

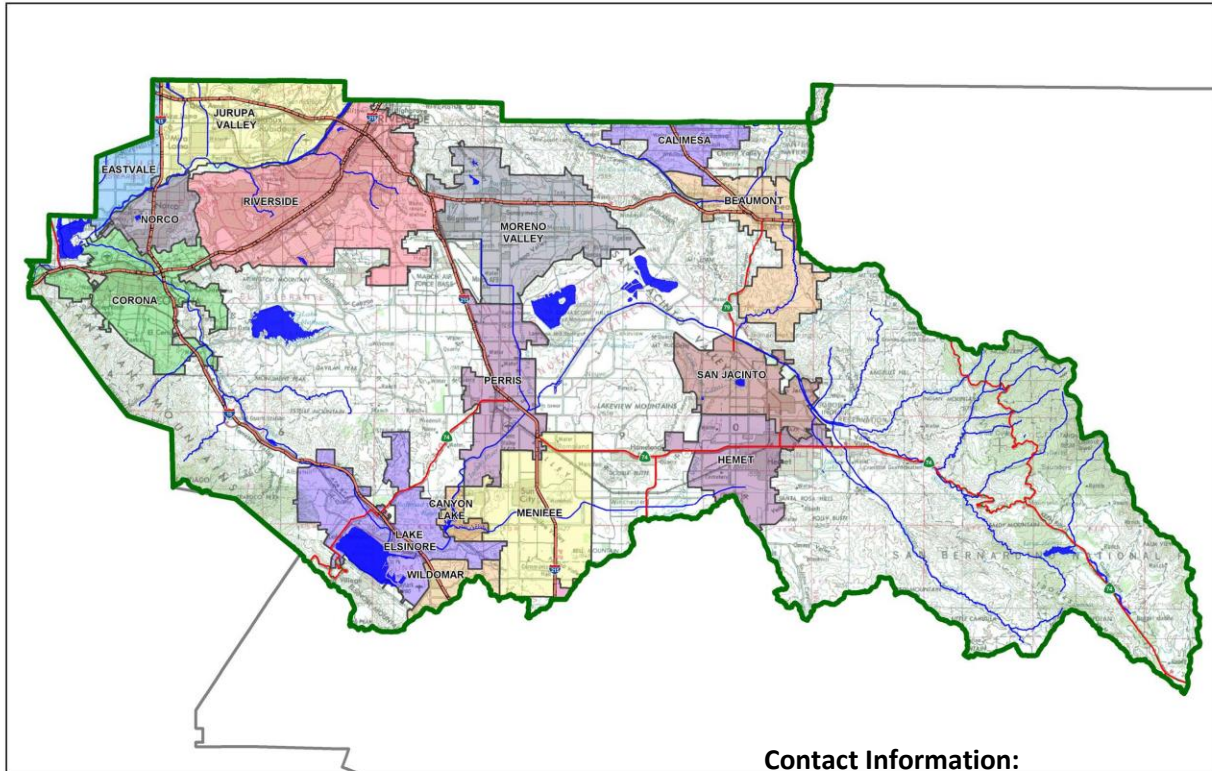
Final Project Specific Water Quality Management Plan

A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County

Project Title: Cottonwood Avenue Site

Development No:

Design Review/Case No:



Contact Information:

- Preliminary
- Final

Original Date Prepared: 11-11-20

Revision Date(s):

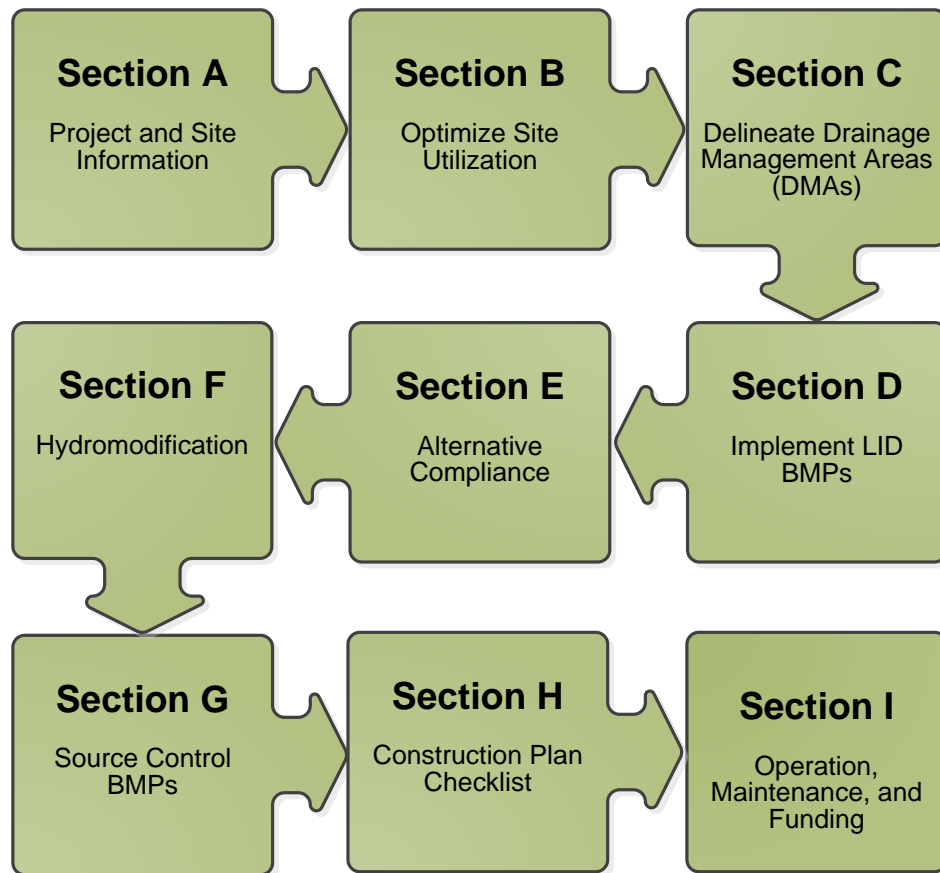
*Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016*

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A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your “how-to” manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for West Coast Inland Partners IV, LLC, by Mayers and Associates for the Cottonwood Project (Tract 37881) project.

This WQMP is intended to comply with the requirements of City of Hemet for Hemet Water Quality Ordinance (Municipal Code Section 14-471, et seq.) which includes the requirement for the preparation and implementation of a Project Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Hemet Water Quality Ordinance (Municipal Code Section 14-471 et seq.).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature

Date

Owner's Printed Name

Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature

Date

Dru J. Mayers

Preparer's Printed Name

Civil Engineer

Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Single Family Residential Development
Planning Area:	Low Density Residential (RC-LDR)
Community Name:	San Jacinto
Development Name:	Cottonwood Avenue Site
PROJECT LOCATION	
Latitude & Longitude (DMS):	33°47'23.89"N, 117°00'43.84"W
Project Watershed and Sub-Watershed:	Santa Ana Watershed
Gross Acres:	40.1 acres
APN(s):	432-130-006, 432-130-007
Map Book and Page No.:	Book 436, page 17
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Residential/Open Space
Proposed or Potential SIC Code(s)	1521
Area of Impervious Project Footprint (SF)	1,745,336
Total Area of <u>proposed</u> Impervious Surfaces within the Project Footprint (SF)/or Replacement	1,745,336
Does the project consist of offsite road improvements?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Does the project propose to construct unpaved roads?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Is the project part of a larger common plan of development (phased project)?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
EXISTING SITE CHARACTERISTICS	
Total area of <u>existing</u> Impervious Surfaces within the Project limits Footprint (SF)	0
Is the project located within any MSHCP Criteria Cell?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
If so, identify the Cell number:	n/a
Are there any natural hydrologic features on the project site?	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
Is a Geotechnical Report attached?	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	n/a
What is the Water Quality Design Storm Depth for the project?	85 th percentile = 0.68

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

Narrative Project Description:

The site is situated at the northern portion of Cottonwood Avenue within an undeveloped terrain at the NE corner of Cawston Avenue and Cottonwood Avenue. The subject property is surrounded by agricultural terrain to the west sides, undeveloped terrain on the north side and east side and an existing school on the south side. The site is in the south portion of the San Jacinto River Subwatershed jurisdiction Santa Ana Regional Water Quality Control Board (SARWQCB).

Existing Condition:

The existing terrain is currently vacant raw portion of land covered with grass and shrubs all around the site. The site currently drains northwest at an average rate of 0.33% unmitigated towards Cawston Avenue. Existing conditions is 100% pervious. There is no existing storm drain system onsite and the project does not take on additional run-on from existing slopes south of the project.

Proposed Condition:

The proposed project includes the subdivision of the two parcels via a tentative tract map (No. 37881) construction of 194 single-family detached residences, onsite roadways, a detention basin, and a park/open space area on the site, as shown in Figure 5, *Proposed Site Plan*.

The residential lots would be a minimum of 4,500 square feet. The proposed project includes 194 single-family residences within 22.68 net acres, which would result in 8.6 units per net acre. Residential structures would be 1 or 2 stories in height with a maximum height of 28 feet. Residences would range in floor area size from 1,600 square feet to 2,800 square feet. Consistent with the 2019 CA Building Energy Efficiency Standards (Title 24 Part 6), the proposed project would include photovoltaic (PV) solar panels on the rooftop of each residence to offset its energy demand.

DMA A is 36.8 AC, which is the majority of the project and drain to a bio-retention basin for DMA A on the north west side of the project. Majority of DMA A consist of single family residential developments, parks and a roundabout with encompassing roads.

DMA B is 1.8 AC, which is located south of the project and drains along the projects frontage along Cottonwood Avenue. Majority of DMA B consist of an existing half street along Cottonwood Avenue. Since the majority of DMA B is already developed water draining towards the half street of Cottonwood will keep its existing flow path head west along Cottonwood unmitigated. Treatment for the half street on Cottonwood will be treated down the line as the master drainage facilities get built.

DMA C is 1.41 AC, which is located west of the project and drains along the projects frontage along Cawston Avenue. Majority of DMA C consist of an existing dirt road along Cawston Avenue. Treatment for the half street on Cawston Avenue will be treated down the line as the master drainage facilities get built.

All pocket parks throughout the project site will be self-treating.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
San Jacinto River Reach 4	None	AGR, GWR, REC 1, REC 2, WARM, WILD	Not a RARE designation
Canyon Lake	Nutrients, Pathogens	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	Not a RARE waterbody
San Jacinto River Reach 1	None	AGR, GWR, REC 1, REC 2, WARM, WILD	Not a RARE designation
Lake Elsinore	Nutrients, Organic Compounds/Oxygen demanding substances, Sediment/Turbidity, Unknown Toxicity	REC1, REC2, EST, WILD, RARE, MAR, MIGR, SPWN	Not a RARE waterbody

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
US Army Corps of Engineers, CWA Section 404 Permit	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Statewide Construction General Permit Coverage	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
Statewide Industrial General Permit Coverage	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	<input type="checkbox"/> Y	<input checked="" type="checkbox"/> N
Other (please list in the space below as required)	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N
City of San Jacinto Grading and Improvement Permits		

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The proposed project will be the same as the already existing drainage patterns. The drainage flow is usually to the north/northwest.

Did you identify and protect existing vegetation? If so, how? If not, why?

Existing vegetation was protected optimally to assure as much pervious area as possible.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

In the soils report dated January 22, 2020 the soil where the proposed basins were to be located were deemed to have very low infiltration rates but it is recommended to use bioretention basins to allow for an engineered infiltration to the absorbent portion of soil under the surface.

Did you identify and minimize impervious area? If so, how? If not, why?

The proposed project has incorporated pervious areas, landscaping and natural open space areas to reduce impervious areas.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Runoff from various impervious areas, such as run-off from roofs and sidewalks will disperse into surrounding landscaping before discharging into the storm drains. Open space and bioswales are proposed and throughout the entire project and can be found on the WQMP site plan.

The project will utilize a combination of onsite source control and site design BMPs supplemented with primary treatment control BMPs prior to discharging into the MS4 system.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s) ¹²	Area (Sq. Ft.)	DMA Type
A	Mixed Surface	1,605,559	Type D
B	Mixed Surface	78,173	Type D
C	Mixed Surface	61,604	Type D

¹Reference Table 2-1 in the WQMP Guidance Document to populate this column

²If multi-surface provide back-up

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

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

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet)	Storm Depth (inches)	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches)
		[A]	[B]			[D]

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

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

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

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

DMA Name or ID	BMP Name or ID
A	Bio-filtration Basin

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream ‘Highest and Best Use’ for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? Y N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream ‘Highest and Best Use’ feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermitee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? Y N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site...	YES	NO
...have any DMAs with a seasonal high groundwater mark shallower than 10 feet? If Yes, list affected DMAs:		X
...have any DMAs located within 100 feet of a water supply well? If Yes, list affected DMAs:		X
...have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact? If Yes, list affected DMAs:		X
...have measured in-situ infiltration rates of less than 1.6 inches / hour? If Yes, list affected DMAs:	X	
...have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface? If Yes, list affected DMAs:		X
...geotechnical report identify other site-specific factors that would preclude effective and safe infiltration? Describe here: Low infiltration rates at basins don't allow natural infiltration to be feasible.	X	

If you answered “Yes” to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment (N/A)

Please check what applies:

- Reclaimed water will be used for the non-potable water demands for the project.
- Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).
- The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: 27.8 acres

Type of Landscaping (Conservation Design or Active Turf): Conservation Design

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 28.1 acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: $0.87'' = 2.22$

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: $28.1 \text{ acres} \times 2.22 = 62.4 \text{ acres}$

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
62.4 acres	28.1 acres

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 1416 users(354 units x 4 residents/units)

Project Type: Residential

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 28.1 acres

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number of toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 0.87 = 141

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 141(28.1 AC) = 3,962 users

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
3,962	1416

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

n/a

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: n/a

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: n/a

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: n/a

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: n/a

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
n/a	n/a

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

- LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).
- A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

DMA-B & DMA-C are half street portions of Cottonwood Avenue and Cawston Avenue respectively. Both will be treat at a later date once the master drainage facilities get built down the line. Both DMA-B and DMA-C continue on their existing drainage path matching existing conditions.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First, calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second, design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas \times Runoff Factor	DMA A – Extended retention Basin		
	[A]		[B]	[C]	[A] x [C]			
A	400620	Roof	1	0.89	356,551	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
A	462,903	Asphalt and concrete	1	0.89	411,983			
A	742036	Landscape	.10	0.11	81,624			
	1,605,559				850,158	0.68	$[F] = \frac{[D] \times [E]}{12}$ A: 48,176	A:50,355

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- Or -

The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

List DMAs here.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
<input checked="" type="checkbox"/> Detached Residential Development	P	N	P	P	N	P	P	P
<input checked="" type="checkbox"/> Attached Residential Development	P	N	P	P	N	P	P	P ⁽²⁾
<input type="checkbox"/> Commercial/Industrial Development	P ⁽³⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁵⁾	P ⁽¹⁾	P	P
<input type="checkbox"/> Automotive Repair Shops	N	P	N	N	P ^(4, 5)	N	P	P
<input type="checkbox"/> Restaurants (>5,000 ft ²)	P	N	N	N	N	N	P	P
<input type="checkbox"/> Hillside Development (>5,000 ft ²)	P	N	P	P	N	P	P	P
<input type="checkbox"/> Parking Lots (>5,000 ft ²)	P ⁽⁶⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁴⁾	P ⁽¹⁾	P	P
<input type="checkbox"/> Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

P = Potential

N = Not Potential

⁽¹⁾ A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

⁽²⁾ A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

⁽³⁾ A potential Pollutant is land use involving animal waste

⁽⁴⁾ Specifically petroleum hydrocarbons

⁽⁵⁾ Specifically solvents

⁽⁶⁾ Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage ²
N/A	N/A
<i>Total Credit Percentage</i> ¹	N/A

¹Cannot Exceed 50%

²Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I _f	DMA Runoff Factor	DMA Area x Runoff Factor	Enter BMP Name / Identifier Here			
	[A]		[B]	[C]	[A] x [C]				
N/A									
						<i>Design Storm Depth (in)</i>	<i>Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)</i>	<i>Total Storm Water Credit % Reduction</i>	<i>Proposed Volume or Flow on Plans (cubic feet or cfs)</i>
	$A_T = \sum[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D] \times [E]}{[G]}$	$[F] \times (1 - [H])$	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High:** equal to or greater than 80% removal efficiency
- **Medium:** between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID ¹	Priority Pollutant(s) of Concern to Mitigate ²	Removal Efficiency Percentage ³
N/A		

¹ Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

² Cross Reference Table E.1 above to populate this column.

³ As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermitttee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? Y N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration¹ of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? Y N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	Post-condition	% Difference
Time of Concentration	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (Cubic Feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE

¹ Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? Y N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

The project runoff will be conveyed sheet flowing through Cawston Avenue which is a city maintained street. Sheet flow from Cawston head north over the canal bridge and to wet ponds northwest of Cawston. Per the master drainage map, water ultimately head towards Canyon Lake, which is an adequate sump that is exempt from hydromodification. Since all avenues for runoff travels through an engineered and maintained channel or street the project can be deemed HCOC exempt. (See receiving waters exhibit on appendix 1)

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

- a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.
- b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.
- c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and “housekeeping”, that must be implemented by the site’s occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. **Identify Pollutant Sources:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.
2. **Note Locations on Project-Specific WQMP Exhibit:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.
3. **Prepare a Table and Narrative:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.
4. **Identify Operational Source Control BMPs:** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Makers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	Maintain and periodically repaint or replace inlet markings. Provide stormwater pollution prevention information to new site owners, residential owners and operators (HOA). See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance”, in the

	Flo Gard Catch Basin Insert Filter curb Inlet Style, and combination style will be used in catch basins.	CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Include the following in CC&R's: "Owner shall not allow anyone to discharge anything to storm drains or to store deposit materials so as to create a potential discharge to storm drains.
Need for future indoor & structural pest control	Note building design features that discourage entry of pests.	Provide Integrated Pest Management information to owners and operators.
Landscape/Outdoor Pesticide Use	<p>Preserve, existing native trees, shrubs, and ground cover to the maximum extent possible.</p> <p>Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.</p> <p>Where landscaping areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.</p> <p>Consider using pest-resistant plants, especially to hardscape. To insure successful establishments, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.</p>	<p>Maintain landscaping using minimum or no pesticides.</p> <p>Provide IPM information to new owners and operators.</p>
Fire Sprinkler Test Water	Provide means to drain fire sprinkler to sanitary sewer.	See CASQA Fact Sheet SC-41.
Plazas, sidewalks and parking lots		Sweep regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into storm drain system. Collect wash water containing any agent or degreaser and discharge to

		sanitary sewer not to a storm drain.
--	--	--------------------------------------

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

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

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Property Owner West Coast Inland Partners until Transfer to HOA.

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

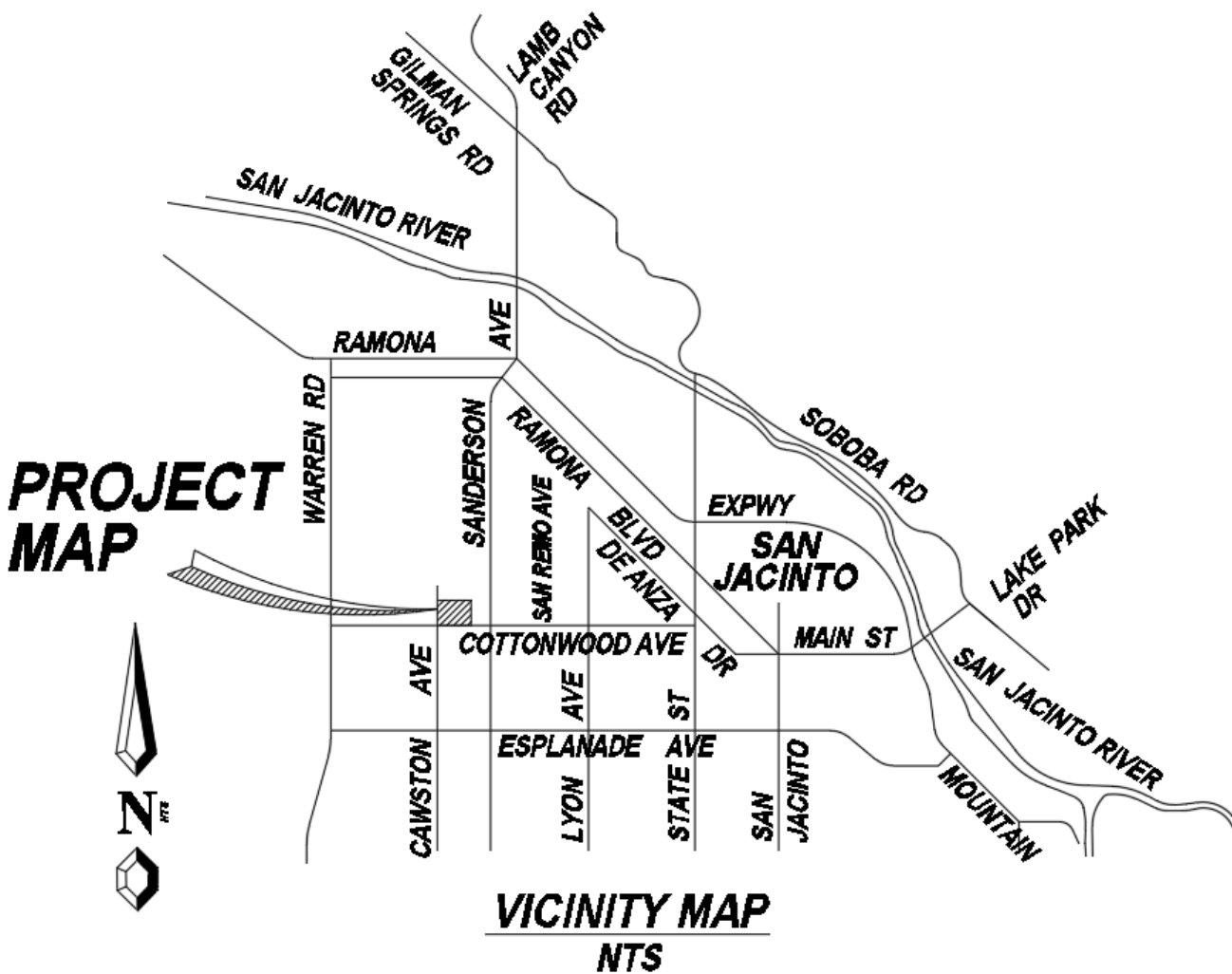
Y N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

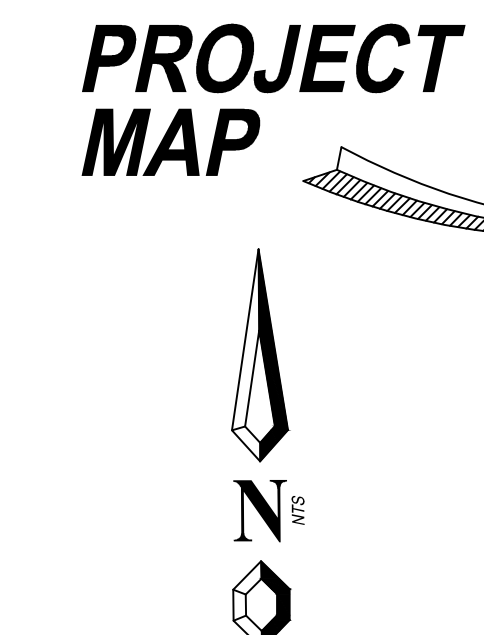
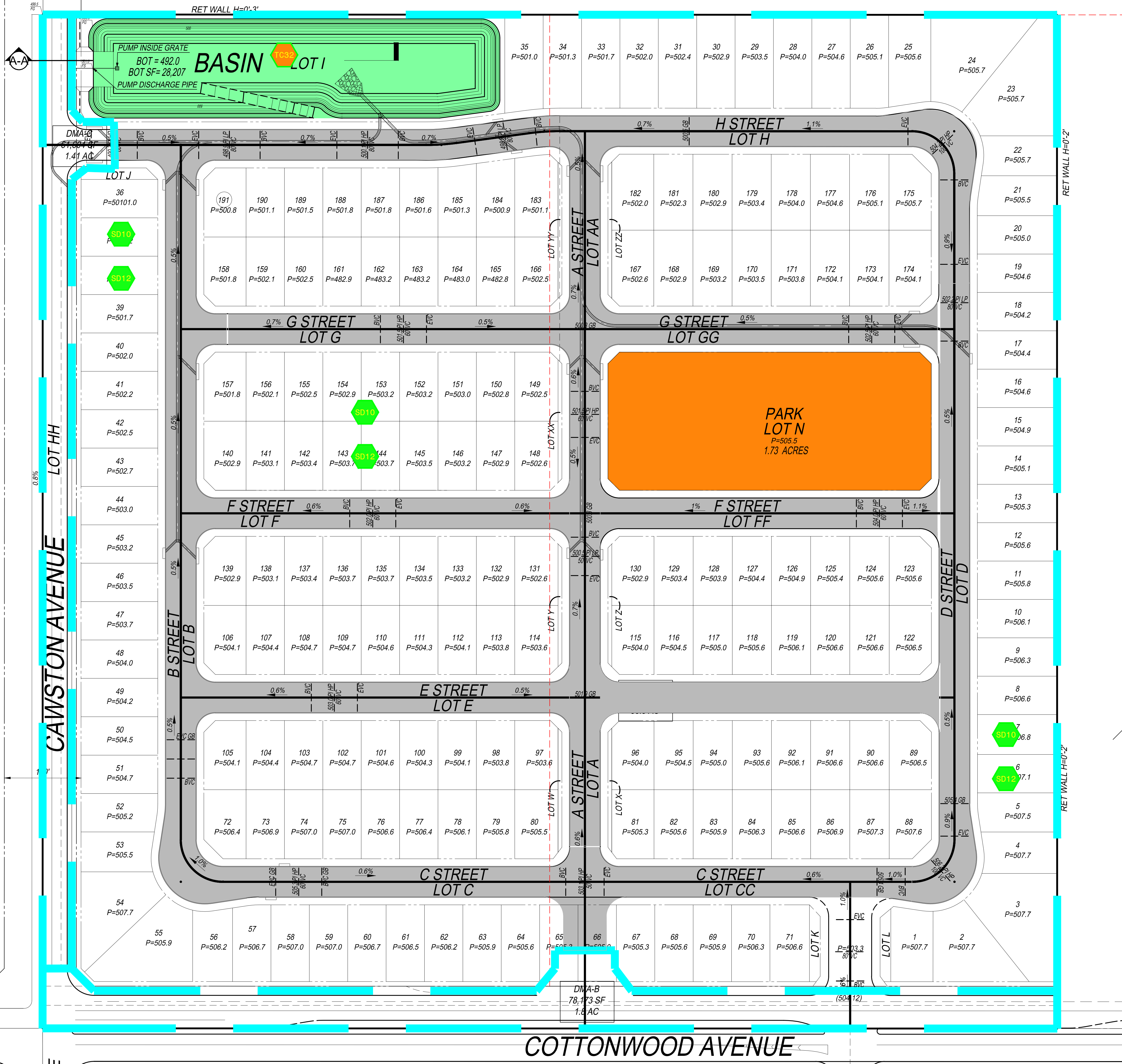
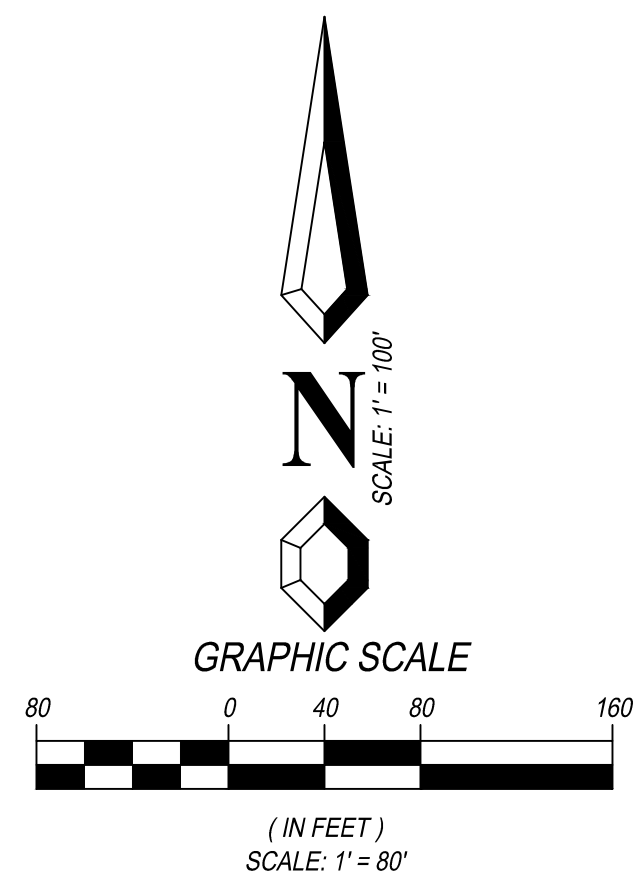
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Appendix 1 Vicinity Map

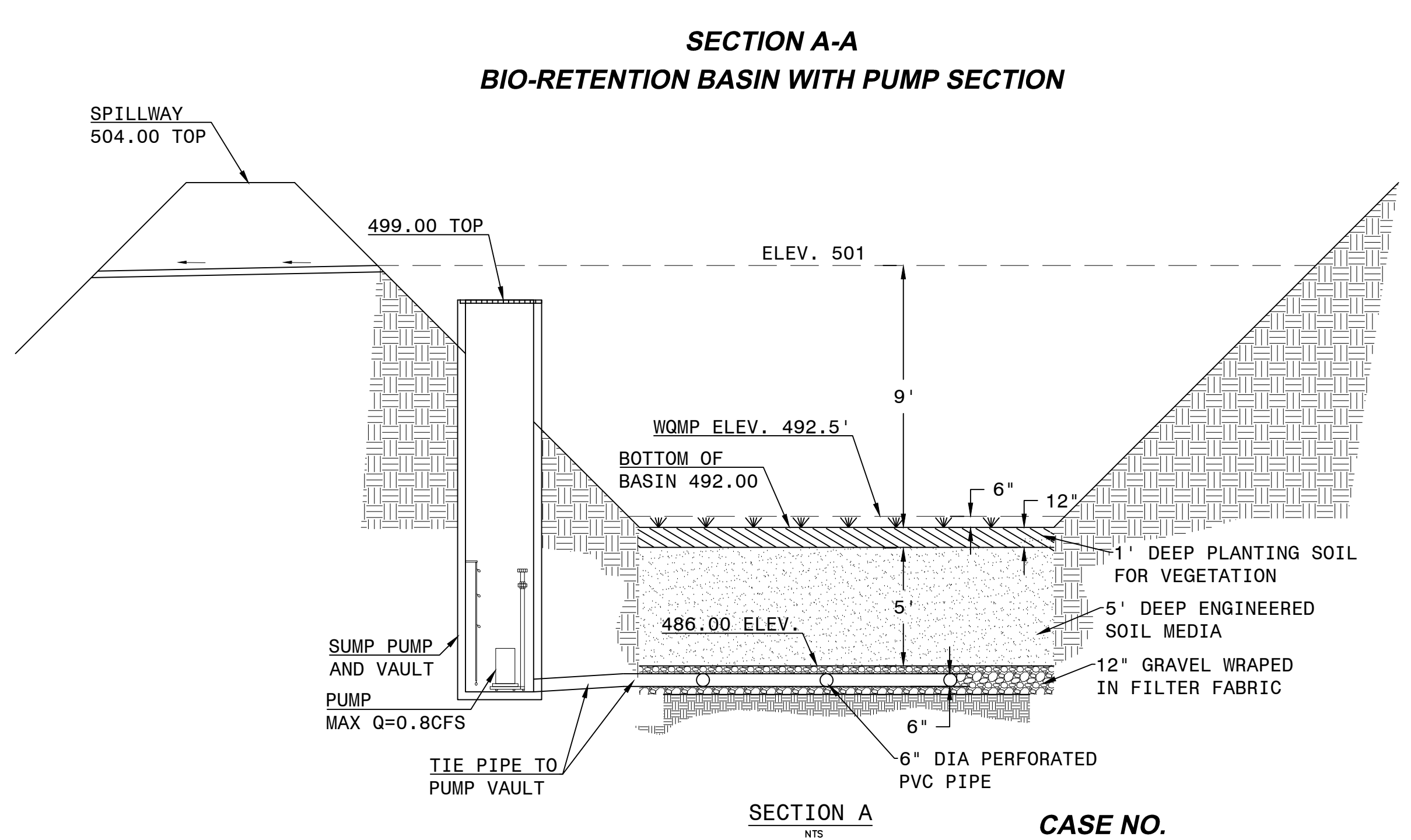


WQMP SITE PLAN COTTONWOOD AVE SITE



LEGEND

- BIO-RETENTION BASIN
 - PROPOSED STREET PAVING
 - SELF TREATING AREAS
 - FLOW DIRECTION
 - DMA BOUNDARY
 - DMA INFORMATION
-
- #### SOURCE CONTROL BMP'S:
- SD10 SITE DESIGN & LANDSCAPE PLANNING
 - SD11 ROOF RUNOFF CONTROLS
 - SD12 EFFICIENT IRRIGATION
 - SD13 STORM DRAIN SIGNAGE/STENCIL
 - SD21 ALTERNATIVE BUILDING MATERIALS
-
- #### SOURCE CONTROL BMP'S:
- ##### NON STRUCTURAL CONTROL BMP'S:
- N4 EDUCATION FOR PROPERTY OWNERS, TENANTS AND OCCUPANTS (ENTIRE SITE)
-
- #### TREATMENT CONTROL BMP'S:
- TC32 BIORETENTION BASIN



CASE NO.
**WQMP SITE PLAN
37881**
IN THE CITY OF SAN JACINTO, CALIFORNIA

19 Spectrum Pointe Drive • Suite 609
Lake Forest, CA 92630
(949) 599-0870
(949) 599-0880 Fax
MAYERS & ASSOCIATES
Civil Engineering, Inc.
PLANNING • ENGINEERING • SURVEYING

Jan 21 2022

Dwg. Revision Date: 01/21/2022 BY: FJP PLOT DATE: 01/21/2022

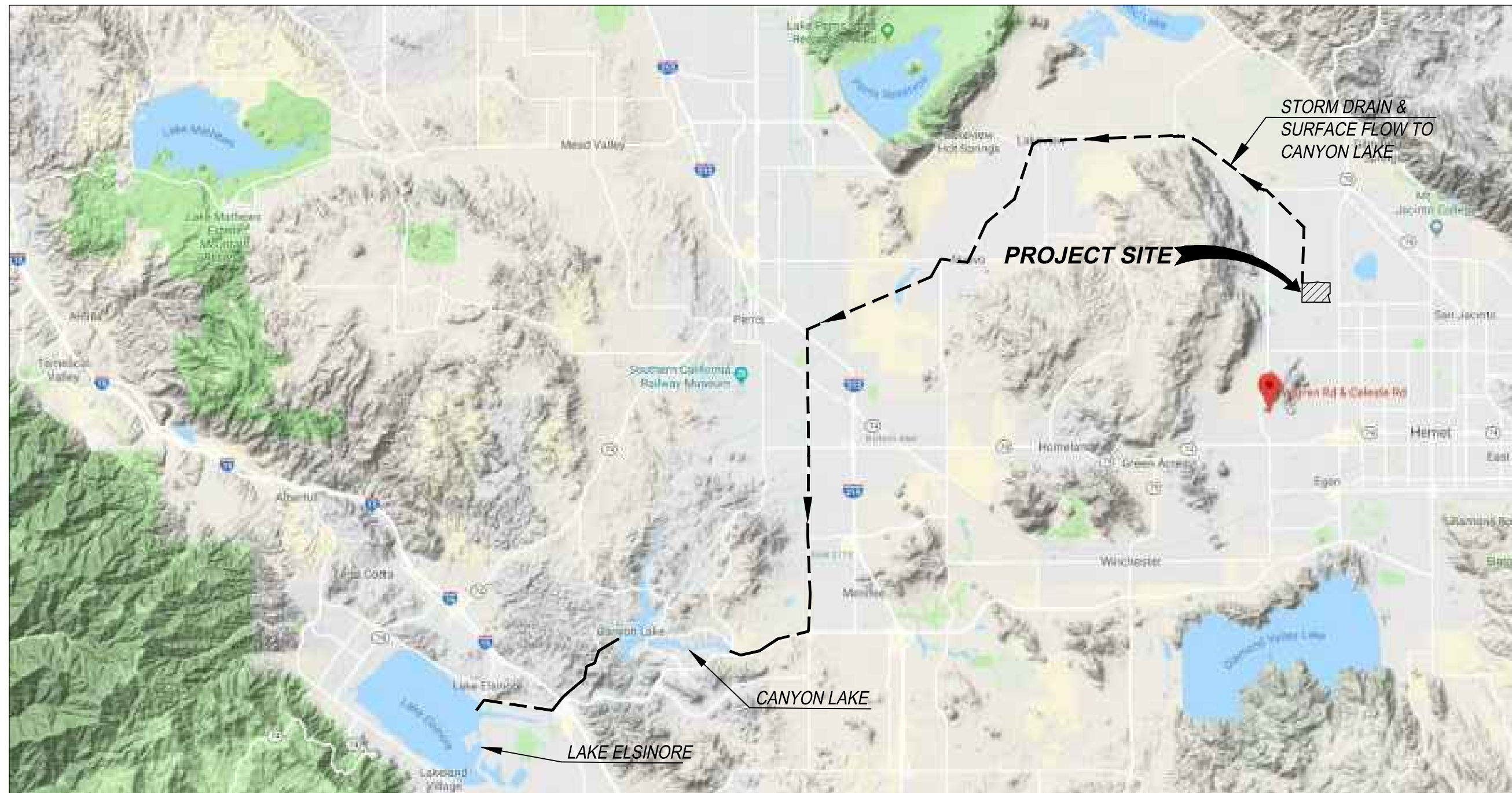
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REVISIONS	
DATE	APPROVED

MAYERS & ASSOCIATES CIVIL ENGINEERING, INC.

**WQMP SITE PLAN
COTTONWOOD AVE SITE**

1
SHEET 1 OF 1



PREPARED FOR:
WEST COAST INLAND LLC
 43980 MAHLON VAIL RD.
 TEMECULA, CA 92592
 (949) 215-4568

PREPARED BY:

**MAYERS & ASSOCIATES
 CIVIL ENGINEERING, INC.**
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**RECEIVING WATERS EXHIBIT
 COTTONWOOD AVENUE SITE**

Appendix 2: Construction Plans

Grading and Drainage Plans

CITY OF SAN JACINTO, CALIFORNIA

TENTATIVE TRACT MAP NO. 37881

SINGLE FAMILY RESIDENTIAL

GENERAL NOTES

1. OWNER RESERVES THE RIGHT TO DEVELOP THE PROJECT IN PHASES.
2. PROPOSED LAND USE: RESIDENTIAL
3. EXISTING / PROPOSED ZONING: RM / RM
4. THE TOTAL AREA WITHIN THE TRACT BOUNDARY IS 37.1 ACRES.
5. DENSITY: RM 8.6 DUs PER NET ACRE
6. ALL CUT AND FILL SLOPES ARE 2:1 (MAXIMUM) UNLESS OTHERWISE NOTED.
7. GRADING SHOWN HEREON IS PRELIMINARY AND IS SUBJECT TO REVISIONS.
8. TOPO SHOWN ON THIS MAP IS BASED ON AERIAL TOPO FLOWN FEBRUARY 1920.
9. FIRE DEPARTMENT: RIVERSIDE COUNTY FIRE DEPARTMENT UNDER AGREEMENT WITH CITY OF SAN JACINTO
10. SCHOOLS: SAN JACINTO UNIFIED SCHOOL DISTRICT.
11. ALL LENGTHS, DISTANCES, LOT DIMENSIONS, AND CURVE RADI ARE APPROXIMATE.
12. THE PROPOSED USES FOR LOTS:
 - LOTS 1-191 = SINGLE FAMILY RESIDENTIAL 50' x 90' MIN.
 - LOTS 'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'AA', 'BB', 'CC', 'DD', 'EE', 'FF', 'GG' & 'HH' = DEDICATED STREETS
 - LOTS 'I' = WATER QUALITY BASIN
 - LOTS 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z', 'AA', 'BB', 'CC' & 'DD' = LANDSCAPE AREAS
 - LOTS 'N' = PARK
13. THE TOTAL NUMBER OF LOTS IS 213 (191 RESIDENTIAL, 10 STREETS, 1 BASIN, 1 PARK & 10 LANDSCAPES)
14. BASED ON A VISUAL SURVEY OF THE PROPERTY, THERE ARE NO EXISTING STRUCTURES OR BUILDINGS WITHIN THE LIMITS OF DEVELOPMENT.
15. BASED ON A VISUAL SURVEY OF THE PROPERTY, THERE ARE NO EXISTING WELLS, WATERLINES, CULVERTS, DRAINPIPES, DIKES, CHANNELS, OR PUBLIC UTILITIES WITHIN THE LIMITS OF DEVELOPMENT, EXCEPT AS NOTED TO CORRECT EXISTING STORM WATER RUNOFF. NEW FACILITIES TO HANDLE STORM WATER RUNOFF WILL BE DESIGNED IN CONJUNCTION WITH THE PROPOSED DEVELOPMENT.
16. BASED ON A REVIEW OF FEMA MAPS, THIS DEVELOPMENT LIES IN ZONE X
17. A SLUMP PUMP SHALL BE INSTALLED IN THE DETENTION BASIN IF INFILTRATION DOES NOT PROVIDE A DRY BASIN WITHIN 72 HOURS

PUBLIC UTILITIES

WATER:
EASTERN MUNICIPAL WATER DISTRICT
2270 TRIMBLE ROAD
PERRIS, CALIFORNIA 92570
(951) 928-7777

SEWER:
CITY OF SAN JACINTO PUBLIC UTILITIES
270 BISSELL PLACE
SAN JACINTO, CA 92583
(951) 654-4041

ELECTRIC:
SOUTHERN CALIFORNIA EDISON
26100 MENEFEE ROAD
ROMOLAND, CALIFORNIA 92380
(951) 843-8281

GAS:
SOUTHERN CALIFORNIA GAS COMPANY
1500 CORPORATE PARK DRIVE
MONTEREY PARK, CALIFORNIA 91754
(602) 427-2300

TELEPHONE:
VERIZON
800) 922-0204

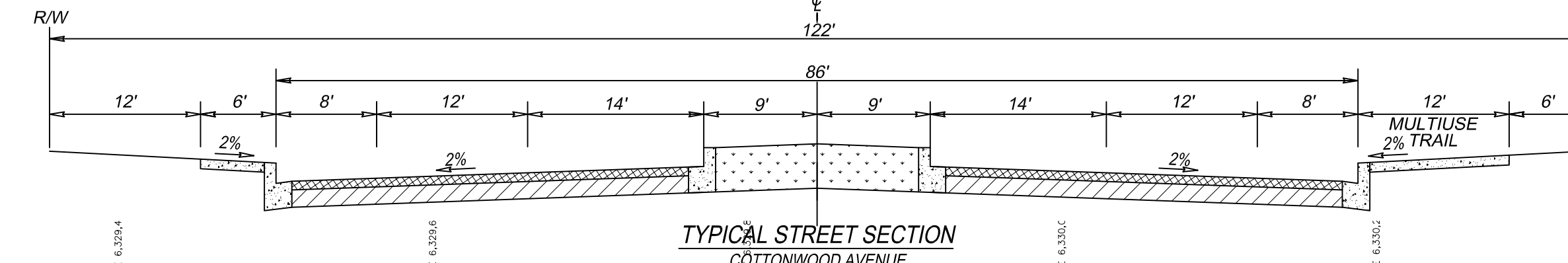
CABLE TV:
CHARTER COMMUNICATIONS (SPECTRUM)
800) 922-0204

LEGEND

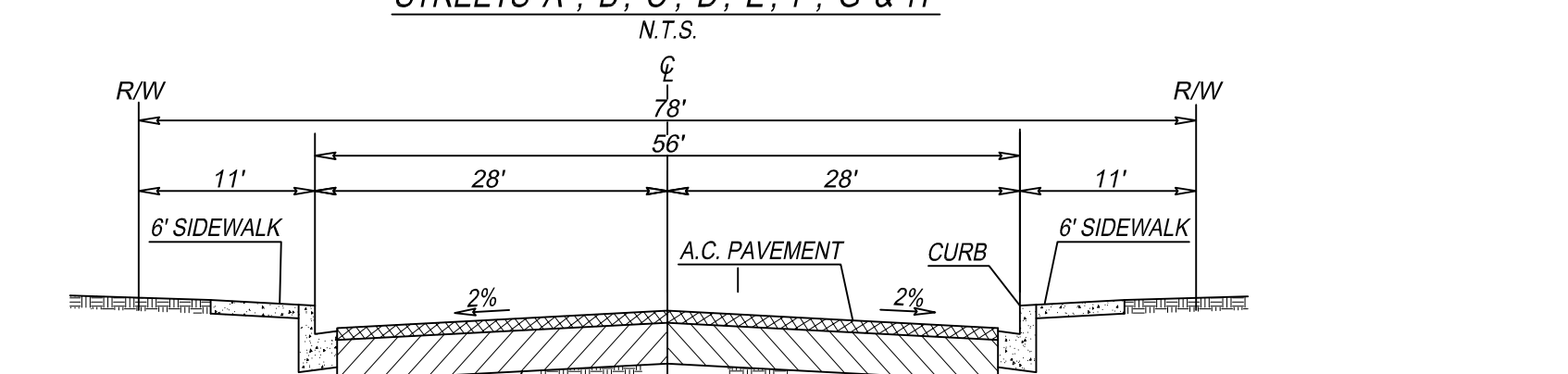
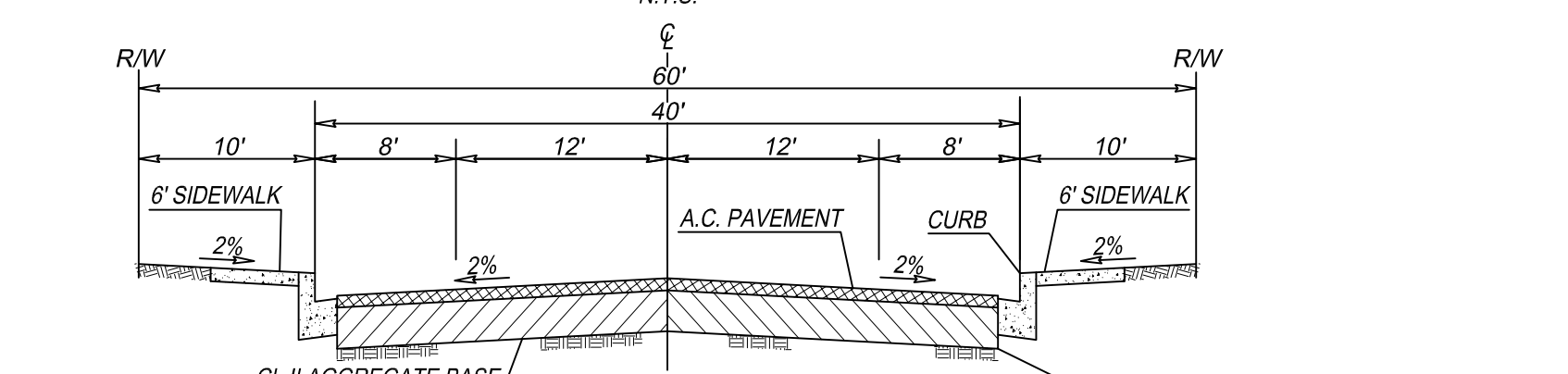
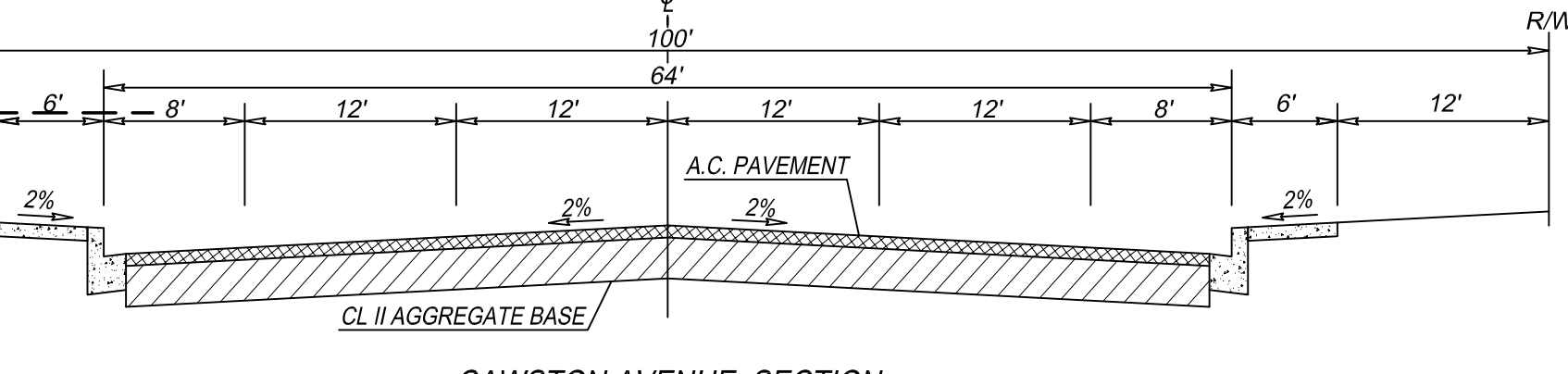
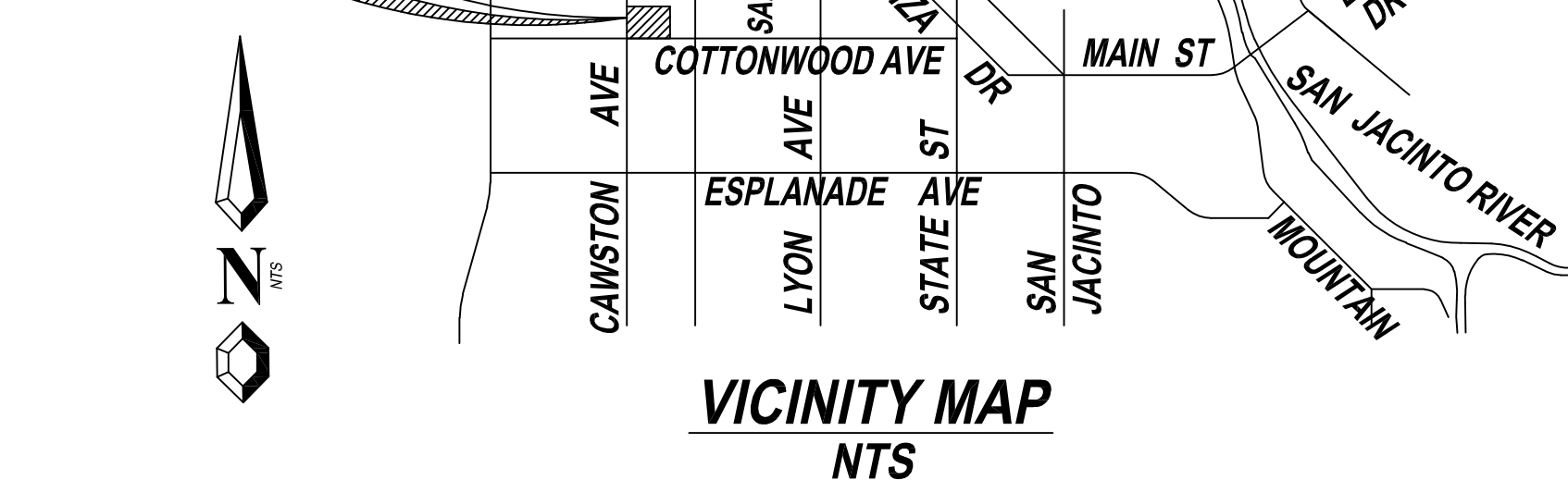
- ZONING AREA BOUNDARY: ---
- TENTATIVE MAP BOUNDARY: - - - -
- BEGIN/END VERTICAL CURVE: ———
- POINT OF INTERSECTION: PI
- FINISHED SURFACE: FS
- GRADE BREAK: GB
- CENTERLINE RADIUS: R=300'
- STREET CENTERLINE ELEVATION: 580
- STREET GRADE: 2%
- LOT NUMBER: 48
- PAD ELEVATION: P-631.0
- FIRST / LAST RESIDENTIAL LOT NUMBER: ○
- EXISTING WATERLINE: W
- EXISTING RECLAIMED WATERLINE: RW
- EXISTING STORM DRAIN: SD
- EXISTING SEWER AND MANHOLES: S
- PROPOSED WATERLINE: W
- PROPOSED STORM DRAIN: SD
- PROPOSED SEWER AND MANHOLES: S
- RETAINING WALL: RET
- CROSS GUTTER: CG
- EXISTING LOT NUMBER: PARCEL 4
- GRADED V-DITCH: V-D

ABBREVIATIONS

- | | | | |
|------|-----------------------|-------|-----------------------------|
| BVC | BEGIN VERTICAL CURVE | P | PAD |
| CB | CATCH BASIN | PI | POINT OF INTERSECTION |
| CL | CENTERLINE | PL | PROPERTY LINE |
| CP | CONTROL POINT | PP | POWER POLE |
| CMP | CORRUGATED METAL PIPE | Qx | FLOW (PEAK) PER TIME (YEAR) |
| CNTL | CONTROL | RCW | RECYCLED WATER |
| DI | DROP INLET | RET | RETAININGS |
| EG | EXIST. GROUND | RET | RETAINING WALL |
| EP | EDGE OF PAVEMENT | RW | RIGHT OF WAY |
| EVC | END VERTICAL CURVE | S | SIGNS/METAL POST |
| FH | FIRE HYDRANT | SMH | SEWER MANHOLE |
| FL | FLOW LINE | ST LT | STREET LIGHT |
| HC | HANDICAPPED | SD | STORM DRAIN |
| HCR | HANDICAPPED RAMP | SDMH | STORM DRAIN MANHOLE |
| HP | HIGH POINT | TB | TRACT BOUNDARY |
| HW | HEADWALL | TC | TOP OF CURB |
| INV | INVERT OF PIPE | WV | WATER VALVE |
| LP | LOW POINT | WM | WATER METER |
| MH | MANHOLE | WS | WATER SURFACE |
| NG | NATURAL GROUND | W | WATER LINE |
| NTS | NOT TO SCALE | | |



PROJECT MAP



LEGAL DESCRIPTION

REAL PROPERTY IN THE CITY OF SAN JACINTO, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

PARCELS 5 AND 6 OF PARCEL MAP 6832, IN THE CITY OF SAN JACINTO, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ON FILE IN BOOK 32, PAGES 36 THROUGH 42, INCLUSIVE, OF PARCEL MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY;

TOGETHER WITH THAT PORTION OF LETTER LOT 'G', LYING NORTHERLY OF THE WESTERLY EXTENSION OF THE SOUTHERLY LINE OF SAID PARCEL 6, AND SOUTHERLY OF THE WESTERLY EXTENSION OF THE NORTHERLY LINE OF SAID PARCEL 6;

APN: 432-130-006-5 (PARCEL 5) AND 432-130-007-6 (PARCEL 6 AND PORTION OF LOT G)

EARTHWORK QUANTITIES:

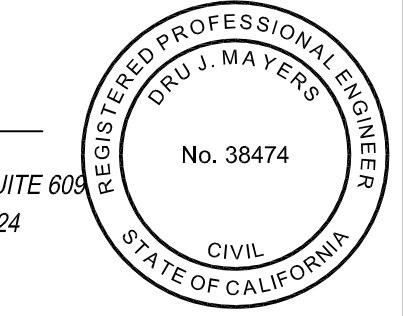
CUT 28,200 CU. YD., FILL 28,200 CU. YD., IMPORT 0 CU. YD.*

DOES NOT INCLUDE REMOVALS

EARTHWORK TO BALANCE ON SITE

ENGINEERING/CONTACT PERSON

THIS MAP WAS PREPARED UNDER THE DIRECTION OF DRU J. MAYERS
A REGISTERED CIVIL ENGINEER IN THE STATE OF CALIFORNIA
CONTACT PERSON: FRED J. PUGH (1043) 689-5555



DRU J. MAYERS
MAYERS AND ASSOCIATES
113 SPECTRUM POINT DRIVE, SUITE 609
LAKE FOREST, CALIFORNIA 92724

APPLICANT

FRED J. PUGH (1043) 689-5555
MAYERS AND ASSOCIATES
113 SPECTRUM POINT DRIVE, SUITE 609

OWNER / DEVELOPER

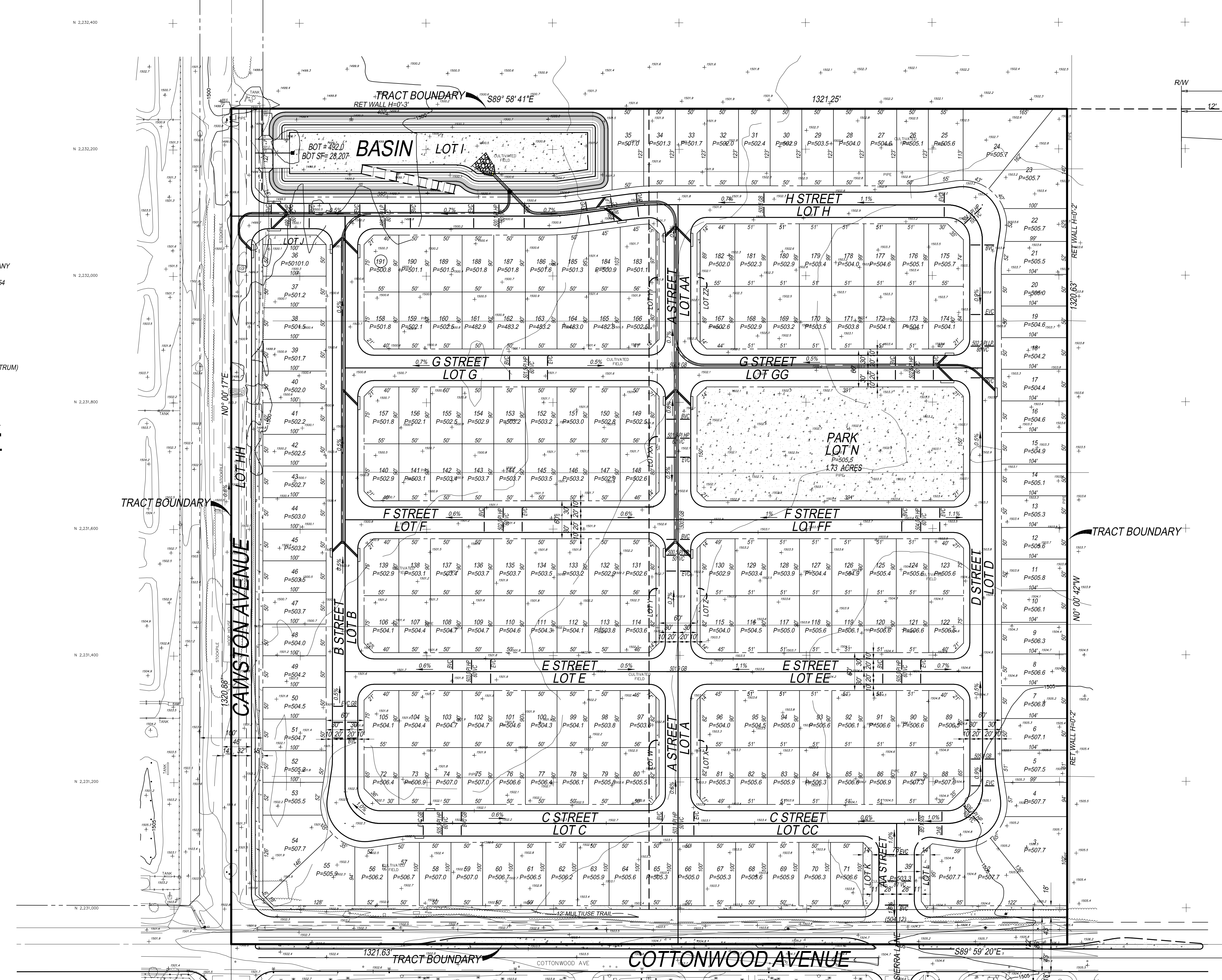
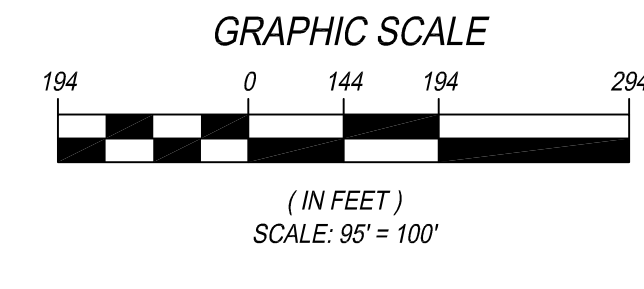
WEST COAST INLAND PARTNERS IV, LLC
44074 HAWKINSON ROAD, #104
TEMECULA, CA 92696
(1043) 689-5555

ASSESSOR'S PARCEL NUMBERS

526-130-006-5 (PARCEL 5) AND 432-130-007-6 (PARCEL 6 AND PORTION OF LOT G)

DATE OF MAP

12/1/2020

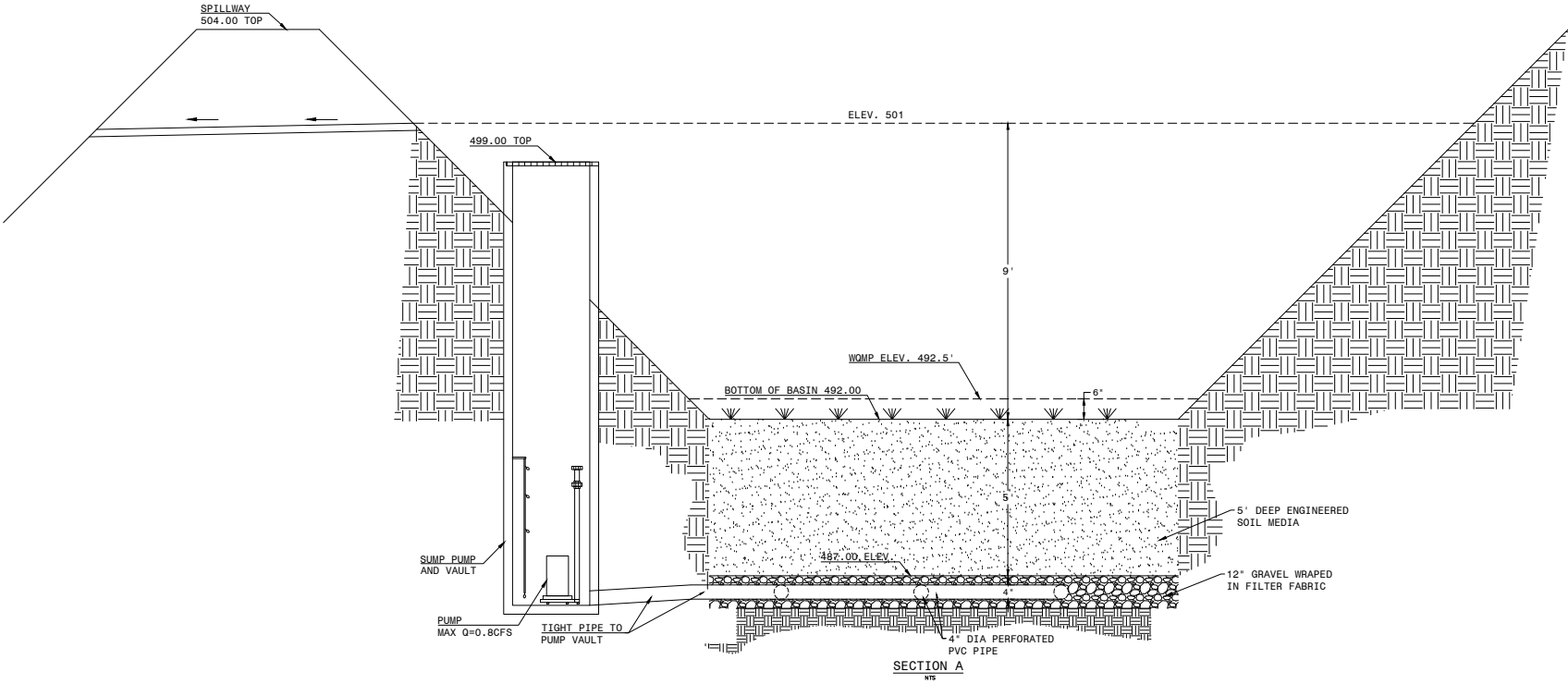


LOT NO.		LOT SIZE		LOT NO.		LOT SIZE		LOT NO.		LOT SIZE		LOT NO.		LOT SIZE		LOT NO.		LOT SIZE		LOT NO.		LOT SIZE		LOT NO.		LOT SIZE											
1	5,189 SF	12	5,189 SF	26	6,081 SF	40	5,000 SF	54	8,778 SF	68	5,000 SF	82	4,990 SF	96	4,900 SF	110	4,500 SF	124	4,625 SF	138	4,500 SF	152	4,500 SF	166	5,025 SF	180	5,045 SF	194	5,045 SF	208	5,045 SF	222	5,045 SF				
2	8,439 SF	13	5,189 SF	27	6,081 SF	41	5,000 SF	55	10,990 SF	69	5,000 SF	83	4,990 SF	97	5,025 SF	111	4,500 SF	125	4,625 SF	139	4,837 SF	153	4,500 SF	167	5,364 SF	181	5,045 SF	195	5,045 SF	209	5,045 SF	223	5,045 SF	237	5,045 SF	251	5,045 SF
3	12,101 SF	14	5,189 SF	28	6,081 SF	42	5,000 SF	56	4,825 SF	70	5,000 SF	84	4,990 SF	98	4,500 SF	112	4,500 SF	126	4,625 SF	140	4,837 SF	154	4,900 SF	168	5,047 SF	182	5,363 SF	196	5,047 SF	210	5,047 SF	224	5,047 SF	238	5,047 SF	252	5,047 SF
4	5,212 SF	15	5,189 SF	29	6,081 SF	43	5,000 SF	57	4,825 SF	71	5,154 SF	85	4,990 SF	99	4,500 SF	113	4,500 SF	127	4,625 SF	141	4,500 SF	155	4,500 SF	169	5,047 SF	183	5,047 SF	197	5,047 SF	211	5,047 SF	225	5,047 SF	239	5,047 SF	253	5,047 SF
5	5,225 SF	16	5,189 SF	30	6,081 SF	44	5,000 SF	58	5,000 SF	72	4,637 SF	86	4,990 SF	100	4,500 SF	114	5,024 SF	128	4,625 SF	142	4,500 SF	156	4,500 SF	170	5,047 SF	184	4,989 SF	198	5,047 SF	212	5,047 SF	226	5,047 SF	240	5,047 SF	254	5,047 SF
6	5,189 SF	17	5,189 SF	31	6,081 SF	45	5,000 SF	59	5,000 SF	73	4,500 SF	87	4,590 SF	101	4,500 SF	115	4,900 SF	129	4,590 SF	143	4,500 SF	157	4,837 SF	171	5,085 SF	185	4,636 SF	199	4,636 SF	213	4,636 SF	227	4,636 SF	241	4,636 SF	255	4,636 SF
7	5,189 SF	18	5,189 SF	32	6,081 SF	46	5,000 SF	60	5,000 SF	74	4,500 SF	88	4,639 SF	102	4,500 SF	116	4,590 SF	130	4,900 SF	144	4,500 SF	158	4,837 SF	172	5,085 SF	186	4,636 SF	200	4,636 SF	214	4,636 SF	228	4,636 SF	242	4,636 SF	256	4,636 SF
8	5,189 SF	19	5,189 SF	33	6,081 SF	47	5,000 SF	61	5,000 SF	75	4,500 SF	89	4,836 SF	103	4,500 SF	117	4,590 SF	131	5,024 SF	145	4,500 SF	159	4,500 SF	173	5,085 SF	187	4,636 SF	201	4,636 SF	215	4,636 SF	229	4,636 SF	243	4,636 SF	257	4,636 SF
9	5,189 SF	20	5,189 SF	34	6,081 SF	48	5,000 SF	62	5,000 SF	76	4,500 SF	90	4,836 SF	104	4,500 SF	118	4,590 SF	132	4,500 SF	146	4,500 SF	160	4,500 SF	174	5,122 SF	188	5,303 SF	202	5,303 SF	216	5,303 SF	230	5,303 SF	244	5,303 SF	258	5,303 SF
10	5,189 SF	21	5,189 SF	35	6,258 SF	49	5,000 SF	63	4,500 SF	77	4,500 SF	91	4,625 SF	105	4,837 SF	119	4,500 SF	133	4,500 SF	147	4,500 SF	161	4,500 SF	175	5,122 SF	189	4,500 SF	203	4,500 SF	217	4,500 SF	231	4,500 SF	245	4,500 SF	259	4,500 SF
11	5,189 SF	22	5,035 SF	36	4,997 SF	50	5,000 SF	64	4,500 SF	78	4,500 SF	92	4,625 SF	106	4,837 SF	120	4,625 SF	134	4,500 SF	148	5,024 SF	162	4,500 SF	176	5,078 SF	190	4,500 SF	204	4,500 SF	218	4,500 SF	232	4,500 SF	246	4,500 SF	260	4,500 SF
	23	9,310 SF	37	4,997 SF	51	5,000 SF	65	5,000 SF	79	4,500 SF	93	4,625 SF	107	4,500 SF	121	4,625 SF	135	4,500 SF	149	5,024 SF	163	4,500 SF	177	5,078 SF	191	4,638 SF	205	4,638 SF	219	4,638 SF	233	4,638 SF	247	4,638 SF	261	4,638 SF	
	24	14,517 SF	38	4,997 SF	52	4,934 SF	66	5,025 SF	80	5,025 SF	94	4,990 SF	108	4,500 SF	122	4,831 SF	136	4,500 SF	150	4,500 SF	164	4,500 SF	178	5,078 SF	192	4,638 SF	206	4,638 SF	220	4,638 SF	234	4,638 SF	248	4,638 SF	262	4,638 SF	
	25	6,397 SF	39	4,997 SF	53	4,822 SF	67	5,000 SF	81	4,900 SF	95	4,990 SF	109	4,500 SF	123	4,831 SF	137	4,500 SF	151	4,500 SF	165	4,500 SF	179	5,078 SF	193	4,638 SF	207	4,638 SF	221	4,638 SF	235	4,638 SF	249	4,638 SF	263	4,638 SF	

CASE NO.
TENTATIVE TRACT MAP NO.
37881
IN THE CITY OF SAN JACINTO, CALIFORNIA

MAYERS & ASSOCIATES
CIVIL ENGINEERING, INC.
PLANNING • ENGINEERING • SURVEYING
19 Spectrum Pointe Drive • Suite 609 Lake Forest, CA 92630
(949) 599-0870 • (949) 599-0880 Fax • www.mayerscivil.com

BIO-RETENTION BASIN WITH PUMP SECTION



Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data



GeoTek, Inc.
1548 North Maple Street, Corona, California 92880
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

January 22, 2020
Project No. 2298-CR

West Coast Inland Partners IV, LLC
43980 Mahlon Vail Road, Suite 104
Temecula, California 92592

Attention: Mr. Loren Huweiler

Subject: Infiltration Evaluation
Proposed Residential Development
Assessor's Parcel Numbers 432-130-006 and -007
San Jacinto, Riverside County, California

References: See Page 5

Dear Mr. Huweiler:

As requested and authorized, GeoTek, Inc. (GeoTek) has performed an infiltration evaluation associated with the proposed residential development to be located in the city of San Jacinto, Riverside County, California. The intent of this study is to evaluate the infiltration properties of the underlying soils within the proposed water quality basin. This report presents the results of the testing completed by GeoTek.

Site Description

The subject project is located north of Cottonwood Avenue and westerly of North Sanderson Avenue in the city of San Jacinto, Riverside County, California. The square shaped site is comprised of two (2) parcels of land [Assessor Parcel Numbers (APNs) 432-130-006 and -007] and encompasses a total of approximately 37 acres. The site can be accessed from Cottonwood Avenue. The site is generally comprised of vacant land.

Infiltration Testing

Two percolation test borings (Borings I-1 and I-2) were excavated with a track mounted hollow stem auger drill rig within the proposed basin to a depth of approximately 8 feet below ground surface (bgs) each, approximately the bottom elevation of the proposed basin, as indicated to us by the project civil engineer (Mayers & Associates Civil Engineering, Inc.). The borings were approximately 8-inches in diameter. Four-inch diameter slotted PVC pipes encapsulated in filter sock were inserted into the test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel.

An additional boring was excavated with a track mounted hollow stem auger drill rig within the proposed water quality basin to a depth of 20 feet bgs to assess if groundwater is present or any impermeable layer may be present below the proposed basin.

The soils encountered in all three of our borings consisted of silty sand and sandy silt, with some clayey silt lenses. The logs of the borings are presented in Appendix A.

Groundwater was not encountered nor observed in our borings.

Subsequent to pre-soaking the test holes in general conformance with the referenced document (County of Riverside, 2011), percolation testing was performed in the lower 36 to 41 inches of the percolation borings by a representative from our firm. The percolation testing was conducted in general conformance with the referenced document from the County of Riverside. The percolation rates were converted to an infiltration rate via the Porchet Method.

The infiltration rate for each of the test borings is presented in the follow table after the water level had stabilized.

Boring No.	Infiltration Rate (inches per hour)	Depth of Boring (feet)
Boring I-1	0	8
Boring I-2	0	8

Copies of the percolation data sheets and infiltration conversion sheets (Porchet Method) are included in Appendix B. The reported infiltration rate is the measured rate without any factor of safety applied. Over the lifetime of the detention basin, the infiltration rates may be affected by silt build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rates in design the infiltration system.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed native soils. Infiltration rates will vary and are mostly dependent on the underlying

consistency of the site soils and relative density. Infiltration rates will be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors. GeoTek, Inc. assumes no responsibility or liability for the ultimate design or performance of the storm water facility.

LIMITATIONS

The materials observed on the project site appear to be representative of the basin area; however, soil materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

Our conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact our office.

Respectfully submitted,
GeoTek, Inc.



Edward H. LaMont
CEG 1892, Exp. 07/31/20
Principal Geologist



Robert R. Russell
GE 2042, Exp. 12/31/20
Senior Project Engineer

Anna M. Scott
Project Geologist

Enclosures: Figure I – Boring Location Map
 Appendix A – Logs of Exploratory Borings
 Appendix B – Percolation Data Sheets Conversion Sheets (Porchet Method)

Distribution: (1) Addressee via email (PDF file)

G:\Projects\2251 to 2300\2298CR West Coast Inland Partners IV, LLC APNs 432-130-006 and -007 San Jacinto\Infiltration Evaluation\2298CR Infiltration Evaluation APNs 436-170-018, -019 and -020.doc

REFERENCES

Mayers & Associates Civil Engineering, Inc., 2019, "Preliminary Site Plan for The Cottonwood Site," dated December 18.

Riverside County, 2011, "Low Impact Development BMP Design Handbook, Appendix A – Infiltration Testing."

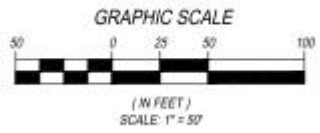
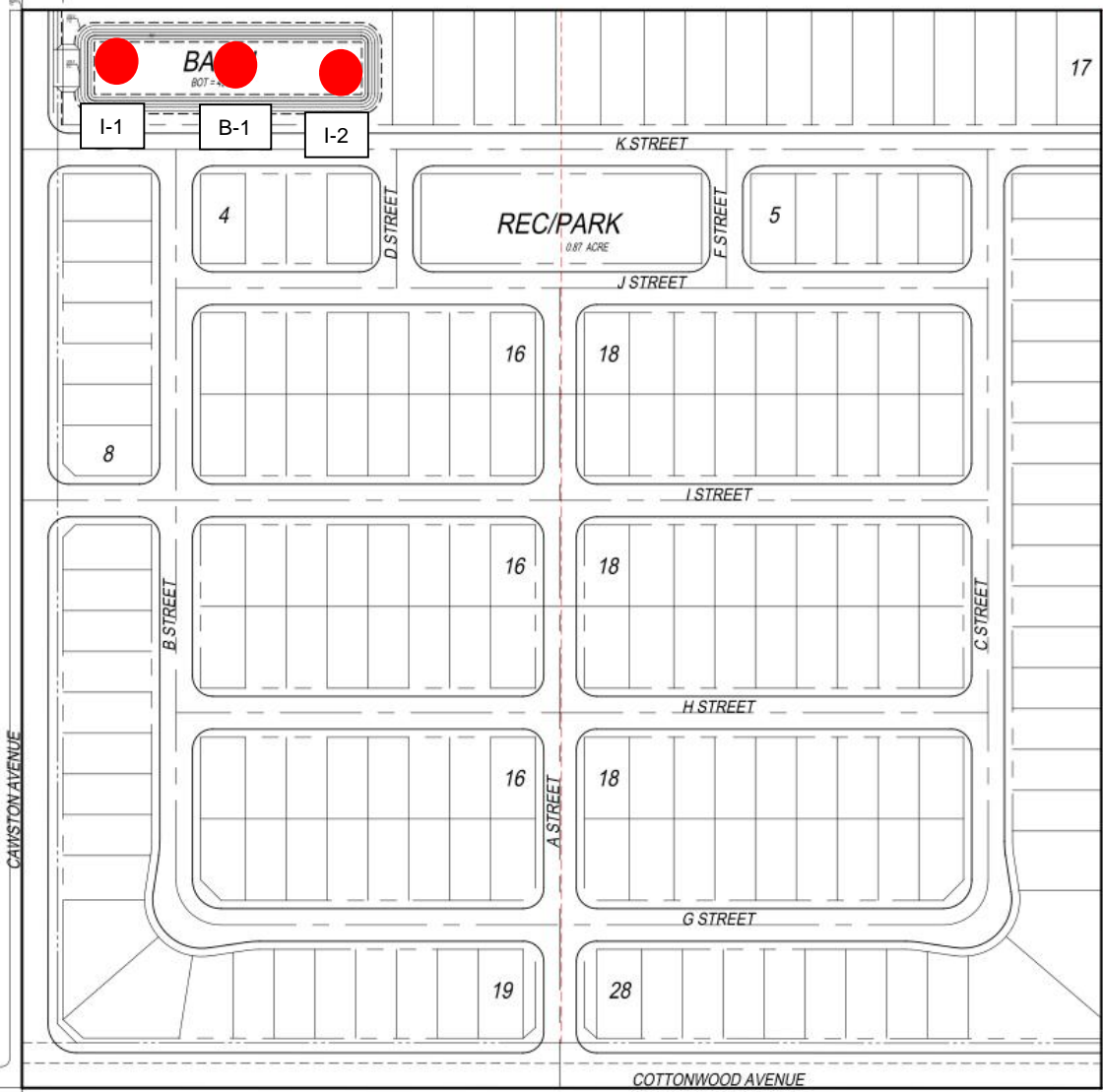


SCALE: 1" = 50'

LEGEND

I-2

Approximate Location of Boring



West Coast Inland Partners IV, LLC

The Cottonwood Site
San Jacinto, Riverside County, California

GeoTek Project No. 2298-CR

Figure I
Boring Location
Map



APPENDIX A

LOGS OF EXPLORATORY BORINGS

**APNs 432-130-006 and -007
San Jacinto, Riverside County, California
Project No. 2298-CR**



GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: West Coast Partners IV, LLC	DRILLER: 2R Drilling	LOGGED BY: DRW
PROJECT NAME: APNs 432-130-006 & -007	DRILL METHOD: Hollow Stem	OPERATOR: Jeff
PROJECT NO.: 2298-CR	HAMMER: 140#/30"	RIG TYPE: CME 75
LOCATION: San Jacinto, CA		DATE: 1/16/2020

Depth (ft)	SAMPLES			USCS Symbol	Boring No.: I-1 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number			Water Content (%)	Dry Density (pcf)	Others
0				SM	Fill Soils: F SAND with few silt, brown, slightly moist, few grass and rootlets Alluvium: SM Silty f-c SAND, brown, moist, some rootlets			
5				SM/ML	Silty f-m SAND to f-m sandy SILT, grayish brown, slightly moist, trace rootlets			
				ML	Clayey SILT to vf sandy SILT, grayish brown, slightly moist			
10					BORING TERMINATED AT 8 FEET No groundwater encountered.			
15								
20								
25								
30								

LEGEND	Sample type:	<input type="checkbox"/> ---Ring	<input type="checkbox"/> ---SPT	<input type="checkbox"/> ---Small Bulk	<input checked="" type="checkbox"/> ---Large Bulk	<input type="checkbox"/> ---No Recovery	<input type="checkbox"/> ---Water Table	
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation	RV = R-Value Test

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: West Coast Partners IV, LLC	DRILLER: 2R Drilling	LOGGED BY: DRW
PROJECT NAME: APNs 432-130-006 & -007	DRILL METHOD: Hollow Stem	OPERATOR: Jeff
PROJECT NO.: 2298-CR	HAMMER: 140#/30"	RIG TYPE: CME 75
LOCATION: San Jacinto, CA		DATE: 1/16/2020

Depth (ft)	SAMPLES			USCS Symbol	Boring No.: I-2 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number			Water Content (%)	Dry Density (pcf)	Others
0				SM	Fill Soils: F SAND with few silt, brown, slightly moist, few grass and rootlets Alluvium:			
				SM/ML	Silty f-m SAND to f-m sandy SILT, grayish brown, slightly moist, trace rootlets			
				SM	Silty f-m SAND, grayish brown, slightly moist, trace rootlets			
5				ML	Vf sandy SILT with trace CLAY, brown, slightly moist			
					BORING TERMINATED AT 8 FEET			
10					No groundwater encountered.			
15								
20								
25								
30								

LEGEND	Sample type:	<input type="checkbox"/> ---Ring	<input type="checkbox"/> ---SPT	<input type="checkbox"/> ---Small Bulk	<input checked="" type="checkbox"/> ---Large Bulk	<input type="checkbox"/> ---No Recovery	<input type="checkbox"/> ---Water Table	
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation	RV = R-Value Test

GeoTek, Inc.
LOG OF EXPLORATORY BORING

CLIENT: West Coast Partners IV, LLC	DRILLER: 2R Drilling	LOGGED BY: DRW
PROJECT NAME: APNs 432-130-006 & -007	DRILL METHOD: Hollow Stem	OPERATOR: Jeff
PROJECT NO.: 2298-CR	HAMMER: 140#/30"	RIG TYPE: CME 75
LOCATION: San Jacinto, CA		DATE: 1/16/2020

Depth (ft)	SAMPLES			USCS Symbol	Boring No.: B-1 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/ 6 in	Sample Number			Water Content (%)	Dry Density (pcf)	Others
0				SM	Fill Soils: F SAND with few silt, brown, slightly moist, few grass and rootlets Alluvium:			
				SM/ML	Silty f-m SAND to f-m sandy SILT, grayish brown, slightly moist, some rootlets			
5				ML	F sandy SILT, grayish brown, slightly moist			
					F sandy SILT to clayey SILT, grayish brown, slightly moist, trace rootlets			
10								
				SM	Silty f-m SAND, brownish gray, slightly moist			
15								
					Silty f-c SAND, brownish gray, dry to slightly moist, trace fine gravel			
20					BORING TERMINATED AT 20 FEET			
					No groundwater encountered.			
25								
30								

LEGEND	Sample type:	<input type="checkbox"/>	---Ring	<input type="checkbox"/>	---SPT	<input type="checkbox"/>	---Small Bulk	<input checked="" type="checkbox"/>	---Large Bulk	<input type="checkbox"/>	---No Recovery	<input type="checkbox"/>	---Water Table
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation	RV = R-Value Test	MD = Maximum Density				

APPENDIX B

PERCOLATION DATA AND CONVERSION SHEETS

**APNs 432-130-006 and -007
San Jacinto, Riverside County, California
Project No. 2298-CR**



PERCOLATION DATA SHEET

Project:

Job No.: 2298-CK

Test Hole No.: 1

Tested by: DW

Date: 1/16

Depth of Hole As Drilled: 8'

Before Test: 8'

After Test: 8'

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Comments		
1	9:15	25	8'	60	60.5	0.5			
2	9:40	25		60	60.5	0.5			
3	10:05	30		60	60.5	0.5			
4	10:35			60	60.25	0.25			
5	11:05			60	60.25	0.25			
6	11:35			60	60.25	0.25			
7	12:06			60	60.25	0.25			
8	12:36			60	60.25	0.25			
9	1:06			60	60.25	0.25			
10	1:36			60	60.25	0.25			
11	2:06			60	60.2	0.2			
12	2:37			60	60.2	0.2			
13	3:07			60	60.2	0.2			
14	3:38			↓	↓	60	60.2	0.2	

PERCOLATION DATA SHEET

Project:

Job No.: 2298-CL

Test Hole No.: 2

Tested by: DW

Date: 1/16

Depth of Hole As Drilled: 8

Before Test: 8

After Test: 8

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Comments
1	9:18	25	8'	54"	55	1	
2	9:43	25	↓	55	56	1	
3	10:09	30		55	55.75	0.75	
4	10:39			55	55.75	0.75	
5	11:09			55	55.75	0.75	
6	11:40			55	55.75	0.75	
7	12:10			55	55.6	0.6	
8	12:40			55	55.6	0.6	
9	1:10			55	55.5	0.5	
10	1:40			55	55.5	0.5	
11	2:10			55	55.5	0.5	
12	2:40			55	55.375	0.375	
13	3:10			55	55.375	0.375	
14	3:40			55	55.375	0.375	

Client: West Coast Inland Partners IV, LLC
Project: The Cottonwood Site
Project No: 2298-CR
Date: 1/26/2020

Boring No. I-1

Percolation Rate (Porchet Method)

Time Interval, $\Delta t =$	30	min
Final Depth to Water, $D_F =$	36	in
Test Hole Radius, $r =$	4	in
Initial Depth to Water, $D_O =$	36	in
Total Test Hole Depth, $D_T =$	96	in

Equation - $I_t = \frac{\Delta H (60r)}{\Delta t (r+2H_{avg})}$

$H_O = D_T - D_O =$	60	in
$H_F = D_T - D_F =$	59.8	in
$\Delta H = \Delta D = H_O - H_F =$	0.2	in
$H_{avg} = (H_O + H_F)/2 =$	59.9	in

$I_t =$ 0.0 Inches per Hour



Client: West Coast Inland Partners IV, LLC
Project: The Cottonwood Site
Project No: 2298-CR
Date: 1/16/2020

Boring No. I-2

Percolation Rate (Porchet Method)

Time Interval, $\Delta t =$	30	min
Final Depth to Water, $D_F =$	41	in
Test Hole Radius, $r =$	4	in
Initial Depth to Water, $D_O =$	41	in
Total Test Hole Depth, $D_T =$	96	in

Equation - $I_t = \frac{\Delta H (60r)}{\Delta t (r+2H_{avg})}$

$H_O = D_T - D_O =$	55	in
$H_F = D_T - D_F =$	54.62	in
$\Delta H = \Delta D = H_O - H_F =$	0.38	in
$H_{avg} = (H_O + H_F)/2 =$	54.81	in

$I_t =$ 0.0 Inches per Hour



Appendix 4: Historical Site Conditions (N/A)

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

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Bioretention Facility - Design Procedure		BMP ID DMA-A	Legend:	Required Entries
				Calculated Cells
Company Name:	Mayers and Associates		Date: NOV/12/20	
Designed by:	C.R.		County/City Case No.:	
Design Volume				
Enter the area tributary to this feature			$A_T =$	36.8 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} =$	48,176 ft ³
Type of Bioretention Facility Design				
<input checked="" type="radio"/> Side slopes required (parallel to parking spaces or adjacent to walkways) <input type="radio"/> No side slopes required (perpendicular to parking space or Planter Boxes)				
Bioretention Facility Surface Area				
Depth of Soil Filter Media Layer			$d_S =$	5.0 ft
Top Width of Bioretention Facility, excluding curb			$w_T =$	113.0 ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$			$d_E =$	1.79 ft
Minimum Surface Area, A_m $A_M (ft^2) = \frac{V_{BMP} (ft^3)}{d_E (ft)}$			$A_M =$	26,857 ft ²
Proposed Surface Area			$A =$	37,780 ft ²
Bioretention Facility Properties				
Side Slopes in Bioretention Facility			$z =$	2 :1
ERROR, side slopes too steep for Bioretention Facility design				
Diameter of Underdrain				6 inches
Longitudinal Slope of Site (3% maximum)				3 %
6" Check Dam Spacing				10 feet
Describe Vegetation:				
Notes:				

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

1. Column 1 identifies which of these potential sources of stormwater pollutants apply to the site. Check each box that applies.
2. Column 2 incorporates all of the corresponding applicable BMPs in the WQMP Exhibit.
3. Columns 3 and 4 incorporate all of the corresponding applicable permanent controls and operational BMPs in the WQMP. See accompanying narrative of the specific Source Control BMPs in Section G.

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

<p align="center">1 Potential Sources of Runoff Pollutants</p>	<p align="center">2 Permanent Controls—Shown on WQMP Drawings</p>	<p align="center">3 Permanent Controls—Listed in WQMP Table and Narrative</p>	<p align="center">4 Operational BMPs—Included in WQMP Table and Narrative</p>
<p><input type="checkbox"/> D1. Need for future indoor & structural pest control</p>		<p><input type="checkbox"/> Note building design features that discourage entry of pests.</p>	<p><input type="checkbox"/> Provide Integrated Pest Management information to owners, lessees, and operators.</p>
<p><input checked="" type="checkbox"/> D2. Landscape/ Outdoor Pesticide Use</p>	<p><input checked="" type="checkbox"/> Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.</p> <p><input checked="" type="checkbox"/> Show self-retaining landscape areas, if any.</p> <p><input checked="" type="checkbox"/> Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)</p>	<p>State that final landscape plans will accomplish all of the following:</p> <p><input checked="" type="checkbox"/> Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.</p> <p><input checked="" type="checkbox"/> Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.</p> <p>x Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.</p> <p>x Consider using pest-resistant plants, especially adjacent to hardscape.</p> <p>x To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.</p>	<p><input checked="" type="checkbox"/> Maintain landscaping using minimum or no pesticides.</p> <p><input checked="" type="checkbox"/> See applicable operational BMPs in “What you should know for.....Landscape and Gardening” http://rcflood.org/stormwater/</p> <p><input type="checkbox"/> Provide IPM information to new owners, lessees and operators.</p>

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

<p align="center">1</p> <p align="center">Potential Sources of Runoff Pollutants</p>	<p align="center">2</p> <p align="center">Permanent Controls—Shown on WQMP Drawings</p>	<p align="center">3</p> <p align="center">Permanent Controls—Listed in WQMP Table and Narrative</p>	<p align="center">4</p> <p align="center">Operational BMPs—Included in WQMP Table and Narrative</p>
<p><input type="checkbox"/> I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)</p>	<p><input type="checkbox"/> Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.</p> <p><input type="checkbox"/> Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.</p> <p><input type="checkbox"/> Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.</p>	<p>Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.</p> <p>Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:</p> <ul style="list-style-type: none"> ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank <p>www.cchealth.org/groups/hazmat/</p>	<p><input type="checkbox"/> See the Fact Sheets SC-31, “Outdoor Liquid Container Storage” and SC-33, “Outdoor Storage of Raw Materials ” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com</p>

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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<p><input type="checkbox"/> L. Fuel Dispensing Areas</p>	<p><input type="checkbox"/> Fueling areas⁶ shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.</p> <p><input type="checkbox"/> Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area¹.] The canopy [or cover] shall not drain onto the fueling area.</p>		<p><input type="checkbox"/> The property owner shall dry sweep the fueling area routinely.</p> <p><input type="checkbox"/> See the Fact Sheet SD-30 , “Fueling Areas” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com</p>

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

Appendix 9: O&M

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

Post Construction BMPs
Maintenance Responsibility / Frequency Matrix

Best Management Practices (BMPs)	Implementation, Maintenance and Inspection Procedures and Frequency	Maintenance/Repair Program
Source Control BMPs		
<p>N1 Education for Property Owners, Tenants and Occupants</p>	<p>For developments with no Property Owners Association (POA) or with POAs of less than fifty (50) dwelling units, practical information materials will be provided to the first residents/occupants/tenants on general housekeeping practices that contribute to the protection of stormwater quality. These materials will be initially developed and provided to first residents/occupants/tenants by the developer. Thereafter such materials will be available through the Permittees' education program. Different materials for residential, office commercial, retail commercial, vehicle-related commercial and industrial uses will be developed.</p> <p>Brief employee with the maintenance and monitoring of all BMPs.</p> <p>On going.</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>Orientation and training shall be provided to new owners, employees, tenants and contractors.</i></p>
<p>N2 Activity Restrictions</p>	<p>If a POA is formed, conditions, covenants and restrictions (CCRs) must be prepared by the developer for the purpose of surface water quality protection. An example would be not allowing car washing outside of established community car wash areas in multi-unit complexes. Alternatively, use restrictions may be developed by a building</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>Orientation and training shall be provided to new owners, employees, tenants and contractors.</i></p>

	<p>operator through lease terms, etc. These restrictions must be included in the Project SUSMP Report.</p> <p>Prohibit maintenance & washing of vehicles, outdoor storage of materials, unlabeled containers, loading/unloading of materials that may come in contact with stormwater.</p> <p>On going.</p>	
N3 Common Area Landscape Management	<p>Identify on-going landscape maintenance requirements that are consistent with those in the County Water Conservation Resolution (or city equivalent) that include fertilizer and/or pesticide usage consistent with Management Guidelines for Use of Fertilizers.</p> <p>Inspect and maintain landscape areas on regular basis.</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Remove dead leaves, tree trunks, etc. Remove and replace plants that are showing signs of dying.</i></p>
N4 BMP Maintenance	<p>The Project SUSMP shall identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.</p> <p>Identify responsibility for implementation of each non-structural BMP and scheduled cleaning and/or maintenance of all structural BMP facilities.</p> <p>On going</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, tenants and contractors regarding BMP cleaning and maintenance.</i></p>
N7 Spill Contingency Plan	<p>A Spill Contingency Plan is prepared by building operator or occupants for use by specified types of building or suite occupancies. The Spill</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592</p>

	<p>Contingency Plan describes how the occupants will prepare for and respond to spills of hazardous materials. Plans typically describe stockpiling of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation, etc.</p> <p>On going.</p>	<p>(949) 215-4568</p> <p><i>Keep the Spill Prevention Control and Countermeasure (SPCC) plan up-to-date, and implement accordingly.</i></p>
N9 Hazardous Materials Disclosure Compliance	<p>Compliance with Permittee ordinances typically enforced by respective fire protection agencies for the management of hazardous materials. The Orange County, health care agencies, and/or other appropriate agencies (i.e., Department of Toxics Substances Control) are typically responsible for enforcing hazardous materials and hazardous waste handling and disposal regulations.</p> <p>On going.</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>File with the City of San Jacinto and maintain onsite a current "Hazardous Materials Disclosure & Business Emergency Plan".</i></p>
N10 Uniform Fire Code Implementation	<p>Compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency.</p> <p>Facility shall be in compliance with Article 80 of the Uniform Fire Code enforced by fire protection agency. The classification of hazards for chemicals stored, used, and handled at this facility is required to ensure that proper types of fire and life safety protection systems and procedures are in place at all times.</p> <p>On going.</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>Orientation and training shall be provided to new owners, employees, tenants and contractors about flammable materials and products.</i></p>
N11 Common Area Litter	<p>For industrial/commercial developments and for</p>	<p>Responsible Party:</p>

Control	<p>developments with POAs, the owner/POA should be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The owner/POA may contract with their landscape maintenance firms to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations by tenants/homeowners or businesses and reporting the violations to the owner/POA for investigation.</p> <p>Every two weeks.</p>	<p>Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>Provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations.</i></p>
N12 Common Area Litter Control	<p>Education program (see N1) as it would apply to future employees of individual businesses. Developer either prepares manual(s) for initial purchasers of business site or for development that is constructed for an unspecified use makes commitment on behalf of POA or future business owner to prepare. An example would be training on the proper storage and use of fertilizers and pesticides, or training on the implementation of hazardous spill contingency plans.</p> <p>Train all employees, management, office, yard, manufacturing, field and clerical in BMPs and pollution prevention and make them aware of the maintenance procedures and requirements of all BMPs.</p> <p>Within 6 months after occupancy</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>Orientation and training shall be provided to new owners, employees, tenants and contractors.</i></p>

	and annually thereafter.	
N14 Common Area Catch Basin Inspection	<p>For industrial/commercial developments and for developments with privately maintained drainage systems, the owner is required to have at least 80 percent of drainage facilities inspected, cleaned and maintained on an annual basis with 100 percent of the facilities included in a two-year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. Drainage facilities include catch basins (storm drain inlets) detention basins, retention basins, sediment basins, open drainage channels and lift stations. Records should be kept to document the annual maintenance.</p> <p>Inspect annually, clean at minimum, prior to October 1st or more often as needed when debris is present.</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>All drainage facilities inspected, cleaned and maintained after every storm events. Remove debris and garbage to avoid clogging of the storm drain system.</i></p>
N15 Street Sweeping Private Streets and Parking Lots	<p>Streets and parking lots are required to be swept prior to the storm season, in late summer or early fall, prior to the start of the rainy season or equivalent as required by the governing jurisdiction. Prevent soil from being washed onto pavement and keep landscape areas well maintained. Vacuum/Pressure-wash clogged surfaces.</p> <p>Every two weeks and once before October 1st.</p>	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568</p> <p><i>Clean and remove trash, debris and washed out soil from the pavement surface and along gutter flow lines.</i></p>
SC10 Non-Storm Water Discharges	Train employees to identify non-stormwater discharges and report them to appropriate departments.	<p>Responsible Party: Attn: West Coast Inland Partners IV, LLC</p>

	Daily of as needed.	43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Nuisance water and spills to be removed on regular basis. No standing water is allowed in more than 48 hrs.</i>
SC11 Spill Prevention, Control and Cleanup	Develop and implement a Spill Prevention Control and Response Plan. Educate employees about spill prevention, spill response and cleanup on a routine basis. Daily or as needed.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Conduct employee training and awareness program and implement of spill prevention plan.</i>
SC34 Waste Handling & Disposal	Post “No Littering” signs and enforce anti-litters laws. Keep waste collection areas clean. Daily or as needed.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, and tenants.</i>
SC41 Building & Grounds Maintenance	Prevent soil from being washed onto pavement and keep landscape areas well maintained inspect pavement at least twice per year. Inspect outlets annually. Vacuum/Pressure wash clogged surfaces. Weekly or as needed.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, tenants and contractors.</i>
SC43 Parking/Storage Area Maintenance	Keep parking and storage areas clean and orderly. Remove debris in a timely fashion. Have designated personnel conduct inspections of the parking facilities and stormwater conveyance systems associated with them on a regular basis.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, tenants and</i>

	Weekly or as needed.	<i>contractors.</i>
SC44 Drainage System Maintenance	Staff regularly inspect facilities to ensure compliance with standard practices for immediate repair of drainage devices. Check legibility of stencils and signs. At least three times per year or as needed.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, and tenants.</i>
SC60 Housekeeping Practices	Keep work sites clean and orderly. Remove debris in a timely fashion. Sweep the area on regular basis. Daily or as needed.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, and tenants.</i>
SC61 Safer Alternative Products	Train employees who handle potentially harmful materials in the use of safer alternatives. Weekly or as needed.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, and tenants.</i>
SD11 Roof Run-off Controls	Inspect roof leaders and remove unnecessary debris and sediments. On regular basis or after every storm events.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, and tenants.</i>
SD12 Efficient Irrigation	Equipment-water sensors, irrigation heads and timing-inspection on a monthly basis.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568

		<i>Orientation and training shall be provided to new owners, employees, and tenants.</i>
SD13 Storm Drain System Signs	See SC44 (Drainage System Maintenance) At least three times per year or after every storm events.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, and tenants.</i>
Treatment Control BMPs		
TC32 – Bio-Filtration Basin	Maintain adjacent landscaped areas. Remove clippings from landscape maintenance activities. Conduct routine inspections for trash or other debris that may be blocking the inlets or outlet pipes. At least three times per year or after every storm events.	Responsible Party: Attn: West Coast Inland Partners IV, LLC 43980 Mahlon Vail Road, #104 Temecula, CA 92592 (949) 215-4568 <i>Orientation and training shall be provided to new owners, employees, tenants and contractors.</i>

Appendix 10: Educational Materials

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



Design Considerations

- Soil for Infiltration
- Tributary Area
- Slope
- Aesthetics
- Environmental Side-effects

Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

California Experience

None documented. Bioretention has been used as a stormwater BMP since 1992. In addition to Prince George's County, MD and Alexandria, VA, bioretention has been used successfully at urban and suburban areas in Montgomery County, MD; Baltimore County, MD; Chesterfield County, VA; Prince William County, VA; Smith Mountain Lake State Park, VA; and Cary, NC.

Advantages

- Bioretention provides stormwater treatment that enhances the quality of downstream water bodies by temporarily storing runoff in the BMP and releasing it over a period of four days to the receiving water (EPA, 1999).
- The vegetation provides shade and wind breaks, absorbs noise, and improves an area's landscape.

Limitations

- The bioretention BMP is not recommended for areas with slopes greater than 20% or where mature tree removal would

Targeted Constituents

✓	Sediment	■
✓	Nutrients	▲
✓	Trash	■
✓	Metals	■
✓	Bacteria	■
✓	Oil and Grease	■
✓	Organics	■

Legend (Removal Effectiveness)

- Low
- High
- ▲ Medium



be required since clogging may result, particularly if the BMP receives runoff with high sediment loads (EPA, 1999).

- Bioretention is not a suitable BMP at locations where the water table is within 6 feet of the ground surface and where the surrounding soil stratum is unstable.
- By design, bioretention BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water.
- In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Design and Sizing Guidelines

- The bioretention area should be sized to capture the design storm runoff.
- In areas where the native soil permeability is less than 0.5 in/hr an underdrain should be provided.
- Recommended minimum dimensions are 15 feet by 40 feet, although the preferred width is 25 feet. Excavated depth should be 4 feet.
- Area should drain completely within 72 hours.
- Approximately 1 tree or shrub per 50 ft² of bioretention area should be included.
- Cover area with about 3 inches of mulch.

Construction/Inspection Considerations

Bioretention area should not be established until contributing watershed is stabilized.

Performance

Bioretention removes stormwater pollutants through physical and biological processes, including adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization (EPA, 1999). Adsorption is the process whereby particulate pollutants attach to soil (e.g., clay) or vegetation surfaces. Adequate contact time between the surface and pollutant must be provided for in the design of the system for this removal process to occur. Thus, the infiltration rate of the soils must not exceed those specified in the design criteria or pollutant removal may decrease. Pollutants removed by adsorption include metals, phosphorus, and hydrocarbons. Filtration occurs as runoff passes through the bioretention area media, such as the sand bed, ground cover, and planting soil.

Common particulates removed from stormwater include particulate organic matter, phosphorus, and suspended solids. Biological processes that occur in wetlands result in pollutant uptake by plants and microorganisms in the soil. Plant growth is sustained by the uptake of nutrients from the soils, with woody plants locking up these nutrients through the seasons. Microbial activity within the soil also contributes to the removal of nitrogen and organic matter. Nitrogen is removed by nitrifying and denitrifying bacteria, while aerobic bacteria are responsible for the decomposition of the organic matter. Microbial processes require oxygen and can result in depleted oxygen levels if the bioretention area is not adequately

aerated. Sedimentation occurs in the swale or ponding area as the velocity slows and solids fall out of suspension.

The removal effectiveness of bioretention has been studied during field and laboratory studies conducted by the University of Maryland (Davis et al, 1998). During these experiments, synthetic stormwater runoff was pumped through several laboratory and field bioretention areas to simulate typical storm events in Prince George's County, MD. Removal rates for heavy metals and nutrients are shown in Table 1.

Pollutant	Removal Rate
Total Phosphorus	70-83%
Metals (Cu, Zn, Pb)	93-98%
TKN	68-80%
Total Suspended Solids	90%
Organics	90%
Bacteria	90%

Results for both the laboratory and field experiments were similar for each of the pollutants analyzed. Doubling or halving the influent pollutant levels had little effect on the effluent pollutants concentrations (Davis et al, 1998).

The microbial activity and plant uptake occurring in the bioretention area will likely result in higher removal rates than those determined for infiltration BMPs.

Siting Criteria

Bioretention BMPs are generally used to treat stormwater from impervious surfaces at commercial, residential, and industrial areas (EPA, 1999). Implementation of bioretention for stormwater management is ideal for median strips, parking lot islands, and swales. Moreover, the runoff in these areas can be designed to either divert directly into the bioretention area or convey into the bioretention area by a curb and gutter collection system.

The best location for bioretention areas is upland from inlets that receive sheet flow from graded areas and at areas that will be excavated (EPA, 1999). In order to maximize treatment effectiveness, the site must be graded in such a way that minimizes erosive conditions as sheet flow is conveyed to the treatment area. Locations where a bioretention area can be readily incorporated into the site plan without further environmental damage are preferred. Furthermore, to effectively minimize sediment loading in the treatment area, bioretention only should be used in stabilized drainage areas.

Additional Design Guidelines

The layout of the bioretention area is determined after site constraints such as location of utilities, underlying soils, existing vegetation, and drainage are considered (EPA, 1999). Sites with loamy sand soils are especially appropriate for bioretention because the excavated soil can be backfilled and used as the planting soil, thus eliminating the cost of importing planting soil.

The use of bioretention may not be feasible given an unstable surrounding soil stratum, soils with clay content greater than 25 percent, a site with slopes greater than 20 percent, and/or a site with mature trees that would be removed during construction of the BMP.

Bioretention can be designed to be off-line or on-line of the existing drainage system (EPA, 1999). The drainage area for a bioretention area should be between 0.1 and 0.4 hectares (0.25 and 1.0 acres). Larger drainage areas may require multiple bioretention areas. Furthermore, the maximum drainage area for a bioretention area is determined by the expected rainfall intensity and runoff rate. Stabilized areas may erode when velocities are greater than 5 feet per second (1.5 meter per second). The designer should determine the potential for erosive conditions at the site.

The size of the bioretention area, which is a function of the drainage area and the runoff generated from the area is sized to capture the water quality volume.

The recommended minimum dimensions of the bioretention area are 15 feet (4.6 meters) wide by 40 feet (12.2 meters) long, where the minimum width allows enough space for a dense, randomly-distributed area of trees and shrubs to become established. Thus replicating a natural forest and creating a microclimate, thereby enabling the bioretention area to tolerate the effects of heat stress, acid rain, runoff pollutants, and insect and disease infestations which landscaped areas in urban settings typically are unable to tolerate. The preferred width is 25 feet (7.6 meters), with a length of twice the width. Essentially, any facilities wider than 20 feet (6.1 meters) should be twice as long as they are wide, which promotes the distribution of flow and decreases the chances of concentrated flow.

In order to provide adequate storage and prevent water from standing for excessive periods of time the ponding depth of the bioretention area should not exceed 6 inches (15 centimeters). Water should not be left to stand for more than 72 hours. A restriction on the type of plants that can be used may be necessary due to some plants' water intolerance. Furthermore, if water is left standing for longer than 72 hours mosquitoes and other insects may start to breed.

The appropriate planting soil should be backfilled into the excavated bioretention area. Planting soils should be sandy loam, loamy sand, or loam texture with a clay content ranging from 10 to 25 percent.

Generally the soil should have infiltration rates greater than 0.5 inches (1.25 centimeters) per hour, which is typical of sandy loams, loamy sands, or loams. The pH of the soil should range between 5.5 and 6.5, where pollutants such as organic nitrogen and phosphorus can be adsorbed by the soil and microbial activity can flourish. Additional requirements for the planting soil include a 1.5 to 3 percent organic content and a maximum 500 ppm concentration of soluble salts.

Soil tests should be performed for every 500 cubic yards (382 cubic meters) of planting soil, with the exception of pH and organic content tests, which are required only once per bioretention area (EPA, 1999). Planting soil should be 4 inches (10.1 centimeters) deeper than the bottom of the largest root ball and 4 feet (1.2 meters) altogether. This depth will provide adequate soil for the plants' root systems to become established, prevent plant damage due to severe wind, and provide adequate moisture capacity. Most sites will require excavation in order to obtain the recommended depth.

Planting soil depths of greater than 4 feet (1.2 meters) may require additional construction practices such as shoring measures (EPA, 1999). Planting soil should be placed in 18 inches or greater lifts and lightly compacted until the desired depth is reached. Since high canopy trees may be destroyed during maintenance the bioretention area should be vegetated to resemble a terrestrial forest community ecosystem that is dominated by understory trees. Three species each of both trees and shrubs are recommended to be planted at a rate of 2500 trees and shrubs per hectare (1000 per acre). For instance, a 15 foot (4.6 meter) by 40 foot (12.2 meter) bioretention area (600 square feet or 55.75 square meters) would require 14 trees and shrubs. The shrub-to-tree ratio should be 2:1 to 3:1.

Trees and shrubs should be planted when conditions are favorable. Vegetation should be watered at the end of each day for fourteen days following its planting. Plant species tolerant of pollutant loads and varying wet and dry conditions should be used in the bioretention area.

The designer should assess aesthetics, site layout, and maintenance requirements when selecting plant species. Adjacent non-native invasive species should be identified and the designer should take measures, such as providing a soil breach to eliminate the threat of these species invading the bioretention area. Regional landscaping manuals should be consulted to ensure that the planting of the bioretention area meets the landscaping requirements established by the local authorities. The designers should evaluate the best placement of vegetation within the bioretention area. Plants should be placed at irregular intervals to replicate a natural forest. Trees should be placed on the perimeter of the area to provide shade and shelter from the wind. Trees and shrubs can be sheltered from damaging flows if they are placed away from the path of the incoming runoff. In cold climates, species that are more tolerant to cold winds, such as evergreens, should be placed in windier areas of the site.

Following placement of the trees and shrubs, the ground cover and/or mulch should be established. Ground cover such as grasses or legumes can be planted at the beginning of the growing season. Mulch should be placed immediately after trees and shrubs are planted. Two to 3 inches (5 to 7.6 cm) of commercially-available fine shredded hardwood mulch or shredded hardwood chips should be applied to the bioretention area to protect from erosion.

Maintenance

The primary maintenance requirement for bioretention areas is that of inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Plants that are appropriate for the site, climatic, and watering conditions should be selected for use in the bioretention cell. Appropriately selected plants will aide in reducing fertilizer, pesticide, water, and overall maintenance requirements. Bioretention system components should blend over time through plant and root growth, organic decomposition, and the development of a natural

soil horizon. These biologic and physical processes over time will lengthen the facility's life span and reduce the need for extensive maintenance.

Routine maintenance should include a biannual health evaluation of the trees and shrubs and subsequent removal of any dead or diseased vegetation (EPA, 1999). Diseased vegetation should be treated as needed using preventative and low-toxic measures to the extent possible. BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water. Routine inspections for areas of standing water within the BMP and corrective measures to restore proper infiltration rates are necessary to prevent creating mosquito and other vector habitat. In addition, bioretention BMPs are susceptible to invasion by aggressive plant species such as cattails, which increase the chances of water standing and subsequent vector production if not routinely maintained.

In order to maintain the treatment area's appearance it may be necessary to prune and weed. Furthermore, mulch replacement is suggested when erosion is evident or when the site begins to look unattractive. Specifically, the entire area may require mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas. Mulch replacement should be done prior to the start of the wet season.

New Jersey's Department of Environmental Protection states in their bioretention systems standards that accumulated sediment and debris removal (especially at the inflow point) will normally be the primary maintenance function. Other potential tasks include replacement of dead vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment, unclogging the underdrain, and repairing overflow structures. There is also the possibility that the cation exchange capacity of the soils in the cell will be significantly reduced over time. Depending on pollutant loads, soils may need to be replaced within 5-10 years of construction (LID, 2000).

Cost

Construction Cost

Construction cost estimates for a bioretention area are slightly greater than those for the required landscaping for a new development (EPA, 1999). A general rule of thumb (Coffman, 1999) is that residential bioretention areas average about \$3 to \$4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between \$10 to \$40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Retrofitting a site typically costs more, averaging \$6,500 per bioretention area. The higher costs are attributed to the demolition of existing concrete, asphalt, and existing structures and the replacement of fill material with planting soil. The costs of retrofitting a commercial site in Maryland, Kettering Development, with 15 bioretention areas were estimated at \$111,600.

In any bioretention area design, the cost of plants varies substantially and can account for a significant portion of the expenditures. While these cost estimates are slightly greater than those of typical landscaping treatment (due to the increased number of plantings, additional soil excavation, backfill material, use of underdrains etc.), those landscaping expenses that would be required regardless of the bioretention installation should be subtracted when determining the net cost.

Perhaps of most importance, however, the cost savings compared to the use of traditional structural stormwater conveyance systems makes bioretention areas quite attractive financially. For example, the use of bioretention can decrease the cost required for constructing stormwater conveyance systems at a site. A medical office building in Maryland was able to reduce the amount of storm drain pipe that was needed from 800 to 230 feet - a cost savings of \$24,000 (PGDER, 1993). And a new residential development spent a total of approximately \$100,000 using bioretention cells on each lot instead of nearly \$400,000 for the traditional stormwater ponds that were originally planned (Rappahanock,). Also, in residential areas, stormwater management controls become a part of each property owner's landscape, reducing the public burden to maintain large centralized facilities.

Maintenance Cost

The operation and maintenance costs for a bioretention facility will be comparable to those of typical landscaping required for a site. Costs beyond the normal landscaping fees will include the cost for testing the soils and may include costs for a sand bed and planting soil.

References and Sources of Additional Information

Coffman, L.S., R. Goo and R. Frederick, 1999: Low impact development: an innovative alternative approach to stormwater management. Proceedings of the 26th Annual Water Resources Planning and Management Conference ASCE, June 6-9, Tempe, Arizona.

Davis, A.P., Shokouhian, M., Sharma, H. and Minami, C., "Laboratory Study of Biological Retention (Bioretention) for Urban Stormwater Management," *Water Environ. Res.*, 73(1), 5-14 (2001).

Davis, A.P., Shokouhian, M., Sharma, H., Minami, C., and Winogradoff, D. "Water Quality Improvement through Bioretention: Lead, Copper, and Zinc," *Water Environ. Res.*, accepted for publication, August 2002.

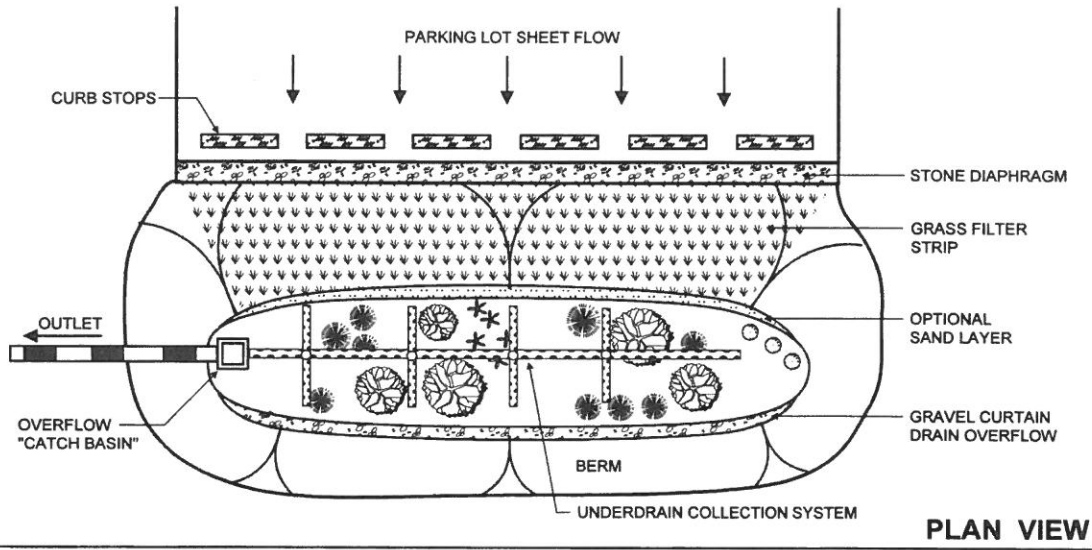
Kim, H., Seagren, E.A., and Davis, A.P., "Engineered Bioretention for Removal of Nitrate from Stormwater Runoff," *WEFTEC 2000 Conference Proceedings on CDROM Research Symposium, Nitrogen Removal*, Session 19, Anaheim CA, October 2000.

Hsieh, C.-h. and Davis, A.P. "Engineering Bioretention for Treatment of Urban Stormwater Runoff," *Watersheds 2002, Proceedings on CDROM Research Symposium*, Session 15, Ft. Lauderdale, FL, Feb. 2002.

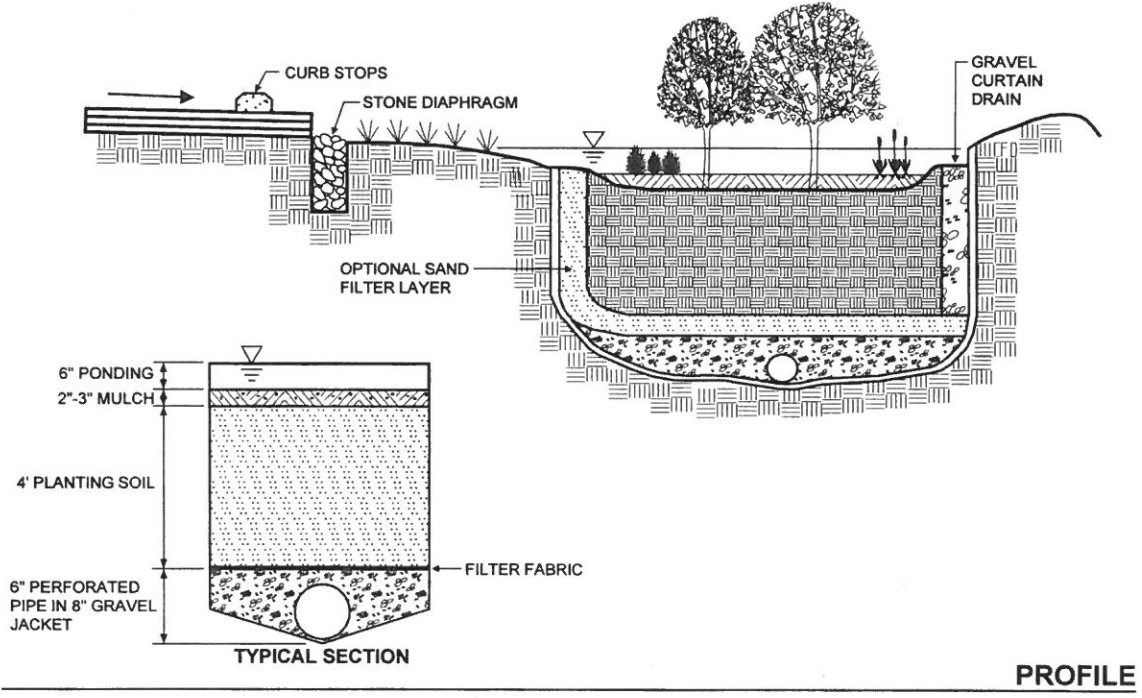
Prince George's County Department of Environmental Resources (PGDER), 1993. Design Manual for Use of *Bioretention in Stormwater Management*. Division of Environmental Management, Watershed Protection Branch. Landover, MD.

U.S. EPA Office of Water, 1999. Stormwater Technology Fact Sheet: Bioretention. EPA 832-F-99-012.

Weinstein, N. Davis, A.P. and Veeramachaneni, R. "Low Impact Development (LID) Stormwater Management Approach for the Control of Diffuse Pollution from Urban Roadways," *5th International Conference Diffuse/Nonpoint Pollution and Watershed Management Proceedings*, C.S. Melching and Emre Alp, Eds. 2001 International Water Association



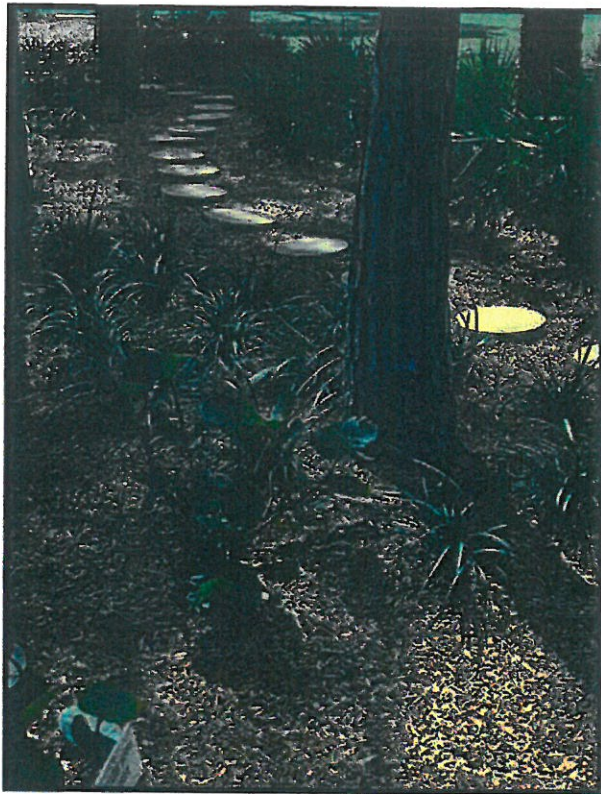
PLAN VIEW



PROFILE

Schematic of a Bioretention Facility (MDE, 2000)

Site Design & Landscape Planning SD-10



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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



Site Design & Landscape Planning SD-10

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

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

Protection of Slopes and Channels during Landscape Design

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





Redeveloping Existing Installations

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



Rain Garden

Design Objectives

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

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

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

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain



Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

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

Supplemental Information

Examples

- ☒ City of Ottawa’s Water Links Surface –Water Quality Protection Program
- ☒ City of Toronto Downspout Disconnection Program
- ☒ City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, “Low-Impact Development”, January/February 2003.
www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD.
www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

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

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



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

Redeveloping Existing Installations

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

Other Resources

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

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

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

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



Design Objectives

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Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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





After the Storm



For more information contact:

ONLY RAIN IN THE STORM DRAIN
Riverside County Flood Control District
1995 Market Street, Riverside, CA 92501
Call Toll Free: 1-800-506-2555
E-mail: flood.fcnpdes@co.riverside.ca.us

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



United States
Environmental Protection
Agency

EPA-333-B-03-002

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*Riverside County
Understanding Stormwater*

What is stormwater runoff?

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



Why is stormwater runoff a problem?

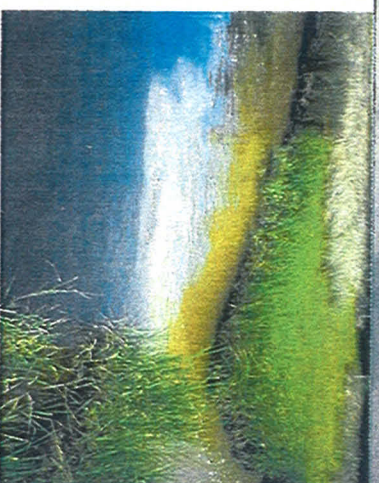


Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking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

The effects of pollution

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

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



Landscape Design & Water Quality

Create a landscape design that reduces pesticide and fertilizer runoff and conserves water. Good plant choices, proper site preparation, installation of “smart” irrigation equipment, and use of porous materials for walkways and other unplanted areas are key elements in an environmentally friendly landscape.

Install porous surfaces in unplanted areas.

- ◆ Use flagstone, interlocking pavers, or pervious concrete on walkways and patios instead of impermeable surfaces such as concrete and asphalt.
- ◆ Interlocking pavers for driveways or an interceptor drain at the bottom of the driveway collect runoff and divert water into your landscape.
- ◆ Consider gravel, organic mulches or other materials that allow water to soak into the ground in unplanted areas.
- ◆ Avoid using concrete, asphalt, compacted bare soil, or other impervious surfaces wherever possible.

Improve water absorption.

- ◆ Add organic matter, such as compost, and aerate regularly to reduce compaction.
- ◆ Use perforated drainage lines to allow water to filter into surrounding soils.
- ◆ Install gravel sumps or other percolation areas to keep water from collecting in unwanted areas.

Choose plants that conserve water, buffer runoff, and resist pest problems.

- ◆ Plant water-efficient plants, including many native species, to reduce irrigation. Some natives require little to no fertilizer or pest management.
- ◆ Use turfgrasses and pest-resistant plants best adapted to the local climate.
- ◆ Install dense plantings with fibrous root systems along landscape edges to reduce runoff and soil erosion.



Create landscape features to collect runoff water.

- ◆ Incorporate long, shallow grassy depressions, known as swales, to hold large amounts of runoff from driveways, streets, or parking lots.
- ◆ Create low-lying areas in the garden to provide temporary storage for heavy runoff and allow sediment, water, and garden chemicals to soak into the ground. Establish plant species that can survive both wet and dryer conditions.
- ◆ Include trees to intercept rainfall.
- ◆ Use rain barrels to collect and store runoff from rooftops for irrigating plants.
- ◆ Add terrace walls or other features.

Install and properly operate irrigation systems and equipment.

- ◆ Check your irrigation system and if necessary, make adjustments; replace old and mismatched sprinklers with low-flow rotor heads.
- ◆ Consider the addition of a “smart” irrigation controller. These are designed to reduce excess irrigation by replacing only the amount of water lost through plant use and evaporation.
- ◆ Install drip systems or soaker hoses for trees, shrubs, and some ground covers.



Minimize the use of pesticides that pollute our waterways. Use nonchemical alternatives or less toxic pesticide products whenever possible. Read product labels carefully and follow instructions on proper use, storage, and disposal.

For more information about managing pests, contact your **University of California Cooperative Extension** office listed under the county government pages of your phone book or the UC IPM Web site at www.ipm.ucdavis.edu.



University of California
Cooperative Extension

What you use in your landscape affects our rivers and oceans!

Text developed through a grant from CA SWRCB and the CALFED Bay-Delta Program.

Stormwater Pollution - Threatening Local Waterways

When you think of water pollution, you might think of foaming industrial outfalls or smelly sewage plants . . . but did you ever consider that YOU might be contributing to the water pollution problem?

Even after industry and sewage plants became regulated, it is still apparent that there are other sources of pollution entering our local waterways. In fact, monitoring programs found that runoff from urban and rural areas causes as much as 60-70% of our water pollution problem.

Many residents are unaware of the problem of stormwater pollution (polluted runoff), and the threat it poses to local waterways. Unfortunately, many people don't realize that storm drains connect to local waterways, so whatever ends up in the storm drains flows directly - without treatment - to our rivers, lakes and streams.

Another misconception is that stormwater pollution happens only when it rains. Actually, throughout the dry part of the year, pollutants such as motor oil, antifreeze, trash and grease accumulate on streets and parking lots. When rain finally does fall, the rain water carries these pollutants into the storm drain. Also, throughout the year, runoff water from lawns and landscaped areas can carry pesticides and fertilizers into the storm drains. Even activities such as washing our cars can result in detergents and dirt making their way into the storm drain.



Since pollution prevention is much easier and less costly than cleaning up after-the-fact, we must all work together to help keep our precious waterways clean.

Here's how YOU can help:

- Don't overdose our environment with pesticides and fertilizers. They contain products which promote algae growth in local waterways. Abundant algae growth suffocates aquatic life. Try non-toxic alternatives for pest control.
- Keep yard and grass clippings out of the storm drains. When these materials reach local waterways, they cloud the water and block sunlight that is essential to aquatic life.
- Pick-up animal waste, seal it in a bag and dispose of it in a trash can. Animal waste contains harmful bacteria and organisms that can spread diseases if allowed to reach the storm drain system.
- Never pour anything into the gutter or down a storm drain.
- Wash cars on a grassy area. Do not allow dirty, soapy water to flow into the street gutter or storm drains.

Here's how WE can help YOU:

The StormWater/CleanWater Protection Program provides a number of FREE pollution prevention materials for residents, schools and club organizations. Call **1-800-506-2555** to order any of the materials or services listed below:

- Less toxic alternatives for the home and garden
- Storm drain pollution prevention materials for children
- Classroom presentations
- Guest speakers for rotary/civic/group functions
- Watershed Maps (illustrating local rivers, lakes and streams)



**Storm Water
Clean Water
PROTECTION PROGRAM**

For information or questions, call your stormwater coordinator at 413-3115.
Sponsored by the City of Moreno Valley and the StormWater/CleanWater Protection Program.

Home Gardening – Made Easy and Pesticide Free



Do you love a beautiful flower garden and a bountiful vegetable patch, but don't like the idea of using pesticides and chemicals to keep pesky bugs away?

Come to a **FREE GARDEN WORKSHOP** to learn how to deter pests out of the garden without the use of pesticides.

At the workshop you will learn how specific plants help to repel pests and how other plants help attract beneficial insects like ladybugs and lacewings.

Call **1-800-506-2555** for information about a **FREE GARDEN WORKSHOP** near you.

Are these familiar garage and household items?

Do you know how to properly dispose of unwanted quantities?

While products such as household cleaners, bleach, oven cleaners, paints, solvents, motor oil and antifreeze serve useful purposes, you must remember to handle them as household hazardous waste (HHW) when you throw away unwanted quantities.

Help keep our environment clean! Recycle unwanted HHW items. There will be an **HHW Collection Event on June 19, 20 and 21** at the Moreno Valley City Corporate Yard located at 15670 Perris Blvd.

You may bring up to five gallons of hazardous liquid waste or a total of 50 pounds maximum per car/per trip (enforced by CHP). Multiple trips are allowed. Containers should be marked and secured to prevent leaks. Containers holding gasoline will not be returned. The collection event will be closed if rained out or excessive winds. Call 358-5256 for more information.

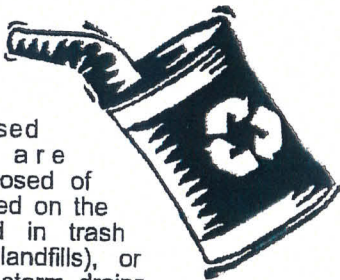


Tips to help protect our environment:

- Never pour any HHW into the gutter or down a storm drain.
- Never pour HHW on the ground as this may percolate to groundwater – an important drinking water resource.
- Never throw HHW in the trash as this may injure sanitation workers and contaminate landfills and the surrounding area.

Do-It-Yourselfers...Remember to Do It Safe and Right

In the United States alone, an estimated 200 million gallons of used motor oil are improperly disposed of by being dumped on the ground, tossed in trash (ending-up in landfills), or poured down storm drains. The good news is it's never been more convenient to recycle used motor oil and oil filters.



Recycle used motor oil by bringing it to a local store in your neighborhood.

- Firestone Store - 24673 Alessandro Blvd. - (909) 242-6631
- Kragen Auto Parts - 24021 Alessandro Blvd., #C - (909) 242-0641
- Kragen Auto Parts - 12240 Perris Blvd. - (909) 247-5509
- Auto Zone - 24570 Alessandro Blvd. - (909) 242-8439
- Auto Zone - 12601 Perris Blvd. - (909) 242-4353
- Auto Zone - 23031 Sunnymead Blvd. - (909) 924-5460
- Pep Boys - 23470 Sunnymead Blvd. - (909) 247-4564
- Grease Monkey - 23165 Hemlock - (909) 247-1873
- Scher Tire - 23135 Hemlock - (909) 924-9797
- Ramona Auto Services, Inc. - 12275 Heacock - (909) 243-6424

For additional recycling locations call 1-800-CLEANUP.

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL

1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
www.rcflood.org

Online resources include:

- California Storm Water Quality Association
www.casqa.org
- State Water Resources Control Board
www.waterboards.ca.gov
- Power Washers of North America
www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers



Storm drain pollution prevention information for:

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

Do you know where street flows actually go?

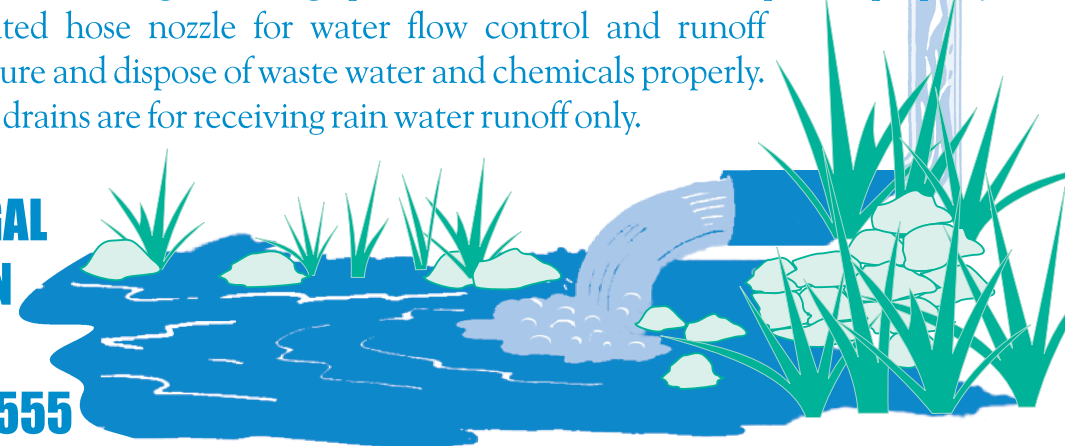
Storm drains are NOT connected to sanitary sewer systems and treatment plants!



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

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

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



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is **PROHIBITED** by law and can result in stiff penalties?

Best Management Practices

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

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

Simple solutions for both light and heavy duty jobs:

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

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

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

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

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

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

Do...check to see if local ordinances prevent certain activities.

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



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

Using Cleaning Agents

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



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

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks *with loose paint*, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

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

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.