FONTANA
CALIFORNIA

City of Fontana

Water Quality Management Plan Handbook

September 2016

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Water Quality Management Plan Handbook

FINAL

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Acronyms

BMP	Best Management Practice
CASQA	California Stormwater Quality Association
CWA	Clean Water Act
CFD	Community Facilities District
DCV	Design Capture Volume
HCOC	Hydrological Conditions of Concern
LID	Low Impact Development
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
PE	Project Engineer
RWQCB	Santa Ana Regional Water Quality Control Board
SBCFCD	San Bernardino County Flood Control District
SIC	Standard Industrial Classification
SMARTS	Stormwater Multiple Applications and Reporting Tracking System
TGD	Technical Guidance Document for Water Quality Management Plans
TMDL	Total Maximum Daily Load
WQMP	Water Quality Management Plan

1. Introduction

The 1972 Federal Clean Water Act (CWA) established requirements for the discharge of urban runoff from Municipal Separate Storm Sewer Systems (MS4) under the National Pollutant Discharge Elimination System (NPDES) program. The Santa Ana Regional Water Quality Control Board (RWQCB) issued Permit Order No. R8-2010-0036 ("MS4 Permit") to authorize the discharge of urban runoff from the collective San Bernardino County MS4s within the Region on January 29, 2010. This is the fourth MS4 permit issued to the area-wide San Bernardino County Stormwater Program by the RWQCB since the first permit was issued in 1990. The 2010 MS4 permit expired on January 28, 2015, but remains effective and current, pending issuance of a new MS4 Permit.

The MS4 Permit regulates discharges from all MS4 facilities within the Santa Ana River watershed in San Bernardino County. The permittees covered by this permit include the San Bernardino County Flood Control District (SBCFCD), San Bernardino County ("County") and 16 municipal jurisdictions, including the City of Fontana. The SBCFCD is the Principal Permittee and the remaining jurisdictions are the Co-Permittees. Although all permittees work cooperatively to implement the area-wide MS4 program, each permittee is responsible for compliance with the MS4 Permit within its respective jurisdiction.

The MS4 Permit requires post-construction best management practices (BMPs) to be implemented for both private and public new development and significant redevelopment projects. The area-wide MS4 program requires the completion of a Water Quality Management Plan (WQMP) to minimize the potential adverse effects that development projects can have on receiving waters (MS4 Permit Part XI.D.2). These effects may be minimized through the implementation of site designs that reduce runoff and pollutant transport by minimizing impervious surfaces and maximizing onsite infiltration, source-control BMPs, on-site structural treatment control BMPs, and/or participation in regional or watershed-based structural treatment control BMPs.

The area-wide MS4 program established a RWQCB-approved Model WQMP Guidance and Template ("WQMP Template") document in 2005 during the third-term MS4 Permit to support preparation of WQMPs. Following the issuance of the fourth-term MS4 Permit in 2010, a Technical Guidance Document for Water Quality Management Plans (TGD) was created. The TGD was approved of on June 21, 2013 and became effective on September 19, 2013. The TGD aims to assist in development and implementation of programs and policies to minimize the effects of urbanization on site hydrology, urban runoff flow rates or velocities, and pollutant loads. This goal may be achieved through watershed-based structural treatment controls in combination with site-specific BMPs. The TGD also aims to reduce the concentration of pollutants in post-development runoff to the maximum extent practicable (MEP), and reduce or eliminate the discharge of any listed pollutant to an impaired waterbody on the 303(d) List that causes or contributes to an exceedance of a receiving water quality objective.

This WQMP Handbook has been prepared by the City of Fontana (City) to streamline the WQMP process and provide guidance to those preparing and approving WQMPs within the City.

1.1 Project Types Requiring a WQMP

Priority projects requiring a WQMP are listed in **Table 1-1**. Transportation projects that are part of new development or significant redevelopment projects implemented by a private developer are subject to the

requirements applicable to priority projects, regardless of whether the roads remain private or are dedicated to public right-of-way after the development is complete.

Priority project types require the following elements:

- Incorporate and implement site design BMPs as specified in the WQMP;
- Incorporate and implement all source control BMPs as specified in the WQMP, unless not applicable to the project due to project characteristics;
- Either incorporate and implement treatment control BMPs as specified in the WQMP, by including a selection of such BMPs in the project design; or participate in or contribute to an approved regional-based treatment program (site design and source control BMPs are required for projects participating in regional-based treatment programs); and
- The combination of site design, source control and/or treatment control BMPs or regional-based treatment program must address all identified pollutants and hydrologic conditions of concern (HCOC).

For non-priority/non-category projects, submission of a WQMP is not required. The practice and use of LID BMP principles is still recommended for these projects.

Table 1-1 Priority Project Types Requiring a WQMP

Category No.	Project Type
1	All significant redevelopment projects - defined as the addition or replacement of 5,000 or more square feet of impervious surface on an already developed site subject to discretionary approval of the City. Redevelopment 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. Where redevelopment 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 below applies only to the addition or replacement, and not to the entire developed site. Where redevelopment results in an increase of 50% or more of the impervious surfaces of a previously existing developed site, the numeric sizing criteria applies to the entire development.
2	New development projects that create 10,000 square feet 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 City.
3	New development or significant redevelopment of automotive repair shops (with Standard Industrial Classification [SIC][1] codes 5013, 5014, 5541, 7532- 7534, 7536-7539) where the project creates, adds, and/or replaces 5,000 square feet or more of impervious surfaces.
4	New development or significant redevelopment of restaurants (with SIC[1] Code 5812) where the land area of development is 5,000 square feet or more.
5	All hillside developments of 5,000 square feet or more which are located on areas with known erosive soil conditions or where the natural slope is 25% or more.

Category No.	Project Type
6	Developments of 2,500 square feet of impervious surface or more adjacent to (within 200 feet) or discharging directly into environmentally sensitive areas such as areas designated in the Ocean Plan as areas of special biological significance or waterbodies listed on the CWA Section 303(d) List of impaired waters.
7	Parking lots of 5,000 square feet or more exposed to stormwater. A parking lot is defined as land area or facility for the temporary parking or storage of motor vehicles.
8	New development or significant redevelopment of retail gasoline outlets that are either 5,000 square feet or more, or have a projected average daily traffic of 100 or more vehicles per day.

[1] SIC codes can be found on the OSHA website https://www.osha.gov/pls/imis/sicsearch.html

1.2 Using this Handbook in Development of a WQMP

This handbook was created as a guide to the entire WQMP process for developments and redevelopments within the City. The guidance provided in this handbook is intended to supplement the TGD. This handbook provides background information along with tools and summaries of the characteristics of the City to help streamline the WQMP development and approval process. Additionally, this handbook identifies BMPs that have been pre-approved by the City depending on the project type and future maintenance responsibility. Lastly, the handbook summarizes the WQMP review and approval process.

The most recent version of the WQMP template, last updated on June 17, 2015, can be found here: http://www.sbcounty.gov/dpw/land/pdf/WQMP/AppendixB-WQMPTemplate(editable)FINAL.doc

In addition to this handbook, the following resource documents are available:

- Technical Guidance Document for Water Quality Management Plans, June 2013
  http://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/docs/sbpermit/wqmp/Final/Final_TGD_WQMP.pdf
- Watershed Geodatabase
  http://permitrack.sbcounty.gov/WAP/
- RWQCB TMDL webpage
  http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml
- Natural Resource Conservation Services (NRCS) web soil survey
  http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
- NPDES MS4 Permit
  http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2010/10_036_SBC_MS4_Permit_01_29_10.pdf
- San Bernardino County Hydrology Manual and Addendum
  http://cms.sbcounty.gov/Portals/50/floodcontrol/HydrologyManual.pdf
  http://cms.sbcounty.gov/Portals/50/floodcontrol/20100412_addendum.pdf
- City of Fontana Municipal Code
  https://www.municode.com/library/ca/fontana/codes/code_of_ordinances?nodeId=12233

- CASQA Stormwater Municipal Best Management Practice Handbook, 2003
  https://www.casqa.org/sites/default/files/BMPHandbooks/BMP_Municipal_Complete.pdf

2. Fontana Characteristics

The TGD provides guidance on completing the WQMP template and references sources that can be used to identify characteristics that influence the designs proposed in the WQMP to address water quality concerns. This section provides easy to follow maps and tables to identify these key characteristics as they exist in the City. Information requested in the WQMP template that is not discussed in this section can be found in other references, likely the Watershed Geodatabase. The following guidance is provided in this section:

- Hydrologic soil group – required to assess HCOC (Form 3-2 in WQMP template)
- HCOC exempt areas – used to assess exemption and type of exemption (Form 3-3 in WQMP template)
- Receiving waters – required in watershed description (Form 3-3 in WQMP template)
- Unlined downstream water bodies – required in watershed description (Form 3-3 in WQMP template)
- Total Maximum Daily Loads (TMDLs) – required in watershed description (Form 3-3 in WQMP template)
- 303(d) List impairments – required in watershed description (Form 3-3 in WQMP template)

2.1 Hydrologic Soil Group

Form 3-2 in the WQMP template requires the hydrologic soil group within the project area to be identified as part of the HCOC assessment. **Figure 2-1** illustrates the hydrologic soil groups within the City. As shown in the figure, most of the City is considered Type A soils with some Type B soils located along the northern and southern boundaries of the City.

2.2 HCOC Exempt Areas

Form 3-3 in the WQMP template requires that HCOC areas be documented if applicable. **Figure 2-2** illustrates the HCOC exempt areas and the types of exemptions that occur throughout the City. As shown in the figure, a majority of the City is considered exempt from HCOC requirements. This is mostly due to the fact that a majority of the area drains to adequate sumps or are diverted to storage facilities. The various storage facilities (Basins/Dams) are shown in the figure.

2.3 Receiving Waters

Form 3-3 in the WQMP template requires the downstream receiving waters to be identified for the project site. Once the downstream receiving waters are identified, they will be used to assess what TMDLs and 303(d) List impairments exist downstream. It is important that new and redevelopment post-construction activities do not worsen existing impairments downstream. The identification of those impairments may dictate the types of BMPs proposed, both structural and non-structural. **Figure 2-3** illustrates the storm drain system in the region along with the receiving waters. The storm drain that will capture runoff from the project must be identified and then used to determine the downstream receiving waters. The entire City is located within the Santa Ana River Watershed and ultimately drains to the Santa Ana River. **Figure 2-4** demonstrates the flow path from various areas within the City. Once the nearest receiving water is identified, the figure can be used to determine the flow path to the Pacific Ocean.

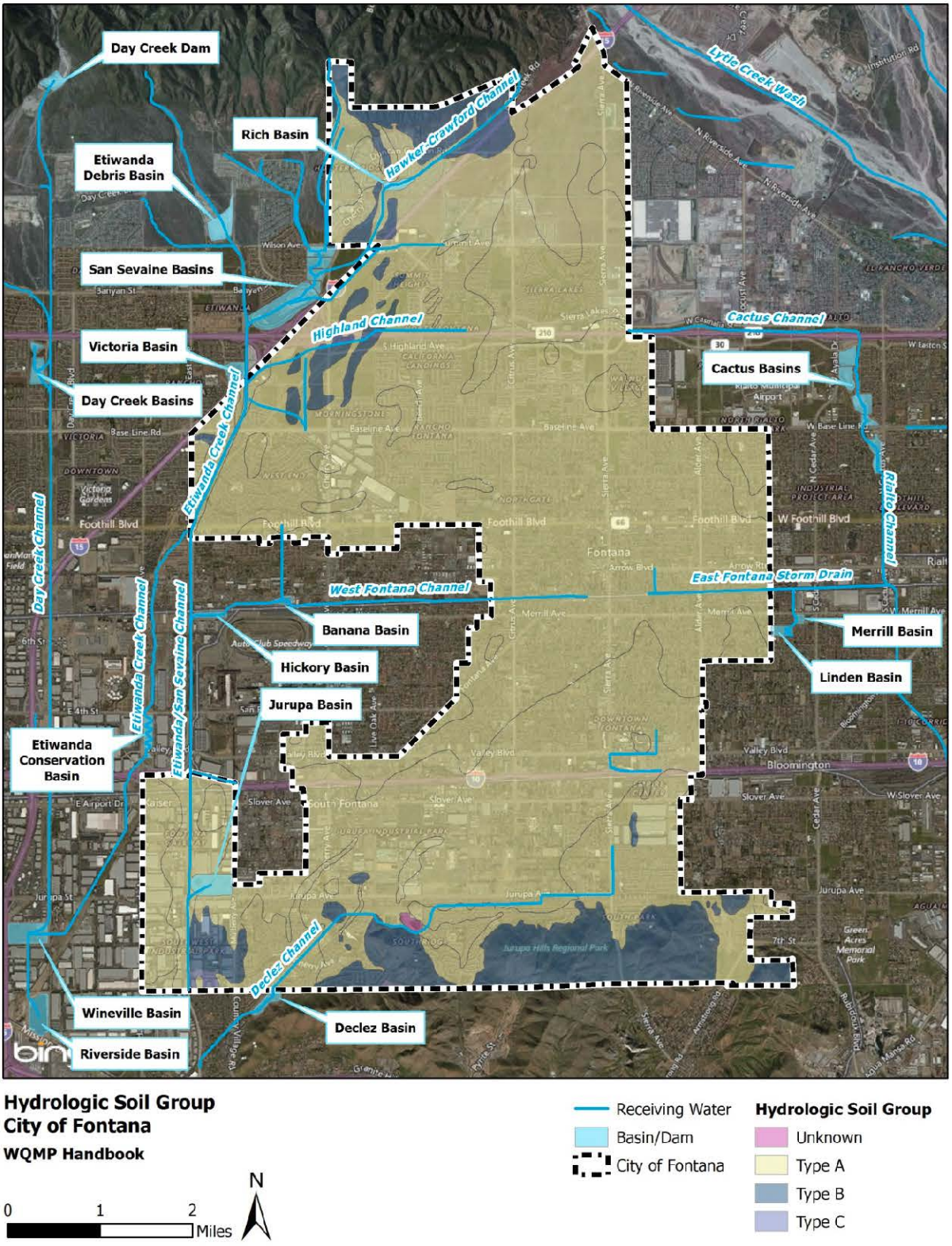


Figure 2-1 Hydrologic Soil Group

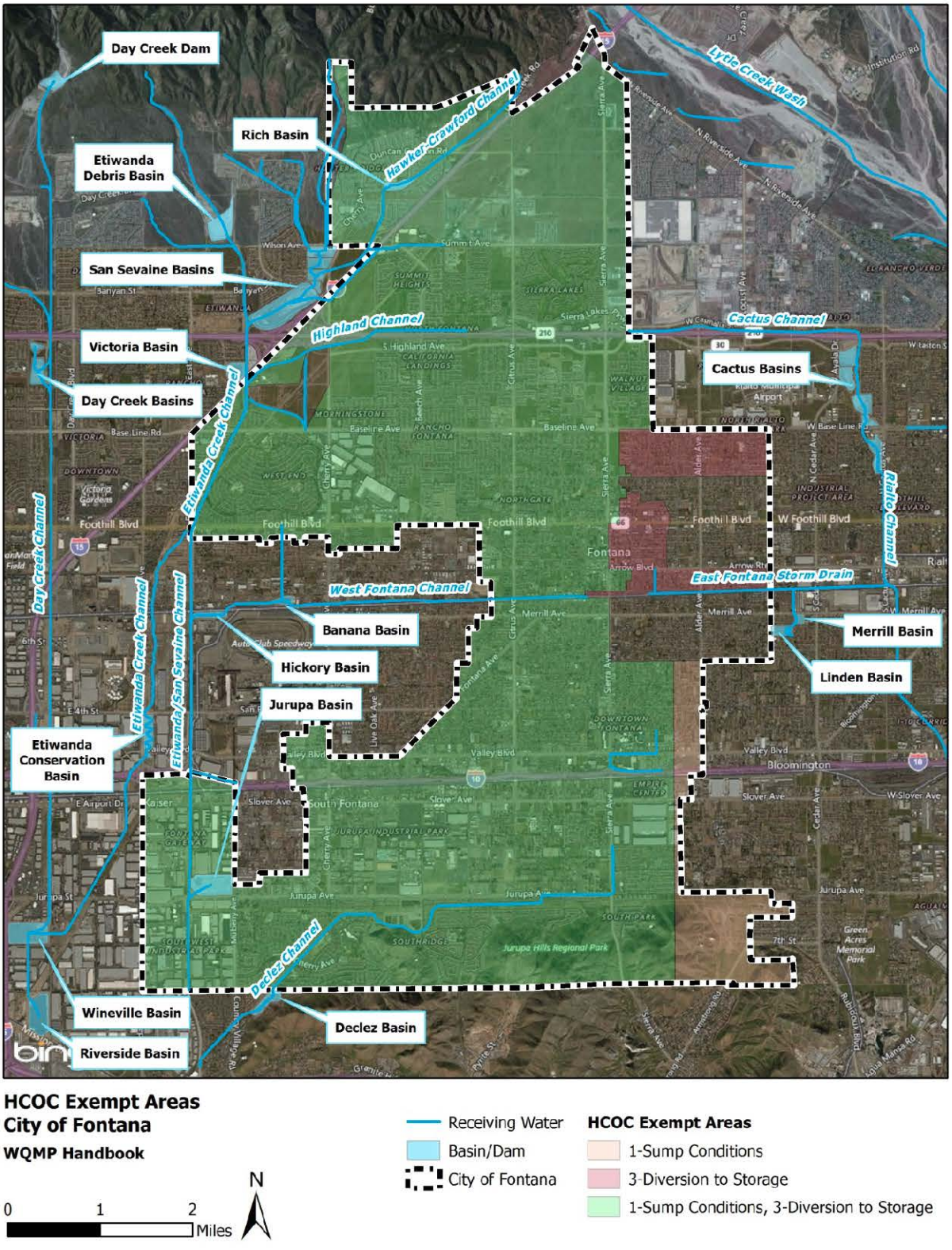


Figure 2-2 HCOC Exempt Areas

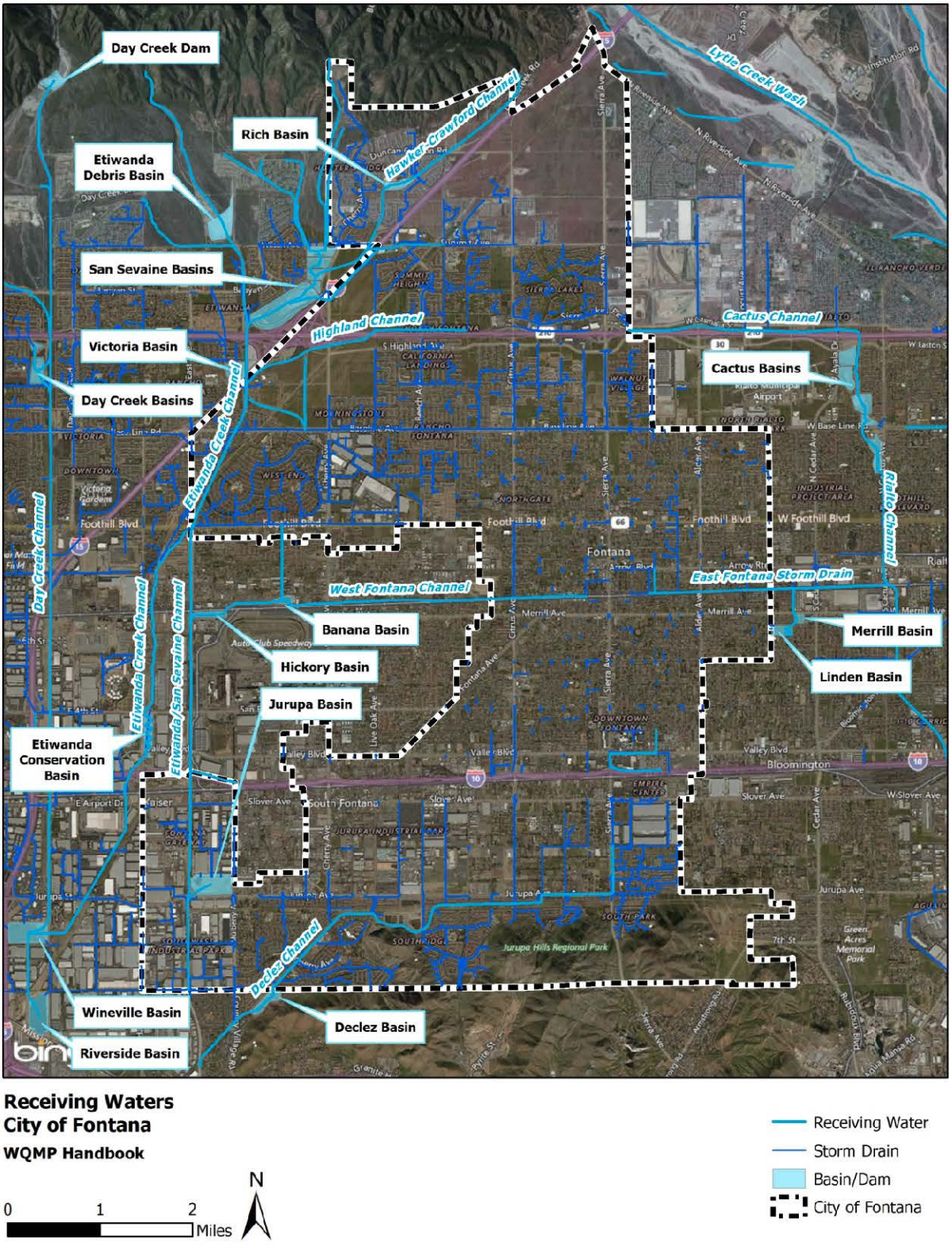


Figure 2-3 Receiving Waters

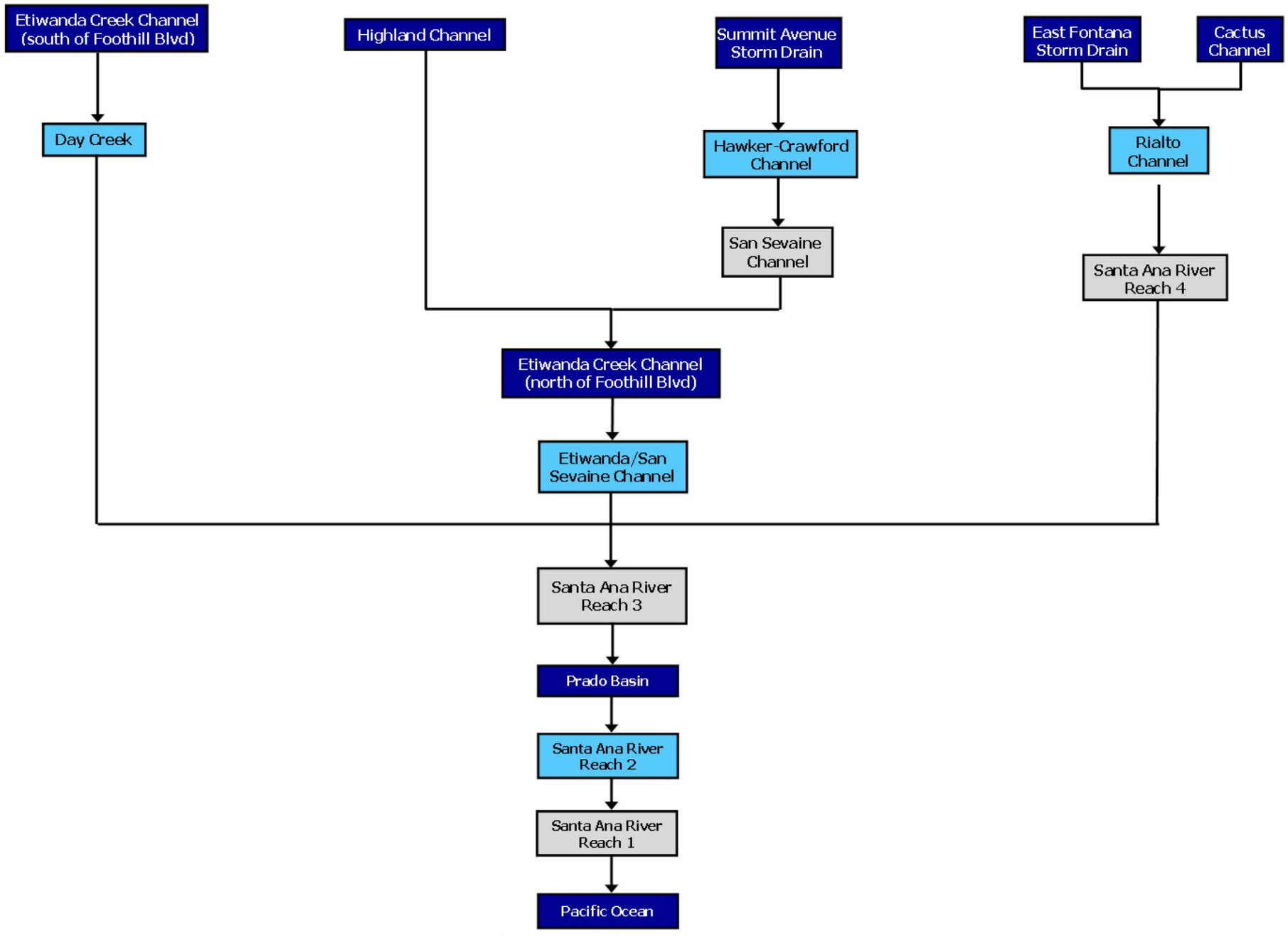


Figure 2-4 Receiving Waters Flow Chart

2.4 Unlined Downstream Water Bodies

Form 3-3 in the WQMP template requires unlined downstream water bodies to be identified for the project site. The determination of downstream receiving waters is detailed in **Section 2.3**. The unlined water bodies in the vicinity of the City, and project, are illustrated in **Figure 2-5**.

2.5 Total Maximum Daily Loads

Form 3-3 in the WQMP template requires the applicable TMDLs to be identified for the project. Pollutants of concern are pollutants that may be generated onsite **AND** are impairments downstream (TMDLs and/or 303(d) Listings). The WQMP must incorporate Low Impact Development (LID) BMPs that fully retain stormwater or provide medium or high effectiveness in reducing pollutants of concern prior to release if retention is not feasible. **Table 2-1** identifies the potential downstream receiving waters, as identified in **Section 2.3**, and the corresponding TMDLs.

Table 2-1 Summary of TMDLs Applicable to City

Receiving Water	TMDL
Santa Ana River Reach 3	Nitrate and Pathogens
Prado Dam (Prado Park Lake)	Pathogens

2.6 303(d) List Impairments

Form 3-3 in the WQMP template requires downstream 303(d) List impairments to be identified for the project. The Federal CWA Section 303(d) requires that States assess the quality of their waters every two years and publish a list of those waters not meeting the water quality standards established for them. For water bodies placed on the 303(d) List, States are required to develop TMDLs for the pollutant(s) that are causing impairments. As described in the section above, pollutants of concern are pollutants that may be generated onsite **AND** are impairments downstream (TMDLs and/or 303(d) Listings). The WQMP must incorporate LID BMPs that fully retain stormwater or provide medium or high effectiveness in reducing pollutants of concern prior to release if retention is not feasible. **Table 2-2** identifies the potential downstream receiving waters, as identified in **Section 2.3**, and the corresponding 303(d) List impairments.

Table 2-2 Summary of 303(d) Listings Applicable to City

Receiving Water	303(d) Listing
Santa Ana River Reach 4	Pathogens
Santa Ana River Reach 3	Copper, Lead, and Pathogens
Prado Dam (Prado Park Lake)	Nutrients and Pathogens
Santa Ana River Reach 2	Indicator Bacteria

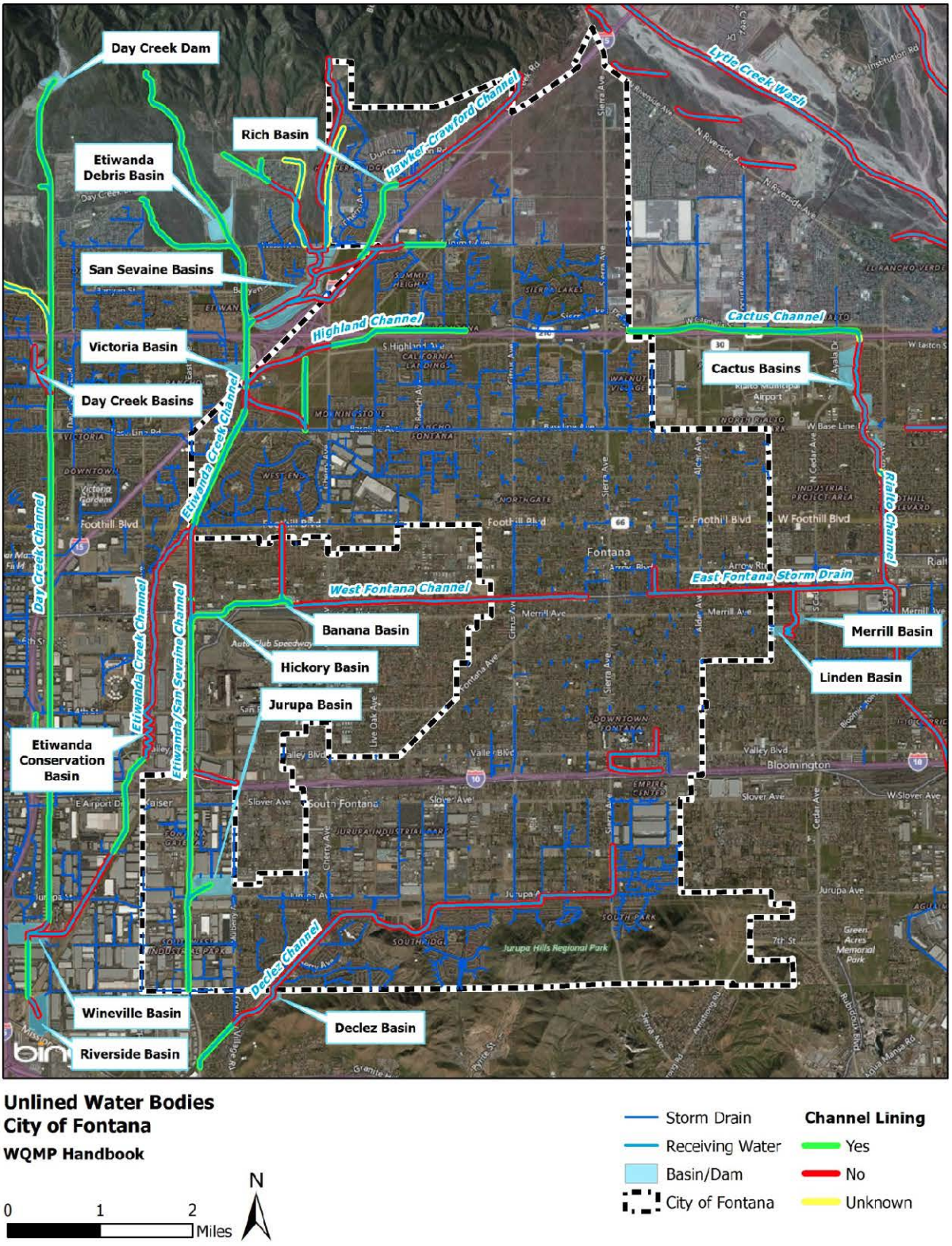


Figure 2-5 Unlined Water Bodies

3. BMP Selection

New and redevelopment projects that meet the criteria of a priority project, as described in **Section 1.1**, must incorporate post-construction BMPs into their site plan to mitigate potential negative water quality impacts often associated with new and redevelopment. This section provides tools and guidance to streamline the BMP selection process within the City.

3.1 Source Control BMPs

Source control BMPs are structural and non-structural BMPs that help control the source of pollutants rather than provide retention or treatment. Section 7 of the TGD provides details pertaining to the various source control BMPs that may be implemented onsite. This section summarizes key information that may be used to determine if a specific source control BMP is applicable to a project based on site characteristics and proposed activities onsite.

Table 3-1 identifies the potential source control BMPs that may be implemented onsite. The identifier and description match those identified in the TGD. The table specifies whether each source control BMP applies to all new and redevelopment projects or if it only applies to sites that include certain activities and/or site design features. **Table 3-2** summarizes potential project characteristics and activities and the source control BMPs that would apply to the project based on those characteristics and activities.

The following steps may be used to determine the source control BMPs that are applicable to a specific project:

1. Review the general project site design needs (landscaping, refuse containers, etc.)
2. Select the source control BMPs required for all WQMP projects from **Table 3-1**
3. Select any additional source control BMPs from **Table 3-1** based on the project characteristics and activities that apply to the project, as identified in **Table 3-2**
4. Review the source control BMPs in **Table 3-1** (see Section 7 of the TGD or the CASQA Handbook for BMP details) to confirm whether or not each control measure is applicable
5. Incorporate source control BMPs into the site design and relevant documents

Table 3-1 Source Control BMPs

Identifier	BMP Description	CASQA Handbook ID	Required for All WQMP Projects?
Non-Structural			
N1	Education for Property Owners, Tenants, and Occupants	--	Yes
N2	Activity Restrictions	--	No
N3	Landscape Management	SC-73	No
N4	BMP Maintenance	--	Yes
N5	Title 22 CCR Compliance	--	No
N6	City of Fontana Municipal Code Compliance	--	Yes

Identifier	BMP Description	CASQA Handbook ID	Required for All WQMP Projects?
N7	Spill Contingency Plan	SC-11	No
N8	Underground Storage Tank Compliance	--	No
N9	Hazardous Materials Disclosure Compliance	--	No
N10	Uniform Fire Code Implementation	--	Yes
N11	Litter Control	SC-60	Yes
N12	Employee Training	--	No
N13	Housekeeping of Loading Docks	SD-31	No
N14	Catch Basin Inspection	SC-74	No
N15	Vacuum Sweep Private Streets and Parking Lots	SC-43 & SC-70	No
N16	Other Non-structural Measures for Public Agency Projects	--	
N17	Comply with all other applicable NPDES permits	--	Yes
Structural			
S1	Provide storm drain system stenciling and signage	SD-13	No
S2	Design and construct outdoor material storage areas to reduce pollution introduction	SD-34	No
S3	Design and construct trash and waste storage areas to reduce pollution introduction	SD-32	No
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control	SD-12	No
S5	Finished grade of landscaped areas	--	No
S6	Protect slopes and channels and provide energy dissipation	--	No
S7	Loading dock areas	SD-31	No
S8	Maintenance bays	SD-31	No
S9	Vehicle wash areas	SD-33	No
S10	Outdoor processing areas	SD-36	No
S11	Equipment wash areas	--	No
S12	Fueling areas	SD-30	No
S13	Hillside landscaping	SD-10	No
S14	Wash water control for food preparation areas	--	No
S15	Community car wash racks	--	No

Table 3-2 Source Control BMPs Selection Worksheet

Project Feature / Activity	Non-Structural BMPs Always Included	Non-Structural BMPs	Structural BMPs
Onsite Storm Drain Inlets	N1, N4, N6, N10, N11, N17	N2, N12, N14	S1
Landscape/Outdoor Pesticide Use	N1, N4, N6, N10, N11, N17	N2, N3, N12	S4, S5, S6, S13
Food Service/Restaurants	N1, N4, N6, N10, N11, N17	N2, N12	S3, S14
Refuse Areas	N1, N4, N6, N10, N11, N17	N2, N12	S3

Project Feature/Activity	Non-Structural BMPs Always Included	Non-Structural BMPs	Structural BMPs
Outdoor Storage of Equipment or Materials	N1, N4, N6, N10, N11, N17	N2, N7, N9, N12	S2, S10
Vehicle and Equipment Cleaning	N1, N4, N6, N10, N11, N17	N2, N12	S8, S9, S11, S15
Vehicle/Equipment Repair and Maintenance	N1, N4, N6, N10, N11, N17	N2, N7, N12	S8, S12
Fuel Dispensing Areas	N1, N4, N6, N10, N11, N17	N2, N7, N8, N12	S12
Loading Docks	N1, N4, N6, N10, N11, N17	N2, N12, N13	S7
Streets and Parking Lots	N1, N4, N6, N10, N11, N17	N2, N12, N15	N/A
Underground Storage Tanks	N1, N4, N6, N10, N11, N17	N2, N8, N12	N/A
Hazardous Waste Handling/ Generation	N1, N4, N6, N10, N11, N17	N2, N5, N9, N12	N/A

Source: Adapted from the Technical Guidance Document for Water Quality Management Plans, County of San Bernardino Stormwater Program, September 2013

The TGD provides additional details on hydrologic source control BMPs. Hydrologic source control BMPs are differentiated from retention and biotreatment classes of BMPs by their higher level of integration within a site. They are not sized according to engineering design criteria, and they do not typically result in a distinct facility. They are usually regarded as site design practices instead of structural BMPs. Hydrologic source control BMPs include impervious area dispersion, localized on-lot infiltration, green/brown roof, blue roof, street trees, and residential rain barrels/cisterns.

3.2 LID BMPs

The TGD identifies the post-construction BMP hierarchy that must be followed when selecting structural LID BMPs to be included onsite. **Figure 3-1** illustrates the flow chart used in the TGD, which demonstrates that onsite infiltration/retention BMPs must be incorporated if feasible. If determined infeasible, the following types of BMPs must be evaluated in the order listed: capture and use BMPs, volume based biotreatment BMPs, flow based biotreatment BMPs, and alternative compliance. The flowchart evaluates whether the most preferred BMP satisfies the Design Capture Volume (DCV). If the DCV is not satisfied, then the remaining volume must be captured by the next priority BMP type and so on.

The City has developed a list of pre-approved BMPs to be implemented based on the type of new and/or redevelopment project and the future maintenance responsibility. **Figure 3-2** illustrates the flow chart that must be followed to select LID BMPs for priority projects within the City. **Section 3.2.1** provides guidance on the process that is to be followed if a BMP not already pre-approved by the City is proposed in the WQMP. Factsheets are included in **Attachment A** for each of the pre-approved LID BMPs based on the TGD and other local standards. Additionally, the LID BMP calculation forms, along with the other forms included in the WQMP template have been provided in an excel format in **Attachment B**. The Excel template automates the calculation process, links values to prevent inconsistencies, and streamlines the review process.

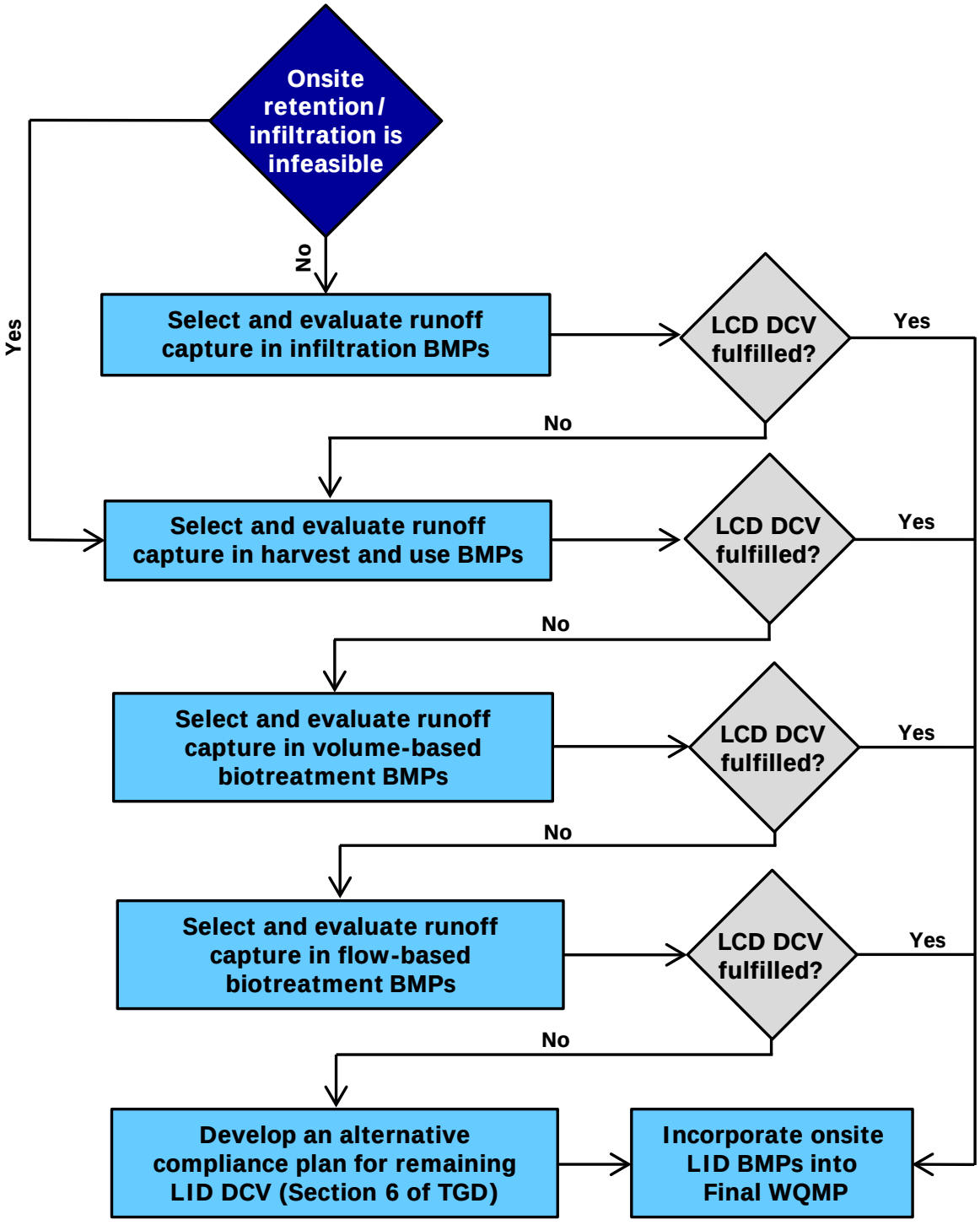


Figure 3-1 Onsite LID BMP Selection and Evaluation Flowchart

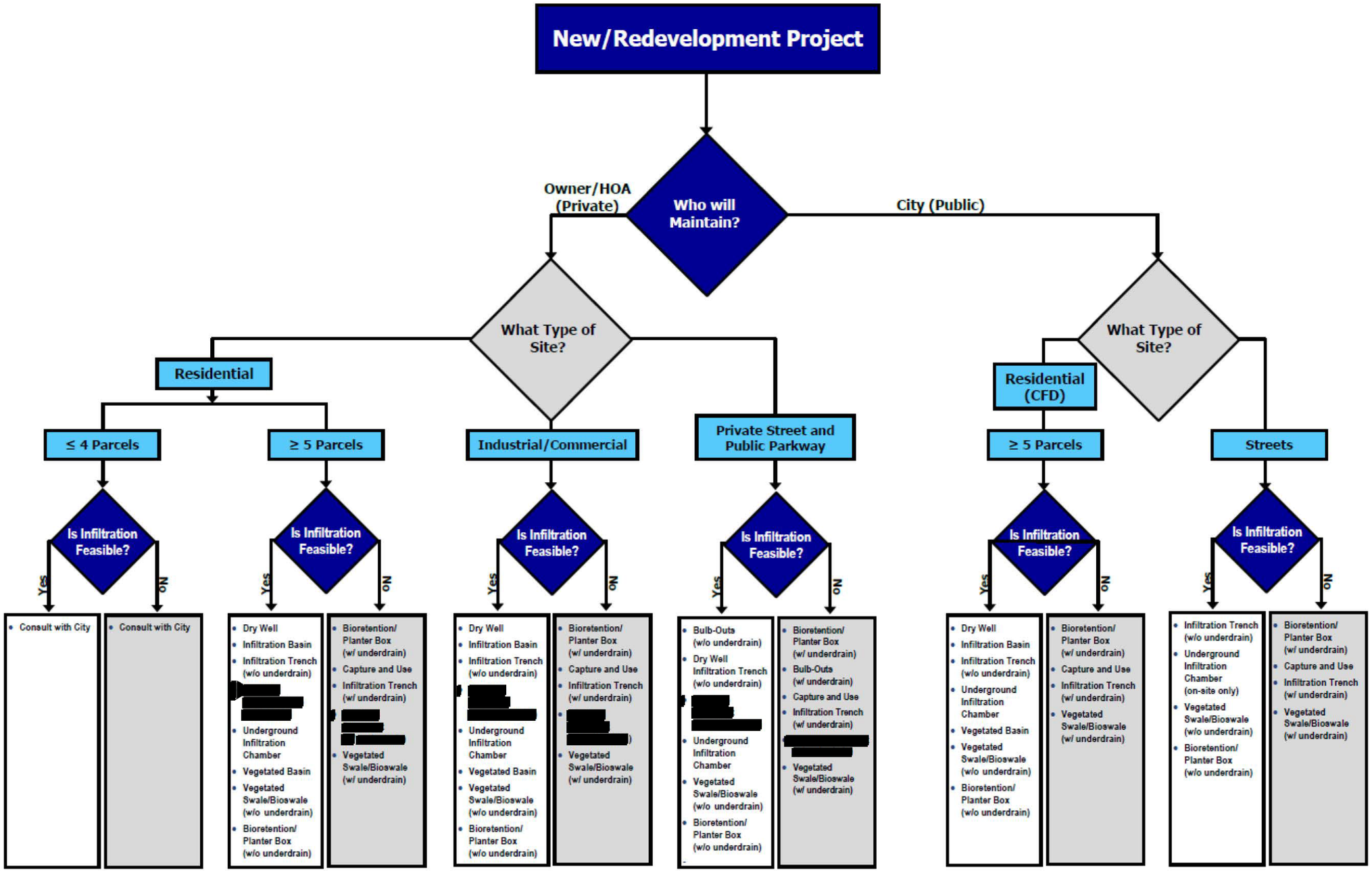


Figure 3-2 Pre-Approved LID BMP Flowchart

3.2.1 Selecting LID BMPs not Pre-Approved

If a priority project requiring a WQMP wishes to propose an LID BMP that has not been pre-approved by the City, then a formal request must be completed and submitted to the City for review prior to the submission of the WQMP.

Figure 3-3 summarizes the process that must be followed. The developer must submit seven copies of the BMP Information Form included in **Attachment C** along with supporting documents, which are identified in the form and include BMP cut sheets/factsheet, including maintenance requirements, calculations, and performance data (for treatment BMPs). The City will review the submittal package internally and send a letter to the developer explaining if the BMP was approved for inclusion in the WQMP.

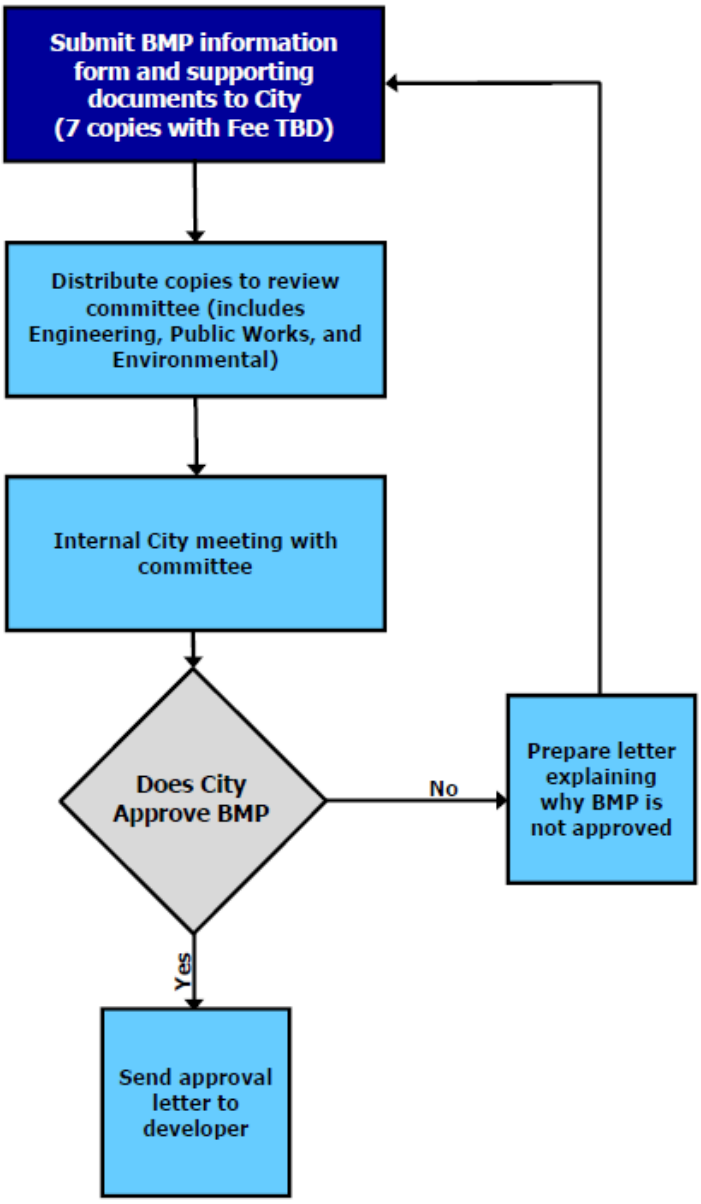


Figure 3-3 BMP Approval Process for BMPs that are not Pre-Approved

4. WQMP Approval Process

Priority projects must prepare and submit a WQMP for approval. The WQMP must be prepared using the WQMP template and in accordance with the TGD and this Handbook. Both a Preliminary- and Final-WQMP are required, which corresponds with a total of three WQMP approval phases. **Figure 4-1** illustrates the general procedure that must be followed when submitting a WQMP for approval. The developer must submit the entitlement application and Preliminary-WQMP to the Planning Division. This document must include a geotechnical report, calculations, and WQMP plan sheet(s). Once approved, the case planner will allocate a Project Engineer (PA) as being responsible for the Preliminary WQMP. A plan check will be performed by the City (internally or externally). City staff at the Engineering counter will be responsible for reviewing the WQMP considering the context of other entitlement applications, such as rough grading, civil, Community Facilities District (CFD), landscaping, etc. The City will then determine if the WQMP is approved. If the WQMP is not approved then the developer must revise the Preliminary-WQMP and resubmit. The project's Preliminary WQMP will then need to be approved by the Planning Commission.

Once the Preliminary-WQMP has been reviewed and approved then the developer will submit the Final-WQMP. The Final-WQMP must include the finalized WQMP site plan, additional details, and finalized grading plans. Once the Final WQMP has been submitted, the City will review the document and once it satisfies the requirements it will be considered plan check approved. The Final WQMP approval will come after the control measures are placed in the ground, the party responsible for maintenance has taken over, and the City has completed the necessary inspection. Once this has been taken care of, the WQMP process is satisfied. This will end the WQMP approval process.

When the City approves the Final-WQMP, the document must be recorded by the applicant at the end of the Project. The City will be responsible for inputting the project information into the MS4 Database and other tracking databases. The developer is responsible for submitting the WQMP Project Information Form found in **Attachment D** with each submittal of the WQMP. This form will be used to populate the MS4 Database. The project case number will be closed out and the Planning Division will provide a hard copy of the approved WQMP to the Public Works Department.

As the post-construction BMPs are being constructed, the property owner will be required to coordinate with the City for the required inspections. **Attachment E** includes a BMP Installation and Inspection Schedule, WQMP Punch Card, which identifies when inspections are required during the post-construction BMP installation. The project will be considered complete once all of the required inspections have been performed and once the project has filed their Notice of Termination (NOT) on the Stormwater Multiple Applications and Report Tracking System (SMARTS). The NOT is related to the Stormwater Pollution Prevention Plan (SWPPP) prepared for the construction activities; however, once the NOT is filed it is assumed all post-construction BMPs are in place and the WQMP is finalized.

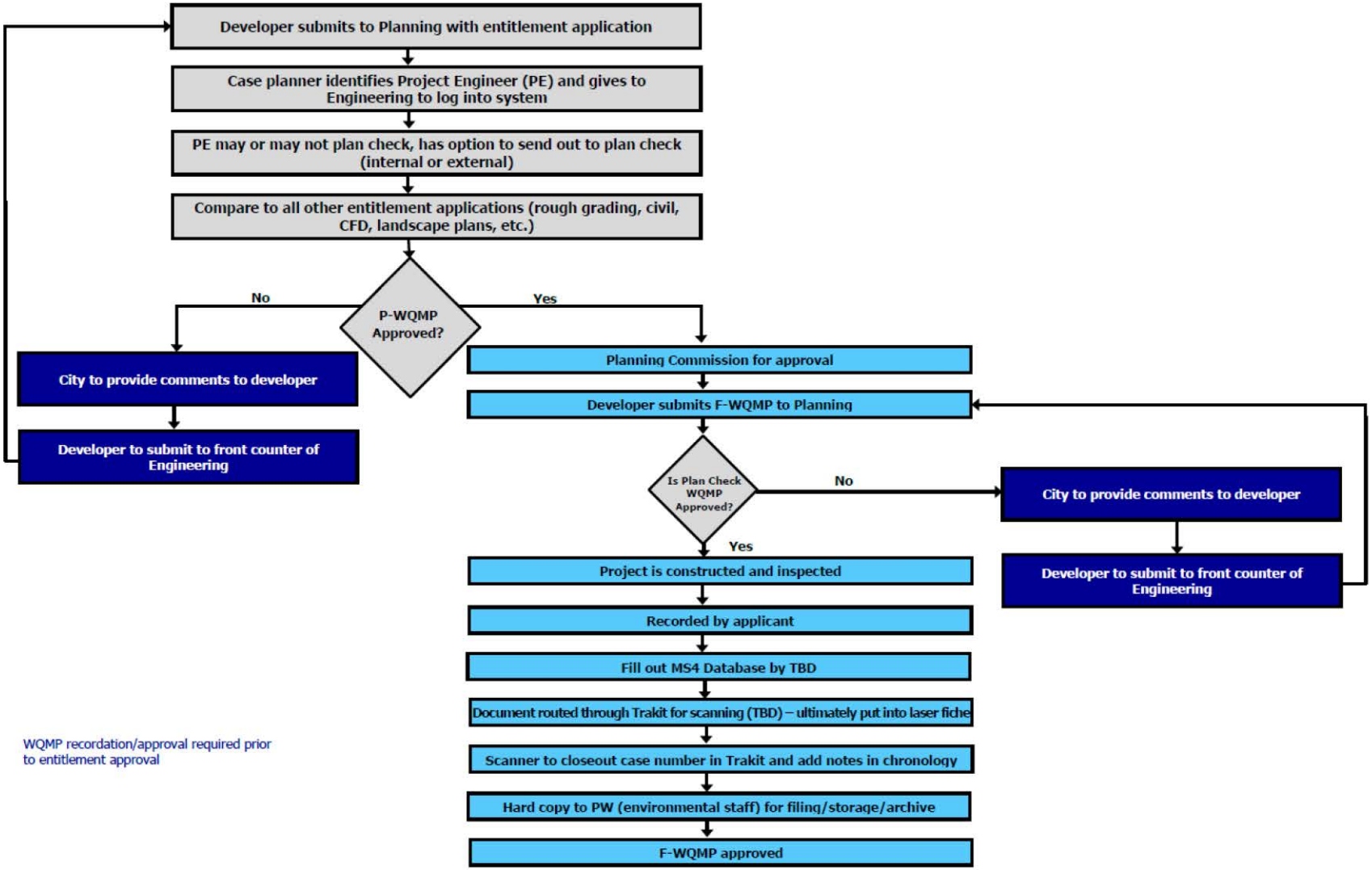


Figure 4-1 WQMP Approval Flowchart

Attachment A

Pre-Approved LID BMP Factsheets

Infiltration Trench

Infiltration trenches are long, narrow, rock-filled areas with an underground reservoir that stores runoff. Runoff is stored in the void spaces and infiltrates through the bottom and sides of the trench into the soil matrix. If infiltration is not feasible, an underdrain may be provided near the trench invert. Infiltration trenches with an underdrain provide moderate treatment/removal of metals, particulates, oil and grease. Infiltration trenches without underdrains remove 100% of the pollutant load, as infiltration is a volume reduction which results in complete pollutant removal.

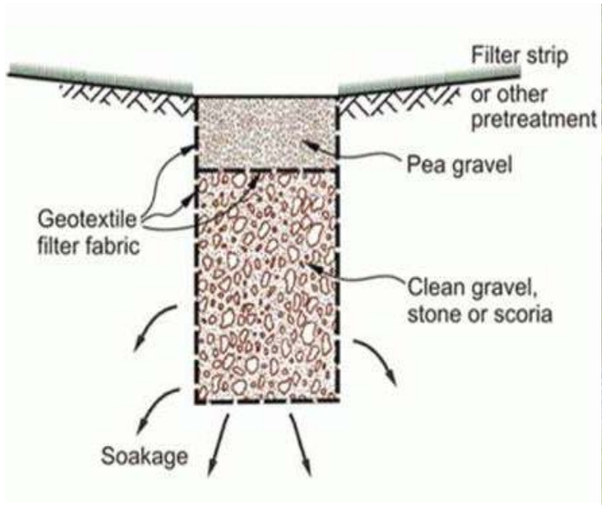
Design Criteria and Constraints

Design Parameter	Design Criteria
Design drawdown time	48 hours (without underdrain)
Maximum drainage area	10 acres
Maximum trench depth	8 feet (1 foot maximum ponding)
Maximum filter strip slope	1%
Minimum filter strip width	5 feet in the direction of flow for all areas draining to trench
Historic high groundwater mark setback	> 10 feet below invert (without underdrain) > 4 feet below surface (with underdrain)
Bedrock/impermeable layer setback	> 5 feet below invert (without underdrain)
Tree setback	Mature tree drip line must not overhang trench
Well/tank/spring setback	> 100 feet horizontally from trench

Note: Infiltration trenches with underdrain perforated pipes should have minimum diameter of 6 inches, minimum lateral spacing of 10 feet, and minimum slope of 0.5%

Material Specifications

Design Parameter	Design Criteria
Reservoir rock material	AASHTO #3 or 57 material or a clean, washed aggregate 1-3 inches in diameter
Filter strip material	Mulch or grasses
Trench lining material	As recommended in Geotechnical Report



Operation

1. Sediment control: pretreatment is required, as infiltration trenches have the risk of becoming clogged over time
2. Observation wells: observation wells must be provided every 50 feet to serve as cleanouts
3. Overflow system: an overflow route is needed to redirect excessive flows to downstream conveyance system in the event of clogging or large storm event
4. Slope: invert slope effects storage volume; no slope ensures storage volume is calculated properly

Maintenance

Maintenance Activities	Suggested Frequency
Remove sediment, trash, debris, grass clippings, trees, and other larger vegetation	Every two weeks, or standard maintenance as needed
Check for surface ponding and observation well for ponding. If ponded, remove and wash or replace pea gravel layer.	48 hours after a significant rainfall event

Infiltration/Vegetated Basin

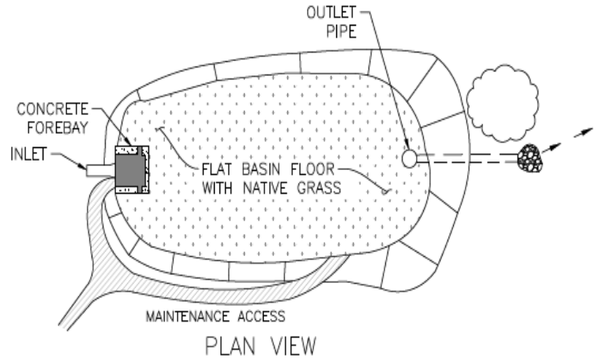
Infiltration basins consist of an earthen basin with a flat floor constructed in naturally pervious soils. Infiltration basins are designed to capture runoff and infiltrate it back into the soil matrix, thus contributing to groundwater recharge. Infiltration basins can be earthen or vegetated.

Design Criteria and Constraints

Design Parameter	Design Criteria
Design drawdown time	48 hours
Maximum treatment area	50 acres
Maximum depth	5 feet
Minimum freeboard	1 foot
Minimum height of concrete forebay splashwall	1 foot
Forebay volume	≥ 0.5% of design volume
Basin slope	0%
Historic high groundwater mark setback	> 10 feet below invert
Bedrock/impermeable layer setback	> 5 feet below invert
Tree setback	Mature tree drip line must not overhang the basin
Well/tank/spring horizontal setback	> 100 feet horizontally from basin

Material Specifications

Design Parameter	Design Criteria
Basin vegetation	Native grasses able to withstand periods of inundation and long term drought



Operation

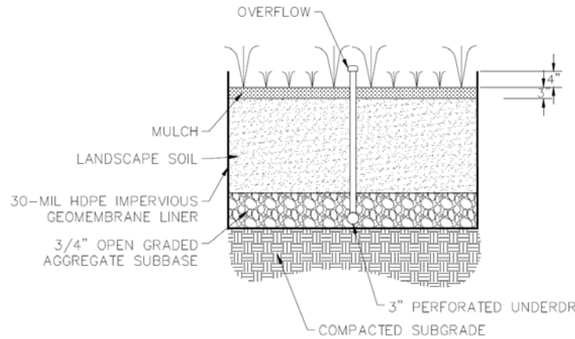
1. Forebay: a concrete forebay must be provided to reduce sediment clogging and erosion
2. Overflow system: an overflow route is needed to redirect excessive flows to a downstream conveyance system in the event of clogging or a large storm event
3. Accaccessibility: the basin invert must be accessible so the required maintenance can be performed
4. Post-construction (vegetated basins): regularly water during the first three months as vegetation establishes roots, and check the swale drains within the design drawdown time
5. Slope: invert slope effects storage volume; no slope ensures storage volume is calculated properly

Maintenance

Maintenance Activities	Suggested Frequency
Maintain vegetation and re-vegetate as needed	Ongoing
Remove sediment, trash, and debris to minimize clogging	Ongoing standard maintenance as-needed before annual storm seasons and following rainfall events
Check basin for sediment deposits and clean as needed	Annually
Check for long term standing water and correct for drainage deficiencies if necessary	48 hours after a significant rainfall event

Bioretention/Planter Box

Bioretention/planter boxes are shallow, vegetated depressions underlain by an engineered soil media. Bioretention/planter boxes can be used when infiltration is determined to be infeasible by including an underdrain or used without an underdrain to promote infiltration. When an underdrain is included, flows are captured and discharged once they have been treated through the media matrix. Bioretention/planter boxes with underdrains provide excellent treatment of metals, nutrients, and particulates. Bioretention/planter boxes without underdrains remove 100% of the pollutant load, as infiltration is a volume reduction which results in complete pollutant removal.



Design Criteria and Constraints

Design Parameter	Design Criteria
Drainage area	1-10 acres
Design drawdown time	48 hours (without underdrain)
Maximum ponding depth	18 inches (6 inches minimum)
Maximum pounding area side slope	3:1 (vertical allowed if perpendicular to walkways/parking stalls)
Depth of mulch layer above bioretention	2-3 inches
Minimum depth of engineered soil media	18 inches
Minimum depth gravel layer	12 inches

Note: Bioretention/planter boxes with underdrain perforated pipes should have minimum diameter of 6 inches, minimum lateral spacing of 5 feet, and minimum slope of 0.5%. Historic high groundwater mark, bedrock, tree, and well/tank/spring horizontal setbacks identified for other infiltration BMPs apply if an underdrain is not proposed.

Material Specifications

Design Parameter	Design Criteria
Planter box structure	Stone, concrete, brick, and other stable materials
Vegetation for bioretention/planter box	Native grasses, shrubs, and small trees
Engineered soil mix	85% mineral component (sandy loam with the following specifications: 70-80% sand, 15-20% silt, 5-10% clay) and 15% organic component

Operation

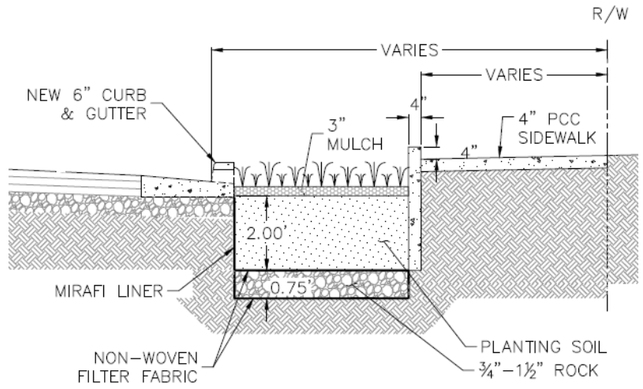
1. Post-construction: regularly water during the first three months as vegetation establishes roots, and check the swale drains within the design drawdown time
2. Curb cuts: curb cuts or inlets should be placed approximately every 10 feet around the perimeter of the bioretention/planter box to allow runoff into the box and must include erosion control (curb cut must be at least 1 foot wide and include local depression)
3. Overflow system: an overflow route is needed to redirect excessive flows to a downstream conveyance system in case of clogging or a large storm event
4. Observation wells: observation wells must be provided every 50 feet to serve as cleanouts if underdrains are used
5. Slope: invert slope effects storage volume; no slope ensures storage volume is calculated properly

Maintenance

Maintenance Activities	Suggested Frequency
Remove trash and debris	Ongoing standard maintenance as needed
Replace surface mulch layers	Maintain required depth of 2-3 inches
Check for ponding	48 hours after a significant rainfall event
Inspect/clean inlets and outlets	Annually before the storm season (October)

Vegetated Swale/Bioswale

Vegetated swales, or referred to as bioswales, are broad, shallow channels with dense vegetation covering the side slope and bottom. The vegetation in the swale provides pollutant removal though settling and filtration. Vegetated swales can potentially eliminate the need for curbs, gutters, and storm drains and are typically designed with an underdrain, but can also be used without to promote infiltration. Vegetated swales/bioswales are often used along roadways to capture street runoff. Vegetated swales with an underdrain provide moderate treatment/removal of metals, particulates, oil and grease. Vegetated swales/bioswales without underdrains remove 100% of the pollutant load, as infiltration is a volume reduction which results in complete pollutant removal.



Design Criteria and Constraints

Design Parameter	Design Criteria
Design drawdown time	48 hours
Drainage area	1-10 acres
Maximum swale bottom width	2 feet
Vegetation height	4-6 inches
Historic high groundwater mark setback	> 10 feet below invert (without underdrain) > 4 feet below surface (with underdrain)
Bedrock/impermeable layer setback	> 5 feet below invert (without underdrain)
Building foundations setback	10-100 feet
Well/tank/spring horizontal setback	> 100 feet horizontally from swale (without underdrain)

Note: Vegetated swales/bioswales with underdrain perforated pipes should have minimum diameter of 6 inches and minimum slope of 0.5%

Material Specifications

Design Parameter	Design Criteria
Swale vegetation	Fine, close-growing, water-resistant grasses, shrubs, and small trees
Engineered soil mix	85% mineral component (sandy loam with the following specifications: 70-80% sand, 15-20% silt, 5-10% clay) and 15% organic component

Operation

1. Post-construction: regularly water during the first three months as vegetation establishes roots, and check the swale drains within the design drawdown time
2. Curb cuts: curb cuts or inlets should be placed approximately every 10 feet around the perimeter of the vegetated swale/bioswale to allow runoff into the box and must include erosion control (curb cut must be at least 1 foot wide and include local depression)
3. Overflow system: an overflow route is needed to redirect excessive flows to a downstream conveyance system in case of clogging or a large storm event
4. Observation wells: observation wells must be provided every 50 feet to serve as cleanouts if underdrains are used
5. Slope: invert slope effects storage volume; no slope ensures storage volume is calculated properly

Maintenance

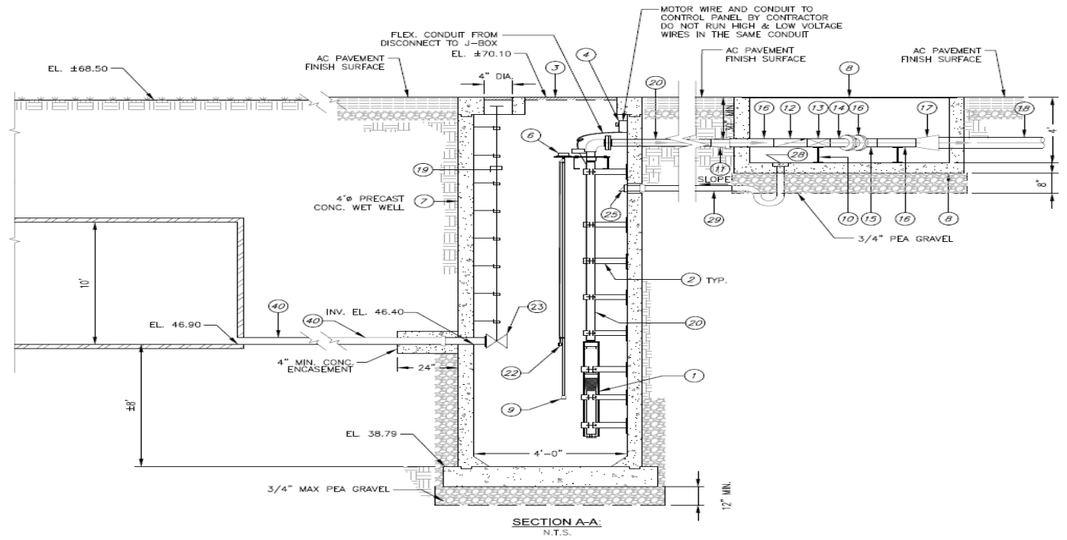
Maintenance Activities	Suggested Frequency
Check the erosion and damage to vegetation	Semi-annually, or beginning and end of rainy season
Remove debris, trash, and accumulated sediment	Semi-annually, or beginning and end of rainy season
Mow and re-plant grass to maintain vegetation height	As needed, and remove litter prior to mowing

Capture and Use

Capture and use systems include storage facilities, irrigation pumps, and distribution lines. The collected runoff is temporarily stored and can be plumbed for irrigation, industrial processes, and other non-potable uses on a case-by case basis and as determined by regional restrictions. Capture and use BMPs remove 100% of the pollutant load, as they provide a volume reduction which results in complete pollutant removal.

Design Criteria and Constraints

Design Parameter	Design Criteria
Drainage area	Limited by the cistern/detention storage size and Estimated Applied Water Use (ETWU)
Maximum distance between access points	50 feet
Minimum diameter of access entry covers at storage system	36 inches



Material Specifications

Design Parameter	Design Criteria
Cistern/detention structure	Concrete, steel, and/or high-density polyethylene (HDPE)

Operation

1. Underground detention facilities: cisterns should be installed on consolidated and stable native soil, but if not, a geotechnical analysis should be performed to ensure stability
2. Pretreatment: proper pretreatment measure must be provided to prevent sediment accumulation
3. Plumbing system: plumbing systems should be installed in accordance with California Building and Plumbing Codes
4. Make up water system must be provided unless parallel irrigation systems are installed (consult local Health Department and/or water department for cross connection requirements)
5. Overflow system: an overflow route is needed to redirect excessive flows to a downstream conveyance system in case of clogging or a large storm event

Maintenance

Maintenance Activities	Suggested Frequency
Remove debris and sediment from pretreatment and storage system	Annually before wet season
Verify proper operation of all pumps	Annually
Check locking mechanisms on entry covers	Annually before wet season
Check mosquito screens (if applicable)	Annually before wet season

Note: Maintenance specifications from vendors for proprietary systems must be considered

Underground Infiltration Chamber

Underground infiltration chambers often include a vault or chamber with an open bottom that is used to store and infiltrate runoff. Alternatively, perforated pipes can also be used. Durable prefabricated structures are offered by a number of vendors. Retention volume provided by underground infiltration chambers is a function of the infiltrating surface area. Underground infiltration chambers remove pollutants infiltrated through the system, as infiltration is a volume reduction which results in a 100% pollutant load reduction.

Design Criteria and Constraints

Design Parameter	Design Criteria
Maximum drawdown time	48 hours
Maximum drainage area	50 acres
Maximum distance between cleanouts	50 feet
Minimum diameter of access entry covers	36 inches
Historic high groundwater mark setback	> 10 feet below invert of system
Bedrock/impermeable layer setback	> 5 feet below invert of system
Well/tank/spring setback	> 100 feet horizontally from system

Note: Sizing for an underground infiltration chamber is similar to that of infiltration basins

Material Specifications

Design Parameter	Design Criteria
Chamber Structure	Concrete, steel, plastics, and other stable materials

Operation

1. Siting consideration: underground infiltration chamber are not permitted near steep slopes or existing soil contamination areas
2. Pretreatment: pretreatment should be provided upstream of the infiltration chamber to mitigate the risk of groundwater contamination
3. Overflow system: an overflow route is needed to redirect excessive flows to a downstream conveyance system in case of clogging or a large storm event

Maintenance

Maintenance Activities	Suggested Frequency
Remove sediment, trash, and debris from pretreatment facilities and storage chambers	Ongoing standard maintenance as needed
Check inlets/outlets and clean as needed	Ongoing standard maintenance as needed
Check access points and maintain	Annually before the wet season

Note: Maintenance specifications from vendors for proprietary systems must be considered

Dry Well

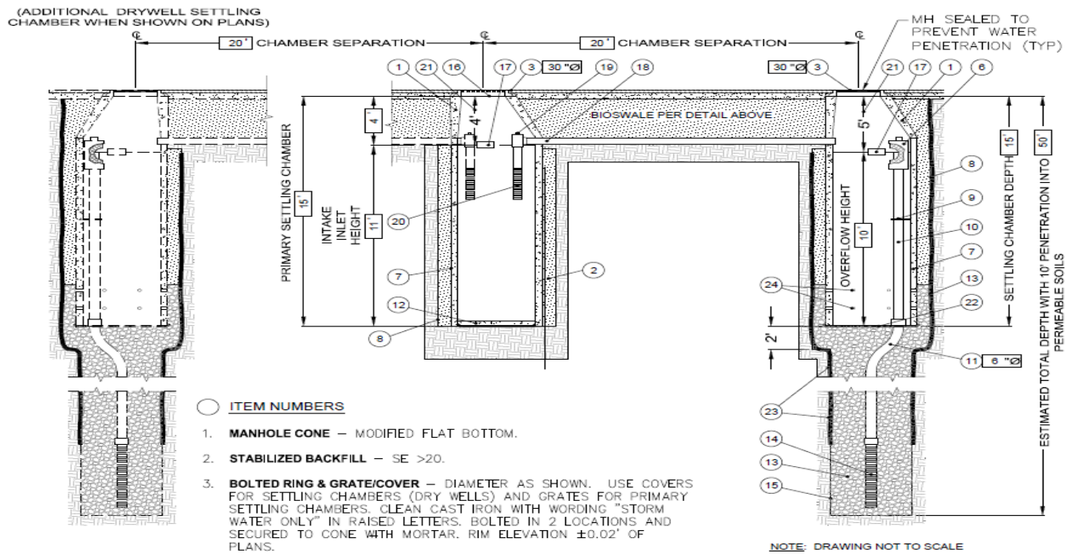
Dry wells, similar to infiltration trenches in design and function, are underground, open-bottomed chambers used to infiltrate runoff into the surrounding soil for groundwater recharge. Dry wells have a great depth to footprint ratio and can be installed at relatively large depths. A dry well can be a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment.

Design Criteria and Constraints

Design Parameter	Design Criteria
Maximum drawdown time	48 hours
Infiltration rate of soils	Must be checked at various depths, including the invert of the proposed dry well
Maximum diameter of dry well	12 feet
Depth of dry well	As approved by a geotechnical professional
Historic high groundwater mark setback	> 10 feet below invert of dry well
Bedrock/impermeable layer setback	> 5 feet below invert of dry well
Well/tank/spring setback	> 100 feet horizontally from dry well
Building foundation setback	> 100 feet horizontally from dry well

Material Specifications

Design Parameter	Design Criteria
Dry well structure	Pipe, concrete, or approved proprietary device
Backfill/fill material	AASHTO #2/3, or double-washed rock with diameter range of 1.5 to 3 inches



Operation

1. Access: dry wells should have a direct access path for maintenance activities
2. Pretreatment: dry wells require pretreatment to prevent sediment and trash accumulation from clogging the well in areas with high sediment loads
3. Overflow system: dry wells should be constructed to operate offline, and an overflow route is needed to redirect excessive flows to downstream conveyance system

Maintenance

Maintenance Activities	Suggested Frequency
Remove sediment, trash, and debris	Ongoing standard maintenance as needed
Drain well via pumping	If the dry well has not drained within 48 hours after the end of a storm, clean perforated piping and gravel media

Note: Maintenance specifications from vendors for proprietary systems must be considered

Bulb-outs

Bulb-outs, also referred to as curb-extensions, extend the sidewalk into the parking lane and may include planters to address stormwater runoff. Bulb-outs enhance pedestrian safety by slowing vehicles. Bulb-outs can be used to promote infiltration or if infiltration rates are insufficient an underdrain may be included. Bulb-outs are most effective on wide streets with on-street parking. The cross section within the bulb-out should mimic bioretention/planter boxes. Bulb-outs with an underdrain provide moderate treatment/removal of metals, particulates, oil and grease. Bulb-outs without underdrains remove 100% of the pollutant load, as infiltration is a volume reduction which results in complete pollutant removal.

Design Criteria and Constraints

Design Parameter	Design Criteria
Drainage area	1-10 acres
Maximum drawdown time	48 hours (without underdrain)
Maximum ponding depth	18 inches (6 inches minimum)
Depth of mulch layer	2-3 inches
Minimum depth of engineered soil media	18 inches
Minimum depth gravel layer	12 inches (with underdrain)
Historic high groundwater mark setback	> 10 feet below invert (without underdrain) > 4 feet below surface (with underdrain)
Bedrock/impermeable layer setback	> 5 feet below invert
Well/tank/spring horizontal setback	> 100 feet horizontally (without underdrain)

Note: Bulb-outs with underdrain perforated pipes should have minimum diameter of 6 inches, minimum lateral spacing of 10 feet, and minimum slope of 0.5%

Material Specifications

Design Parameter	Design Criteria
Swale vegetation	Fine, close-growing, water-resistant grasses, shrubs, and small trees
Engineered soil mix	85% mineral component (sandy loam with the following specifications: 70-80% sand, 15-20% silt, 5-10% clay) and 15% organic component

Operation

1. Post-construction: regularly water during the first three months as vegetation establishes roots, and check the swale drains within the design drawdown time
2. Curb cuts: curb cuts or inlets should be placed on the upstream side of the bulb-out and approximately every 10 feet around the perimeter to capture runoff and must include erosion control (curb cut must be at least 1 foot wide and include local depression)
3. Overflow system: an overflow route is needed to redirect excessive flows to a downstream conveyance system in case of clogging or a large storm event
4. Observation wells: observation wells must be provided every 50 feet to serve as cleanouts if underdrains are used
5. Slope: invert slope effects storage volume; no slope ensures storage volume is calculated properly

Maintenance

Maintenance Activities	Suggested Frequency
Remove trash and debris	Ongoing standard maintenance as needed
Replace surface mulch layers	Maintain required depth of 2-3 inches
Check for ponding	48 hours after a significant rainfall event
Inspect/clean inlets and outlets	Annually before the storm season (October)

Attachment B

WQMP Template Excel Forms

Attachment C

BMP Information Form

BMP INFORMATION FORM

for BMPs that are not Pre-Approved

Developer Name: _____

Developer Company: _____

Project Name: _____

Project Location: _____

BMP to be approved: _____

Is BMP proprietary?	☐ Yes	☐ No
Is infiltration feasible?	☐ Yes	☐ No
Select type of development:	☐ Residential (≤ 4 parcels)	☐ Residential (≥ 5 parcels)
	☐ Residential (CFD)	☐ Commercial/Industrial
	☐ Private streets and public parkway	☐ Streets (public)
Who will maintain?	☐ Owner/HOA (private)	☐ City (public)

Please explain why the pre-approved BMPs will not be used and how the proposed BMP will combat those issues.	

Please populate the table below with the inspection and maintenance procedures and frequency.

	Activities	**Frequency**
Inspection		
Maintenance		

Please include the following supporting documents:

Document	**Included?**	**Comments**
BMP cut sheet, including maintenance (if proprietary)	☐ Yes ☐ No	
BMP factsheet, including maintenance (if not proprietary)	☐ Yes ☐ No	
Calculations (if site design is done/in progress)	☐ Yes ☐ No	
Performance data (for treatment BMPs)	☐ Yes ☐ No	

Attachment D

WQMP Project Information Form

Attachment E

BMP Installation and Inspection Schedule
WQMP BMP Punch Card

BMP INSTALLATION AND INSPECTION SCHEDULE

WQMP Punch Card

INSPECTION REQUEST LINE: (909) 350-7693

Requests made by 5:00 P.M. will be scheduled for the next business day. Fridays, holidays, and weekends are not considered business days. Business days are considered as Monday – Thursday.

Inspection #	BMP Installation and Inspection Schedule	Sign Off
Bioretention/Planter Box		
1	When excavated	
2	When structure is constructed	
3	When fabrics are installed (if applicable)	
4	When inlets, outlets, and underdrains are installed (if applicable)	
5	When planted and irrigation is operational (completed)	
Bulb-Out		
1	When excavated	
2	When structure is constructed	
3	When fabrics are installed (if applicable)	
4	When inlets (curb cuts), outlets, and underdrains are installed	
5	When planted and irrigation operational (completed)	
Capture and Use		
1	When storage system and pump well are excavated	
2	When fabrics and initial gravel layer are installed	
3	When storage system and necessary appurtenances are installed	
4	When backfilling around storage structure	
5	When inlets, outlets, and piping is installed	
6	When pumps and irrigation equipment is installed	
7	When planted and irrigation is operational (completed)	
Dry Well		
1	When well is excavated	
2	When pretreatment, inlets, and outlets are installed	
3	When system is ready to receive flow (completed)	
Infiltration Basin		
1	When excavated	
2	When inlets and outlets are installed	
3	When side slopes are stabilized and ready to receive flow (completed)	
Infiltration Trench		
1	When excavated	
2	When underdrain is installed (is applicable)	
3	When reservoir layer is installed	
4	When inlets and outlets are installed	
5	When system is ready to receive flow (completed)	

BMP INSTALLATION AND INSPECTION SCHEDULE

WQMP Punch Card

Inspection #	BMP Installation and Inspection Schedule	Sign Off
[redacted]		
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
[redacted]	[redacted]	
Underground Infiltration Chamber		
1	When excavated	
2	When fabrics and initial gravel layer is installed	
3	When storage system and necessary appurtenances are installed	
4	When backfilling around storage structure	
5	When system is ready to receive flow (completed)	
Vegetated Basin		
1	When excavated	
2	When inlets and outlets are installed	
3	When side slopes are stabilized	
4	When planted and irrigation is operational (completed)	
Vegetated Swale/Bioswale		
1	When graded	
2	When fabrics are installed (if applicable)	
3	When inlets, outlets, and underdrains (if applicable) are installed	
4	When planted and irrigation is operational (completed)	