
APPENDIX G

PRELIMINARY WATER QUALITY MANAGEMENT PLAN

Preliminary Water Quality Management Plan

For:

The Commons at California
913 California St. Redlands
Tentative Parcel Map 20854
M24-0054

Prepared for:

JD Fuel LLC

1031 Rosecrans Ave, Suite 207
Fullerton, CA. 92833
(909) 562-6388

Prepared by:



Submittal Date: 5/20/2025

Revision Date: _____

Approval Date: _____

Project Owner's Certification

This Preliminary Water Quality Management Plan (PWQMP) has been prepared for JD Fuel LLC by SP2 & Co. The WQMP is intended to comply with the requirements of the San Bernardino County and the NPDES Areawide Stormwater Program requiring the preparation of a PWQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this PWQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

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

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	TPM 20854	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			0292-034-17-0-000
Owner's Signature			
Owner Name: Chandresh Ravaliya, JD Fuel LLC			
Title	Owner		
Company	JD Fuel LLC		
Address	1031 Rosecrans Ave, Suite 207 Fullerton, CA 92833		
Email	cravaliya@gmail.com		
Telephone #	(909) 562-6388		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):		Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			0292-034-17-0-000

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

Engineer: Jimmy C. Chen		PE Stamp Below 
Title	Principal Engineer	
Company	SP2 & Co.	
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Signature		
Date	5/20/2025	

Table of Contents

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

Forms

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

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

Attachment 1: Geotechnical Investigation and Percolation Testing for SUSMP Proposed Commercial Development Project by AES dated 11/30/2023

Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name		The Commons at California			
Project Owner Contact Name:		John Heimann			
Mailing Address:	1031 Rosecrans Avenue, Suite 207 Fullerton, CA 92833	E-mail Address:	cravaliya@gmail.com, heimanndevgrp@outlook.com	Telephone:	(909) 562-6388 (909) 260-2100
Permit/Application Number(s):		Tract/Parcel Map Number(s):		TPM 20854	
Additional Information/ Comments:					
Description of Project:		<p>Tentative Parcel Map 20854 (The Project) proposes the development of approximately 5.08 acres of vacant land located northwest of Redlands Blvd. and California St. in the City of Redlands, San Bernardino County into three (3) commercial parcels. The Project proposes a four-story hotel, a drive-thru carwash, a drive-thru coffee shop and dedicated parking for each. The project fronts a railroad right of way to the north, a drainage channel to the south, and commercial/retail to the east.</p> <p>The existing topography for the property gently slopes from the northeast to the southwest towards the drainage channel at approximately 0.5 to 2% over natural cover.</p> <p>The Project proposes an infiltration basin that will provide stormwater treatment and detention capacity for peak developed runoff mitigation. Where feasible, open space landscaped areas shall be used as BMP infiltration trenches for their respective tributaries. The increased runoff from the Project will be detained on site and released via a calibrated basin outlet structure (see outlet detail on the PWQMP Site Plan) connected to the adjacent drainage channel with the required DCV being retained and infiltration onsite.</p>			
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.					

Section 2 Project Description

2.1 Project Information

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

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

Form 2.1-1 Description of Proposed Project					
1 Development Category (Select all that apply):					
<input type="checkbox"/> Significant re-development involving the addition or replacement of 5,000 ft ² or more of impervious surface on an already developed site	<input checked="" type="checkbox"/> New development involving the creation of 10,000 ft ² or more of impervious surface collectively over entire site	<input type="checkbox"/> Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	<input checked="" type="checkbox"/> Restaurants (with SIC code 5812) where the land area of development is 5,000 ft ² or more		
<input type="checkbox"/> Hillside developments of 5,000 ft ² or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	<input type="checkbox"/> Developments of 2,500 ft ² of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	<input checked="" type="checkbox"/> Parking lots of 5,000 ft ² or more exposed to storm water	<input type="checkbox"/> Retail gasoline outlets that are either 5,000 ft ² or more, or have a projected average daily traffic of 100 or more vehicles per day		
<input type="checkbox"/> Non-Priority / Non-Category Project <i>May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements.</i>					
2 Project Area (ft ²):	215,657	3 Number of Dwelling Units:	0	4 SIC Code:	1542, 5812, 7011
5 Is Project going to be phased? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.</i>					
6 Does Project include roads? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)</i>					

2.2 Property Ownership/Management

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

Form 2.2-1 Property Ownership/Management

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

The maintenance responsibility for the drainage facilities shall fall under the current property owner until the Property Owner's Association (POA) has been established. No infrastructure improvements will be transferred to the public for ownership or maintenance.

2.3 Potential Stormwater Pollutants

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

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	
Pathogens (Bacterial / Virus)	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Santa Ana River Reach 4 is impaired by indicator bacteria. Santa Ana River Reach 3 is impaired by indicator bacteria. <u>Origin:</u> Waste storage area and pavement runoff. Decomposition of organic waste. <u>Mitigation:</u> Regular street/parking sweeping and maintaining trash enclosures. Removal of organic waste from
Nutrients - Phosphorous	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by phosphorus. <u>Origin:</u> Landscaping fertilizer and pesticide use. <u>Mitigation:</u> Restrict use of fertilizer and pesticides onsite.
Nutrients - Nitrogen	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by nitrogen. <u>Origin:</u> Landscaping fertilizer. <u>Mitigation:</u> Restrict use of fertilizer.
Noxious Aquatic Plants	E <input type="checkbox"/>	N <input checked="" type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by noxious aquatic plants. <u>Origin:</u> Aquatic plants <u>not</u> native to the local ecology. <u>Mitigation:</u> Project does not propose aquatic plants onsite as part of the landscaping plan and design.
Sediment	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by sediment. <u>Origin:</u> Unprotected slopes and non-landscaped areas. <u>Mitigation:</u> Dampen unprotected slopes during grading operations. Minimize bare soil slopes with landscaping plan. Regularly perform street and parking lot sweeping. Stormwater inlets to be cleaned out periodically before wet season.
Metals	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Santa Ana River Reach 3 is impaired by metals (copper & Lead). <u>Origin:</u> Runoff from parking lots and waste storage areas. <u>Mitigation:</u> Regularly sweep streets and parking lots. Restrict vehicle maintenance activities onsite.
Oil and Grease	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by oil and grease. <u>Origin:</u> Runoff from parking lots and paved areas. Vehicle washing. <u>Mitigation:</u> Perform regular street and parking sweeping. Vehicle washing to be performed in designated areas with inlets not connected to the stormwater system.
Trash/Debris	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by trash & debris. <u>Origin:</u> Waste storage areas and parking lots. Vehicle washing. <u>Mitigation:</u> Regularly perform street and parking sweeping. Clear property of trash and debris regularly.
Pesticides / Herbicides	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by pesticides or herbicides. <u>Origin:</u> Pesticide and/or herbicide use for weed abatement. <u>Mitigation:</u> Restrict use of pesticides and herbicides onsite.
Organic Compounds	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	Downstream receiving waters <u>not</u> impaired by organic compounds. <u>Origin:</u> Runoff from waste storage areas and landscape areas. <u>Mitigation:</u> Trash enclosures to be cleared and maintained regularly. Landscaping waste to be properly removed and disposed of.

Preliminary Water Quality Management Plan (PWQMP)

Other: pH	E <input checked="" type="checkbox"/>	N <input type="checkbox"/>	<p>Prado Dam is impaired by pH. <u>Origin:</u> Runoff from waste storage areas, landscaped areas, parking lots and street. Use of herbicides and/pesticides. Vehicle washing. <u>Mitigation:</u> Use of herbicides, pesticides, and fertilizer to be restricted. Runoff from car washing designated areas to be disconnected from the stormwater treatment system. Street and parking sweeping to be conducted regularly.</p>
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	

2.4 Water Quality Credits

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

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

Section 3 Site and Watershed Description

Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Form 3-1 Site Location and Hydrologic Features			
Site coordinates <i>take GPS measurement at approximate center of site</i>	Latitude: 34°04'54" N	Longitude: 117°13'37" W	Thomas Bros Map page 607
¹ San Bernardino County climatic region: <input checked="" type="checkbox"/> Valley <input type="checkbox"/> Mountain			
² Does the site have more than one drainage area (DA): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached</i>			
<pre> graph LR A[DA1 DMA A] --> B[Outlet 1] </pre>			
Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA.		
DA1 DMA A to DA1	DMA A drains to a 5-ft. deep, 7,471 ft ² infiltration basin "A" via the proposed onsite drainage inlets and storm drain pipes. Peak runoff from DMA A is detained within Basin "A".		
DA1 to Outlet 1	Emergency overflow and mitigated peak runoff from the project discharges from Basin "A", via a calibrated outlet structure, into the adjacent drainage channel (Mission Channel).		

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA A	DMA B	DMA C	DMA D
1 DMA drainage area (ft ²)	215,657			
2 Existing site impervious area (ft ²)	0			
3 Antecedent moisture condition <i>For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf</i>	2			
4 Hydrologic soil group. <i>Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/</i>	B			
5 Longest flowpath length (ft)	1,002			
6 Longest flowpath slope (ft/ft)	0.0150			
7 Current land cover type(s). <i>Select from Fig C-3 of Hydrology Manual</i>	Fallow			
8 Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>	Poor			

Tentative Parcel Map 20854

Site Photos



Figure 1. Taken from northwest corner of adjacent gas station looking west along northern property line.



Figure 2. Taken from northwest corner of adjacent gas station looking southwest.



Figure 3. Taken from northwest corner of adjacent gas station looking south.



Figure 4. Taken from northwest corner of property looking southeast.



Figure 5. Taken from northwest corner of property looking east northern property line.



Figure 6. Taken from southeast corner of property looking northwest.



Figure 7. Taken from southeast corner of property looking north along California St.



Figure 8. Taken from southeast corner of adjacent gas station looking west.



Figure 9. Taken from southeast corner of adjacent gas station looking southwest.



Figure 10. Taken from southeast corner of adjacent gas station looking south along California St.

Form 3-3 Watershed Description for Drainage Area 1	
<p>Receiving waters <i>Refer to Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/</i> <i>See "Drainage Facilities" link at this website</i></p>	<p>Mission Channel</p> <p>Santa Ana River Reach 4</p> <p>Santa Ana River Reach 3</p> <p>Prado Dam</p> <p>Santa Ana River thru Orange County</p> <p>Pacific Ocean</p>
<p>Applicable TMDLs <i>Refer to Local Implementation Plan</i></p>	<p>Pathogens, Metals (Lead & Copper), & pH</p>
<p>303(d) listed impairments <i>Refer to Local Implementation Plan and Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/ and State Water Resources Control Board website - http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml</i></p>	<p>Santa Ana Reach 3: Pathogens, Metals (Lead & Copper)</p> <p>Santa Ana Reach 4: Pathogens</p> <p>Prado Dam: pH</p>
<p>Environmentally Sensitive Areas (ESA) <i>Refer to Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/</i></p>	<p>Not Applicable</p>
<p>Unlined Downstream Water Bodies <i>Refer to Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/</i></p>	<p>Mission Channel</p> <p>Santa Ana River</p>
<p>Hydrologic Conditions of Concern</p>	<p><input type="checkbox"/> Yes <i>Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal.</i></p> <p><input checked="" type="checkbox"/> No</p>
<p>Watershed-based BMP included in a RWQCB approved WAP</p>	<p><input type="checkbox"/> Yes <i>Attach verification of regional BMP evaluation criteria in WAP</i></p> <ul style="list-style-type: none"> • <i>More Effective than On-site LID</i> • <i>Remaining Capacity for Project DCV</i> • <i>Upstream of any Water of the US</i> • <i>Operational at Project Completion</i> • <i>Long-Term Maintenance Plan</i> <p><input checked="" type="checkbox"/> No</p>

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

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

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

Form 4.1-1 Non-Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants, and Occupants on Stormwater BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Provide Literature including, but not limited to, the materials attached in <i>Section 6.4.6</i> of this report to Property Owner(s) upon purchase of unit. Additional Resources can be found at County of San Bernardino NPDES Website. http://www.sbcounty.gov/dpw/land/npdes.asp
N2	Activity Restrictions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pesticide Controls: Pesticides and Herbicides shall be applied in accordance with the California Department of Pesticides requirements. Must be done by a state certified applicator.
N3	Landscape Management BMPs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Landscape management including, but not limited to, mowing of lawns, pruning of vegetation, removal of invasive plant species, shall be provided into perpetuity as the responsibility of the Owner/POA.
N4	BMP Maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	BMP Maintenance shall be performed in accordance with Section 5 of this report, the Operations & Maintenance Plan in the Appendix of this report, or the currently accepted Maintenance Procedures at the time of maintenance.
N5	Title 22 CCR Compliance (How development will comply)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project will not produce, nor transport hazardous waste.
N6	Local Water Quality Ordinances	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not consist of fuel dispensing areas or other areas of concern to public properties.
N7	Spill Contingency Plan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hazardous materials will not be stockpiled on-site.
N8	Underground Storage Tank Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project will not have underground storage tanks.
N9	Hazardous Materials Disclosure Compliance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hazardous materials will not be stored on-site.

Form 4.1-1 Non-Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hazardous Materials will not be stored or used onsite. Article 80 does not apply.
N11	Litter/Debris Control Program	<input type="checkbox"/>	<input checked="" type="checkbox"/>	It shall be the Owner's/POS's responsibility to provide proper litter control per CASQA BMP SC 60. Litter controls shall be provided during regularly scheduled landscape maintenance, or as needed to prevent transportation of trash & debris from the site.
N12	Employee Training	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Owner/POA to prepare and provide applicable educational materials and training to future employees of the businesses regarding the care and maintenance of the applicable BMP facilities, storage and use of fertilizers and pesticides.
N13	Housekeeping of Loading Docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not propose loading docks.
N14	Catch Basin Inspection Program	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Owner/POA responsible for the maintenance and inspection of the catch basin and drainage facilities on an annual basis and after every storm event.
N15	Vacuum Sweeping of Private Streets and Parking Lots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Owner/POA is responsible for keeping the parking and drive isles clean and clear of the accumulation of debris by performing sweeping/vacuuming at regular intervals and prior to the start of the rainy season (late summer to early fall).
N16	Other Non-structural Measures for Public Agency Projects	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not a public agency project.
N17	Comply with all other applicable NPDES permits	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Projects disturbing greater than one (1) acre are required to implement a Storm Water Pollution Prevention Plan during construction to control stormwater and non-stormwater discharges from the site, in conjunction with providing erosion control to prevent sediment from leaving the site.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> - Provide stencilling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language (such as: "No Dumping Flows to Creek") and/or graphical icons to discourage illegal dumping. - Post signs and prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area. - Maintain legibility of stencils and signs.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>Hazardous materials with the potential to contaminate urban runoff shall either be:</p> <ul style="list-style-type: none"> (a) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the MS4; or (b) protected by secondary containment structures (not double wall containers) such as berms, dikes, or curbs. <ul style="list-style-type: none"> - The storage area shall be paved and sufficiently impervious to contain leaks and spills. - The storage area shall have a roof or awning to minimize direct precipitation and exposure, and collection of stormwater within the secondary containment area. - Any stormwater retained within the containment structure must not be discharged to the street or storm drain system. - Location(s) of installations of where these preventative measures will be employed must be included on the map or plans identifying BMPs.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>All trash container areas shall meet the following requirements (limited exclusion: detached residential homes):</p> <ul style="list-style-type: none"> - Paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and

Preliminary Water Quality Management Plan (PWQMP)

				<p>pavements diverted around the area, screened or walled to prevent off-site transport of trash; and</p> <p>Provide solid roof or awning to prevent exposure to direct precipitation.</p> <p>Connection of trash area drains to the MS4 is prohibited.</p>
S4	<p>Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>In general, the following methods to reduce excessive irrigation runoff shall be considered, and incorporated for all landscaped areas:</p> <ul style="list-style-type: none"> - Employing rain shutoff devices to prevent irrigation after precipitation. - Designing irrigation systems to each landscape area's specific water requirements. - Using flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines. - The timing and application methods of irrigation water shall be designed to minimize the runoff of excess irrigation water into the municipal storm drain system. - Employing other comparable, equally effective, methods to reduce irrigation water runoff. - Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider other design features, such as: <ul style="list-style-type: none"> - Use mulches (such as wood chips or shredded wood products) in planter areas without ground cover to minimize sediment in runoff. - Install appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant material where possible and/or as recommended by the landscape architect. - Leave a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible. - Choose plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth.

Preliminary Water Quality Management Plan (PWQMP)

S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	<input type="checkbox"/>	<input checked="" type="checkbox"/>	All landscape pockets, fingers, setback areas, parkway strips, street medians, etc., shall be finish-graded at a minimum of 1-2 inches below top of curb or sidewalk for increased retention/infiltration of stormwater and irrigation water.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Project plans should include Source Control BMPs to decrease the potential for erosion of slopes and/or channels. The following design principles should be considered and incorporated and implemented where determined applicable and feasible by the local jurisdiction:</p> <ul style="list-style-type: none"> - Convey runoff safely from the tops of slopes. - Avoid disturbing steep or unstable slopes. - Avoid disturbing natural channels. - Install permanent stabilization BMPs on disturbed slopes as quickly as possible. - Vegetate slopes with native or drought tolerant vegetation. - Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems. - Install permanent stabilization BMPs in channel crossings as quickly as possible and ensure that increases in runoff velocity and frequency caused by the project do not erode the channel. - Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters should be installed in such a way as to minimize impacts to receiving waters. - On-site conveyance channels should be lined, where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. Irrigation demand of vegetated systems should be considered. If velocities in the channel are large enough to erode grass or other vegetative linings, rock, riprap, concrete soil cement or geo-grid stabilization may be substituted or used in combination with grass or other vegetation stabilization. - Other design principles which are comparable and equally effective.

Preliminary Water Quality Management Plan (PWQMP)

				<p>- These practices should be implemented, as feasible, consistent with local codes and ordinances. Projects involving an alteration to bed, bank, or channel of a Water of the US may require approval of additional regulatory agencies with jurisdiction over water bodies, (e.g., the U.S. Army Corps of Engineers, the California Regional Water Quality Control Boards and the California Department of Fish and Game).</p>
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>Loading /unloading dock areas shall include the following:</p> <ul style="list-style-type: none"> - Cover loading dock areas, or design drainage to preclude run-on and runoff, unless the material loaded and unloaded at the docks does not have potential to contribute to stormwater pollution, and this use is ensured for the life of the facility. - Direct connections to the municipal storm drain system from below grade loading docks (truck wells) or similar structures are prohibited. Stormwater can be discharged through a permitted connection to the storm drain system with a treatment control BMP applicable to the use. - Other comparable and equally effective features that prevent unpermitted discharges to the MS4. - Housekeeping of loading docks shall be consistent with Housekeeping of Loading Dock Areas (SD-31).
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>Maintenance bays shall include the following:</p> <ul style="list-style-type: none"> - Repair/maintenance bays shall be indoors; or, designed to preclude urban run-on and runoff. - Design a repair/maintenance bay drainage system to capture all wash water, leaks and spills. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around repair bays to prevent spilled materials and wash-down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the MS4 is prohibited. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only if allowed by the local sewerage agency through permitted connection. - Other features which are comparable and equally effective that prevent discharges to the MS4 without appropriate permits.

Preliminary Water Quality Management Plan (PWQMP)

<p>S9</p>	<p>Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)</p>	<p><input checked="" type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p>Projects that include areas for washing /steam cleaning of vehicles shall use the following:</p> <ul style="list-style-type: none"> - Self-contained or covered with a roof or overhang. - Equipped with a wash rack, and with the prior approval of the sewerage agency (Note: Discharge monitoring may be required by the sewerage agency). - Equipped with a clarifier or other pretreatment facility. - If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only allowed by the local sewerage agency through permitted connection. - Other features which are comparable and equally effective that prevent unpermitted discharge, to the MS4.
<p>S10</p>	<p>Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)</p>	<p><input type="checkbox"/></p>	<p><input checked="" type="checkbox"/></p>	<p>Outdoor process equipment operations, such as rock grinding or crushing, painting or coating, grinding or sanding, degreasing or parts cleaning, landfills, waste piles, and wastewater and solid waste handling, treatment, and disposal, and other operations determined to be a potential threat to water quality by the local jurisdiction shall adhere to the following requirements.</p> <ul style="list-style-type: none"> - Cover or enclose areas that would be the sources of pollutants; or slope the area toward a sump that will provide infiltration or evaporation with no discharge; or, if there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered only allowed by the local sewerage agency through permitted connection. - Grade or berm area to prevent run-on from surrounding areas. - Installation of storm drains in areas of equipment repair is prohibited. - Other features which are comparable or equally effective that prevent unpermitted discharges to the MS4. - Where wet material processing occurs (e.g. electroplating), secondary containment structures (not double wall containers) shall be provided to hold spills resulting from accidents, leaking tanks or equipment, or any other unplanned releases. - Some of these land uses (e.g. landfills, waste piles, wastewater and solid waste handling, treatment and disposal) may be subject to other permits including Phase I Industrial Permits that may require additional BMPs.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<p>Outdoor equipment/accessory washing and steam cleaning activities shall use the following:</p> <ul style="list-style-type: none"> - Be self-contained or covered with a roof or overhang. - Design an equipment wash area drainage system to capture all wash water. Provide impermeable berms, drop inlets, trench catch basins, or overflow containment structures around equipment wash areas to prevent wash-down waters from entering the storm drain system. Connect drains to a sump for collection and disposal. Discharge from equipment wash areas to the MS4 is prohibited. If there are no other alternatives, discharge of non-stormwater flow to the sanitary sewer may be considered, but only when allowed by the local sewerage agency through a permitted connection. - Other comparable or equally effective features that prevent unpermitted discharges to the MS4.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>Fuel dispensing areas shall contain the following:</p> <ul style="list-style-type: none"> - At a minimum, the fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less. - The fuel dispensing area shall be paved with Portland cement concrete (or equivalent smooth impervious surface). The use of asphalt concrete shall be prohibited. - The fuel dispensing area shall have an appropriate slope (2 percent - 4 percent) to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of stormwater. - An overhanging roof structure or canopy shall be provided. The cover's minimum dimensions must be equal to or greater than the area of the fuel dispensing area in the first item above. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across

Preliminary Water Quality Management Plan (PWQMP)

				<p>the fueling area. The fueling area shall drain to the project's Treatment Control BMP(s) prior to discharging to the MS4.</p> <p>- See CASQA Stormwater Handbook Section 3.2.11 and BMP Fact Sheet SD-30 for additional information.</p>
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Hillside areas that are disturbed by project development shall be landscaped with deep-rooted, drought tolerant plant species selected for erosion control, satisfactory to the local jurisdiction.
S14	Wash water control for food preparation areas	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Food establishments (per State Health & Safety Code 27520) shall have either contained areas or sinks, each with sanitary sewer connections for disposal of wash waters containing kitchen and food wastes. If located outside, the contained areas or sinks shall also be structurally covered to prevent entry of stormwater. Adequate signs shall be provided and appropriately placed stating the prohibition of discharging wash water to the storm drain system.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	In complexes larger than 100 dwelling units where car washing is allowed, a designated carwash area that does not drain to a storm drain system shall be provided for common usage. Wash water from this area may be directed to the sanitary sewer (with the prior approval of the sewerage agency); to an engineered infiltration system; or to an equally effective alternative. Ore-treatment may also be required.

4.1.2 Preventative LID Site Design Practices

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

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

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

Form 4.1-3 Preventative LID Site Design Practices Checklist
<p>Site Design Practices <i>If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be</i></p>
<p>Minimize impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Driveway and drive isle widths have been minimized to the allowable minimum for fire access and turn-around requirements. Sidewalk and walkway widths have been reduced to the allowable minimum for ADA compliance. The parking lots have been reduced to the required stall counts.</p>
<p>Maximize natural infiltration capacity: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Minimize unnecessary compaction of soils in order to maximize infiltration. To the maximum extent practical, heavy machinery shall be prohibited from long term contact on surface where infiltration BMPs will be implemented.</p>
<p>Preserve existing drainage patterns and time of concentration: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: The use of LID infiltration BMPs effectively increases the concentration time of runoff due to routing through the proposed BMPs. An increase in concentration time does not adversely affect downstream water ways. The proposed basin will provide mitigation capacity for the increased runoff from the proposed development.</p>
<p>Disconnect impervious areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Roofs and hardscape walkways shall discharge to adjacent landscaped areas. This allows some incidental infiltration and aids in removing sediment from runoff prior to infiltration in the onsite infiltration BMPs.</p>
<p>Protect existing vegetation and sensitive areas: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Explanation: Existing weeds shall be replaced by landscaping more appropriate for commercial development.</p>
<p>Re-vegetate disturbed areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Disturbed areas shall be replaced with landscaping more appropriate for commercial development.</p>
<p>Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Heavy machinery shall be actively prohibited from long term contact with any surface within an infiltration BMP area.</p>
<p>Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Where possible, landscaped areas shall be graded as swales and will direct runoff away from buildings and toward the infiltration BMPs.</p>
<p>Stake off areas that will be used for landscaping to minimize compaction during construction: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Explanation: Proposed landscape area shall be delineated in construction drawings and staked during construction. Heavy machinery shall be prohibited from long term contact within proposed landscaped areas (i.e. no overnight storage).</p>

4.2 Project Performance Criteria

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

Methods applied in the following forms include:

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

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

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)		
¹ Project area DA 1 (ft ²): 215,657	² Imperviousness after applying preventative site design practices (Imp%): 0.64	³ Runoff Coefficient (Rc): 0.44 $R_c = 0.858(Imp\%)^3 - 0.78(Imp\%)^2 + 0.774(Imp\%) + 0.04$
⁴ Determine 1-hour rainfall depth for a 2-year return period P _{2yr-1hr} (in): 0.47 http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html		
⁵ Compute P ₆ , Mean 6-hr Precipitation (inches): 0.70 <i>P₆ = Item 4 * C₁, where C₁ is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)</i>		
⁶ Drawdown Rate <i>Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.</i>		24-hrs <input type="checkbox"/> 48-hrs <input checked="" type="checkbox"/>
⁷ Compute design capture volume, DCV (ft ³): 10,795 <i>DCV = 1/12 * [Item 1 * Item 3 * Item 5 * C₂], where C₂ is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)</i> <i>Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2</i>		

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

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

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

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

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

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

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

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

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

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

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

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

Compute peak runoff for pre- and post-developed conditions

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

4.3 Project Conformance Analysis

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

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

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

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

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

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

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2). **Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment.**

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

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

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

If Yes, provide basis: (attach)

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

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

If Yes, provide basis: (attach)

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

If Yes, provide basis: (attach)

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

If Yes, provide basis: (attach)

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

If Yes, provide basis: (attach)

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

If Yes, provide basis: (attach)

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

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

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

4.3.1 Site Design Hydrologic Source Control BMP

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

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

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

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

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

4.3.2 Infiltration BMPs

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

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

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

Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

¹ Remaining LID DCV not met by site design HSC BMP (ft ³): 10,795 $V_{unmet} = \text{Form 4.2-1 Item 7} - \text{Form 4.3-2 Item 30}$			
BMP Type <i>Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs</i>	DA 1 DMA A BMP Type Infiltration Basin		
² Infiltration rate of underlying soils (in/hr) <i>See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods</i>	1.3 in/hr		
³ Infiltration safety factor <i>See TGD Section 5.4.2 and Appendix D</i>	3		
⁴ Design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$	0.43 in/hr		
⁵ Pondered water drawdown time (hr) <i>Copy Item 6 in Form 4.2-1</i>	48 hrs		
⁶ Maximum ponding depth (ft) <i>BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details</i>	4.0 ft		
⁷ Ponding depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$	1.73 ft		
⁸ Infiltrating surface area, SA_{BMP} (ft ²) <i>the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP</i>	7,471 sf		
⁹ Amended soil depth, d_{media} (ft) <i>Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details</i>	N/A		
¹⁰ Amended soil porosity	N/A		
¹¹ Gravel depth, d_{media} (ft) <i>Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details</i>			
¹² Gravel porosity			
¹³ Duration of storm as basin is filling (hrs) <i>Typical - 3hrs</i>	3 hrs		
¹⁴ Above Ground Retention Volume (ft ³) $V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$	13,220 cf		
¹⁵ Underground Retention Volume (ft ³) <i>Volume determined using manufacturer's specifications and calculations</i>	N/A		
¹⁶ Total Retention Volume from LID Infiltration BMPs: 13,220 cu-ft			
¹⁷ Fraction of DCV achieved with infiltration BMP: 122.5% $\text{Retention\%} = \text{Item 16} / \text{Form 4.2-1 Item 7}$			
¹⁸ Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, demonstrate conformance using Form 4.3-10: If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.</i>			

4.3.3 Harvest and Use BMP

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

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

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

4.3.4 Biotreatment BMP

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

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

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

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

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

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

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

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

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

4.3.5 Conformance Summary

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

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)	
1	Total LID DCV for the Project DA-1 (ft ³): 10,795 <i>Copy Item 7 in Form 4.2-1</i>
2	On-site retention with site design hydrologic source control LID BMP (ft ³): 0 <i>Copy Item 30 in Form 4.3-2</i>
3	On-site retention with LID infiltration BMP (ft ³): 13,220 <i>Copy Item 16 in Form 4.3-3</i>
4	On-site retention with LID harvest and use BMP (ft ³): 0 <i>Copy Item 9 in Form 4.3-4</i>
5	On-site biotreatment with volume based biotreatment BMP (ft ³): 0 <i>Copy Item 3 in Form 4.3-5</i>
6	Flow capacity provided by flow based biotreatment BMP (cfs): 0 <i>Copy Item 6 in Form 4.3-5</i>
7	<p>LID BMP performance criteria are achieved if answer to any of the following is "Yes":</p> <ul style="list-style-type: none"> • Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> <i>If yes, sum of Items 2, 3, and 4 is greater than Item 1</i> • Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized</i> ▪ On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> <i>If yes, Form 4.3-1 Items 7 and 8 were both checked yes</i>
8	<p>If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:</p> <ul style="list-style-type: none"> • Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: <input type="checkbox"/> <i>Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, $V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%$</i> • An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: <input type="checkbox"/> <i>Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed</i>

4.3.6 Hydromodification Control BMP

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

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

4.4 Alternative Compliance Plan (if applicable)

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

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

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

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

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

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)			
BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
TC-11 Infiltration Basin	Owner/Future POA	<p>Inspection Activities:</p> <ul style="list-style-type: none"> Observe drain time for a storm after completion or modification of the facility to confirm that the desired drain time has been obtained. Newly established vegetation should be inspected several times to determine if any landscape maintenance (reseeding, irrigation, etc.) is necessary. Inspect for differential accumulation of sediment, signs of wetness or damage to structures, erosion of the basin floor, dead or dying grass on the bottom, condition of riprap, drain time, signs of petroleum hydrocarbon contamination, standing water, trash and debris, sediment accumulation, slope stability, and pretreatment device condition. <p>Maintenance Activities:</p> <ul style="list-style-type: none"> Factors responsible for clogging should be repaired immediately. Weed once monthly during the first growing seasons. Stabilize eroded banks. Repair undercut and eroded areas at inflow and outflow structures. Maintain access to the basin for regular maintenance activities. Mow as appropriate for vegetation and replace as necessary. Control mosquitoes as necessary. 	<p>After construction.</p> <p>Semi-annual & after extreme events.</p> <p>Annual.</p>

Preliminary Water Quality Management Plan (PWQMP)

		<ul style="list-style-type: none"> • Remove litter and debris from infiltration basin area as required. • Mow and remove grass clippings, litter, and debris. • Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons. • Replant eroded or barren spots to prevent erosion and accumulation of sediment. • Scape bottom and remove sediment when accumulated sediment reduces original infiltration rate by 25-50%. Restore original cross-section and infiltration rate. Properly dispose of sediment. • Seed or sod to restore ground cover. • Disc or otherwise aerate bottom. • Dethatch basin bottom. 	
N1: Education of Property Owners, Tenants and Occupants on Stormwater BMPs	Owner/Future POA	<p>For developments with no Property Owners Association (POA)² or with POA of less than fifty (50) dwelling units, practical information materials will be provided to the first residents/occupants/tenants on general housekeeping practices that contribute to the protection of stormwater quality. These materials will be initially developed and provided to first residents/occupants/tenants by the developer. Thereafter such materials will be available through the local jurisdiction's stormwater education program. Different materials for residential, office commercial, retail commercial, vehicle-related commercial and industrial uses have been developed.</p> <p>For developments with POA and residential projects of more than fifty (50) dwelling units, project conditions of approval will require that the POA periodically provide environmental awareness education materials, made available by the municipalities, to all members. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of wastes via hosing or other direct discharge to gutters, catch basins and storm drains. Educational materials available from the San Bernardino Stormwater Program and can be downloaded at: http://www.sbcountystormwater.org/gov_out.html</p>	Once, upon purchase of unit.
N2: Activity Restrictions	Owner/Future POA	If a POA is formed, conditions, covenants, and restrictions (CCRs) must be prepared by the developer	As needed.

Preliminary Water Quality Management Plan (PWQMP)

		for the purpose of surface water quality protection. An example would be not allowing car washing outside of established community car wash areas in multi-unit complexes. Alternatively, use restrictions may be developed by a building operator through lease terms, etc. These restrictions must be included in the Project WQMP.	
N3: Landscape Management BMPs	Owner/Future POA	Identify on-going landscape maintenance requirements consistent with applicable local ordinances that may include fertilizer and/or pesticide usage. See attached SC-73 protocol information obtained from the California Stormwater BMP Handbook.	As needed to achieve the goals outlined in the attached SC-73 protocol.
N12: Employee Training	Owner/Future POA	The developer prepares manual(s) for initial purchasers of a business site or for a development that is constructed for an unspecified use, the developer makes a commitment on behalf of POA or future business owner to prepare the training. An example would be a provision to provide training on the proper storage and use of fertilizers and pesticides, or training on the implementation of hazardous spill contingency plans.	Once, during employee training.
N14: Catch Basin Inspection	Owner/Future POA	For industrial/commercial developments and for developments with privately maintained drainage systems, the owner is required to have at least 80 percent of drainage facilities inspected, cleaned and maintained on an annual basis with 100 percent of the facilities included in a two-year period. Cleaning should take place in the late summer/early fall prior to the start of the rainy season. Drainage facilities include catch basins (storm drain inlets) detention basins, retention basins, sediment basins, open drainage channels and lift stations.	Annually. Prior to the start of the rainy season. After extreme event.
N15: Vacuum Sweep Private Streets and Parking Lots	Owner/Future POA	Streets and parking lots are required to be swept on a regular frequency-based usage and field observations of waste accumulation, using a vacuum assisted sweeper. At a minimum all paved areas of a business shall be swept, in late summer or early fall, prior to the start of the rainy season or equivalent, as required by the governing jurisdiction.	Monthly or as needed. Prior to the start of the rainy season.

Preliminary Water Quality Management Plan (PWQMP)

N17: Comply with Other Applicable NPDES Permits	Owner/Future POA	Projects disturbing greater than one (1) acre are required to implement a Storm Water Pollution Prevention Plan during construction to control stormwater and non-stormwater discharges from the site, in conjunction with providing erosion control to prevent sediment from leaving the site.	As needed during construction.
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Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

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

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

6.2 Electronic Data Submittal

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

6.3 Post Construction

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

6.4 Other Supporting Documentation

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

6.1 Site Plan and Drainage Plan

- Existing Drainage Exhibit
- Preliminary WQMP Site Plan
- Supporting Calculation Summary