

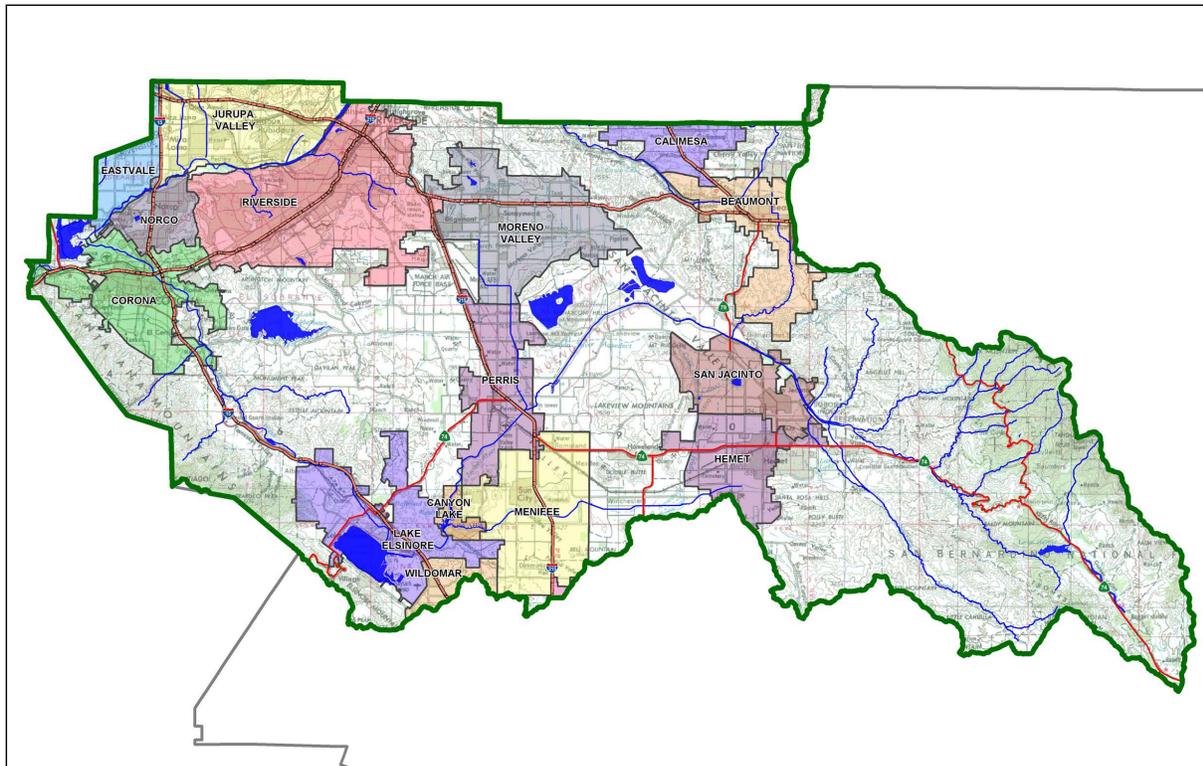
Project Specific Water Quality Management Plan

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

Project Title: Skyline Village PM 37691

Development No: DPR2020-0003

Design Review/Case No: WQ20-001P



- Preliminary
- Final

Original Date Prepared: 3-6-2020

Revision Date(s): 5-20-2021

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**

Contact Information:

Prepared for:

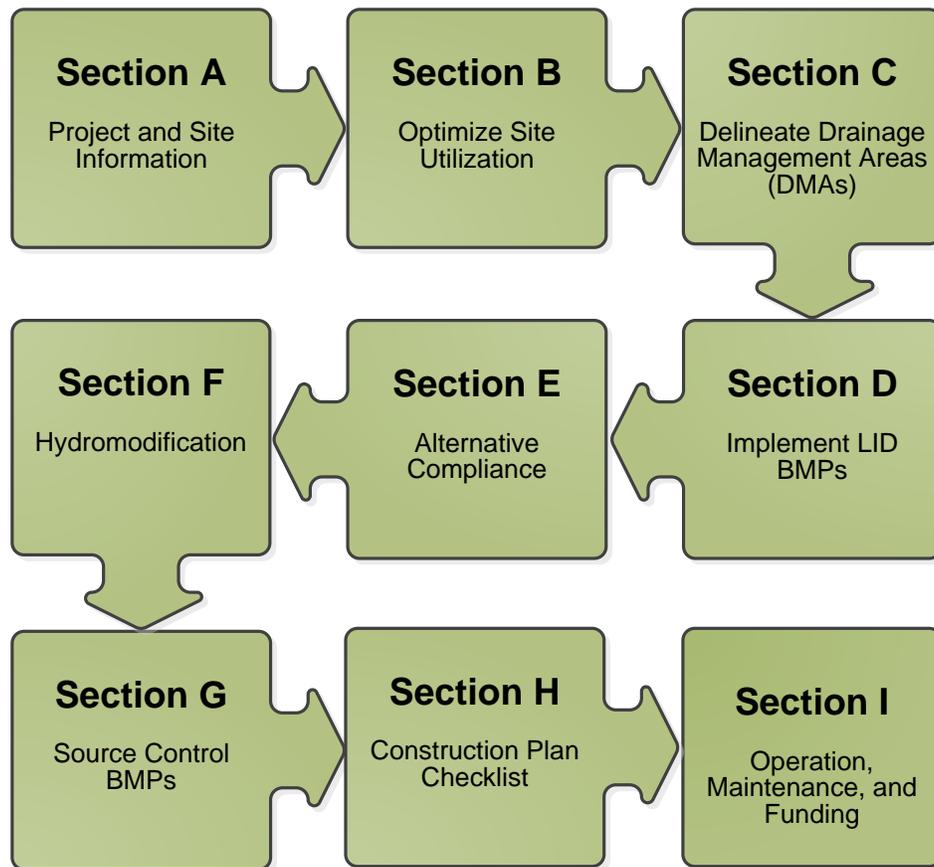
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A Brief Introduction

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 GF Investments, LLC by KWC Engineers for the Skyline Village PM 37691 project.

This WQMP is intended to comply with the requirements of City of Corona for Storm Water Quality Ordinance (Corona Municipal Code Section 15.36, Title 13 Chapter 13.27 and City Council Ordinance No. 2291 and 2828) 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 Corona Water Quality Ordinance (Corona Municipal Code Section 15.36, Title 13 Chapter 13.27 and City Council Ordinance No. 2291 and 2828).

"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."

DocuSigned by:

DA25486A2B6D409...

Chris Bowen

Owner's Printed Name

11/17/2020

Date

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

Mike Taing, P.E.
Preparer's Printed Name

11-12-20

Date

Director of Engineering
Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Mixed-Use
Planning Area:	Temescal Canyon Area Plan
Community Name:	City of Corona
Development Name:	Skyline Village PM 37691
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°50'38"N, 117°36'12"W	
Project Watershed and Sub-Watershed: Santa Ana River Reach 3, Temescal Creek, and Oak Street Channel.	
APN(s): 275-050-014-6 and 275-080-041-3	
Map Book and Page No.: N/A	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Commercial/MF
Proposed or Potential SIC Code(s)	N/A
Area of Impervious Project Footprint (SF)	373,309 sf
Total Area of <u>proposed</u> Impervious Surfaces within the Project Limits (SF)/or Replacement	373,309 sf
Does the project consist of offsite road improvements?	<input type="checkbox"/> Y <input checked="" 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 (SF)	0 sf
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 checked="" type="checkbox"/> Y <input 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?	0.95
Project Description:	
<p>The Skyline Village project is comprised of approximately 17.02 acres of vacant land located in the hills south of the City of Corona in the County of Riverside. The site is located approximately 3 miles south of the 71 and 91 Freeways and approximately 4 miles west of Interstate 15 (I-15). The site is within the City of Corona's Sphere of Influence and is proposed to be annexed to the City during the entitlement process.</p> <p>The Skyline Village project is generally bounded to the east by Foothill Parkway, on the south by undeveloped open space land adjacent to single-family residences Tract 31955, on the west and southwest by undeveloped open space land adjacent Tract 36544 and north by undeveloped open space land adjacent to single-family residences Tract 36544. The immediate surrounding area consists of Low Density Residential (2-6 du/ac) within the City of Corona. Figure 2 in Appendix 1 shows a vicinity map of the area illustrating the location of the project and the developments in the area. Project Number: PWWQ2020-0002</p>	

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

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.

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
Temescal Creek Reach 1	pH	REC 2, WARM, WILD	-
Prado Dam	None	REC1, REC2, WARM, WILD, RARE	N/A
Santa Ana River Reach 3	Lead, Copper (Wet Season Only)	AGR, GWR, REC 1, REC 2, WARM, WILD, RARE, SPWN	6.5 miles

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 checked="" type="checkbox"/> Y	<input 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 <i>(please list in the space below as required)</i> City of Corona Grading, Improvement, and Building Permits.	<input checked="" type="checkbox"/> Y	<input type="checkbox"/> N

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.

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 existing drainage patterns of the site were identified and preserved. In the existing condition, the site drains from the southwest to northeast of the site along several valleys and stream channels. Existing flows from the site drain to Kroonen Channel and Oak Street Reservoir to the north and east of the site. The existing and proposed drainage patterns are identified on the WQMP Site Plan (as well as identified in the project Preliminary Hydrology Report). Using a system of interceptor drains, ditches, and storm drain piping, offsite flow will by-pass the site and will not be co-mingled with development runoff which needs to be treated at the proposed designated BMP treatment areas.

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

The project site borders the Cleveland National Forest. The site consists of sparsely vegetated and otherwise undeveloped land with the exception of dirt roads. The site is characterized by steep topography, generally increasing in elevation from the northeast to the southwest. Due to the nature of the project, a majority of the project area will be developed. Some areas within the property boundary will remain as open space and undisturbed areas. The natural open space areas are comprised of approximately 3.33 acres. The existing vegetation and drainage patterns will be protected and are identified in the WQMP Site Plan.

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

As proposed by the development, the site will be subject to fill of up to 24 feet in some of the canyon bottoms and cuts of up to 96 feet along some of the ridgelines. The site consists of alluvium and colluvium deposits. The infiltration test results are included in Appendix 3 of the report.

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

Due to this project being a commercial development, a majority of the area will be impervious building and parking areas. The project adheres to City of Corona development guidelines with respect to landscaping area requirements.

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

Yes, roof runoff has been designed to drain into pervious landscape areas surrounding each proposed commercial building prior to discharge onto streets or connection to proposed on-site storm drain systems. The 2-yr storm runoff from development will be collected and conveyed to proposed WQMP treatment areas for treatment prior to discharge or connection to proposed on-site storm drain 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) ¹	Area (Sq. Ft.)	DMA Type
DMA 1	Roofs, Concrete/Asphalt, Landscaping, Open Space	398,342 sf	Type D
1A	Roofs	11,118 sf	Type D
1B	Hardscape	12,849 sf	Type D
1C	Street	25,239 sf	Type D
1D	Open	321,405	Type D
1E	Landscape	27,641 sf	Type D
DMA 2	Roofs, Concrete/Asphalt, Landscaping	395,994 sf	Type D
2A	Roofs	57,695 sf	Type D
2B	Hardscape	88,438 sf	Type D
2C	Street	127,687 sf	Type D
2D	Open	7,524 sf	Type D
2E	Landscape	114,650 sf	Type D
DMA 3	Roofs, Concrete/Asphalt, Landscaping, Open Space	36,953 sf	Type D
3A	Roofs	0 sf	Type D
3B	Hardscape	3,252 sf	Type D
3C	Street	15,080 sf	Type D
3D	Open	0 sf	Type D
3E	Landscape	18,621 sf	Type D
DMA 4	Concrete/Asphalt, Landscaping	33,975 sf	Type D
4A	Roofs	0 sf	Type D
4B	Hardscape	1,132 sf	Type D
4C	Street	12,068 sf	Type D
4D	Open	0 sf	Type D
4E	Landscape	20,775 sf	Type D
DMA 5	Concrete/Asphalt, Landscaping	35,743 sf	Type D
5A	Roofs	0 sf	Type D
5B	Hardscape	0 sf	Type D
5C	Street	18,151 sf	Type D
5D	Open	0 sf	Type D
5E	Landscape	17,592 sf	Type D
DMA 6	Self-Treating Area	108,735 sf	Type A

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

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
DMA 6	108,735 sf	Slope	N/A

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) = [D]
		[A]	[B]			
N/A						

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

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	Runoff factor	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]
N/A							

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

DMA Name or ID	BMP Name or ID
DMA 1	Infiltration Basin
DMA 2	Infiltration Basin
DMA 3	Modular Wetland System
DMA 4	Modular Wetland System
DMA 5	Modular Wetland System

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. 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 Co-permittee 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: DMA 1, 2, 3, 4, & 5	X	
...geotechnical report identifies other site-specific factors that would preclude effective and safe infiltration? Describe here:		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

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 Co-permittee).
- 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 neither 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: 9.98 AC

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: 7.04 AC

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: 2.65

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: 19.42 AC

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)
19.42 AC	9.98 AC

Toilet Use Feasibility

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

N/A

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:

Project Type:

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:

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number of toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor:

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:

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)

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:

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:

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

Enter the factor from Table 2-3:

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

Minimum required use:

Step 5: Determine if harvesting stormwater runoff for other non-potable 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 non-potable use (Step 4)	Projected average daily use (Step 1)

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, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

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	
DMA Basin 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DMA Basin 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DMA Basin 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
DMA Basin 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
DMA Basin 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" 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 Biotreatment Basins 3, 4, and 5 do not qualify for infiltration basins because the infiltration rate does not meet the minimum standard based on the Technical Infeasibility Criteria in Appendix 5. The infiltration basins that correspond to DMA Areas 1 and 2 handle the majority of the site runoff. DMA Areas 3, 4, and 5 only collect minor street and sloping area runoff, which belong to the outer portions of the site. Due to the small amount of runoff per area and the lack of space to fit infiltration basins or harvest and use basins, options 1 and 2 are not feasible. Since these areas have a lower infiltration rate than 0.3 inches per hour, the Biotreatment BMPs were selected for DMA Areas 3, 4, and 5. For further information, see Appendix 5.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume or Flow Rate will be addressed by the selected BMPs. First, calculate the Design Capture Volume or Flow Rate for each LID BMP using the V_{BMP} or Q_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second, design the LID BMP to meet the required V_{BMP} or Q_{BMP} using a method approved by the Co-permittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Co-permittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume of Flow and the Proposed Volume or Flow 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.

Refer to Appendix 6 for DCV calculations sheets corresponding to the proposed LID BMPs. All proposed BMPs are designed to handle and treat the minimum design capture volumes as identified on the DCV calculations.

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 x Runoff Factor	BMP 1 - Infiltration Basin		
Basin 1	[A]		[B]	[C]	[A] x [C]			
1A	11,118	Roofs	1	0.89	9,917.3	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
1B	12,849	Concrete	1	0.892	11,461.3			
1C	25,329	Asphalt	1	0.892	22,593.5			
1D	321,405	Natural (D Soil)	0.4	0.279712	89,900.8			
1E	27,641	Ornamental Landscaping	0.1	0.110458	3,053.2			
	$A_T =$ 398,342				$\Sigma =$ 136,926.1	0.95	10,840	11,421

[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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	BMP 2 - Infiltration Basin		
Basin 2	[A]		[B]	[C]	[A] x [C]			
2A	57,695	Roofs	1	0.89	51,463.9	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
2B	88,438	Concrete or Asphalt	1	0.892	78,886.7			
2C	127,687	Asphalt	1	0.892	113,896.8			
2D	7,524	Natural (D Soil)	0.4	0.279712	2,104.6			
2E	114,650	Ornamental Landscaping	0.1	0.110458	12,664			
	$A_T =$ 395,994				$\Sigma =$ 259,016	0.95	20,505.4	20,923

[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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas \times Runoff Factor	BMP 3 - Modular Wetland		
Basin 3	[A]		[B]	[C]	[A] \times [C]			
3B	3,252	Concrete or Asphalt	1	0.892	2,900.8	Design Rainfall Intensity (in/hr)	Design Flow Rate, Q_{BMP} (cfs)	Proposed Flow Rate (cfs)
3C	15,080	Concrete or Asphalt	1	0.892	13,451.4			
3E	18,621	Ornamental Landscaping	0.1	0.110458	2,056.8			
	$A_T =$ 36,953				$\Sigma =$ 18,409	0.20	0.10	0.115

[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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas \times Runoff Factor	BMP 4 - Modular Wetland		
Basin 4	[A]		[B]	[C]	[A] \times [C]			
4B	1,132	Concrete or Asphalt	1	0.892	1,009.7	Design Rainfall Intensity (in/hr)	Design Flow Rate, Q_{BMP} (cfs)	Proposed Flow Rate (cfs)
4C	12,068	Concrete or Asphalt	1	0.892	10,764.7			
4E	20,775	Ornamental Landscaping	0.1	0.110458	2,294.8			
	$A_T =$ 33,975				$\Sigma =$ 14,069.2	0.20	0.10	0.115

[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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas \times Runoff Factor	BMP 5 - Modular Wetland		
Basin 5	[A]		[B]	[C]	[A] \times [C]			
5C	18,151	Concrete or Asphalt	1	0.892	16,190.7	Design Rainfall Intensity (in/hr)	Design Flow Rate, Q_{BMP} (cfs)	Proposed Flow Rate (cfs)
5E	17,592	Ornamental Landscaping	0.1	0.110458	1,943.2			
	$A_T =$ 35,743				$\Sigma =$ 18,133.9	0.20	0.10	0.115

[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 Co-permittee). 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.

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 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 checked="" 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 checked="" 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 checked="" 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"/>							

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.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
DMA 1 (Infiltration Basin)	Bacteria, Metals, Nutrients, Pesticides, Toxic Organic Compounds, Sediments, Trash & Debris, Oils & Grease	60% Medium
DMA 2 (Infiltration Basin)	Bacteria, Metals, Nutrients, Pesticides, Toxic Organic Compounds, Sediments, Trash & Debris, Oils & Grease	60% Medium
DMA 3 (Bio-Filtration)	Bacteria, Metals, Nutrients, Pesticides, Toxic Organic Compounds, Sediments, Trash & Debris, Oils & Grease	60% Medium
DMA 4 (Bio-Filtration)	Bacteria, Metals, Nutrients, Pesticides, Toxic Organic Compounds, Sediments, Trash & Debris, Oils & Grease	60% Medium
DMA 5 (Bio-Filtration)	Bacteria, Metals, Nutrients, Pesticides, Toxic Organic Compounds, Sediments, Trash & Debris, Oils & Grease	60% Medium

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 Co-permittee 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			
Volume (Cubic Feet)			

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 Sensitivity 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 runoff from the proposed project site discharges directly to the Kroonen Channel and Oak Street Reservoir, which connect to City/County maintained MS4 Storm Drain System, which in turn drain to the Santa Ana River Reach 3. These facilities have been identified by Riverside County Flood Control and Water Conservation District to be within a watershed not susceptible to HCOC according to the HCOC Applicability Map. This map is included in Appendix 7.

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. Co-permittee 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	<ul style="list-style-type: none"> • Mark all inlets with the words “Only Rain Down the Storm Drain” or similar. Catch Basin Markers shall be per local agency requirements 	<ul style="list-style-type: none"> • Maintain and periodically repaint or replace inlet markings. • Provide Stormwater pollution prevention information to new site owners, lessees, or operators. • See applicable operational BMPs in Fact Sheet SC-44, “Drainage System Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com • Include the following in lease agreements: “Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.”

Interior floor drains and elevator shaft sump pumps	<ul style="list-style-type: none"> • State that interior floor drains add elevator shaft sump pump will be plumbed to sanitary sewer. 	<ul style="list-style-type: none"> • Inspect and maintain drains to prevent blockages and overflow.
Need for future indoor & structural pest control	<ul style="list-style-type: none"> • Note building design features that discourage entry of pests. 	<ul style="list-style-type: none"> • Provide Integrated Pest Management information to owners, lessees, and operators.
Landscape/ Outdoor Pesticide Use	<p>Final landscape plans will accomplish all of the following:</p> <ul style="list-style-type: none"> • Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. • Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. • Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. • Consider using pest-resistant plants, especially adjacent to hardscape. • To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. 	<ul style="list-style-type: none"> • Maintain landscaping using minimum or no pesticides. • See applicable operational BMPs in “What you should know for.....landscape and Gardening” at http://rcflood.org/stormwater/ • Provide IPM information to new owners, lessees and operators.
Food Service	<ul style="list-style-type: none"> • State how site refuse will be handled and provide supporting detail to what is shown on plans. • State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar. 	<ul style="list-style-type: none"> • State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post “no hazardous material” 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 and Quality

		Handbooks at www.cabmphandbooks.com
Refuse areas	<ul style="list-style-type: none"> • Site refuse (trash) will be contracted with local refuse Collection Company for regular pick up and disposal on onsite refuse. • Signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar. 	<ul style="list-style-type: none"> • Adequate onsite refuse receptacles will be provided per local agency requirements. • Onsite refuse receptacles will be inspected regularly as dictated by the approved CC&Rs for the development. • Onsite refuse receptacles will be kept covered and repaired or replaced as dictated by the approved CC&Rs for the development. • All leaky onsite refuse receptacles will be repaired or replaced. • Post “no hazardous materials” signs to prohibit/prevent dumping of liquid or hazardous wastes. <p>Inspect and pick up litter daily and clean up spills immediately as dictated by the approved CC&Rs for the development. 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>
Fire Sprinkler Test Water	<ul style="list-style-type: none"> • Provide a means to drain fire sprinkler test water to the sanitary sewer. 	<ul style="list-style-type: none"> • See the note in Fact Sheet SC-41, “Building and Grounds Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
Sidewalks, and parking lots.		<ul style="list-style-type: none"> • 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.

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 G.2 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
DMA 1	Infiltration Basin	Precise Grading Plans
DMA 2	Infiltration Basin	Precise Grading Plans
DMA 3	Bio-Filtration Unit	Precise Grading Plans
DMA 4	Bio-Filtration Unit	Precise Grading Plans
DMA 5	Bio-Filtration Unit	Precise Grading Plans

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 H: Operation, Maintenance and Funding

The Co-permittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Co-permittee 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:

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

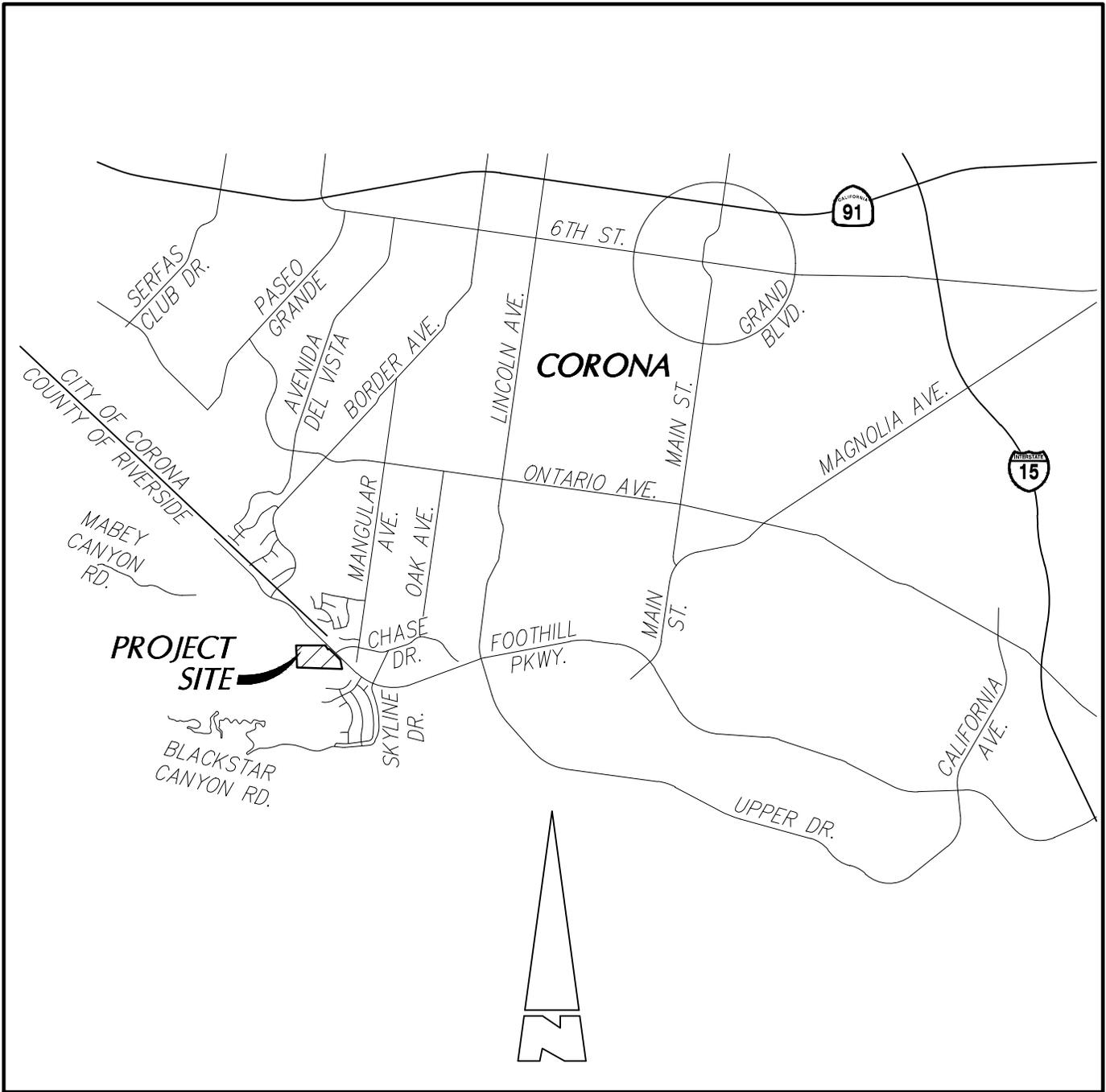
Y N

A Property Owner Association will be responsible to maintain the proposed BMPs as required by the property CC&Rs and guidance set forth in this WQMP report. The Water Quality Management Plan and Stormwater BMP Maintenance and Right of Entry Agreement between the City of Corona and GF Investments, LLC is included in Appendix 9.

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



LOCATION MAP

NOT TO SCALE



CIVIL ENGINEERS • PLANNERS • SURVEYORS
 1880 COMPTON AVENUE, SUITE 100 • CORONA, CA. 92881-3370 • 951-734-2130

FIGURE 1



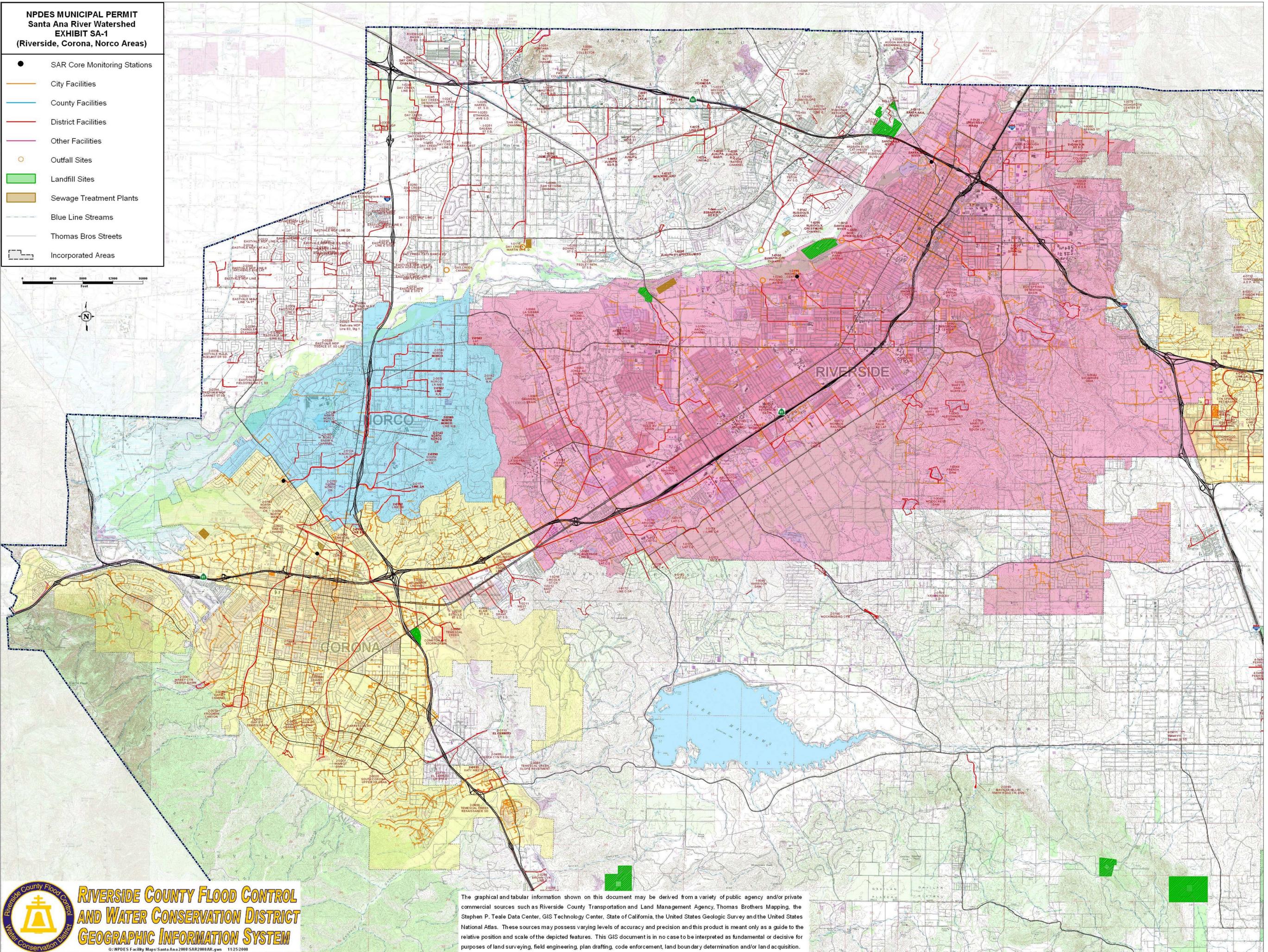
FIGURE 2
VICINITY MAP



**NPDES MUNICIPAL PERMIT
Santa Ana River Watershed
EXHIBIT SA-1
(Riverside, Corona, Norco Areas)**

- SAR Core Monitoring Stations
- City Facilities
- County Facilities
- District Facilities
- Other Facilities
- Outfall Sites
- Landfill Sites
- Sewage Treatment Plants
- Blue Line Streams
- Thomas Bros Streets
- Incorporated Areas

0 4000 8000 12000 16000
Feet

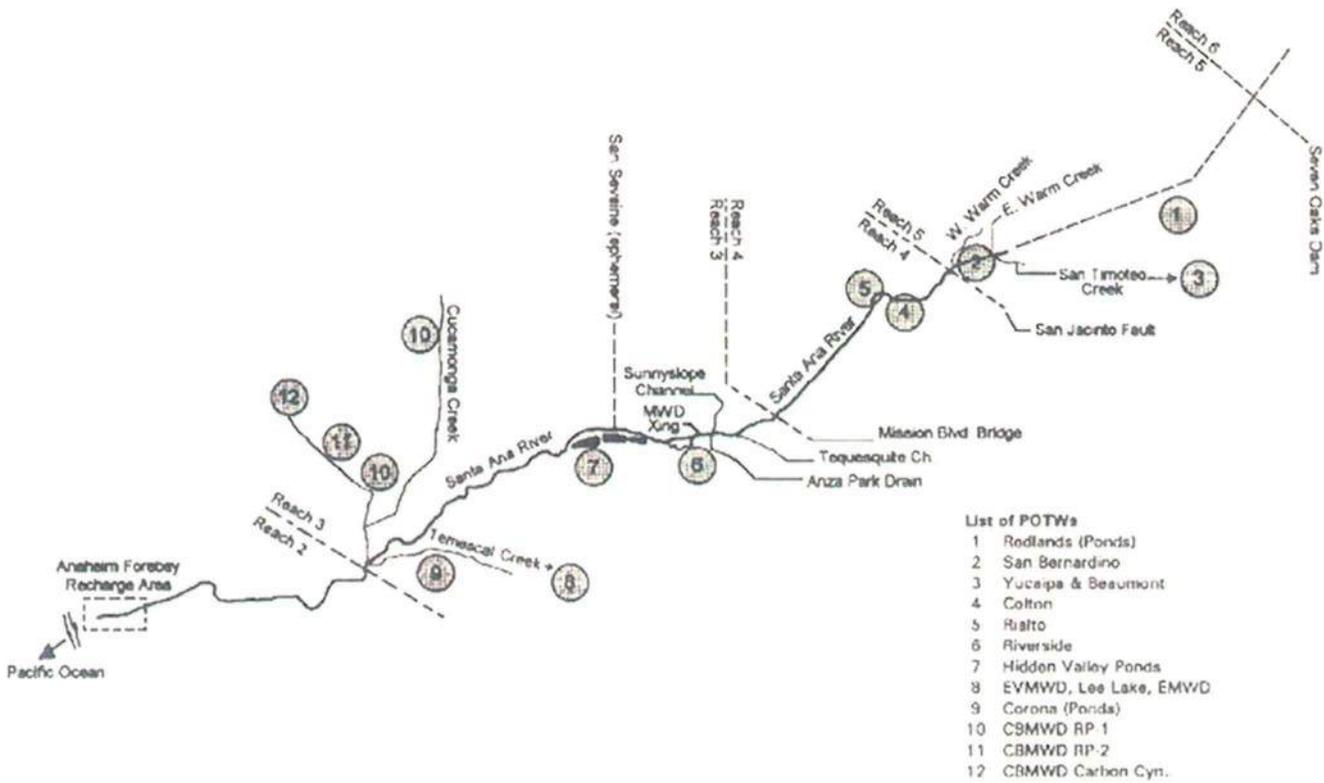


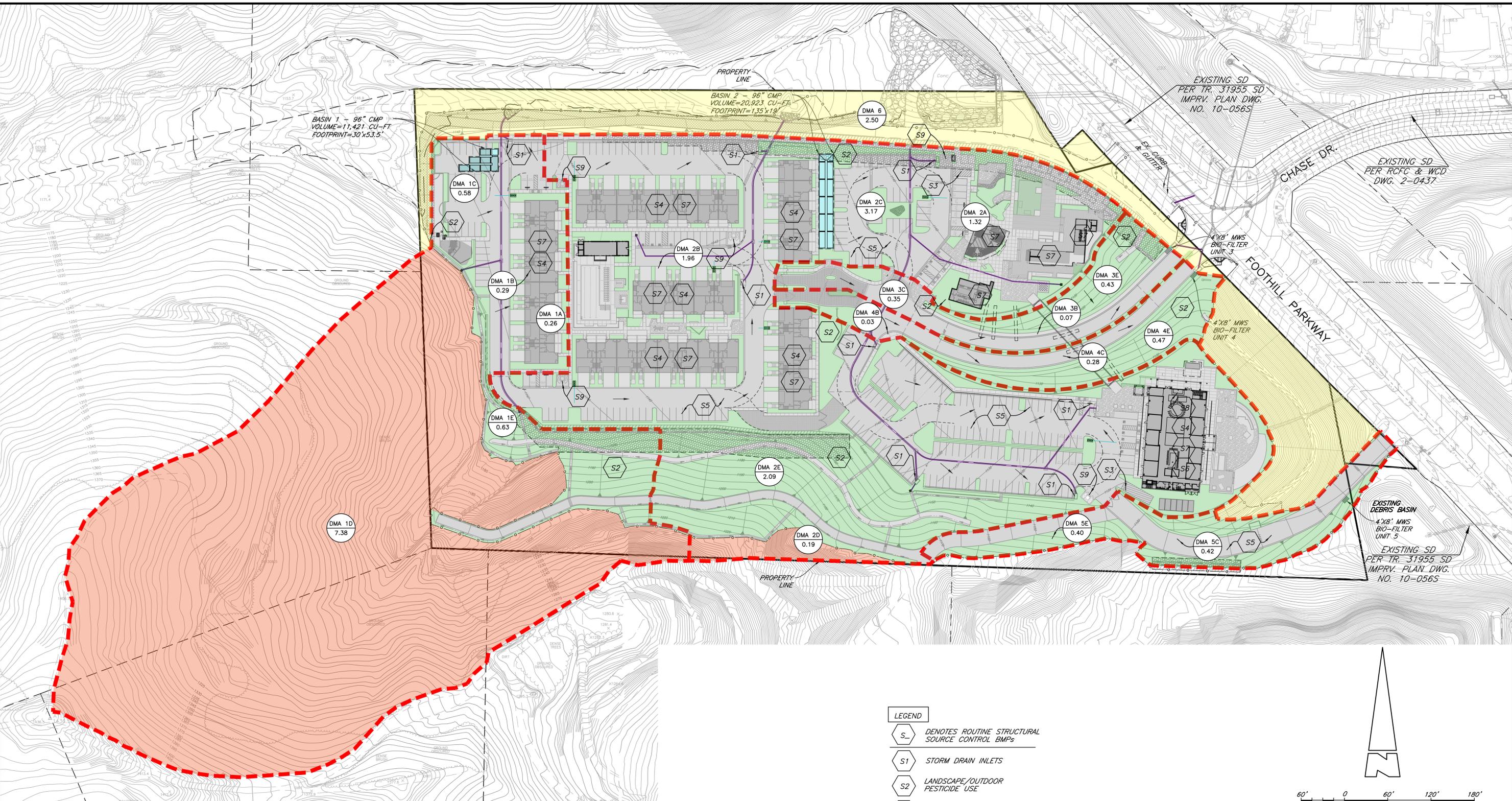
**RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT
GEOGRAPHIC INFORMATION SYSTEM**

Q:\NPDES Facility Maps\Santa Ana 2008\SAR2008AR.gws 11/25/2008

The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

FIGURE 1-2
SANTA ANA RIVER AND TRIBUTARIES





LEGEND

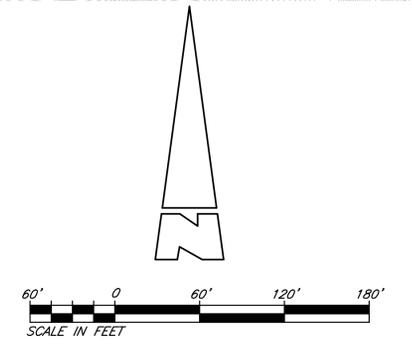
	ROOF AREA		TRIBUTARY AREA BOUNDARY
	STREET AREA		PROPOSED STORM DRAIN
	CONCRETE AREA		PROPOSED CATCH BASIN
	LANDSCAPING AREA		AREA DRAIN/GRATE INLET
	OPEN SPACE		DRAINAGE FLOW DIRECTION
	WQMP BASIN/MWS UNIT		RIDGE LINE
	SELF-TREATING AREA		

NOTE: ROOF LINES AND DOWNSPOUTS ARE NOT SHOWN FOR SAKE OF CLARITY ON THE SITE PLAN.

WQMP TREATMENT SUMMARY TABLE

UNIT	DMA AREA (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	DESIGN CAPTURE VOLUME (CU-FT)	PROPOSED CAPTURE VOLUME (CU-FT)	DESIGN FLOW RATE (CFS)	PROPOSED FLOW RATE (CFS)
1	9.14	1.13	8.01	10,840	11,421	-	-
2	9.09	6.29	2.80	20,505	20,923	-	-
3	0.85	0.42	0.43	-	-	0.100	0.115
4	0.78	0.31	0.47	-	-	0.100	0.115
5	0.82	0.42	0.40	-	-	0.100	0.115
6	2.50	-	2.50	-	-	-	-
TOTAL	23.18	8.57	14.61	31,345	32,344	0.300	0.345

- LEGEND**
- DENOTES ROUTINE STRUCTURAL SOURCE CONTROL BMPs
 - STORM DRAIN INLETS
 - LANDSCAPE/OUTDOOR PESTICIDE USE
 - LOADING DOCKS
 - FIRE SPRINKLER TEST WATER
 - STREET SWEEPING PLAZAS, SIDEWALKS AND PARKING LOTS
 - INTERIOR FLOOR DRAINS AND ELEVATOR SUMP PUMPS
 - INDOOR & STRUCTURAL PEST CONTROL
 - FOOD SERVICE
 - REFUSE AREAS



PRELIMINARY WQMP EXHIBIT
SKYLINE VILLAGE COMMERCIAL CENTER
CITY OF CORONA

PREPARED FOR: GF INVESTMENTS, INC.
 1871 CALIFORNIA AVE
 CORONA, CA 92881
 (951) 603-5042

PREPARED BY: **KWC ENGINEERS**
 CIVIL ENGINEERS • PLANNERS • SURVEYORS
 1880 COMPTON AVENUE, SUITE 100 CORONA, CA 92881-3370 951-734-2130

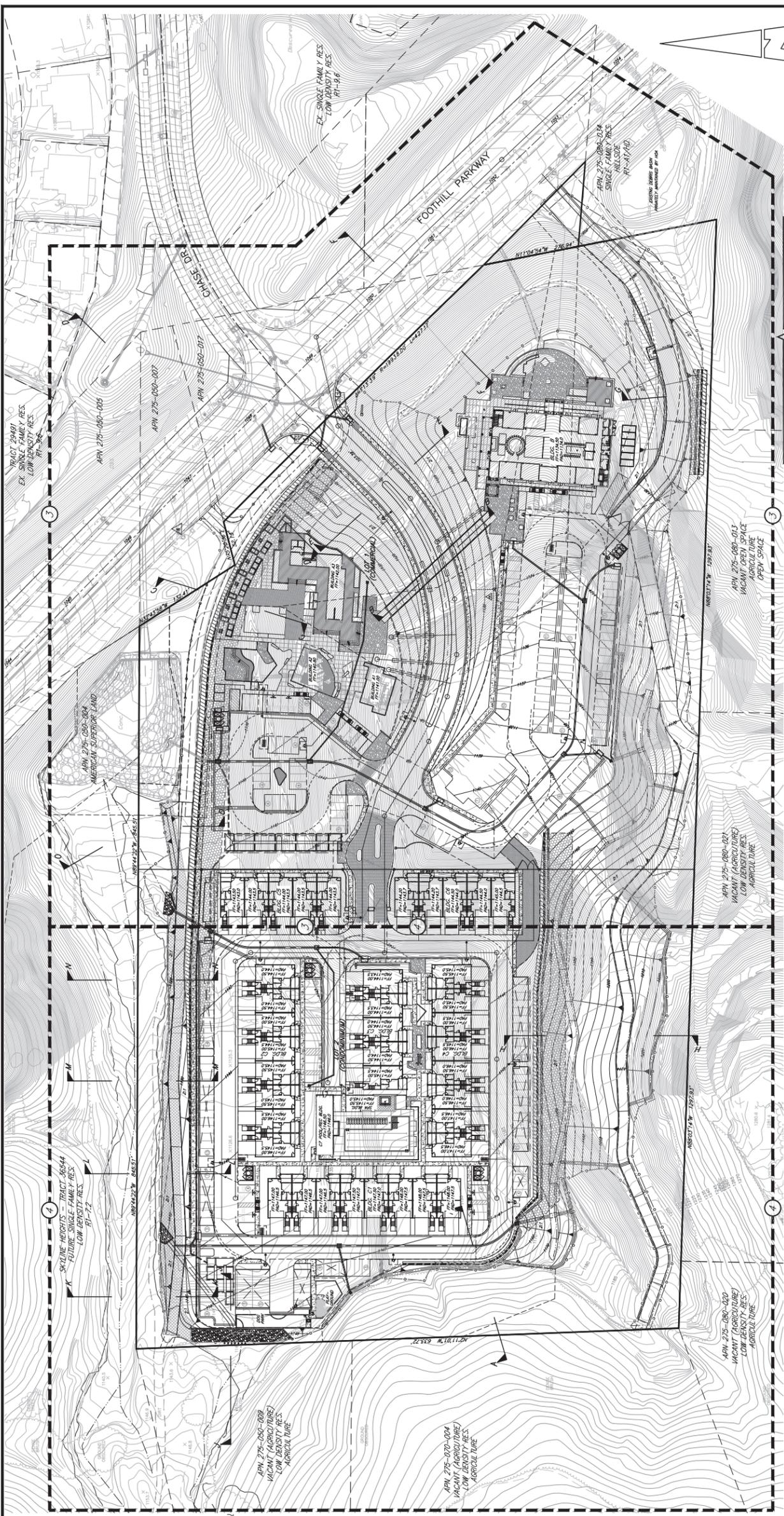
SHEET 1 OF 1 SHEETS

DATED: 11-6-20

18-1847-01 R:1/18/1847 PRELIM WQMP REPORTS PRELIM WQMP Appendix 1-Map and Site Plans Prelim WQMP Site Plan.dwg 04/22/2021 09:44

Appendix 2: Construction Plans

Grading and Drainage Plans



PRECISE PLAN
SKYLINE VILLAGE - T1M 37691
CITY OF CORONA

PREPARED FOR:
 GF INVESTMENTS, LLC,
 110 N. LINCOLN AVE #202
 CORONA, CA 92882
 (951) 603-5042

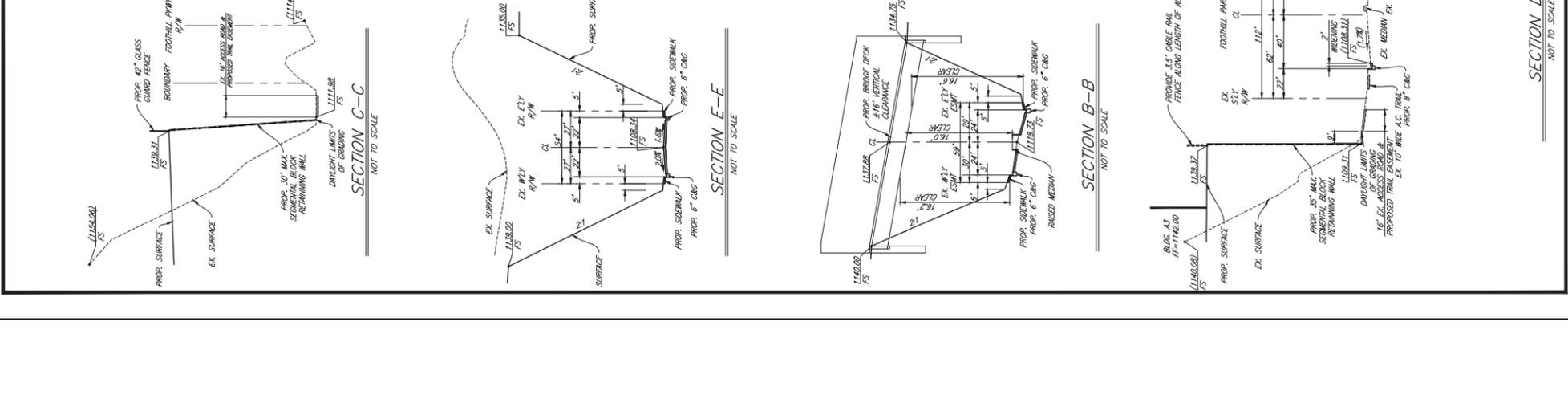
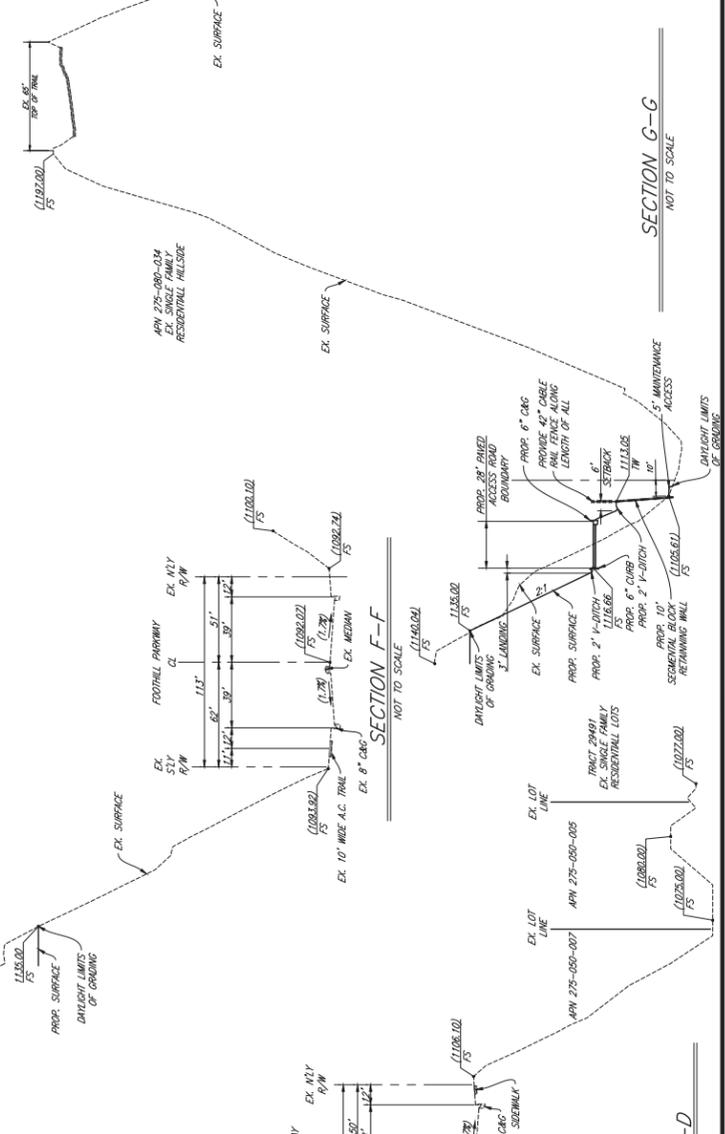
PREPARED BY:
HUG ENGINEERS
 1800 COMMON AERIAL, SUITE 100, CORONA, CA 92882-5555 951-734-1330

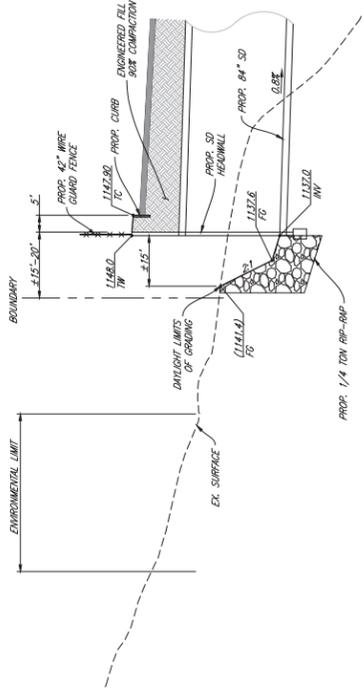
SHEET
 2 OF 5
 SHEET

INDEX MAP
 SCALE: 1"=50'

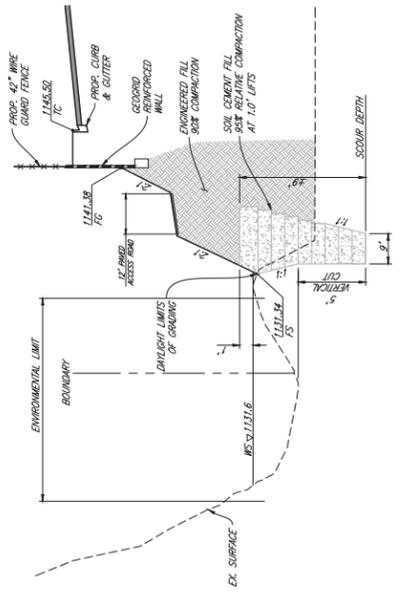
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- (1) INDICATES GRADING PLAN SHEET NUMBER
- INDICATES GRADING PLAN SHEET LIMIT

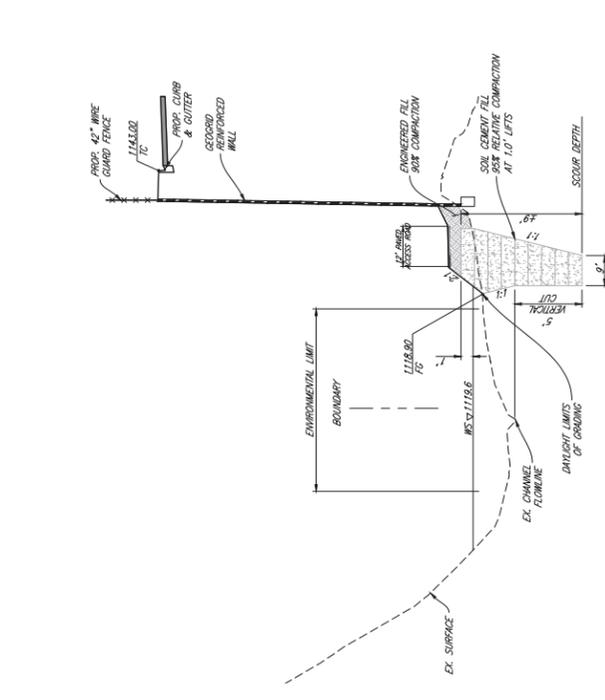




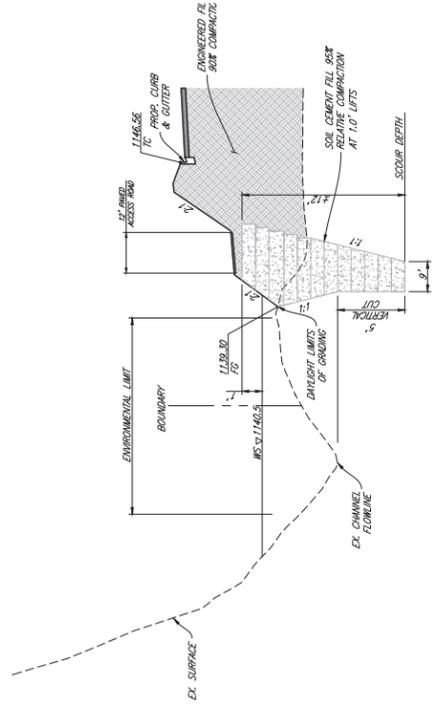
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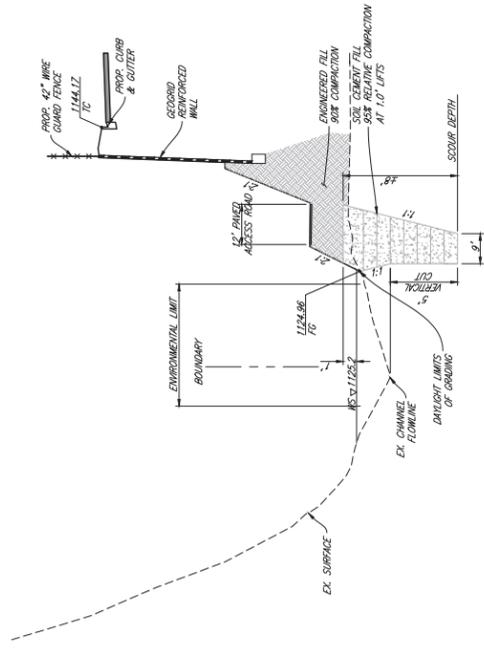
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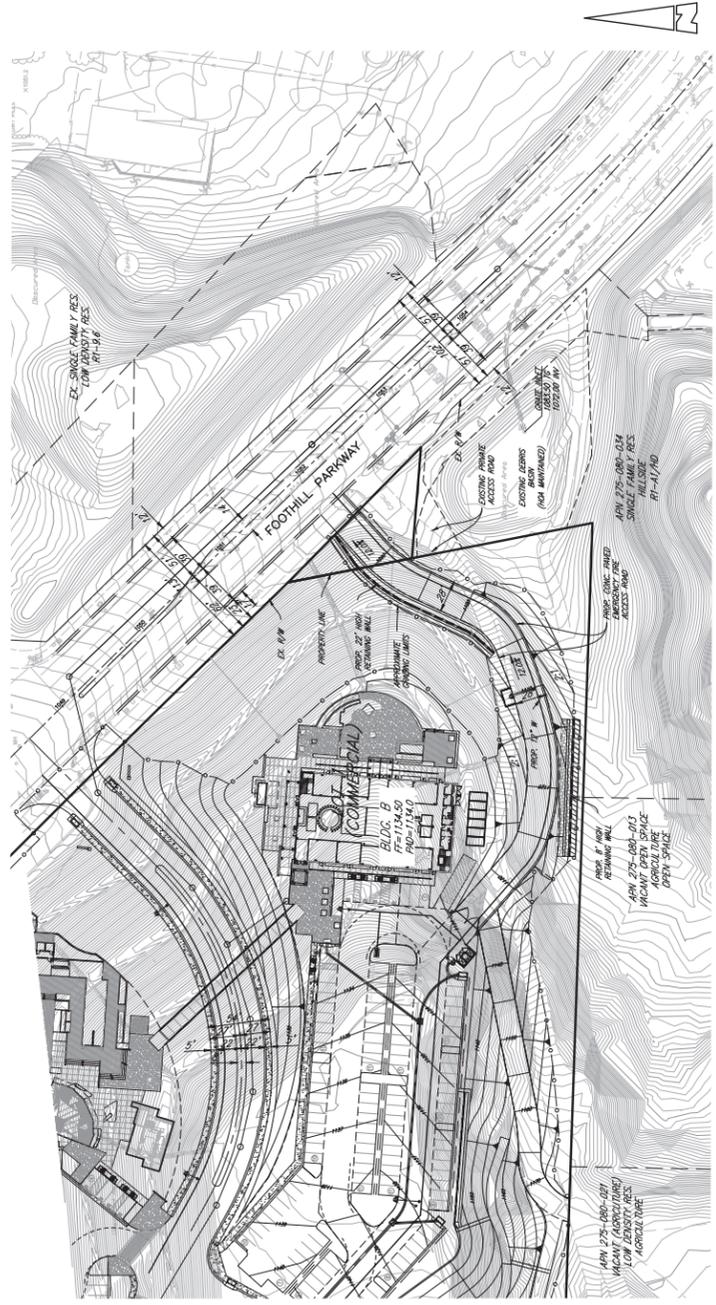
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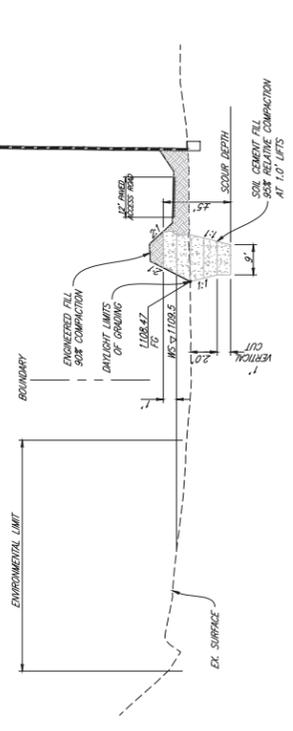
SECTION K-K
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SECTION M-M
NOT TO SCALE



ALTERNATIVE EVA ACCESS CONCEPT
SCALE: 1"=60'



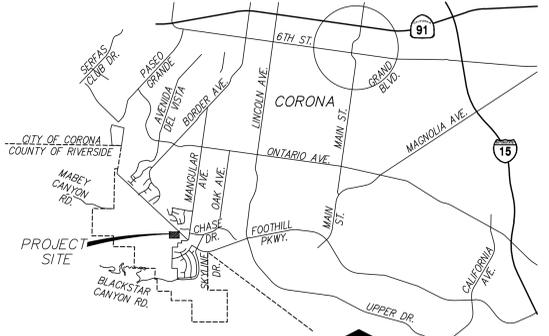
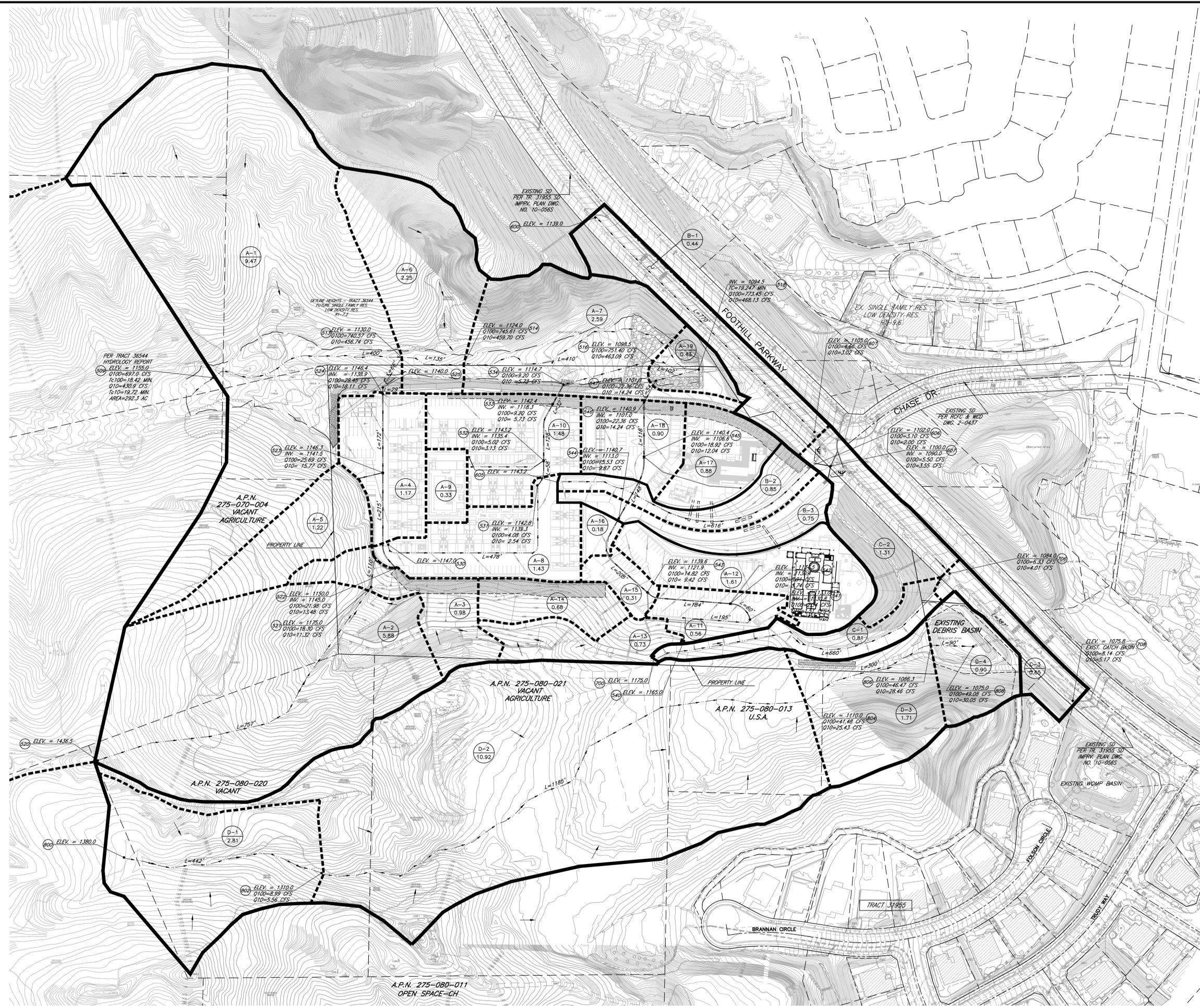
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PRECISE PLAN
SKYLINE VILLAGE - TTM 37691
CITY OF CORONA

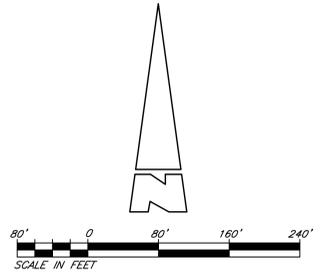
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PREPARED BY
HWC ENGINEERS
1800 COMMON AERIAL, SUITE 100, CORONA, CA 92881-5055
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SHEET
5 OF 5
SHEET



VICINITY MAP:
N. T. S.



LEGEND

- MAJOR WATERSHED BOUNDARY
- - - SUB DRAINAGE AREA BOUNDARY
- FLOW PATH
- DIRECTION OF FLOW
- (C17) DRAINAGE AREA DESIGNATION
- 70.21 ACRES
- (S40) NODE DESIGNATION
- L=300' LENGTH OF EXISTING FLOW PATH
- Q₁₀₀ CALCULATED 100-YEAR STORM RUNOFF
- Q₁₀ CALCULATED 10-YEAR STORM RUNOFF
- SOIL TYPE "D"

**PROPOSED CONDITION
HYDROLOGY KEY MAP
FOR
SKYLINE VILLAGE COMMERCIAL CENTER
COUNTY RIVERSIDE**

HYD: CS	KWC ENGINEERS CIVIL ENGINEERING, PLANNING AND CONSTRUCTION MANAGEMENT 1880 COMPTON AVENUE, SUITE 100 • CORONA, CA 92681-3370 • 951-734-2150	SHEET
DRAFT: CS		7
CHECK: MCT		OF
		1

JUN 18, 1947, LOG. RE: 181 (1847) (PRELIMINARY REPORTS) (HYDRO) (PRELIMINARY FIGURES) (1847) (HYDRO) (PROPOSING)

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data



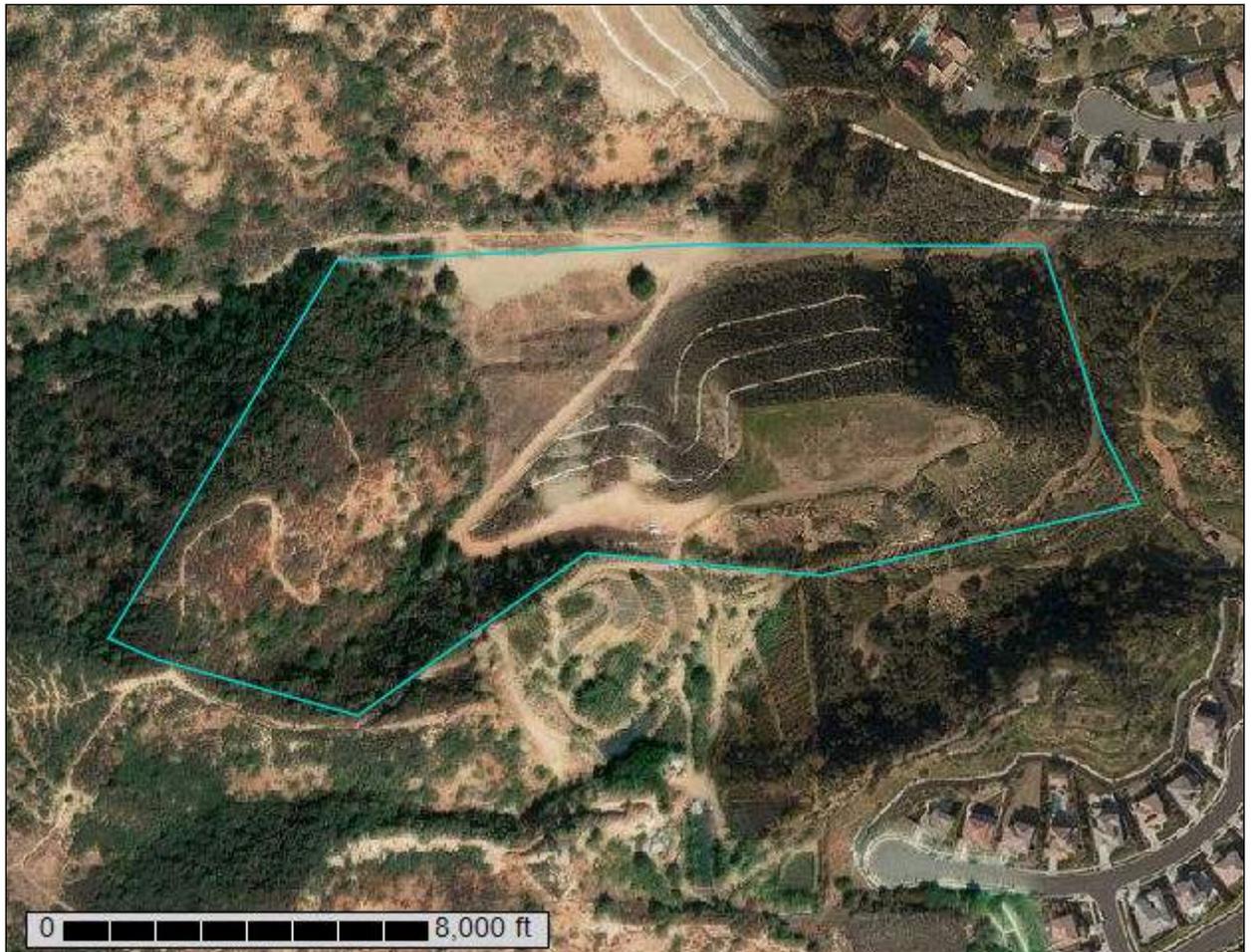
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

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

Custom Soil Resource Report for Orange County and Part of Riverside County, California



Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

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

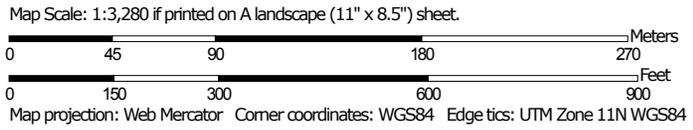
Soil Map

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

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.



MAP LEGEND

- Area of Interest (AOI)**
 -  Area of Interest (AOI)
- Soils**
 -  Soil Map Unit Polygons
 -  Soil Map Unit Lines
 -  Soil Map Unit Points
- Special Point Features**
 -  Blowout
 -  Borrow Pit
 -  Clay Spot
 -  Closed Depression
 -  Gravel Pit
 -  Gravelly Spot
 -  Landfill
 -  Lava Flow
 -  Marsh or swamp
 -  Mine or Quarry
 -  Miscellaneous Water
 -  Perennial Water
 -  Rock Outcrop
 -  Saline Spot
 -  Sandy Spot
 -  Severely Eroded Spot
 -  Sinkhole
 -  Slide or Slip
 -  Sodic Spot
- Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography
-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Orange County and Part of Riverside County, California
 Survey Area Data: Version 12, Sep 12, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Oct 25, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
142	Cieneba sandy loam, 30 to 75 percent slopes, eroded	20.0	79.8%
197	Soboba gravelly loamy sand, 0 to 5 percent slopes	4.8	19.0%
CnCwr	Cortina gravelly coarse sandy loam, 2 to 8 percent slopes	0.3	1.2%
Totals for Area of Interest		25.1	100.0%

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

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landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Orange County and Part of Riverside County, California

142—Cieneba sandy loam, 30 to 75 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcml
Elevation: 500 to 4,000 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Cieneba and similar soils: 65 percent
Minor components: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cieneba

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 7 inches: sandy loam
H2 - 7 to 59 inches: weathered bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 4 to 20 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SHALLOW LOAMY (1975) (R019XD060CA)
Hydric soil rating: No

Minor Components

Cieneba, uneroded

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

San andreas, sandy loam

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

Soper, cobbly loam

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

Calleguas, clay loam

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

Vista, sandy loam

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

Rock outcrop

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

Tollhouse

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

Blasingame, loam

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

197—Soboba gravelly loamy sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: hcpc
Elevation: 30 to 4,200 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 61 to 63 degrees F
Frost-free period: 175 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Soboba and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Soboba

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Riser, flat
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and gravelly alluvium derived from mixed

Custom Soil Resource Report

Typical profile

H1 - 0 to 10 inches: gravelly loamy sand

H2 - 10 to 60 inches: very gravelly sand

Properties and qualities

Slope: 0 to 5 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Excessively drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: SANDY (1975) (R019XD035CA)

Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent

Hydric soil rating: No

Riverwash

Percent of map unit: 5 percent

Landform: Fans

Hydric soil rating: Yes

Corralitos, loamy sand

Percent of map unit: 5 percent

Hydric soil rating: No

Soboba, gravelly loamy sand

Percent of map unit: 5 percent

Hydric soil rating: No

CnCwr—Cortina gravelly coarse sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1lwh9

Elevation: 30 to 2,400 feet

Mean annual precipitation: 8 to 20 inches

Mean annual air temperature: 61 to 63 degrees F

Frost-free period: 240 to 270 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cortina and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cortina

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from metasedimentary rock

Typical profile

H1 - 0 to 23 inches: gravelly sandy loam

H2 - 23 to 38 inches: stratified very gravelly loamy sand to very gravelly loam

H3 - 38 to 60 inches: stratified very gravelly sand to very gravelly loamy sand

Properties and qualities

Slope: 2 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3s

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: A

Ecological site: SANDY (1975) (R019XD035CA)

Hydric soil rating: No

Minor Components

Arbuckle

Percent of map unit: 10 percent

Hydric soil rating: No

Garretson

Percent of map unit: 5 percent

Hydric soil rating: No

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LGC GEO-ENVIRONMENTAL, INC.

PRELIMINARY GEOTECHNICAL INVESTIGATION REPORT FOR THE PROPOSED 17-ACRE MULTI-USE DEVELOPMENT, LOCATED AT WEST CHASE DRIVE AND FOOTHILL PARKWAY IN THE CITY OF CORONA, RIVERSIDE COUNTY, CALIFORNIA; APNS: 275-050-014-6 AND 275-080-041-3.

***Dated: December 31, 2019
Project No. G19-1802-20***

Prepared For:

***Mr. Chris Bowen
GF Investments, LLC
1871 California Avenue
Corona, California 92882***



December 31, 2019

Project No. G19-1802-20

Mr. Chris Bowen
GF Investments, LLC
1871 California Avenue
Corona, California 92882

Subject: Preliminary Infiltration Testing Investigation for the Proposed 17-Acre Multi-Use Development, Located at West Chase Drive and Foothill Parkway in the City of Corona, Riverside County, California; APNs: 275-050-014-6 and 275-080-041-3.

1.0 INTRODUCTION

LGC Geo-Environmental, Inc. (LGC) is pleased to present this preliminary infiltration testing investigation for the proposed 17-acre multi-use development located at West Chase Drive and Foothill Parkway in the city of Corona, Riverside County, California; APNs: 275-050-014-6 and 275-080-041-3. The purpose of our study was to determine the vertical infiltration rates and physical characteristics of the subsurface soils in selected areas of proposed onsite storm water infiltration BMP devices within specific portions of the subject property.

2.0 PROPERTY LOCATION AND DESCRIPTION

The site is comprised of two irregular-shaped, undeveloped parcels totaling approximately 17 acres. The site is bounded easterly by Foothill Parkway, vacant parcels to the south and west, and a future residential development to the north. The general location and configuration of the site is shown on the Site Location Map (Figure 1).

The subject site has been previously graded; currently, it is vacant.

Onsite surface elevations range from approximately 1,215 feet above mean sea level (msl) on the pad to approximately 1,080 feet above msl in the northeast. Local drainage is generally directed away from the flattened ridge top in all directions and towards the northeast at the base of the ridge.

3.0 PROPOSED CONSTRUCTION

According to the referenced Conceptual Grading plan, the proposed development will consist of four parcels with retail, gas station and office usage closer to Foothill Parkway. Condominiums will comprise the westerly portion.

4.0 SUBSURFACE EXPLORATION: INFILTRATION TESTING

4.1 Subsurface Exploration

Subsurface exploration of the subject site was performed on December 9, 2019 and consisted of excavating eight (8) trenches utilizing a backhoe within the proposed infiltration system locations, excavated to approximate depths of 4 feet to approximately 5 feet below existing grade. In addition, two (2) exploratory trenches that were excavated utilizing a backhoe on December 10, 2019 near the proposed infiltration locations to a depth of approximately 14 feet below existing grade, will be utilized to document subsurface material and depth to groundwater. Earth materials encountered within the locations were classified in general accordance with the visual manual procedures of the Unified Soil Classification System (USCS). Logs of the infiltration trenches are presented in Appendix A, and their approximate locations are depicted on the Infiltration Test Location Map (Plate 1).

Prior to the subsurface exploration work, an underground utilities clearance was obtained from Underground Service Alert of Southern California.

4.2 Infiltration Testing

On December 10, 2019 and December 11, 2019, eight (8) infiltration tests were conducted within the proposed area of the infiltration systems. The infiltration test trenches were labeled IT-1 through IT-8; and are depicted on the Infiltration Test Location Map (Plate 1).

Once the depth of 4 feet to 5 feet below existing surface was excavated with a backhoe, an 8-inch diameter test hole, approximately 20-inches deep, was excavated at the bottom of the trenches. A 2-inch layer of 3/4 inch gravel was placed at the bottom of the test hole, and a 5-foot perforated polyvinyl chloride pipe (PVC) covered with a filter sock, with a nominal diameter of 3 inches, was inserted into the test hole. The PVC pipe installed in the infiltration test hole contained 0.375 inch diameter perforations throughout the length of the pipe. The annular space around the 20-inch deep test hole was backfilled with 3/4-inch gravel. The infiltration trenches were then backfilled with native soil leaving the upper approximately 5-inches of the pipe exposed. A pre-soak period was then conducted to allow the test holes to presaturate before beginning the infiltration test. At the beginning of the infiltration test, a sandy soils test was performed with two consecutive readings taken within 25 minutes, to measure a water drop of at least 6 inches. Upon completion of the sandy soils test, readings were taken at 60-minute intervals for the entirety of the infiltration test, with the drop in water level being recorded at the end of each interval. All trenches were backfilled at the conclusion of the tests. Minor settlement of the backfill soils may occur over time.

To acquire the vertical design infiltration test rates, the field percolation rates, which have vertical and sidewall infiltration, were reduced utilizing a reduction factor per the Porchet Method standard in order to get a vertical design infiltration rate. A reduction factor of 2.25, 2.25, 2.69, 2.59, 2.25, 2.25, 3.42, and 2.95 was applied to the field percolation rates for IT-1 through IT-8, respectively. The results of the percolation method infiltration tests are presented in the following table in Section 5.3. The infiltration test data sheets are presented in Appendix A.

5.0 FINDINGS

5.1 Earth Materials

Based on our review of the data from the geotechnical investigation and current exploration of the earth materials underlying the proposed onsite infiltration system area, the materials encountered to the depths explored include compacted artificial fill, alluvial fan deposits, and the Ladd Formation. A description of the earth material soils encountered is described below:

Artificial Fill, Compacted (Afc): During our subsurface exploration, artificial fill was encountered in all trenches to depths ranging from approximately 1 foot to 3 feet. These materials generally consisted of clayey sand, silty sand, poorly-graded sand, and gravel which was various shades of red, orange, brown and gray; dry to moist; medium dense; very fine to coarse grained with gravel and cobbles; roots and root hairs; slight oxidation staining; upper 4 inches to 6 inches desiccated; and construction debris.

Young Alluvial Fan Deposits (Qyf): Young alluvial fan deposits were encountered on the site during our subsurface exploration ranging from approximately 1 foot to 14 feet deep to the depths explored below the artificial fill, compacted. The young alluvial fan deposits generally consisted of clayey sand, silty sand, poorly graded sand, well graded sand, and gravel, which was various shades of brown, yellow, orange, and gray; dry to moist; medium dense to dense; fine to coarse grained with gravel and cobbles; and oxidation staining. Bedding was observed in all trenches.

Ladd Formation (Kl): Cretaceous aged Ladd Formation was encountered below the compacted artificial fill. The bedrock is generally a silty sandstone and is characterized as being various shades of orange and brown; damp; moderately hard; fine to medium grained with subangular to subrounded gravel, cobbles, trace of boulders; moderately weathered; oxidation staining; and roots and root hairs.

5.2 Groundwater

Groundwater was not encountered during exploratory trenching. A review of the California Department of Water Resources, Water Data Library 2018 online database indicates groundwater approximately 2.3 miles away from the general site area is approximately 198 feet below the existing ground surface at an elevation of approximately 729 feet above mean sea level (Well ID: Station 338729N1175842W001).

5.3 Infiltration Testing Results

The shallow infiltration testing rates for design considerations for the proposed infiltration system area which was tested are presented in the table below.

Infiltration Design Rates

TEST NO.	TEST LOCATION	TEST DEPT H (Feet)	INFILTRATION RATES		SOIL DESCRIPTION (USCS)
			FIELD PERCOLATION RATE (INCHES/HOUR)	DESIGN INFILTRATION RATE (INCHES/HOUR)	
IT-1	North Infiltration Area	5	60.00	26.67	SP-SM
IT-2	North Infiltration Area	4	60.00	26.67	SP-SM
IT-3	North-Northeast Infiltration Area	4	42.00	14.51	SM
IT-4	North-Northeast Infiltration Area	4	48.75	16.77	SM
IT-5	Northwest Infiltration Area	4	60.00	26.67	SM
IT-6	Northwest Infiltration Area	4	60.00	26.67	SM
IT-7	West Infiltration Area	4	9.75	2.72	SM
IT-8	West Infiltration Area	4	35.25	8.89	SM

6.0 CONCLUSIONS AND RECOMMENDATIONS

Shallow infiltration testing for the proposed infiltration system indicate design rates of, 26.67 inches/hour for IT-1 and IT-2 at depths of approximately 4 feet to 5 feet, 14.51 inches/hour and 16.77 inches/hour for IT-3 and IT-4 at a depth of approximately 4 feet, 26.67 inches/hour for IT-5 and IT-6 at depth of approximately 4 feet, and 2.72 inches/hour and 8.89 inches/hour for IT-7 and IT-8 at a depth of approximately 4 feet. After applying reduction factors shown in the table above, per the Porchet Method. The design rates representing the infiltration devices proposed to be installed, should be utilized for the proposed infiltration device location, as indicated on the Infiltration Test Location Map (Plate 1). An average composite design rate of **26.67 inches/hour** for the proposed infiltration basin represented by testing from infiltration test trenches IT-1, IT-2, IT-5, and IT-6 can be utilized. An average composite design rate of **15.64 inches/hour** for the proposed infiltration basin represented by testing from infiltration test trenches IT-3 and IT-4 can be utilized. A significantly lower rate was observed within infiltration test trenches IT-7 and IT-8, thus, an average composite design rate of **5.81 inches/hour** for the proposed infiltration basin represented by testing from IT-7 and IT-8 can be utilized.

The proposed infiltration basin device should be placed at least five (5) feet horizontally away from or beyond a 1:1 (horizontal to vertical) projection from the base of any proposed or existing structures or walls, whichever is greater. Since the proposed infiltration basin device is within and/or adjacent to proposed roadways, parking areas and/or sidewalks (within five (5) feet) and may be up to approximately six (6) feet deep, any gravel backfill should be densified or any soil backfill should be compacted to at least 90% of the maximum dry density during placement. The project geologist or engineer should observe infiltration device excavations

during trenching to verify the anticipated soil units and geotechnical conditions; as well as observe, probe and/or test any densification or compaction of the infiltration trench and pit gravel and/or soil backfill.

Furthermore, based on the data presented from the California Department of Water Resources, Water Data Library Well Data, groundwater should be approximately 198 feet below the existing ground surface and should not be present within the current allowable limit of within 10 feet of the bottom of testing and/or proposed infiltration drainage devices as set forth by the City of Corona, Riverside County, and California State requirements.

7.0 PLAN REVIEWS AND CONSTRUCTION SERVICES

This report was prepared for the exclusive use of **GF Investments, LLC** to assist the project civil engineer in the design of the proposed infiltration systems for the proposed development. It is recommended that LGC be engaged to review infiltration device plans, grading plans, foundation plans and the final infiltration design drawings and specifications prior to construction. This is to document that the recommendations contained in this report were properly interpreted and incorporated into the project plans and specifications from a geotechnical standpoint. Plans should be forwarded to the project geotechnical engineer and/or engineering geologist for LGC for review and comments, as deemed necessary. LGC's review of infiltration device plans, grading plans, foundation plans and the final infiltration design drawings and specifications may indicate that additional subsurface exploration, laboratory testing and analysis should be performed to address areas of concern. If LGC is not accorded the opportunity to review these documents, we cannot take responsibility for misinterpretation of our recommendations.

If the project plans change significantly (e.g., location and type of infiltration devices), LGC should be retained to review our original design recommendations and applicability to the revised construction. If conditions are encountered during construction that appears to be different from those indicated in this report, this office should be notified immediately. Design and construction revisions may be required.

The preliminary conclusions and recommendations provided in this report are based on review of previous geotechnical reports, infiltration testing, geologic field mapping, and geotechnical/geologic analyses to date. A representative of LGC should observe the interpolated subsurface conditions in the field during construction.

We recommend that LGC be retained to provide geotechnical engineering services during future grading, infiltration device excavations, installation of infiltration materials, backfill of infiltration devices, or when an unusual soil condition is encountered at the site. This is to document compliance with the design, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

8.0 INVESTIGATION LIMITATIONS

This report is based upon information provided by the client and the project civil engineer, a limited number of subsurface excavations, field observations and percolation/infiltration tests to which we applied various methods of analysis and interpretation. The materials encountered and tested in the field on the project site are believed representative of the project area, and the conclusions and recommendations contained herein are presented on that basis. However, soil materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions, recommendations, and performance of the proposed storm water infiltration device BMP systems. Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation, and the other factors not in evidence at the time measurements were made. If this occurs, the changed conditions must be evaluated by the project geotechnical engineer and engineering geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field.

The conclusions and opinions contained in this report are based on the results of the described geotechnical evaluations and represent our professional judgment. The findings, conclusions and recommendations contained in this report are to be considered tentative only and subject to confirmation by the undersigned during the construction process. Without this confirmation, this report is to be considered incomplete and LGC or the undersigned professionals assume no responsibility for its use.

The conclusions and opinions contained in this report are valid up to a period of 2 years from the date of this report. Changes in the conditions of a property can and do occur with the passage of time, whether they be because of natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate codes or standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, if any of the above mentioned situations occur, an update of this report should be completed.

This report has not been prepared for use by parties or projects other than those named or designed above. It may not contain sufficient information for other parties or other purposes.

The opportunity to be of service is appreciated. If you have any questions regarding the content of this report or require additional information, please do not hesitate to contact this office at your earliest convenience.

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by engineers and geologists practicing in this or other localities. The contents of this report are professional opinions and as such, are not to be considered a guarantee or warranty.

Respectfully submitted,

LGC Geo-Environmental, Inc.



Mark Bergmann CEG 1348
Certified Engineering Geologist/President



JL/MB

Distribution: (2) Addressee
(1) KWC Engineers ATTN: Mr. Mike Taing

Attachments: Figure 1 – Site Location Map
Appendix A – Exploratory Trench Logs (*Rear of Text*)
Appendix B – Infiltration Test Results (*Rear of Text*)
Plate 1 – Infiltration Test Location Map (*Pocket Enclosure*)

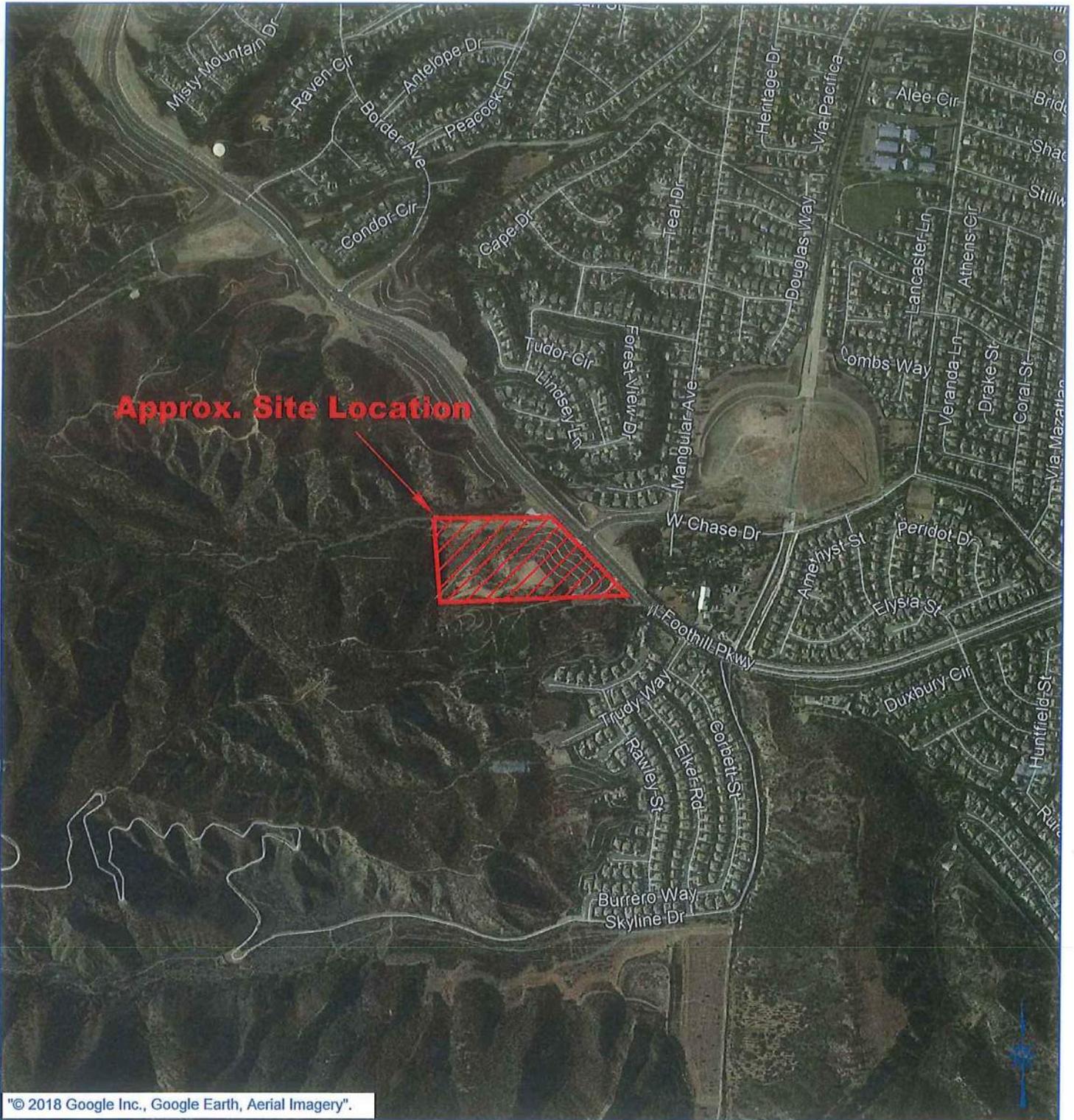


FIGURE 1
SITE LOCATION MAP

Project Name	GF INVESTMENTS
Project No.	G19-1802-20
Engineer	LC
Scale	NOT TO SCALE
Date	DECEMBER 2019

APPENDIX A

EXPLORATORY TRENCH LOGS



Project Name: GF INVESTMENTS		Logged by: JL		LOG OF TRENCH IT-1			
Project Number: G19-1802-20		Elevation:		Engineering Properties			
Equipment: BACKHOE		Location/Grid: SEE INFILTRATION MAP		USCS	Sample No.	Moisture (%)	Dry Density (pcf)
Depth	Date: 12/9/19	Description:	Geologic Unit				
0.0'-1.5'	A	<u>ARTIFICIAL FILL, COMPACTED</u> Clayey SAND; brown, moist, medium dense, fine to medium grained with some gravel, roots, root hairs, upper 6" desiccated	Afc	SC			
1.5'-2.0'	B	<u>YOUNG ALLUVIAL FAN DEPOSITS:</u> Poorly-graded SAND; brown, damp, loose to medium dense, fine grained with some coarse grains and gravel, roots, root hairs, oxidation staining	Qyf	SP			
2.0'-5.0'	C	SAND with GRAVEL; light brown, damp, medium dense, medium grained to coarse grained with gravel, roots, root hairs @3.0'; bedding: N4E/20E		SW			
GRAPHICAL REPRESENTATION: EAST WALL				SURFACE SLOPE: LEVEL	TREND: N87E		
				TOTAL DEPTH= 5.0 FEET GROUNDWATER NOT ENCOUNTERED			

Project Name: GF INVESTMENTS			Logged by: JL			LOG OF TRENCH IT-3		
Project Number: G19-1802-20			Elevation:			Engineering Properties		
Equipment: BACKHOE			Location/Grid: SEE INFILTRATION MAP			USCS		
Depth	Date: 12/9/19	Description:	Geologic Unit	Sample No.	Moisture (%)	Dry Density (pcf)		
0.0'-2.0'	A	<u>ARTIFICIAL FILL, COMPACTED:</u> Poorly-graded SAND /Silty SAND; orange brown, damp to moist, medium dense, fine to medium grained with coarse grains and gravel, roots, root hairs, upper 4" desiccated	Afc	SP/SM				
2.0'-2.5'	B	<u>YOUNG ALLUVIAL FAN DEPOSITS:</u> Poorly-graded SAND; yellow brown, moist, medium dense, fine to medium grained with gravel and some cobbles, roots, root hairs, oxidation staining @2.0'; bedding: N20E/15E	Qyf	SP				
2.5'-4.0'	C	SAND with GRAVEL; light brown to brown, damp, medium dense, fine to coarse grained with gravel and cobbles, roots, and root hairs		SW				
GRAPHICAL REPRESENTATION: EAST WALL			SCALE: 1" = 5'			SURFACE SLOPE: LEVEL		
TOTAL DEPTH= 4.0 FEET GROUNDWATER NOT ENCOUNTERED								

Project Name: GF INVESTMENTS			Logged by: JL			LOG OF TRENCH IT-4			
Project Number: G19-1802-20			Elevation:			Engineering Properties			
Equipment: BACKHOE			Location/Grid: SEE INFILTRATION MAP			USCS			
Depth	Date: 12/9/19	Description:	Geologic Unit	Sample No.	Moisture (%)	Dry Density (pcf)			
0.0'-2.0'	A	<u>ARTIFICIAL FILL, COMPACTED:</u> Poorly-graded SAND/Silty SAND; orange brown, damp to moist, medium dense, fine to coarse grained with cobbles and gravel, roots, root hairs, upper 5" desiccated	Afc						
2.0'-2.5'	B	<u>YOUNG ALLUVIAL FAN DEPOSITS:</u> Poorly-graded SAND; light brown, moist, loose to medium dense, fine to coarse grained with gravel, oxidation staining @2.0'; bedding: N10E,14E	Qyf						
2.5'-4.0'	C	SAND with GRAVEL; brown, moist, loose to medium dense, fine to coarse grained with cobbles, roots, root hairs, oxidations staining							
GRAPHICAL REPRESENTATION: EAST WALL			SCALE: 1" = 5'			SURFACE SLOPE: LEVEL		TREND: N1E	
								TOTAL DEPTH= 4.0 FEET GROUNDWATER NOT ENCOUNTERED	

Project Name: GF INVESTMENTS			Logged by: JL			LOG OF TRENCH IT-5		
Project Number: G19-1802-20			Elevation:			Engineering Properties		
Equipment: BACKHOE			Location/Grid: SEE INFILTRATION MAP			USCS		
Depth	Date: 12/9/19	Description:	Geologic Unit	Sample No.	Moisture (%)	Dry Density (pcf)		
0.0'-1.0'	A	ARTIFICIAL FILL, COMPACTED: Poorly-graded SAND/SiltySAND; brown, moist, medium dense, fine to medium grained with gravel, roots, root hairs, trash	Afc					
1.0'-2.5'	B	Clayey SAND/Silty SAND; light brown to orange brown, damp, medium dense, fine to medium grained with some coarse grains and gravel, roots, root hairs, oxidation staining						
2.5'-3.5'	C	YOUNG ALLUVIAL FAN DEPOSITS Clayey SAND; brown, damp, medium dense, fine to medium grained with some coarse grains and gravel @3.0'; bedding: N30E/18E	Qyf					
3.5'-4.0'	D	Well-graded SAND/Silty SAND; light brown to gray, dry to damp, loose to medium dense, fine to coarse grained with gravel						
GRAPHICAL REPRESENTATION: EAST WALL			SCALE: 1" = 5'			SURFACE SLOPE: LEVEL		
TOTAL DEPTH= 4.0 FEET GROUNDWATER NOT ENCOUNTERED								

Project Name: GF INVESTMENTS		Logged by: JL		LOG OF TRENCH IT-6			
Project Number: G19-1802-20		Elevation:		Engineering Properties			
Equipment: BACKHOE		Location/Grid: SEE INFILTRATION MAP		USCS	Sample No.	Moisture (%)	Dry Density (pcf)
Depth	Date: 12/9/19	Description:	Geologic Unit				
0.0'-1.0'	A	<u>ARTIFICIAL FILL, COMPACTED:</u> Poorly-graded SAND/SiltySAND; light brown to brown, damp, medium dense, fine to medium grained with coarse grains and gravel, roots, root hairs, trash	Afc	SP/SM			
1.0'-2.5'	B	Clayey SAND/Silty SAND; light brown to orange brown, damp, medium dense, fine to medium grained with some coarse grains and gravel, roots, root hairs, oxidation staining		SC/SM			
2.5'-3.5'	C	<u>YOUNG ALLUVIAL FAN DEPOSITS</u> Clayey SAND; brown, damp, medium dense, fine to medium grained with some coarse grains and gravel @3.0'; bedding: N30E/18E	Qyf	SC			
3.5'-4.0'	D	Well-graded SAND/Silty SAND; light brown to gray, dry to damp, loose to medium dense, fine to coarse grained with gravel		SW/SM			
GRAPHICAL REPRESENTATION: EAST WALL				SURFACE SLOPE: LEVEL		TREND: N89E	
						TOTAL DEPTH= 4.0 FEET GROUNDWATER NOT ENCOUNTERED	

Project Name: GF INVESTMENTS		Logged by: JL		LOG OF TRENCH IT-7			
Project Number: G19-1802-20		Elevation:		Engineering Properties			
Equipment: BACKHOE		Location/Grid: SEE INFILTRATION MAP		USCS	Sample No.	Moisture (%)	Dry Density (pcf)
Depth	Date: 12/9/19	Description:	Geologic Unit				
0.0'-3.0'	A	ARTIFICIAL FILL, COMPACTED: Clayey SAND; red brown, moist, medium dense, fine to medium grained with some coarse grains and gravel, roots, root hairs, upper 5" desiccated @1.5'; brown, some cobbles, weathered granitic clasts	Afc	SC			
3.0'-3.5'	B	LADD FORMATION: Silty SANDSTONE; light brown to orange brown, damp, moderately hard fine to medium grained with some coarse grains and gravel, roots, root hairs, oxidation staining @3.0'; bedding: N30W/24E	KI				
3.5'-4.0'	C	Poorly-graded SANDSTONE/Silty SANDSTONE; white to light brown, damp, moderately hard, fine to medium grained with gravel, oxidation staining, weathered granitic boulder					
GRAPHICAL REPRESENTATION: EAST WALL				SURFACE SLOPE: LEVEL	TREND: N44E		
				TOTAL DEPTH= 4.0 FEET GROUNDWATER NOT ENCOUNTERED			

Project Name: GF INVESTMENTS			Logged by: JL			LOG OF TRENCH TR-4		
Project Number: G19-1802-10			Elevation:			Engineering Properties		
Equipment: BACKHOE			Location/Grid: SEE GEOTECHNICAL MAP			USCS		
Depth	Date: 12/10/19	Description:	Geologic Unit	Sample No.	Moisture (%)	Dry Density (pcf)		
0.0'-2.0'	A	<u>ARTIFICIAL FILL, UNDOCUMENTED:</u> Clayey SAND/ Silty SAND; light brown to brown, damp to moist, medium dense, fine to medium grained with some coarse grains, gravel, and cobbles, roots, root hairs, upper 5" desiccated	Afu	Bulk @ 0.0'-5.0' Nuke @ 0.0'	11.4	122.8		
2.0'-3.0'	B	<u>YOUNG ALLUVIAL FAN DEPOSITS:</u> Poorly-graded SAND; light brown to yellow brown, damp to moist, medium dense, fine to medium grained with gravel, oxidation staining @3.5'; bedding: N19E/17E	Qyf					
3.0'-7.0'	C	Silty SAND/GRAVEL; brown, moist, loose, fine to coarse grained with cobbles, oxidations staining, weathered granitic clasts, subangular to subrounded clasts						
7.0'-14.0'	D	Well-graded SAND; brown to gray, damp, loose to medium dense, fine to coarse grained with gravel and cobbles, oxidation staining, weathered granitic clasts, subangular to subrounded clasts						
GRAPHICAL REPRESENTATION: EAST WALL			SCALE: 1" = 5'			SURFACE SLOPE: LEVEL		

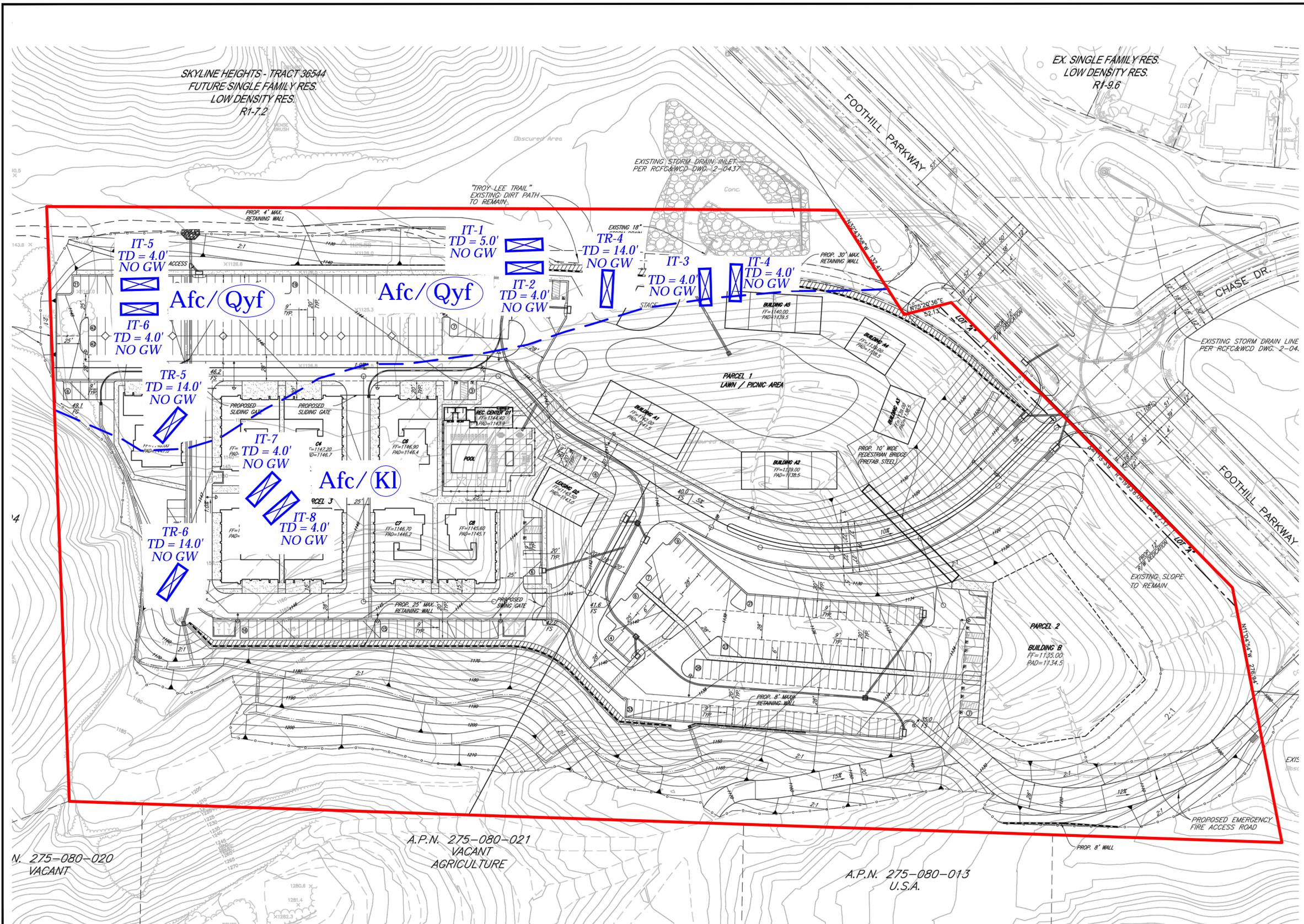
Project Name: GF INVESTMENTS			Logged by: JL			LOG OF TRENCH TR-5		
Project Number: G19-1802-10			Elevation:			Engineering Properties		
Equipment: BACKHOE			Location/Grid: SEE GEOTECHNICAL MAP			USCS		
Depth	Date: 12/10/19	Description:	Geologic Unit	Sample No.	Moisture (%)	Dry Density (pcf)		
0.0'-2.0'	A	<u>ARTIFICIAL FILL, UNDOCUMENTED:</u> Clayey SAND; orange to brown, moist, medium dense, fine to medium grained with some gravel, roots, root hairs, asphalt fragments	Afu	Bulk @ 1.0'-6.0'				
2.0'-8.5'	B	<u>YOUNG ALLUVIAL FAN DEPOSITS:</u> Well-graded SAND; orange to light brown, dry to damp, fine to coarse grained with gravels	Qyf	Nuke @ 5.0'	1.6	118.3		
8.5'-14.0'	C	SAND/GRAVEL; light brown to brown, damp, loose to medium dense, fine to medium grained with some coarse grains and cobbles, weathered granitic clasts, subangular to rounded clasts @10.0'; bedding: N50W/25E		Nuke @ 11.0'	5.6	100.4		
GRAPHICAL REPRESENTATION: EAST WALL			SCALE: 1" = 5'			SURFACE SLOPE: LEVEL		TREND: N40E

Project Name: GF INVESTMENTS			Logged by: JL			LOG OF TRENCH TR-6		
Project Number: G19-1802-10			Elevation:			Engineering Properties		
Equipment: BACKHOE			Location/Grid: SEE GEOTECHNICAL MAP			USCS		
Depth	Date: 12/10/19	Description:	Geologic Unit	Sample No.	Moisture (%)	Dry Density (pcf)		
0.0'-1.5'	A	<u>ARTIFICIAL FILL, UNDOCUMENTED:</u> Clayey SAND; red to brown, damp to moist, medium dense, fine to medium grained with some coarse grains and gravel, roots and root hairs	Afu	Nuke @ 1.0'	13.9	112.8		
1.5'-6.0'	B	Silty SAND; light brown, damp, medium dense, fine to medium grained with coarse grains and gravel, oxidation staining, porous		Bulk @ 2.0'-6.0'				
6.0'-9.5'	C	<u>LADD FORMATION:</u> Well-graded SANDSTONE; gray, red, to brown, dry to damp, moderately hard to hard, fine to coarse grained with gravel and cobbles, weathered granitic and shale clasts, subangular to rounded clasts @8.0'; Poorly-graded sand seam, bedding: N80W/30NE	KI	Bulk @ 6.0'-9.5' Nuke @ 9.5'	7.2	105.4		
GRAPHICAL REPRESENTATION: EAST WALL			SCALE: 1" = 5'			SURFACE SLOPE: LEVEL		
			<p>TOTAL DEPTH= 9.5 FEET GROUNDWATER NOT ENCOUNTERED</p>					

APPENDIX B

INFILTRATION TEST RESULTS





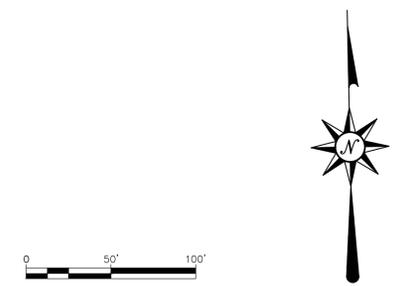
LEGEND
(Locations are Approximate)

Geologic Earth Units

- Afc - Artificial Fill, Compacted
- Qyf - Young Alluvial Fan Deposits (Circled Where Buried)
- Kl - Ladd Formation (Circled Where Buried)

Symbols

- Limits of This Report
- Approximate Geologic Contact
- Infiltration Exploratory Trench Location
- Infiltration Exploratory Trench Location



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Mark Bergmann
 Engineering Geologist

INFILTRATION TEST LOCATION MAP
 APNs 275-050-014-6 and 275-080-041-3, Located at West Chase Drive and Foothill Parkway
 City of Corona, County of Riverside, State of California

Name:	GF Investments
Project No.:	G19-1802-20
Client:	GF Investments, LLC
Scale:	1" = 50'
Date:	December 2019
Reference:	KWC Engineers, Conceptual Grading Plan Skyline Village Project, Scale = 1"=40', sheet 1 of 1, dated December 10, 2019
Plate No.:	1 OF 1

Appendix 4: Historical Site Conditions

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



LGC GEO-ENVIRONMENTAL, INC.

***PHASE I ENVIRONMENTAL SITE ASSESSMENT, PROPOSED 17-ACRE
MULTI-USE DEVELOPMENT INCLUDING OFFICE, RETAIL AND CONDOMINIUMS,
LOCATED AT FOOTHILL PARKWAY AND WEST CHASE DRIVE,
CITY OF CORONA, RIVERSIDE COUNTY, CALIFORNIA;
APNS: 275-050-014-6 AND 275-080-041-3.***

***Dated: December 30, 2019
Project No. G19-1802-15***

***Prepared For:
Mr. Sam Tsapatolis
GF Investments, LLC
1871 California Avenue
Corona, California 92882***



December 30, 2019

Project No. G19-1802-15

Mr. Sam Tsapatolis
GF Investments, LLC
1871 California Avenue
Corona, California 92882

Subject: Phase I Environmental Site Assessment, Proposed Multi-Use Development including Office, Retail and Condominiums, Located at West Foothill Parkway and West Chase Drive, City of Corona, Riverside County, California; APNs: 275-050-014 and 275-080-041.

INTRODUCTION

LGC Geo-Environmental, Inc. (LGC) is pleased to submit herewith our Phase I Environmental Site Assessment (ESA) report for proposed multi-use development including office, retail and condominiums, located at West Foothill Parkway and West Chase Drive, City of Corona, Riverside County, California. The Property is identified as Assessor's Parcel Numbers (APNs) 275-050-014 and 275-080-041. Our Phase I ESA was performed in accordance with American Society for Testing and Materials (ASTM) Standard E1257-13.

This report also presents and evaluates the results of LGC's site reconnaissance, review of previous reports, historical review, regulatory records review, and other information and documentation.

This Phase I ESA have been performed for the exclusive use and benefit of the addressee identified on the cover of this report, or agents directly specified by the addressee, for the transaction at issue concerning the Property described in this report. This Phase I ESA shall not be used or relied upon by others without the prior written consent of LGC, and of the addressee identified on the cover of this report.

I declare that, to the best of my professional knowledge and belief, I meet the definition of *Environmental Professional* as defined in 40 CFR §312.10. I have the specific qualifications based on education, training and experience to assess a *property* of the nature, history, and setting of the *subject property*. I have developed and performed the All Appropriate Inquiries in conformance with the standard and practices set forth in 40 CFR Part 312.

The objective of this Phase I ESA was to ascertain the potential presence or absence of recognized environmental conditions that could impact the Property, as delineated in the scope of services and limitations identified in this report and in the service agreement. The procedure was to perform reasonable steps in accordance with the existing regulations, currently available technology, and generally accepted environmental consulting practices, to accomplish the stated objective.

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. The surface observations made by LGC are believed representative of the entire project. Sub-surface soil and geologic conditions, however, may be different from our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soils engineer and geologist for alternative recommendations.

The findings of this report are valid as of the present date. Changes in the conditions of a property, however, can and do occur with the passage of time, whether due to natural and/or manmade processes on the Property or adjacent properties.

In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control.

CLOSING

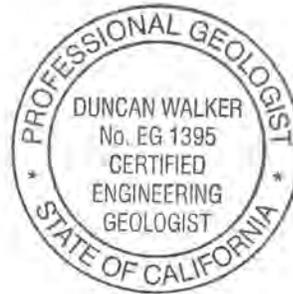
It has been a pleasure to be of service to you on this project. Should you have any questions, regarding the contents of this report or should you require additional information, please contact this office at your earliest convenience.

Respectfully submitted,

LGC GEO-ENVIRONMENTAL, INC.



Duncan Walker, CEG 1395
Environmental Professional/Certified Engineering Geologist



DW

Distribution: (4) Addressee

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Appendix D – Environmental Data Resources, Inc. Report
Appendix E – Sanborn Maps & City Directories
Appendix F – User Questionnaire & Interview Log

EXECUTIVE SUMMARY

Overview – LGC Geo-Environmental, Inc. (LGC) was retained by GF Investments, LLC (GFI) to perform a Phase I Environmental Site Assessment (ESA) for proposed multi-use development including office, retail and condominiums, located at West Foothill Parkway and West Chase Drive, City of Corona, Riverside County, California. The Property is identified as Assessor's Parcel Numbers (APNs) 275-050-014 and 275-080-041.

This Phase I ESA was performed in accordance with the scope and limitations of the *American Society for Testing and Materials (ASTM) Standard E1527-13*. The following summarizes LGC's independent conclusions and best professional judgment based upon information available to us during this Phase I ESA.

The purpose and scope of this Phase I ESA are to make preliminary conclusions regarding potential presence of recognized environmental conditions (RECs), including controlled RECs (CRECs), on, at, in, or to the Property. ASTM defines RECs as the presence or likely presence of hazardous substance or petroleum products on, at, in, or to a property. Historical RECs and de minimis conditions are not considered RECs.

When making any decisions concerning the findings of this Phase I ESA, please also refer to the remainder of this report, which may provide additional information regarding the items below and/or present other items of interest that are not discussed in this Executive Summary.

Property Description – Located along the southwest side of West Foothill Parkway opposite its 'T' intersection with West Chase Drive, the Property consists of two irregular-shaped parcels comprising a total of approximately 17.63 acres. In 2006, the Property was graded for proposed single-family residential development under permit, creating a large pad in the center flanked by a graded slope facing north and northwest. In 2015 and 2016, a large roadcut slope was graded on the northeast portion of the Property for improvement/paving of West Foothill Parkway. The Property is bounded on the northeast by West Foothill Parkway followed by single-family residential parcels and West Chase Drive, on the north and west by vacant parcels, and on the south by a nursery parcel and a vacant parcel.

Property Observations – At the time of our site reconnaissance on December 3, 2019, the Property was vacant. The Property is unfenced, except along its south boundary with the nursery. Primary vehicular access to the Property is via a north access road with a locked gate near its entrance from West Foothill Parkway approximately opposite the 'T' intersection with West Chase Drive. Approximately the first 400 feet of the north access road are paved, and the remainder is dirt. The north access road splits in the north center with the main fork extending southwest and east to the onsite pad, and the other fork extending west to the northwest property corner. There is another (south) access road extending from West Foothill Parkway near the southeast property corner. The south access road also accesses the offsite nursery and has locked gates in two places. The graded pad and onsite dirt access roads are generally cleared of vegetation. Most of the remainder of the Property is covered with annual grasses and/or brush, as well as trees mainly along its west boundary. No stressed vegetation was observed.

There is a tree house, possibly a former homeless shelter, near the northwest property corner. On the ground around the tree house, there is scattered trash which appears to be non-hazardous solid waste. On the access road north of the tree house there is a small area of stained (black) surface soil which is approximately 6 to 8 feet across and several inches deep. The stained soil appears to be residue from a small fire but may also contain petroleum hydrocarbons (oil). There are two lengths of cement pipe near the fork in the north access road in the north center of the Property which were apparently dumped by unknown persons. The pipes are approximately 6-inch inside diameter by approximately 8 to 10 feet long and may be composed of asbestos-cement (transite).

Property Background – Historical aerial photographs of the Property dating back to 1931, as well as historical topographic maps dating back to 1902, were reviewed as part of this Phase I ESA. The Property has apparently always vacant unoccupied land. Agricultural use (orchards) of the adjacent area to the east began prior to 1931, and the area began transitioning to single-family residences in the early 1980s. Nursery use of the parcel adjoining southwest began in the early 2000s. The parcels adjoining west and north, together with the parcel adjoining southeast, have apparently always been vacant land.

Potable Water Source – Corona Department of Public Works (CDPW) records indicate that there is a water main in West Foothill Parkway adjacent to the Property. The Property is not currently connected to CDPW water service.

Public Sewer Source – CDPW records indicate that there is no sewer water main adjacent to the Property, and public sewer service is therefore not currently available to the Property.

Environmental Data Resources Report – LGC utilized Environmental Data Resources, Inc. (EDR) to conduct a search of available environmental databases, records and resources regarding the Property. EDR searched the databases for sites surrounding the Property to meet the requirements of *ASTM Standard E1527-13*. The results of EDR's research are contained in *The EDR Radius Map™ Report with GeoCheck®, Inquiry 5888607.2s*, dated December 2, 2019. To supplement the EDR Report, LGC additionally reviewed online databases for four environmental agencies.

The Property and adjoining properties are not listed in any of the databases searched by EDR or in the four additional online databases reviewed by LGC. The EDR Report also lists and describes one site located within ASTM-specified search radii surrounding the Property; no sites were identified in the four additional online databases reviewed by LGC. The site identified in the EDR Report is not considered to be a concern as regards the Property.

Findings – A summary of our findings is provided below. Details are not included or fully developed in this section, and the Phase I ESA report must be read in its entirety for a comprehensive understanding of these findings.

- Located along the southwest side of West Foothill Parkway opposite its 'T' intersection with West Chase Drive, the Property consists of two irregular-shaped parcels comprising a total of approximately 17.63 acres. The Property is vacant land which was graded beginning in 2006.
- Historical aerial photographs of the Property dating back to 1931, as well as historical topographic maps dating back to 1902, were reviewed as part of this Phase I ESA. The Property has apparently always vacant unoccupied land. Agricultural use of the adjacent area to the east began prior to 1931, and the area began transitioning to single-family residences in the early 1980s.
- The Property and adjoining properties were not identified in the databases in the EDR Report or in the four additional online databases reviewed by LGC.
- No evidence of pesticides or herbicides spills was observed on the Property during our site reconnaissance, and there is no indication that pesticides or herbicides were used on the Property.
- There are two lengths of cement pipe near the north access road fork in the north center of the Property which were apparently dumped by unknown persons. The pipes may be composed of asbestos-cement (transite). No other evidence of current or past storage or use of hazardous materials or petroleum products was identified on the Property during our site reconnaissance and records review.
- There is a small area of stained (black) surface soil along the access road north of the tree house and near the northwest Property corner. The stained soil appears to be residue from a small fire but may also contain petroleum hydrocarbons (oil). No other stained surface soil or other visible evidence of petroleum products or hazardous materials spills was observed on the Property. No stressed vegetation was observed.
- No evidence of aboveground storage tanks was observed on the Property during our site reconnaissance or identified during record review.
- No evidence of underground storage tanks, sumps, clarifiers, or other storage or treatment structures for hazardous materials or petroleum products was observed on the Property during our site reconnaissance or identified during record review.
- No evidence of known regulatory actions, regarding hazardous materials or petroleum products cleanup that have been issued or are being issued for the Property, was identified during our records review.

Opinions – A summary of our opinions is provided below. Details are not included or fully developed in this section, and the Phase I ESA report must be read in its entirety for a comprehensive understanding of these opinions.

- No apparent or potential threat of past or present hazardous material releases exists regarding the Property based on the EDR Report and the Agency Contact and Database Search, including the site identified within the ASTM-specified search radii surrounding the Property.
- A Vapor Encroachment Condition does not exist or is not likely to exist in connection with the Property.
- No RECs, including CRECs, were identified on, at, in, or to the Property.
- No significant data gaps were identified that affect the ability of the Environmental Professional to identify RECs.
- There are no unusual circumstances where greater certainty is required regarding RECs.

Conclusions and Recommendations – LGC has performed a Phase I ESA of the Property in conformance with the scope and limitations of *ASTM E1527-13*. There were no exceptions to, or deletions from *ASTM E1527-13* in conducting this Phase I ESA. This Phase I ESA has revealed no evidence of RECs in connection with the Property.

LGC recommends the following additional environmental assessment and remediation, based on the results of this Phase I ESA:

- The two lengths of cement pipe near the north access road fork in the north center of the Property should be sampled to determine if they are composed of asbestos-cement (transite). If the sample results indicate that the contain asbestos, then the pipes and any visible broken-off pipe pieces should be removed, packaged and disposed of as an asbestos-containing material (ACM) by a properly-licensed contractor. If they are not ACM, then they can be disposed of as non-hazardous solid waste. The pipes are a possible ACM and are therefore not an REC.
- The small area of stained (black) surface soil on the road north of the tree house should be sampled to determine if it contains petroleum hydrocarbons. If the sample results indicate that the contain petroleum hydrocarbons, then the stained soil should be excavated, containerized and disposed of as petroleum hydrocarbon contaminated waste by a properly-licensed contractor. If the stained soil does not contain petroleum hydrocarbons, then it can be disposed of as non-hazardous solid waste. The stained soil comprises an estimated 0.5 cubic yard or less, and it is therefore a de minimis condition which is not an REC.
- The other trash on the Property should be removed and disposed of as non-hazardous solid waste.

Non-Scope Issues – The following Non-Scope Issues, which are outside the scope of *ASTM E1527-13*, were assessed in connection with this Phase I ESA of the Property.

Building construction materials that could contain hazardous materials, including asbestos-containing building materials (ACBMs) and lead-based paint (LBP), were considered during this Phase I ESA. There apparently never have been structures on the Property, and therefore ACBMs and LBP are not considered to be concerns regarding the Property. The two lengths of cement pipe near the north access road fork in the north center of the Property should be sampled to determine if they contain asbestos.

Indoor radon levels on the Property were considered during this Phase I ESA. Available information indicates that the Property is in Radon Zone 2 and has a predicted average indoor radon screening level which is less than or equal to the USEPA's radon action level. Radon is therefore not a concern regarding the Property.

Natural occurrences of asbestos near the Property were considered during this Phase I ESA. Available information indicates that there are no reported natural asbestos occurrences or historic asbestos/prospects mines located within 1 mile of the Property. Natural asbestos occurrences and historic asbestos mines/prospects are therefore not concerns regarding the Property.

1.0 INTRODUCTION

1.1 Purpose

LGC Geo-Environmental, Inc. (LGC) was retained by GF Investments, LLC (GFI) to perform a Phase I Environmental Site Assessment (ESA) for proposed multi-use development including office, retail and condominiums, located at West Foothill Parkway and West Chase Drive, City of Corona, Riverside County, California. The Property is identified as Assessor's Parcel Numbers (APNs) 275-050-014 and 275-080-041.

This Phase I ESA was performed in accordance with the scope and limitations of *American Society for Testing and Materials (ASTM) E1527-13: Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. This Phase I ESA report summarizes LGC's independent conclusions and best professional judgment based upon information available to us during this Phase I ESA.

The purpose and scope of this Phase I ESA are to make preliminary conclusions regarding the potential presence of recognized environmental conditions (RECs), including controlled RECs (CRECs), on, at, in, or to the Property. Historical RECs (HRECs) are not considered RECs. ASTM defines REC as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. de minimis conditions are not recognized environmental conditions."

1.2 Scope of Services

LGC's Scope of Services included the following:

- Reconnaissance of the Property to visually assess current conditions on the Property and adjoining properties.
- Locate and document the potential onsite presence and possible use or storage of hazardous materials or petroleum products, in addition to any signs of surface or subsurface contamination.
- Review of historical aerial photographs and topographic maps.
- Review of available reports and documents previously prepared for the Property.
- Review of the soil and groundwater conditions on the Property.
- Review of available environmental and geologic maps which may have been prepared for the Property.
- Review of state and federal environmental databases regarding the Property and surrounding area.
- Environmental analysis of data to address environmental issues relative to hazardous wastes associated with the Property.
- Review of available regulatory agency files.
- Access to the current purchase price and the fair market value of the Property.

There are no data gaps to *ASTM Standard E1527-13* which affect the ability of the Environmental Professional to identify conditions indicative of releases or threatened releases of hazardous substances on, at, in, or to the Property.

1.3 User Questionnaire

A *User Questionnaire* was completed by Chris Bowen of GFI, a prospective purchaser of the Property and the User of this Phase I ESA, and was returned to LGC (Appendix F). Chris Bowen indicated that: 1) the purchase price/loan amount for the Property reasonably reflects the fair market of the Property, and 2) he had no other information or documents regarding the Property, including no information regarding recorded environmental cleanup liens or Activity and Use Limitations (AULs). Annie Hernaez (GFI) provided LGC with a preliminary title report, which did not identify any recorded environmental cleanup liens or AULs.

1.4 Interviews

LGC interviewed the following, an Interview Log (Appendix F) summarizes these interviews:

- Chris Bowen and Annie Hernaez, GFI (prospective purchaser of the Property), regarding the *User Questionnaire*, preliminary title report, and general information.
- Corona Department of Water and Power, regarding availability of water and sewer service to the Property.

- Corona Department of Public Works (CDPW), regarding availability of water and sewer service to the Property.

2.0 PROPERTY OVERVIEW

2.1 Location and Property Description

Located along the southwest side of West Foothill Parkway opposite its 'T' intersection with West Chase Drive, the Property consists of two irregular-shaped parcels comprising a total of approximately 17.63 acres (Property Location Map, Figure 1). In 2006, the Property was graded for proposed single-family residential development under permit, creating a large pad in the center flanked by a graded slope facing north and northwest. In 2015 and 2016, a large roadcut slope was graded on the northeast portion of the Property for improvement/paving of West Foothill Parkway. The Property is bounded on the northeast by West Foothill Parkway followed by single-family residential parcels and West Chase Drive, on the north and west by vacant parcels, and on the south by a nursery parcel and a vacant parcel.

2.2 Property Observations

At the time of our site reconnaissance on December 3, 2019, the Property was vacant. The Property is unfenced, except along its south boundary with the nursery. Primary vehicular access to the Property is via a north access road with a locked gate near its entrance from West Foothill Parkway approximately opposite the 'T' intersection with West Chase Drive. Approximately the first 400 feet of the north access road are paved, and the remainder is dirt. The north access road splits in the north center with the main fork extending southwest and east to the onsite pad, and the other fork extending west to the northwest property corner. There is another (south) access road extending from West Foothill Parkway near the southeast property corner. The south access road also accesses the offsite nursery and has locked gates in two places. The graded pad and onsite dirt access roads are generally cleared of vegetation. Most of the remainder of the Property is covered with annual grasses and/or brush, as well as trees mainly along its west boundary. No stressed vegetation was observed.

There is a tree house, possibly a former homeless shelter, near the northwest property corner. On the ground around the tree house, there is scattered trash which appears to be non-hazardous solid waste. On the access road north of the tree house there is a small area of stained (black) surface soil which is approximately 6 to 8 feet across and several inches deep. The stained soil appears to be residue from a small fire but may also contain petroleum hydrocarbons (oil). There are two lengths of cement pipe near the fork in the north access road in the north center of the Property which were apparently dumped by unknown persons. The pipes are approximately 6-inch inside diameter by approximately 8 to 10 feet long and may be composed of asbestos-cement (transite).

2.3 Historical Property Description

Historical aerial photographs of the Property dating back to 1931, as well as historical topographic maps dating back to 1902, were reviewed as part of this Phase I ESA. The Property has apparently always vacant unoccupied land. Agricultural use (orchards) of the adjacent area to the east began prior to 1931, and the area began transitioning to single-family residences in the early 1980s. Nursery use of the parcel adjoining southwest began in the early 2000s. The parcels adjoining west and north, together with the parcel adjoining southeast, have apparently always been vacant land.

2.4 Topography

The ground surface on the Property is irregular. There is a graded pad on a ridge crest in the center with descending slopes to the north, northwest, northeast and south. The continuation of the ridge crest ascends toward the west from the pad. Graded slopes descending from the pad toward the north, northwest and northeast are inclined at approximately 2:1 (h:v) or flatter and range to approximately 125 feet high. A natural slope descending from the pad toward the south extends offsite and ranges to approximately 100 feet high. Ground surface elevations on the Property range from approximately 1,233 feet above mean sea level (msl) on the graded pad in the east-center to approximately 1,094 feet above msl near the southeast property corner.

2.5 Geology

Regionally, the Property is within the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are characterized by steep, elongated valleys and mountain ranges that trend west and northwest. The



Map base reproduced from Google Earth photo (08/24/2018).



Legend	
—	Approximate Property boundary



FIGURE 1 PROPERTY LOCATION MAP

GF Investments, LLC, West Foothill Parkway and West Chase Drive, City of Corona, Riverside County, California

Project Name	GF Investments – Corona
Project No.	G19-1802-15
Geologist	DW
Scale	1" = 100'
Date	December 2019

mountainous areas are underlain by Pre-Cretaceous metasedimentary and metavolcanic rocks and Cretaceous plutonic rocks of the Southern California Batholith. The valleys are underlain by young alluvial deposits followed by Quaternary and Tertiary bedrock units (sandstones, mudstones and conglomerates, as well as volcanics). The Property and adjacent area are underlain by bedrock units of the Ladd Formation consisting of silty sandstone with gravel, cobbles and boulders which are white to gray, dry to damp and dense (LGC Inland Inc., 2004).

The northwest-southeast trending topography for the area is controlled by the Elsinore fault zone (EFZ), which extends northwesterly approximately 190 miles from San Diego County through Riverside County to southeastern Los Angeles County. The EFZ separates the Santa Ana Mountains Block on the southwest, which includes the Property, from the Perris Block on the northeast. An active southeast trending trace of the EFZ crosses the Property near the northeast property corner, and there is a State of California Earthquake Fault Zone on the Property in the northeast associated with the EFZ. The Tin Mine fault crosses the Property from west to east near the south property boundary. The Tin Mine fault is not designated as an active fault, but there is a County Fault Zone associated with it. The County Fault Zone associated with the EFZ and the Tin Mine fault covers the entire Property (Riverside County, 2018).

2.6 Groundwater

The California Department of Water Resources (DWR) *Water Data Library* indicates that the nearest well is State Well Number 338729N1175842W001 which is located approximately 2.2 miles north-northeast of the Property. The recorded groundwater depths in this well have ranged from 112 to 201 feet below ground surface (bgs) during 2011 through 2019.

2.7 Potable Water Source

CDPW records indicate that there is a water main in West Foothill Parkway adjacent to the Property. The Property is not currently connected to CDPW water service.

2.8 Public Sewer Source

CDPW records indicate that there is no sewer water main adjacent to the Property, and public sewer service is apparently not currently available to the Property.

3.0 RECORDS REVIEW

3.1 Historical Aerial Photograph Review

The following table describes the historical aerial photographs provided by Environmental Data Resources, Inc. (EDR) that were reviewed during this Phase I ESA (Appendix C). These historical aerial photographs were reviewed for evidence of potential past usage, storage, and/or disposal of hazardous materials or petroleum products on the Property and vicinity, which include, but are not limited to: landfills, oil wells, storage drums, underground storage tanks (USTs), aboveground storage tanks (ASTs), gas stations, agricultural operations known to use pesticides or herbicides, waste disposal pipes, and waste disposal areas.

HISTORICAL AERIAL PHOTOGRAPH REVIEW

Date	Observations
1931	The Property & the surrounding area to the N, W & SE are vacant. Some the nearby area to the E & SW is orchards. A main N-S dirt road & E-trending connector dirt roads are visible.
1938	No significant changes since 1931.
1948	More orchards to the E. No other significant changes since 1938.
1953	No significant changes since 1948.
1959	More orchards to the E. No other significant changes since 1953.
1961	More orchards to the NE. No other significant changes since 1959.
1967	More orchards to the NE. No other significant changes since 1961.
1975	No significant changes since 1967.
1985	Most of the orchards to the NE are gone. No other significant changes since 1975.
1989	Residential tracts have replaced most of the orchards to the NE. No other significant changes since 1985.

Date	Observations
1994	No significant changes since 1989.
2006	The ridge-crest pad, N/NW slopes & access roads have been graded on the Property. The nursery parcel adjoining SW is being developed. More residential tracts are replacing most of the orchards to the N, E, NE & SE. No other significant changes since 1994.
2009	W Foothill Pkwy (paved) extends to near the SE Property corner. Residential tracts have replaced more of the orchards to the SE. No other significant changes since 2006.
2012	Residential tracts have replaced the orchards to the SE. No other significant changes since 2009.
2016	The NE roadcut slope on the Property has been graded & the Property is in approx. current conditions. W Foothill Pkwy & W Chase Dr have been graded NE of the Property. Most of the surrounding area is developed in approx. current conditions. No other significant changes since 2012.

3.2 Historical Topographic Map Review

The following table describes the historical topographic maps provided by EDR that were reviewed during this Phase I ESA (Appendix C). These historical topographic maps were reviewed for evidence of potential past usage, storage, and/or disposal of hazardous materials or petroleum products on the Property and vicinity, which include, but are not limited to: landfills, oil wells, storage drums, USTs, ASTs, gas stations, agricultural operations known to use pesticides or herbicides, waste disposal pipes, and waste disposal areas.

HISTORICAL TOPOGRAPHIC MAP REVIEW

Date	Observations
1902	The Property is apparently vacant. An unnamed road is along the N Property boundary & a structure is N of the road. Many of the current roads are visible to the E & NE.
1942	There is no map coverage for the Property & areas to the N, W & S. No significant changes since 1902 for area to the E with map coverage.
1947	There is an unnamed mine NE of the Property & 3 other unnamed mines to the N & NW. Most of nearby area to the E is orchards. No other significant changes since 1942.
1954	There is an unnamed dirt road the W part of the Property. The nearby mine is gone. There are structures to the E & SE. No other significant changes since 1947.
1967	The dirt road the W part of the Property is gone. There are more structures & a well nearby to the E. There are residential subdivisions N of Ontario Av. No other significant changes since 1954.
1973	There are more residential subdivisions to the N. No other significant changes since 1967.
1982	There is a large unnamed reservoir nearby to the NE. There are more residential subdivisions & a landing strip to the N. No other significant changes since 1973.
1988	No significant changes since 1982.
1997	The large reservoir nearby to the NE is the Oak Street Reservoir. There are more residential subdivisions to the N & NE. No other significant changes since 1988.
2012	The surrounding area is developed in approx. current conditions including most of the current roads except W Foothill Pkwy. The landing strip to the N is gone.

3.3 City Directories

EDR indicated that City Directories listings are available only for adjacent properties on Anza Road (Appendix E). There no City Directories listings for the 55105 Scrub Oak Road address related to the Property, including for 2011 after the Property was developed and presumably occupied.

3.4 Sanborn Insurance Maps

No Sanborn Fire Insurance Maps were available for the Property and surrounding area.

3.5 Assessor's Parcel Number

Riverside County Assessor's Office records indicate that the Property consists of APNs 573-080-071 and 573-080-072.

3.6 Prior Environmental Site Assessment Reports

Based on research and data obtained during this Phase I ESA, there are no records of prior ESA reports regarding the Property, There are, however, records of the following three prior geotechnical reports regarding the Property (Appendix A).

In 2006, LGC Inland Inc. (LGC Inland) provided observation and testing services during rough grading operations for the Property, the results of which are reported in *Geotechnical Report of Rough Grading, Proposed Residential Development, APN 275-050-008 & 275-080-015, Located at 3210 Mangular Avenue, Corona Area, Riverside County, California* (Project No. I04481-30) dated May 19, 2006. LGC Inland stated the following: "The grading generally conformed to the grades and elevations shown on the original grading plan. Earthwork and grading operations were performed in accordance with the recommendations presented in the referenced reports (see References) and the Grading Code of the County of Riverside, California. The completed earthwork has been reviewed and is considered adequate for the construction now planned."

In 2004, LGC Inland conducted a preliminary geotechnical investigation for the Property, the results of which are reported in *Preliminary Geotechnical Investigation for the Proposed 18-Acre Single Family Residence, Chase Drive and Mangular Avenue, Corona Area of Riverside County, California* (Project No. I04481-10) dated August 5, 2004. Four test pits and two fault trenches were excavated, logged and sampled. Soil testing was conducted using soil samples from the four test pits. Groundwater was not encountered in any of the test pits or trenches to a maximum depth of approximately 7 feet bgs. Two faults, which were exposed in the trenches, were judged to be inactive. LGC Inland concluded that the subject property was considered suitable for the proposed residential development from a soils engineering and engineering geologic point of view.

In 2004, LGC Inland conducted a sewage disposal feasibility investigation for the Property, the results of which are reported in *Sewage Disposal Feasibility Report, Proposed Single Family Residence Located on an 18-Acre Site near Chase Drive and Mangular Avenue, Corona area, Riverside County, California* (Project No. I04481-10) dated July 26, 2004. One boring, two trenches and four test pits were excavated, logged and sampled. Percolation testing was conducted in the four test pits, which indicated that there was sufficient area at the subject site to support an onsite wastewater treatment system (OWTS). Groundwater was not encountered in the boring to a maximum depth of approximately 50 feet bgs or in any of the trenches/test pits.

3.7 Environmental Data Resources Report

LGC utilized EDR to conduct a search of available environmental databases, records and resources regarding the Property. EDR searched the databases for sites surrounding the Property to meet the requirements of *ASTM Standard E1527-13*, including ASTM-specified search radii of up to 1.000 mile and data currency. The results of EDR's research are contained in *The EDR Radius Map™ Report with GeoCheck®, Inquiry 5888607.2s*, dated December 2, 2019 (Appendix D). The Government Records Searched and Data Currency Tracking section in EDR's Report describes the databases that were searched, including data currency.

The Property and adjoining properties are not listed in any of the databases searched by EDR. The EDR Report lists and describes the following site located within ASTM-specified search radii surrounding the Property:

MAP FINDINGS SUMMARY – EDR REPORT

EDR MAP ID	SITE NAME	SITE ADDRESS	EDR DATABASE ACRONYMS	REL. ELEV.	DIST. (mi), DIR.
1	HAGADOS RANCH	3466 SKYLINE DR., CORONA	HIST UST	Lower	0.186, ESE

The following is a discussion of the Standard Federal, State, and Tribal Environmental Record Sources (*ASTM Standard E1527-13*), including the above site listed in the EDR Report.

3.7.1 National Priority List (NPL), Proposed NPL, Delisted NPL, and NPL Liens

The NPL is a USEPA listing of uncontrolled or abandoned hazardous waste sites undergoing long-term remedial action under the Superfund Act. The Proposed NPL is a USEPA listing of sites proposed for the NPL. The Delisted NPL is a USEPA listing of sites which were once considered to be NPL sites but have been reviewed and removed from the NPL. This may be because they have been remediated or reevaluated based on additional information. The NPL Liens is a listing of filed notices of Superfund

Liens. No NPL, Proposed NPL or Delisted NPL sites were identified within 1.000 mile of the Property, and no NPL Liens sites were identified within 0.001 mile of the Property.

3.7.2 Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) List

CERCLIS is a USEPA listing of sites that are either proposed or on the NPL and sites that are in the screening and assessment phase for possible inclusion on the NPL. No CERCLIS sites were identified within 0.500 mile of the Property.

3.7.3 CERCLIS No Further Remedial Action Planned (NFRAP) List

CERCLIS-NFRAP is a USEPA listing of CERCLIS sites where following an initial investigation, no contamination was found, contamination was quickly removed, or contamination was not serious enough to require Federal Superfund action or NPL consideration. No CERCLIS-NFRAP sites were identified within 0.500 mile of the Property.

3.7.4 Resource Conservation and Recovery Act (RCRA) Corrective Actions (CORRACTS) List

RCRA CORRACTS is a USEPA listing of RCRA facilities that are undergoing corrective action. Corrective actions may be required beyond the facility's boundary and can be required regardless of when the release occurred. No RCRA CORRACTS sites were identified within 1.000 mile of the Property.

3.7.5 RCRA Non-CORRACTS Treatment, Storage, and Disposal (TSD) Facilities List

USEPA maintains a list of RCRA Non-CORRACTS TSD facilities, which have permits to manage hazardous material. No RCRA Non-CORRACTS TSD facilities were identified within 0.500 mile of the Property.

3.7.6 RCRA Generators List

The RCRA Generators List contains facilities that generate, store, transport, treat, or dispose of hazardous waste. No Generator facilities were identified within 0.250 mile of the Property.

3.7.7 Federal Institutional Control/Engineering Control Registries

Institutional controls and engineering controls are forms of AULs which are an explicit recognition that residual levels of hazardous substances or petroleum products may be present on the Property and unrestricted use of the Property may not be acceptable. The Property was not identified the Federal Institutional Control/Engineering Control Registries Lists.

3.7.8 Emergency Response Notification System (ERNS) List

ERNS is a USEPA listing of reported Comprehensive Environmental Response Compensation and Liability Act (CERCLA) hazardous substance releases or spills in quantities greater than the reportable quantity, as maintained at the National Response Center (NRC). The Property was not identified on the ERNS List.

3.7.9 State- and Tribal-Equivalent NPL (RESPONSE)

The State- and Tribal-Equivalent NPL (RESPONSE) list identifies confirmed release sites where Department of Toxic Substances Control (DTSC) is involved in remediation, either in a lead or oversight capacity. RESPONSE sites are generally high-priority and high potential risk. No RESPONSE sites were identified within 1.000 mile of the Property.

3.7.10 State- and Tribal-Equivalent CERCLIS (ENVIROSTOR)

The ENVIROSTOR database identifies sites that have known contamination or sites for which there may be reasons to investigate further. No ENVIROSTOR sites were identified within 1.000 mile of the Property.

3.7.11 State and Tribal Landfill and/or Solid Waste Disposal Site Lists

The Solid Waste Information System list contains Solid Waste Facilities/Landfill (SWF/LF) site records of Active, Closed and Inactive Landfills. No SWF/LF sites were identified within 0.500 mile of the Property.

3.7.12 State and Tribal Leaking Underground Storage Tank (LUST) Sites

Lists of LUST sites registered with the state (including *GeoTracker*) and USEPA (tribal). No LUST sites were identified within 0.500 mile of the Property.

3.7.13 State and Tribal Registered UST Sites

An inventory of USTs registered with the state (including *GeoTracker*) and USEPA (tribal). No UST sites were identified within 0.250 mile of the Property.

3.7.14 Registered Aboveground Storage Tank Sites

A list of AST sites registered with the State Water Resources Control Board (SWRCB). No registered AST sites were identified within 0.250 mile of the Property.

3.7.15 State and Tribal Voluntary Cleanup Program (VCP) Sites

A listing of low threat level sites with confirmed or unconfirmed releases and the project proponents have requested that DTSC oversee investigation and/or cleanup activities. No VCP sites were identified within 0.500 mile of the Property.

3.7.16 State and Tribal Brownfields Sites

A listing of Brownfields sites which have come to the SWRCB through the Memorandum of Agreement (MOA) Process. No Brownfields sites were identified within 0.500 mile of the Property.

3.7.17 Historical UST (HIST UST) Sites

The Hazardous Substance Storage Container Database is a historical list of UST sites (HIST UST). The EDR Report identified one HIST UST site within 0.250 mile of the Property. Hagados Ranch, 40675 Skyline Drive, Corona, is located approximately 0.186 mile east-southeast of the Property. This HIST UST site is not listed in the *GeoTracker* database, and it is therefore not considered to be a concern regarding the Property due to the following: no leaks or violations reported and/or site location relative to the apparent direction of regional groundwater flow.

3.8 Agency Contact and Database Search

To supplement the EDR Report, LGC reviewed online databases for the following environmental agencies:

- Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR).
- SWRCB.
- South Coast Air Quality Management District (AQMD).
- DTSC.

3.8.1 Division of Oil, Gas, and Geothermal Resources

The DOGGR *WellFinder* database and map were reviewed online regarding oil and gas wells near the Property. The *WellFinder* map indicates that the nearest oil and gas well is located approximately 1.2 miles north-northwest of the Property. The well is identified as API: 0406500083, Well Number 1, Operator: Edgington Oil Refineries, Inc. This oil and gas well is a plugged dry hole and is not considered to be a concern regarding the Property.

3.8.2 State Water Resources Control Board

The SWRCB *GeoTracker* database and map were reviewed online regarding the Property. The *GeoTracker* database contains information about Permitted USTs, LUST Cleanup Sites, Cleanup Program Sites, Land Disposal Sites, Military Sites, Waste Discharge Requirements (WDR) Sites, and Irrigated Lands Regulatory Program Sites. The *GeoTracker* map indicates there are no Permitted USTs, LUST Cleanup Sites, Cleanup Program Sites, Land Disposal Sites, Military Sites, WDR Sites, and Irrigated Lands Regulatory Program Sites within ASTM-specified search radii surrounding the Property. Therefore, these sites are not considered to be concerns regarding the Property.

3.8.3 South Coast Air Quality Management District

The South Coast AQMD *Facility Information Detail (FIND)* database and map were reviewed online regarding the Property. The *FIND* database contains information about facilities having AQMD permits. Based on the *FIND* map, there are no AQMD permit sites within 0.250 mile of the Property. Therefore, AQMD permit sites are not considered to be concerns regarding the Property.

3.8.4 Department of Toxic Substances Control

The DTSC *ENVIROSTOR* database and map were reviewed online regarding the Property. The *ENVIROSTOR* database identifies sites that have known contamination or sites for which there may be reasons to investigate further. The *ENVIROSTOR* map indicates there are no Federal NPL, State NPL, Voluntary Cleanup, School Cleanup, Evaluation, Military Evaluation, Tiered Permit, and Corrective Action sites within ASTM-specified search radii surrounding the Property. Therefore, these sites are not considered to be concerns regarding the Property.

4.0 SITE RECONNAISSANCE

4.1 Site Reconnaissance Methodology

On December 3, 2019, LGC performed a site reconnaissance of the Property to observe and evaluate its current use and onsite environmental conditions. The site reconnaissance involved walking the Property while observing for evidence of existing and potential environmental concerns. Property photographs are provided in Appendix B.

4.2 Limiting Conditions

LGC encountered no limiting conditions during the site reconnaissance on December 3, 2019.

4.3 Interior Observations of Property

During the site reconnaissance on December 3, 2019, LGC observed no structures on the Property and therefore made no interior observations for the east parcel.

Exterior Observations of Property

During the site reconnaissance on December 3, 2019, LGC made the following observations regarding the exterior of the Property:

EXTERIOR OBSERVATIONS OF PROPERTY

Item or Condition	Observed Evidence	No Evidence Observed	Comments
Hazardous Substances & Petroleum Products:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	There are 2 lengths of cement pipe near the north access road fork in the north center of the Property. The pipes are approximately may be composed of transite (asbestos-cement).
Odors:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Storage Tanks & Related Equipment:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Standing Surface Water or Other Pools of Liquid:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Drums of Hazardous Substances, Petroleum Products, or Unidentified Contents:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Transformers or Equipment containing Polychlorinated Biphenyls (PCBs):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Pits, Ponds, or Lagoons:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

Item or Condition	Observed Evidence	No Evidence Observed	Comments
Drains and Sumps:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Stained Soil or Pavement:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	A small area of stained (black) surface soil is located north of the tree house near the NW property corner. The stained soil appears to be residue from a small fire but may also include petroleum hydrocarbons (oil).
Stressed Vegetation (other than from insufficient water):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Evidence of Mounds, Depressions or Filled or Graded Areas Suggesting Trash or Other Solid Waste Disposal:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Wastewater or any discharge (including storm water) into a Drain, Ditch, or Stream on or Adjacent to the Property:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Most onsite storm water runoff apparently discharges north into the culvert inlet along W. Foothill Pkwy. & NW onto the road shoulder. The remaining onsite storm water runoff apparently discharges south onto the adjoining properties.
Wells (active, inactive, or abandoned):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Septic Systems or Cesspools:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Prior Structures:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Roads, Tracks, Railroad Tracks or Spurs:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

4.5 Adjoining Property Observations

As defined in *ASTM Standard E1527-13*, an adjoining property is any real property whose border is contiguous or partially contiguous with the Property, or would be contiguous or partially contiguous with the Property if that property were not separated from the Property by a roadway, street or other public thoroughfare.

The Property is bordered by the following:

Northeast: West Foothill Parkway (paved) followed by single-family residential parcels and West Chase Drive.

North: A vacant parcel.

South: A nursery parcel (west) and a vacant parcel (east).

West: A vacant parcel.

5.0 FINDINGS

A summary of our findings is provided below. Details are not included or fully developed in this section, and the Phase I ESA report must be read in its entirety for a comprehensive understanding of these findings.

- Located along the southwest side of West Foothill Parkway opposite its 'T' intersection with West Chase Drive, the Property consists of two irregular-shaped parcels comprising a total of approximately 17.63 acres. The Property is vacant land which was graded beginning in 2006.
- Historical aerial photographs of the Property dating back to 1931, as well as historical topographic maps dating back to 1902, were reviewed as part of this Phase I ESA. The Property has apparently always vacant unoccupied land. Agricultural use of the adjacent area to the east began prior to 1931, and the area began transitioning to single-family residences in the early 1980s.

- The Property and adjoining properties were not identified in the databases in the EDR Report or in the four additional online databases reviewed by LGC.
- No evidence of pesticides or herbicides spills was observed on the Property during our site reconnaissance, and there is no indication that pesticides or herbicides were used on the Property.
- There are two lengths of cement pipe near the north access road fork in the north center of the Property which were apparently dumped by unknown persons. The pipes may be composed of asbestos-cement (transite). No other evidence of current or past storage or use of hazardous materials or petroleum products was identified on the Property during our site reconnaissance and records review.
- There is a small area of stained (black) surface soil along the access road north of the tree house and near the northwest Property corner. The stained soil appears to be residue from a small fire but may also contain petroleum hydrocarbons (oil). No other stained surface soil or other visible evidence of petroleum products or hazardous materials spills was observed on the Property. No stressed vegetation was observed.
- No evidence of ASTs was observed on the Property during our site reconnaissance or identified during record review.
- No evidence of USTs, sumps, clarifiers, or other storage or treatment structures for hazardous materials or petroleum products was observed on the Property during our site reconnaissance or identified during record review.
- No evidence of known regulatory actions, regarding hazardous materials or petroleum products cleanup that have been issued or are being issued for the Property, was identified during our records review.

6.0 OPINIONS

A summary of our opinions is provided below. Details are not included or fully developed in this section, and the Phase I ESA report must be read in its entirety for a comprehensive understanding of these opinions.

- No apparent or potential threat of past or present hazardous material releases exists regarding the Property based on the EDR Report and the Agency Contact and Database Search, including the site identified in the EDR Report within the ASTM-specified search radii surrounding the Property.
- A Vapor Encroachment Condition does not exist or is not likely to exist in connection with the Property.
- No RECs, including CRECs, were identified on, at, in, or to the Property.
- No significant data gaps were identified that affect the ability of the Environmental Professional to identify RECs.
- There are no unusual circumstances where greater certainty is required regarding RECs.

7.0 CONCLUSIONS AND RECOMMENDATIONS

LGC has performed a Phase I ESA of the Property in conformance with the scope and limitations of *ASTM E1527-13*. There were no exceptions to, or deletions from *ASTM E1527-13* in conducting this Phase I ESA. This Phase I ESA has revealed no evidence of RECs in connection with the Property.

LGC recommends the following additional environmental assessment and remediation, based on the results of this Phase I ESA:

- The two lengths of cement pipe near the north access road fork in the north center of the Property should be sampled to determine if they are composed of asbestos-cement (transite). If the sample results indicate that the contain asbestos, then the pipes and any visible broken-off pipe pieces should be removed, packaged and disposed of as an asbestos-containing material (ACM) by a properly-licensed contractor. If they are not ACM, then they can be disposed of as non-hazardous solid waste. The pipes are a possible ACM and are therefore not an REC.
- The small area of stained (black) surface soil on the road north of the tree house should be sampled to determine if it contains petroleum hydrocarbons. If the sample results indicate that the contain petroleum hydrocarbons, then the stained soil should be excavated, containerized and disposed of as petroleum hydrocarbon contaminated waste by a properly-licensed contractor. If the stained soil does not contain petroleum hydrocarbons, then it can be disposed of as non-hazardous solid waste. The stained soil comprises an estimated 0.5 cubic yard or less, and it is therefore a de minimis condition which is not an REC.

- The other trash on the Property should be removed and disposed of as non-hazardous solid waste.

8.0 NON-SCOPE ISSUES

The following Non-Scope Issues, which are outside the scope of *ASTM E1527-13*, were assessed in connection with this Phase I ESA of the Property.

8.1 Building Construction Materials

Building construction materials that could contain hazardous materials, including asbestos-containing building materials (ACBMs) and lead-based paint (LBP), were considered during this Phase I ESA. There apparently never have been structures on the Property, and therefore ACBMs and LBP are not considered to be concerns regarding the Property. The two lengths of cement pipe near the north access road fork in the north center of the Property should be sampled to determine if they contain asbestos.

8.2 Indoor Radon

The *Map of Radon Zones in California*, based on USEPA data, was reviewed online. The map indicates that Riverside County, including the Property, is in Radon Zone 2 and has a predicted average indoor radon screening level between 2 and 4 picocuries per liter (pCi/L), which is considered "Moderate Potential". This screening level is less than or equal to the USEPA's radon action level of 4 pCi/L, and radon is therefore not a concern regarding the Property.

8.3 Natural Asbestos Occurrences

The map of *Reported Historic Asbestos Mines, Historic Asbestos Prospects, and Other Natural Occurrences of Asbestos in California* by the California Geologic Survey (CGS) and U.S. Geologic Survey (USGS) was reviewed. The map depicts historic asbestos mines/prospects and natural asbestos occurrences and indicates that there are no reported natural asbestos occurrences or historic asbestos/prospects mines located within 1 mile of the Property. Natural asbestos occurrences and historic asbestos mines/prospects are therefore not concerns regarding the Property.

9.0 LIMITATIONS

This Phase I ESA was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers, geologists, and environmental professionals practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. The current observations made in the field and the review of available records and other documentation are believed to be representative of the entire project. However, soil, geologic and other conditions revealed by excavation may be different from our preliminary findings. If this occurs, the changed conditions must be evaluated by the environmental professional, and the recommendations within this Phase I ESA are subject to change. Changes in the conditions of the Property can and do occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties.

This report is issued with the understanding that it is the responsibility of the owner and/or owner's representative to ensure that the information and recommendations contained herein are adhered to and made clear.

The conclusions, opinions and recommendations contained in this Phase I ESA report represent our professional judgment and are based on the results of the described review of available records and other documentation.

The conclusions, opinions and recommendations contained in this Phase I ESA report are valid up to a period of one (1) year from the date of this report in accordance with the All Appropriate Inquiries (AAI) Final Rule. Changes in the conditions on the Property can and do occur with the passage of time, due to natural processes and/or the works of man. In addition, changes in applicable or appropriate codes, regulation and/or standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this Phase I ESA may be invalidated wholly or partially by changed conditions outside LGC's control. Therefore, if any of the abovementioned situations occur, then this report must be updated.

This report has been prepared solely for use by the parties and purposes named and/or designed above. It may not contain sufficient and/or applicable information for use by other parties or other purposes. LGC reserves the right to

the information, conclusions, recommendations, and findings of this Phase I ESA should the client decide to forfeit their ownership of the Property.

LGC appreciates the opportunity to be of service to you and looks forward to the opportunity to work with you in the future. Should you have any questions, or should you require additional information, regarding the contents of this Phase I ESA please do not hesitate to contact this office at your earliest convenience.

10.0 PREPARERS

Duncan Walker
Environmental Professional and Certified Engineering Geologist

B.S., Geology, California University at Los Angeles, 1980.
California Professional Geologist, #4105
California Certified Engineering Geologist, #1395

Environmental Division Manager and Certified Engineering Geologist at LGC. Mr. Walker has more than 30 years of experience in the fields of Environmental Due Diligence including conducting and managing Phase I and Phase II Environmental Site Assessments, as well as Preliminary Environmental Assessments, Supplemental Site Investigations and Removal Action Work Plans/Implementation. Current duties include business development, client liaison, technical oversight, and review and preparation of proposals and reports. Principal areas of responsibility for this Phase I ESA: Project Management, Client Point of Contact, Research, Site Reconnaissance, Interviews, and Report Preparation.

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Technical Infeasibility Criteria

Technical infeasibility for on-site infiltration may result from conditions including the following:

1. The corrected in-situ infiltration rate is less than 0.3 inches per hour, as determined by infiltration test, and it is not technically feasible to amend the in-situ soils to attain an infiltration rate necessary to achieve reliable performance of retention-based stormwater quality control measures;
2. Locations where the seasonal high groundwater level is within 10 feet of the surface, as determined by soils investigations;
3. Locations within 100 feet of a groundwater well used for drinking water;
4. Brownfield development sites where infiltration poses a risk of pollutant mobilization;
5. Other locations where pollutant mobilization is a documented concern (e.g., at or near properties that are contaminated or store hazardous substances underground);
6. Locations with potential geotechnical hazards;
7. Smart growth and infill or redevelopment locations where the density and/or nature of the project would create significant difficulty for compliance with the onsite retention requirement;
8. Locations where infiltration may adversely impact biological resources; or
9. Locations where infiltration may cause health and safety concerns.

It may be technically infeasible for stormwater runoff harvest and use for the following situations:

1. Projects that would not provide sufficient irrigation or (where permitted) domestic grey water demand for use of stored stormwater runoff due to limited landscaping or extensive use of low water use plant palettes in landscaped areas;
2. Projects that are required to use recycled water for landscape irrigation;
3. Projects in which the harvest and use of stormwater runoff would conflict with local, state, or federal ordinances or building codes;
4. Locations where storage facilities may cause potential geotechnical hazards as outlined in the geotechnical report; or
5. Locations where storage facilities may cause health and safety concerns.

It may be technically infeasible for Bioretention (with underdrains) for the following situations:

1. Projects that have less than 0.3 in/hr infiltration rate and do not have sufficient land area to construct an above ground system;
2. Projects that have no potential connection to existing or proposed storm drain systems.

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

Legend:

Required Entries

Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	KWC Engineers	Date	3/4/2020
Designed by	Calvin Sy	Case No	
Company Project Number/Name	2018.1847.1 Skyline Village Commercial Center		

BMP Identification

BMP NAME / ID **DMA 2**

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E $D_{85} =$ **0.95** inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
2A	57,695	Roofs	1	0.89	51463.9			
2B	88,438	Concrete or Asphalt	1	0.892	78886.7			
2C	127,687	Concrete or Asphalt	1	0.892	113896.8			
2D	7,524	Natural (D Soil)	0.4	0.279712	2104.6			
2E	114,650	Ornamental Landscaping	0.1	0.110458	12664			
395994		Total			259016	0.95	20505.4	20,923

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

Legend:

Required Entries

Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	KWC Engineers	Date	3/4/2020
Designed by	Calvin Sy	Case No	
Company Project Number/Name	2018.1847.1 Skyline Village Commercial Center		

BMP Identification

BMP NAME / ID	DMA 3
<i>Must match Name/ID used on BMP Design Calculation Sheet</i>	

Design Rainfall Depth

Design Rainfall Intensity	I =	0.20	in/hr
---------------------------	-----	------	-------

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type <i>(use pull-down menu)</i>	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
3A	0	Roofs	1	0.89	0			
3B	3,252	Concrete or Asphalt	1	0.892	2900.8			
3C	15,080	Concrete or Asphalt	1	0.892	13451.4			
3D	0	Natural (D Soil)	0.4	0.279712	0			
3E	18,621	Ornamental Landscaping	0.1	0.110458	2056.8			
36953		Total			18409	0.20	0.1	0.115

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

Legend:

Required Entries

Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	KWC Engineers	Date	3/4/2020
Designed by	Calvin Sy	Case No	
Company Project Number/Name	2018.1847.1 Skyline Village Commercial Center		

BMP Identification

BMP NAME / ID	DMA 4
<i>Must match Name/ID used on BMP Design Calculation Sheet</i>	

Design Rainfall Depth

Design Rainfall Intensity	I =	0.20	in/hr
---------------------------	-----	------	-------

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type <i>(use pull-down menu)</i>	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
4A	0	Roofs	1	0.89	0			
4B	1,132	Concrete or Asphalt	1	0.892	1009.7			
4C	12,068	Concrete or Asphalt	1	0.892	10764.7			
4D	0	Natural (D Soil)	0.4	0.279712	0			
4E	20,775	Ornamental Landscaping	0.1	0.110458	2294.8			
		33975	Total		14069.2	0.20	0.1	0.115

Notes:

Santa Ana Watershed - BMP Design Flow Rate, Q_{BMP}

Legend:

Required Entries

Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	KWC Engineers	Date	3/4/2020
Designed by	Calvin Sy	Case No	
Company Project Number/Name	2018.1847.1 Skyline Village Commercial Center		

BMP Identification

BMP NAME / ID	DMA 5
---------------	-------

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

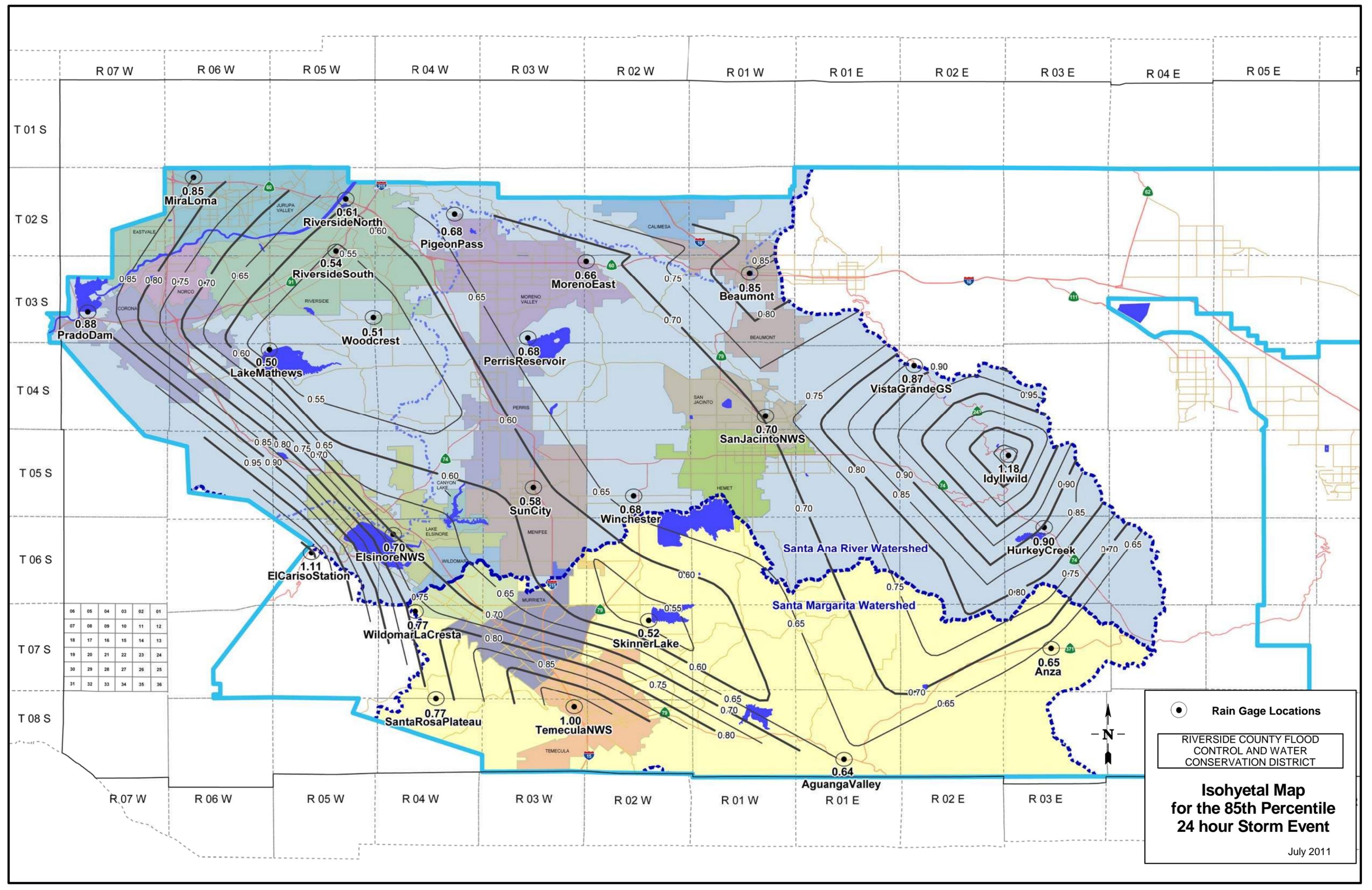
Design Rainfall Intensity	I =	0.20	in/hr
---------------------------	-----	------	-------

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type <i>(use pull-down menu)</i>	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
5A	0	Roofs	1	0.89	0			
5B	0	Concrete or Asphalt	1	0.892	0			
5C	18,151	Concrete or Asphalt	1	0.892	16190.7			
5D	0	Natural (D Soil)	0.4	0.279712	0			
5E	17,592	Ornamental Landscaping	0.1	0.110458	1943.2			
35743		Total			18133.9	0.20	0.1	0.115

Notes:



06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

● Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

July 2011

PROJECT SUMMARY

CALCULATION DETAILS

- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 123 lf.

STORAGE SUMMARY

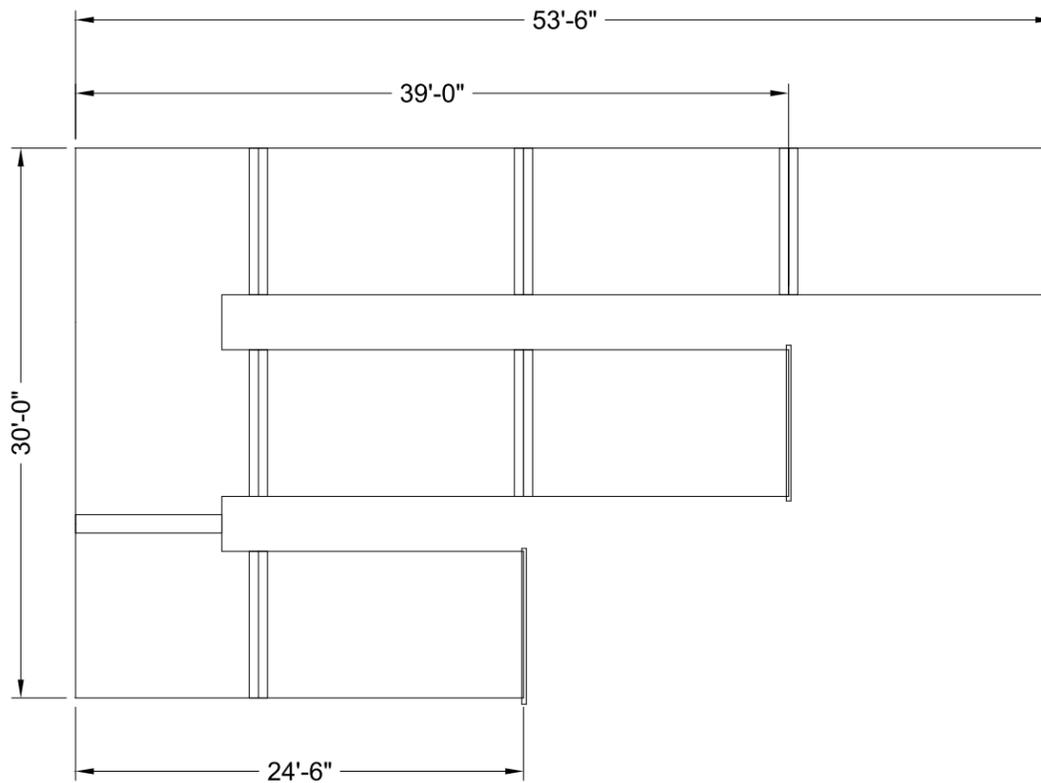
- STORAGE VOLUME REQUIRED = 10,900 cf.
- PIPE STORAGE VOLUME = 6,183 cf.
- BACKFILL STORAGE VOLUME = 5,238 cf.
- TOTAL STORAGE PROVIDED = 11,421 cf.

PIPE DETAILS

- DIAMETER = 96 IN.
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = Perforated
- BARRELL SPACING = 36 IN.

BACKFILL DETAILS

- WIDTH AT ENDS = 36 IN.
- ABOVE PIPE = 6 IN.
- WIDTH AT SIDES = 36 IN.
- BELOW PIPE = 6 IN.



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

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2³/₈" x 1/2" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.

ASSEMBLY
SCALE: 1" = 10'

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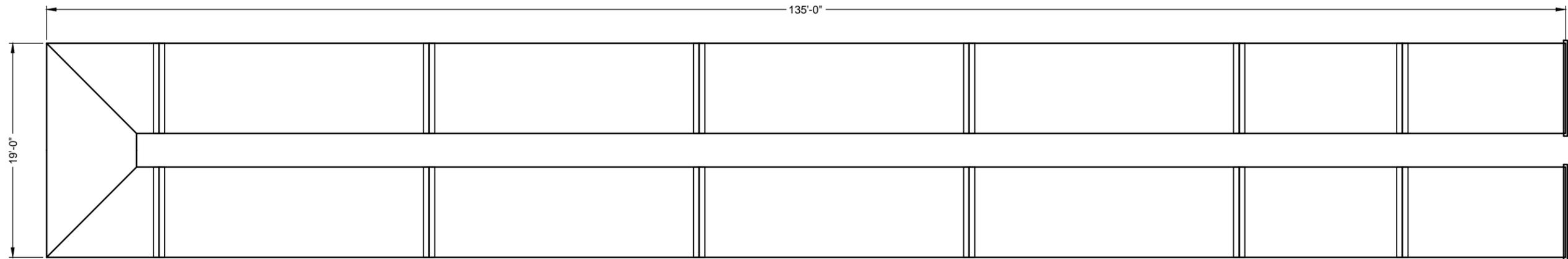
MARK	DATE	REVISION DESCRIPTION	BY

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9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
CMP DETENTION SYSTEMS
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DYODS
DRAWING

DYO4802 Skyline Village
DMA 1
Corona, CA
DETENTION SYSTEM

PROJECT No.: 3101	SEQ. No.: 4802	DATE: 12/28/2020
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.:		D1



ASSEMBLY
SCALE: 1" = 10'

PROJECT SUMMARY

CALCULATION DETAILS

- LENGTH PER BARREL = 127 FT
- LENGTH PER HEADER = 19 FT
- LOADING = H20 & H25
- APPROX. CMP FOOTAGE = 273 FT

STORAGE SUMMARY

- STORAGE VOLUME REQUIRED = 20,826.10 CF
- PIPE STORAGE = 13,722 CF
- STRUCTURAL BACKFILL STORAGE = 7,201 CF
- TOTAL STORAGE PROVIDED = 20,923 CF

PIPE DETAILS

- DIAMETER = 96 IN
- CORRUGATION = 5" X 1" OR 3" X 1"
- GAGE = 16
- COATING = ALUMINIZED STEEL
- TYPE 2 (ALT2)
- WALL TYPE = PERFORATED
- BARREL SPACING = 36 IN

BACKFILL DETAILS

- WIDTH AT ENDS = 36 IN
- ABOVE PIPE = 6 IN
- WIDTH AT SIDES = 36 IN
- BELOW PIPE = 6 IN

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE 2 1/2" x 1/2" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
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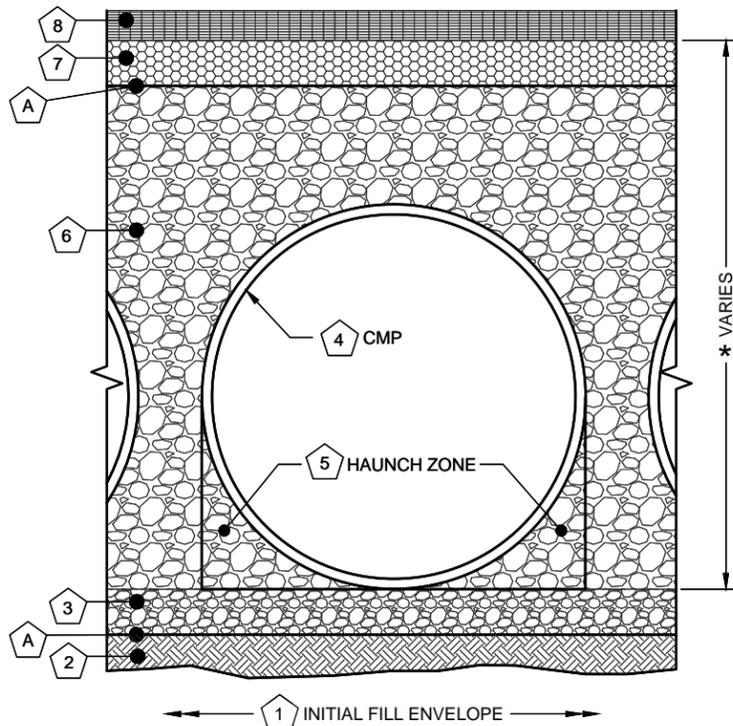
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DYODS
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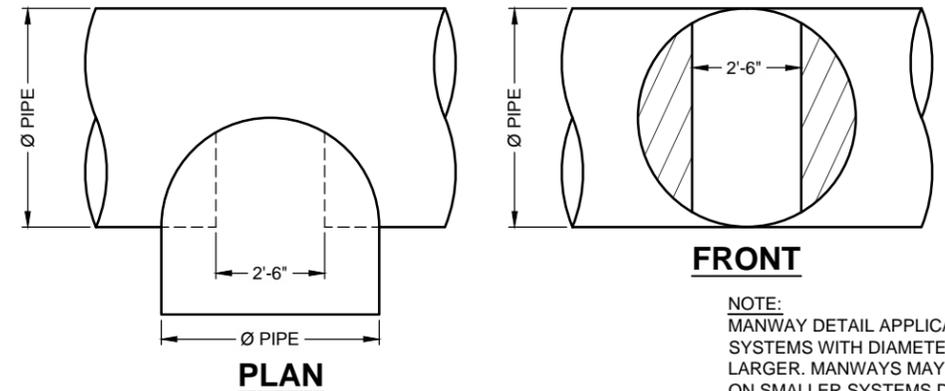
DYODS - 14310-2-0
 PROJECT NAME: Skyline Village
 Corona, CA
 DESCRIPTION: DMA 2

PROJECT No.: 14310-2	SEQ. No.: 0	DATE: 7/10/2020
DESIGNED: DYODS	DRAWN: DYODS	
CHECKED:	APPROVED:	
SHEET NO.:		D1



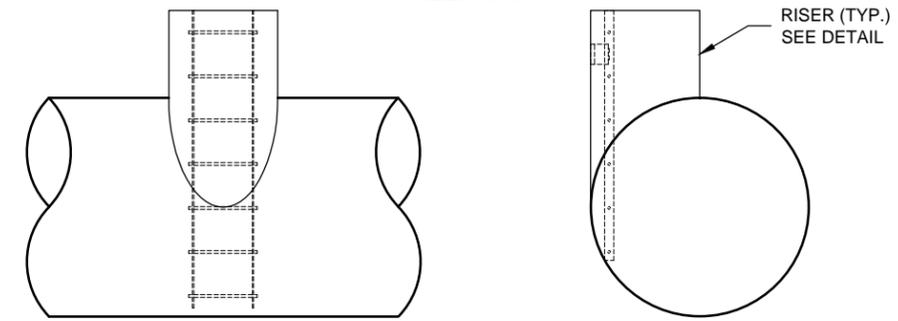
Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)		
7	Road Base (if applicable)		
Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of 1/2" - 2 1/2" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction*
Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.

* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.



TYPICAL MANWAY DETAIL
SCALE: N.T.S.

NOTE: MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



TYPICAL RISER DETAIL
SCALE: N.T.S.

NOTE: LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

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

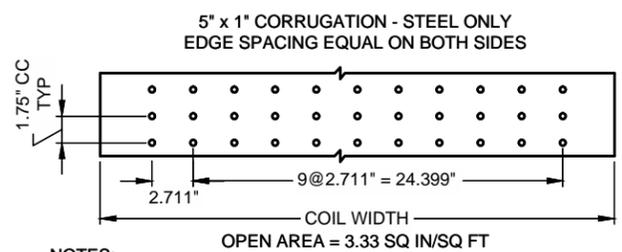
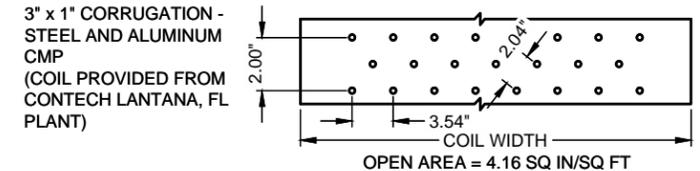
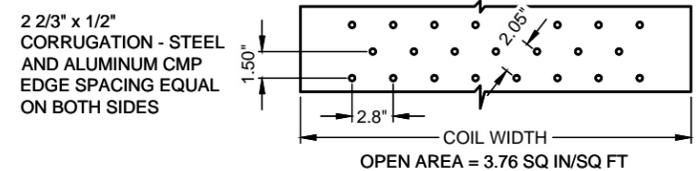
5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

BACKFILL
MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

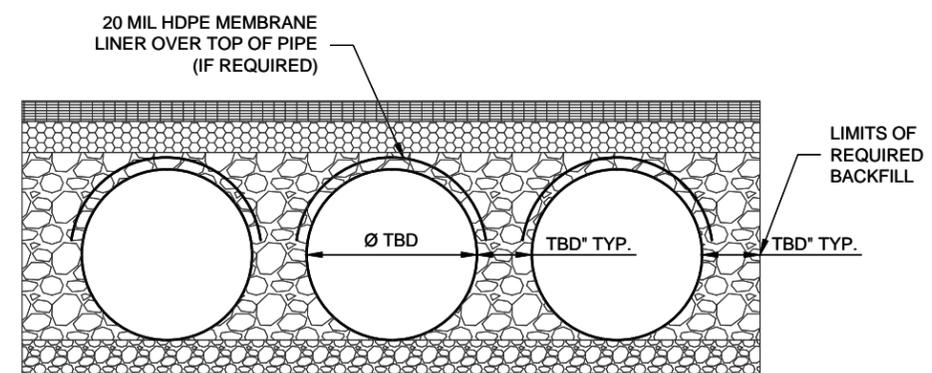
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

BACKFILL DETAIL
SCALE: N.T.S.



- NOTES:
- PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
 - PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
 - ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
 - ALL HOLES Ø3/8".

TYPICAL PERFORATION DETAIL
SCALE: N.T.S.



TYPICAL SECTION VIEW
LINER OVER ROWS
SCALE: N.T.S.

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

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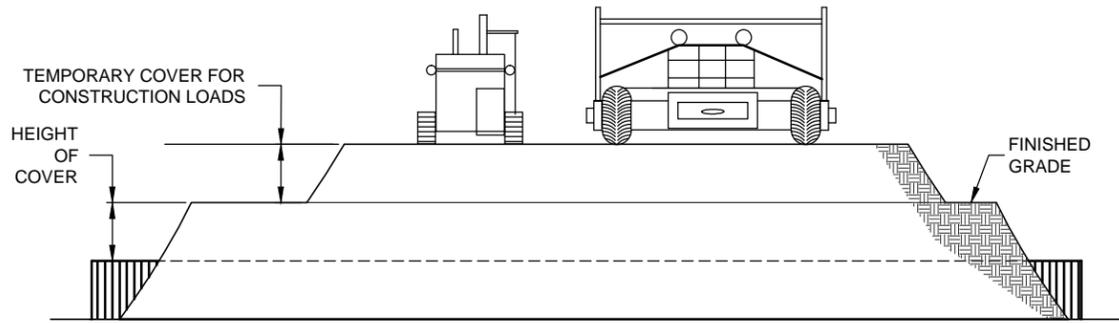
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CMP DETENTION SYSTEMS
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DYODS - 14309-1-0
PROJECT NAME: Skyline Village
Corona, CA
DESCRIPTION: DMA A 9.34 AC

PROJECT No.: 14309-1	SEQ. No.: 0	DATE: 3/5/2020
DESIGNED: DYODS	DRAWN: DYODS	
CHECKED:	APPROVED:	
SHEET NO.: D2		



CONSTRUCTION LOADS

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

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

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

CONSTRUCTION LOADING DIAGRAM
SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

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

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

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

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

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

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

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

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

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

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

GALVANIZED: AASHTO M-36 OR ASTM A-760

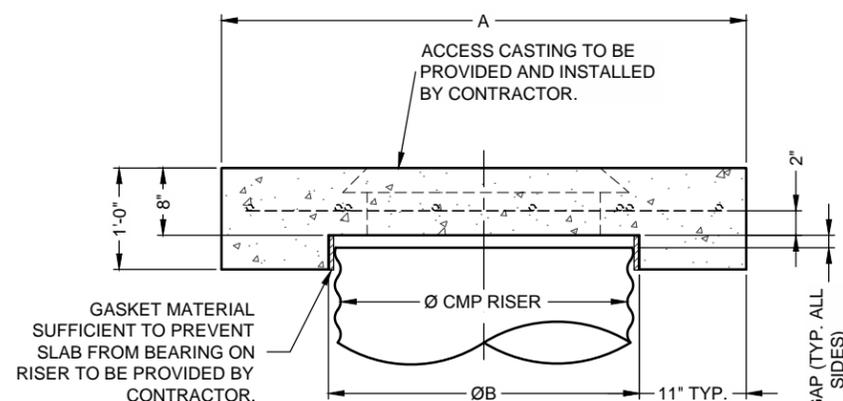
POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

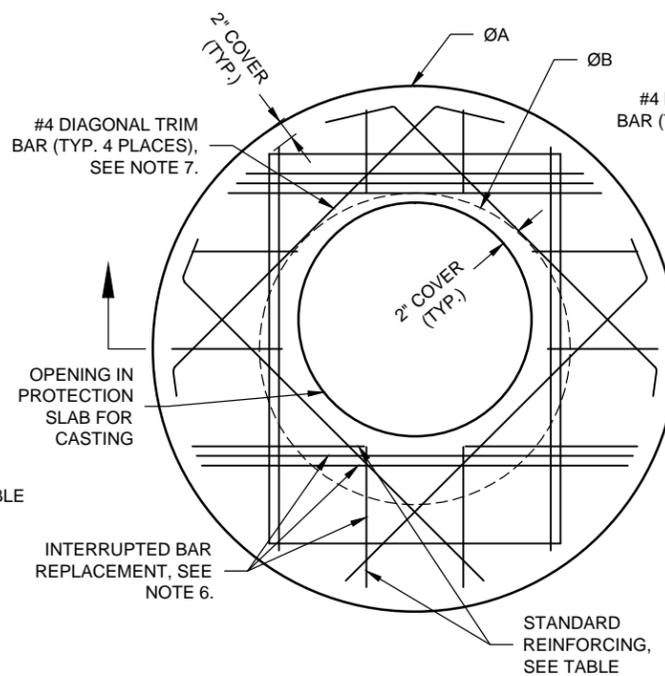
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

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

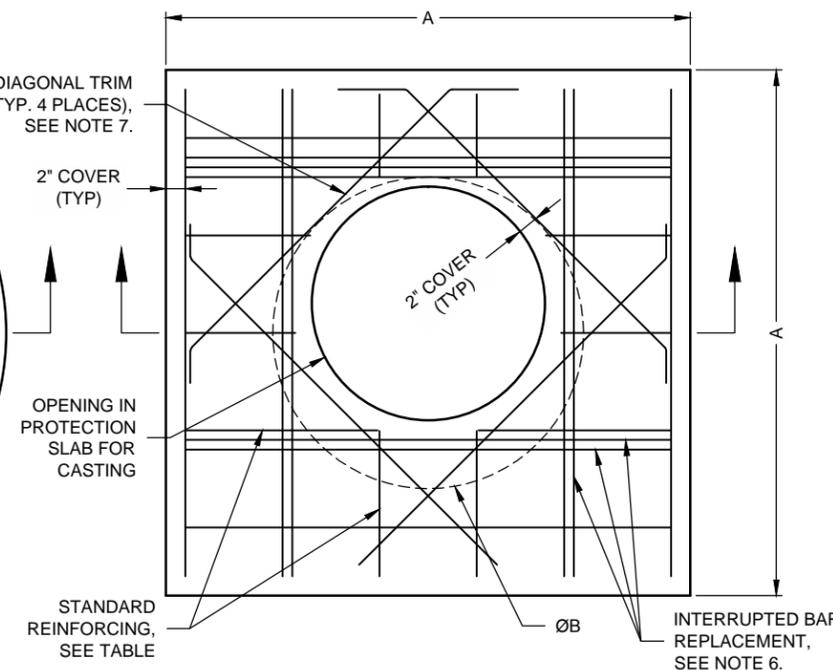
IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.



SECTION VIEW



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
- DESIGN LOAD HS25.
- EARTH COVER = 1' MAX.
- CONCRETE STRENGTH = 3,500 psi
- REINFORCING STEEL = ASTM A615, GRADE 60.
- PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
- TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
- PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
- DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL
SCALE: N.T.S.

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

** ASSUMED SOIL BEARING CAPACITY

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CONTECH
CMP DETENTION SYSTEMS
CONTECH
DYODS
DRAWING

DYODS - 14309-1-0
PROJECT NAME: Skyline Village
Corona, CA
DESCRIPTION: DMA A 9.34 AC

PROJECT No.: 14309-1	SEQ. No.: 0	DATE: 3/5/2020
DESIGNED: DYODS	DRAWN: DYODS	
CHECKED:	APPROVED:	
SHEET NO.:		D3

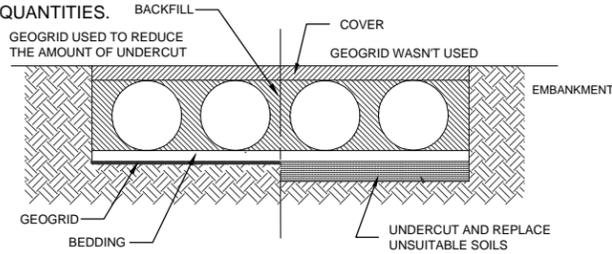
CMP DETENTION INSTALLATION GUIDE

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

FOUNDATION

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

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

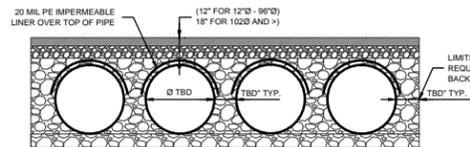


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING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

GEOMEMBRANE BARRIER

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

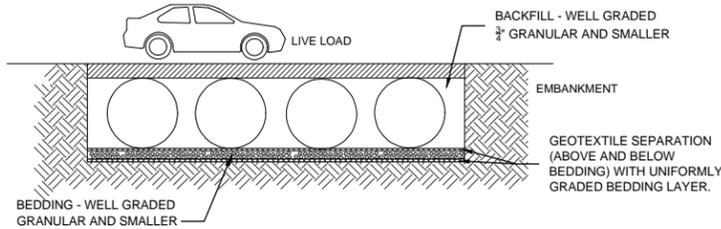
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE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



IN-SITU TRENCH WALL

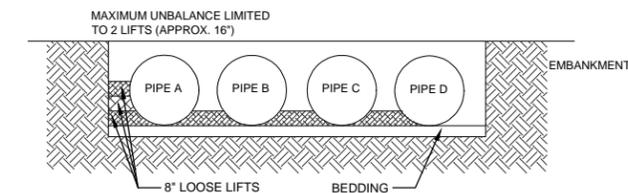
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION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

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



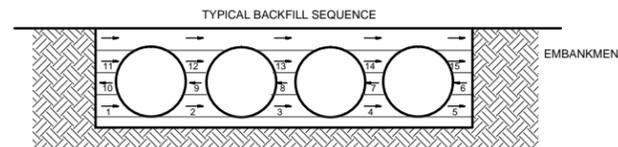
BACKFILL PLACEMENT

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

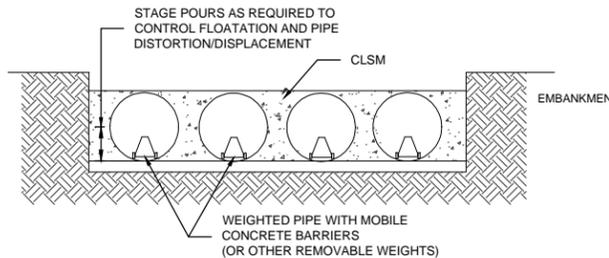


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE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

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



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

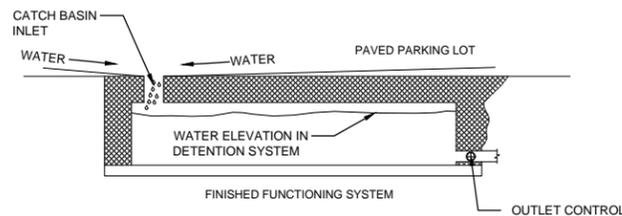


CONSTRUCTION LOADING

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

ADDITIONAL CONSIDERATIONS

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



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

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

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, QUARTERLY INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

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

MAINTENANCE

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

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

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

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

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

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CONTECH
CMP DETENTION SYSTEMS
CONTECH
DYODS
DRAWING

DYODS - 14309-1-0
PROJECT NAME: Skyline Village
Corona, CA
DESCRIPTION: DMA A 9.34 AC

PROJECT No.: 14309-1	SEQ. No.: 0	DATE: 3/5/2020
DESIGNED: DYODS	DRAWN: DYODS	
CHECKED:	APPROVED:	
SHEET NO.:	D4	

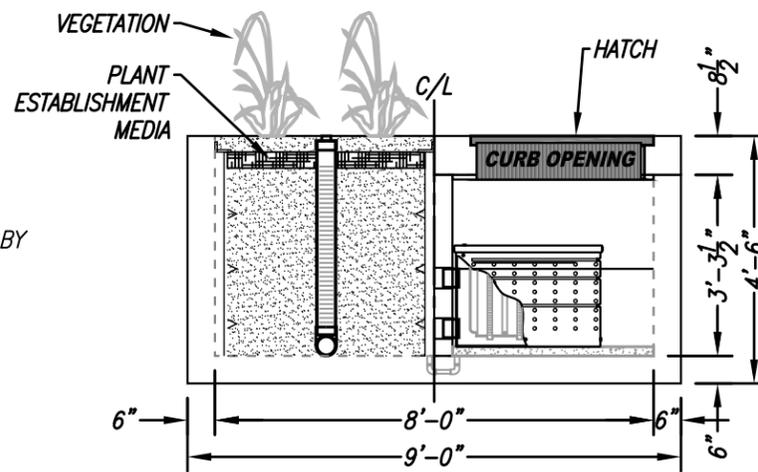
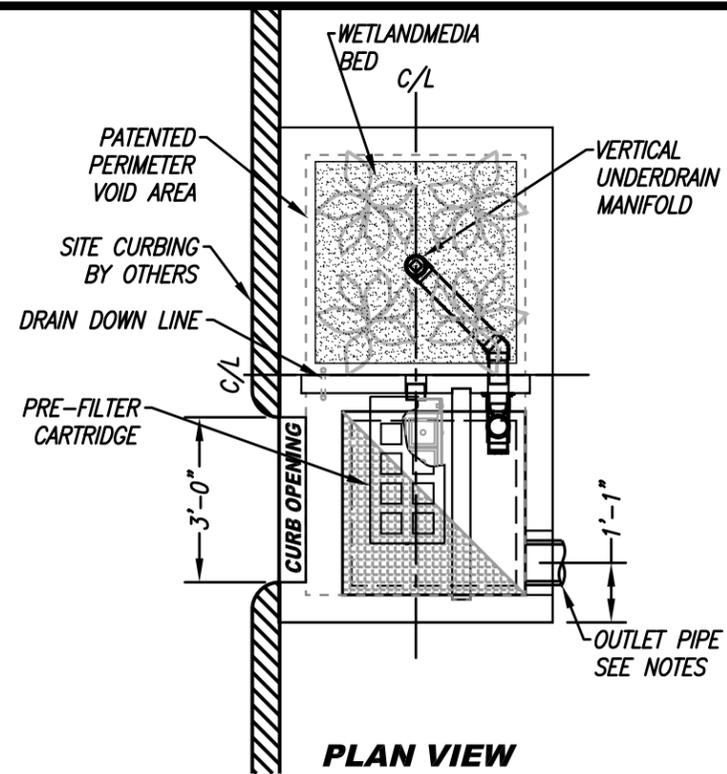
SITE SPECIFIC DATA			
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	36" X 36"	N/A	N/A
WETLANDMEDIA VOLUME (CY)		TBD	
ORIFICE SIZE (DIA. INCHES)		TBD	
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			

INSTALLATION NOTES

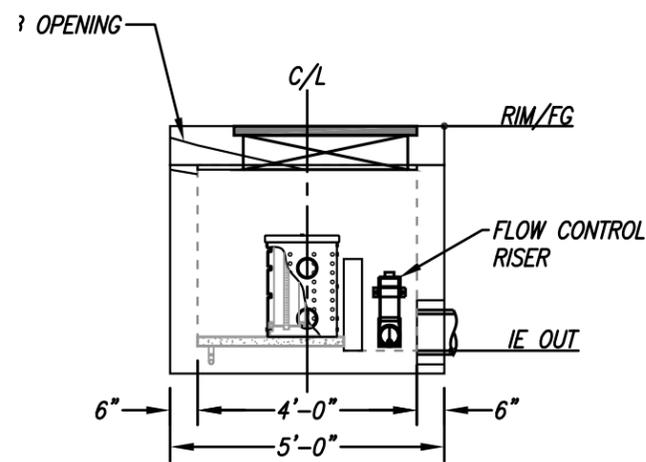
- CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
- UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
- CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
- CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
- VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
- CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

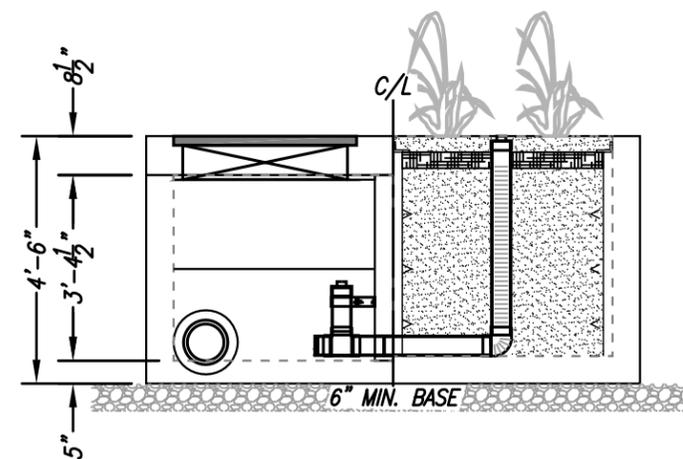
- MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
- ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



LEFT END VIEW



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.115
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0



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MWS-L-4-8-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL



Flow Based Sizing

The MWS Linear can be used in stand alone applications to meet treatment flow requirements. Since the MWS Linear is the only biofiltration system that can accept inflow pipes several feet below the surface it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

Model #	Dimensions	WetlandMEDIA Surface Area	Treatment Flow Rate (cfs)
MWS-L-4-4	4' x 4'	23 sq. ft.	0.052
MWS-L-4-6	4' x 6'	32 sq. ft.	0.073
MWS-L-4-8	4' x 8'	50 sq. ft.	0.115
MWS-L-4-13	4' x 13'	63 sq. ft.	0.144
MWS-L-4-15	4' x 15'	76 sq. ft.	0.175
MWS-L-4-17	4' x 17'	90 sq. ft.	0.206
MWS-L-4-19	4' x 19'	103 sq. ft.	0.237
MWS-L-4-21	4' x 21'	117 sq. ft.	0.268
MWS-L-6-8	7' x 9'	64 sq. ft.	0.147
MWS-L-8-8	8' x 8'	100 sq. ft.	0.230
MWS-L-8-12	8' x 12'	151 sq. ft.	0.346
MWS-L-8-16	8' x 16'	201 sq. ft.	0.462
MWS-L-8-20	9' x 21'	252 sq. ft.	0.577
MWS-L-8-24	9' x 25'	302 sq. ft.	0.693



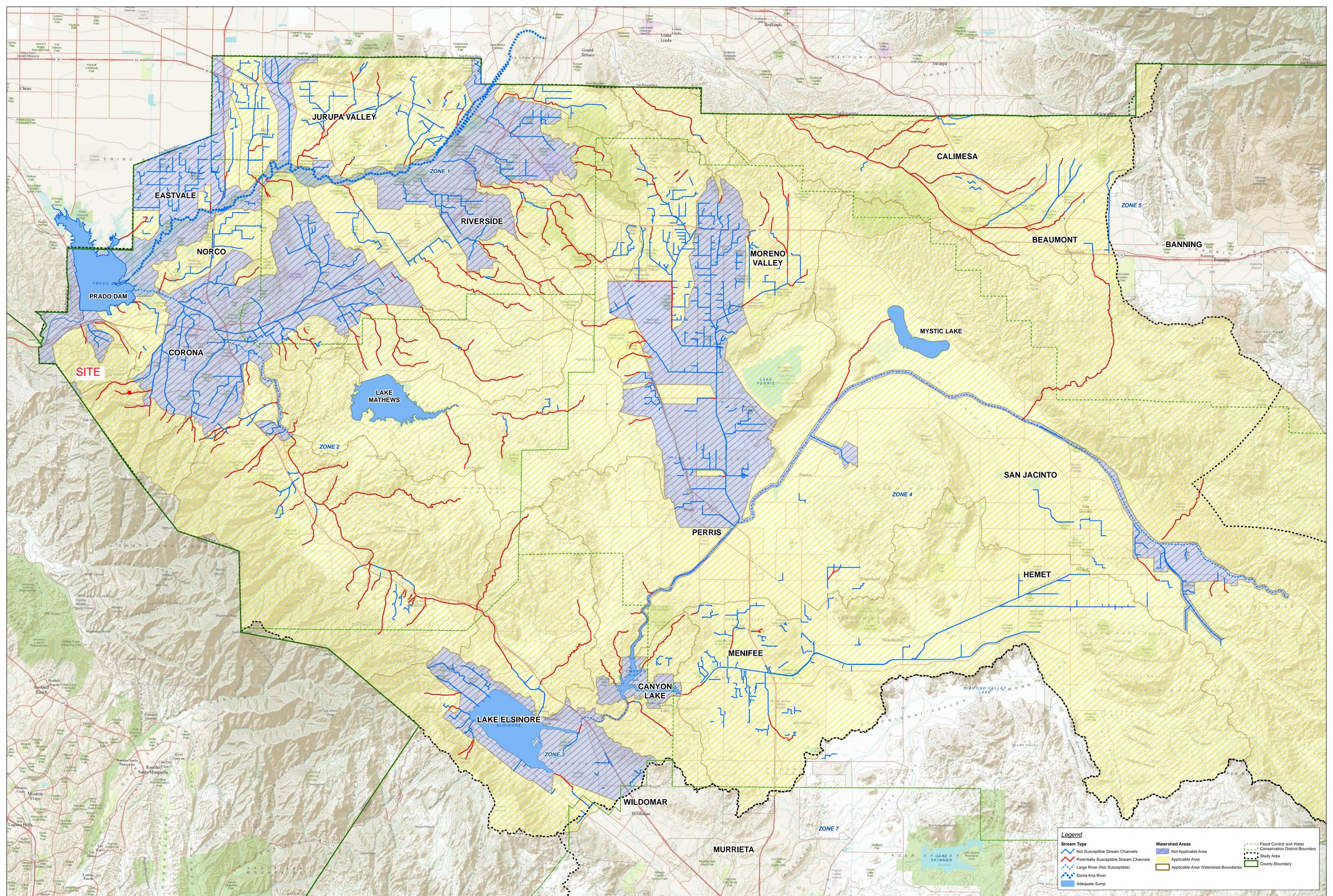
Volume Based Sizing

Many states require treatment of a water quality volume and do not offer the option of flow based design. The MWS Linear and its unique horizontal design makes it the only biofilter that can be used in volume based design installed downstream of ponds, detention basins, and underground storage systems.

Model #	Treatment Capacity (cu. ft.) @ 24-Hour Drain Down	Treatment Capacity (cu. ft.) @ 48-Hour Drain Down
MWS-L-4-4	1140	2280
MWS-L-4-6	1600	3200
MWS-L-4-8	2518	5036
MWS-L-4-13	3131	6261
MWS-L-4-15	3811	7623
MWS-L-4-17	4492	8984
MWS-L-4-19	5172	10345
MWS-L-4-21	5853	11706
MWS-L-6-8	3191	6382
MWS-L-8-8	5036	10072
MWS-L-8-12	7554	15109
MWS-L-8-16	10073	20145
MWS-L-8-20	12560	25120
MWS-L-8-24	15108	30216

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern



Legend

Stream Type	Not Applicable Area	Flood Control and Water Conservation District Boundary
Potentially Susceptible Stream Channels	Applicable Area	Study Area
Large River (Not Susceptible)	Applicable Area Watershed Boundaries	County Boundary
Santa Ana River		
Adequate Sump		

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1 on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input 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 checked="" 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 checked="" type="checkbox"/> B. Interior floor drains and elevator shaft sump pumps		<input checked="" type="checkbox"/> State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	<input checked="" 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

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> H. Industrial processes.	<input type="checkbox"/> Show process area.	<input type="checkbox"/> If industrial processes are to be located on site, state: “All process activities to be performed indoors. No processes to drain to exterior or to storm drain system.”	<input type="checkbox"/> See Fact Sheet SC-10, “Non-Stormwater Discharges” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure “Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities” at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<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

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<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

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<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

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> L. Fuel Dispensing Areas	<input type="checkbox"/> Fueling areas ⁶ shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. <input type="checkbox"/> Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area ¹ .] The canopy [or cover] shall not drain onto the fueling area.		<input type="checkbox"/> The property owner shall dry sweep the fueling area routinely. <input type="checkbox"/> See the Fact Sheet SD-30 , “Fueling Areas” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input type="checkbox"/> M. Loading Docks	<ul style="list-style-type: none"> <input type="checkbox"/> Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. <input type="checkbox"/> Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. <input type="checkbox"/> Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer. 		<ul style="list-style-type: none"> <input type="checkbox"/> Move loaded and unloaded items indoors as soon as possible. <input type="checkbox"/> See Fact Sheet SC-30, “Outdoor Loading and Unloading,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input checked="" type="checkbox"/> N. Fire Sprinkler Test Water		<input checked="" type="checkbox"/> Provide a means to drain fire sprinkler test water to the sanitary sewer.	<input checked="" 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>O. Miscellaneous Drain or Wash Water or Other Sources</p> <ul style="list-style-type: none"> <input type="checkbox"/> Boiler drain lines <input type="checkbox"/> Condensate drain lines <input type="checkbox"/> Rooftop equipment <input type="checkbox"/> Drainage sumps <input type="checkbox"/> Roofing, gutters, and trim. <input type="checkbox"/> Other sources 		<ul style="list-style-type: none"> <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. <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. <input type="checkbox"/> Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. <input type="checkbox"/> Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. <input type="checkbox"/> Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. <p>Include controls for other sources as specified by local reviewer.</p>	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
<input checked="" type="checkbox"/> P. Plazas, sidewalks, and parking lots.			<input checked="" type="checkbox"/> Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

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

Will provide Maintenance Agreement in Final Engineering.

Operations and Maintenance (O&M) Plan

Water Quality Management Plan

for

Skyline Village – TTM 37691

APN 275-050-014 and 275-080-041

Prepared for:

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Contact: Chris Bowen

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1880 Compton Ave, Suite 100.
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Tel: 951-734-2130
Contact: Mike C. Taing, P.E.

Prepared on:

November 10, 2020

Operations and Maintenance Plan

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	<p>Education for Property Owners, Tenants and Occupants</p> <p>All owners & tenants will be given a copy of the recorded CC&R's which will contain a section outlining the environmental awareness education materials.</p> <p>Educational materials will be provided to residents/tenants, including education materials and restrictions to reduce pollutants from reaching the storm drain system.</p>	<p>Prior to occupancy and annually thereafter.</p> <p><u>Frequency:</u> Annually</p>	<p><i>Owner or POA</i></p>
Yes	<p>Activity Restriction</p> <p>Activity restriction shall be clearly noted within the CC&R's or lease agreement.</p> <p>The POA shall restrict activities that have the potential to create adverse impacts on water quality. Activities include but are not limited to: prohibiting vehicle maintenance activities within parking areas and stalls, prohibiting long-term parking without prior authorization, and prohibiting outdoor vehicle washing. Restriction shall begin upon occupancy</p>	<p>The Owner will prescribe activity restrictions to protect surface water quality, through lease terms or other equally effective measure, for the property. Restrictions include, but are not limited to, prohibiting vehicle maintenance or vehicle washing.</p> <p><u>Frequency:</u> Ongoing</p>	<p><i>Owner or POA</i></p>

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	<p>Common Area Landscape Management</p> <p>Common area landscape management that includes minimizing fertilizer and pesticide application, use of slow-release fertilizers, maintenance activities, providing education to homeowners and tenants (via project owner and/or POA), and providing education and training for employees on management of landscape materials and storm water management.</p> <p><i>Landscape Management Includes:</i></p> <ul style="list-style-type: none"> • <i>Mitigation of the potential dangers of fertilizer and pesticide usage through the incorporation of an Integrated Pest Management Program (IPM).</i> • <i>Monitor for runoff and efficiency regularly.</i> • <i>Implementation of a water budget.</i> • <i>Irrigation systems shall be automatically controlled and designed, installed, and maintained so as to minimize overspray and runoff onto streets, sidewalks, driveways, structures, windows, walls, and fences.</i> • <i>Use of native and drought tolerant species when replanting</i> 	<p>Maintenance shall be consistent with City requirements. Fertilizer and/or pesticide usage shall be consistent with City/County Management Guidelines for Use of Fertilizers. Maintenance includes mowing, weeding, and debris removal on a weekly basis. Trimming, replanting, and replacement of mulch shall be performed on an as-needed basis to prevent exposure of erodible surfaces. Trimmings, clippings, and other landscape wastes shall be properly disposed of in accordance with local regulations. Materials temporarily stockpiled during maintenance activities shall be placed away from water courses and storm drains inlets.</p> <p><u>Frequency</u>: Monthly</p>	<p><i>Owner or POA</i></p>

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	<p>BMP Maintenance</p> <p>The POA will be responsible for the implementation and maintenance of each applicable non-structural BMP, as well as scheduling inspections and maintenance of all applicable structural BMP facilities through its staff, landscape contractor, and/or any other necessary maintenance contractors.</p>	<p>Maintenance of structural BMPs implemented at the project site shall be performed at the frequency prescribed in this WQMP. Records of inspections and BMP maintenance shall be kept by the Owner and shall be available for review upon request.</p> <p><u>Frequency:</u> Ongoing</p>	<p><i>Private Areas: Owner or POA</i></p> <p><i>Public Areas: City</i></p>
No	<p>Title 22 CCR Compliance</p>	Not Applicable	Not Applicable
No	<p>Spill Contingency Plan</p>	Not Applicable	Not Applicable
No	<p>Underground Storage Tank Compliance</p> <p>There are no underground storage tanks.</p>	Not Applicable	Not Applicable
No	<p>Hazardous Materials Disclosure Compliance</p> <p>There are no hazardous materials stored on site.</p>	Not Applicable	Not Applicable
No	<p>Uniform Fire Code Implementation</p>	Not Applicable	Not Applicable

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	<p>Common Area Litter Control</p> <p>The POA will be responsible for performing trash pickup and sweeping of littered common areas as needed and weekly at a minimum. Any trash/debris waste collected shall be properly disposed of in accordance with local regulations. Responsibilities will also include noting improper disposal of materials by the public and reporting such violations for further investigation.</p>	<p>Litter patrol, violations investigations, reporting and other litter control activities shall be performed on a weekly basis and in conjunction with routine maintenance activities.</p> <p><u>Frequency:</u> Weekly</p>	<p><i>Owner or POA</i></p>
Yes	<p>Employee Training</p> <p>All employees of the POA and any contractors will require training to ensure that employees are aware this WQMP and of maintenance activities that may result in pollutants reaching the storm drain. Training will include, but not be limited to, spill cleanup procedures, proper waste disposal, housekeeping practices, etc</p>	<p>Educate all new employees/ managers on storm water pollution prevention, particularly good housekeeping practices, prior to the start of the rainy season (October 1). Refresher courses shall be conducted on an as needed basis.</p> <p><u>Frequency:</u> Annually</p>	<p><i>Owner or POA</i></p>
Yes	<p>Housekeeping of Loading Docks</p> <p>No below-grade loading docks are proposed. Housekeeping measures will be implemented to keep any delivery areas clean and orderly condition. Includes sweeping, removal of trash & debris on a weekly basis, and use of dry methods for cleanup.</p>	<p>Sweep delivery areas weekly and remove any trash/debris. Keep area clean of trash and debris at all times. Spills shall be cleaned up immediately using dry methods.</p> <p><u>Frequency:</u> Weekly</p>	

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	<p>Common Area Catch Basin Inspection</p> <p>All on-site storm drain inlets, curb and gutters and ribbon gutter systems shall be inspected and cleaned out by the HOA at least once a year, prior to the rainy season, no later than October 1st of each year. All public drainage facilities will be maintained by the City.</p>	<p>Catch basin inlets and other drainage facilities shall be inspected after each storm event and once per year. Inlets and other facilities shall be cleaned prior to the rainy season, by October 1st each year. <u>Frequency:</u> Annually</p>	<p>Private Areas: Owner or POA Public Areas: City</p>
Yes	<p>Street Sweeping Private Streets and Parking Lots</p> <p>The POA shall be responsible for the street sweeping of all private street, drive aisles and parking areas within the project quarterly, and prior to the rainy season, no later than October 1st each year. The City shall be responsible for sweeping of public streets</p>	<p>Streets & parking lots must be swept at least quarterly (every 3 months), including prior to the start of the rainy season (October 1st). <u>Frequency:</u> Quarterly</p>	<p>Private Areas: Owner or POA Public Areas: City</p>
No	<p>Retail Gasoline Outlets</p> <p>There are no gasoline stations proposed.</p>	Not Applicable	Not Applicable
Structural Source Control BMPs			
Yes	<p>Provide Storm Drain System Stenciling and Signage</p> <p>The phrase “NO DUMPING! DRAINS TO OCEAN” or an equally effective phrase approved by the City, will be stenciled on all major storm drain inlets within the project site to alert the public to the destination of pollutants discharged into storm water. Stencils shall be in place by completion of construction</p>	<p>Storm drain stencils shall be inspected for legibility, at minimum, once prior to the storm season, no later than October 1st each year. Those determined to be illegible will be restenciled as soon as possible. <u>Frequency:</u> Annually</p>	<p>Private Areas: Owner or POA Public Areas: City</p>

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	<p>Design and Construct Outdoor Material Storage Areas to Reduce Pollutant Introduction Outdoor storage prohibited.</p>	Not Applicable	Not Applicable
Yes	<p>Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction All trash and waste shall be stored in containers that have lids or tarps to minimize direct precipitation into the containers. Any trash storage areas will be paved, covered, and either be sloped to landscaping areas or include a barrier to keep drainage out of the storm drain.</p>	Sweep trash area at least once per week and before October 1st each year. Maintain area clean of trash and debris at all times. <u>Frequency:</u> Weekly	<i>Owner or POA</i>
Yes	<p>Use Efficient Irrigation Systems & Landscape Design Irrigation systems would be designed to meet City standards for water efficient landscaping, as applicable in accordance with City Municipal Code. Where feasible, includes incorporation of native tolerant species for landscaping, protection of slopes and efficient irrigation. May be used in conjunction with educational materials to homeowners/tenants as well as activity restrictions.</p>	In conjunction with routine maintenance activities, verify that landscape design continues to function properly by adjusting properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather, and day or night time temperatures. <u>Frequency:</u> Monthly	<i>Owner or POA</i>

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	<p>Protect Slopes and Channels and Provide Energy Dissipation All disturbed slopes will be re-vegetated and stabilized to prevent erosion.</p>	<p>To be performed in conjunction with maintenance activities. Maintain vegetative cover and/or mulch to eliminate exposed soils. Any eroded surfaces to be repaired immediately. Inspections to be performed twice each year (spring and fall) and after major storm events to check for signs of erosion, gullies, and sloughing. <u>Frequency: Monthly</u></p>	<p><i>Owner or POA</i></p>
No	<p>Loading Docks There will be no loading docks</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
No	<p>Maintenance Bays There will be no maintenance bays</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
No	<p>Vehicle Wash Areas There will be no vehicle wash areas</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
No	<p>Outdoor Processing Areas There will be no outdoor processing areas</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
No	<p>Equipment Wash Areas There will be no equipment wash areas</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
No	<p>Fueling Areas There will be no fueling areas</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
No	<p>Hillside Landscaping</p>	<p>Not Applicable</p>	<p>Not Applicable</p>

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
No	Wash Water Controls for Food Preparation Areas There will be no food processing areas	Not Applicable	Not Applicable
No	Community Car Wash Racks There will be no community car wash areas.	Not Applicable	Not Applicable
Treatment Control BMPs			
Yes	Treatment Control BMP # 1 Infiltration BMP - Contech Underground CMP Infiltration System	Maintenance should be done during dry weather conditions when no flow is entering the system. A person can open the manhole on the Underground system and inspect the system to determine the need for maintenance. If needed remove sediment and trash. <u>Frequency:</u> Annually, Before storm season or after rain event as needed.	Owner or POA

BMP Applicable? Yes/No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation & Maintenance Responsibility
Yes	Treatment Control BMP #2 Biotreatment BMP - Bio-Clean MWS Units	Maintenance should be done during dry weather conditions when no flow is entering the system. A person can open the manhole on the MWS Unit and inspect the system to determine the need for maintenance. If needed remove sediment and trash, replace cartridge and draw down filter media, and trim vegetation as recommended by manufacturer. <u>Frequency:</u> Annually or bi-annually, Before storm season or after rain event as needed.	<i>Owner or POA</i>

Responsible Party

The responsible party for implementation of this WQMP is:

name of person/ or POA Property Manager, etc.

address:

phone number:

24-Hour Emergency Contact #:

Email:

Required Permits

There are no permits required for the implementation, operation, and maintenance of the BMPs.

Forms to Record BMP Implementation, Maintenance, and Inspection

The owner shall be responsible for BMP implementation, maintenance, and inspection. See Table for BMP Implementation, maintenance, and inspection requirements. The form "Record of BMP Implementation, Maintenance, and Inspection attached and shall be used to record implementation, maintenance, and Inspection of BMPs. The inspection form shall include the date of the inspection, the name of person and signature of the person who performed the inspection, the BMP that was inspected/maintained, and description of the activity performed. Forms shall be regularly completed and kept with this Operations and Maintenance Plan.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

Employee Training Program

Staff reviewing plans, inspecting and maintaining Water Quality/Stormwater BMPs shall be appropriately trained and qualified to implement and maintain Water Quality/stormwater BMPs. New staff shall receive training within 6 months of hiring.

The Owner will develop a training program for staff that includes the use of the educational materials, training on litter patrol, contingency plans for spill clean-up, good housekeeping of the site, BMP maintenance, etc. the Owner is responsible for supply of materials at the time of initial employment training and on an annual basis (at a minimum).

Revisions to Operations & Maintenance Plan

The Owner will be responsible for revisions to the O&M Plan in the event of a substantial change to the project BMP due to construction. Modifications to the O&M Plan may be necessary if project changes result in a potential increase in pollutant discharge to storm water or if inspection and monitoring indicates that existing BMPs are ineffective. Any revisions shall

be made by the Engineer of Record or other qualified person(s) and shall obtain appropriate approvals by the local agency that has jurisdiction over the subject property.

Funding

The Owner, as listed below, will be responsible for funding the installation and on-going maintenance for the BMPs. An appropriate mechanism for the long-term operation and maintenance will be developed by the Owner or Property Owner Association, as applicable.

Owner/Responsible Party information:

GF Investments, LLC

110 N. Lincoln Ave, #202.

Corona, CA 92882

951-603-5024

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

**Name of Person Performing Activity
(Printed):** _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

(LIST OF BMP MAINTENANCE ITEMS)
(To Be Completed by the Project Engineer)

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
StormFilter Pretreatment Unit	Property Owner	Maintenance should be done during dry weather conditions A person can open the manhole on the StormFilter and inspect the vault to determine the need for maintenance. If needed remove sediment and replace cartridge.	Before storm season, (July), or after rain event.
CMP Underground Infiltration System	Property Owner	Maintenance should be done during dry weather conditions when no flow is entering the system. A person can open the manhole on the StormFilter and inspect the vault to determine the need for maintenance. If needed remove sediment and replace cartridge.	Before storm season, (July), or after rain event.
N1 - Education	Property Owner	The Owner shall utilize the Stormwater and Water Quality BMP educational materials contained in this report for training programs.	Before storm season (July)
N2 – Activity Restriction	Property Owner	Owner shall prescribe activity restrictions to protect surface water quality.	Upon occupancy and annually thereafter (July)
N3 – Landscape Management	Property Owner	Maintain landscape weekly or as needed to comply with local City Ordinances	Weekly
N4 – BMP Maintenance	Property Owner	Inspect site and review records to make sure non-structural and structural BMPs are properly maintained as schedule. Provide records to City if requested	Monthly, after rain event
N7 – Spill Contingency	Property Owner	Owner shall prepare occupancy specific plan regarding the storage of cleanup materials, notification of responsible agencies, disposal of cleanup materials, documentation etc.	Monthly
N10 – Uniform Fire Code Implementation	Property Owner	Owner shall comply with Article 80 of the Uniform Fire Code	Monthly
N11 - Litter/Debris Control Program	Property Owner	Owner shall contract with landscaping maintenance firm to regularly empty trash receptacles, collect litter, and report tenant disposal violations. Owner shall be responsible for trash and litter control in the common areas of the facilities.	Weekly
N12 - Employee Training	Property Owner	Owner shall prepare or include a provision for an education program/manual for employees regarding the storage of hazardous materials and implementation of spill contingency plans.	Upon initial employment

N14 - Catch Basin Inspection Program	Property Owner	Owner shall inspect, clean, and maintain drainage facilities prior to start of the rainy season.	Before rainy season (July), after rain event
N15 - Vacuum Sweep Private Streets and Parking Lots	Property Owner	Dictated by waste accumulation, or as needed to comply with local ordinances.	Before rainy season (July) to limit pollution during storm event
N17 - Comply with all other applicable NPDES permits	Property Owner	Permittees shall comply with all other NPDES permits to include BMPs that are required as part of a SWPPP.	Monthly
FloGard Catch Basin Filter Inserts	Property Owner	The owner shall perform visual inspections of the Catch Basin and Filter Inserts to remove miscellaneous landscape, Debris, and Trash from inside the baskets. Filter medium shall be replaced once per year per manufacturer's recommendation or more frequently if warranted.	Before storm season (July), after rain event

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
S1 - Provide Storm Drain System Stenciling and Signage	Property Owner	Owner to maintain legibility of stencil and signs.	Should be inspected annually before rainy season (July) and be repainted/replaced as necessary.
S3 - Trash Enclosures to Reduce Pollutant	Property Owner	Property owner to maintain trash enclosure to prevent run-on and exposure to direct precipitation.	Trash Enclosures shall be inspected and cleaned weekly. Dumpster pick up shall be scheduled weekly at minimum
S4 – Use Efficient Irrigation Systems and Landscape Design	Property Owner	Property owner shall maintain and audit irrigation system and landscaping in accordance with CASQA BMP Handbook SD-12.	Weekly
S6 – Slope and Channel Protection	Property Owner	Property owner shall maintain/protect slopes and channels in accordance with CASQA BMP Handbook SD-10.	Before storm season (July), after rain event
S14 - Wash Water Control for Food Preparation Areas	Property Owner	Property owner shall provide signage where applicable stating the prohibition of discharging wash water to storm drain system.	Should be inspected annually before rainy season (July) and be repainted/replaced as necessary.

Weekly WQMP Inspection Record

Performed by: _____

Date: _____

BMP	Activity	Yes	No
Trash & Debris	Are Common Areas clean of trash & debris?		
	Are the trash receptacles clean of trash and debris?		
	Does the perimeter of the site been clear of trash & debris?		
Drainage Facilities	Are there any signs of illegal discharges or dumping down any drainage facilities?		

Quarterly WQMP Inspection Record

Performed by: _____

Date: _____

BMP	Activity	Yes	No
MS4 Signage	Does the Catch Basin label need replacing?		
Drainage Facilities	Does the Catch Basin need cleaning of debris?		
	Do any drainage facilities need repair?		
Trash & Debris	Do any trash receptacles need repair?		
	Have the trash bins been picked up on a regular basis?		
	Does the trash enclosure need cleaning?		

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

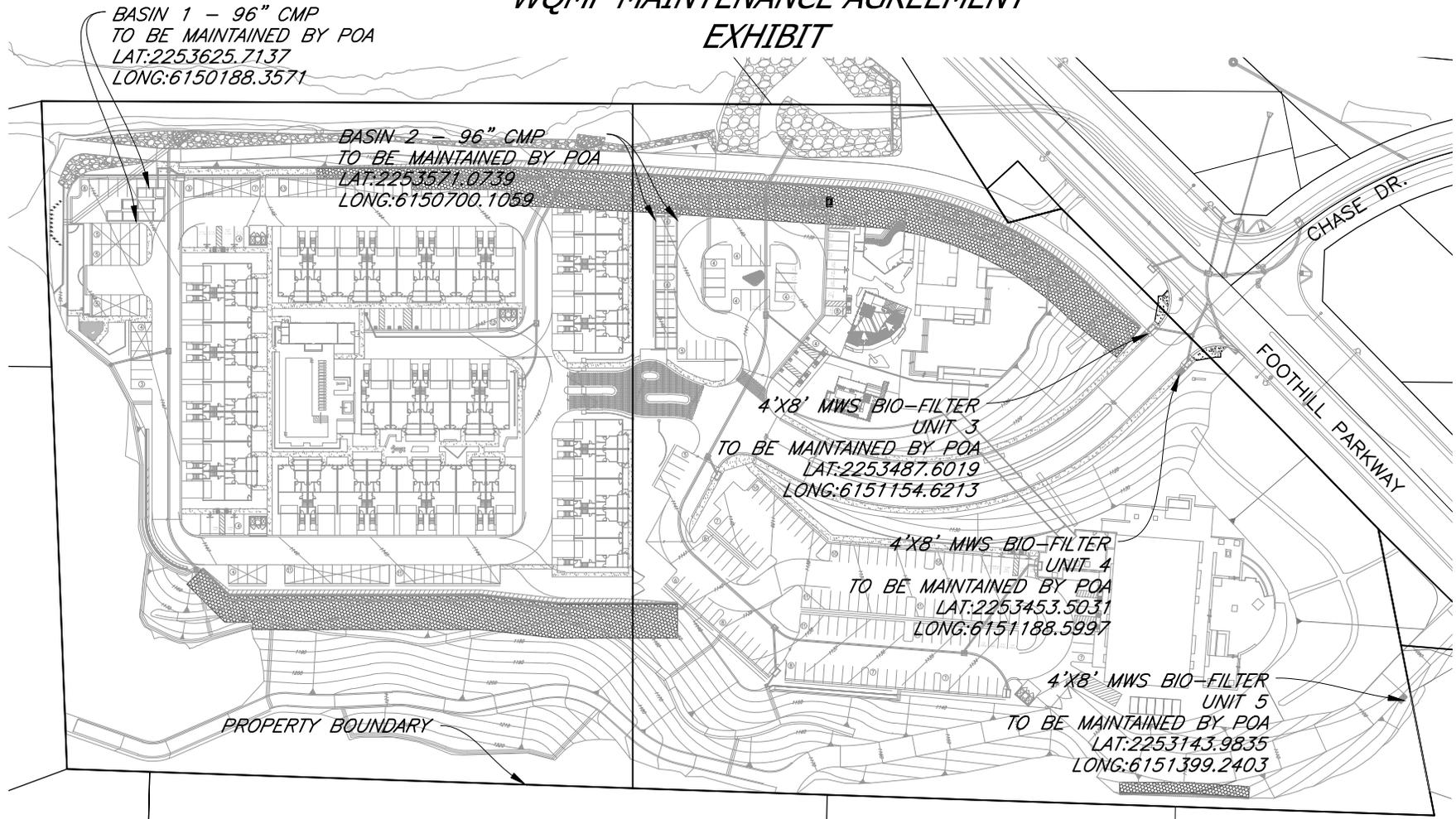
Today's Date:

**Name of Person Performing Activity
(Printed):**

Signature:

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

SKYLINE VILLAGE COMMERCIAL CENTER WQMP MAINTENANCE AGREEMENT EXHIBIT



WQMP TREATMENT SUMMARY TABLE

UNIT	DMA AREA (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	DESIGN CAPTURE VOLUME (CU-FT)	PROPOSED CAPTURE VOLUME (CU-FT)	DESIGN FLOW RATE (CFS)	PROPOSED FLOW RATE (CFS)
1	9.14	1.13	8.01	10,840	11,421	-	-
2	9.09	6.29	2.80	20,505	20,923	-	-
3	0.85	0.42	0.43	-	-	0.100	0.115
4	0.78	0.31	0.47	-	-	0.100	0.115
5	0.82	0.42	0.40	-	-	0.100	0.115
TOTAL	20.68	8.57	12.11	31,345	32,344	0.300	0.345

EXHIBIT SKYLINE VILLAGE COMMERCIAL CENTER WQMP TREATMENT BMP LOCATION MAP

PREPARED BY:



CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA 92881-3370 951-734-2130

SHEET
1 OF 1

DATE: 05/14/2013 10:58:10 AM

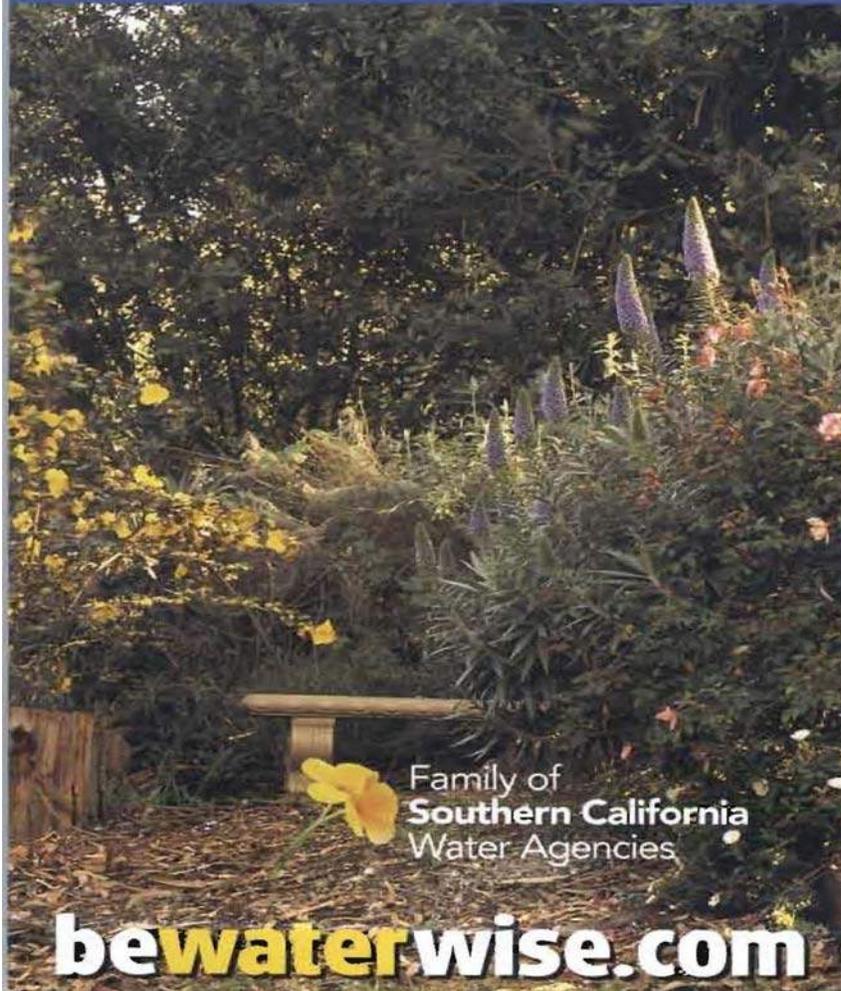
List of Onsite Activity Restrictions

1. Prohibit discharges of fertilizer, pesticides, or animal wastes to streets or storm drains.
2. Prohibit blowing or sweeping of debris (leaf litter, grass clippings, litter, etc.) into streets or storm drains.
3. Prohibit connections of pool/spa drains to streets or storm drains.
4. Requirement to keep dumpster lids closed at all times.
5. Requirement to keep trash receptacles covered or sheltered by a roof overhang or canopy.
6. Prohibit discharges of paint or masonry wastes to streets or storm drains.
7. Prohibit the washing kitchen wastes or kitchen equipment (restaurant, fast food, grocery store deli, bakery, etc.) to stormwater drainage features.
8. Prohibit vehicle washing, maintenance, or repair on the premises or restrict those activities to designated areas.

Appendix 10: Educational Materials

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

10 Ways to **Save** Water Outdoors



Family of
Southern California
Water Agencies

bewaterwise.com

TIP #1 The average homeowner uses twice the amount of water needed to keep plants healthy. Use the watering calculator and index at bewaterwise.com to know exactly how much water your plants need.

TIP #2 Check your sprinkler system for leaks, overspray and broken sprinkler heads. Update with drip or other more water-efficient sprinklers where appropriate.

TIP #3 This fall, plant a portion of your garden with beautiful native and California Friendly plants. Browse the plant database at bewaterwise.com to find just the right look for your outdoor spaces.

TIP #4 Reduce the amount of water-thirsty grass. Keep only what you need and replace the rest with less-thirsty plants or permeable paving.

TIP #5 For the grass you keep, set your lawnmower blade higher.

TIP #6 Adjust your sprinkler timer downward in September. Plants need less water when days are shorter.

TIP #7 Use a broom instead of the hose for cleaning sidewalks and patios.

TIP #8 Mulch! A layer of bark, gravel, compost, sawdust or low-growing groundcover evens out soil temperature and allows better water retention.

TIP #9 Check the list of invasive plants that hurt our environment at caleppc.org and remove any from your garden.

TIP #10 Share these tips with your gardener, neighbors and friends. Water conservation should be a part of every Southern Californian's lifestyle, but that doesn't mean we can't have lush and beautiful outdoor spaces.

bewaterwise.com

LID Plant Guidance for Bioretention

Low Impact Development



This Technical Assistance Memo (TAM) provides plant guidance for bioretention stormwater control measures. Bioretention systems are low impact development (LID) features that use a combination of soil, plants, and other design elements to slow, treat, retain, and infiltrate stormwater runoff to mimic the natural, pre-development hydrology of a site.

While bioretention systems may look like regular landscaped areas, they are designed (engineered) to manage stormwater runoff volumes and pollutants created by urbanization. Specifying the appropriate plants and soil for a bioretention system is critical to its performance and community acceptance.

Which Bioretention Facility Type?



There are two basic bioretention design types: planter and slope-sided. The flat-bottom planter type has a level soil surface, which allows stormwater to pond across the entire area. All plants in the planter type of bioretention must be able to tolerate stormwater inundation (Figure 1, Zone A). In comparison, the slope-sided type has two landscape conditions: the area that functions for stormwater management (Figure 2, Zone A) and the area above the ponding level. Similar to the planter type, plants in Zone A of a slope-sided bioretention type must be able to survive periodic ponding conditions. Plants in Zone B, however, are not located in the stormwater management area and the plants/trees can be selected from conventional plant palettes. For each project, it is important that the landscape designer understand where the delineation between Zone A and Zone B occurs in order to develop a proper plant design.



Source: Kevin Robert Perry

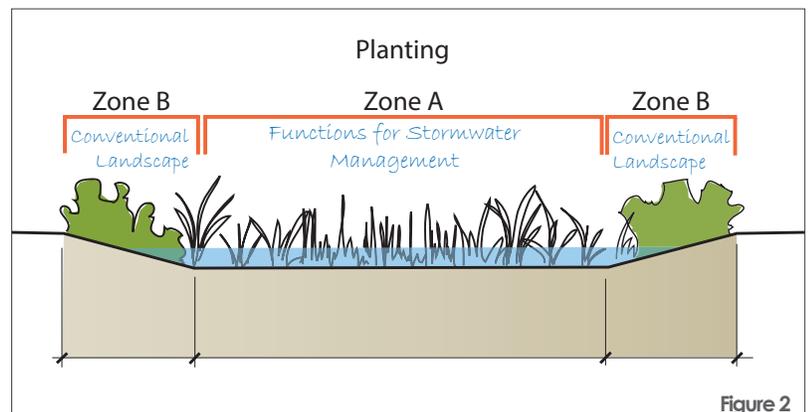
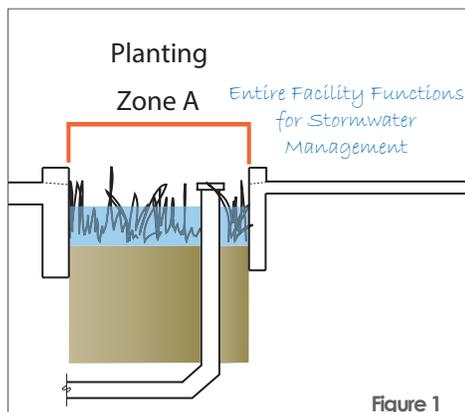
Slope-sided:
This facility type has a lower area that ponds and conventional landscape on the side-slopes. Only plants in the functional, ponding area (Zone A) must be tolerant of periodic inundation.



Source: Cannon

Flat-bottom Planter:

This design type has a flat surface with consistent depth of ponding across the structure. The entire area functions for stormwater management and all plants in this facility must be tolerant of periodic inundation (Zone A).



Choosing the Plants



With the bioretention facility type known and ponding areas identified, the plants can be selected. A list of plants appropriate for Zone A conditions (periodic ponding) is available on the Central Coast Low Impact Development Initiative (LIDI) website.

The LIDI Bioretention plant list was developed using the following criteria:

- Tolerant of varied moisture conditions (wet and dry)
- Tolerant of varied soil types and growing conditions
- Low maintenance requirements
- Not invasive weeds
- Do not have aggressive/invasive root systems
- Exhibit an attractive appearance.

centralcoastlidi.org/plants

The bioretention plants provided on the LIDI website represent a basic bioretention plant palette. When selecting plants, the landscape designer should determine whether a plant species is appropriate for the site considering proximity to cars, pedestrians, height limits, and anticipated levels of maintenance. Drought tolerant native plants are strongly encouraged to support water conservation, provide wildlife habitat, and for their ability to survive in local climate conditions.

While plant selection for Zone B areas is at the discretion of the landscape designer, selection should take into account the sandy, free draining bioretention soil mix and the potentially erosive conditions where stormwater enters the facility.



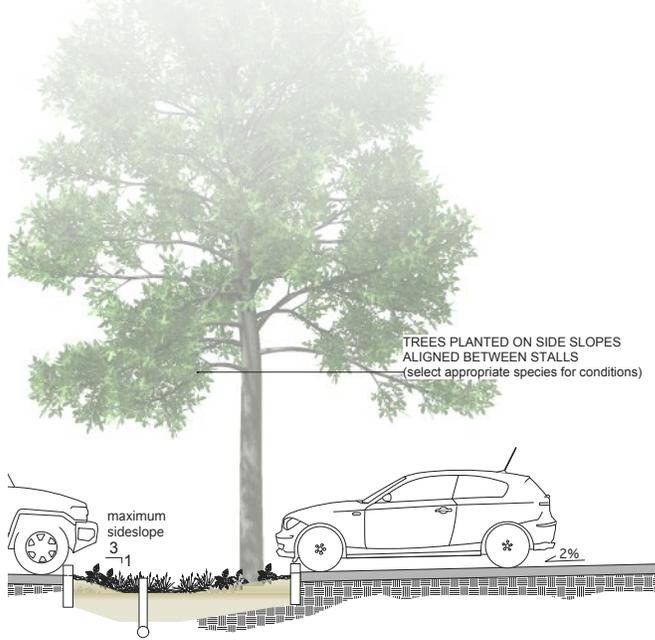
Plant Selection and Maintenance: Anticipating the level of maintenance a facility will receive informs plant selection and may improve long-term system function. Where irrigation levels and maintenance are expected to be low, select a tough plant palette using species with similar requirements. For example, on a road-side bioretention swale that will receive little or no irrigation and minimal maintenance after establishment, a planting of *Juncus patens*, *Achillea millefolium* and *Muhlenbergia rigens* could survive on rainfall once established. These tough plants, which look best when given supplemental water and cut back annually, will also tolerate mowing.

About Plant Substitutions

Selection of different plant species may be appropriate based on the specific project objectives. However, the designer must ensure that plants selected for the Zone A location of a bioretention facility can tolerate periodic stormwater inundation. During construction, designers and/or construction managers should carefully review substitution requests. In the case of substitutions sought due to supplier availability, the contractor may need to broaden their search to locate a different supplier.

Bioretention Workhorse: *Juncus* is a genus of plants, commonly known as rushes. They are found across the globe and frequently on bioretention plant lists because of their tolerance for inundation. Some *Juncus* perform better than others in arid environments. *Juncus patens* is an easy to grow California native rush. It tolerates poor drainage, flooding, drought, and shade. A strong bioretention performer, it is more drought tolerant than the commonly available *Juncus effusus*. Additional *Juncus* cultivars and varieties may also be available at nurseries. Ask growers which *Juncus* will perform well with both seasonal inundation and drought.

Trees in Bioretention Areas



Trees provide additional aesthetic and performance benefits. Following these guidelines will maximize their success in bioretention areas:

- Provide sufficient facility width (a rule of thumb is 8' min.)
- Trees should be located at least five feet from facility inlets to avoid erosion of soils around the root ball
- Select trees that will tolerate seasonally wet soils and potential ponding
- Typically, locate trees on side-slopes; not at the bottom of Zone A
- Some trees may tolerate periodic shallow ponding, especially if native soils are highly infiltrative
- Do not specify trees with invasive roots
- Securely stake trees planted in bioretention areas

Soils for Bioretention



Specifying the correct soils for bioretention areas is critical in order to achieve stormwater objectives and plant health. Soils must balance three primary design objectives:

- High enough infiltration rates to meet surface water draw down requirements
- Infiltration rates that are not so high that they preclude pollutant removal function of soils
- Soil composition that supports plant establishment and long-term health

Bioretention Soil Mix: Construction documents for any LID project should include a bioretention soil specification that defines the ratio of materials in the mix (approximately 35% aged compost to 65% concrete sand), and the gradation, quality analysis, and other requirements for the materials. Specifications should also include guidelines for blending and placement of the bioretention soil mix.



Plant Installation



Landscape installation for bioretention areas is similar to that of traditional landscapes with a few added considerations:

- Conditions differ greatly between the ponding area (Zone A) and side-slopes (Zone B); plant installation must accurately follow landscape plans. After planting, an inspection should ensure correct placement.
- Plants should not block stormwater flows at inlets. The mature, full-size of plants should be estimated to determine proper setback from inlets, with adjustments made after installation, if plants are too close.
- A two-inch layer of compost may be applied to retain moisture, prevent erosion, and suppress weed growth. Use the same compost from the bioretention soil mix specification and avoid bark mulches that can float during storm events.
- Landscape installers should be aware to avoid compaction of the soil with machinery, or never working wet soils.

Plant Establishment and Care

Like traditional landscapes, bioretention planting areas require care and ongoing maintenance for optimal health. Due to their functional nature as stormwater management facilities the following guidelines should be followed:



Irrigation is typically needed for two to three years following installation. After that period, native plants will need little to no supplemental irrigation to survive, however they may enter a dormant stage and appear dried up until rejuvenated by rains or supplemental irrigation. Because bioretention soils are formulated to infiltrate, irrigation application rates must be properly designed to avoid overwatering, and for systems with an underdrain prevent potential discharges through the underdrain.

Compost Mulch (1" - 2") may be reapplied to bioretention areas annually, or as the mulch layer breaks down. Use compost mulch (the same compost used in the bioretention soil mix) and avoid bark mulches that can float during storm events. Do not apply mulch just prior to the rainy season.

Fertilizer should not be used in bioretention areas. Instead, a compost top dressing or application of compost tea can be used to introduce nutrients and beneficial microorganisms to the soil.

Synthetic herbicides and pesticides should **not be used** in bioretention areas because of their potential toxicity risk to aquatic organisms. There are a variety of natural methods and products that can be used to control weeds and pests.

Weeds compete with plants for nutrients, water, and sunlight. They should be regularly removed, with their roots, by hand pulling or with manual pincer-type weeding tools. Care should be given to avoid unnecessary compaction of soils while weeding.

Replace plants that die due to unsuitable plant conditions, disease, underwatering, or other unforeseen issues. Dead and dying plants must be removed and replaced to avoid spreading disease, establishment of weeds in bare areas, and reduced LID function. Before replacing with the same species, determine if another species may be better suited to the conditions.

Check tree staking, especially in high wind areas. Trees in bioretention areas may be more easily impacted by storms because of side-slope and saturated soil conditions. They should be inspected once or twice a year and following storm events to ensure they maintain a vertical, upright position during establishment. Stakes should be removed once they are no longer needed to encourage self supporting root systems (between one and two years).

Plant Nurseries

Check with your local nursery for availability of plants on the LIDI Bioretention plant list. Additionally, LIDI's Bioretention Vendor List, while it may not be inclusive of all suppliers, provides contact information for Central Coast nurseries that stock plants from the Bioretention plant list.



Source: Las Pilitas Nursery

For additional technical resources:

www.centralcoastlidi.org

For questions or to contact the Central Coast Low Impact Development Initiative:

info@centralcoastlidi.org



UC Davis LID Initiative

LEGAL DISCLAIMER: This Technical Assistance Memo (TAM) is intended as guidance only and should not be used as a substitute for site specific design and engineering. Applicants are responsible for compliance with all code and rule requirements, whether or not described in this TAM.

Central Coast Low Impact Development Initiative

Bioretention Plant List

Plants for Zone A: Periodic inundation, area ponds following storm events (6" to 12" depth for 24 - 72 hours) and compost amended sand soil.

Scientific & Common Name	Height / Width	Light Preferences			Water Tolerances		CA Native	Sunset Climate Zones ¹	Notes
		Sun	Part	Shade	Drought	Inundation			
 GRASS / GRASSLIKE									
<i>Carex barbarae</i> Santa Barbara Sedge/ Basket Sedge	1-2' / 1'-2'	X	X	X		X	X	4 - 9, 14 - 23	Attracts butterflies, deer resistant, good for erosion control, can spread aggressively and should be sited carefully.
<i>Carex divulsa</i> Berkeley Sedge	1' / spreading	X	X	X	X	X		all, but 1A-3A	Attractive blue-grey leaves. Can be mowed 4 in high to keep clean look.
<i>Carex flacca</i> Blue Sedge	1' / spreading	X	X		X	X		3A - 9, 14 - 23	Attractive blue-grey leaves. Can be mowed 4 in high to keep clean look.
<i>Carex praegracilis</i> California Field Sedge	1' / spreading	X	X			X	X	all, but 1A -3A	Mounding, drought deciduous during summer months.
<i>Carex spissa</i> San Diego sedge	3 - 4' / 2 - 3'	X	X		X	X	X	all, but 1A-3A	Can handle foot traffic and is deer resistant.
<i>Chondropetalum tectorum</i> Small Cape Rush	2 - 3' / 3 - 4'	X	X	X	X	X		all, but 1A-3A and 7	Needs very little maintenance. If trimmed too much plant will lose visual integrity.
<i>Leymus condensatus</i> 'Canyon Prince' Canyon Prince Wild Rye	3'/3'	X	X			X	X	all, but 1A-3A	Tolerant of drought, poor soils, part shade and seasonal wet. Spreads by rhizomes, so nice planted in masses. Cut back annually in spring before new growth emerges.
<i>Juncus effusus</i> Common Rush	2 - 3' / clumping	X	X			X	X	all	Easy to grow & very reliable. Needs more water than <i>Juncus patens</i> .
<i>Juncus patens</i> 'Elk Blue' Elk Blue California Gray Rush	2' / clumping	X	X		X	X	X	all	Very little maintenance, handles dry summers and wet winters.
<i>Muhlenbergia rigens</i> Deer Grass	2 - 3' / 3 - 6'	X	X		X	X	X	all, but 1A-3A	Can handle no watering, will stay green year round with watering, trim annually.
<i>Scirpus cernuus</i> Low Bulrush	1' / spreading	X	X			X		7 - 24	Grow individually or in mass, cut back once a year, very attractive.

¹ Refers to Sunset Western Garden Book Zones. The Central Coast includes the following Climate Zones: 1A, 2A, 3A, 7, 9, 14-24 www.sunset.com/garden/climate-zones/

Central Coast Low Impact Development Initiative

Bioretention Plant List

Plants for Zone A: Periodic inundation, area ponds following storm events (6" to 12" depth for 24 - 72 hours) and compost amended sand soil.

Scientific & Common Name	Height / Width	Light Preferences			Water Tolerances		CA Native	Sunset Climate Zones ¹	Notes
		Sun	Part	Shade	Drought	Inundation			
 PERENNIALS									
<i>Achillea millefolium californica</i> Yarrow	1 - 3' / 2'	X	X		X	X	X	all	Tolerates regular to no watering, foot traffic, attracts butterflies, stress deciduous.
<i>Anemopsis californica</i> Yerba Mansa	1 - 2' / spreading	X	X			X	X	all, but 1A-3A	Mat forming ground cover, interesting white flowers, prune back in late summer, likes moist conditions.
<i>Bidens laevis</i> Joaquin Sunflower	2 - 3' / 1 - 2'	X				X	X	all but 1A	Attracts beneficial insects, stress deciduous in summer, likes water but will survive drought if pruned back.
<i>Calliandra eriophylla</i> Fairy Duster	1 - 3' / 1 - 3'	X			X	X	X	10 - 24	Very attractive 1 - 2 inch pink flowers , little water after established, semi-evergreen, attracts butterflies and hummingbirds.
<i>Epipactis gigantea</i> Stream Orchid	1 - 2' / 2 - 3'	X	X			X	X	all	Will go dormant during drought, interesting muted pink and yellow flowers.
<i>Eschscholzia californica</i> California Poppy	1 - 3' / 1 - 3"	X			X	X	X	all	Can handle periodic inundation, cut back yearly to prevent it from becoming weedy.
<i>Iris douglasiana</i> Douglas Iris	1 - 2' / spreading	X	X			X	X	all, but 1A-3A	Needs moisture or shade inland, does well on coast, evergreen leaves, attractive lavender-blue flowers in Spring.
<i>Lilium pardalinum</i> Leopard Lily	3 - 8' / 6"	X	X			X	X	2-7, 14-17	Attractive red-orange spotted blossoms in spring, needs regular water, will get large in moist, partial shade conditions.
<i>Lobelia cardinalis</i> Cardinal Flower	2 - 3' / 2'	X	X	X		X	X	1-7, 14-17	A bog plant, attracts hummingbirds, showy scarlet flowers.
<i>Mimulus cardinalis</i> Scarlet Monkey Flower	1 - 3' / 1 - 3'	X	X	X		X	X	all but 1A	Year round red color with regular water, attracts hummingbirds, reseeds itself & should not be used for small spaces.
<i>Mimulus guttatus</i> Seep Monkey Flower	1 - 3' / 1 - 3'	X	X			X	X	all but 1A	Yellow flowers are abundant in spring-summer, attracts butterflies, will die back in drought and come back following year.
<i>Rudbeckia californica</i> California Coneflower	2 - 5' / 1 - 2'		X		X	X	X	all	Yellow showy flowers late summer and fall, cut back in winter, can get large under ideal conditions and may require pruning.
<i>Salvia spathacea</i> Hummingbird Sage	1 - 3' / spreading		X	X	X	X	X	all, but 1A-3A	Very attractive foliage and flowers, fragrant, attracts hummingbirds, deer resistant, likes to grow in understory of trees.
<i>Sisyrinchium bellum</i> Blue-Eyed Grass	6" - 1' / 6" - 1'	X			X	X	X	all, but 1A-3A	Requires little to no maintenance. Summer dormant, will come back during wetter months on it's own. Can irrigate to prolong flowering.
<i>Solidago californica</i> California Goldenrod	1 - 3' / 2 - 3'	X	X	X	X	X	X	all, but 24	Attracts beneficial insects and butterflies. Attractive yellow flowering inflorescences in summer and fall. Dormant in winter, cut back to ground.

¹ Refers to Sunset Western Garden Book Zones. The Central Coast includes the following Climate Zones: 1A, 2A, 3A, 7, 9, 14-24 www.sunset.com/garden/climate-zones/

Central Coast Low Impact Development Initiative

Bioretention Plant List

Plants for Zone A: Periodic inundation, area ponds following storm events (6" to 12" depth for 24 - 72 hours) and compost amended sand soil.

Scientific & Common Name	Height / Width	Light Preferences			Water Tolerances		CA Native	Sunset Climate Zones ¹	Notes
		Sun	Part	Shade	Drought	Inundation			
 SHRUBS/SUBSHRUBS									
<i>Baccharis pilularis</i> Coyote Brush	wide variation	X			X	X	X	all, but 1A-3A	Adaptable evergreen shrub, provides quick cover and bank stabilization, tolerant of coastal conditions, alkaline soil, sand, clay and seasonal wet, dwarf (low growing) varieties available.
<i>Zauschneria californica</i> 'Catalina' Island California Fuchsia	1 - 3' / 2 - 3'	X	X		X	X	X	All but 1A	Likes moisture but will survive through drought, attractive red flowers that hummingbirds like. This species is hardier and flowers last longer.
<i>Zauschneria californica</i> 'Uvas Canyon' San Jose California Fuchsia	2 - 3' / spreading	X	X		X	X	X	All but 1A	Grey foliage, attractive red- orange flowers, very showy in late fall. Full sun with regular watering or along coast. Can be mowed to look like lawn.
 LARGE SHRUBS / TREES									
<i>Aesculus californica</i> California Buckeye	15'	X	X		X	X	X	all but 1A-2A	Small tree that has fragrant white panicles April - May.. Needs regular water for the first 2 years. Interesting form throughout all seasons. Good for native bee population.
<i>Amorpha californica</i> California False Indigo Bush	6' / spreading		X	X	X	X	X	all, but 1A -3A	Large shrub, with fragrant purple flowers. Needs no water after established. Provides larval food for California State butterfly.
<i>Cercis occidentalis</i> Western Redbud	3 - 16' / 3 - 16'	X	X		X	X	X	all but 1A	Needs winter chill to set flowers properly. Abundant amount of flowering purple-pink flowers in spring. Can be pruned to tree or left as shrub.
<i>Cornus californica</i> California Dogwood	3 - 10' / 3 - 10'		X		X	X	X	all, but 1A -3A	Attractive red branching stems with red deciduous leaves in winter. Good for erosion control. Showy white blooms in spring.
<i>Garrya elliptica</i> 'James Roof' Silk Tassel	10 - 15'	X	X		X	X	X	all, but 1A -3A	Drought tolerant where rainfall exceeds 20." Evergreen shrub - tree with hanging white catkins.
<i>Sambucus mexicana</i> Tapiro, Blue Elderberry	6 - 15'	X	X		X	X	X	all but 1A	Deciduous shub that can be pruned to a tree. Can handle extreme drought after first years. Needs maintenance to upkeep appearance. Attractive yellow flowers and edible blue berries. Great for ecosystem rehabilitation.
<i>Spiraea douglasii</i> Western Spiraea	4 - 5'	X	X		X	X	X	all	Deciduous shrub, fast growing. Attractive pink clustered flowers summer to early fall. Drought tolerant once established. Very adaptable.

¹ Refers to Sunset Western Garden Book Zones. The Central Coast includes the following Climate Zones: 1A, 2A, 3A, 7, 9, 14-24 www.sunset.com/garden/climate-zones/

Stormwater and the Construction Industry

Protect Natural Features



Bad



Good

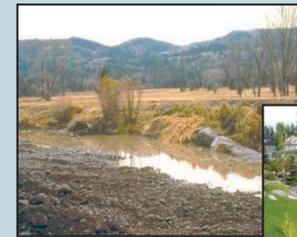
- Minimize clearing.
- Minimize the amount of exposed soil.
- Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity.
- Protect streams, stream buffers, wild woodlands, wetlands, or other sensitive areas from any disturbance or construction activity by fencing or otherwise clearly marking these areas.

Construction Phasing



- Sequence construction activities so that the soil is not exposed for long periods of time.
- Schedule or limit grading to small areas.
- Install key sediment control practices before site grading begins.
- Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.

Vegetative Buffers



Bad



Good

- Protect and install vegetative buffers along waterbodies to slow and filter stormwater runoff.
- Maintain buffers by mowing or replanting periodically to ensure their effectiveness.

Silt Fencing



Bad



Good

- Inspect and maintain silt fences after each rainstorm.
- Make sure the bottom of the silt fence is buried in the ground.
- Securely attach the material to the stakes.
- Don't place silt fences in the middle of a waterway or use them as a check dam.
- Make sure stormwater is not flowing around the silt fence.

Site Stabilization



Bad



Good

- Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed.

Maintain your BMPs!
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TO REPORT ILLEGAL STORMDRAIN DISPOSAL

E-mail: Flood.fcnpdes@co.riverside.ca.us
 Visit our website: www.floodcontrol.co.riverside.ca.us

Brought to you by the Storm Water/Clean Water Pollution Protection Program....

REMEMBER, ONLY RAIN IN THE STORMDRAIN!

Construction Entrances



Bad



Good

- Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway.
- Properly size entrance BMPs for all anticipated vehicles.
- Make sure that the construction entrance does not become buried in soil.

Slopes



Bad



Good

- Rough grade or terrace slopes.
- Break up long slopes with sediment barriers, or under drain, or divert stormwater away from slopes.

Dirt Stockpiles



Bad



Good

- Cover or seed all dirt stockpiles.

Storm Drain Inlet Protection



Bad



Good

- Use rock or other appropriate material to cover the storm drain inlet to filter out trash and debris.
- Make sure the rock size is appropriate (usually 1 to 2 inches in diameter).
- If you use inlet filters, maintain them regularly.

Stormwater and the Construction Industry

Planning and Implementing Erosion and Sediment Control Practices

The construction industry is a critical participant in the nation's efforts to protect streams, rivers, lakes, wetlands, and oceans. Through the use of best management practices (BMPs), construction site operators are the key defense against erosion and sedimentation.

As stormwater flows over a construction site, it picks up pollutants like sediment, debris, and chemicals. High volumes of stormwater can also cause stream bank erosion, and destroy downstream aquatic habitat. Preventing soil erosion and sedimentation is an important responsibility at all construction sites.

In addition to the environmental impact, uncontrolled erosion can have a significant financial impact on a construction project. It costs money and time to repair gullies, replace vegetation, clean sediment-clogged storm drains, replace poorly installed BMPs, and mitigate damage to other people's property or to natural resources.

Best Management Practice (BMP)

A BMP is a method used to prevent or control stormwater runoff and the discharge of pollutants, including sediment, into local waterbodies. Silt fences, inlet protection, and site-stabilization techniques are typical BMPs on a construction site.

Operator

An operator is someone who has control over and the ability to modify construction plans and specifications (e.g. owner, general contractor)

or

Someone who has control over the day-to-day operations at a site (e.g., owner, general contractor) that are necessary to ensure compliance with the permit requirements. It is the responsibility of a construction site owner or operator to contain stormwater runoff and prevent erosion during all stages of a project.

There may be more than one person at a site who meets these definitions and must apply for permit coverage. (States may have different definitions of the term "operator.")

So what's being done about polluted runoff?

The Clean Water Act includes the National Pollutant Discharge Elimination System (NPDES) permitting program. As of January 2003, 44 states and territories are authorized to issue NPDES stormwater permits. If your state isn't authorized to operate the NPDES stormwater permit program, EPA issues the permits. Permits vary from state to state, so contact your state or EPA for specific information. Your permitting authority has specific information on your state's NPDES stormwater permit program. In general, construction permits require construction operators to do all of the following:

- Develop and implement a stormwater pollution prevention plan
- Submit a permit application or notice of intent (NOI)
- Comply with the permit, including maintaining BMPs and inspecting the site

Under the NPDES program, construction activities that disturb 1 or more acres are required to obtain stormwater permit coverage. States have different names for the plans that construction operators must develop, such as

- Stormwater pollution prevention plan
- Erosion and sediment control plan
- Erosion control and stormwater management plan
- Stormwater management plan
- Water pollution control plan
- Pollution prevention plan

This document uses the term "*Plan*."

I think I need a permit... Where do I start?

All land-disturbing activities, including clearing, grading, and excavation, that disturb **1 or more acres** are required to be covered under a state or EPA-issued NPDES construction stormwater permit **prior to land disturbance**. Permit requirements vary by state. Begin by researching the specific requirements in your state. You might already be subject to local erosion and sediment control requirements, but that doesn't release you from the requirements of the NPDES program at the state or EPA level. Although you must comply with both sets of requirements, in most cases they have been designed to be complementary. Contact your permitting authority to find out exactly what you need to do. A good place to start your search is the Construction Industry Compliance Assistance web site at <http://www.envcap.org/cica>.

The NPDES permit requirements include small construction activities that are part of a larger common plan of development or sale, such as a single lot within a larger subdivision. For developments with multiple operators, all operators must have permit coverage for their individual parts of the larger development, no matter how large or small each operation happens to be. When there are multiple operators at one site, they're encouraged to develop and share one comprehensive Plan and obtain permit coverage as co-permittees.

The **owner or operator** of the construction site is responsible for complying with the requirements of the permit. Responsibilities include developing a Plan, obtaining permit coverage, implementing BMPs, and stabilizing the site at the end of the construction activity.

Determine your eligibility

All construction activity that disturbs 1 or more acres of land, as well as activity that disturbs less than 1 acre but is part of a larger common plan of development, must obtain permit coverage.

Read and understand your stormwater permit requirements

Get a copy of the permit for construction activities and a permit application (or notice of intent form) from your state or EPA permitting authority.

Develop a Plan

Most states do not require you to submit your Plan. However, you do need to keep the Plan on site. If that's impractical, you may post a notice that tells where the Plan is kept so it can be accessed by the permitting authority and other interested parties.

You'll need to post a copy of your completed application on site. Put it in a place where the public can see it so they'll know your site is covered by an NPDES permit!

Apply for permit coverage

Once you understand your permit requirements and have developed a Plan, you can submit a stormwater permit application (or notice of intent) to your permitting authority. This must be done before beginning any land disturbance on the site. Some states require a few days of lead time, so check with your permitting authority. Once you've submitted the application, you must satisfy the conditions of the permit.

Implement the Plan

Be prepared to implement the BMPs in your Plan before construction begins. Ensure that BMPs are properly maintained, and upgrade and repair them as necessary.

Developing and Implementing a Plan

You must have a Plan that includes erosion and sediment control and pollution prevention BMPs. These Plans require

- Advance planning and training to ensure proper implementation of the BMPs
- Erosion and sediment control BMPs in place until the area is permanently stabilized
- Pollution prevention BMPs to keep the construction site "clean"
- Regular inspection of the construction site to ensure proper installation and maintenance of BMPs

Fortunately, the practices and measures that must be included in your Plan are already part of the standard operating procedures at many construction sites.

Six steps are associated with developing and implementing a stormwater Plan. There's a wealth of information available on developing pollution prevention plans. Please contact your permitting authority for help in finding additional guidance materials, or visit www.epa.gov/npdes/stormwater. A sample construction plan is available at www.epa.gov/npdes/pubs/sample_swppp.pdf.

1. Site Evaluation and Design Development

- Collect site information
- Develop site plan design
- Prepare pollution prevention site map

The first step in preparing a Plan is to define the characteristics of the site and the type of construction that will occur. This involves collecting site information, identifying natural features that should be protected, developing a site plan design, describing the nature of the construction activity, and preparing a pollution prevention site map.

2. Assessment

- Measure the site area
- Determine the drainage areas
- Calculate the runoff coefficient

The next step is assessing the impact the project will have on stormwater runoff. Determine the drainage areas and estimate the runoff amounts and velocities. For more information on calculating the runoff coefficient, go to www.epa.gov/npdes/pubs/chap02_conguide.pdf, page 11.

3. Control Selection and Plan Design

- Review and incorporate state or local requirements
- Select erosion and sediment controls
- Select other controls
- Select stormwater management controls
- Indicate the location of controls on the site map
- Prepare an inspection and maintenance plan
- Coordinate controls with construction activity
- Prepare sequence of major activities

In the third step you'll actually document your procedures to prevent and control polluted stormwater runoff. You must delineate areas that will not be disturbed, including critical natural areas like streamside areas, floodplains, and trees. You must also identify the measures (or BMPs) you'll use to protect these areas.

Soil erosion control tips...

- Design the site to infiltrate stormwater into the ground and to keep it out of storm drains. Eliminate or minimize the use of stormwater collection and conveyance systems while maximizing the use of stormwater infiltration and bioretention techniques.
- Minimize the amount of exposed soil on site.
 - To the extent possible, plan the project in stages to minimize the amount of area that is bare and subject to erosion. The less soil exposed, the easier and cheaper it will be to control erosion.
 - Vegetate disturbed areas with permanent or temporary seeding immediately upon reaching final grade.
 - Vegetate or cover stockpiles that will not be used immediately.
- Reduce the velocity of stormwater both onto and away from the project area.
 - Interceptors, diversions, vegetated buffers, and check dams are a few of the BMPs that can be used to slow down stormwater as it travels across and away from the project site.
 - Diversion measures can also be used to direct flow away from exposed areas toward stable portions of the site.
 - Silt fences and other types of perimeter filters should never be used to reduce the velocity of runoff.
- Protect defined channels immediately with measures adequate to handle the storm flows expected.
 - Sod, geotextile, natural fiber, riprap, or other stabilization measures should be used to allow the channels to carry water without causing erosion. Use softer measures like geotextile or vegetation where possible to prevent downstream impacts.
- Keep sediment on site.
 - Place aggregate or stone at construction site vehicle exits to accommodate at least two tire revolutions of large construction vehicles. Much of the dirt on the tires will fall off before the vehicle gets to the street.
 - Regular street sweeping at the construction entrance will prevent dirt from entering storm drains. Do not hose paved areas.
 - Sediment traps and basins are temporary structures and should be used in conjunction with other measures to reduce the amount of erosion.
- Maintaining all BMPs is critical to ensure their effectiveness during the life of the project.
 - Regularly remove collected sediment from silt fences, berms, traps, and other BMPs.
 - Ensure that geotextiles and mulch remain in place until vegetation is well established.
 - Maintain fences that protect sensitive areas, silt fences, diversion structures, and other BMPs.

Other BMPs and Activities to Control Polluted Runoff

You'll need to select other controls to address potential pollutant sources on your site. Construction materials, debris, trash, fuel, paint, and stockpiles become pollution sources when it rains. Basic pollution prevention practices can significantly reduce the amount of pollution leaving construction sites. The following are some simple practices that should be included in the Plan and implemented on site:

- Keep potential sources of pollution out of the rain as practicable (e.g., inside a building, covered with plastic or tarps, or sealed tightly in a leak-proof container).
- Clearly identify a protected, lined area for concrete truck washouts. This area should be located away from streams, storm drain inlets, or ditches and should be cleaned out periodically.
- Park, refuel, and maintain vehicles and equipment in one area of the site to minimize the area exposed to possible spills and fuel storage. This area should be well away from streams, storm drain inlets, or ditches. Keep spill kits close by and clean up any spills or leaks immediately, including spills on pavement or earthen surfaces.
- Practice good housekeeping. Keep the construction site free of litter, construction debris, and leaking containers. Keep all waste in one area to minimize cleaning.
- Never hose down paved surfaces to clean dust, debris, or trash. This water could wash directly into storm drains or streams. Sweep up materials and dispose of them in the trash. Never bury trash or debris!
- Dispose of hazardous materials properly.

4. Certification and Notification

- Certify the Plan
- Submit permit application or notice of intent

Once the Plan has been developed, an authorized representative must sign it. Now is the time to submit the permit application or notice of intent. Your permit might require that the Plan be kept on site, so be sure to keep it available for the staff implementing the Plan.

Erosion and sedimentation control practices are only as good as their installation and maintenance.

5. Implementing and Maintaining a Plan

- Implement controls
- Inspect and maintain controls
- Update/change the Plan
- Report releases of hazardous materials

A Plan describes the practices and activities you'll use to prevent stormwater contamination and meet the NPDES permit requirements. Make sure that the Plan is implemented and that the Plan is updated as necessary to reflect changes on the site.

Erosion and sedimentation control practices are only as good as their installation and maintenance. Train the contractors that will install the BMPs and inspect immediately to ensure that the BMPs have been installed correctly.

Regularly inspect the BMPs (especially before and after rain events) and perform any necessary repairs or maintenance immediately. Many BMPs are designed to handle a limited amount of sediment. If not maintained, they'll become ineffective and a source of sediment pollution.

It's also important to keep records of BMP installation, implementation, and maintenance. Keep track of major grading activities that occur on the site, when construction activities cease (temporarily or permanently), and when a site is temporarily or permanently stabilized.

If construction plans change at any time, or if more appropriate BMPs are chosen for the site, update the Plan accordingly.

6. Completing the Project: Final Stabilization and Termination of the Permit

- Final stabilization
- Notice of Termination
- Record retention

Many states and EPA require a Notice of Termination (NOT) or other notification signifying that the construction activity is completed. An NOT is required when

- Final stabilization has been achieved on all portions of the site for which the permittee is responsible.

- Another operator has assumed control over all areas of the site that have not been finally stabilized. That operator would need to submit a new permit application to the permitting authority.

- For residential construction only, temporary stabilization of a lot has been completed prior to transference of ownership to the homeowner, with the homeowner being made aware of the need to perform final stabilization.

Permittees must keep a copy of their permit application and their Plan for at least 3 years following final stabilization. This period may be longer depending on state and local requirements.

An ounce of prevention is worth a pound of cure! It's far more efficient and cost-effective to prevent pollution than it is to try to correct problems later. Installing and maintaining simple BMPs and pollution prevention techniques on site can greatly reduce the potential for stormwater pollution and can also save you money!

Preconstruction Checklist

- A site description, including
 - Nature of the activity
 - Intended sequence of major construction activities
 - Total area of the site
 - Existing soil type and rainfall runoff data
- A site map with:
 - Drainage patterns
 - Approximate slopes after major grading
 - Area of soil disturbance
 - Outline of areas which will not be disturbed
 - Location of major structural and nonstructural soil erosion controls
 - Areas where stabilization practices are expected to occur
 - Surface waters
 - Stormwater discharge locations
 - Name of the receiving water(s)
- A description of controls:
 - Erosion and sediment controls, including
 - Stabilization practices for all areas disturbed by construction
 - Structural practices for all drainage/discharge locations
 - Stormwater management controls, including
 - Measures used to control pollutants occurring in stormwater discharges after construction activities are complete
 - Velocity dissipation devices to provide nonerosive flow conditions from the discharge point along the length of any outfall channel
 - Other controls, including
 - Waste disposal practices that prevent discharge of solid materials
 - Measures to minimize offset tracking of sediments by construction vehicles
 - Measures to ensure compliance with state or local waste disposal, sanitary sewer, or septic system regulations
 - Description of the timing during the construction when measures will be implemented
- State or local requirements incorporated into the Plan
- Inspection and maintenance procedures for control measures identified in the Plan
- Contractor certification and Plan certification

Implementation Checklist

- Maintain records of construction activities, including
 - Dates when major grading activities occur
 - Dates when construction activities temporarily cease on the site or a portion of the site
 - Dates when construction activities permanently cease on the site or a portion of the site
 - Dates when stabilization measures are completed on the site
- Prepare inspection reports summarizing
 - Name of person conducting BMP inspections
 - Qualifications of person conducting BMP inspections
 - BMPs/areas inspected
 - Observed conditions
 - Necessary changes to the Plan
- Report releases of reportable quantities of oil or hazardous materials
 - Notify the National Response Center at 800-424-8802 immediately
 - Report releases to your permitting authority immediately, or as specified in your permit. You must also provide a written report within 14 days.
- Modify the Plan to include
 - The date of release
 - Circumstances leading to the release
 - Steps taken to prevent reoccurrence of the release
- Modify Plan as necessary
 - Incorporate requests of the permitting authority to bring the Plan into compliance
 - Address changes in design, construction operation, or maintenance that affect the potential for discharge of pollutants



Visit www.epa.gov/npdes/stormwater for more information.



A Citizen's Guide to Understanding Stormwater



EPA United States Environmental Protection Agency

EPA 833-B-03-002

January 2003

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What is stormwater runoff?

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

Why is stormwater runoff a problem?

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

The effects of pollution

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

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

◆ Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.



Stormwater Pollution Solutions

Residential

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

Lawn care

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



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

Septic systems

Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby waterbodies. Pathogens can cause public health problems and environmental concerns.



- ◆ Inspect your system every 3 years and pump your tank as necessary (every 3 to 5 years).
- ◆ Don't dispose of household hazardous waste in sinks or toilets.

Auto care

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



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

Pet waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.



- ◆ When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.



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

Residential landscaping

Permeable Pavement—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

Rain Barrels—You can collect rainwater from rooftops in mosquito-proof containers. The water can be used later on lawn or garden areas.



Rain Gardens and Grassy Swales—Specially designed areas planted with native plants can provide natural places for



rainwater to collect and soak into the ground. Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

Vegetated Filter Strips—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.

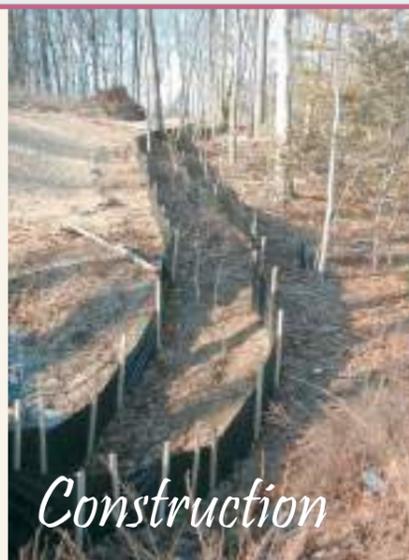
Commercial

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm sewer system and eventually enter local waterbodies.

- ◆ Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- ◆ Cover grease storage and dumpsters and keep them clean to avoid leaks.
- ◆ Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local waterbodies.

- ◆ Divert stormwater away from disturbed or exposed areas of the construction site.
- ◆ Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- ◆ Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.



Construction

Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local waterbodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- ◆ Keep livestock away from streambanks and provide them a water source away from waterbodies.
- ◆ Store and apply manure away from waterbodies and in accordance with a nutrient management plan.
- ◆ Vegetate riparian areas along waterways.
- ◆ Rotate animal grazing to prevent soil erosion in fields.
- ◆ Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.



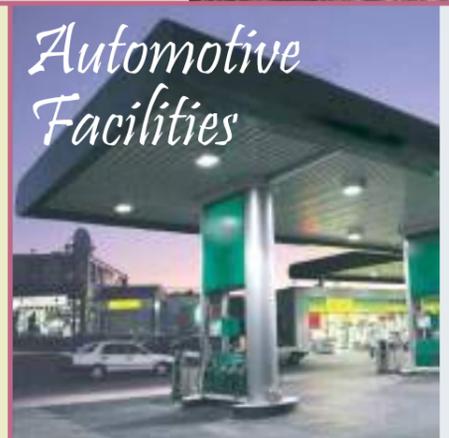
Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- ◆ Conduct preharvest planning to prevent erosion and lower costs.
- ◆ Use logging methods and equipment that minimize soil disturbance.
- ◆ Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- ◆ Construct stream crossings so that they minimize erosion and physical changes to streams.
- ◆ Expedite revegetation of cleared areas.



Automotive Facilities



Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- ◆ Clean up spills immediately and properly dispose of cleanup materials.
- ◆ Provide cover over fueling stations and design or retrofit facilities for spill containment.
- ◆ Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local waterbodies.
- ◆ Install and maintain oil/water separators.



Landscaping and garden maintenance activities can be major contributors to water pollution. Soils, yard wastes, over-watering and garden chemicals become part of the urban runoff mix that winds its way through streets, gutters and storm drains before entering lakes, rivers, streams, etc. Urban runoff pollution contaminates water and harms aquatic life!

In Riverside County, report illegal discharges into the storm drain, call
1-800-506-2555
"Only Rain Down the Storm Drain"

Important Links:

Riverside County Household Hazardous Waste Collection Information
1-800-304-2226 or www.rivcwm.org

Riverside County Backyard Composting Program
1-800-366-SAVE

Integrated Pest Management (IPM) Solutions
www.ipm.ucdavis.edu

California Master Gardener Programs
www.mastergardeners.org
www.camastergardeners.ucdavis.edu

California Native Plant Society
www.cnps.org

The Riverside County "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges Orange County's Storm Water Program for their contribution to this brochure.

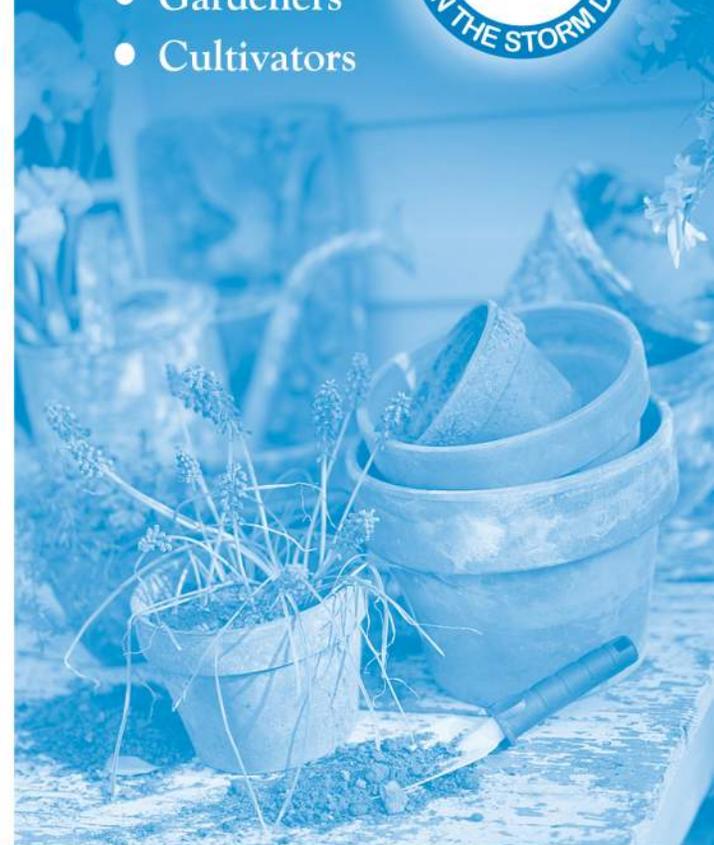


...Only Rain Down ...the Storm Drain

*What you should know for...
Landscape and Gardening*

Best Management tips for:

- Professionals
- Novices
- Landscapers
- Gardeners
- Cultivators



Tips for Landscape & Gardening

This brochure will help you to get the most of your lawn and gardening efforts and keep our waterways clean. Clean waterways provide recreation, establish thriving fish habitats, secure safe sanctuaries for wildlife, and add beauty to our communities. NEVER allow gardening products or waste water to enter the street, gutter or storm drain.

General Landscaping Tips

- Protect stockpiles and materials from wind and rain by storing them under tarps or secured plastic sheeting.
- Prevent erosion of slopes by planting fast-growing, dense ground covering plants. These will shield and bind the soil.
- Plant native vegetation to reduce the amount of water, fertilizers and pesticides applied to the landscape.
- Never apply pesticides or fertilizers when rain is predicted within the next 48 hours.



Garden & Lawn Maintenance

- Do not overwater. Use irrigation practices such as drip irrigation, soaker hoses or micro-spray systems. Periodically inspect and fix leaks and misdirected sprinklers.

- Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Instead, dispose of green waste by composting, hauling it to a permitted landfill, or recycling it through your city's program.



- Consider recycling your green waste and adding "nature's own fertilizer" to your lawn or garden.
- Read labels and use only as directed. Do not over-apply pesticides or fertilizers. Apply to spots as needed, rather than blanketing an entire area.
- Store pesticides, fertilizers and other chemicals in a dry covered area to prevent exposure that may result in the deterioration of containers and packaging.
- Rinse empty pesticide containers and re-use rinse water as you would use the product. Do not dump rinse water down storm drains or sewers. Dispose of empty containers in the trash.
- When available, use non-toxic alternatives to traditional pesticides, and use pesticides specifically designed to control the pest you are targeting.

- Try natural long-term common sense solutions first. Integrated Pest Management (IPM) can provide landscaping guidance and solutions, such as:

- ◆ **Physical Controls** - Try hand picking, barriers, traps or caulking holes to control weeds and pests.
- ◆ **Biological Controls** - Use predatory insects to control harmful pests.
- ◆ **Chemical Controls** - Check out www.ipm.ucdavis.edu before using chemicals. Remember, all chemicals should be used cautiously and in moderation.

- If fertilizer is spilled, sweep up the spill before irrigating. If the spill is liquid, apply an absorbent material such as cat litter, and then sweep it up and dispose of it in the trash.
- Take unwanted pesticides to a Household Waste Collection Center to be recycled.
- *Dumping toxics into the street, gutter or storm drain is illegal!*

www.bewaterwise.com Great water conservation tips and drought tolerant garden designs.

www.ourwaterourworld.com Learn how to safely manage home and garden pests.

Additional information can also be found on the back of this brochure.

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?

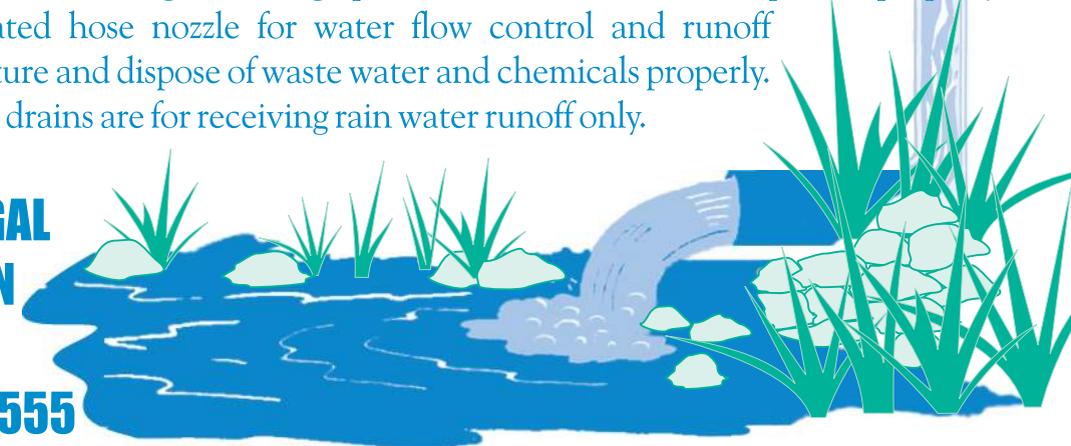
Storm drains are NOT connected to sanitary sewer systems and treatment plants!



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

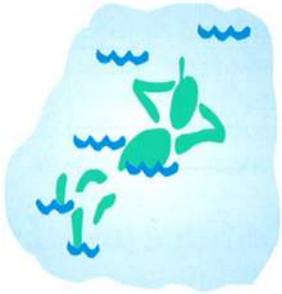
- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment 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.

Saltwater Pools

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



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

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

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

Helpful telephone numbers and links

RIVERSIDE COUNTY WATER AGENCIES:

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

CALL 1-800-506-2555 to:

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

Or visit our

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

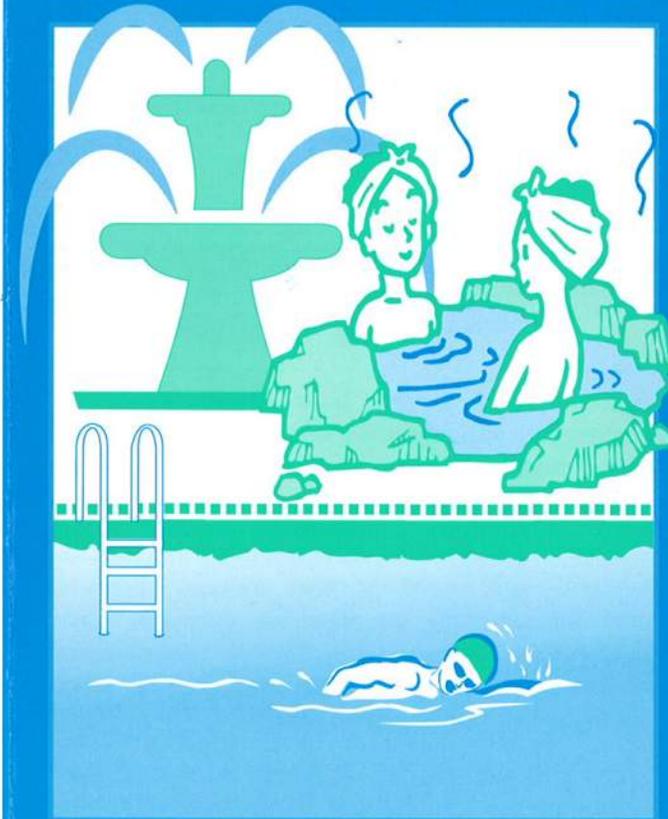
Other links to additional storm drain pollution information:

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



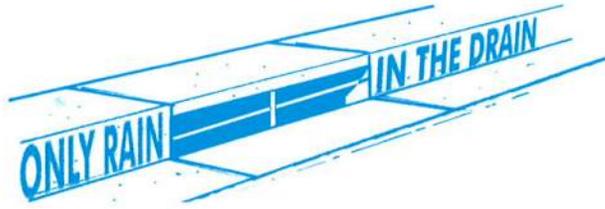
Riverside County's, "Only Rain Down the Storm Drain" Pollution Prevention Program gratefully acknowledges the Bay Area Stormwater Management Agencies Association and the Cleaning Equipment Trade Association for information provided in this brochure.

Guidelines for Maintaining your...



Swimming Pool, Jacuzzi and Garden Fountain

Where does the water go?



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



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

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

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



Discharge Regulations

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

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



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

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

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

Maintenance & Chemicals

Cleaning Filters

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



Algaecides

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

Chemical Storage and Handling

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

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





Modular Wetlands[®] System Linear

A Stormwater Biofiltration Solution



OVERVIEW

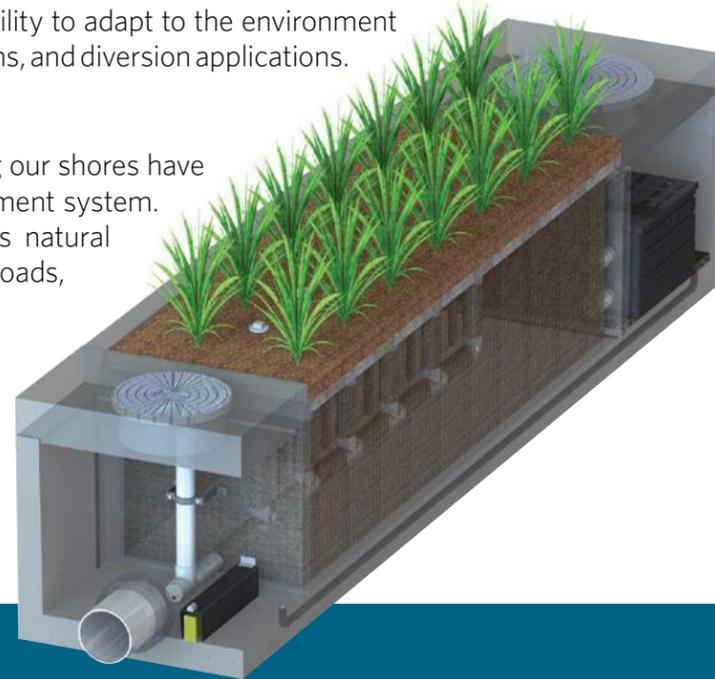
The Bio Clean Modular Wetlands® System Linear (MWS Linear) represents a pioneering breakthrough in stormwater technology as the only biofiltration system to utilize patented horizontal flow, allowing for a smaller footprint, higher treatment capacity, and a wide range of versatility. While most biofilters use little or no pretreatment, the Modular Wetlands System Linear incorporates an advanced pretreatment chamber that includes separation and pre-filter cartridges. In this chamber, sediment and hydrocarbons are removed from runoff before entering the biofiltration chamber, reducing maintenance costs and improving performance.

Horizontal flow also gives the system the unique ability to adapt to the environment through a variety of configurations, bypass orientations, and diversion applications.

The Urban Impact

For hundreds of years, natural wetlands surrounding our shores have played an integral role as nature's stormwater treatment system. But as cities grow and develop, our environment's natural filtration systems are blanketed with impervious roads, rooftops, and parking lots.

Bio Clean understands this loss and has spent years re-establishing nature's presence in urban areas, and rejuvenating waterways with the MWS Linear.



PERFORMANCE

The Modular Wetlands® System Linear continues to outperform other treatment methods with superior pollutant removal for TSS, heavy metals, nutrients, hydrocarbons, and bacteria. Since 2007 the MWS Linear has been field tested on numerous sites across the country and is proven to effectively remove pollutants through a combination of physical, chemical, and biological filtration processes. In fact, the MWS Linear harnesses some of the same biological processes found in natural wetlands in order to collect, transform, and remove even the most harmful pollutants.

66% REMOVAL OF DISSOLVED ZINC	69% REMOVAL OF TOTAL ZINC	38% REMOVAL OF DISSOLVED COPPER	64% REMOVAL OF TOTAL PHOSPHORUS	
45% REMOVAL OF NITROGEN	50% REMOVAL OF TOTAL COPPER	95% REMOVAL OF MOTOR OIL	67% REMOVAL OF ORTHO PHOSPHORUS	85% REMOVAL OF TSS

APPROVALS

The Modular Wetlands® System Linear has successfully met years of challenging technical reviews and testing from some of the most prestigious and demanding agencies in the nation and perhaps the world. Here is a list of some of the most high-profile approvals, certifications, and verifications from around the country.



Washington State Department of Ecology TAFE Approved

The MWS Linear is approved for General Use Level Designation (GULD) for Basic, Enhanced, and Phosphorus treatment at 1 gpm/ft² loading rate. The highest performing BMP on the market for all main pollutant categories.



California Water Resources Control Board, Full Capture Certification

The Modular Wetlands® System is the first biofiltration system to receive certification as a full capture trash treatment control device.



Virginia Department of Environmental Quality, Assignment

The Virginia Department of Environmental Quality assigned the MWS Linear the highest phosphorus removal rating for manufactured treatment devices to meet the new Virginia Stormwater Management Program (VSMP) regulation technical criteria.



Maryland Department of the Environment, Approved ESD

Granted Environmental Site Design (ESD) status for new construction, redevelopment, and retrofitting when designed in accordance with the design manual.



MASTEP Evaluation

The University of Massachusetts at Amherst - Water Resources Research Center issued a technical evaluation report noting removal rates up to 84% TSS, 70% total phosphorus, 68.5% total zinc, and more.



Rhode Island Department of Environmental Management, Approved BMP

Approved as an authorized BMP and noted to achieve the following minimum removal efficiencies: 85% TSS, 60% pathogens, 30% total phosphorus, and 30% total nitrogen.



Texas Commission on Environmental Quality



Atlanta Regional Commission

ADVANTAGES

- HORIZONTAL FLOW BIOFILTRATION
- GREATER FILTER SURFACE AREA
- PRETREATMENT CHAMBER
- PATENTED PERIMETER VOID AREA
- FLOW CONTROL
- NO DEPRESSED PLANTER AREA
- AUTO DRAINDOWN MEANS NO MOSQUITO VECTOR

OPERATION

The Modular Wetlands® System Linear is the most efficient and versatile biofiltration system on the market, and it is the only system with horizontal flow which:

- Improves performance
- Reduces footprint
- Minimizes maintenance

Figure 1 & Figure 2 illustrate the invaluable benefits of horizontal flow and the multiple treatment stages.

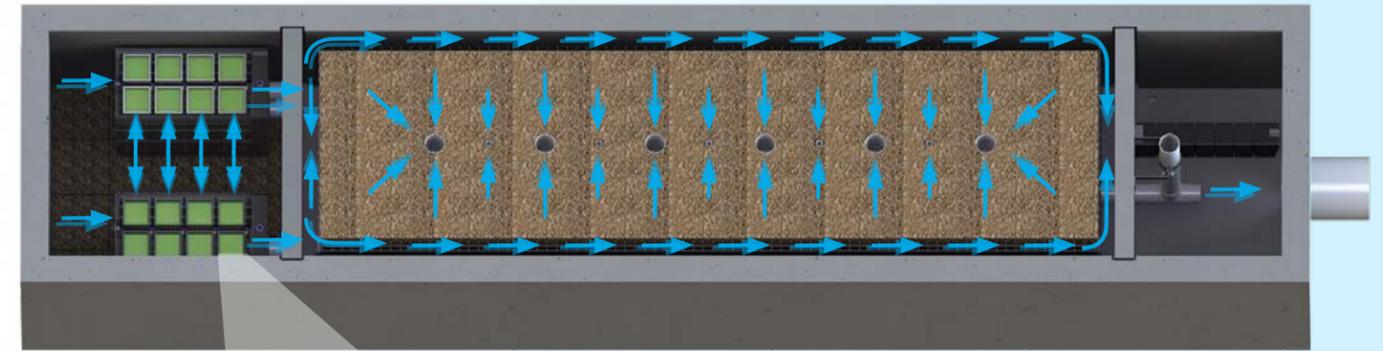


Figure 2,
Top View

2x to 3x more surface area than traditional downward flow bioretention systems.

1 PRETREATMENT

SEPARATION

- Trash, sediment, and debris are separated before entering the pre-filter boxes
- Designed for easy maintenance access

PRE-FILTER BOXES

- Over 25 sq. ft. of surface area per box
- Utilizes BioMediaGREEN™ filter material
- Removes over 80% of TSS and 90% of hydrocarbons
- Prevents pollutants that cause clogging from migrating to the biofiltration chamber

2 BIOFILTRATION

HORIZONTAL FLOW

- Less clogging than downward flow biofilters
- Water flow is subsurface
- Improves biological filtration

PATENTED PERIMETER VOID AREA

- Vertically extends void area between the walls and the WetlandMEDIA™ on all four sides
- Maximizes surface area of the media for higher treatment capacity

WETLANDMEDIA

- Contains no organics and removes phosphorus
- Greater surface area and 48% void space
- Maximum evapotranspiration
- High ion exchange capacity and lightweight

3 DISCHARGE

FLOW CONTROL

- Orifice plate controls flow of water through WetlandMEDIA™ to a level lower than the media's capacity
- Extends the life of the media and improves performance

DRAINDOWN FILTER

- The draindown is an optional feature that completely drains the pretreatment chamber
- Water that drains from the pretreatment chamber between storm events will be treated

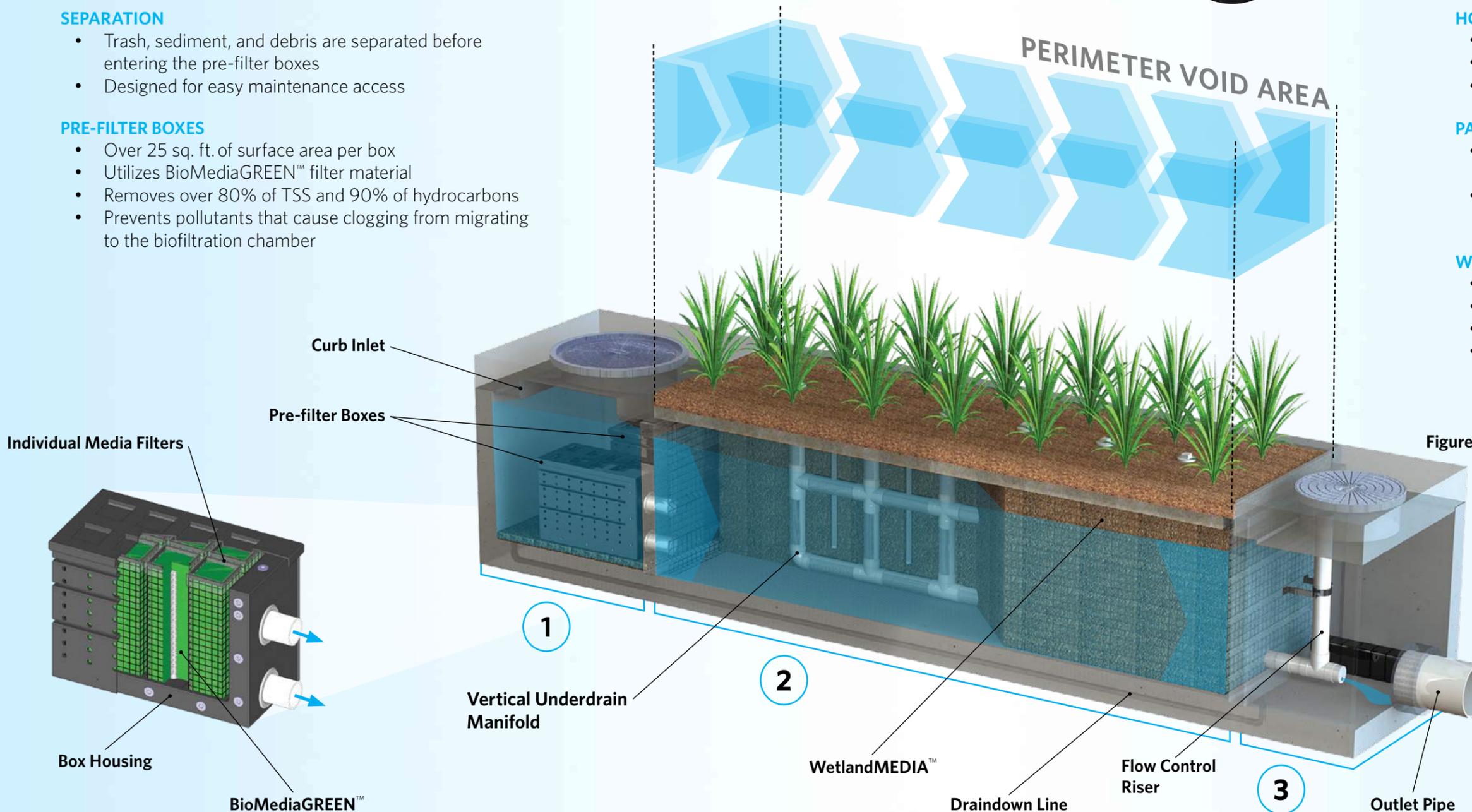
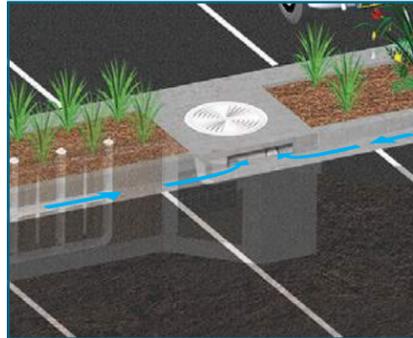


Figure 1



CONFIGURATIONS

The Modular Wetlands® System Linear is the preferred biofiltration system of civil engineers across the country due to its versatile design. This highly versatile system has available “pipe-in” options on most models, along with built-in curb or grated inlets for simple integration into your storm drain design.



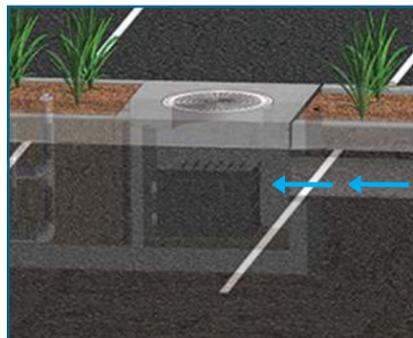
CURB TYPE

The Curb Type configuration accepts sheet flow through a curb opening and is commonly used along roadways and parking lots. It can be used in sump or flow-by conditions. Length of curb opening varies based on model and size.



GRATE TYPE

The Grate Type configuration offers the same features and benefits as the Curb Type but with a grated/drop inlet above the systems pretreatment chamber. It has the added benefit of allowing pedestrian access over the inlet. ADA-compliant grates are available to assure easy and safe access. The Grate Type can also be used in scenarios where runoff needs to be intercepted on both sides of landscape islands.



VAULT TYPE

The system’s patented horizontal flow biofilter is able to accept inflow pipes directly into the pretreatment chamber, meaning the Modular Wetlands® can be used in end-of-the-line installations. This greatly improves feasibility over typical decentralized designs that are required with other biofiltration/bioretenion systems. Another benefit of the “pipe-in” design is the ability to install the system downstream of underground detention systems to meet water quality volume requirements.



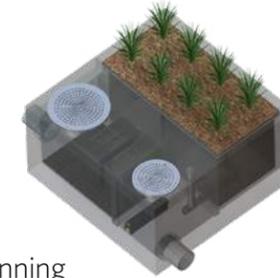
DOWNSPOUT TYPE

The Downspout Type is a variation of the Vault Type and is designed to accept a vertical downspout pipe from rooftop and podium areas. Some models have the option of utilizing an internal bypass, simplifying the overall design. The system can be installed as a raised planter, and the exterior can be stuccoed or covered with other finishes to match the look of adjacent buildings.

ORIENTATIONS

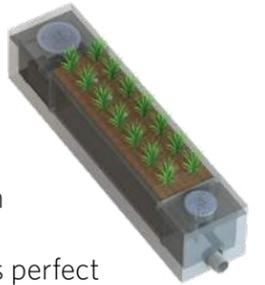
SIDE-BY-SIDE

The Side-By-Side orientation places the pretreatment and discharge chamber adjacent to one another with the biofiltration chamber running parallel on either side. This minimizes the system length, providing a highly compact footprint. It has been proven useful in situations such as streets with directly adjacent sidewalks, as half of the system can be placed under that sidewalk. This orientation also offers internal bypass options as discussed below.



END-TO-END

The End-To-End orientation places the pretreatment and discharge chambers on opposite ends of the biofiltration chamber, therefore minimizing the width of the system to 5 ft. (outside dimension). This orientation is perfect for linear projects and street retrofits where existing utilities and sidewalks limit the amount of space available for installation. One limitation of this orientation is that bypass must be external.



BYPASS

INTERNAL BYPASS WEIR (SIDE-BY-SIDE ONLY)

The Side-By-Side orientation places the pretreatment and discharge chambers adjacent to one another allowing for integration of internal bypass. The wall between these chambers can act as a bypass weir when flows exceed the system’s treatment capacity, thus allowing bypass from the pretreatment chamber directly to the discharge chamber.

EXTERNAL DIVERSION WEIR STRUCTURE

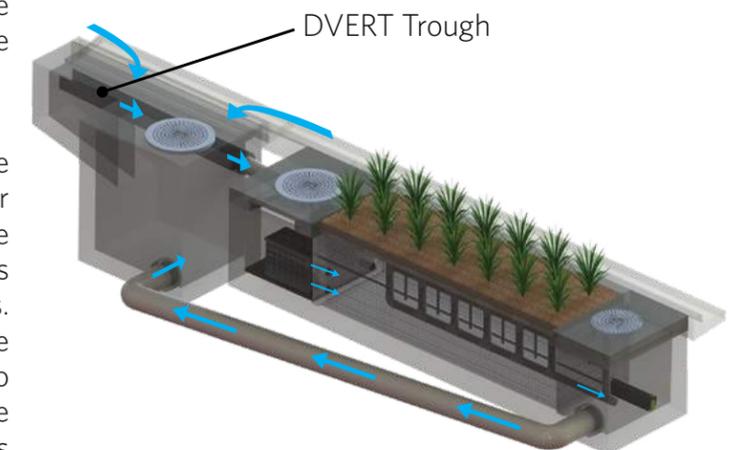
This traditional offline diversion method can be used with the Modular Wetlands® System Linear in scenarios where runoff is being piped to the system. These simple and effective structures are generally configured with two outflow pipes. The first is a smaller pipe on the upstream side of the diversion weir - to divert low flows over to the MWS Linear for treatment. The second is the main pipe that receives water once the system has exceeded treatment capacity and water flows over the weir.

FLOW-BY-DESIGN

This method is one in which the system is placed just upstream of a standard curb or grate inlet to intercept the first flush. Higher flows simply pass by the MWS Linear and into the standard inlet downstream.

DVERT LOW FLOW DIVERSION

This simple yet innovative diversion trough can be installed in existing or new curb and grate inlets to divert the first flush to the Modular Wetlands® System Linear via pipe. It works similar to a rain gutter and is installed just below the opening into the inlet. It captures the low flows and channels



them over to a connecting pipe exiting out the wall of the inlet and leading to the MWS Linear. The DVERT is perfect for retrofit and green street applications that allow the system to be installed anywhere space is available.

SPECIFICATIONS

FLOW-BASED DESIGNS

The Modular Wetlands® System Linear can be used in stand-alone applications to meet treatment flow requirements, and since it is the only biofiltration system that can accept inflow pipes several feet below the surface, it can be used not only in decentralized design applications but also as a large central end-of-the-line application for maximum feasibility.

MODEL #	DIMENSIONS	WETLAND MEDIA SURFACE AREA (sq. ft.)	TREATMENT FLOW RATE (cfs)
MWS-L-4-4	4' x 4'	23	0.052
MWS-L-4-6	4' x 6'	32	0.073
MWS-L-4-8	4' x 8'	50	0.115
MWS-L-4-13	4' x 13'	63	0.144
MWS-L-4-15	4' x 15'	76	0.175
MWS-L-4-17	4' x 17'	90	0.206
MWS-L-4-19	4' x 19'	103	0.237
MWS-L-4-21	4' x 21'	117	0.268
MWS-L-6-8	7' x 9'	64	0.147
MWS-L-8-8	8' x 8'	100	0.230
MWS-L-8-12	8' x 12'	151	0.346
MWS-L-8-16	8' x 16'	201	0.462
MWS-L-8-20	9' x 21'	252	0.577
MWS-L-8-24	9' x 25'	302	0.693
MWS-L-10-20	10' x 20'	302	0.693

VOLUME-BASED DESIGNS

HORIZONTAL FLOW BIOFILTRATION ADVANTAGE



MODULAR WETLANDS® SYSTEM LINEAR WITH URBANPOND™ PRESTORAGE

In the example above, the Modular Wetlands® System Linear is installed downstream of the UrbanPond storage system. The MWS Linear is designed for the water quality volume and will treat and discharge the required volume within local draindown time requirements. The MWS Linear's unique horizontal flow design, gives it benefits no other biofilter has - the ability to be placed downstream of detention ponds, extended dry detention basins, underground storage systems and permeable paver reservoirs. The system's horizontal flow configuration and built-in orifice control allows it to be installed with just 6" of fall between inlet and outlet pipe for a simple connection to projects with shallow downstream tie-in points.

UrbanPond
Single and Double Modules



DESIGN SUPPORT

Bio Clean engineers are trained to provide you with superior support for all volume sizing configurations throughout the country. Our vast knowledge of state and local regulations allow us to quickly and efficiently size a system to maximize feasibility. Volume control and hydromodification regulations are expanding the need to decrease the cost and size of your biofiltration system. Bio Clean will help you realize these cost savings with the MWS Linear, the only biofilter than can be used downstream of storage BMPs.

ADVANTAGES

- LOWER COST THAN FLOW-BASED DESIGN
- MEETS LID REQUIREMENTS
- BUILT-IN ORIFICE CONTROL STRUCTURE
- WORKS WITH DEEP INSTALLATIONS

APPLICATIONS

The Modular Wetlands® System Linear has been successfully used on numerous new construction and retrofit projects. The system's superior versatility makes it beneficial for a wide range of stormwater and waste water applications - treating rooftops, streetscapes, parking lots, and industrial sites.



INDUSTRIAL

Many states enforce strict regulations for discharges from industrial sites. The MWS Linear has helped various sites meet difficult EPA-mandated effluent limits for dissolved metals and other pollutants.



RESIDENTIAL

Low to high density developments can benefit from the versatile design of the MWS Linear. The system can be used in both decentralized LID design and cost-effective end-of-the-line configurations.



STREETS

Street applications can be challenging due to limited space. The MWS Linear is very adaptable, and it offers the smallest footprint to work around the constraints of existing utilities on retrofit projects.



PARKING LOTS

Parking lots are designed to maximize space and the Modular Wetlands® 4 ft. standard planter width allows for easy integration into parking lot islands and other landscape medians.



COMMERCIAL

Compared to bioretention systems, the MWS Linear can treat far more area in less space, meeting treatment and volume control requirements.



MIXED USE

The MWS Linear can be installed as a raised planter to treat runoff from rooftops or patios, making it perfect for sustainable "live-work" spaces.

More applications include:

- Agriculture
- Reuse
- Low Impact Development
- Waste Water

PLANT SELECTION

Abundant plants, trees, and grasses bring value and an aesthetic benefit to any urban setting, but those in the Modular Wetlands® System Linear do even more - they increase pollutant removal. What's not seen, but very important, is that below grade, the stormwater runoff/flow is being subjected to nature's secret weapon: a dynamic physical, chemical, and biological process working to break down and remove non-point source pollutants. The flow rate is controlled in the MWS Linear, giving the plants more contact time so that pollutants are more successfully decomposed, volatilized, and incorporated into the biomass of the Modular Wetlands® micro/macro flora and fauna.



A wide range of plants are suitable for use in the Modular Wetlands®, but selections vary by location and climate. View suitable plants by visiting biocleanenvironmental.com/plants.

INSTALLATION



The Modular Wetlands® System Linear is simple, easy to install, and has a space-efficient design that offers lower excavation and installation costs compared to traditional tree-box type systems. The structure of the system resembles precast catch basin or utility vaults and is installed in a similar fashion.

The system is delivered fully assembled for quick installation. Generally, the structure can be unloaded and set in place in 15 minutes. Our experienced team of field technicians is available to supervise installations and provide technical support.

MAINTENANCE



Reduce your maintenance costs, man hours, and materials with the Modular Wetlands® System Linear. Unlike other biofiltration systems that provide no pretreatment, the MWS Linear is a self-contained treatment train which incorporates simple and effective pretreatment.

Maintenance requirements for the biofilter itself are almost completely eliminated, as the pretreatment chamber removes and isolates trash, sediments, and hydrocarbons. What's left is the simple maintenance of an easily accessible pretreatment chamber that can be cleaned by hand or with a standard vac truck. Only periodic replacement of low-cost media in the pre-filter boxes is required for long-term operation, and there is absolutely no need to replace expensive biofiltration media.



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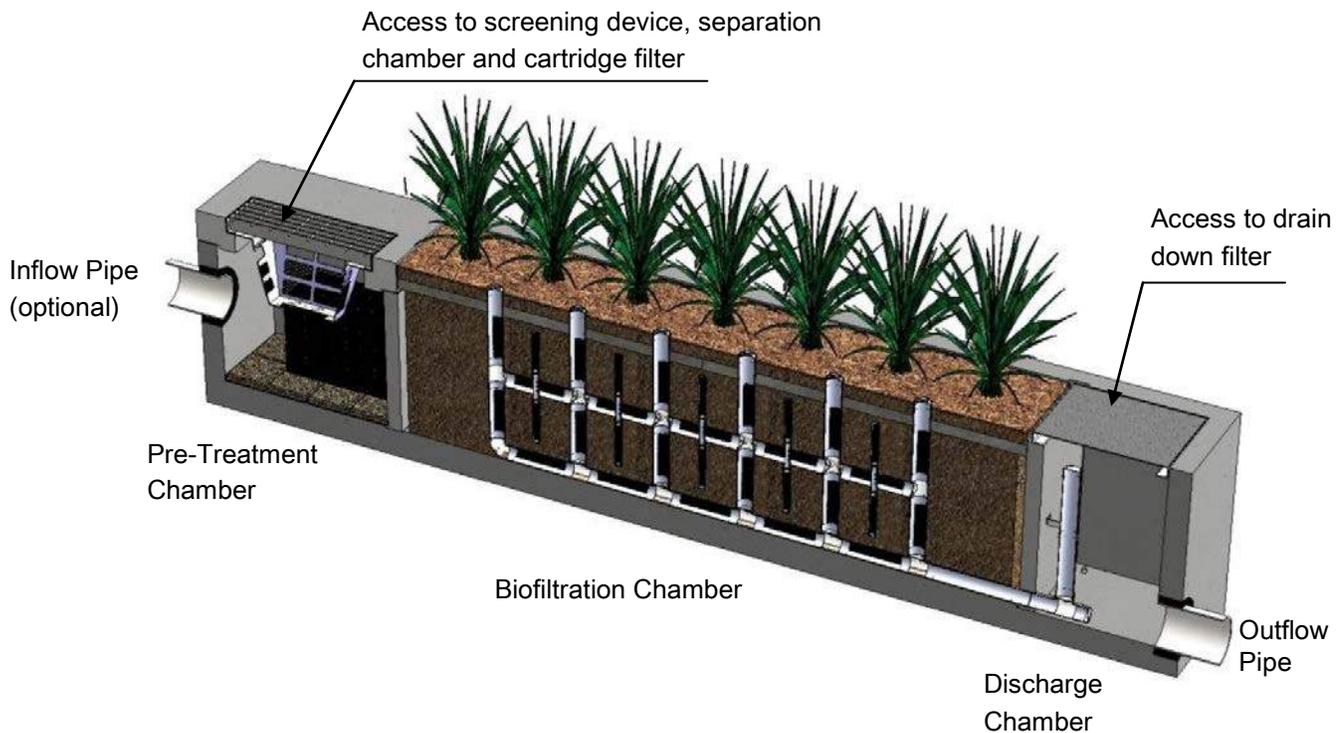
5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

Maintenance Guidelines for Modular Wetland System - Linear

Maintenance Summary

- Remove Trash from Screening Device – average maintenance interval is 6 to 12 months.
 - *(5 minute average service time).*
- Remove Sediment from Separation Chamber – average maintenance interval is 12 to 24 months.
 - *(10 minute average service time).*
- Replace Cartridge Filter Media – average maintenance interval 12 to 24 months.
 - *(10-15 minute per cartridge average service time).*
- Replace Drain Down Filter Media – average maintenance interval is 12 to 24 months.
 - *(5 minute average service time).*
- Trim Vegetation – average maintenance interval is 6 to 12 months.
 - *(Service time varies).*

System Diagram



Maintenance Procedures

Screening Device

1. Remove grate or manhole cover to gain access to the screening device in the Pre-Treatment Chamber. Vault type units do not have screening device. Maintenance can be performed without entry.
2. Remove all pollutants collected by the screening device. Removal can be done manually or with the use of a vacuum truck. The hose of the vacuum truck will not damage the screening device.
3. Screening device can easily be removed from the Pre-Treatment Chamber to gain access to separation chamber and media filters below. Replace grate or manhole cover when completed.

Separation Chamber

1. Perform maintenance procedures of screening device listed above before maintaining the separation chamber.
2. With a pressure washer spray down pollutants accumulated on walls and cartridge filters.
3. Vacuum out Separation Chamber and remove all accumulated pollutants. Replace screening device, grate or manhole cover when completed.

Cartridge Filters

1. Perform maintenance procedures on screening device and separation chamber before maintaining cartridge filters.
2. Enter separation chamber.
3. Unscrew the two bolts holding the lid on each cartridge filter and remove lid.
4. Remove each of 4 to 8 media cages holding the media in place.
5. Spray down the cartridge filter to remove any accumulated pollutants.
6. Vacuum out old media and accumulated pollutants.
7. Reinstall media cages and fill with new media from manufacturer or outside supplier. Manufacturer will provide specification of media and sources to purchase.
8. Replace the lid and tighten down bolts. Replace screening device, grate or manhole cover when completed.

Drain Down Filter

1. Remove hatch or manhole cover over discharge chamber and enter chamber.
2. Unlock and lift drain down filter housing and remove old media block. Replace with new media block. Lower drain down filter housing and lock into place.
3. Exit chamber and replace hatch or manhole cover.

Maintenance Notes

1. Following maintenance and/or inspection, it is recommended the maintenance operator prepare a maintenance/inspection record. The record should include any maintenance activities performed, amount and description of debris collected, and condition of the system and its various filter mechanisms.
2. The owner should keep maintenance/inspection record(s) for a minimum of five years from the date of maintenance. These records should be made available to the governing municipality for inspection upon request at any time.
3. Transport all debris, trash, organics and sediments to approved facility for disposal in accordance with local and state requirements.
4. Entry into chambers may require confined space training based on state and local regulations.
5. No fertilizer shall be used in the Biofiltration Chamber.
6. Irrigation should be provided as recommended by manufacturer and/or landscape architect. Amount of irrigation required is dependent on plant species. Some plants may require irrigation.

Maintenance Procedure Illustration

Screening Device

The screening device is located directly under the manhole or grate over the Pre-Treatment Chamber. It's mounted directly underneath for easy access and cleaning. Device can be cleaned by hand or with a vacuum truck.



Separation Chamber

The separation chamber is located directly beneath the screening device. It can be quickly cleaned using a vacuum truck or by hand. A pressure washer is useful to assist in the cleaning process.



Cartridge Filters

The cartridge filters are located in the Pre-Treatment chamber connected to the wall adjacent to the biofiltration chamber. The cartridges have removable tops to access the individual media filters. Once the cartridge is open media can be easily removed and replaced by hand or a vacuum truck.



Drain Down Filter

The drain down filter is located in the Discharge Chamber. The drain filter unlocks from the wall mount and hinges up. Remove filter block and replace with new block.



Trim Vegetation

Vegetation should be maintained in the same manner as surrounding vegetation and trimmed as needed. No fertilizer shall be used on the plants. Irrigation per the recommendation of the manufacturer and or landscape architect. Different types of vegetation requires different amounts of irrigation.



Inspection Form



Bio Clean

P. 855-566-3938

F. 760-433-3176

E. Info@BioCleanEnvironmental.com



A Forterra Company

Inspection Report Modular Wetlands System

Project Name _____

Project Address _____ (city) (Zip Code)

Owner / Management Company _____

Contact _____

Phone () -

Inspector Name _____

Date ____ / ____ / ____

Time _____ AM / PM

Type of Inspection Routine Follow Up Complaint

Storm

Storm Event in Last 72-hours? No Yes

Weather Condition _____

Additional Notes _____

For Office Use Only

(Reviewed By)

(Date)
Office personnel to complete section to the left.

Inspection Checklist

Modular Wetland System Type (Curb, Grate or UG Vault): _____ Size (22', 14' or etc.): _____

Structural Integrity:	Yes	No	Comments
Damage to pre-treatment access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Damage to discharge chamber access cover (manhole cover/grate) or cannot be opened using normal lifting pressure?			
Does the MWS unit show signs of structural deterioration (cracks in the wall, damage to frame)?			
Is the inlet/outlet pipe or drain down pipe damaged or otherwise not functioning properly?			
Working Condition:			
Is there evidence of illicit discharge or excessive oil, grease, or other automobile fluids entering and clogging the unit?			
Is there standing water in inappropriate areas after a dry period?			
Is the filter insert (if applicable) at capacity and/or is there an accumulation of debris/trash on the shelf system?			
Does the depth of sediment/trash/debris suggest a blockage of the inflow pipe, bypass or cartridge filter? If yes, specify which one in the comments section. Note depth of accumulation in in pre-treatment chamber.			Depth:
Does the cartridge filter media need replacement in pre-treatment chamber and/or discharge chamber?			Chamber:
Any signs of improper functioning in the discharge chamber? Note issues in comments section.			
Other Inspection Items:			
Is there an accumulation of sediment/trash/debris in the wetland media (if applicable)?			
Is it evident that the plants are alive and healthy (if applicable)? Please note Plant Information below.			
Is there a septic or foul odor coming from inside the system?			

Waste:	Yes	No
Sediment / Silt / Clay		
Trash / Bags / Bottles		
Green Waste / Leaves / Foliage		

Recommended Maintenance	
No Cleaning Needed	
Schedule Maintenance as Planned	
Needs Immediate Maintenance	

Plant Information	
Damage to Plants	
Plant Replacement	
Plant Trimming	

Additional Notes: _____

Maintenance Report



Bio Clean

P. 855-566-3938

F. 760-433-3176

E. Info@BioCleanEnvironmental.com



A Forterra Company

Cleaning and Maintenance Report Modular Wetlands System

Project Name _____

Project Address _____
(city) (Zip Code)

Owner / Management Company _____

Contact _____ Phone () -

Inspector Name _____ Date ____ / ____ / ____ Time _____ AM / PM

Type of Inspection Routine Follow Up Complaint Storm Storm Event in Last 72-hours? No Yes

Weather Condition _____ Additional Notes _____

For Office Use Only

(Reviewed By) _____

(Date) _____
 Office personnel to complete section to the left.

Site Map #	GPS Coordinates of Insert	Manufacturer / Description / Sizing	Trash Accumulation	Foliage Accumulation	Sediment Accumulation	Total Debris Accumulation	Condition of Media 25/50/75/100 (will be changed @ 75%)	Operational Per Manufactures' Specifications (If not, why?)
	Lat: Long:	MWS Catch Basins						
		MWS Sedimentation Basin						
		Media Filter Condition						
		Plant Condition						
		Drain Down Media Condition						
		Discharge Chamber Condition						
		Drain Down Pipe Condition						
		Inlet and Outlet Pipe Condition						

Comments:

CMP Detention and Infiltration Installation Guide



CMP Detention and Infiltration Installation Guide

Proper installation of a flexible underground detention system will ensure long-term performance. The configuration of these systems often requires special construction practices that differ from conventional flexible pipe construction. Contech recommends scheduling a preconstruction meeting with your local Contech Representative to determine if additional measures, not covered in this guide, are appropriate for your site.

Preconstruction Meeting

It is a best practice to have a pre-construction meeting with the installation contractor and Contech personnel. Included at the end of this guide is a preconstruction checklist to review prior to installation.

Proper Pipe Unloading, Handling and Placement

The pipe should be unloaded off the flatbed trailer with a fork lift, excavator, crane or other piece of construction equipment. The pipe should never be dropped or rolled off the flatbed trailer. Nylon slings or lifting lugs should be used to lift the pipe into place.

Normally the header row pipe section is placed on the downstream end. For detention systems with a single header row on one end and pipe with bulkheads on the other end; it is a best practice to start pipe placement on the header row end.



Lifting CMP off the flatbed with a front end loader and forks.



Lifting ALT2 CMP with nylon slings.



Lowering the header pipe section into place first.



Lifting polymer-coated CMP into place with nylon slings.

Foundation and Pipe Bedding

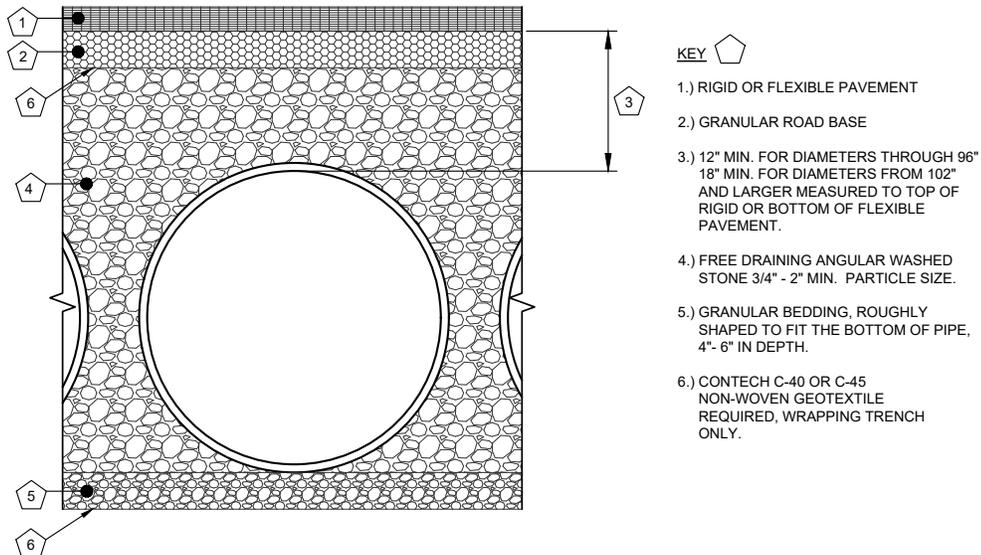
Construct a foundation that can support the design loading applied by the pipe and adjacent backfill weight as well as maintain its integrity during construction. If soft or unsuitable soils are encountered, remove the poor soils to a suitable depth and then replace with a competent granular material to the appropriate elevation. The granular material gradation should not allow the migration of fines, which can cause settlement of the detention system or pavement above. If the structural fill material is not compatible with the underlying soils a geotextile fabric should be used as a separator.

Grade the foundation subgrade to a uniform or slightly sloping grade. If the subgrade is clay or relatively non-porous and the construction sequence will last for an extended period of time, it is best to slope the grade to one end of the system. This will allow excess water to drain quickly, preventing saturation of the subgrade.

A 4" – 6" thick, well-graded granular material is preferred pipe bedding. If the existing foundation is made up of a course sand or other suitable granular material, imported bedding material will not be required.



Site conditions may require 4" – 6" of imported granular material as pipe bedding.



Connecting Bands

There are various types of connecting bands for connecting CMP. Hugger and corrugated bands are the most common. Flat gaskets or O-ring gaskets can also be used in conjunction with connecting bands to reduce leakage in the joints.



Installing a Hugger band on a perforated pipe.



Tightening bolts on a corrugated band.



Installation of band with flat neoprene gasket.



Some jobs may require special bands, such as rod and lug connection, flat bands, or dimple bands.

Geomembrane Barrier

If the underground detention system is installed under a future parking lot or roadway where winter de-icing salts are used, an HDPE liner barrier is recommended to be installed over the pipe. The liner should extend beyond the 9 and 3 o'clock positions (crown) of the pipe. The HDPE liner is intended to help protect the pipe system from the potential adverse effects of de-icing salts, including premature corrosion.

The project engineer of record is to evaluate whether de-icing salts will be used at the site in the future.



An HDPE liner is rolled out over the crown of the pipe prior to backfilling around the pipe.



For large diameter pipes, the liner is shipped in rolls that are folded in half. The liner is rolled out over the crown of the pipe, unfolded, and covered over the pipe from the nine and three o'clock position.

In-Situ Trench Wall

If excavation is required, the trench wall needs to be capable of supporting the load that the pipe sheds as the system is loaded. If soils are not capable of supporting these loads, the pipe can deflect. Perform a simple soil pressure check using the applied loads to determine the limits of excavation beyond the spring line of the outer most pipes.

In most cases, the requirements for a safe work environment and proper backfill placement and compaction take care of the concern. The contractor is responsible for the safety of his/her employees and agents.

Safe practices on construction work as outlined in the latest edition of the "Manual of Accident Prevention in Construction," published by the Associated General Contractors, shall be used as a guide and observed. The contractor shall comply with all applicable city, state, and federal safety codes in effect in the area where work is being performed. This conformance shall include the provisions of the current issue of the "OSHA Safety and Health Standards (29 CFR 1926/1910)" as published by the U.S. Department of Labor.

Backfill Material

Corrugated Steel Pipe is a flexible pipe. All buried flexible pipes are dependent on a quality backfill material for structural support. AASHTO refers to these pipe systems as, "Soil-Corrugated Metal Structure Interaction Systems". The best backfill material is an angular, well-graded, granular fill meeting the requirements of AASHTO A-1, A-2, or A-3. Aggregate materials that are free draining and compact easily such as crushed aggregate, crushed aggregate with fines, gravely sand, and coarse sand make good backfill. The aggregate particle size shall not exceed 3" in diameter.

For solid pipe, well graded or open graded granular material can be used as backfill. Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded stone, with a particle size of 1/2" – 2 1/2" diameter is recommended for backfill around perforated pipe.

Backfill using controlled low-strength material (CLSM, "flash fill", or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.

EXAMPLES OF ACCEPTABLE BACKFILL MATERIAL



Coarse Sand



Crushed Limestone



Crushed Granite



Crushed River Gravel

Backfill Placement

The backfill shall be placed in 8" +/- loose lifts and compacted to 90% AASHTO T99 standard proctor density. Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, vibratory packer, or other effective methods. If AASHTO T99 procedures are determined infeasible by the geotechnical engineer of record, compaction is considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the geotechnical engineer of record (or representative thereof) is satisfied with the level of compaction.

For large systems, conveyor systems, backhoes with long reaches may be used to place backfill. Once minimum cover for the construction loading across the entire width of the system is reached, advance the equipment to the end of the recently placed fill, and begin the sequence again until the system is completely backfilled. This type of construction sequence provides room for stockpiled backfill directly behind the backhoe, as well as the movement of construction traffic.

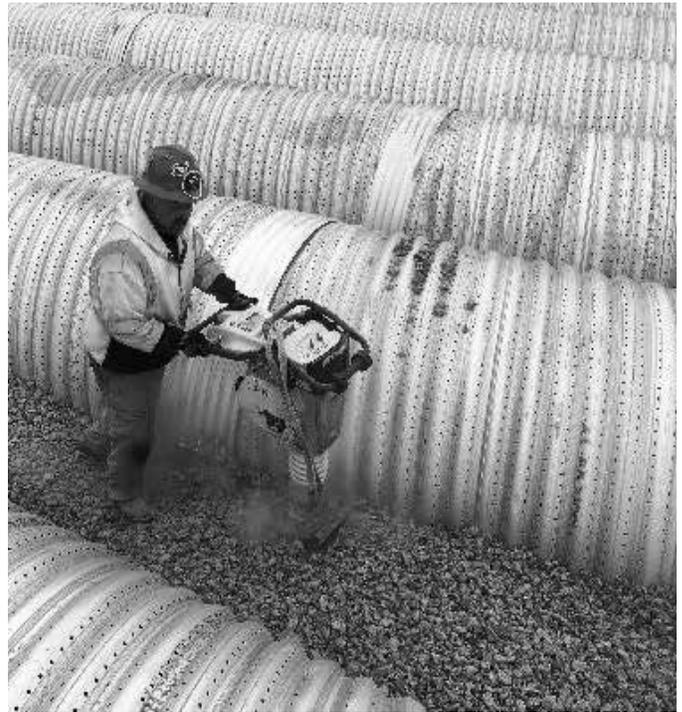
It is important to keep the elevation of backfill between pipes evenly. As a rule of thumb, do not allow for backfill to exceed the elevation of one side of pipe to the other by more than 24".

Material stockpiles on top of the backfilled detention system should be limited to 9' +/- high and must provide balanced loading across all barrels. To determine the proper minimum cover over the pipes to allow the movement of construction equipment, contact your local CONTECH Sales Engineer.

If CLSM or "flowable fill" is used as backfill, pipe flotation needs to be prevented. Typically, small lifts are placed between the pipes and then allowed to set-up prior to the placement of the next lift. The allowable thickness of the CLSM lift is a function of a proper balance between the uplift force of the CLSM, the opposing weight of the pipe, and the effect of other restraining measures. Your local Sales Engineer can help determine an appropriate lift thickness.



Placing backfill with a conveyor.



Compaction with vibratory equipment.

Final Cover Placement and Construction Loading

The minimum cover specified for a project normally assumes H-20 highway live loading. Backfill must be placed and fully compacted to the minimum cover level over the structure before the pipe is subjected to design loads. The minimum cover for AASHTO H-20 Live Loading per design section 12, is span of the pipe divided by eight plus asphalt pavement.

Construction loads often exceed design highway loading. During construction, keep heavy construction equipment that exceeds legal highway loads off the pipe. Light construction equipment on tracks such as a D-3 dozer (or lighter weight) may cross over the pipe when a minimum of 12" of compacted backfill is over pipe. When construction equipment that exceeds legal highway loads must cross over pipe, an additional thickness of compacted fill, beyond that required for planned cover is required. Since construction equipment varies from job to job, it is best to address equipment specific minimum cover requirements with your local CONTECH Sales Engineer during your pre-construction meeting.

Minimum Height of Cover Requirements for Tracked Loading (feet) HEL-COR® Corrugated Steel Pipe ¹					
Diameter (inches)	Track Pressure at Surface (psi)				
	10	15	22	30	40
12-72	1.00	1.50	2.00	2.50	3.00
78-120	1.00	1.75	2.25	2.75	3.25
126-144	1.00	2.00	2.50	3.00	3.50

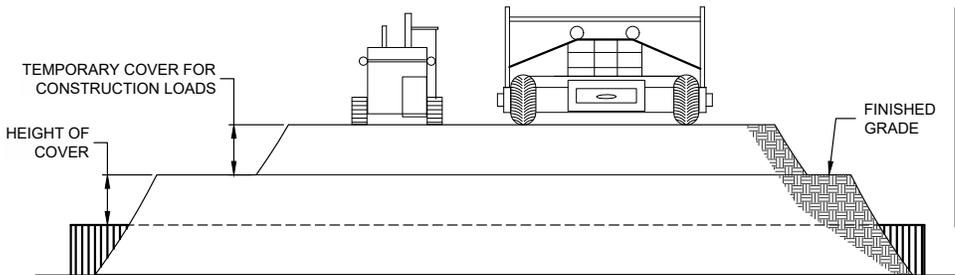
¹ Minimum cover may vary depending on local conditions. The contractor must provide additional cover required to avoid damage to the pipe. Minimum cover is measured from the top of the pipe to the top of the maintained construction roadway surface.



Examples of light, tracked, construction equipment used to place final cover over the pipe system.



Examples of heavy construction equipment that may require additional minimal cover. Contech can help evaluate minimum cover for the installation contractor for all the equipment on the site.



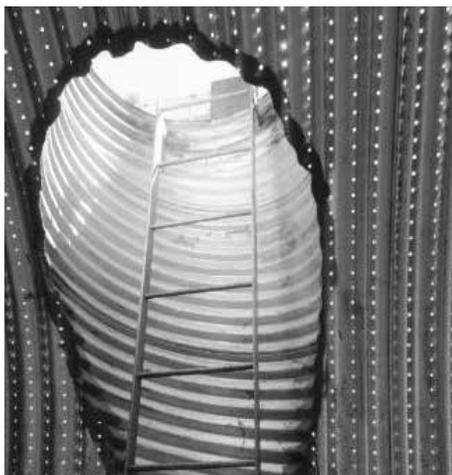
PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

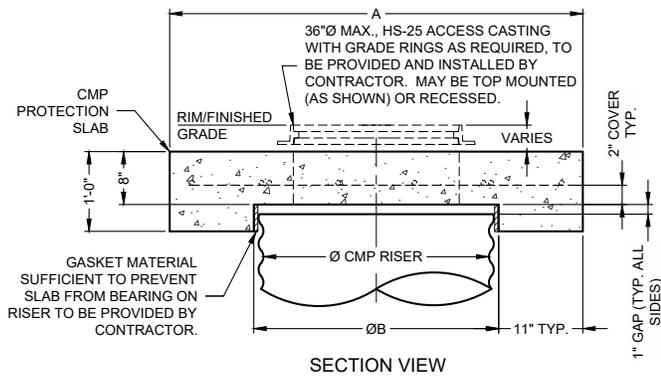
CONSTRUCTION LOADS

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

CMP Manhole Risers

CMP manhole risers allow easy access for future maintenance of the system. If the system is installed under a parking lot or road way subject to live loads, care must be taken to ensure loads are not applied directly to the riser structure. A pre-cast or cast-in-place slab should be installed above the riser. The manhole lid and frame should not rest directly on the CMP riser.





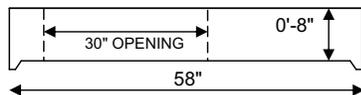
Reinforcing Table				
Ø CMP Riser	A	ØB	Reinforcing	Bearing Pressure** (psf)
24	4' Ø	26"	#5 @ 10" OCEW	2,540
	4' x 4'		#5 @ 10" OCEW	1,900
30"	4'-6" Ø	32"	#5 @ 10" OCEW	2,260
	4'-6" x 4'-6"		#5 @ 9" OCEW	1,670
36"	5' Ø	38"	#5 @ 9" OCEW	2,060
	5' x 5'		#5 @ 8" OCEW	1,500
42"	5'-6" Ø	44"	#5 @ 8" OCEW	1,490
	5'-6" x 5'-6"		#5 @ 8" OCEW	1,370
48"	6' Ø	50"	#5 @ 7" OCEW	1,210
	6' x 6'		#5 @ 7" OCEW	1,270

** Assumed soil bearing capacity.

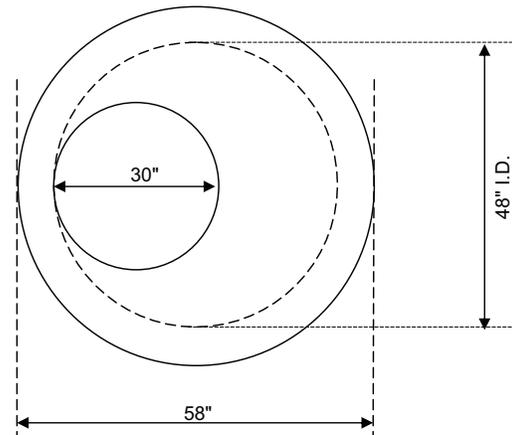
Precast Option for Manhole Riser Caps



SECTION



PLAN VIEW



NOTES:

- A.) 4000 P.S.I. CONCRETE
- B.) GRADE 60 REINFORCING PER ASTM A-615
- C.) BUTYL SEALANT IN JOINTS

Additional Considerations

Because most systems are constructed below-grade, rainfall can rapidly fill the excavation; potentially causing floatation and movement of the previously placed pipes. To help mitigate potential problems, it is best to start the installation at the downstream end with the outlet already constructed to allow a route for the water to escape. Temporary diversion measures may be required for high flows due to the restricted nature of the outlet pipe.



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Support

Drawings and specifications are available at www.ContechES.com/cmp-detention

CMP Detention Install Guide 9/19

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Contech® CMP Detention Inspection and Maintenance Guide

Underground stormwater detention and infiltration systems must be inspected and maintained at regular intervals for purposes of performance and longevity.

Inspection

Inspection is the key to effective maintenance of CMP detention systems and is easily performed. Contech recommends ongoing, annual inspections. Sites with high trash load or small outlet control orifices may need more frequent inspections. The rate at which the system collects pollutants will depend more on-site specific activities rather than the size or configuration of the system.

Inspections should be performed more often in equipment washdown areas, in climates where sanding and/or salting operations take place, and in other various instances in which one would expect higher accumulations of sediment or abrasive/corrosive conditions. A record of each inspection is to be maintained for the life of the system.

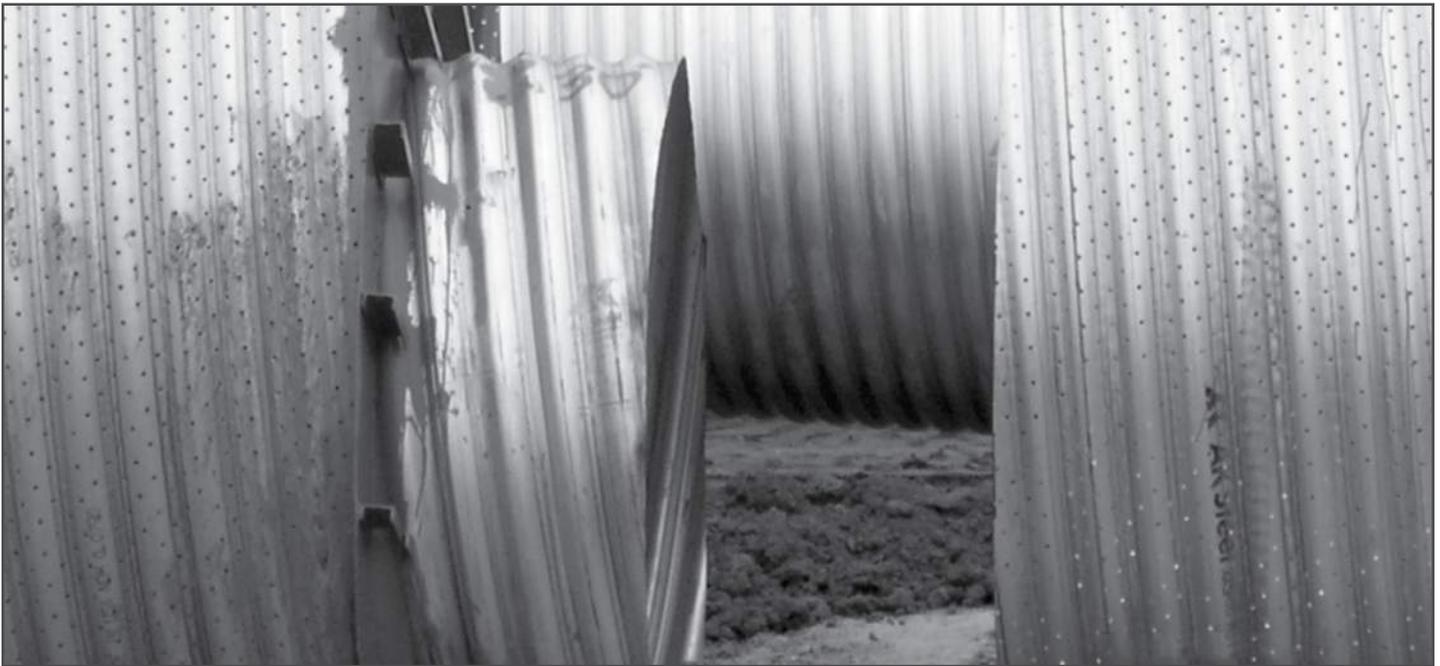
Maintenance

CMP detention systems should be cleaned when an inspection reveals accumulated sediment or trash is clogging the discharge orifice. Accumulated sediment and trash can typically be evacuated through the manhole over the outlet orifice. If maintenance is not performed as recommended, sediment and trash may accumulate in front of the outlet orifice. Manhole covers should be securely seated following cleaning activities. Contech suggests that all systems be designed with an access/inspection manhole situated at or near the inlet and the outlet orifice. Should it be necessary to get inside the system to perform maintenance activities, all appropriate precautions regarding confined space entry and OSHA regulations should be followed.

Annual inspections are best practice for all underground systems. During this inspection if evidence of salting/de-icing agents is observed within the system, it is best practice for the system to be rinsed, including above the spring line soon after the spring thaw as part of the maintenance program for the system.

Maintaining an underground detention or infiltration system is easiest when there is no flow entering the system. For this reason, it is a good idea to schedule the cleanout during dry weather.

The foregoing inspection and maintenance efforts help ensure underground pipe systems used for stormwater storage continue to function as intended by identifying recommended regular inspection and maintenance practices. Inspection and maintenance related to the structural integrity of the pipe or the soundness of pipe joint connections is beyond the scope of this guide.



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