	58.242%
31	30.9	85	0.022%	49	0.012%	57.647%
32	31.7	74	0.019%	48	0.012%	64.865%
33	32.6	71	0.018%	46	0.012%	64.789%

34	33.4	68	0.017%	44	0.011%	64.706%
35	34.3	66	0.017%	43	0.011%	65.152%
36	35.1	64	0.016%	41	0.010%	64.063%
37	36.0	64	0.016%	38	0.010%	59.375%
38	36.8	61	0.015%	34	0.009%	55.738%
39	37.7	59	0.015%	30	0.008%	50.847%
40	38.5	56	0.014%	28	0.007%	50.000%
41	39.4	50	0.013%	27	0.007%	54.000%
42	40.2	47	0.012%	25	0.006%	53.191%
43	41.1	46	0.012%	25	0.006%	54.348%
44	41.9	45	0.011%	24	0.006%	53.333%
45	42.7	44	0.011%	23	0.006%	52.273%
46	43.6	36	0.009%	23	0.006%	63.889%
47	44.4	36	0.009%	23	0.006%	63.889%
48	45.3	34	0.009%	23	0.006%	67.647%
49	46.1	33	0.008%	22	0.006%	66.667%
50	47.0	33	0.008%	21	0.005%	63.636%
51	47.8	31	0.008%	21	0.005%	67.742%
52	48.7	31	0.008%	19	0.005%	61.290%
53	49.5	30	0.008%	19	0.005%	63.333%
54	50.4	28	0.007%	18	0.005%	64.286%
55	51.2	26	0.007%	14	0.004%	53.846%
56	52.1	26	0.007%	14	0.004%	53.846%
57	52.9	25	0.006%	14	0.004%	56.000%
58	53.8	23	0.006%	14	0.004%	60.870%
59	54.6	23	0.006%	13	0.003%	56.522%
60	55.5	22	0.006%	13	0.003%	59.091%
61	56.3	22	0.006%	13	0.003%	59.091%
62	57.1	21	0.005%	13	0.003%	61.905%
63	58.0	18	0.005%	12	0.003%	66.667%
64	58.8	17	0.004%	12	0.003%	70.588%
65	59.7	17	0.004%	12	0.003%	70.588%
66	60.5	15	0.004%	12	0.003%	80.000%
67	61.4	15	0.004%	12	0.003%	80.000%
68	62.2	15	0.004%	12	0.003%	80.000%
69	63.1	15	0.004%	12	0.003%	80.000%
70	63.9	14	0.004%	12	0.003%	85.714%
71	64.8	13	0.003%	12	0.003%	92.308%
72	65.6	12	0.003%	10	0.003%	83.333%
73	66.5	11	0.003%	10	0.003%	90.909%
74	67.3	11	0.003%	10	0.003%	90.909%
75	68.2	10	0.003%	9	0.002%	90.000%

76	69.0	10	0.003%	9	0.002%	90.000%
77	69.9	10	0.003%	8	0.002%	80.000%
78	70.7	10	0.003%	8	0.002%	80.000%
79	71.5	10	0.003%	7	0.002%	70.000%
80	72.4	9	0.002%	7	0.002%	77.778%
81	73.2	8	0.002%	6	0.002%	75.000%
82	74.1	8	0.002%	4	0.001%	50.000%
83	74.9	8	0.002%	4	0.001%	50.000%
84	75.8	8	0.002%	4	0.001%	50.000%
85	76.6	8	0.002%	4	0.001%	50.000%
86	77.5	8	0.002%	4	0.001%	50.000%
87	78.3	8	0.002%	4	0.001%	50.000%
88	79.2	8	0.002%	4	0.001%	50.000%
89	80.0	8	0.002%	4	0.001%	50.000%
90	80.9	8	0.002%	4	0.001%	50.000%
91	81.7	8	0.002%	4	0.001%	50.000%
92	82.6	8	0.002%	4	0.001%	50.000%
93	83.4	8	0.002%	4	0.001%	50.000%
94	84.3	8	0.002%	4	0.001%	50.000%
95	85.1	7	0.002%	4	0.001%	57.143%
96	85.9	7	0.002%	4	0.001%	57.143%
97	86.8	6	0.002%	4	0.001%	66.667%
98	87.6	5	0.001%	4	0.001%	80.000%
99	88.5	5	0.001%	4	0.001%	80.000%
100	89.3	5	0.001%	4	0.001%	80.000%

Peak Flows calculated with Cunannane Ploting Position

Return Period (yr)	Pre-Development (cfs)	Post-Development (cfs) - Mitigated Condition	Reduction (cfs)
10	90.2	75.0	15.2
9	88.6	73.5	15.1
8	87.0	73.5	13.6
7	86.4	73.1	13.3
6	84.5	71.1	13.4
5	72.5	68.7	3.7
4	66.2	65.2	1.1
3	62.0	51.1	10.9
2	54.8	45.8	8.9

Table for peaks events and determination of Q_2 and Q_{10} - Montecito Ranch

PRE-DEV

Date of peak	Peak	Position	Return period - Weibull
3/1/1970	126.3	1	75.3
2/21/1980	116.9	2	28.3
9/2/2007	106.3	3	17.4
12/18/1967	94.2	4	12.6
1/27/2008	89.9	5	9.8
2/21/1980	87.1	6	8.1
2/21/1980	86.3	7	6.8
2/27/1983	84.4	8	5.9
1/29/1980	72.8	9	5.3
2/13/1992	72.1	10	4.7
2/24/2003	67.8	11	4.3
1/14/1969	65.7	12	3.9
3/5/1978	65.0	13	3.6
11/16/1972	64.6	14	3.3
3/1/1983	63.3	15	3.1
2/13/1998	60.5	16	2.9
2/28/1970	60.5	17	2.7
11/23/1965	58.8	18	2.6
1/29/1980	57.8	19	2.4
1/1/1982	57.8	20	2.3
2/8/1983	57.6	21	2.2
1/10/1978	56.4	22	2.1
11/4/1987	54.8	23	2.0
2/20/1980	53.4	24	1.9
2/2/1998	53.3	25	1.8
2/21/1980	52.2	26	1.8
9/2/2007	50.8	27	1.7
1/7/1974	50.6	28	1.6
11/23/1965	50.3	29	1.6
3/1/1978	50.1	30	1.5
12/23/1982	48.8	31	1.5
11/14/197	47.5	32	1.4

Return period - yr	Peak (Weibull) - cfs
10	90.2
9	88.6
8	87.0
7	86.4
6	84.5
5	72.5
4	66.2
3	62.0
2	54.8

2			
4/1/1964	47.2	33	1.4
3/5/1970	45.7	34	1.3
1/29/1980	44.9	35	1.3
1/29/1980	44.5	36	1.3
1/8/1993	43.3	37	1.2
1/17/1973	43.3	38	1.2
1/29/1980	43.3	39	1.2
1/5/1995	43.3	40	1.1
2/16/1980	43.3	41	1.1
11/27/1981	43.1	42	1.1
1/21/1969	42.9	43	1.1
3/14/2003	42.8	44	1.0
2/2/1983	42.5	45	1.0

Table for peaks events and determination of Q_2 and Q_{10} - Montecito Ranch

POST-DEV

Date of peak	Peak	Position	Return period - Weibull
3/1/1970	146.6	1	75.3
2/21/1980	131.7	2	28.3
2/21/1980	98.3	3	17.4
2/21/1980	96.3	4	12.6
2/28/1970	73.6	5	9.8
1/29/1980	73.5	6	8.1
11/23/1965	73.0	7	6.8
11/23/1965	70.9	8	5.9
1/27/2008	69.6	9	5.3
2/21/1980	67.7	10	4.7
1/29/1980	65.5	11	4.3
2/20/1980	65.1	12	3.9
11/23/1965	57.4	13	3.6
1/5/1995	54.0	14	3.3
1/29/1980	51.2	15	3.1
12/5/1966	51.0	16	2.9
2/15/1986	50.8	17	2.7
1/29/1980	50.7	18	2.6
12/5/1966	49.7	19	2.4
1/8/1993	48.6	20	2.3
11/23/1965	48.4	21	2.2
1/25/1969	46.7	22	2.1
2/20/1980	45.8	23	2.0
11/22/1965	42.4	24	1.9
3/6/1995	41.9	25	1.8
1/11/1980	40.0	26	1.8

Return period - yr	Peak (Weibull) - cfs
10	75.0
9	73.5
8	73.5
7	73.1
6	71.1
5	68.7
4	65.2
3	51.1
2	45.8

3/1/1970	39.6	27	1.7
1/7/1993	38.6	28	1.6
2/21/1980	38.3	29	1.6
1/29/1980	38.0	30	1.5
11/23/1965	37.4	31	1.5
11/23/1965	37.4	32	1.4
1/25/1969	37.4	33	1.4
2/9/1976	37.2	34	1.3
12/7/1966	36.6	35	1.3
1/5/1995	36.6	36	1.3
11/14/1972	36.4	37	1.2
10/20/2004	36.3	38	1.2
1/29/1980	36.0	39	1.2
1/29/1980	35.6	40	1.1
1/10/1978	35.4	41	1.1
1/5/1995	34.7	42	1.1
12/19/1967	34.3	43	1.1
2/21/1980	33.8	44	1.0
3/5/1978	33.2	45	1.0

Attachment 4. SWMM Bioretention Modeling Inputs

Overview

The eight prototypical bioretention cells at the site were modeled in different levels of detail, depending on watershed characteristics and proposed facility location. The approaches are summarized below:

Drain(flow) coefficient: The flow coefficient in the SWMM Model is the coefficient needed to transform the orifice equation into a general power law equation form:

$q = C(H - H_D)^n$ (1)

where q is the peak flow in in/hr, n is the exponent(typically 0.5 for orifice equation), H_D is the elevation of the centroid of the orifice in inches (assumed equal to the invert of the orifice for small orifices and our design equal to 0) and H is depth of water in inches.

The general orifice equation can be expressed as:

$$Q = \frac{\pi}{4} Cg \frac{D^2}{144} \frac{\sqrt{2g\,(H-HD)}}{12} \quad (2)$$

Where Q is the peak flow in cfs, D is the diameter in inches, Cg is the typical discharge coefficient for orifices, g is the acceleration of gravity in ft/s^2, and H and H_D are defined above and used in inches in equation (2)

Flat Street B

Total Area:	67.07	acres
Average area:	0.4	acres
Average impervious:	60.0%	
BMP size:	669	sq-ft
Design size:	660	sq-ft
Width of BMP:	11	ft
Length of BMP:	60	ft
% of non BMP area:	62.4%	
Area draining to BMP:	0.3848	acres
Area of BMP:	0.01515	acres

Width:	93.3	ft
(assume contrb. Area L/W = 2)		
Length:	186.7	ft

Area (checking):	0.4	ok

Discharge Orifice

A	660	sq-ft
D	0.5	inch
h	18	inches
Q:	0.0083	cfs
q:	0.540	in/hr
n:	0.5	
C :	0.2003	

Med Street B

Total Area:	53.74	acres
Average area:	0.2	acres
Average impervious:	60.0%	
BMP size:	335	sq-ft
Design size:	330	sq-ft
Width of BMP:	11	ft
Length of BMP:	30	ft
% of non BMP area:	62.4%	
Area draining to BMP:	0.1924	acres
Area of BMP:	0.00758	acres

Width:	66.0	ft	
(assume contrb. Area L/W = 2)			
Length:	132.0	ft	
Area (checking):	0.2		ok

Discharge Orifice

A	330	sq-ft
D	0.375	inch
h	18	inches
Q:	0.0046	cfs

q:	0.609	in/hr
n:	0.5	
C :	0.1442	

Drains Back B

Total Area:	11.10	acres	
Average area:	0.20	acres	
Average impervious:	40.0%		
BMP size:	240	sq-ft	
Design size:	240	sq-ft	
Width of BMP:	11	ft	
Length of BMP:	22	ft	
% of non BMP area:	41.1%		
Area draining to BMP:	0.19449	acres	
Area of BMP:	0.00551	acres	0.20

Width:	66.0	ft	
(assume contrb. Area L/W = 2)			
Length:	132.0	ft	
Area (checking):	0.2		ok

Discharge Orifice

A	240	sq-ft
D	0.4375	inch
h	12	inches
Q:	0.0051	cfs
q:	0.926	in/hr
n:	0.5	
C :	0.2699	

Flat Street C

Total Area:	24.7	acres
Average area:	0.4	acres
Average impervious:	60.0%	

BMP size:	669	sq-ft
Design size:	660	sq-ft
Width of BMP:	11	ft
Length of BMP:	50	ft
% of non BMP area:	62.4%	
Area draining to BMP:	0.3848	acres
Area of BMP:	0.01515	acres

Width:	93.3	ft	
(assume contrb. Area L/W = 2)			
Length:	186.7	ft	
Area (checking):	0.4		ok

Discharge Orifice

A	660	sq-ft
D	0.5625	inch
h	18	inches
Q:	0.0104	cfs
q:	0.683	in/hr
n:	0.5	
C :	0.1622	

Med Street C

Total Area:	39.56	acres
Average area:	0.2	acres
Average impervious:	60.0%	
BMP size:	335	sq-ft
Design size:	330	sq-ft
Width of BMP:	11	ft
Length of BMP:	30	ft
% of non BMP area:	62.4%	
Area draining to BMP:	0.1922	acres
Area of BMP:	0.00781	acres

Width:	66.0	ft
(assume contrb. Area L/W = 2)		

Length:	132.0	ft	
Area (checking):	0.2		ok

Discharge Orifice

A	330	sq-ft
D	0.4375	inch
h	18	inches
Q:	0.0063	cfs
q:	0.803	in/hr
n:	0.5	
C :	0.1905	

Drains Back C

Total Area:	12.07	acres	
Average area:	0.20	acres	
Average impervious:	40.0%		
BMP size:	240	sq-ft	
Design size:	240	sq-ft	
Width of BMP:	11	ft	
Length of BMP:	22	ft	
% of non BMP area:	41.1%		
Area draining to BMP:	0.19449	acres	
Area of BMP:	0.00551	acres	0.20

Width:	66.0	ft	
(assume contrb. Area L/W = 2)			
Length:	132.0	ft	
Area (checking):	0.2		ok

Discharge Orifice

A	240	sq-ft
D	0.5	inch
h	12	inches
Q:	0.0067	cfs

q:	1.208	in/hr
n:	0.5	
C :	0.3525	

Flat Street D

Total Area:	7.7	acres
Average area:	0.4	acres
Average impervious:	60.0%	
BMP size:	558	sq-ft
Design size:	560	sq-ft
Width of BMP:	11	ft
Length of BMP:	50.90909	ft
% of non BMP area:	62.0%	
Area draining to BMP:	0.3871	acres
Area of BMP:	0.01286	acres

Width:	93.3	ft	
(assume contrb. Area L/W = 2)			
Length:	186.7	ft	
Area (checking):	0.4		ok

Discharge Orifice

A	560	sq-ft
D	0.6875	inch
h	18	inches
Q:	0.0156	cfs
q:	1.222	in/hr
n:	0.5	
C :	0.2908	

Drains Back D

Total Area:	0.74	acres
Average area:	0.20	acres
Average impervious:	40.0%	
BMP size:	240	sq-ft

Design size:	240	sq-ft	
Width of BMP:	11	ft	
Length of BMP:	22	ft	
% of non BMP area:	41.1%		
Area draining to BMP:	0.19449	acres	
Area of BMP:	0.00551	acres	0.20

Width:	66.0	ft	
(assume contrb. Area L/W = 2)			
Length:	132.0	ft	
Area (checking):	0.2		ok

Discharge Orifice

A	240	sq-ft
D	0.5	inch
h	12	inches
Q:	0.0067	cfs
q:	1.208	in/hr
n:	0.5	
C :	0.3525	

Attachment 5. Bioretention Surface Layer Drying Time Calculations

As the LID subroutine of the SWMM Model does not increase the discharge of the lower orifice once the storage layer is full (in other words, it does not consider the influence of the pressure in the amended soil layer), the discharge of the lower orifice when the surface layer is full is considered constant by the model and equal to the discharge of the lower orifice when the storage layer is full The volume of surface ponding can be estimated by the product of the depth of the surface layer in feet times the area of the bio-retention in square feet.. The volume could be reduced for the outlet structures that are below the full depth of the bioretention cells and for the 5% of the storage volume occupied by plants. To be conservative, the drying time calculation was performed for full depth with no vegetation.

The drying time under constant discharge is simply:

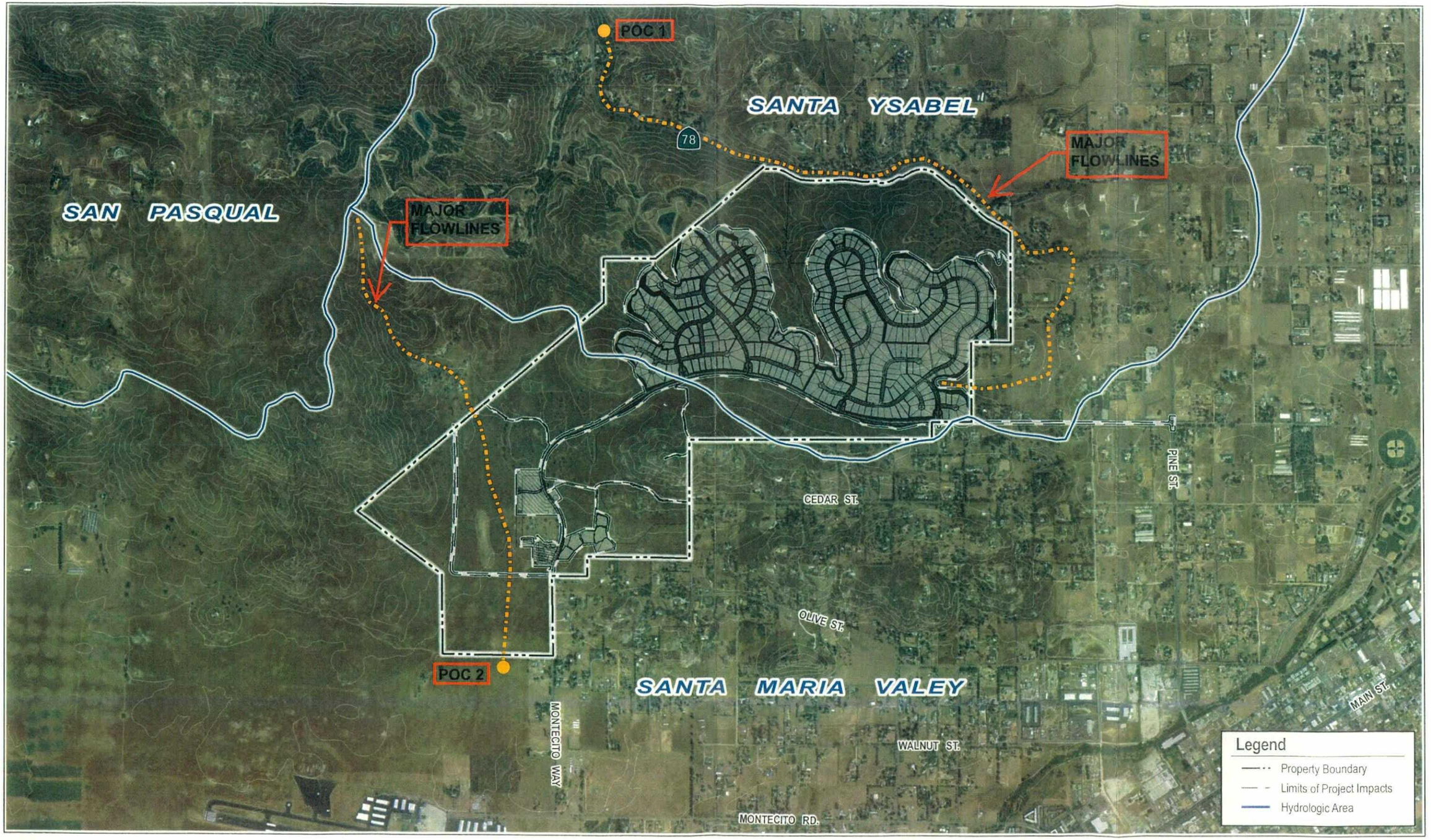
$t = V / (Q \times 3600)$

The drying times for the surface layer of the bioretention cells are shown in the following table. As can be seen in the table, all of the drying times are significantly shorter than the allowable 96 hrs.

BMP	B-FLAT	B-MED	B-BACK FLAT	C-FLAT	C-MED	C- BACK FLAT	D-FLAT	D-BACK FLAT	Units
Surface Area	660	330	240	660	330	240	560	240	FT^2
Max Depth	10	10	18	10	10	18	9	18	Inches
Surface Volume	550	275	360	550	275	360	420	360	FT^3
Orifice Discharge	0.008	0.005	0.005	0.010	0.006	0.006	0.016	0.007	cfs
Time	19.1	15.3	20	15.3	12.7	16.7	7.3	14.3	Hours

Attachment 6. Maps and Details

- POC Map
- Typical DMA Map
- Typical Bioretention Cross Section
- Soil Distribution Map
- Overall Soils Map



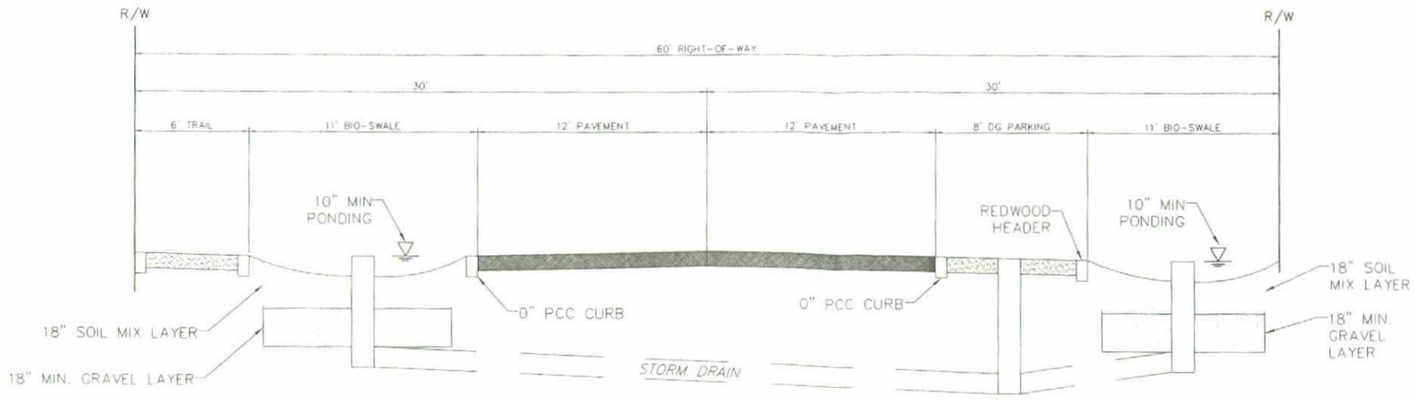
R·E·C Consultants, Inc. | Site Plan | MONTECITO RANCH

POC MAP

Feet 0 750 1,500

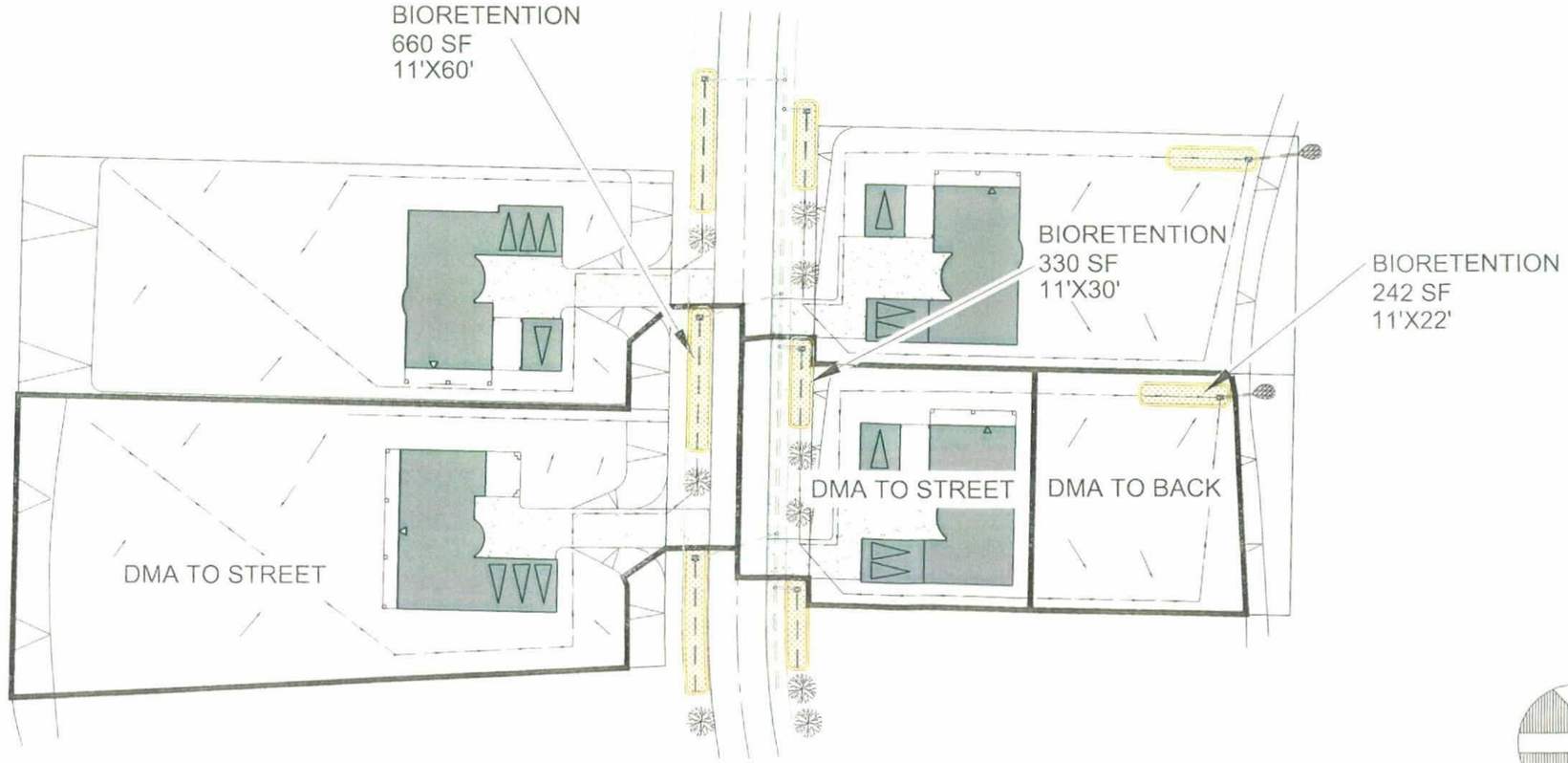
Aerial Source: Google, 2010 | June 2013

- Typical DMA Map



TYPICAL SECTION
NEIGHBORHOOD STREETS (PRIVATE)

NOT TO SCALE



TYPICAL RESIDENTIAL LOT DMA

NO SCALE

NTS

NO.	DESCRIPTION	DATE	APP'D
	REVISIONS		

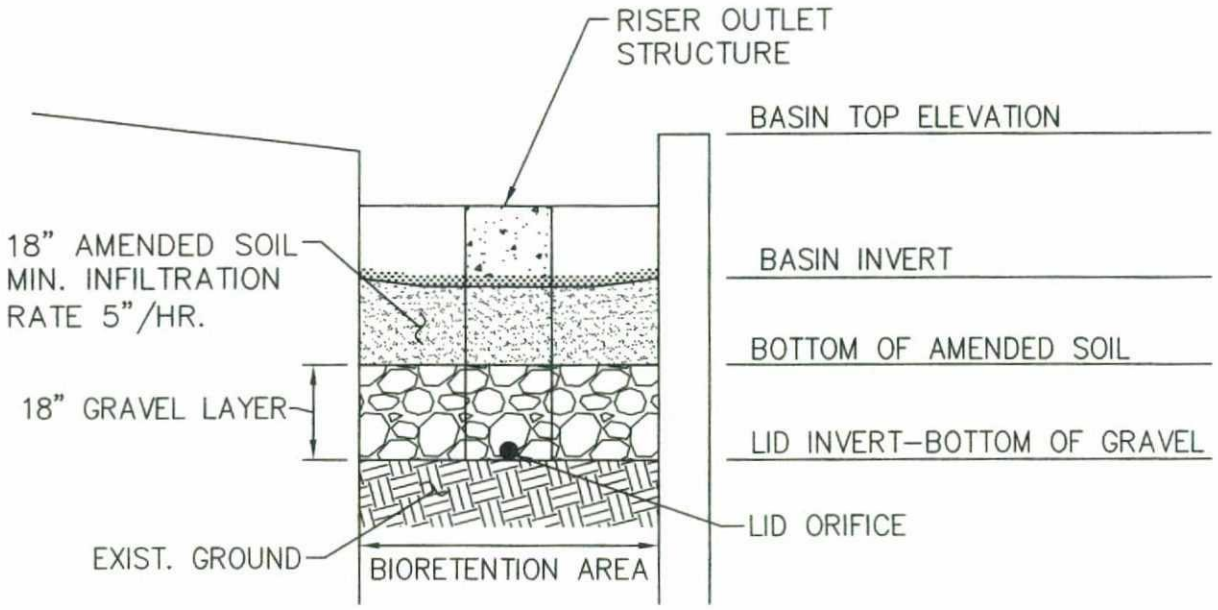
Civil Engineering · Environmental
Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax
REC Consultants, Inc

DATE: 03-01-13
SCALE: 1" = 20'
DRAWN: REC
CHECKED: AP

SHEET TITLE: TYPICAL DMA
PROJECT: MONTECITO RANCH
TBD
COUNTY OF SAN DIEGO

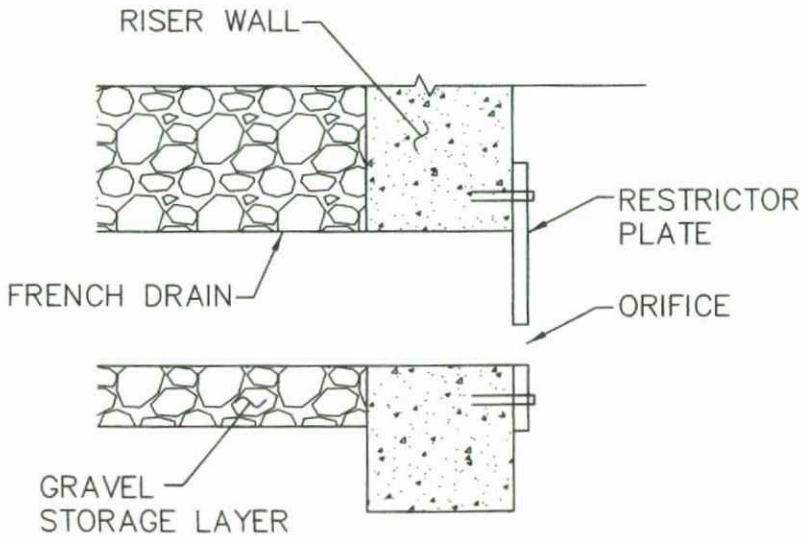
SHEET 1 OF 1 SHEETS

- Typical Bioretention Cross Section



BIORETENTION AREA CROSS SECTION (TYP)

NOT TO SCALE



LID ORIFICE DETAIL

NOT TO SCALE

- Soil Distribution Map

	SOIL TYPE-DESCRIPTION	Mean Slope	AREA (Ac)
1	D ~ FLAT STREET	5.84%	7.69
2	D ~ DRAINS TO BACK	4.56%	0.74
3	C ~ FLAT STREET	12.63%	24.73
4	C ~ MED. STREET	14.27%	39.56
5	C ~ DRAINS TO BACK	15.20%	12.07
6	B ~ FLAT STREET	8.29%	67.07
7	B ~ MED. STREET	9.79%	53.74
8	B ~ DRAINS TO BACK	9.16%	11.10

REVISIONS

NO.	DESCRIPTION	DATE	APP'D

Civil Engineering · Environmental
Land Surveying

2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

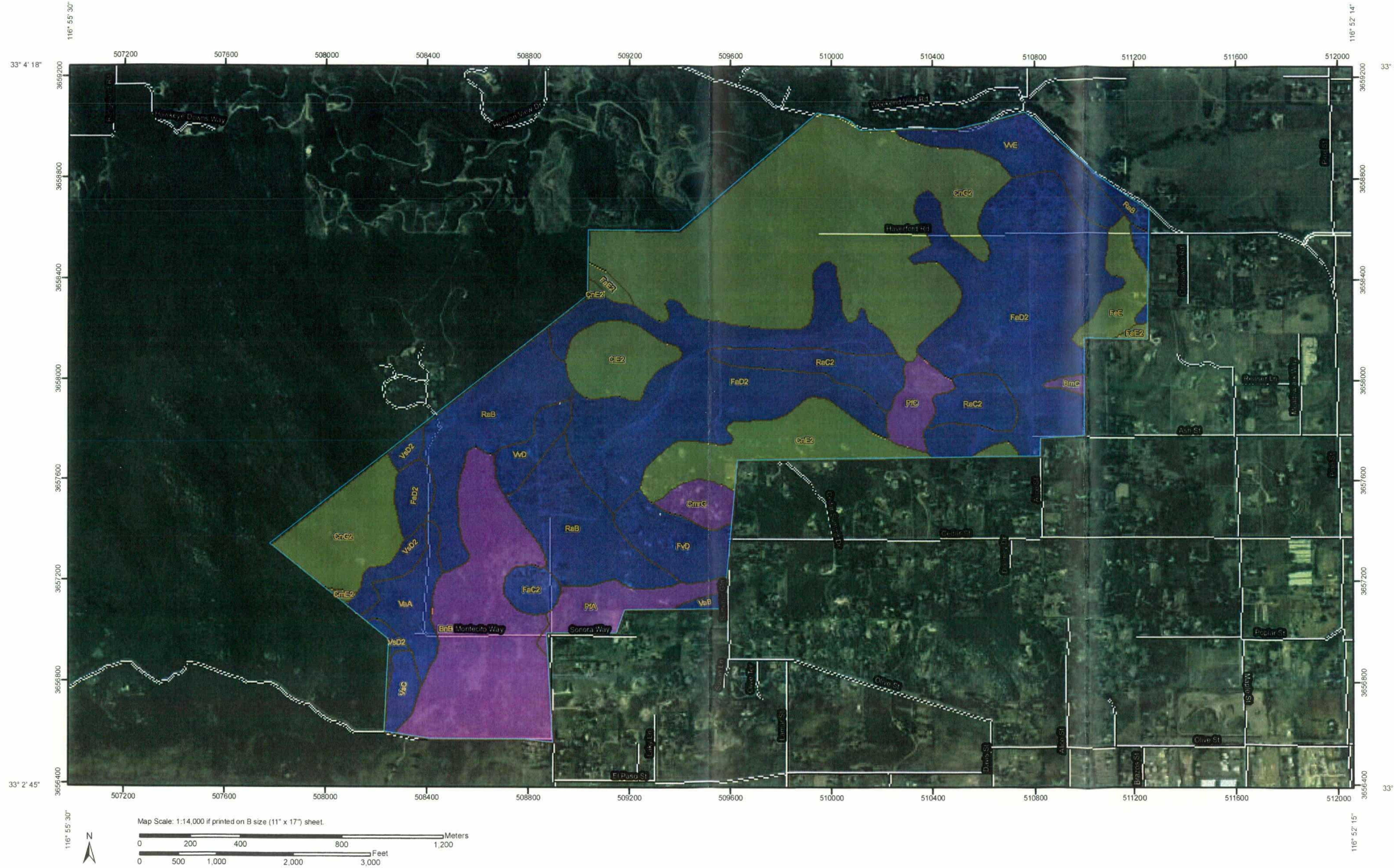
REC
Consultants, Inc.

DATE: 04-17-13
SCALE: 1" = 300'
DRAWN: J. WATSON
CHECKED: J. WILHOIT

SHEET TITLE: SOIL CALCS
PROJECT: MONTECITO RANCH

SHEET 1 OF 1 SHEETS

- Overall Soils Map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116° 52' 14"
33° 4' 18"
33° 2' 45"
116° 52' 15"
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507600
508000
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508800
509200
509600
510000
510400
510800
511200
511600
512000
3659200
3658800
3658400
3658000
3657600
3657200
3656800
3656400
VvE
CnG2
ReB
Haverford Rd
FeD2
FeE
FeE2
CnE2
FaC2
ClE2
ReC2
PfC
BmC
ReB
VvD
VaD2
FeD2
CnG2
VaD2
CmrG
FvD
FaC2
PfA
VaB
CmE2
VaA
BnB
Montecito Way
Sonora Way
VaD2
VaC
Ash St
Cedar St
Poplar St
Olive St
El Paso St
Map Scale: 1:14,000 if printed on B size (11" x 17") sheet.
N
0
200
400
800
1,200
Meters
0
500
1,000
2,000
3,000
Feet

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:14,000 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 6, Dec 17, 2007

Date(s) aerial images were photographed: 5/31/2005

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BmC	Bonsall sandy loam, thick surface, 2 to 9 percent slope s	D	2.1	0.2%
BnB	Bonsall-Fallbrook sandy loams, 2 to 5 percent slopes	D	98.1	9.7%
CIE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, ero ded	C	25.3	2.5%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	C	0.9	0.1%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	10.8	1.1%
CnE2	Cieneba-Fallbrook rocky sandy loams, 9 to 30 percent sl opes, eroded	C	46.7	4.6%
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent s lopes, eroded	C	246.6	24.4%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	B	8.5	0.8%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	B	268.5	26.6%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	4.7	0.5%
FeE	Fallbrook rocky sandy loam, 9 to 30 percent slopes	C	17.0	1.7%
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	B	24.4	2.4%
PfA	Placentia sandy loam, thick surface, 0 to 2 percent slo pes	D	21.7	2.1%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	13.8	1.4%
RaB	Ramona sandy loam, 2 to 5 percent slopes	B	99.8	9.9%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	B	35.4	3.5%
VaA	Visalia sandy loam, 0 to 2 percent slopes	B	20.2	2.0%
VaB	Visalia sandy loam, 2 to 5 percent slopes	B	2.4	0.2%
VsC	Vista coarse sandy loam, 5 to 9 percent slopes	B	7.9	0.8%
VsD2	Vista coarse sandy loam, 9 to 15 percent slopes, eroded	B	13.9	1.4%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
VvD	Vista rocky coarse sandy loam, 5 to 15 percent slopes	B	11.8	1.2%
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes	B	28.9	2.9%
Totals for Area of Interest			1,009.4	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

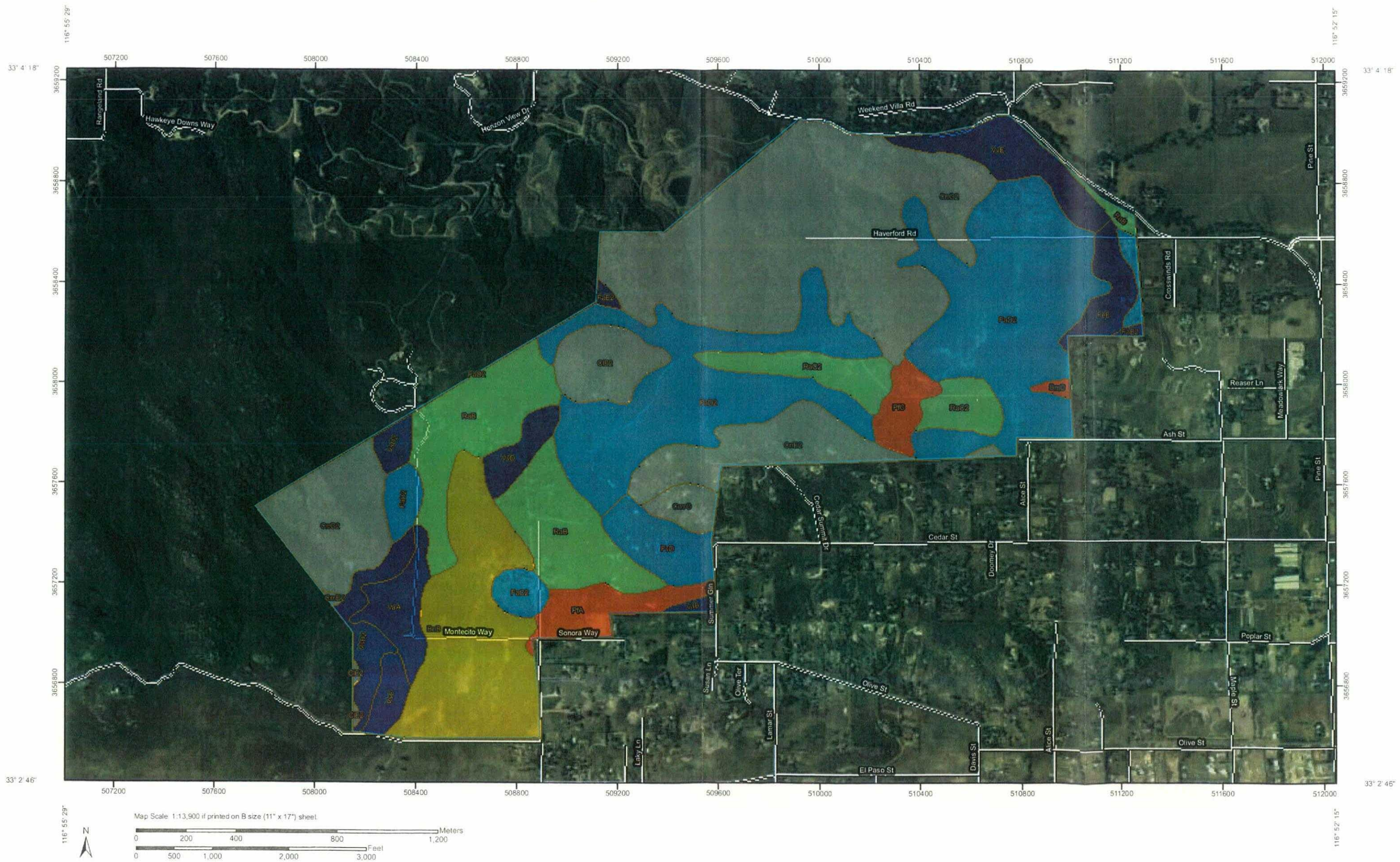
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher


116° 55' 29"
116° 52' 15"
33° 4' 18"
33° 2' 46"
507200
507600
508000
508400
508800
509200
509600
510000
510400
510800
511200
511600
512000
3659200
3658800
3658400
3658000
3657600
3657200
3656800
Rangeland Rd
Hawkeye Downs Way
Horizon View Dr
Weekend Villa Rd
Pine St
Haverford Rd
Crosswinds Rd
Reaser Ln
Meadowlark Way
Ash St
Cedar Summit Dr
Alice St
Cedar St
Doomey Dr
Summer Gln
Montecito Way
Sonora Way
Susan Ln
Olive Ter
Olive St
Lamar St
Poplar St
Maple St
Laky Ln
El Paso St
Davis St
VoE
CmC2
RaB
FaE2
PaD2
CrE2
RaC2
PfC
RaC2
Bm2
CmE2
VaA
PtA
Map Scale: 1:13,900 if printed on B size (11" x 17") sheet.
N
Meters
0 200 400 800 1,200
Feet
0 500 1,000 2,000 3,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- <= 0.215
- > 0.215 AND <= 0.3661
- > 0.3661 AND <= 2.7
- > 2.7 AND <= 7.6304
- > 7.6304 AND <= 28
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:13,900 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 6, Dec 17, 2007

Date(s) aerial images were photographed: 5/31/2005

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

Saturated Hydraulic Conductivity (Ksat)

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
BmC	Bonsall sandy loam, thick surface, 2 to 9 percent slope s	0.2150	2.0	0.2%
BnB	Bonsall-Fallbrook sandy loams, 2 to 5 percent slopes	0.3661	95.7	9.4%
CIE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, ero ded		26.3	2.6%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded		0.7	0.1%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes		10.0	1.0%
CnE2	Cieneba-Fallbrook rocky sandy loams, 9 to 30 percent sl opes, eroded		44.9	4.4%
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent s lopes, eroded		256.6	25.1%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	7.6304	8.5	0.8%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	7.6304	265.7	26.0%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	28.0000	2.7	0.3%
FeE	Fallbrook rocky sandy loam, 9 to 30 percent slopes	28.0000	16.1	1.6%
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	7.5349	23.5	2.3%
PfA	Placentia sandy loam, thick surface, 0 to 2 percent slo pes	0.2150	22.2	2.2%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	0.2150	13.8	1.3%
RaB	Ramona sandy loam, 2 to 5 percent slopes	2.7000	100.4	9.8%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	2.7000	35.4	3.5%
VaA	Visalia sandy loam, 0 to 2 percent slopes	28.0000	20.3	2.0%

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
VaB	Visalia sandy loam, 2 to 5 percent slopes	28.0000	2.6	0.3%
VsC	Vista coarse sandy loam, 5 to 9 percent slopes	28.0000	8.8	0.9%
VsD2	Vista coarse sandy loam, 9 to 15 percent slopes, eroded	28.0000	24.4	2.4%
VvD	Vista rocky coarse sandy loam, 5 to 15 percent slopes	28.0000	11.8	1.2%
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes	28.0000	29.3	2.9%
Totals for Area of Interest			1,021.7	100.0%

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie.

The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: *None Specified*

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Fastest

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Interpret Nulls as Zero: No

This option indicates if a null value for a component should be converted to zero before aggregation occurs. This will be done only if a map unit has at least one component where this value is not null.

Layer Options: Depth Range

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

Top Depth: 24

Bottom Depth: 42

Units of Measure: Inches

Attachment 7. SWMM Input Files

Attached are the screens associated with EPA-SWMM Model in both pre-development and post development conditions. Sub-catchments, outfalls, and LID editors are shown.
Variables for modeling are associated with typical recommended values by EPA-SWMM model, typical values found in technical literature (such as Maidment's Handbook of Hydrology)).
Recommended values for the SWMM model have been attained from the interim Orange County criteria established for their SWMM calibration. Currently, no recommended values have been established by the San Diego County HMP Permit for the SWMM model.

Soil characteristics of the existing soils were determined from information obtain from Web Soil Survey website.

A conservative assumption approach was taken in the development of the SWMM model that have a tendency to increase the size of the needed BMP and also generate a long term runoff as a percentage of rainfall similar to those measured in gage stations in Southern California by the USGS.

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
FLAT STREET B

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           00:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    00:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;                                                  Total     Pcnt.             Pcnt.     Curb      Snow
;;Name           Raingage        Outlet            Area      Imperv    Width   Slope     Length    Pack
;;-------------- --------------- ----------------- --------- --------- --------- --------- --------- ---------
;DMA 1
A1-post          RAMONA          IMP-1B            0.3848    62.4      93        2         0
;IMP B FLAT STREET
IMP-1B           RAMONA          out1              0.01515   0         11        0         0
;DMA B FLAT PRE
A1-pre           RAMONA          OUTPRE            0.4       0         93        15.3      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1B           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      .035       0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          6          .075       0.31
IMP-1B           6          .075       .31
A1-pre           6          0.1        0.31

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

```
IMP1            BC
IMP1            SURFACE     10          0.05        0.05        0           5
IMP1            SOIL        18          0.4         0.2         0.1         5           5           1.5
IMP1            STORAGE     18          .67         0.35        0
IMP1            DRAIN       0.1282      0.5         0           6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area        Width       InitSatur   FromImprv   ToPerv      Report File
;;-------------- ---------------- ------- ----------- ----------- ----------- ----------- ----------- -----------
IMP-1B          IMP1             1       660         11          0           100         0

[OUTFALLS]
;;              Invert     Outfall    Stage/Table      Tide
;;Name          Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1            0          FREE                        NO
;OUTLET PREDE
OUTPRE          0          FREE                        NO

[TIMESERIES]
;;Name          Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA          FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1            200.015            400.000
OUTPRE          0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post         200.000            700.000
IMP-1B          200.000            500.000
A1-pre          0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
```

```
IMP1             BC
IMP1             SURFACE    10         0.05       0.05       0          5
IMP1             SOIL       18         0.4        0.2        0.1        5          5          1.5
IMP1             STORAGE    18         .67        0.35       0
IMP1             DRAIN      0.1442     0.5        0          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- -----------
IMP-1B           IMP1             1       330.00     11         0          100        0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1             0          FREE                        NO
;OUTLET PREDE
OUTPRE           0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA           FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1             200.015            400.000
OUTPRE           0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post          200.000            700.000
IMP-1B           200.000            500.000
A1-pre           0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAMONA           88.100             746.281
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
FLAT MEDIUM B

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           05:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    05:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;
;;Name           Raingage        Outlet          Total      Pcnt.      Width      Pcnt.      Curb       Snow
;;                                                Area       Imperv              Slope      Length     Pack
;;-------------- --------------- --------------- ---------- ---------- ---------- ---------- ---------- ----------
;DMA 1
A1-post          RAMONA          IMP-1B          0.1924     62.4       66         4.0        0
;IMP B MED STREET
IMP-1B           RAMONA          out1            0.00758    0          11         0          0
;DMA B MED PRE
A1-pre           RAMONA          OUTPRE          0.2        0          66         9.8        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1B           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      0.035      0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          3          0.15       0.32
IMP-1B           3          0.15       0.32
A1-pre           3          0.2        0.32

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
FLAT BACK B

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           05:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    05:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;                                                  Total     Pcnt.             Pcnt.     Curb      Snow
;;Name           Raingage          Outlet           Area      Imperv    Width   Slope     Length    Pack
;;-------------- ----------------- ---------------- --------- --------- ------- --------- --------- ---------
;DMA 1
A1-post          RAMONA            IMP-1B           0.19449   41.1      66      2         0
;IMP B MED STREET
IMP-1B           RAMONA            out1             0.00551   0         11      0         0
;DMA B MED PRE
A1-pre           RAMONA            OUTPRE           0.2       0         66      9.2       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1B           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      0.035      0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          3          0.15       0.32
IMP-1B           3          0.15       0.32
A1-pre           3          0.2        0.32

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

```
IMP1             BC
IMP1             SURFACE    18         0.05       0.05       0          5
IMP1             SOIL       18         0.4        0.2        0.1        5          5          1.5
IMP1             STORAGE    12         .67        0.35       0
IMP1             DRAIN      0.2699     0.5        0          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- -----------
IMP-1B           IMP1             1       240        11         0          100        0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1             0          FREE                        NO
;OUTLET PREDE
OUTPRE           0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA           FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1             200.015            400.000
OUTPRE           0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post          200.000            700.000
IMP-1B           200.000            500.000
A1-pre           0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAMONA           93.411             745.849
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
C FLAT BACK

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           00:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    00:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain       Time   Snow   Data
;;Name           Type       Intrvl Catch  Source
;;-------------- ---------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;
;;Name           Raingage        Outlet          Total      Pcnt.      Width      Pcnt.      Curb       Snow
;;                                                Area       Imperv              Slope      Length     Pack
;;-------------- --------------- --------------- ---------- ---------- ---------- ---------- ---------- ----------
;DMA 1
A1-post          RAMONA          IMP-1C          0.1945     41.1       66         2          0
;IMP C BACK
IMP-1C           RAMONA          out1            0.00551    0          11         0          0
;DMA C MED PRE
A1-pre           RAMONA          OUTPRE          0.2        0          66         15.20      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1C           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      0.05       0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          6          0.075      0.31
IMP-1C           6          0.075      0.31
A1-pre           6          0.1        0.31

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

```
IMP1            BC
IMP1            SURFACE     18          0.05        0.05        0           5
IMP1            SOIL        18          0.4         0.2         0.1         5           5           1.5
IMP1            STORAGE     12          .67         .20         0
IMP1            DRAIN       0.3525      0.5         0           6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area        Width       InitSatur   FromImprv   ToPerv      Report File
;;-------------- ---------------- ------- ----------- ----------- ----------- ----------- ----------- -----------
IMP-1C          IMP1             1       240         11          0           100         0

[OUTFALLS]
;;              Invert     Outfall    Stage/Table      Tide
;;Name          Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1            0          FREE                        NO
;OUTLET PREDE
OUTPRE          0          FREE                        NO

[TIMESERIES]
;;Name          Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA          FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1            200.015            400.000
OUTPRE          0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post         200.000            700.000
IMP-1C          200.000            500.000
A1-pre          0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAMONA          90.087             744.187
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
C MEDIUM STREET

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           00:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    00:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;                                                   Total     Pcnt.             Pcnt.     Curb      Snow
;;Name           Raingage        Outlet              Area      Imperv    Width   Slope     Length    Pack
;;-------------- --------------- ------------------ --------- --------- --------- --------- --------- ---------
;DMA 1
A1-post          RAMONA          IMP-1C              0.1922    62.4      66        2         0
;IMP C MED STREET
IMP-1C           RAMONA          out1                0.00781   0         11        0         0
;DMA C MED PRE
A1-pre           RAMONA          OUTPRE              0.2       0         66        14.27     0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1C           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      .05        0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          6          .075       0.31
IMP-1C           6          .075       .31
A1-pre           6          0.1        0.31

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

```
IMP1             BC
IMP1             SURFACE    10         0.05       0.05       0          5
IMP1             SOIL       18         0.4        0.2        0.1        5          5          1.5
IMP1             STORAGE    18         .67        0.20       0
IMP1             DRAIN      0.1400     0.5        0          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- -----------
IMP-1C           IMP1             1       340        11         0          100        0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1             0          FREE                        NO
;OUTLET PREDE
OUTPRE           0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA           FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1             200.015            400.000
OUTPRE           0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post          200.000            700.000
IMP-1C           200.000            500.000
A1-pre           0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAMONA           91.195             744.741
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
C FLAT STREET

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           00:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    00:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;                                                  Total     Pcnt.             Pcnt.     Curb      Snow
;;Name           Raingage        Outlet             Area      Imperv   Width    Slope     Length    Pack
;;-------------- --------------- ---------------- -------- -------- -------- -------- -------- --------
;DMA 1
A1-post          RAMONA          IMP-1C             .3848    62       93       2        0
;IMP C FLAT STREET
IMP-1C           RAMONA          out1               0.01515  0        11       0        0
;DMA C FLAT PRE
A1-pre           RAMONA          OUTPRE             0.4      0        93       12.63    0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1C           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      .035       0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          6          .075       0.31
IMP-1C           6          .075       .31
A1-pre           6          0.1        0.31

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

```
IMP1            BC
IMP1            SURFACE     10          0.05        0.05        0           5
IMP1            SOIL        18          0.4         0.2         0.1         5           5           1.5
IMP1            STORAGE     18          .67         0.20        0
IMP1            DRAIN       0.1622      0.5         0           6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area        Width       InitSatur   FromImprv   ToPerv      Report File
;;-------------- ---------------- ------- ----------- ----------- ----------- ----------- ----------- -----------
IMP-1C          IMP1             1       660         11          0           100         0

[OUTFALLS]
;;              Invert     Outfall    Stage/Table      Tide
;;Name          Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1            0          FREE                        NO
;OUTLET PREDE
OUTPRE          0          FREE                        NO

[TIMESERIES]
;;Name          Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA          FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1            200.015            400.000
OUTPRE          0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post         200.000            700.000
IMP-1C          200.000            500.000
A1-pre          0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAMONA          96.181             742.525
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
D STREET STREET

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           05:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    05:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;                                                  Total     Pcnt.             Pcnt.     Curb      Snow
;;Name           Raingage        Outlet            Area      Imperv    Width   Slope     Length    Pack
;;-------------- --------------- ----------------- --------  --------  --------  --------  --------  --------
;DMA 1
A1-post          RAMONA          IMP-1D            0.3871    62        93        2         0
;IMP D FLAT STREET
IMP-1D           RAMONA          out1              0.01286   0         11        0         0
;DMA D FLAT PRE
A1-pre           RAMONA          OUTPRE            0.4       0         93        5.84      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1D           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      0.05       0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          9          .01875     0.30
IMP-1D           9          0.01875    0.30
A1-pre           9          .025       0.30

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

```
IMP1            BC
IMP1            SURFACE     9          0.05       0.05       0          5
IMP1            SOIL        18         0.4        0.2        0.1        5          5          1.5
IMP1            STORAGE     18         .67        .05        0
IMP1            DRAIN       0.2908     0.5        0          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- -----------
IMP-1D          IMP1             1       560        11         0          100        0

[OUTFALLS]
;;              Invert     Outfall    Stage/Table      Tide
;;Name          Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1            0          FREE                        NO
;OUTLET PREDE
OUTPRE          0          FREE                        NO

[TIMESERIES]
;;Name          Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA          FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1            200.015            400.000
OUTPRE          0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post         200.000            700.000
IMP-1D          200.000            500.000
A1-pre          0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAMONA          94.519             746.403
```

```
0.               BC
0.               SURFACE    18         0.05       0.05       0          5
0.               SOIL       18         0.4        0.2        0.1        5          5          1.5
0.               STORAGE    12         .67        0.05       0
0.               DRAIN      0.3525     0.5        0          6

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSatur  FromImprv  ToPerv     Report File
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- -----------
IMP-1D           0.               1       240        11         0          100        0

[OUTFALLS]
;;               Invert     Outfall    Stage/Table      Tide
;;Name           Elev.      Type       Time Series      Gate
;;-------------- ---------- ---------- ---------------- ----
OUT1             0          FREE                        NO
;OUTLET PREDE
OUTPRE           0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
RAMONA           FILE "C:\Users\Alex\My Documents\EPA SWMM Projects\RAMONA GAGE\ramona.txt"

[REPORT]
INPUT      NO
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS -197.262 291.023 417.877 790.168
Units      None

[COORDINATES]
;;Node          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OUT1             200.015            400.000
OUTPRE           0.000              500.000

[VERTICES]
;;Link          X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment  X-Coord            Y-Coord
;;-------------- ------------------ ------------------
A1-post          200.000            700.000
IMP-1D           200.000            500.000
A1-pre           0.000              700.000

[SYMBOLS]
;;Gage          X-Coord            Y-Coord
;;-------------- ------------------ ------------------
RAMONA           95.627             748.619
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

```
[TITLE]
MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION
D FLAT BACK

[OPTIONS]
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
START_DATE           08/01/1963
START_TIME           05:00:00
REPORT_START_DATE    08/01/1963
REPORT_START_TIME    05:00:00
END_DATE             05/30/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
ALLOW_PONDING        NO
INERTIAL_DAMPING     PARTIAL
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         0
NORMAL_FLOW_LIMITED  BOTH
SKIP_STEADY_STATE    NO
FORCE_MAIN_EQUATION  H-W
LINK_OFFSETS         DEPTH
MIN_SLOPE            0

[EVAPORATION]
;;Type       Parameters
;;---------- ----------
MONTHLY      .041   .076   .118   .192   .237   .318   .308   .286   .217   .140   .067   .041
DRY_ONLY     NO

[RAINGAGES]
;;               Rain      Time   Snow   Data
;;Name           Type      Intrvl Catch  Source
;;-------------- --------- ------ ------ ----------
RAMONA           INTENSITY 1:00   1.0    TIMESERIES RAMONA

[SUBCATCHMENTS]
;;
;;Name           Raingage        Outlet          Total      Pcnt.      Width      Pcnt.      Curb       Snow
;;                                               Area       Imperv              Slope      Length     Pack
;;-------------- --------------- --------------- ---------- ---------- ---------- ---------- ---------- ----------
;DMA 1
A1-post          RAMONA          IMP-1D          0.19449    41.1       66         2          0
;IMP C BACK
IMP-1D           RAMONA          out1            0.00551    0          11         0          0
;DMA C MED PRE
A1-pre           RAMONA          OUTPRE          0.2        0          66         4.56       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
A1-post          .012       0.05       .02        .10        25         OUTLET
IMP-1D           0.012      0.05       0.02       0.1        25         OUTLET
A1-pre           0.012      0.05       0.02       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    HydCon     IMDmax
;;-------------- ---------- ---------- ----------
A1-post          9          0.01875    0.30
IMP-1D           9          0.01875    0.30
A1-pre           9          0.025      0.30

[LID_CONTROLS]
;;               Type/Layer Parameters
;;-------------- ---------- ----------
```

Attachment 8. SWMM Report Files

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION - B FLAT STREET

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... AUG-01-1963 00:00:00
Ending Date ..... MAY-30-2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation .....         43.420       651.340
Evaporation Loss .....             2.796        41.941
Infiltration Loss .....           33.417       501.289
Surface Runoff .....              7.603       114.051
Final Surface Storage ....        0.000         0.002
Continuity Error (%) .....       -0.913

**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....          0.000         0.000
Wet Weather Inflow .....          7.599         2.476
Groundwater Inflow .....          0.000         0.000
RDII Inflow .....                 0.000         0.000
External Inflow .....            0.000         0.000
External Outflow .....           7.599         2.476
Internal Outflow .....           0.000         0.000
Storage Losses .....             0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume ......        0.000         0.000
Continuity Error (%) .....       0.000

***************************
Subcatchment Runoff Summary
***************************

-----------------------------------------------------------------------------------------------------------
                        Total      Total      Total      Total      Total      Total      Peak    Runoff
                       Precip      Runon      Evap       Infil      Runoff     Runoff     Runoff  Coeff
Subcatchment               in         in         in         in         in  10^6 gal        CFS
-----------------------------------------------------------------------------------------------------------
A1-post                651.34       0.00      51.61     222.51     383.92       4.01    0.40    0.589
IMP-1B                 651.34    9751.22     780.07    4873.00    4819.93       1.98    0.40    0.463
A1-pre                 651.34       0.00       4.68     603.89      45.53       0.49    0.35    0.070
```

```
**********************
LID Performance Summary
**********************
```

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1B	IMP1	10402.56	780.02	4872.69	609.94	4209.68	0.00	0.13	-

```
Analysis begun on:  Sun Jun 16 11:48:04 2013
Analysis ended on:  Sun Jun 16 11:48:15 2013
Total elapsed time: 00:00:11
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION - B MEDIUM STREET

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... AUG-01-1963 05:00:00
Ending Date ..... MAY-30-2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation .....         21.710       651.340
Evaporation Loss .....             1.308        39.237
Infiltration Loss .....           17.368       521.072
Surface Runoff .....              3.234        97.025
Final Surface Storage ....        0.000         0.003
Continuity Error (%) .....       -0.921

**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....          0.000         0.000
Wet Weather Inflow .....          3.231         1.053
Groundwater Inflow .....          0.000         0.000
RDII Inflow .....                 0.000         0.000
External Inflow .....            0.000         0.000
External Outflow .....           3.231         1.053
Internal Outflow .....            0.000         0.000
Storage Losses .....              0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume .....         0.000         0.000
Continuity Error (%) .....       0.000

***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
A1-post	651.34	0.00	48.89	235.74	374.06	1.95	0.19	0.574
IMP-1B	651.34	9494.72	797.81	4671.48	4766.99	0.98	0.20	0.470
A1-pre	651.34	0.00	1.20	638.26	13.37	0.07	0.16	0.021

```
**********************
LID Performance Summary
**********************
```

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1B	IMP1	10146.06	798.28	4674.27	415.21	4354.62	0.00	0.14	-

```
Analysis begun on:  Sun Jun 16 11:59:39 2013
Analysis ended on:  Sun Jun 16 11:59:50 2013
Total elapsed time: 00:00:11
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION - B FLAT BACK

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ..............  CFS
Process Models:
  Rainfall/Runoff ........  YES
  Snowmelt ...............  NO
  Groundwater ............  NO
  Flow Routing ...........  NO
  Water Quality ..........  NO
Infiltration Method ......  GREEN_AMPT
Starting Date ............  AUG-01-1963 05:00:00
Ending Date ..............  MAY-30-2008 23:00:00
Antecedent Dry Days ......  0.0
Report Time Step .........  01:00:00
Wet Time Step ............  00:15:00
Dry Time Step ............  04:00:00

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......        21.711       651.340
Evaporation Loss .........         0.918        27.527
Infiltration Loss ........        18.305       549.141
Surface Runoff ...........         2.649        79.478
Final Surface Storage ....         0.000         0.002
Continuity Error (%) .....        -0.738

**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         2.646         0.862
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         2.646         0.862
Internal Outflow .........         0.000         0.000
Storage Losses ...........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.000

***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
A1-post	651.34	0.00	33.01	369.79	253.90	1.34	0.19	0.390
IMP-1B	651.34	8962.12	789.66	3644.53	5285.65	0.79	0.19	0.550
A1-pre	651.34	0.00	1.20	638.28	13.34	0.07	0.16	0.020

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1B	IMP1	9613.46	789.74	3644.90	247.80	5038.38	0.00	0.13	-

Analysis begun on: Sun Jun 16 21:22:16 2013
Analysis ended on: Sun Jun 16 21:22:27 2013
Total elapsed time: 00:00:11

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION - C FLAT STREET

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... AUG-01-1963 00:00:00
Ending Date ..... MAY-30-2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation .....         43.420       651.340
Evaporation Loss .....             2.785        41.779
Infiltration Loss .....           31.336       470.069
Surface Runoff .....              9.686       145.301
Final Surface Storage ....        0.000         0.002
Continuity Error (%) .....       -0.892

**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....          0.000         0.000
Wet Weather Inflow .....          9.681         3.155
Groundwater Inflow .....          0.000         0.000
RDII Inflow .....                 0.000         0.000
External Inflow .....            0.000         0.000
External Outflow .....           9.681         3.155
Internal Outflow .....           0.000         0.000
Storage Losses .....             0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume .....         0.000         0.000
Continuity Error (%) .....       0.000

***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
A1-post	651.34	0.00	51.31	224.88	381.83	3.99	0.39	0.586
IMP-1C	651.34	9698.16	779.20	3160.95	6475.50	2.66	0.40	0.626
A1-pre	651.34	0.00	4.68	604.02	45.32	0.49	0.35	0.070

****
LID Performance Summary
****

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1C	IMP1	10349.50	779.15	3160.75	620.45	5854.64	0.00	0.12	-

Analysis begun on: Sun Jun 16 12:22:34 2013
Analysis ended on: Sun Jun 16 12:22:44 2013
Total elapsed time: 00:00:10

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION - C MEDIUM STREET

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... AUG-01-1963 00:00:00
Ending Date ..... MAY-30-2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation .....         21.712       651.340
Evaporation Loss .....             1.400        42.009
Infiltration Loss .....           15.789       473.662
Surface Runoff .....               4.722       141.646
Final Surface Storage ....         0.000         0.003
Continuity Error (%) .....        -0.918

**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....           0.000         0.000
Wet Weather Inflow .....           4.720         1.538
Groundwater Inflow .....           0.000         0.000
RDII Inflow .....                  0.000         0.000
External Inflow .....             0.000         0.000
External Outflow .....            4.720         1.538
Internal Outflow .....            0.000         0.000
Storage Losses .....              0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume .....         0.000         0.000
Continuity Error (%) .....        0.000

****************************
Subcatchment Runoff Summary
****************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
A1-post	651.34	0.00	50.88	222.33	385.38	2.01	0.20	0.592
IMP-1C	651.34	9484.09	779.44	3322.22	6091.05	1.29	0.20	0.601
A1-pre	651.34	0.00	4.68	603.95	45.44	0.25	0.18	0.070

```
**********************
LID Performance Summary
**********************
```

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1C	IMP1	10135.43	779.94	3324.33	634.34	5460.59	0.00	0.15	-

```
Analysis begun on:  Sun Jun 16 01:27:34 2013
Analysis ended on:  Sun Jun 16 01:27:44 2013
Total elapsed time: 00:00:10
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION - C FLAT BACK

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... AUG-01-1963 00:00:00
Ending Date ..... MAY-30-2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation .....         21.712       651.340
Evaporation Loss .....             1.011        30.342
Infiltration Loss .....           16.768       503.028
Surface Runoff .....              4.124       123.726
Final Surface Storage ....        0.000         0.002
Continuity Error (%) .....       -0.884

**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....          0.000         0.000
Wet Weather Inflow .....          4.122         1.343
Groundwater Inflow .....          0.000         0.000
RDII Inflow .....                 0.000         0.000
External Inflow .....            0.000         0.000
External Outflow .....           4.122         1.343
Internal Outflow .....            0.000         0.000
Storage Losses .....              0.000         0.000
Initial Stored Volume ....        0.000         0.000
Final Stored Volume .....         0.000         0.000
Continuity Error (%) .....       0.000

***************************
Subcatchment Runoff Summary
***************************

-----------------------------------------------------------------------------------------------------------
                        Total      Total      Total      Total      Total      Total      Peak    Runoff
                       Precip      Runon      Evap       Infil      Runoff     Runoff     Runoff  Coeff
Subcatchment               in         in         in         in         in  10^6 gal        CFS
-----------------------------------------------------------------------------------------------------------
A1-post                651.34       0.00      35.22     348.67     273.24       1.44     0.19   0.420
IMP-1C                 651.34    9645.32     789.66    2290.16    7330.21       1.10     0.19   0.712
A1-pre                 651.34       0.00       4.68     603.91      45.51       0.25     0.18   0.070
```

```
**********************
LID Performance Summary
**********************
```

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1C	IMP1	10296.66	789.74	2290.39	458.70	6872.26	0.00	0.14	-

```
Analysis begun on:  Sun Jun 16 01:31:43 2013
Analysis ended on:  Sun Jun 16 01:31:54 2013
Total elapsed time: 00:00:11
```

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION - D FLAT STREET

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.0 (Build 5.0.022)
--------------------------------------------------------------

MONTECITO RANCH - HMP MANAGEMENT WITH BIORETENTION

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

****************
Analysis Options
****************
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date ..... AUG-01-1963 05:00:00
Ending Date ..... MAY-30-2008 23:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 01:00:00
Wet Time Step ..... 00:15:00
Dry Time Step ..... 04:00:00

**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation .....         43.420       651.340
Evaporation Loss .....             3.374        50.615
Infiltration Loss .....           23.308       349.644
Surface Runoff .....              17.215       258.234
Final Surface Storage ....         0.000         0.002
Continuity Error (%) .....       -1.099

**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .....           0.000         0.000
Wet Weather Inflow .....          17.210         5.608
Groundwater Inflow .....           0.000         0.000
RDII Inflow .....                  0.000         0.000
External Inflow .....             0.000         0.000
External Outflow .....           17.210         5.608
Internal Outflow .....             0.000         0.000
Storage Losses .....               0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume .....          0.000         0.000
Continuity Error (%) .....        0.000

****************************
Subcatchment Runoff Summary
****************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
A1-post	651.34	0.00	57.98	177.07	423.93	4.46	0.42	0.651
IMP-1D	651.34	12760.74	795.14	860.77	11849.20	4.14	0.43	0.883
A1-pre	651.34	0.00	19.55	500.22	135.49	1.47	0.40	0.208

```
**********************
LID Performance Summary
**********************
```

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1D	IMP1	13412.08	795.43	861.08	1354.30	10499.18	0.00	0.15	-

```
Analysis begun on:  Sun Jun 16 01:58:39 2013
Analysis ended on:  Sun Jun 16 01:58:50 2013
Total elapsed time: 00:00:11
```

```
**********
LID Performance Summary
**********
```

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Init. Storage in	Final Storage in	P E
IMP-1D	0.	12596.96	790.44	778.04	1180.33	9970.36	0.00	0.13	-

```
Analysis begun on:  Sun Jun 16 21:27:10 2013
Analysis ended on:  Sun Jun 16 21:27:21 2013
Total elapsed time: 00:00:11
```

Attachment 9. SWMM Screens and Explanation of significant variables

LID Control Editor: Explanation of Significant Variables

Storage Depth:

The storage depth variable within se SWMM model is representative of the storage volume provided beneath the engineered soil and mulch components of the bioretention facility.

Porosity: A porosity value of 0.4 has been selected for the model. The amended soil is to be highly sandy in content in order to have a saturated hydraulic conductivity of approximately 5 in/hr.

(In order to comply with the HMP Permit, the value recommended by the Copermittees for the porosity of amended soil is 0.4, per Appendix A of the Final Hydrimodification Management Plan by Brown & Caldwell, dated March 2011. Such porosity is equal to the gravel per the same document.)

Void Ratio: The ratio of the void volume divided by the soil volume is directly related to porosity as n/(1-n). As the underdrain layer is composed of gravel, a porosity value of 0.4 has been selected (also per Appendix A of the Final HMP document), which results in a void ratio of 0.4/(1-0.4)=0.67 for the gravel detention layer.

Conductivity: Due to the natural soil existing on site, infiltration was a viable addition to the LID design. Using the Saturated Hydraulic Conductivity (KSat) for a depth range of 2 to 5 feet from the NRCS Web Soil Survey (See Ksat Map), and then reducing these values by a design safety factor of approximately 2.5 the following conductivity infiltration rates were used within the LID modules:

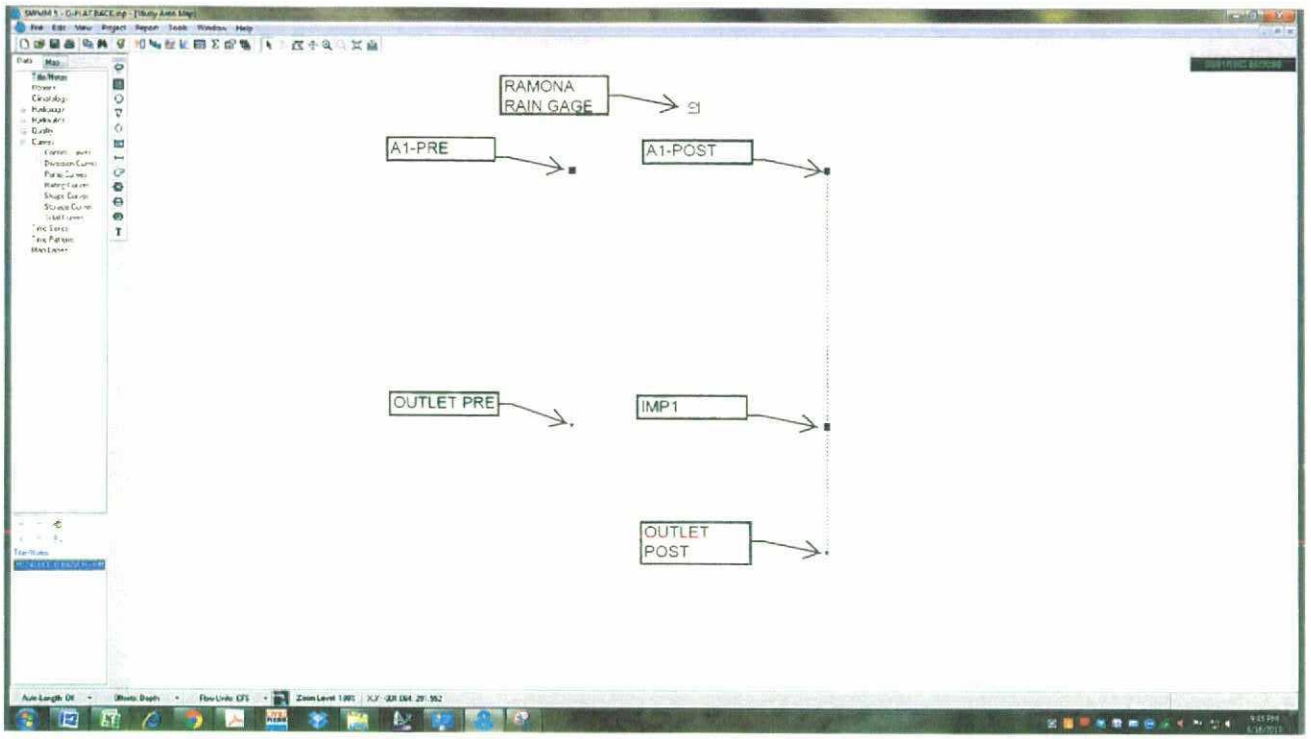
Soil Type B: 0.35

Soil Type C: 0.20

Soil Type D: 0.05

Clogging factor: A clogging factor was not used (0 indicates that there is not cogging assumed within the model). The reason for this is related to the fairness of a comparison with the SDHM model and the HMPO sizing tables: a clogging factor was not considered, and instead, a conservative value of infiltration was recommended.

MONTECITO RANCH SWMM MODEL LAYOUT



Outfall OUTPRE

Property	Value
Name	OUTPRE
X-Coordinate	0.000
Y-Coordinate	500.000
Description	OUTLET PREDE
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

User-assigned name of outfall

Outfall OUT1

Property	Value
Name	OUT1
X-Coordinate	200.015
Y-Coordinate	400.000
Description	
Tag	
Inflows	NO
Treatment	NO
Invert El.	0
Tide Gate	NO
Type	FREE
Fixed Outfall	
Fixed Stage	0
Tidal Outfall	
Curve Name	*
Time Series Outfall	
Series Name	*

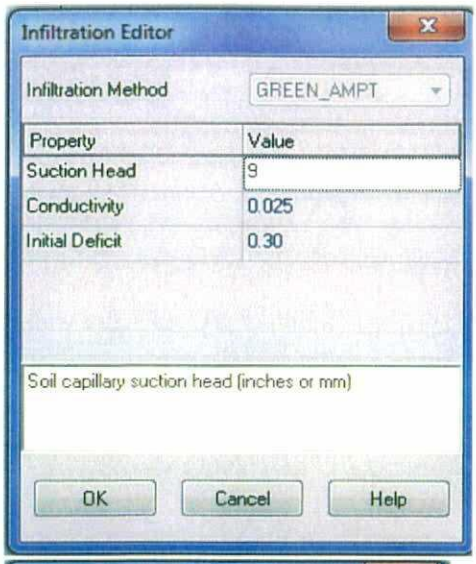
User-assigned name of outfall

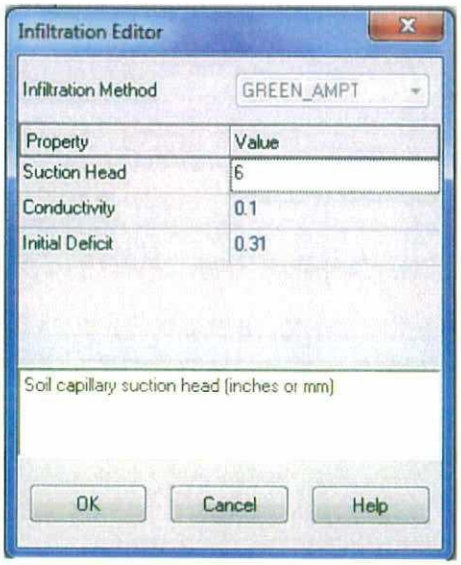
Rain Gage Oceanside

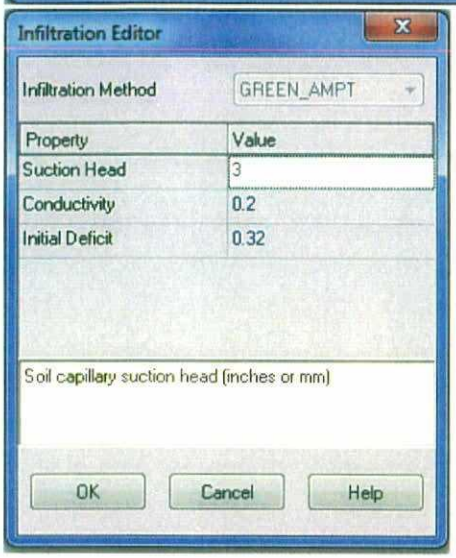
Property	Value
Name	Oceanside
X-Coordinate	75.265
Y-Coordinate	744.456
Description	
Tag	
Rain Format	INTENSITY
Time Interval	1:00
Snow Catch Factor	1.0
Data Source	TIMESERIES
TIME SERIES:	
· Series Name	Oceanside
DATA FILE:	
· File Name	*
· Station ID	*
· Rain Units	IN

User-assigned name of rain gage

PRE-DEVELOPMENT







Subcatchment A1-pre

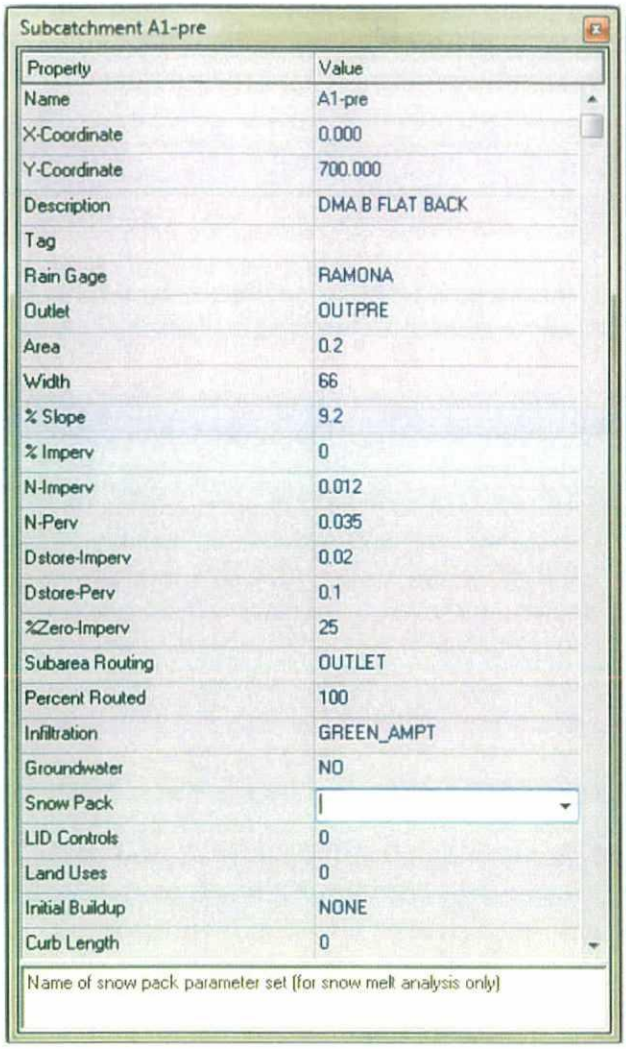
Property	Value
Name	A1-pre
X-Coordinate	0.000
Y-Coordinate	700.000
Description	DMA B FLAT PRE
Tag	
Rain Gage	RAMONA
Outlet	OUTPRE
Area	0.4
Width	93
% Slope	15.3
% Imperv	0
N-Imperv	0.012
N-Perv	.035
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

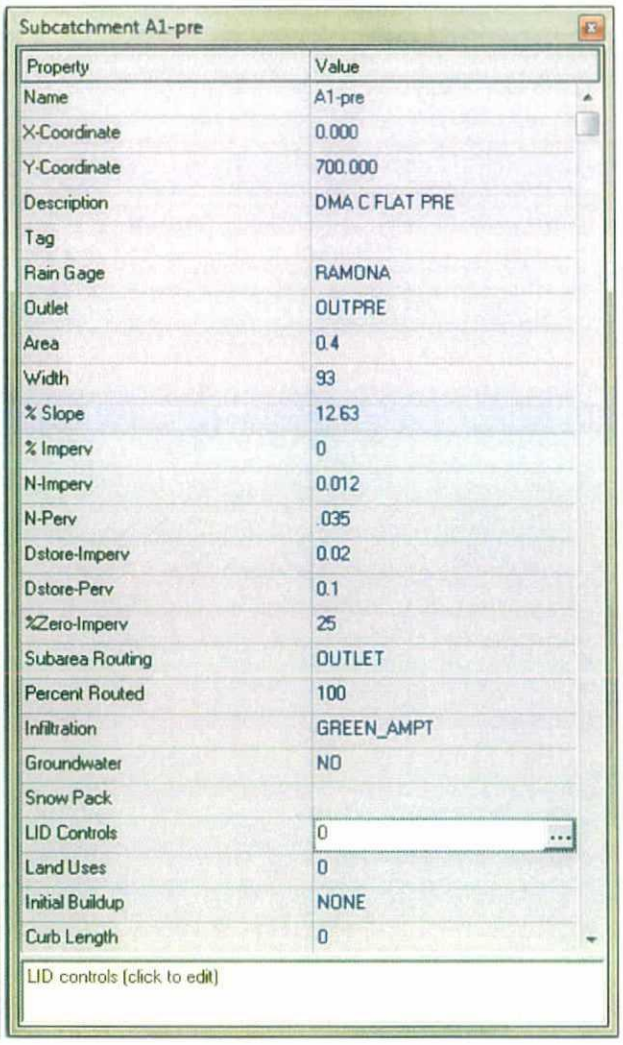
User-assigned name of subcatchment

Subcatchment A1-pre

Property	Value
Name	A1-pre
X-Coordinate	0.000
Y-Coordinate	700.000
Description	DMA B MED PRE
Tag	
Rain Gage	RAMONA
Outlet	OUTPRE
Area	0.2
Width	66
% Slope	9.8
% Imperv	0
N-Imperv	0.012
N-Perv	0.035
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment


Subcatchment A1-pre
Property
Value
Name
A1-pre
X-Coordinate
0.000
Y-Coordinate
700.000
Description
DMA B FLAT BACK
Tag
Rain Gage
RAMONA
Outlet
OUTPRE
Area
0.2
Width
66
% Slope
9.2
% Imperv
0
N-Imperv
0.012
N-Perv
0.035
Dstore-Imperv
0.02
Dstore-Perv
0.1
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
0
Land Uses
0
Initial Buildup
NONE
Curb Length
0
Name of snow pack parameter set (for snow melt analysis only)


Subcatchment A1-pre
Property
Value
Name
A1-pre
X-Coordinate
0.000
Y-Coordinate
700.000
Description
DMA C FLAT PRE
Tag
Rain Gage
RAMONA
Outlet
OUTPRE
Area
0.4
Width
93
% Slope
12.63
% Imperv
0
N-Imperv
0.012
N-Perv
.035
Dstore-Imperv
0.02
Dstore-Perv
0.1
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
0
Land Uses
0
Initial Buildup
NONE
Curb Length
0
LID controls (click to edit)

Subcatchment A1-pre

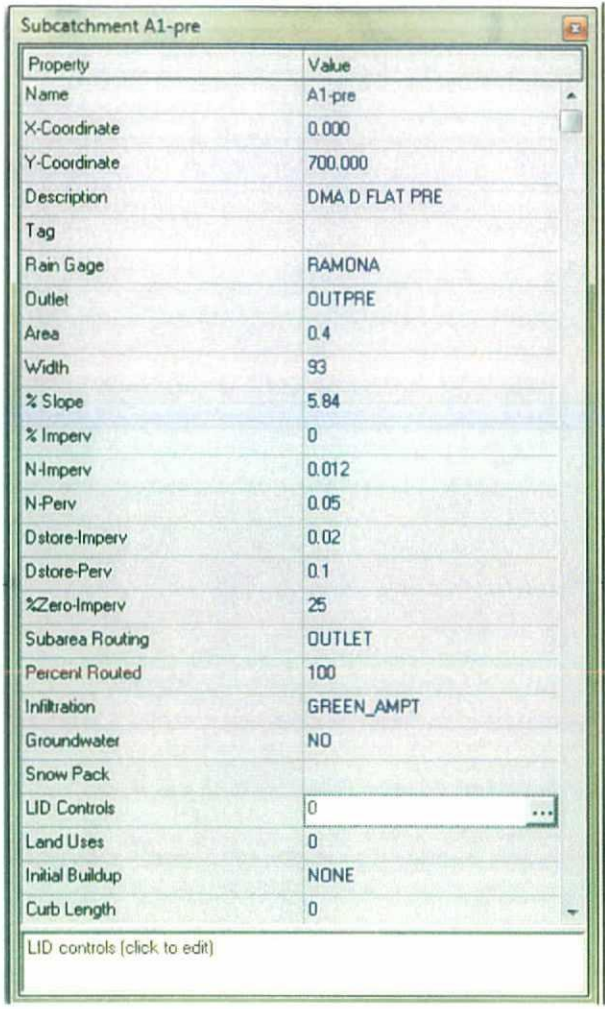
Property	Value
Name	A1-pre
X-Coordinate	0.000
Y-Coordinate	700.000
Description	DMA C MED PRE
Tag	
Rain Gage	RAMONA
Outlet	OUTPRE
Area	0.2
Width	66
% Slope	14.27
% Imperv	0
N-Imperv	0.012
N-Perv	.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0 ...
Land Uses	0
Initial Buildup	NONE
Curb Length	0

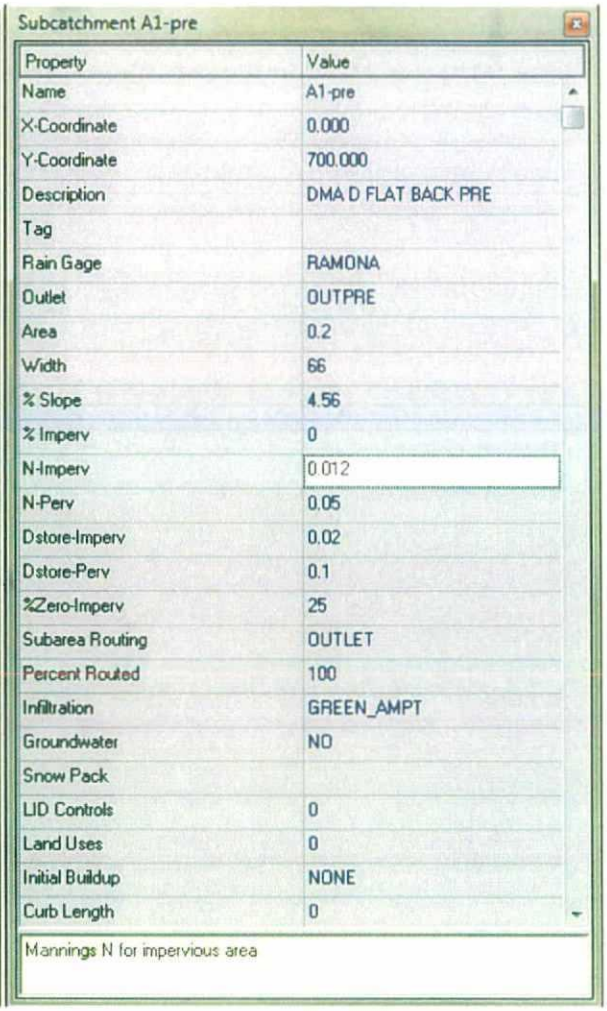
LID controls (click to edit)

Subcatchment A1-pre

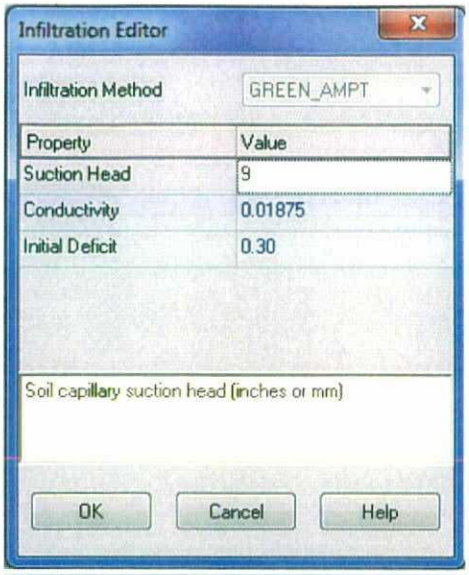
Property	Value
Name	A1-pre
X-Coordinate	0.000
Y-Coordinate	700.000
Description	DMA C FLAT BACK PRE
Tag	
Rain Gage	RAMONA
Outlet	OUTPRE
Area	0.2
Width	66
% Slope	15.20
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

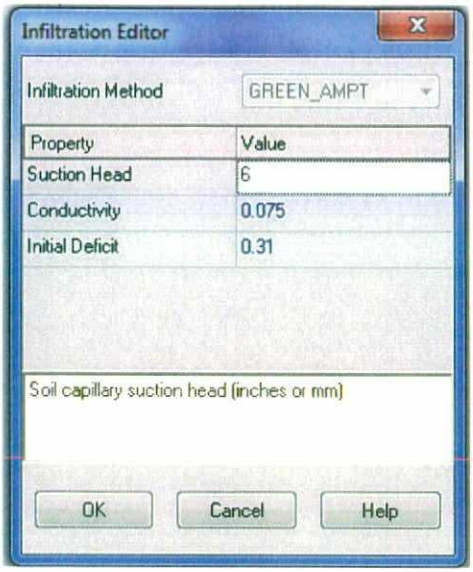
Mannings N for pervious area

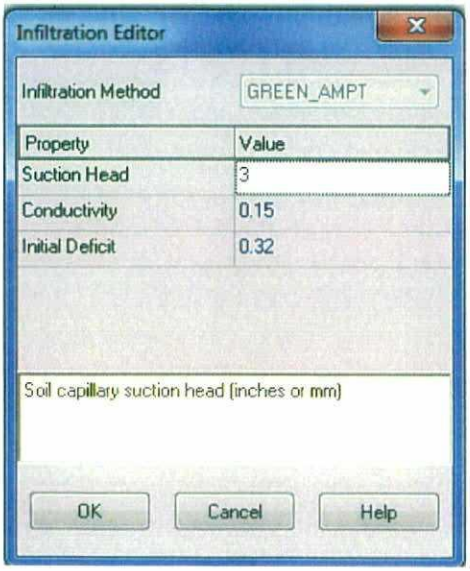

Subcatchment A1-pre
Property
Value
Name
A1-pre
X-Coordinate
0.000
Y-Coordinate
700.000
Description
DMA D FLAT PRE
Tag
Rain Gage
RAMONA
Outlet
OUTPRE
Area
0.4
Width
93
% Slope
5.84
% Imperv
0
N-Imperv
0.012
N-Perv
0.05
Dstore-Imperv
0.02
Dstore-Perv
0.1
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
0
Land Uses
0
Initial Buildup
NONE
Curb Length
0
LID controls (click to edit)


Subcatchment A1-pre
Property
Value
Name
A1-pre
X-Coordinate
0.000
Y-Coordinate
700.000
Description
DMA D FLAT BACK PRE
Tag
Rain Gage
RAMONA
Outlet
OUTPRE
Area
0.2
Width
66
% Slope
4.56
% Imperv
0
N-Imperv
0.012
N-Perv
0.05
Dstore-Imperv
0.02
Dstore-Perv
0.1
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
0
Land Uses
0
Initial Buildup
NONE
Curb Length
0
Mannings N for impervious area

POST-DEVELOPMENT







Subcatchment A1-post

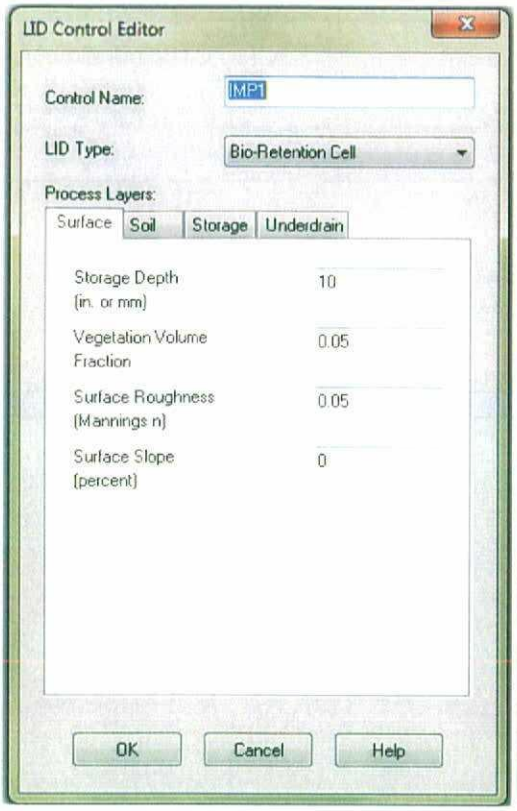
Property	Value
Name	A1-post
X-Coordinate	200.000
Y-Coordinate	700.000
Description	DMA 1
Tag	
Rain Gage	RAMONA
Outlet	IMP-1B
Area	0.3848
Width	93
% Slope	2
% Imperv	62.4
N-Imperv	.012
N-Perv	0.05
Dstore-Imperv	.02
Dstore-Perv	.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE
Curb Length	0

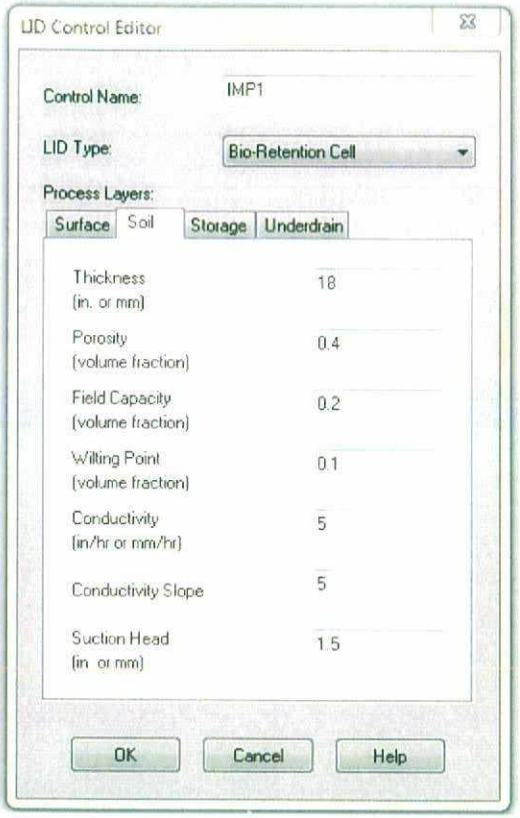
User-assigned name of subcatchment

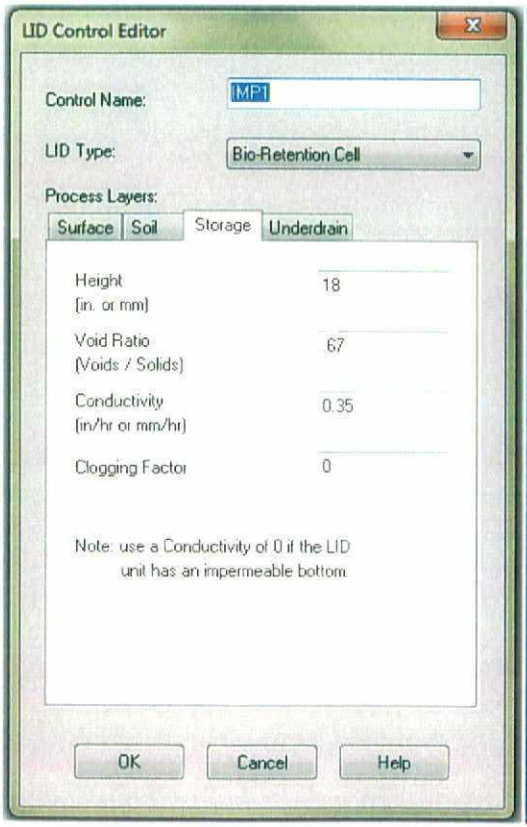
Subcatchment IMP-1B

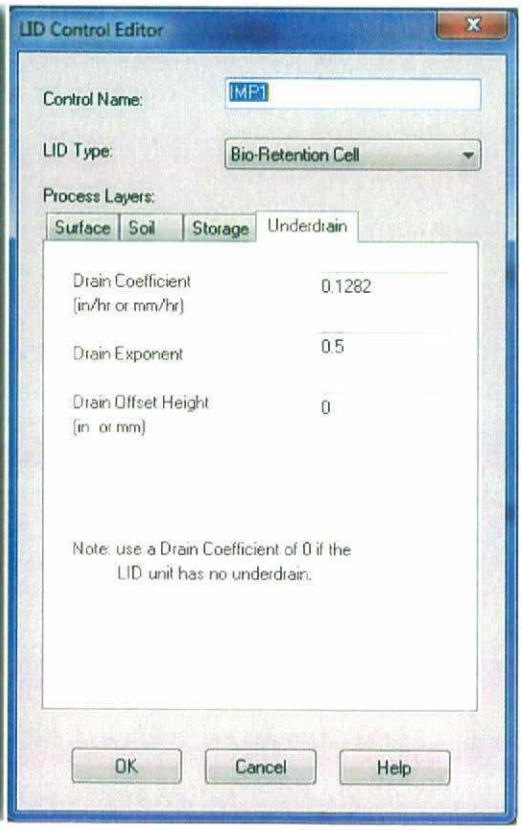
Property	Value
Name	IMP-1B
X-Coordinate	200.000
Y-Coordinate	500.000
Description	IMP B FLAT STREET
Tag	
Rain Gage	RAMONA
Outlet	out1
Area	0.01515
Width	11
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE
Curb Length	0

User-assigned name of subcatchment


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
10
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0.05
Surface Slope
(percent)
0
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
67
Conductivity
(in/hr or mm/hr)
0.35
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
0.1282
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
0
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel
Help

Subcatchment A1-post

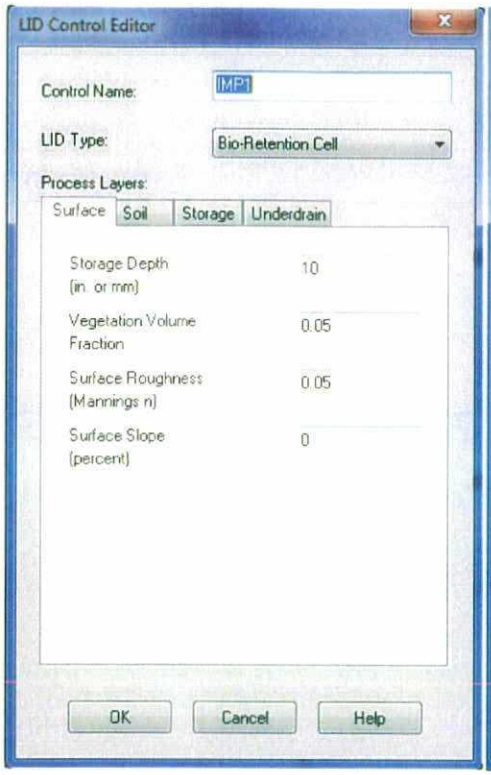
Property	Value
Name	A1-post
X-Coordinate	200.000
Y-Coordinate	700.000
Description	DMA 1
Tag	
Rain Gage	RAMONA
Outlet	IMP-1B
Area	0.1924
Width	66
% Slope	4.0
% Imperv	62.4
N-Imperv	.012
N-Perv	0.05
Dstore-Imperv	.02
Dstore-Perv	.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE

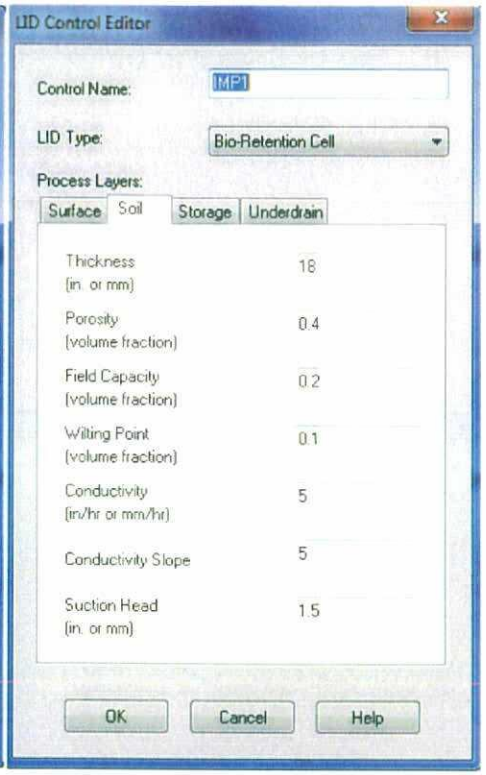
User-assigned name of subcatchment

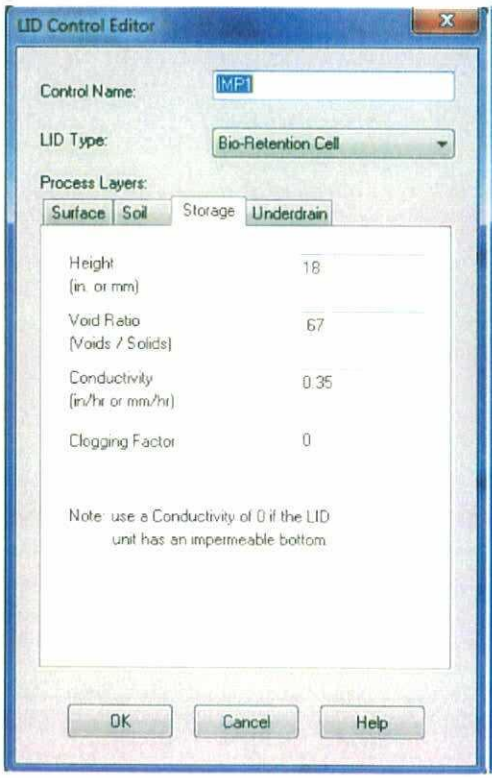
Subcatchment IMP-1B

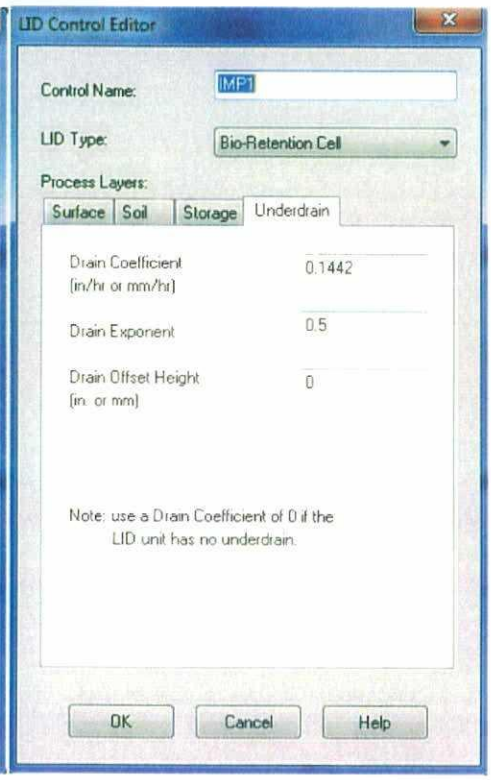
Property	Value
Name	IMP-1B
X-Coordinate	200.000
Y-Coordinate	500.000
Description	IMP B MED STREET
Tag	
Rain Gage	RAMONA
Outlet	out1
Area	0.00758
Width	11
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE

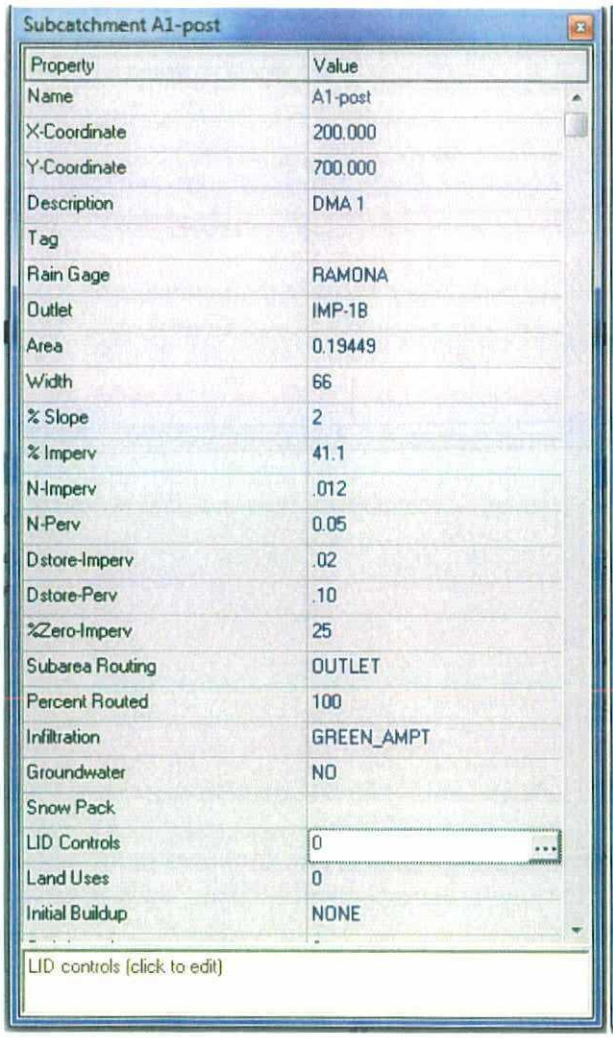
User-assigned name of subcatchment

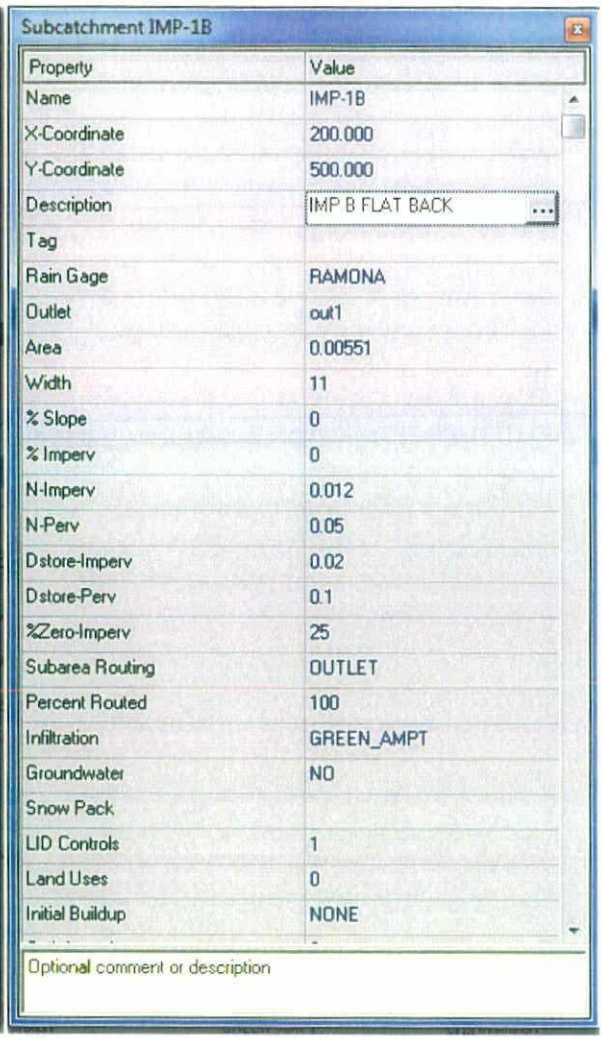

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Storage Depth (in. or mm) 10
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0.05
Surface Slope (percent) 0
OK Cancel Help

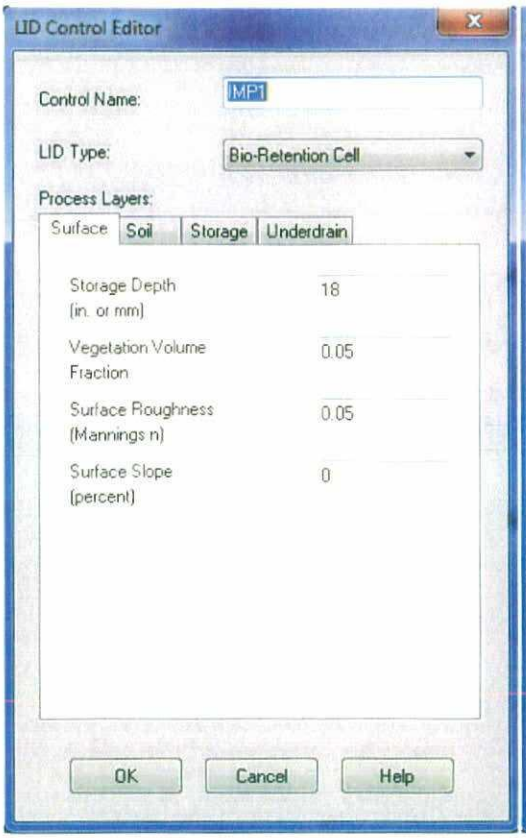

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5
OK Cancel Help

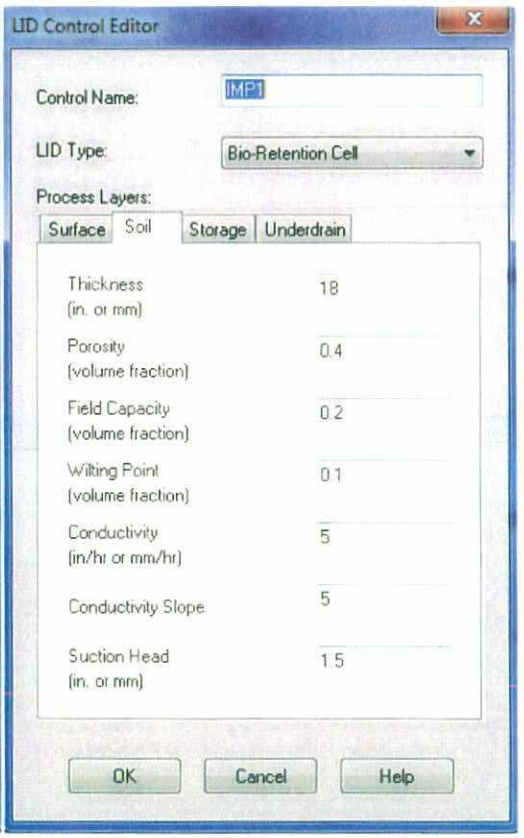

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) 67
Conductivity (in/hr or mm/hr) 0.35
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom
OK Cancel Help

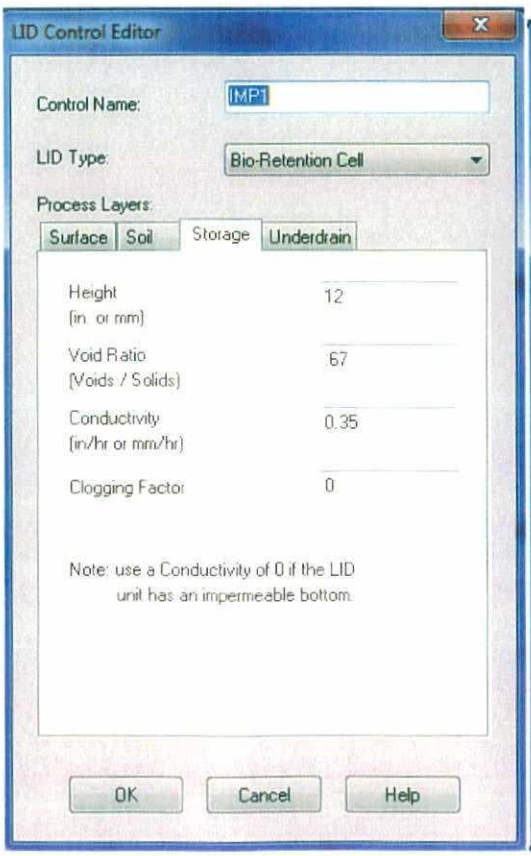

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Drain Coefficient (in/hr or mm/hr) 0.1442
Drain Exponent 0.5
Drain Offset Height (in. or mm) 0
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
OK Cancel Help

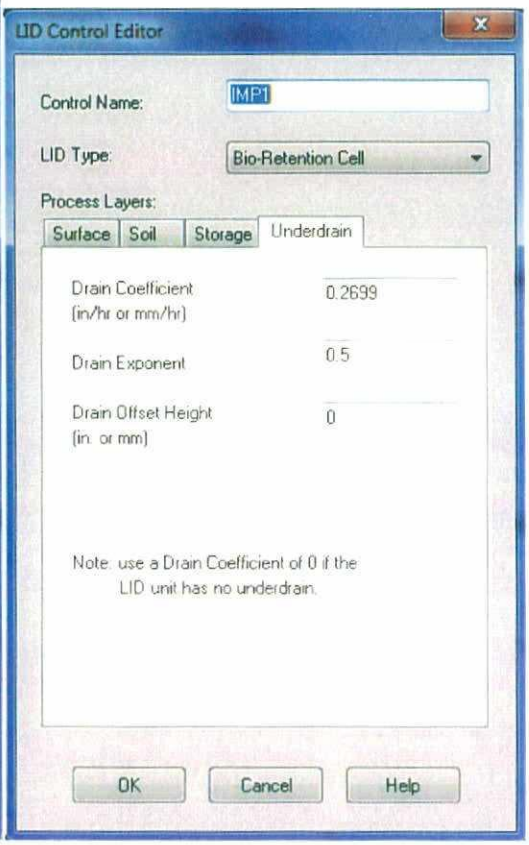

Subcatchment A1-post
Property
Value
Name
A1-post
X-Coordinate
200.000
Y-Coordinate
700.000
Description
DMA 1
Tag
Rain Gage
RAMONA
Outlet
IMP-1B
Area
0.19449
Width
66
% Slope
2
% Imperv
41.1
N-Imperv
.012
N-Perv
0.05
Dstore-Imperv
.02
Dstore-Perv
.10
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
0
Land Uses
0
Initial Buildup
NONE
LID controls (click to edit)

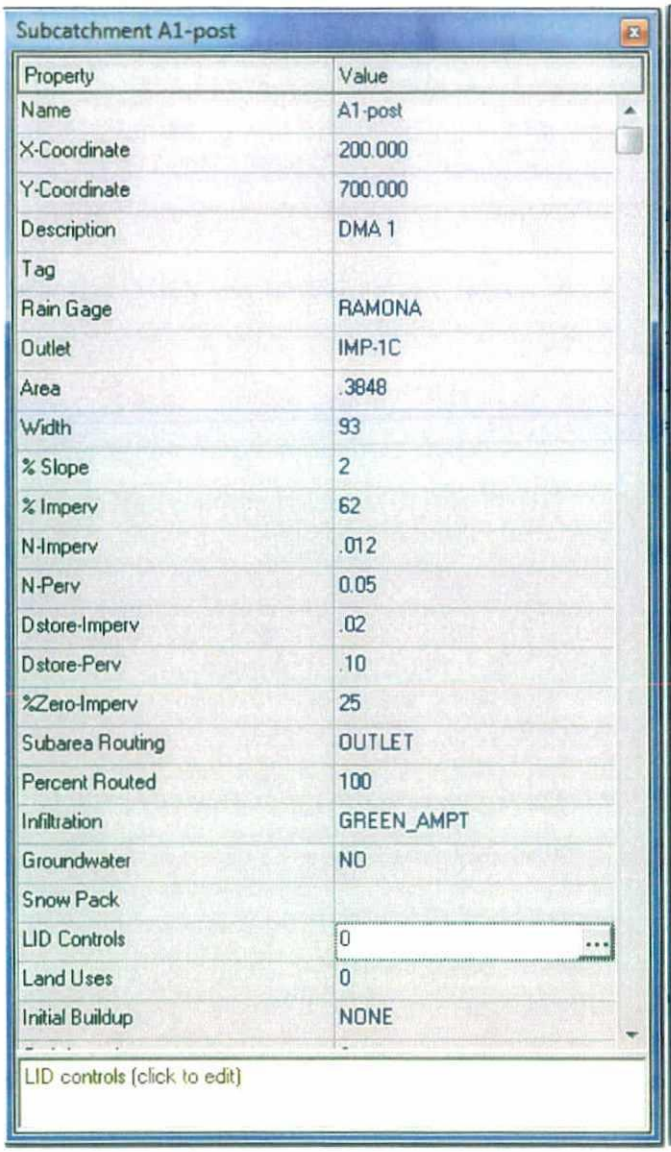

Subcatchment IMP-1B
Property
Value
Name
IMP-1B
X-Coordinate
200.000
Y-Coordinate
500.000
Description
IMP B FLAT BACK
Tag
Rain Gage
RAMONA
Outlet
out1
Area
0.00551
Width
11
% Slope
0
% Imperv
0
N-Imperv
0.012
N-Perv
0.05
Dstore-Imperv
0.02
Dstore-Perv
0.1
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
1
Land Uses
0
Initial Buildup
NONE
Optional comment or description


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
18
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0.05
Surface Slope
(percent)
0
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
12
Void Ratio
(Voids / Solids)
.67
Conductivity
(in/hr or mm/hr)
0.35
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
OK
Cancel
Help

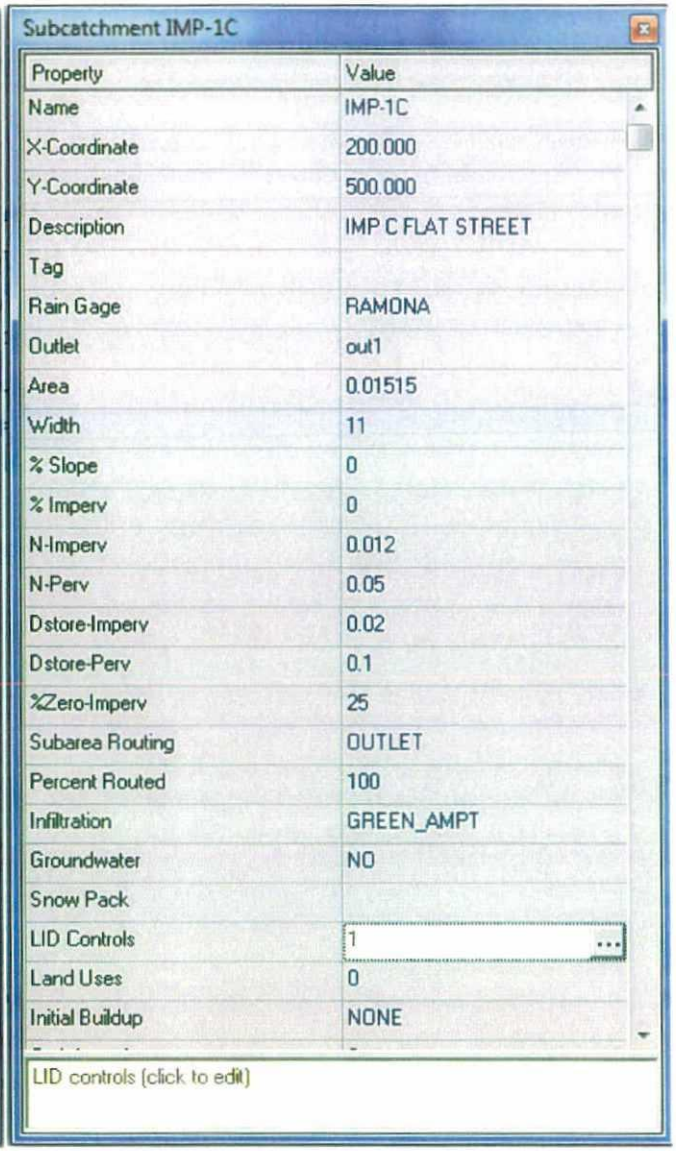

LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
0.2699
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
0
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel
Help



Subcatchment A1-post

Property	Value
Name	A1-post
X-Coordinate	200.000
Y-Coordinate	700.000
Description	DMA 1
Tag	
Rain Gage	RAMONA
Outlet	IMP-1C
Area	.3848
Width	93
% Slope	2
% Imperv	62
N-Imperv	.012
N-Perv	0.05
Dstore-Imperv	.02
Dstore-Perv	.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0 ...
Land Uses	0
Initial Buildup	NONE

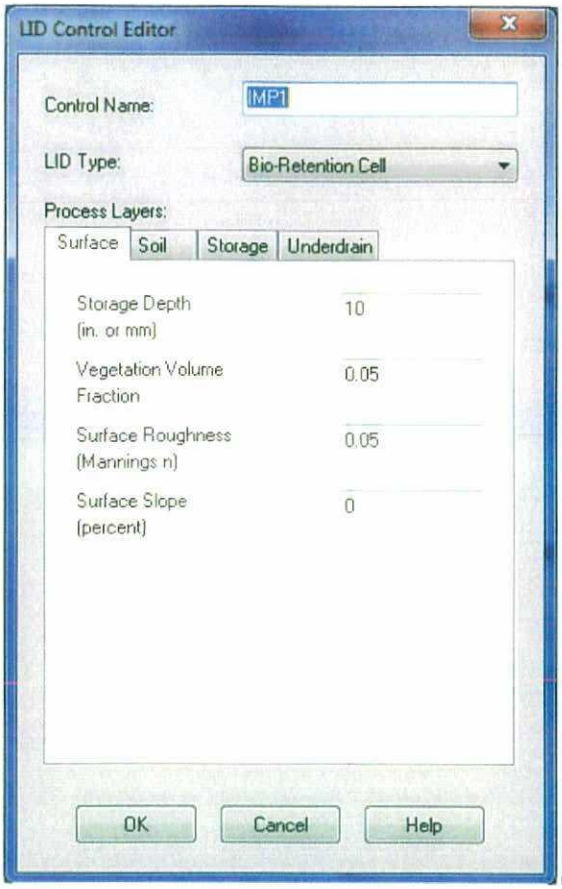
LID controls (click to edit)

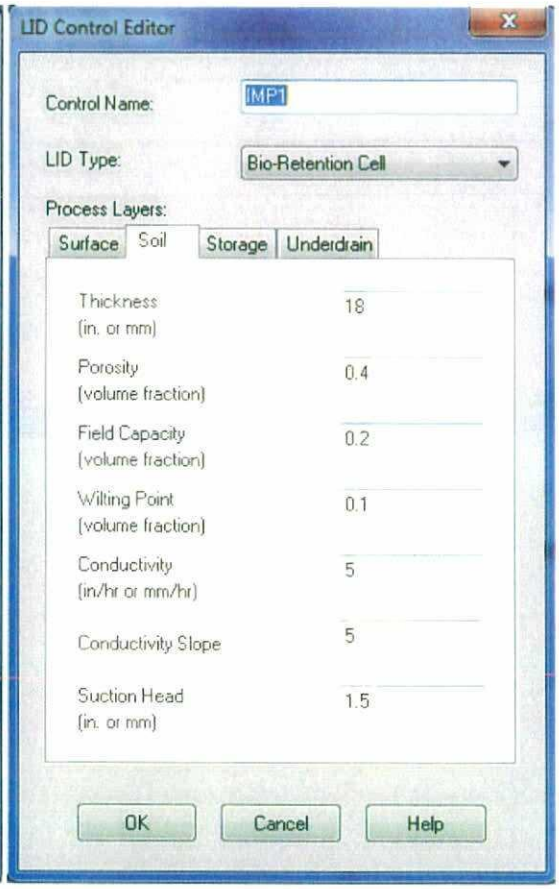


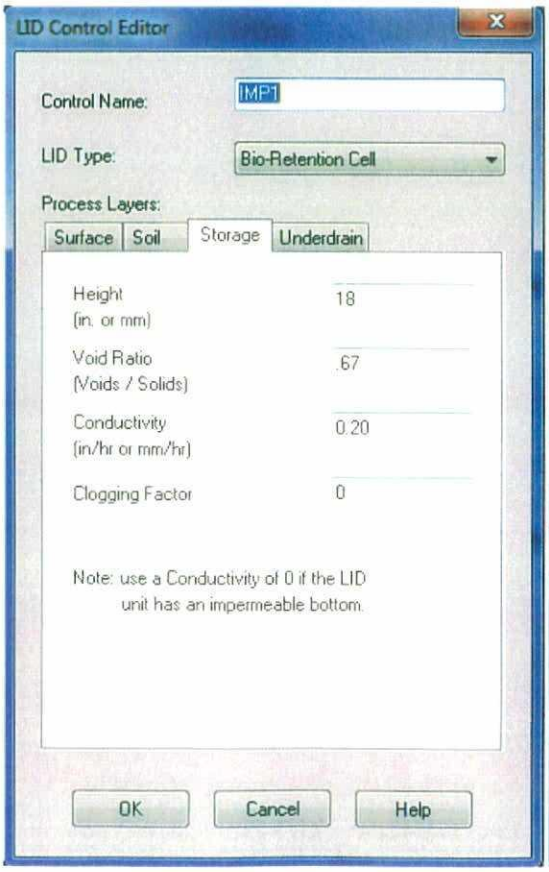
Subcatchment IMP-1C

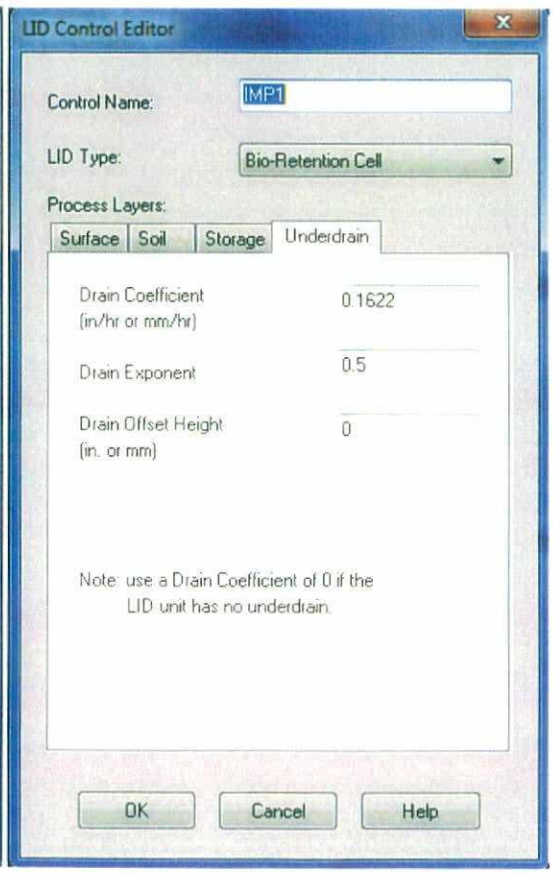
Property	Value
Name	IMP-1C
X-Coordinate	200.000
Y-Coordinate	500.000
Description	IMP C FLAT STREET
Tag	
Rain Gage	RAMONA
Outlet	out1
Area	0.01515
Width	11
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1 ...
Land Uses	0
Initial Buildup	NONE

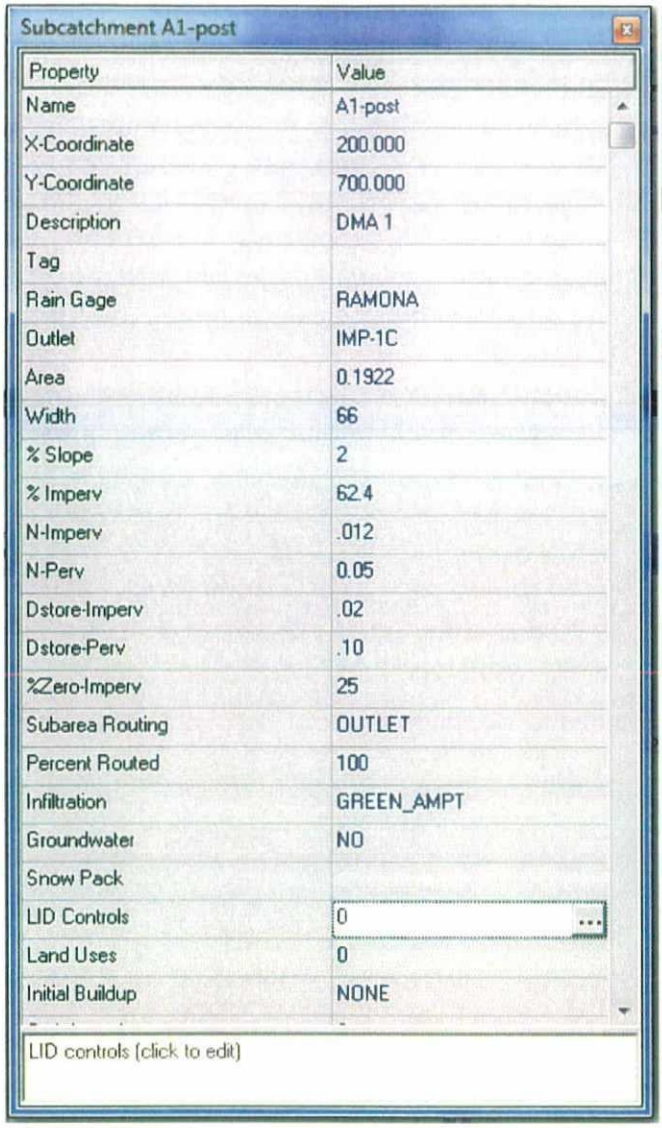
LID controls (click to edit)

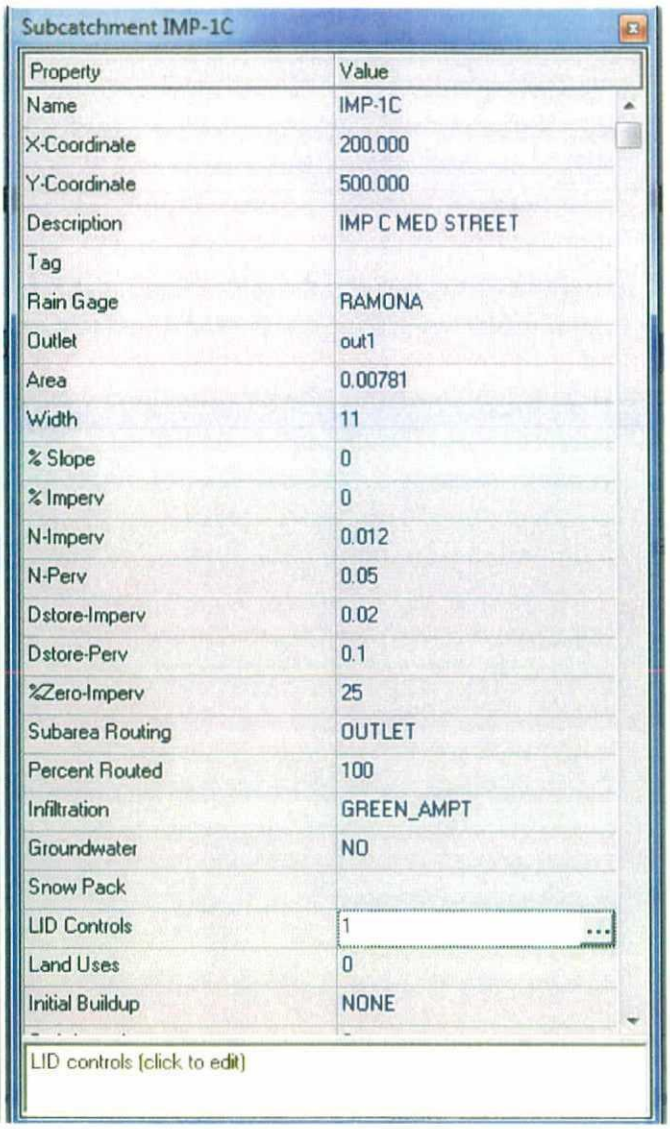

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Storage Depth (in. or mm) 10
Vegetation Volume Fraction 0.05
Surface Roughness (Mannings n) 0.05
Surface Slope (percent) 0
OK Cancel Help

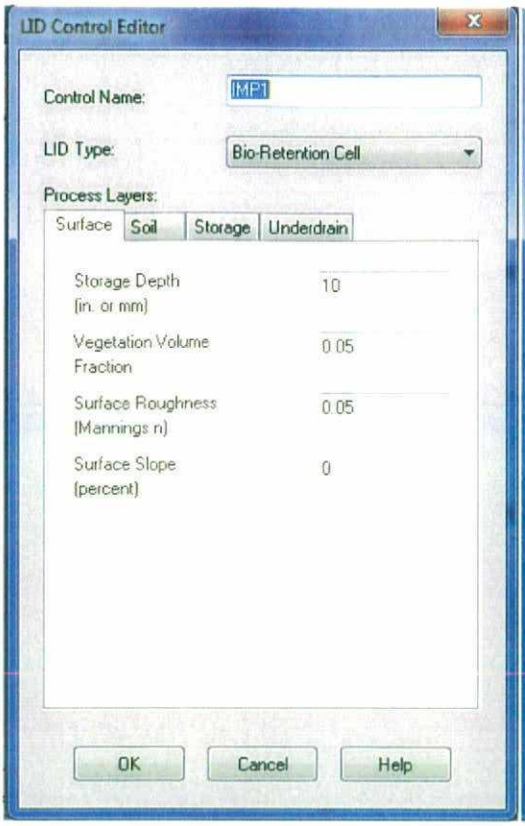

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Thickness (in. or mm) 18
Porosity (volume fraction) 0.4
Field Capacity (volume fraction) 0.2
Wilting Point (volume fraction) 0.1
Conductivity (in/hr or mm/hr) 5
Conductivity Slope 5
Suction Head (in. or mm) 1.5
OK Cancel Help

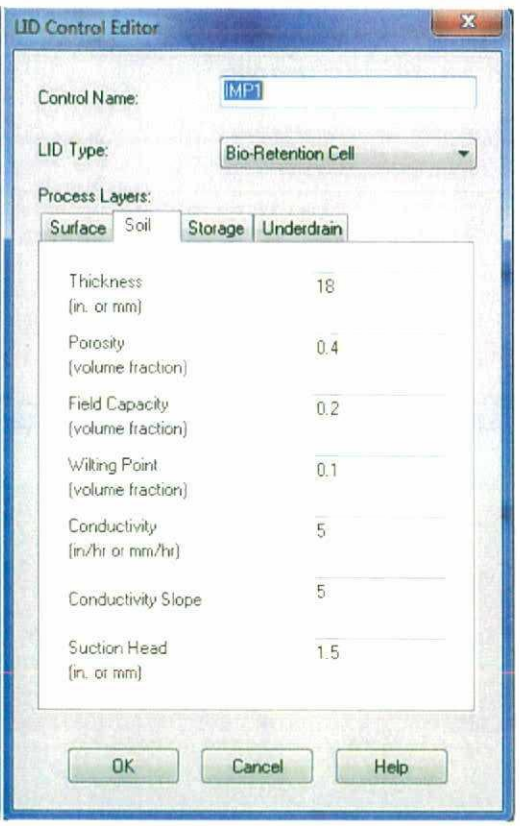

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Height (in. or mm) 18
Void Ratio (Voids / Solids) .67
Conductivity (in/hr or mm/hr) 0.20
Clogging Factor 0
Note: use a Conductivity of 0 if the LID unit has an impermeable bottom.
OK Cancel Help

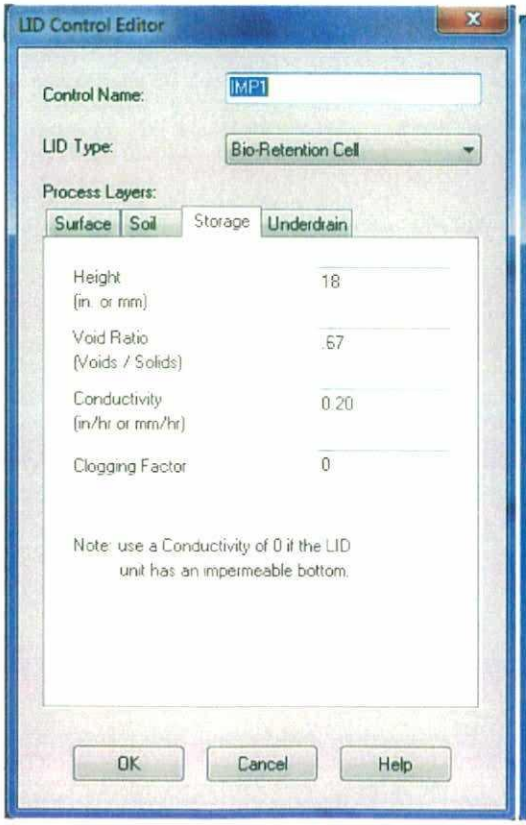

LID Control Editor
Control Name: IMP1
LID Type: Bio-Retention Cell
Process Layers:
Surface Soil Storage Underdrain
Drain Coefficient (in/hr or mm/hr) 0.1622
Drain Exponent 0.5
Drain Offset Height (in. or mm) 0
Note: use a Drain Coefficient of 0 if the LID unit has no underdrain.
OK Cancel Help

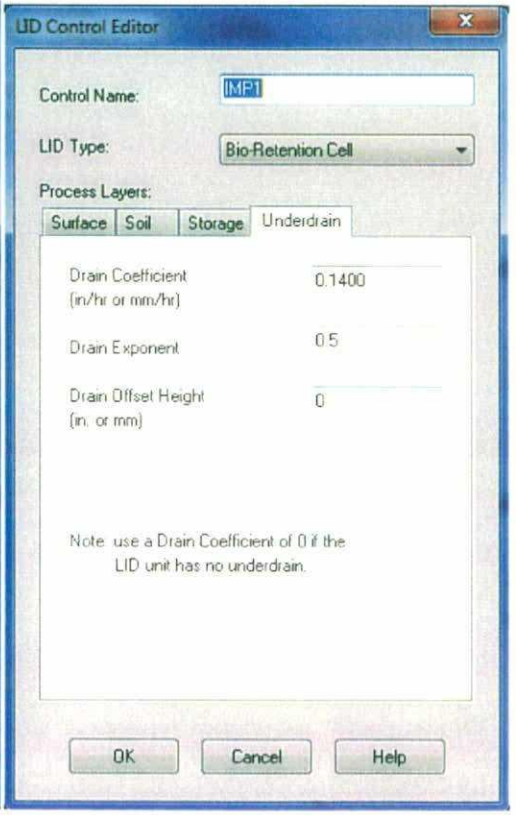

Subcatchment A1-post
Property
Value
Name
A1-post
X-Coordinate
200.000
Y-Coordinate
700.000
Description
DMA 1
Tag
Rain Gage
RAMONA
Outlet
IMP-1C
Area
0.1922
Width
66
% Slope
2
% Imperv
62.4
N-Imperv
.012
N-Perv
0.05
Dstore-Imperv
.02
Dstore-Perv
.10
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
0
Land Uses
0
Initial Buildup
NONE
LID controls (click to edit)


Subcatchment IMP-1C
Property
Value
Name
IMP-1C
X-Coordinate
200.000
Y-Coordinate
500.000
Description
IMP C MED STREET
Tag
Rain Gage
RAMONA
Outlet
out1
Area
0.00781
Width
11
% Slope
0
% Imperv
0
N-Imperv
0.012
N-Perv
0.05
Dstore-Imperv
0.02
Dstore-Perv
0.1
%Zero-Imperv
25
Subarea Routing
OUTLET
Percent Routed
100
Infiltration
GREEN_AMPT
Groundwater
NO
Snow Pack
LID Controls
1
Land Uses
0
Initial Buildup
NONE
LID controls (click to edit)


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
10
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0.05
Surface Slope
(percent)
0
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
.67
Conductivity
(in/hr or mm/hr)
0.20
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
0.1400
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
0
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel
Help

Subcatchment A1-post

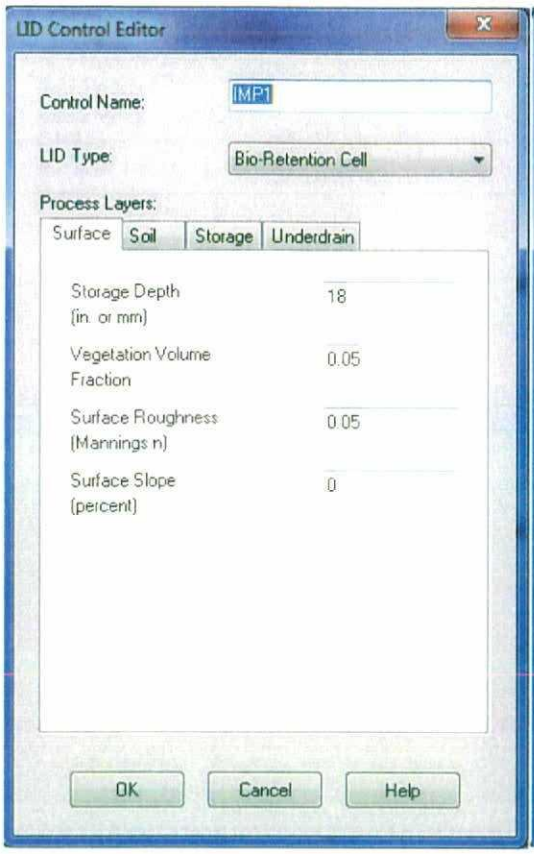
Property	Value
Name	A1-post
X-Coordinate	200.000
Y-Coordinate	700.000
Description	DMA 1 ...
Tag	
Rain Gage	RAMONA
Outlet	IMP-1C
Area	0.1945
Width	66
% Slope	2
% Imperv	41.1
N-Imperv	.012
N-Perv	0.05
Dstore-Imperv	.02
Dstore-Perv	.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE

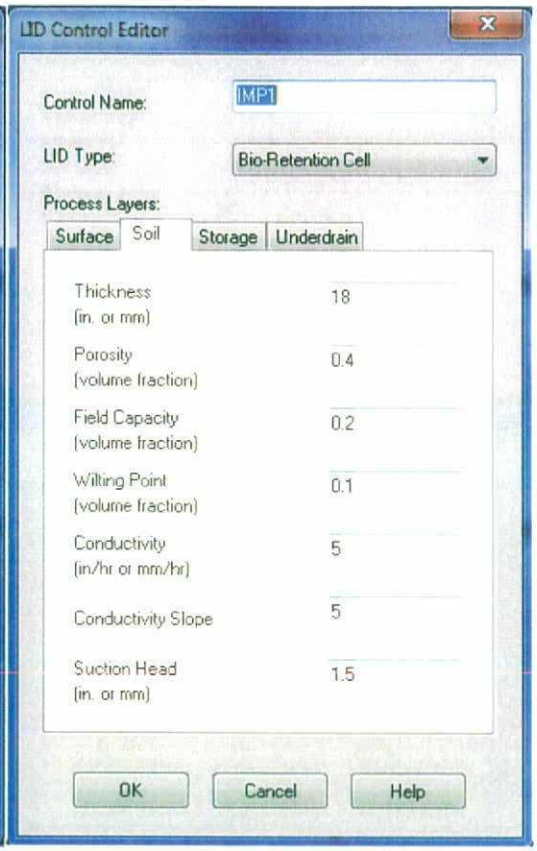
Optional comment or description

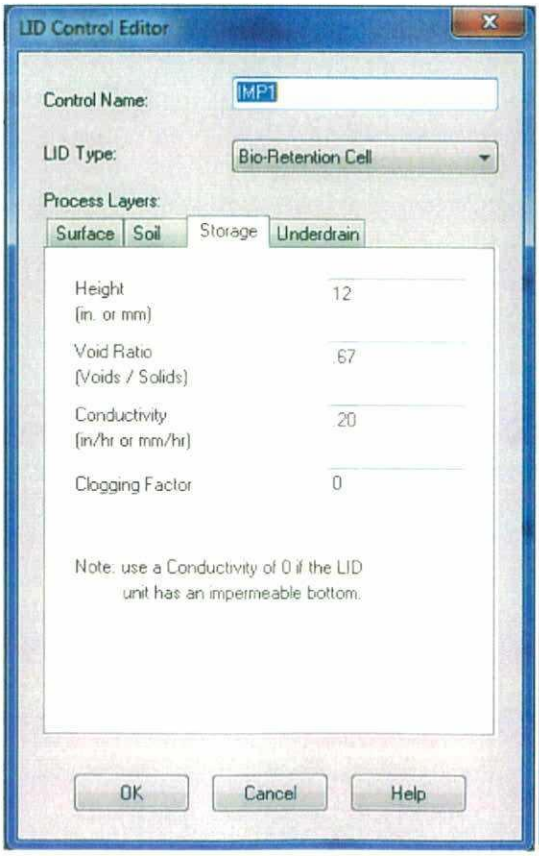
Subcatchment IMP-1C

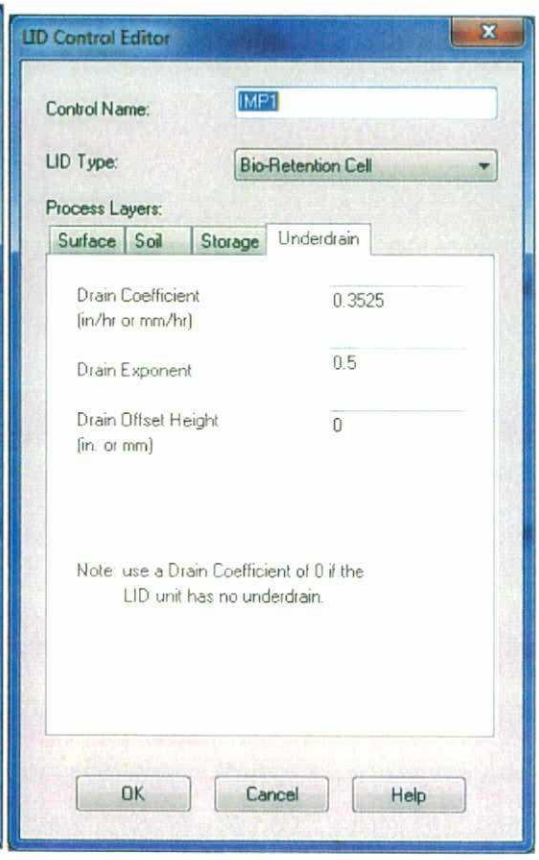
Property	Value
Name	IMP-1C
X-Coordinate	200.000
Y-Coordinate	500.000
Description	IMP C BACK
Tag	
Rain Gage	RAMONA
Outlet	out1
Area	0.00551
Width	11
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE

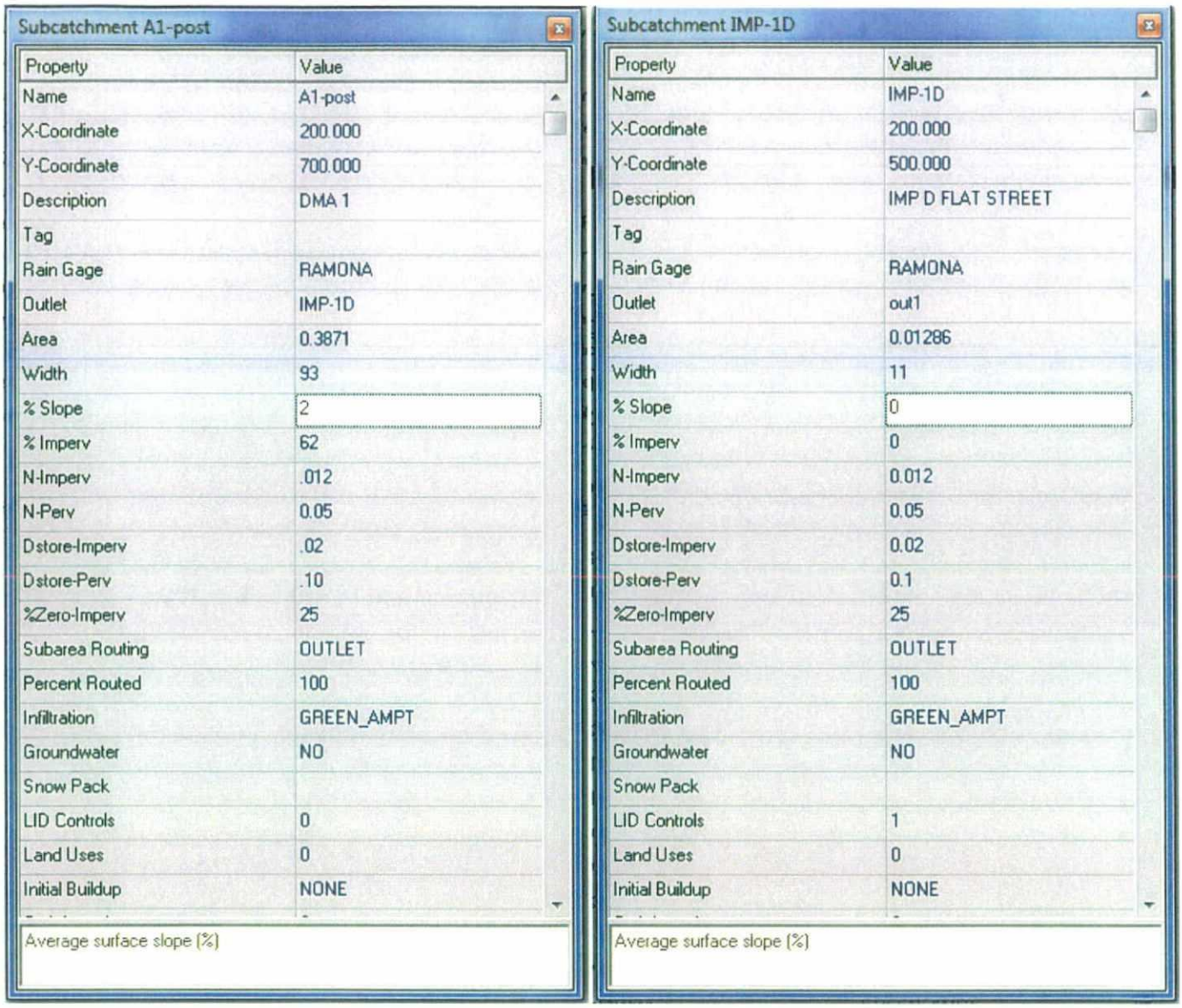
Average surface slope (%)


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
18
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0.05
Surface Slope
(percent)
0
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
12
Void Ratio
(Voids / Solids)
.67
Conductivity
(in/hr or mm/hr)
20
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
0.3525
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
0
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel
Help



Subcatchment A1-post

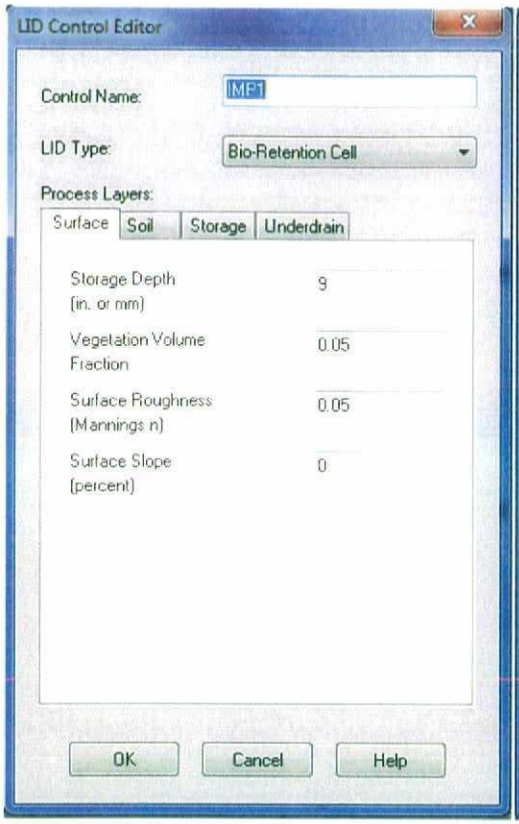
Property	Value
Name	A1-post
X-Coordinate	200.000
Y-Coordinate	700.000
Description	DMA 1
Tag	
Rain Gage	RAMONA
Outlet	IMP-1D
Area	0.3871
Width	93
% Slope	2
% Imperv	62
N-Imperv	.012
N-Perv	0.05
Dstore-Imperv	.02
Dstore-Perv	.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE

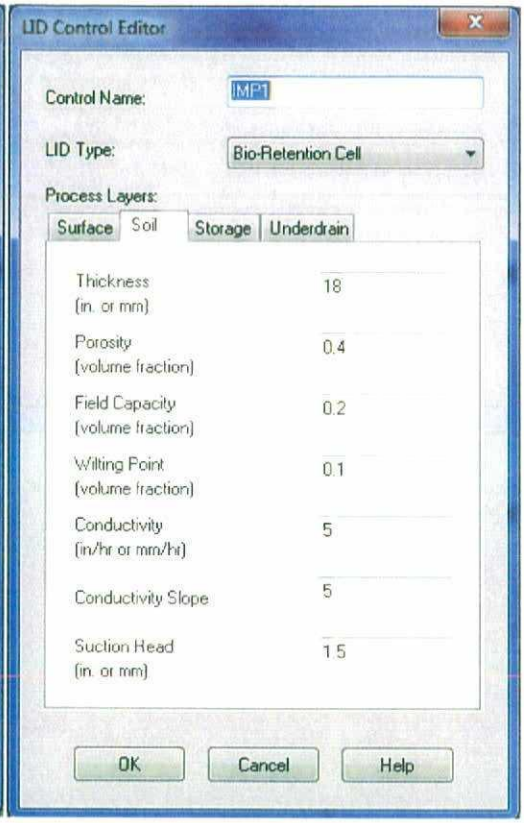
Average surface slope (%)

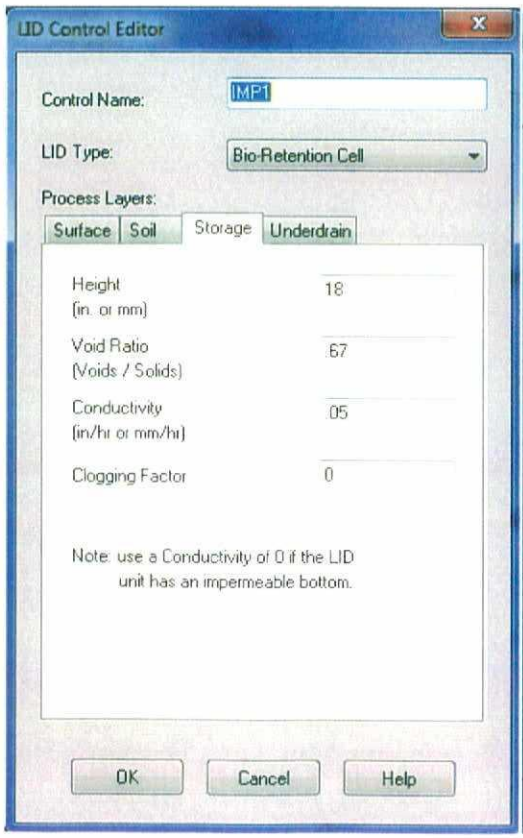
Subcatchment IMP-1D

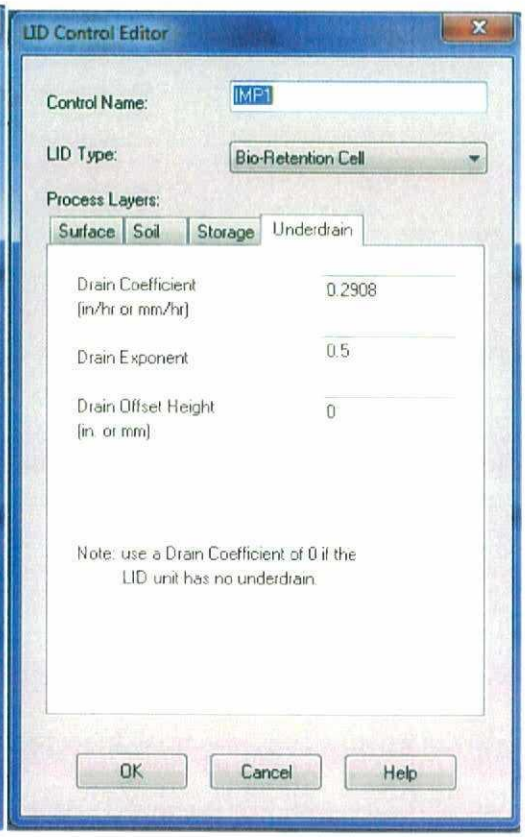
Property	Value
Name	IMP-1D
X-Coordinate	200.000
Y-Coordinate	500.000
Description	IMP D FLAT STREET
Tag	
Rain Gage	RAMONA
Outlet	out1
Area	0.01286
Width	11
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE

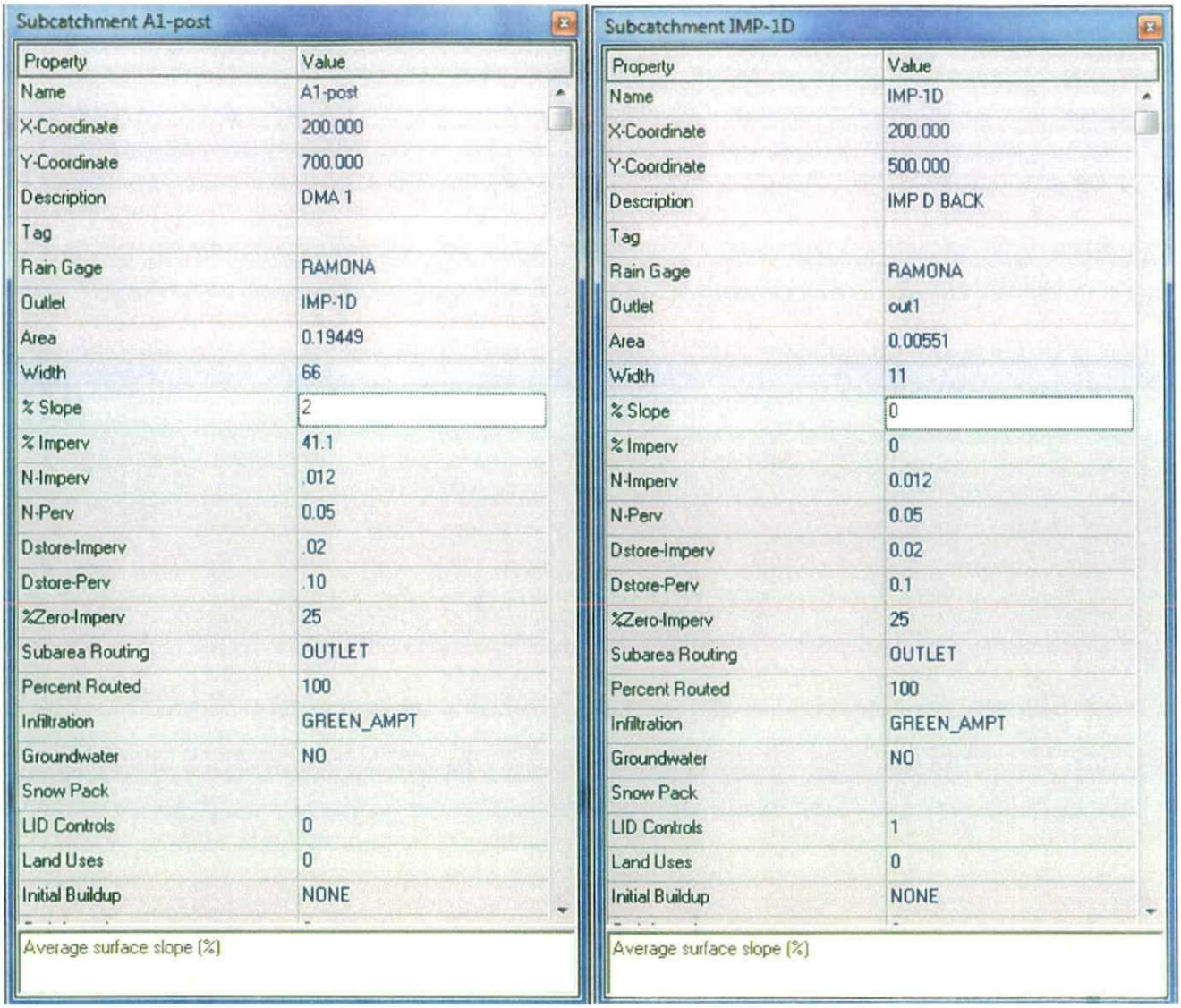
Average surface slope (%)


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
9
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0.05
Surface Slope
(percent)
0
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
18
Void Ratio
(Voids / Solids)
.67
Conductivity
(in/hr or mm/hr)
.05
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom.
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
0.2908
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
0
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel
Help



Subcatchment A1-post

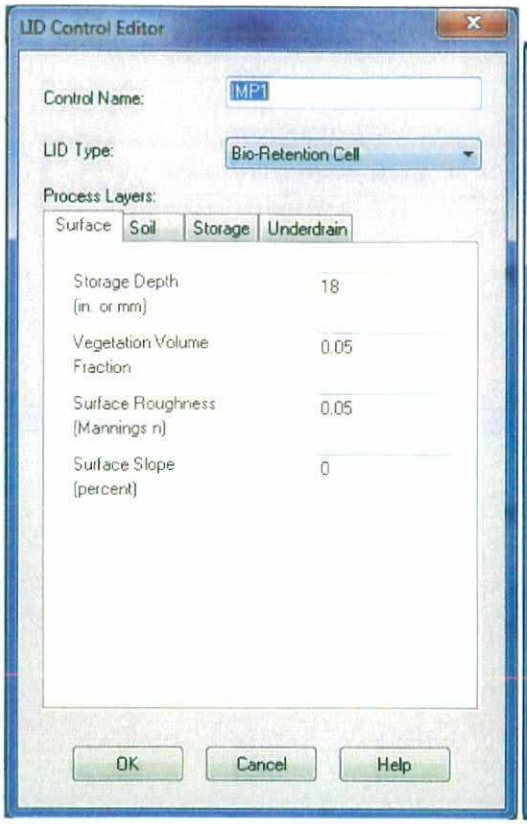
Property	Value
Name	A1-post
X-Coordinate	200.000
Y-Coordinate	700.000
Description	DMA 1
Tag	
Rain Gage	RAMONA
Outlet	IMP-1D
Area	0.19449
Width	66
% Slope	2
% Imperv	41.1
N-Imperv	.012
N-Perv	0.05
Dstore-Imperv	.02
Dstore-Perv	.10
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	0
Land Uses	0
Initial Buildup	NONE

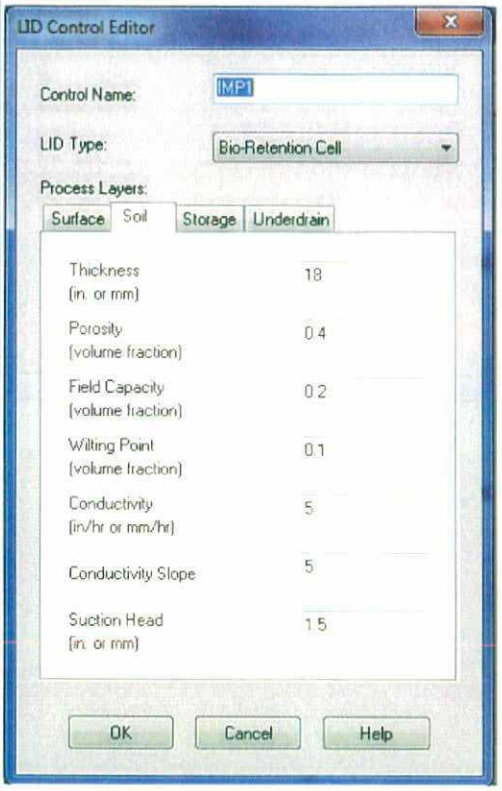
Average surface slope (%)

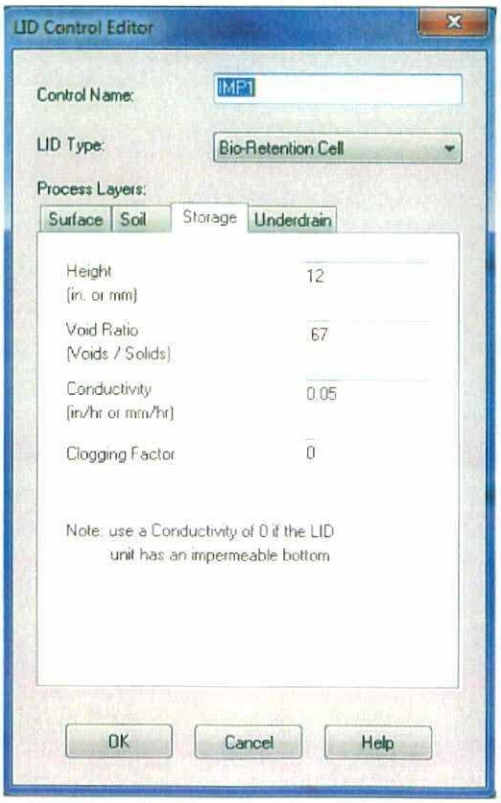
Subcatchment IMP-1D

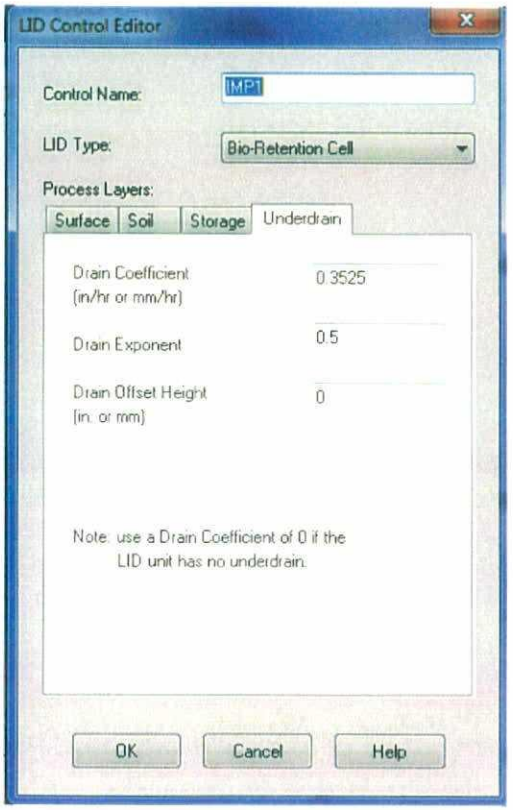
Property	Value
Name	IMP-1D
X-Coordinate	200.000
Y-Coordinate	500.000
Description	IMP D BACK
Tag	
Rain Gage	RAMONA
Outlet	out1
Area	0.00551
Width	11
% Slope	0
% Imperv	0
N-Imperv	0.012
N-Perv	0.05
Dstore-Imperv	0.02
Dstore-Perv	0.1
%Zero-Imperv	25
Subarea Routing	OUTLET
Percent Routed	100
Infiltration	GREEN_AMPT
Groundwater	NO
Snow Pack	
LID Controls	1
Land Uses	0
Initial Buildup	NONE

Average surface slope (%)


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Storage Depth
(in. or mm)
18
Vegetation Volume
Fraction
0.05
Surface Roughness
(Mannings n)
0.05
Surface Slope
(percent)
0
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Thickness
(in. or mm)
18
Porosity
(volume fraction)
0.4
Field Capacity
(volume fraction)
0.2
Wilting Point
(volume fraction)
0.1
Conductivity
(in/hr or mm/hr)
5
Conductivity Slope
5
Suction Head
(in. or mm)
1.5
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Height
(in. or mm)
12
Void Ratio
(Voids / Solids)
.67
Conductivity
(in/hr or mm/hr)
0.05
Clogging Factor
0
Note: use a Conductivity of 0 if the LID
unit has an impermeable bottom
OK
Cancel
Help


LID Control Editor
Control Name:
IMP1
LID Type:
Bio-Retention Cell
Process Layers:
Surface
Soil
Storage
Underdrain
Drain Coefficient
(in/hr or mm/hr)
0.3525
Drain Exponent
0.5
Drain Offset Height
(in. or mm)
0
Note: use a Drain Coefficient of 0 if the
LID unit has no underdrain.
OK
Cancel
Help

Attachment 10. CD with rainfall and model input files

B. Brown and Caldwell Calculator Modeling for Hydromodification Compliance for POC #2

INTRODUCTION

For POC 2 the Brown & Caldwell Calculator was selected for HMP management facility sizing. The numbers produced within this analysis only show the impact of the new impervious surfaces associated with the construction of Montecito Ranch Road. The other areas of ground disturbance (Parks, Equactrian Center. Wastewater Plant) within POC 2 will be close to 90% percent pervious and will manage water quality and peak flows by incorporating Self-retaining areas at the required 1 to 1 ratio.

Project Summary

Project Name	MONTECITO RANCH
Project Applicant	REC CONSULTANTS
Jurisdiction	County of San Diego
Parcel (APN)	000-00-00
Hydrologic Unit	San Dieguito

Compliance Basin Summary

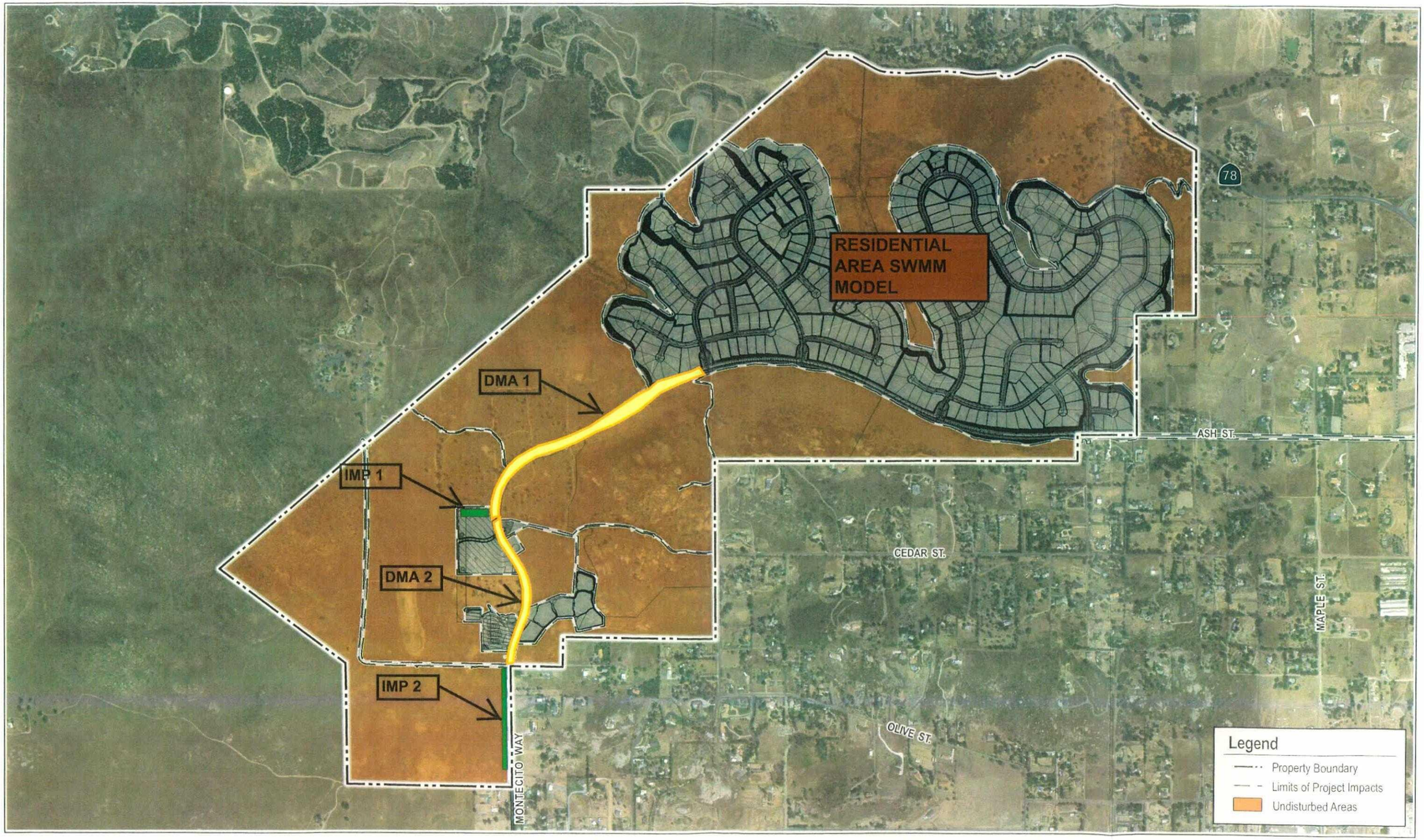
Basin Name:	MONTECITO RANCH BASIN
Receiving Water:	NATURAL CREEKS
Rainfall Basin	Lake Wohlford
Mean Annual Precipitation (inches)	20.0
Project Basin Area (acres):	6.00
Watershed Area (acres):	0.00
SCCWRP Lateral Channel Susceptiblity (H, M, L):	
SCCWRP Vertifical Channel Susceptiblity (H, M, L):	
Overall Channel Susceptibility (H, M, L):	HIGH
Lower Flow Threshold (% of 2-Year Flow):	0.1

Drainage Management Area Summary

ID	Type	BMP ID	Description	Area (ac)	Pre-Project Cover	Post Surface Type	Drainage Soil	Slope
28101	Drains to LID	BMP 1	DMA 1 - ROAD	2.7	Pervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Flat - slope (less ...
28102	Drains to LID	BMP 1	DMA 1 SLOPES	0.7	Pervious (Pre)	Landscaping	Type D (high runoff - clay soi...	
28103	Drains to LID	BMP 2	DMA 2 ROAD	1.7	Pervious (Pre)	Concrete or asphalt	Type D (high runoff - clay soi...	Flat - slope (less ...
28104	Drains to LID	BMP 2	DMA 2 SLOPES	0.00	Pervious (Pre)	Landscaping	Type D (high runoff - clay soi...	Flat - slope (less ...

LID Facility Summary

BMP ID	Type	Description	Plan Area (sqft)	Volume 1(cft)	Volume 2(cft)	Orifice Flow (cfs)	Orifice Size (inch)
BMP 1	Bioretention	BIORETENTION IN PARK	9582	7981	5749	0.085	2.00
BMP 2	Bioretention	BIORETENTION NEXT TO ROAD	7405	6168	4443	0.043	1.00

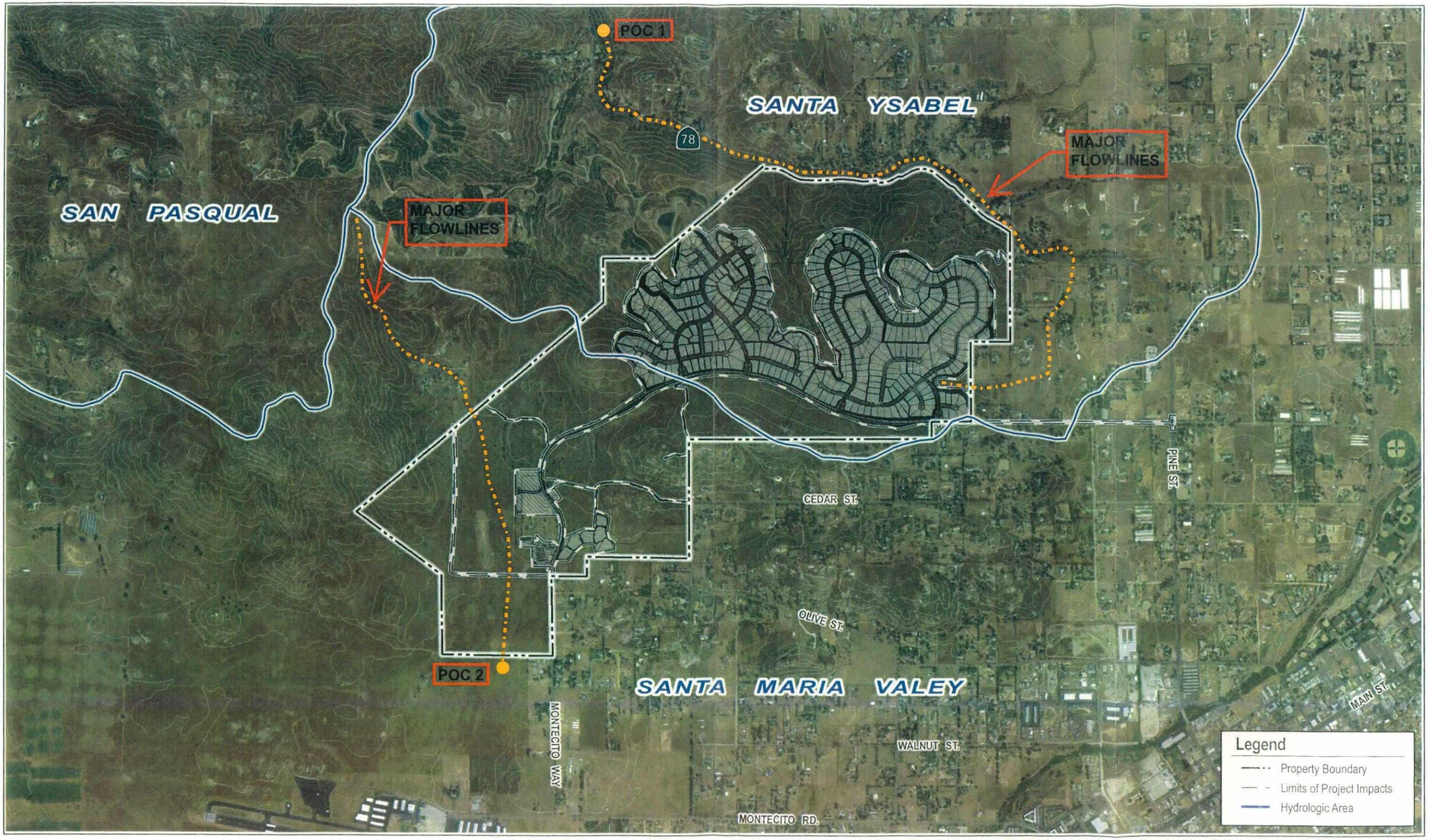


R·E·C Consultants, Inc. | Site Plan

MONTECITO RANCH

Feet 0 500 1,000

Aerial Source: Google 2010 | April 2013



R·E·C Consultants, Inc. | Site Plan | MONTECITO RANCH

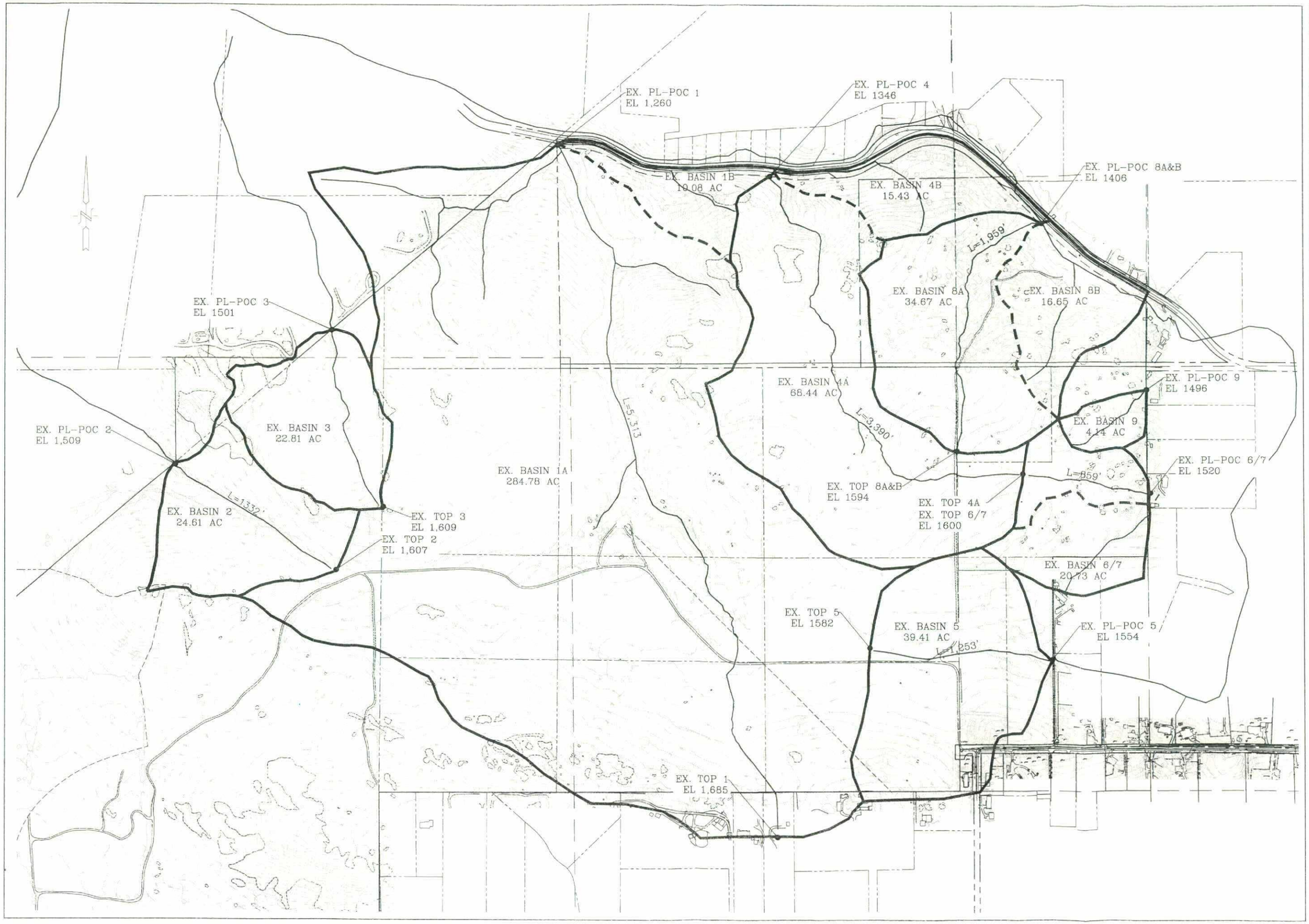
POC MAP

0 750 1,500 Feet

Aerial Source: Google, 2010 | June 2013

ATTACHMENT I

Drainage Maps



NO.	DESCRIPTION	DATE	APP'D

REVISIONS

EXISTING HYDROLOGY MAP

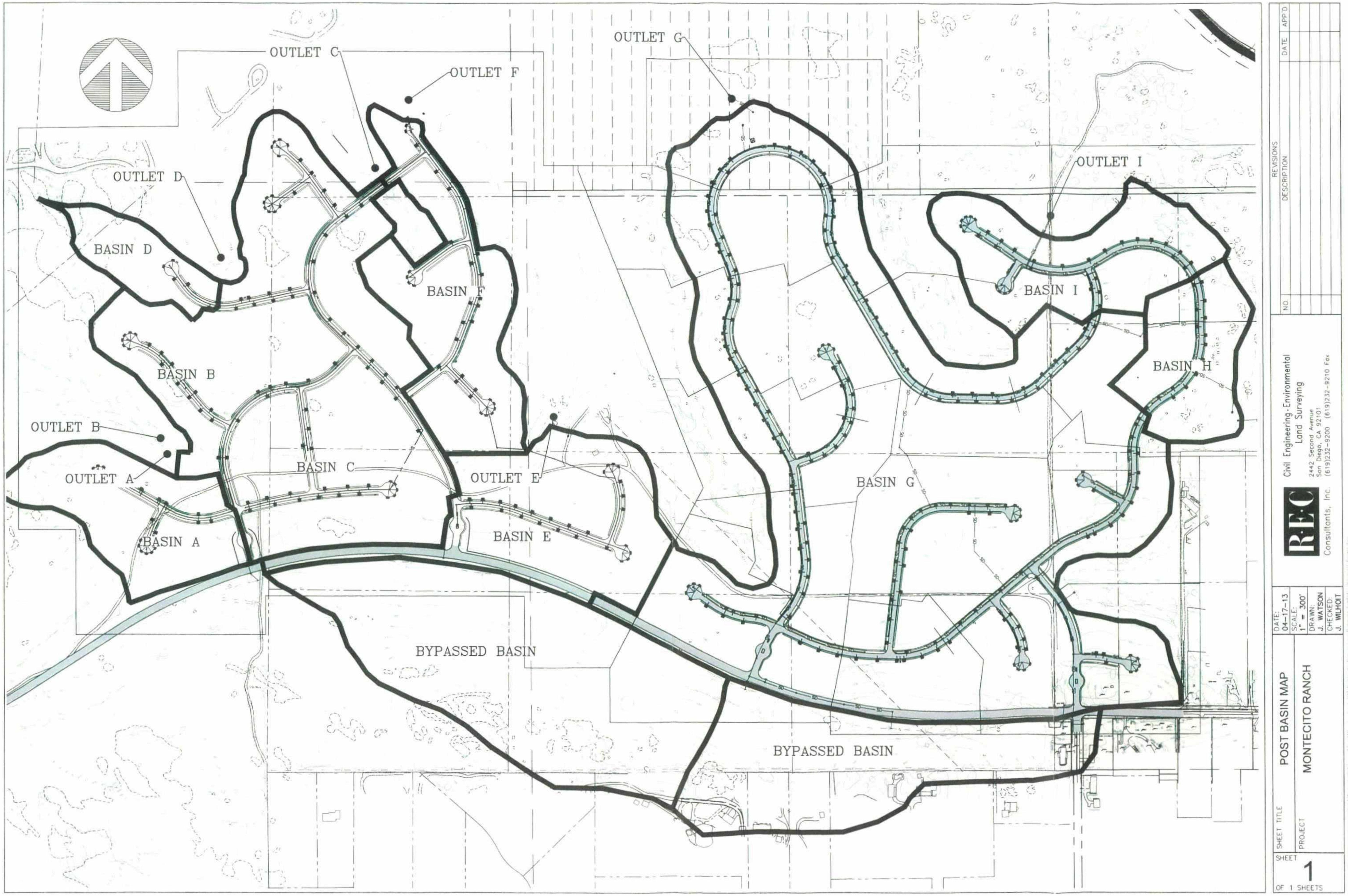
R·E·C Consultants, Inc.
Civil Engineering · Environmental
Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232-9200 (619)232-9210 Fax

DATE: 04-17-13
SCALE: 1" = 300'
DRAWN: J. WATSON
CHECKED: J. WILHOIT

SHEET TITLE: EXISTING HYDROLOGY MAP

PROJECT: MONTECITO RANCH

SHEET 1 OF 1
OF 1 SHEETS



OUTLET C
OUTLET F
OUTLET G
OUTLET D
OUTLET I
BASIN D
BASIN F
BASIN I
BASIN B
BASIN H
OUTLET B
BASIN C
OUTLET E
BASIN G
OUTLET A
BASIN A
BASIN E
BYPASSED BASIN
BYPASSED BASIN
REVISIONS
NO.
DESCRIPTION
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APP'D
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SHEET
1
OF 1 SHEETS

ATTACHMENT J
HMP Exemption Documentation
(if applicable)

ATTACHMENT K

Addendum