



# City of Upland

Department of Public Works | Environmental Division

## Preliminary Water Quality Management Plan

Order No. R8-2010-0036, NPDES No. CAS 618036

Area-wide Urban Storm Water Runoff Management Program

Project Name:				
Project Address:				
Permit/ Application Number(s):				
Tract/ Parcel Map Number(s) (Specify Lot Numbers if Portions of Tract):		APN(s):		
Prepared for	Name:			
	Address:			
	Phone:		Email:	
Prepared by	Name:			
	Address:			
	Phone:		Email:	
Submittal Date:				
Approval Date:				

## Project Owner's Certification

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

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

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):		Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			
Owner's Signature			
<b>Owner Name:</b>			
Title			
Company			
Address			
Email			
Telephone #			
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):			

“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.”

<b>Engineer:</b>		PE Stamp Below
Title		
Company		
Address		
Email		
Telephone #		
Signature		

## Form 1-1 Project Information

<b>Form 1-1 Project Information</b>					
Project Name					
Project Owner Contact Name:					
Mailing Address:		E-mail Address:		Telephone:	
Permit/Application Number(s):			Tract/Parcel Map Number(s):		
Additional Information/Comments:					
Description of Project:					
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.					

## Form 2.1-1 Description of Proposed Project

**1** Development Category (Select all that apply):

<input type="checkbox"/>	<p>All significant re-development<sup>1</sup> projects - defined as the addition or replacement of 5,000 or more square feet (sq. ft) of impervious surface on an already developed site subject to discretionary approval of the permitting jurisdiction. In addition:</p> <ul style="list-style-type: none"> <li>• Re-development does not include: Routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, original purpose of the facility, or emergency redevelopment activity required to protect public health and safety.</li> <li>• Where re-development results in an increase of less than 50% of the impervious surfaces of a previously existing developed site, and the existing development was not subject to WQMP requirements, the numeric sizing criteria discussed in Section 4 applies only to the addition or replacement, and not to the entire developed site.</li> <li>• Where re-development results in an increase of 50% or more of the impervious surfaces of a previously existing developed site, the numeric sizing criteria discussed in Section 4 applies to the entire development.</li> </ul>
<input type="checkbox"/>	<p>New development projects that create 10,000 sq. ft. or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single family home subdivisions, multi-family attached subdivisions or townhomes, condominiums, apartments, etc.), mixed-use, and public projects. This category includes development projects on public and private land, which fall under the planning and building authority of the permitting jurisdiction.</p>
<input type="checkbox"/>	<p>New development or significant re-development<sup>1</sup> of automotive repair shops (with SIC<sup>2</sup> Codes 5013, 5014, 5541, 7532-7534, 7536-7539) where the project creates, adds and/or replaces 5,000 square feet or more of impervious surface.</p>
<input type="checkbox"/>	<p>New development or significant re-development<sup>1</sup> of restaurants (with SIC<sup>2</sup> Code 5812) where the land area of development is 5,000 sq. ft. or more.</p>
<input type="checkbox"/>	<p>All hillside developments of 5,000 sq. ft. or more which are located on areas with known erosive soil conditions or where the natural slope is 25% or more.</p>
<input type="checkbox"/>	<p>Developments of 2,500 sq. ft. of impervious surface or more adjacent to (within 200 feet) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters<sup>(3)</sup>.</p>
<input type="checkbox"/>	<p>Parking lots of 5,000 sq. ft. or more exposed to stormwater. A parking lot is defined as land area or facility for the temporary parking or storage of motor vehicles.</p>
<input type="checkbox"/>	<p>New development or significant re-development<sup>1</sup> of Retail Gasoline Outlets that are either 5,000 sq. ft. or more, or have a projected average daily traffic of 100 or more vehicles per day.</p>

(1) - As defined by RWQCB Order R8-2010-0036

(2) - For SIC codes, see: [www.osha.gov/pls/imis/sicsearch.html](http://www.osha.gov/pls/imis/sicsearch.html)

(3) - See Section 3 of TGD for WQMP for additional information regarding impaired waters

<b>2</b> Project Area (ft <sup>2</sup> ):		<b>3</b> Number of Dwelling Units:		<b>4</b> SIC Code:	
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**5** Is Project going to be phased?    Yes     No

*If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

**6** Does Project include roads?    Yes     No

*If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)*

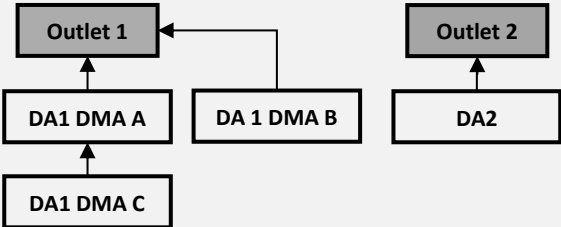
### Form 2.2-1 Property Ownership/Management

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

### Form 2.3-1 Pollutants of Concern

Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E <input type="checkbox"/>	N <input type="checkbox"/>	
Nutrients - Phosphorous	E <input type="checkbox"/>	N <input type="checkbox"/>	
Nutrients - Nitrogen	E <input type="checkbox"/>	N <input type="checkbox"/>	
Noxious Aquatic Plants	E <input type="checkbox"/>	N <input type="checkbox"/>	
Sediment	E <input type="checkbox"/>	N <input type="checkbox"/>	
Metals	E <input type="checkbox"/>	N <input type="checkbox"/>	
Oil and Grease	E <input type="checkbox"/>	N <input type="checkbox"/>	
Trash/Debris	E <input type="checkbox"/>	N <input type="checkbox"/>	
Pesticides / Herbicides	E <input type="checkbox"/>	N <input type="checkbox"/>	
Organic Compounds	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	
Other:	E <input type="checkbox"/>	N <input type="checkbox"/>	

## Form 3-1 Site Location and Hydrologic Features

Site coordinates take GPS measurement at approximate center of site	Latitude:	Longitude:	Thomas Bros Map page:
<b>1</b> San Bernardino County climatic region: <input type="checkbox"/> Valley <input type="checkbox"/> Mountain			
<b>2</b> Does the site have more than one drainage area (DA): Yes <input type="checkbox"/> No <input type="checkbox"/> <i>If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached</i>			
 <pre> graph TD     DA1DMAA[DA1 DMA A] --&gt; Outlet1[Outlet 1]     DA1DMAB[DA 1 DMA B] --&gt; Outlet1     DA1DMAC[DA1 DMA C] --&gt; DA1DMAA     DA2[DA2] --&gt; Outlet2[Outlet 2]       </pre>		<div style="border: 1px solid black; height: 100px; width: 100%;"></div>	
<b>Example only – provide a project specific drawing to the right</b>			
<b>Conveyance</b>	<b>Briefly describe on-site drainage features to convey runoff that is not retained within a DMA</b>		
Example: DA1 DMA C flows to DA1 DMA A	<i>Ex. Bioretention overflow to vegetated bioswale with 4' bottom width, 5:1 side slopes and bed slope of 0.01. Conveys runoff for 1000' through DMA 1 to existing catch basin on SE corner of property</i>		

### 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
<b>1</b> DMA drainage area (ft <sup>2</sup> )				
<b>2</b> Existing site impervious area (ft <sup>2</sup> )				
<b>3</b> Antecedent moisture condition <i>For desert areas, use</i> <a href="http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf">http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf</a>				
<b>4</b> Hydrologic soil group <i>Refer to Watershed Mapping Tool –<a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i>				
<b>5</b> Longest flowpath length (ft)				
<b>6</b> Longest flowpath slope (ft/ft)				
<b>7</b> Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>				
<b>8</b> Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good &gt;75%; Fair 50-75%; Poor &lt;50% Attach photos of site to support rating</i>				

### Form 3-2 Existing Hydrologic Characteristics for Drainage Area 2 (if applicable)

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

## Form 3-3 Watershed Description for Drainage Area

Receiving waters <i>Refer to Watershed Mapping Tool - <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a>                  See "Drainage Facilities" link at this website</i>	
Applicable TMDLs <i>Refer to Local Implementation Plan</i>	
303(d) listed impairments <i>Refer to Local Implementation Plan and Watershed Mapping Tool – <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a> and State Water Resources Control Board website – <a href="http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml">http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml</a></i>	
Environmentally Sensitive Areas (ESA) <i>Refer to Watershed Mapping Tool – <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i>	
Unlined Downstream Water Bodies <i>Refer to Watershed Mapping Tool – <a href="http://permitrack.sbcounty.gov/wap/">http://permitrack.sbcounty.gov/wap/</a></i>	
Hydrologic Conditions of Concern	<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>  <input type="checkbox"/> No
Watershed-based BMP included in a RWQCB approved WAP	<input type="checkbox"/> Yes <i>Attach verification of regional BMP evaluation criteria in WAP</i> <ul style="list-style-type: none"> <li>• More Effective than On-site LID</li> <li>• Remaining Capacity for Project DCV</li> <li>• Upstream of any Water of the US</li> <li>• Operational at Project Completion</li> <li>• Long-Term Maintenance Plan</li> </ul> <input type="checkbox"/> No

## Source Control BMPs Design Consideration

**FOR REFERENCE  
(To be implemented during Final Design)**

If Potential Source of Runoff Pollutants will be on the Project Site...	... then WQMP shall include these Source Control BMPs	
Project Characteristic/ Activity	Non-Structural BMPs	Structural BMPs
On-Site Storm Drain Inlets	N1 - Education for POA, Tenants, Occupants N2 - Activity Restrictions N4 - BMP Maintenance N12 - Employee Training N14 - Catch Basin Inspection	S1 - Provide Storm Drain Stenciling and Signage
Landscape/ Outdoor Pesticide Use	N1 - Education for POA, Tenants, Occupants N2 - Activity Restrictions N3 - Landscape Management N4 - BMP Maintenance N12 - Employee Training	S4 - Use Efficient Irrigation Systems and Landscape Design S5 - Finished Grade of Landscaped Areas S6 - Protect Slopes and Channels S13 - Site Design and Landscape Planning (Hillside Landscaping)
Food Service/ Restaurants	N4 - BMP Maintenance N12 - Employee Training	S3 - Design and Construct Trash and Waste Storage Areas to Reduce Pollution Introduction S14 - Wash Water Controls for Food Preparation Areas
Refuse Areas	N1 - Education for POA, Tenants, Occupants N2 - Activity Restrictions N4 - BMP Maintenance N11 - Litter Control N12 - Employee Training	S3 - Design and Construct Trash and Waste Storage Areas to Reduce Pollution Introduction
Outdoor Storage of Equipment or Materials	N4 - BMP Maintenance N7 - Spill Contingency Plan N9 - Hazardous Materials Disclosure Compliance N12 - Employee Training	S2 - Design Outdoor Materials Storage Areas S10 - Outdoor Processing Areas
Vehicle and Equipment Cleaning	N1 - Education for POA, Tenants, Occupants N2 - Activity Restrictions N4 - BMP Maintenance N12 - Employee Training	S8 - Maintenance Bays & Docks S9 - Vehicle Wash Areas S11 - Equipment Wash Areas S15 - Community Wash Racks
Vehicle/ Equipment Repair & Maintenance	N1 - Education for POA, Tenants, Occupants N2 - Activity Restrictions N4 - BMP Maintenance N12 - Employee Training	S8 - Maintenance Bays & Docks
Fuel Dispensing Areas	N4 - BMP Maintenance N6 - Local Water Quality Permit Compliance N7 - Spill Contingency Plan N8 - Underground Storage Tank Compliance N9 - Hazardous Materials Disclosure Compliance N12 - Employee Training	S12 - Fueling Areas
Loading Docks	N4 - BMP Maintenance N12 - Employee Training N13 - Housekeeping of Loading Docks	S7 - Dock Areas
Streets and Parking Lots	N1 - Education for POA, Tenants, Occupants N2 - Activity Restrictions N4 - BMP Maintenance N12 - Employee Training N15 - Street Sweeping Private Streets and Parking Lots	S1 - Provide Storm Drain Stenciling and Signage

Note:

Table is intended as an example worksheet of how to consider selection of source control BMPs based on project-specific characteristics and does not include all possible project characteristics/ activities and corresponding applicable source control BMPs. Please refer to TGD for WQMP, Section 7, for Final WQMP.

## Form 4.1-3 Preventative LID Site Design Practices Checklist

### Site Design Practices

*If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets*

Minimize impervious areas: Yes  No

Explanation:

Maximize natural infiltration capacity: Yes  No

Explanation:

Preserve existing drainage patterns and time of concentration: Yes  No

Explanation:

Disconnect impervious areas: Yes  No

Explanation:

Protect existing vegetation and sensitive areas: Yes  No

Explanation:

Re-vegetate disturbed areas: Yes  No

Explanation:

Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes  No

Explanation:

Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes  No

Explanation:

Stake off areas that will be used for landscaping to minimize compaction during construction : Yes  No

Explanation:

<b>Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)</b>		
<b>1</b> Project area DA 1 (ft <sup>2</sup> ):	<b>2</b> Imperviousness after applying preventative site design practices (Imp%):	<b>3</b> Runoff Coefficient (Rc): $R_c = 0.858(\text{Imp}\%)^{0.3} - 0.78(\text{Imp}\%)^{0.2} + 0.774(\text{Imp}\%) + 0.04$
<b>4</b> Determine 1-hour rainfall depth for a 2-year return period $P_{2\text{yr-1hr}}$ (in): <a href="http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html">http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html</a>		
<b>5</b> Compute $P_6$ , Mean 6-hr Precipitation (inches): $P_6 = \text{Item 4} * C_1$ , where $C_1$ is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)		
<b>6</b> 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 type="checkbox"/>
<b>7</b> Compute design capture volume, DCV (ft <sup>3</sup> ): $DCV = 1/12 * [\text{Item 1} * \text{Item 3} * \text{Item 5} * C_2]$ , where $C_2$ is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963) Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2		

<b>Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 2, if applicable)</b>		
<b>1</b> Project area DA 1 (ft <sup>2</sup> ):	<b>2</b> Imperviousness after applying preventative site design practices (Imp%):	<b>3</b> Runoff Coefficient (Rc): $R_c = 0.858(\text{Imp}\%)^{0.3} - 0.78(\text{Imp}\%)^{0.2} + 0.774(\text{Imp}\%) + 0.04$
<b>4</b> Determine 1-hour rainfall depth for a 2-year return period $P_{2\text{yr-1hr}}$ (in): <a href="http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html">http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html</a>		
<b>5</b> Compute $P_6$ , Mean 6-hr Precipitation (inches): $P_6 = \text{Item 4} * C_1$ , where $C_1$ is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)		
<b>6</b> 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 type="checkbox"/>
<b>7</b> Compute design capture volume, DCV (ft <sup>3</sup> ): $DCV = 1/12 * [\text{Item 1} * \text{Item 3} * \text{Item 5} * C_2]$ , where $C_2$ is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963) Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2		

## Form 4.3-1 Infiltration BMP Feasibility

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

<sup>1</sup> 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)

<sup>2</sup> 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)

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

If Yes, Provide basis: (attach)

<sup>4</sup> 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)

<sup>5</sup> 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)

<sup>6</sup> 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)

<sup>7</sup> 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.*

<sup>8</sup> 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.*

<sup>9</sup> 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.*

## Form 4.3-3 Infiltration LID BMP - including underground BMPs

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

## Form 4.3-4 Harvest and Use BMPs

IF APPLICABLE

(To be considered if the full LID DCV cannot be met by maximizing Infiltration BMPs)

**1** Remaining LID DCV not met by site design HSC or infiltration BMP (ft<sup>3</sup>):

*V<sub>unmet</sub> = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16*

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>
<b>2</b> Describe cistern or runoff detention facility			
<b>3</b> Storage volume for proposed detention type (ft <sup>3</sup> ) <i>Volume of cistern</i>			
<b>4</b> Landscaped area planned for use of harvested stormwater (ft <sup>2</sup> )			
<b>5</b> Average wet season daily irrigation demand (in/day) <i>Use local values, typical ~ 0.1 in/day</i>			
<b>6</b> Daily water demand (ft <sup>3</sup> /day) <i>Item 4 * (Item 5 / 12)</i>			
<b>7</b> Drawdown time (hrs) <i>Copy Item 6 from Form 4.2-1</i>			
<b>8</b> Retention Volume (ft <sup>3</sup> ) <i>V<sub>retention</sub> = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))</i>			

**9** Total Retention Volume (ft<sup>3</sup>) from Harvest and Use BMP

*Sum of Item 8 for all harvest and use BMP included in plan*

**10** Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest & use BMPs? Yes  No   
*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.*

## Form 4.3-5 Selection and Evaluation of Biotreatment BMP

IF APPLICABLE

(To be considered if the full LID DCV cannot be met by maximizing Infiltration, and Harvest and Use BMPs)

<p><b>1</b> Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft<sup>3</sup>): <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></p>	<p>List pollutants of concern <i>Copy from Form 2.3-1.</i></p>				
<p><b>2</b> Biotreatment BMP Selected <i>(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)</i></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Volume-based biotreatment <i>Use Forms 4.3-6 and 4.3-7 to compute treated volume</i></th> <th style="width: 50%;">Flow-based biotreatment <i>Use Form 4.3-8 to compute treated volume</i></th> </tr> <tr> <td> <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                 </td> <td> <input type="checkbox"/> Vegetated swale  <input type="checkbox"/> Vegetated filter strip  <input type="checkbox"/> Proprietary biotreatment                 </td> </tr> </table>	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
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				
<p><b>3</b> Volume biotreated in volume based biotreatment BMP (ft<sup>3</sup>): <i>Form 4.3-6 Item 15 + Form 4.3-7 Item 13</i></p>	<p><b>4</b> Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft<sup>3</sup>): <i>Item 1 – Item 3</i></p>	<p><b>5</b> Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % <i>Item 4 / Item 1</i></p>			
<p><b>6</b> 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></p>					
<p><b>7</b> Metrics for MEP determination:</p> <ul style="list-style-type: none"> <li>• 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></li> </ul>					

### Site Plan

Include a Site Plan (24" x 36") containing the following minimum information:

- 1) Project location
- 2) Site boundary
- 3) Land uses and land covers, as applicable
- 4) Suitability/ Feasibility constraints
- 5) LID Site Design BMP locations
- 6) Drainage delineation and flow information
- 7) Drainage connections, if applicable
- 8) LID Treatment Control BMP locations

**Notes:**

- 1) Preliminary WQMP requirements (LID Site Design BMP, LID Treatment Control BMP), if applicable, must be incorporated into the project design and shown on project plans prior to entitlement approval.
- 2) Upon Preliminary WQMP review, if proposed project presents environmental concerns or impact, the City could impose additional water quality requirements in the Conditions prior to entitlement approval on a case by case basis.