RIVERSIDE COUNTY
WATERSHED PROTECTION

rcwatershed.org

# WQMP Training for Municipal Staff



Prepared For: Santa Ana River Watershed Permittees

Presented By: CASC Engineering and Consulting, Inc.

Spring 2019

# MS4 Permit Annual Training

rcwatershed.org

- Permittees are required to provide annual training
- Today's training is part of the formal WQMP review training
  - Stormwater Managers
  - Planners
  - For those involved in WQMP reviews

# MS4 SAR Permittees

rcwatershed.org

- Riverside County Flood Control and Water Conservation District
- County of Riverside
- Beaumont
- Calimesa
- Canyon Lake
- Corona
- Hemet
- Lake Elsinore
- Menifee
- Moreno Valley
- Murrieta
- Norco
- Perris
- Riverside
- San Jacinto
- Wildomar

# WQMP Overview and Key Documents

# Development Program Summary

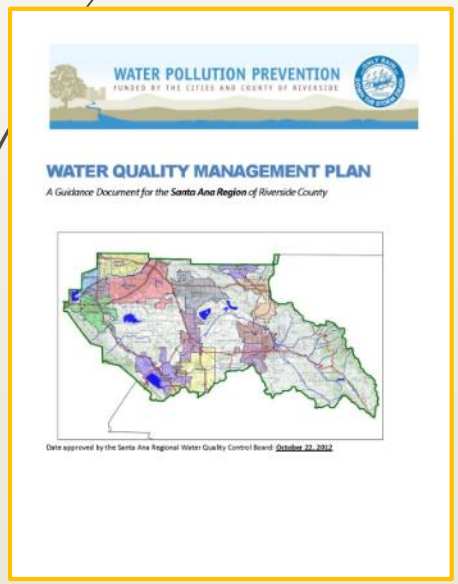
rcwatershed.org

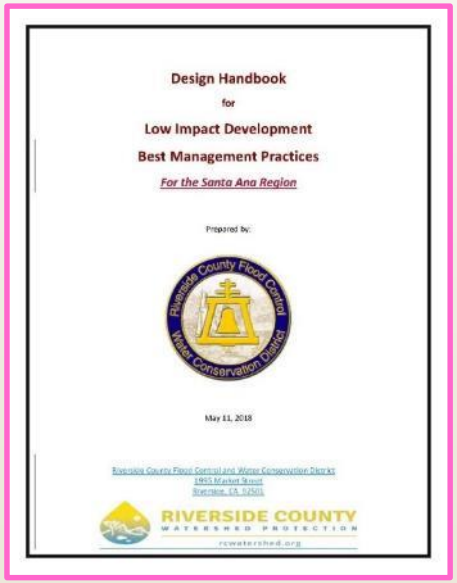
- Local agencies are responsible for implementing development regulations within their jurisdictions and for compliance with the NPDES permit
- The WQMP is a key element of development programs
- Not requiring an appropriate and complete WQMP could cause agencies to be FINED by the State

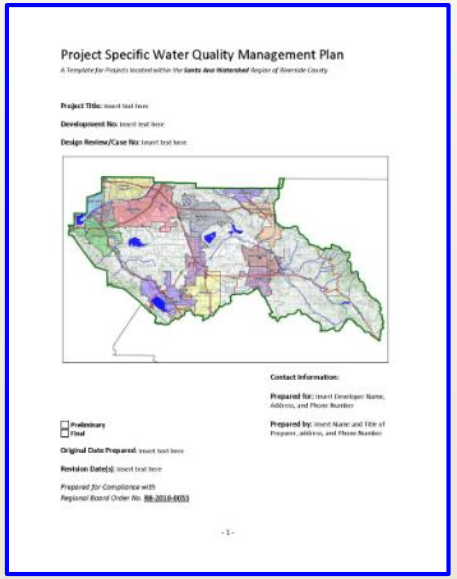
# WQMP Guidance and Key Exhibits

rcwatershed.org

- A WQMP is a plan developed to mitigate the impacts of urban run-off from New Development and Significant Redevelopment Projects



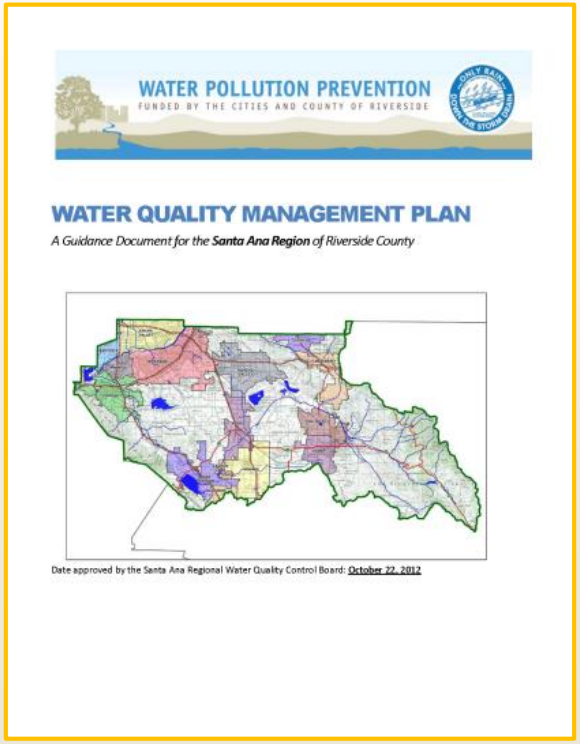



# WQMP Guidance and Key Exhibits

rcwatershed.org

- Guidance guides the preparation process and dictates type of information and analyses required
  - Template is Exhibit B
  - LID Handbook is Exhibit C
  - Documents are available for download
  - RC Flood NPDES website
    - http://rcflood.org/NPDES
    - This presentation will also be available
      - http://rcflood.org/npdes-training/Presentations.aspx



# Which Projects do WQMPs Apply to?

# WQMP Requirements Apply to…

rcwatershed.org

- New Development and Redevelopment Priority Development Projects
- An incorrect determination of Project Category could create significant future headaches such as…
  - Permit enforcement actions against the agency or owner
    - Against the Agency under the Municipal NPDES permit
    - Against the Owner under the General Construction NPDES Permit

# WQMP Requirements Apply to…

rcwatershed.org

- "Whole of an action"
  - Page 5 of WQMP Guidance:

When determining whether WQMP requirements apply, a "project" should be defined consistent with the California Environmental Quality Act (CEQA) definition of "project." That is, the "project" is the whole of an action which has the potential for adding or replacing or resulting in the addition or replacement of roofs, pavement, or other impervious surfaces. "Whole of an action" means the project may not be segmented or piecemealed into small parts if the effect is to reduce the quantity of impervious area for any part to below the applicable threshold.

# Priority Development Categories

rcwatershed.org

- New Development
- Automotive Repair Shops
- Restaurants
- Hillside Development
- Developments adjacent to/directly discharge to ESA
- Parking Lots
- RGOs
- Significant Redevelopment

TABLE 1-1. Priority Development Categories

| Category | Threshold | Notes |
|---|---|---|
| **New Development Projects** | **10,000 SF** | New developments that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial and industrial projects and residential housing subdivisions requiring a Final Map (i.e., detached single family home subdivisions, multi-family attached subdivisions, condominiums, apartments, etc.); mixed use and public projects (excluding Permittee road projects). This category includes development projects on public and private land, which fall under the planning and building authority of the Co-Permittees. |
| **Automotive Repair Shops** | **SIC CODE** | Automotive repair shops (with SIC codes 5013, 5014, 5541, 7532-7534, 7536-7539). |
| **Restaurants** | **5,000 SF** | Restaurants (with SIC code 5812) where the land area of development is 5,000 square feet or more. |
| **Hillside Developments** | **5,000 SF** | Hillside developments disturbing 5,000 square feet or more which are located on areas with known erosive soil conditions or where the natural slope is twenty-five percent or more. |
| **Developments adjacent to, or that discharge directly into Environmentally Sensitive Areas** | **2,500 SF** | Developments of 2,500 square feet of impervious surface or more adjacent to (within 200 feet) or discharging directly into ESAs. |
| **Parking Lots** | **5,000 SF** | Parking lots of 5,000 square feet or more exposed to stormwater. Parking lot is defined as land area or facility for the temporary parking or storage of motor vehicles. |
| **Retail Gasoline Outlets (RGOs)** | **5,000 SF** | Retail Gasoline Outlets (RGOs) that are 5,000 square feet or more with a projected average daily traffic of 100 or more vehicles per day. |
| **Significant Redevelopment Projects** | **5,000 SF** | The addition or replacement of 5,000 square feet of impervious surface on an already developed site. See Section 1.1.2 below for applicability of the "50% Rule". |

# WQMP Triggers – Other Projects

rcwatershed.org

- Other Projects – those projects that are not "Priority Development Projects"
  - WQMP generally not required
  - Local jurisdictions may require WQMP if deemed necessary to ensure mitigation of adverse impacts to water quality
- Required to incorporate:
  - Appropriate LID principles
  - Source Control BMPs
  - Other BMPs, which may or may not include treatment control BMPs

# Public Works Projects

rcwatershed.org

- A Public Works project must have a WQMP if:
  - it has similar functions or characteristics of a Priority Development Project, or may conduct similar activities after construction
  - Examples Include:
  - A corporation yard with a vehicle and equipment maintenance facility is similar to an automotive repair shop
  - A civic center or library has characteristics similar to a commercial office building

# Permittee Discussion…

rcwatershed.org

- Hypothetical scenario: Would this be “redevelopment” Priority Development Project?
  - Proposes to remove the landscaping at back of sidewalk

# Permittee Discussion…

rcwatershed.org

- Hypothetical scenario: Would this be an “other” Project?

# Permittee Discussion…

rcwatershed.org

- Hypothetical scenario: Would this be “hillside” or “new development” Priority Development Project?

# Let's review key terminology…

# Key Terminology - BMPs

rcwatershed.org

- **What are BMPs?**
  - BMPs are non-structural and structural source control measures that are required to be incorporated into all new development and significant redevelopment projects.
  - They are essential elements for effective water pollution control

**WQMPs must include the following BMPs:**

- Site Design BMP Concepts (LID Principles)
- Low Impact Development (LID) BMPs,
- Source Control BMPs, and
- Treatment Control BMPs (Potentially)

Let's discuss each of these

# Key Terminology – BMPs

rcwatershed.org

- **LID Principles:**
  - Site design concepts that eliminate causes (drivers) of negative impacts of development. Requires planning and forethought
    - Smart site layouts that preserve existing vegetation, preserve existing drainage patterns, and minimize areas of imperviousness.
    - Utilizing site design concepts can reduce costs by reducing or in some cases eliminating the need for additional structural BMPs.

# Permittee Discussion…

rcwatershed.org

- LID Principle or pervious area or compacted area?

# Key Terminology – BMPs

rcwatershed.org

- LID BMPs:
  - Those BMPs that incorporate natural environmental and/or biological processes to treat pollutants and address hydromodification.
  - Structural BMPs that primarily utilize some form of; infiltration, bio-filtration, evaporation, transpiration, or a combination thereof.

# Permittee Discussion…

rcwatershed.org

- LID BMP or treatment control?

# Key Terminology – BMPs

rcwatershed.org

- Source Control BMPs:
  - BMPs that attempt to reduce or eliminate pollution at the source (stop it before it starts).
  - May be either structural or procedural
    - Structural Source Controls are permanent BMP structures built into the site.
    - Procedural Source Controls are prescribed methods of performing actions or operations.
      - Good Housekeeping practices is classic example

# Key Terminology – BMPs

rcwatershed.org

- **Treatment Control BMPs**
  - Traditional BMPs (as opposed to LID BMPs) that focus on efficient and effective removal of pollutants with less concern for mimicking pre-development hydrology.

### 3.7 Sand Filter Basin

| Type of BMP | Treatment |
|---|---|
| Treatment Mechanisms | Filtration, Biofiltration |
| **Maximum Tributary Area** | 25 acres |
| **Other Names** | Sand Filter, Media Filter, Pocket Filter |

# Key Terminology - Design Storm Rainfall Depth



rcwatershed.org

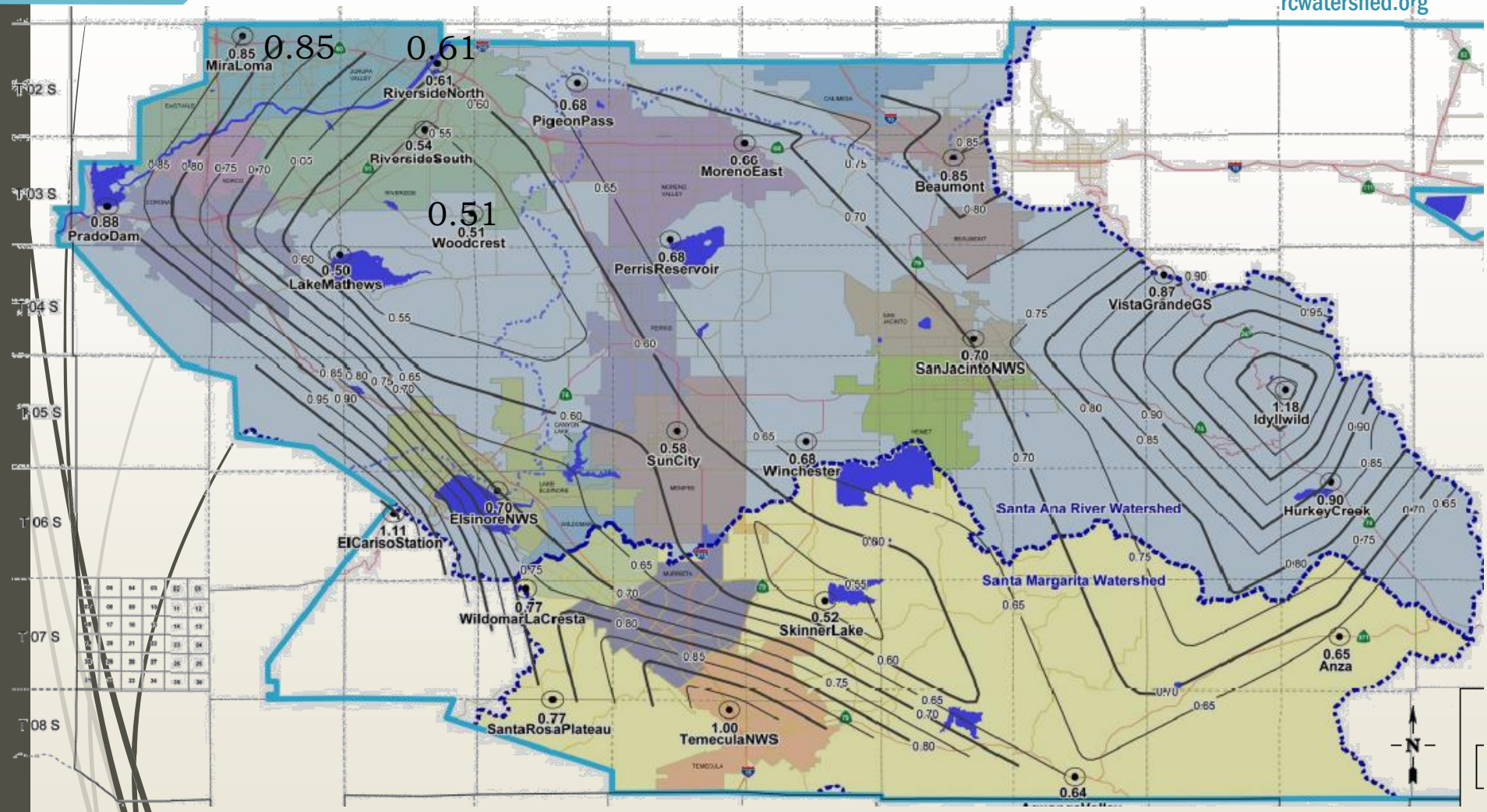



Exhibit A of Guidance Document

# Key Terminology - Design Capture Volume

rcwatershed.org

- **What is the Design Capture Volume (DCV)?**
  - The maximized water quality capture volume
  - Equivalent to the 85$^{th}$ percentile 24-hour storm event
  - Computation of the DCV is covered in the Guidance (Page 23)

**DCV can be calculated based on the following equation:**

$$DCV = \frac{D_{85} \cdot C \cdot A_{TRIB}}{12} =$$

***Where:***

DCV = ($ft^3$)
$D_{85}$ = the Design Storm rainfall depth (from Exhibit A) (inches)
C = composite rational method runoff factor for the Drainage Management Area (unitless)
$A_{TRIB}$ = area tributary to the BMP ($ft^2$)

# Key Terminology – Effective Area

rcwatershed.org

- The minimum area, based on a percentage of a project site, that is necessary to demonstrate MEP implementation of on-site retention and infiltration and biotreatment of the DCV using LID BMPs
- Must meet the following requirements:
  - Is suitable for a BMP (Example: If infiltration is potentially feasible for the site then infiltration must be allowed over this area)
  - This area receives runoff from impervious areas

# Key Terminology – Effective Area

rcwatershed.org

- If the minimum effective area is not provided for LID BMPs and the full DCV is not managed on-site, the reviewer shall request that additional area be made available for BMPs in the site design until either the percentage of the site in Table 2-5 is provided, or the entire DCV is managed, whichever percentage is less
- If the percentage of the site made available for LID BMPs equals or exceeds a Project's minimum effective area criteria for BMPs and still does not achieve the DCV, then the unmet portion of the DCV must be addressed with other $T_{BMPs}$, credits, urban runoff fund contributions, or waivers.

Let's look at Table 2-5…

# Table 2-5. Recommended Effective Area

rcwatershed.org

TABLE 2-5. Recommended Effective Area[1] Required to be made Available for LID BMPs (% of site)[2]

| Priority Development Project Type | New Development | Redevelopment |
|---|---|---|
| SF/MF Residential < 7 du/ac | 10% | 5% |
| SF/MF Residential 7 – 18 du/ac | 7% | 3.5% |
| SF/MF Residential > 18 du/ac | 5% | 2.5% |
| Mixed Use, Commercial/Industrial w/ FAR < 1.0 | 10% | 5% |
| Mixed Use, Commercial/Industrial w/ FAR 1.0 – 2.0 | 7% | 3.5% |
| Mixed Use, Commercial/Industrial w/ FAR > 2.0 | 5% | 2.5% |
| Podium (parking under > 75% of project) | 3% | 1.5% |
| Zoning allowing development to property lines | 2% | 1% |
| Transit Oriented Development[3] | 5% | 2.5% |
| Parking | 5% | 2.5% |

[1] *"Effective area" is defined as area which 1) is suitable for a BMP (for example, if infiltration is potentially feasible for the site based on infeasibility criteria, infiltration must be allowed over this area) and 2) receives runoff from impervious areas.*

[2] *See San Bernardino County Stormwater Program Technical Guidance Document for Water Quality Management Plans (WQMP) for more information regarding this table.*

[3] *Transit oriented development is defined as a development with development center within one half mile of a mass transit center.*

Key: du/ac = dwelling units per acre, FAR = Floor Area Ratio = ratio of gross floor area of building to gross lot area, MF = Multi Family, SF = Single Family

# Key Terminology – Drainage Management Area (DMA)

rcwatershed.org

- DMA – Outlines each LID BMP tributary area and is:
  - Subdivided into smaller areas based on land cover and Hydrologic Soil Group (HSG).
  - Sample: If the Project site has two or more discharge locations, the Project has a minimum of two DMAs and the proponent must complete the HCOC and DCV analysis for each corresponding DMA
- Effective Area (EA) – An area which is suitable for a BMP, and receives runoff from impervious areas.

# Understanding DMA Types

rcwatershed.org

- There are four types of DMAs:

| DMA | DMA Type |
|---|---|
| LID PRINCIPLES – Site design planning areas | |
| Self Treating Areas | A |
| Self Retaining Areas | B |
| Areas that drain to Self-Retaining Areas | C |
| LID BMPS – Structural Mitigation | |
| Areas that drain to BMPs | D |

**Let's take a closer look at each of these types…**

# DMA Type A – Self-Treating Area

rcwatershed.org

Self-Treating Area
Natural areas that do not drain to stormwater BMPs, but rather drain directly off site to the MS4, rather than having its runoff comingle with runoff from the project's impervious surfaces.

Self-treating areas can be removed from the total tributary drainage area used to size BMPs.

- **Self-Treating Areas (if not comingling with project flows):**
  - Conserved natural spaces
  - Undeveloped areas
  - Landscaped areas – requires vegetation of low water use species
  - Note: May only include <5% impervious area (with mild slope areas) to ensure flows will be absorbed into vegetation

# DMA Type B – Self-Retaining Area

rcwatershed.org

Self-Retaining Area
An area that has been designed to capture and retain the volume of runoff requiring treatment from that area. The self-retaining area must have the capability to restore its retention capacity within 72 hours in order to ready itself to capture subsequent runoff events.

Self-retaining areas can be removed from the total tributary drainage area used to size BMPs. They can also provide dual-use functionality as stormwater retention areas and also project amenities.

## Self-Retaining Areas

- Landscape Areas
- Pervious pavement
- Ponds, fountains
- Harvest and Use Areas
- Green Roofs
- Parking islands

# DMA Type B – Self-Retaining Area

rcwatershed.org

# DMA Type C – Draining to Self-Retaining

rcwatershed.org

Areas Draining to Self-Retaining Areas

Runoff from impervious surfaces can be routed to Type "B" (self-retaining) areas, thereby removing the impervious area from total tributary areas used to size required LID Treatment Control BMPs

Must not exceed required 2:1 ratio for impervious to perviousness. Attached self-retaining area must be able to retain entire DCV for all associated areas.

$$\left(\frac{2}{Impervious\ Fraction}\right) : 1$$

(Tributary Area : Self-Retaining Area)

- Examples:
  - Roof downspouts directed to lawn areas
  - Portions of parking lot directed to landscaped areas

# DMA Type D – Draining to BMPs

rcwatershed.org

Areas Draining to BMP

Runoff from impervious surfaces that cannot be dealt with via non-structural preventative measures or LID Principles must be mitigated by a separate specifically designed BMP.

Whenever possible these should consist only of completely impervious surfaces such as roofs and parking lot pavements.

- Type D areas are other areas that could not be addressed through site design infiltration, or Harvest and Use.
  - Types A, B, C are considered self-mitigating
- Includes areas mitigated by treatment control and source control BMPs
- Note: Must follow BMP implementation hierarchy

# DMA Types - Review

rcwatershed.org

- Self Treating = Type "A"
- Self Retaining = Type "B"
- Areas draining to Self Retaining = Type "C"
- Areas draining to BMP = Type "D"

= LID PRINCIPLES

The first three types of DMAs - Self-Treating, Self-Retaining, and draining to Self-Retaining - are methods to account for successful implementation of LID Principles. As more LID Principles are implemented on the site, more of the site will become self-mitigating, resulting in less area that must be mitigated through structural LID BMPs. Further, these areas will not require specialized Operation and Maintenance procedures, and can typically be maintained with normal landscape maintenance. The fourth type of DMA is a method to document the specific areas within the site layout that require additional mitigation measures through LID BMPs. Document your delineated DMA classifications in Table C.1 in Section C of the WQMP template .

***As more LID Principles are implemented on the site, more of the site will become self-mitigating, resulting in less area that must be mitigated through structural LID BMPs.***

# DMA Misconceptions

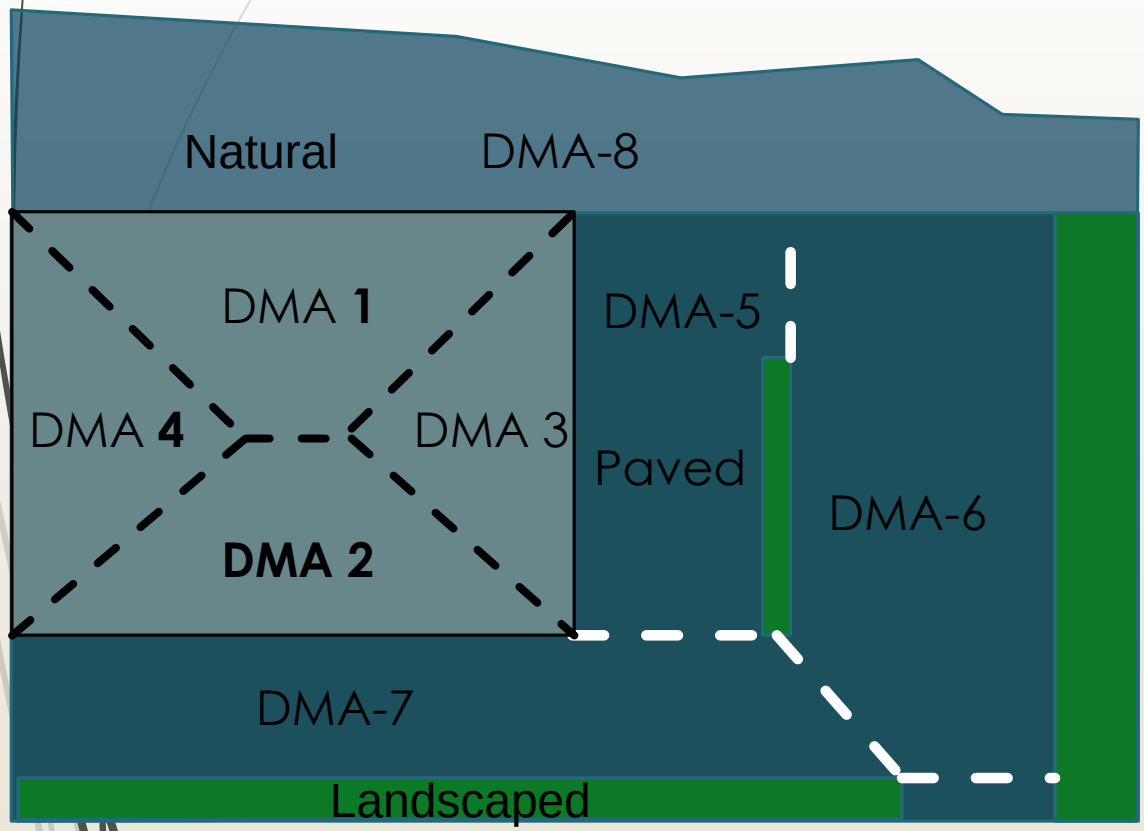
rcwatershed.org

- Understanding Type “A” vs Type “B”
- Can’t have Type “C” without Type “B”
- Infiltration Basins are Structural BMPs
  - Not Type “A” areas
- Type “D” areas are only those areas not addressed by LID Principles.
  - Types A, B, C are LID Principles

# Permittee Discussion…

rcwatershed.org

- Let's look back at a potential DMA map




Question: What type of DMA is DMA-8?

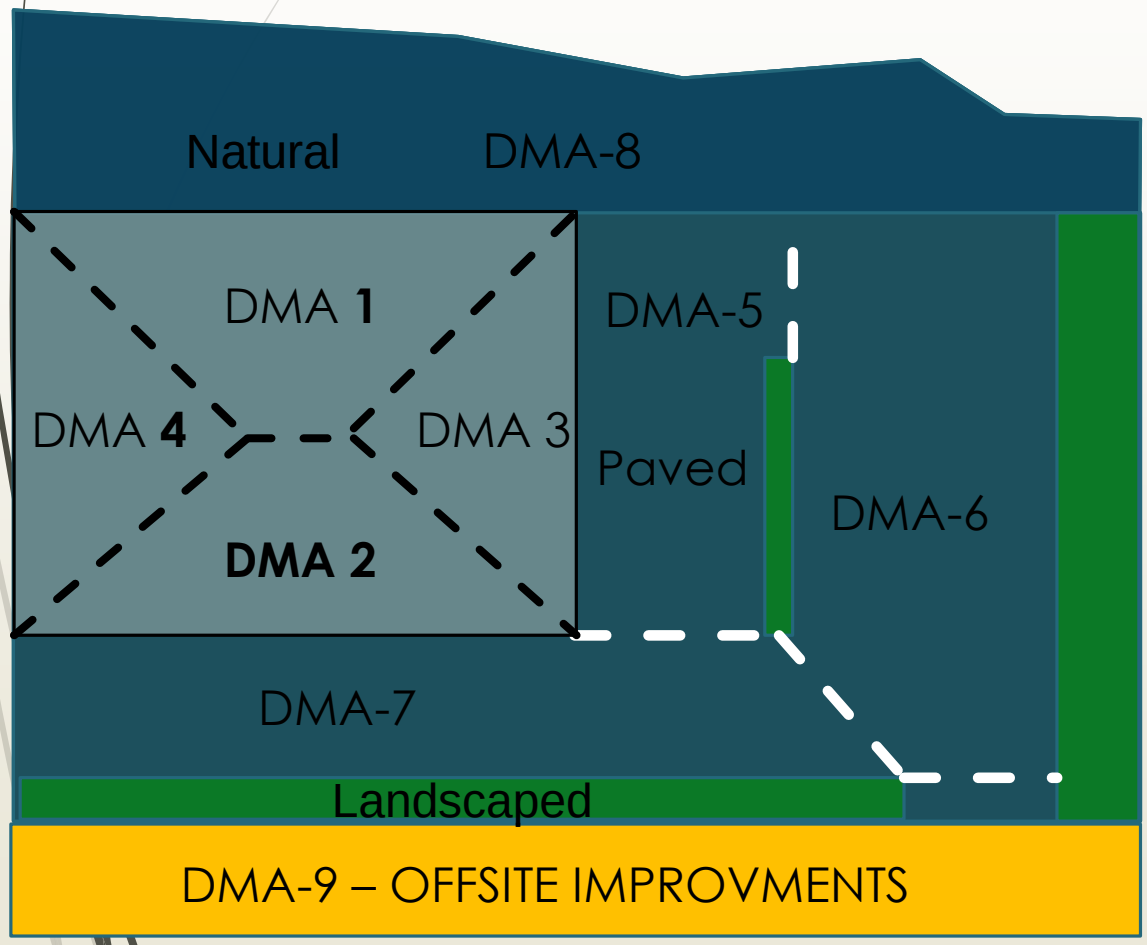
Answer: Depends on where flows drain!

- Self-treating = drains offsite with no comingling
- Self-retaining = designed to hold the design storm rainfall depth
- Drains to BMP = drainage to impervious areas

# Permittee Discussion…

rcwatershed.org

- Offsite Improvements




Question: What about offsite improvements?

What are you seeing from development community?

# Reviewing DMAs

rcwatershed.org

Ensure there is…

- Consistency with grading, paving, and architectural plans
- Sufficient head to ensure drainage across the DMA, and from the DMA to the receiving LID BMP
- Follow-through in final design and during construction

# Permittee Discussion…

rcwatershed.org

- Self-Treating Area or Self-Retaining Area?

# Permittee Discussion…

rcwatershed.org

- Self-Treating Area or Self-Retaining Area?

# Permittee Discussion…

rcwatershed.org

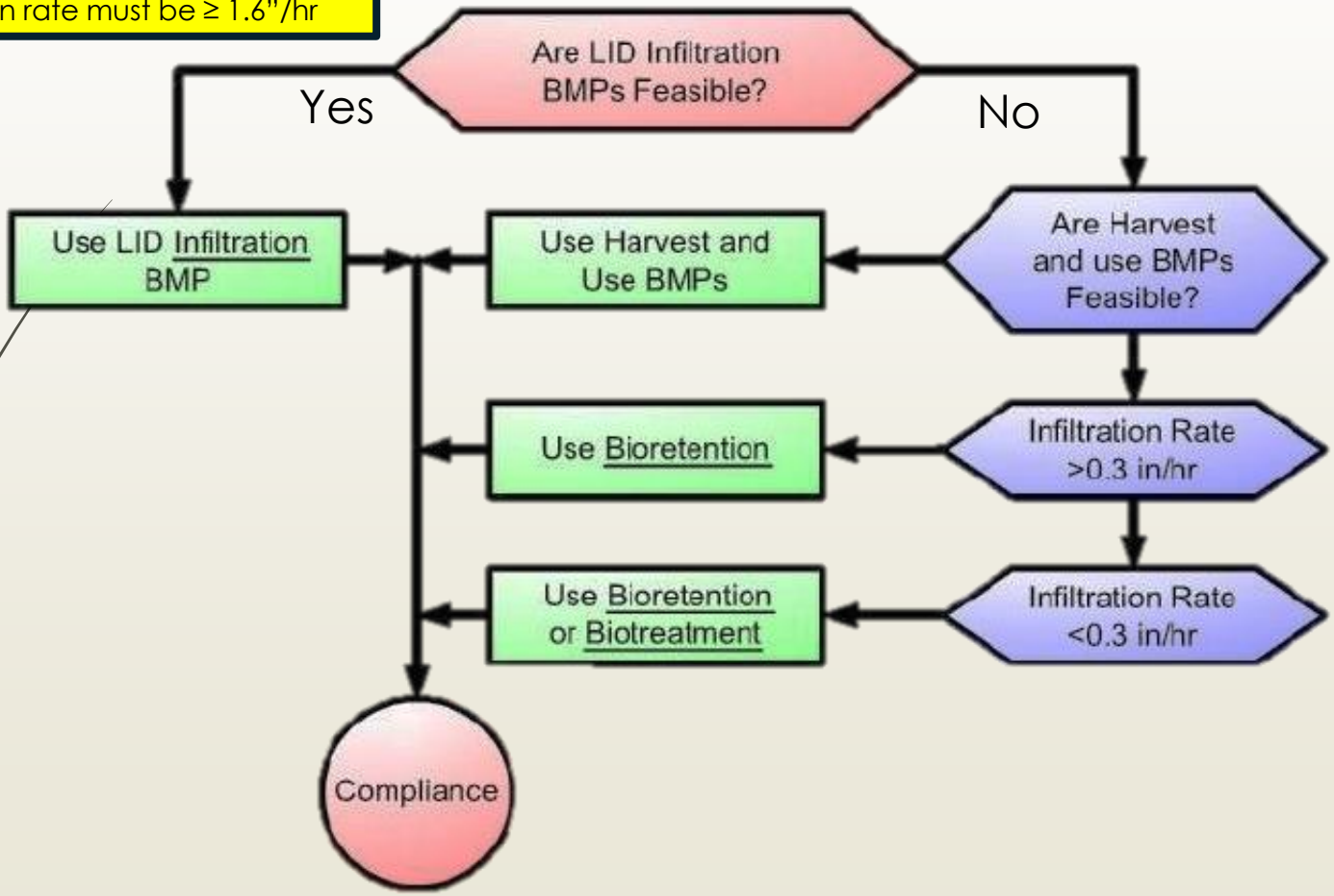
- Self-Retaining Area or LID BMP?

# LID BMP Hierarchy

# Implement LID BMPs - Hierarchy

rcwatershed.org

Requires: Tested pre-development infiltration rate must be ≥ 1.6"/hr



# Implement LID BMPs - Hierarchy

rcwatershed.org

- First Tier BMP - Infiltration BMPs
  - Dependent on infiltration applicability
    - Required for use unless determined not to be feasible on site
  - Only where soils are highly permeable – testing required with some area exemptions (e.g. historical use)
  - BMPs include:
    - Infiltration basins
    - Infiltration trenches
    - Permeable pavement
    - Can also include bioretention facilities with no underdrains

Remember: Tested pre-development infiltration rate must be ≥ 1.6"/hr

# Implement LID BMPs - Hierarchy

rcwatershed.org

- Second Tier BMP - Harvest and Use
  - Capture stormwater for reuse on the site
  - Complete the assessment in section D.2 of template to document feasibility for the project

# Implement LID BMPs - Hierarchy

rcwatershed.org

- Third Tier BMP - Bioretention
  - Vegetative basin underlain by an engineered soil media
  - Feasible on all soil types due to underdrains
  - May be free form areas or planter areas
  - Designed to process the entire DCV

# Implement LID BMPs - Hierarchy

rcwatershed.org

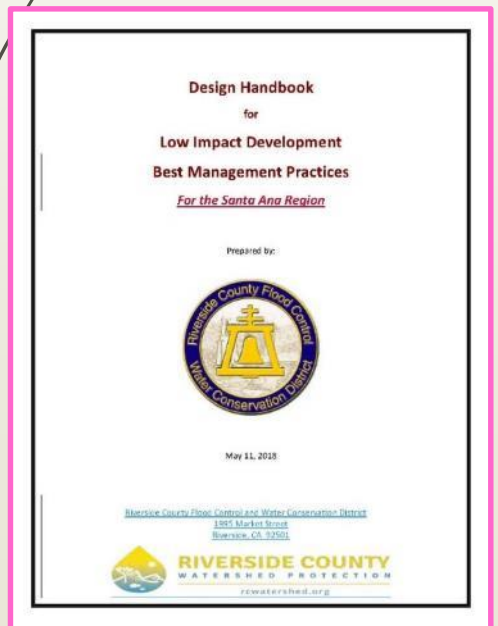
- Fourth Tier BMP - Biotreatment
  - Only where impermeable soils preclude the use of previous tier BMPs
    - $K_{SAT}$ = <0.3"/hr
  - Distinguished from bioretention in that they do not process the entire DCV through a soil media
- BMPs include (requires verification with local jurisdiction for approved biotreatment BMPs):
  - Extended detention basins
  - Bioswales
  - Constructed wetlands

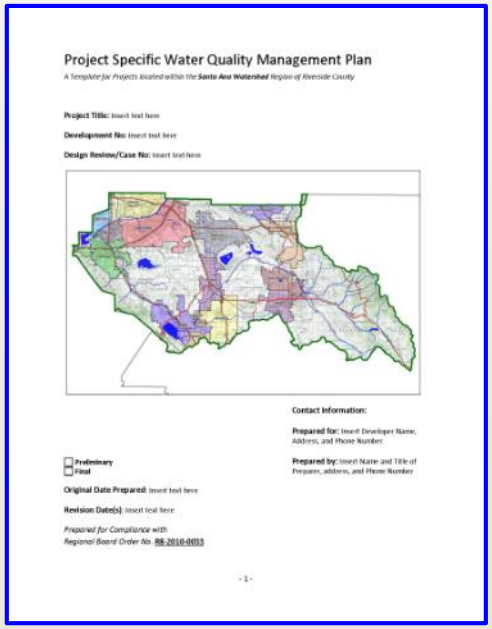
# Updates to Documents

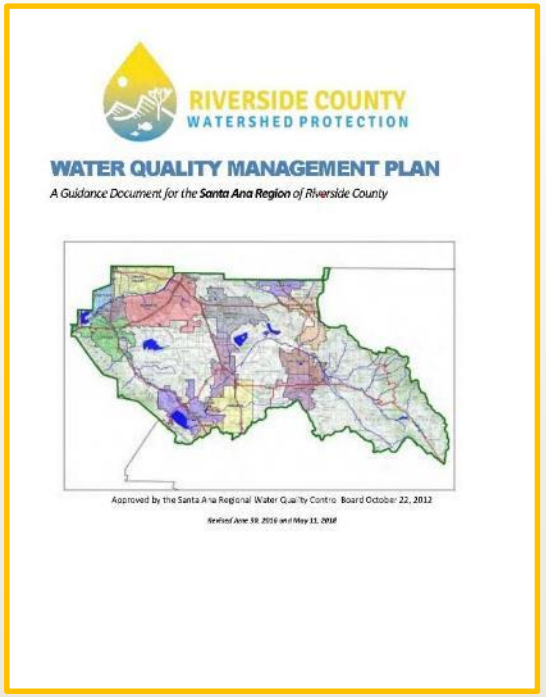
# Updates added in to key documents

rcwatershed.org

- Updates have been incorporated based on input from SAR Permittees.
  - Guidance
    - Exhibit B - Template
    - Exhibit C – LID Handbook


Design Handbook
for
Low Impact Development
Best Management Practices
For the Santa Ana Region
Prepared by:
May 11, 2018
RIVERSIDE COUNTY
WATERSHED PROTECTION

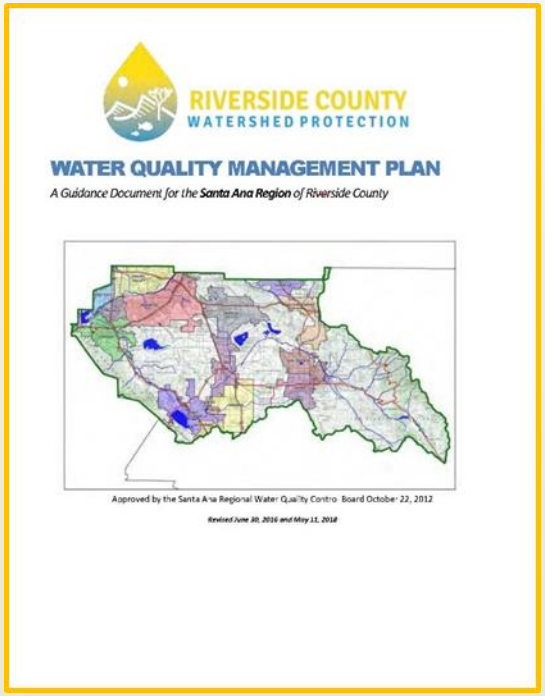

Project Specific Water Quality Management Plan


RIVERSIDE COUNTY
WATERSHED PROTECTION
WATER QUALITY MANAGEMENT PLAN
A Guidance Document for the Santa Ana Region of Riverside County

# WQMP Guidance Updates

rcwatershed.org

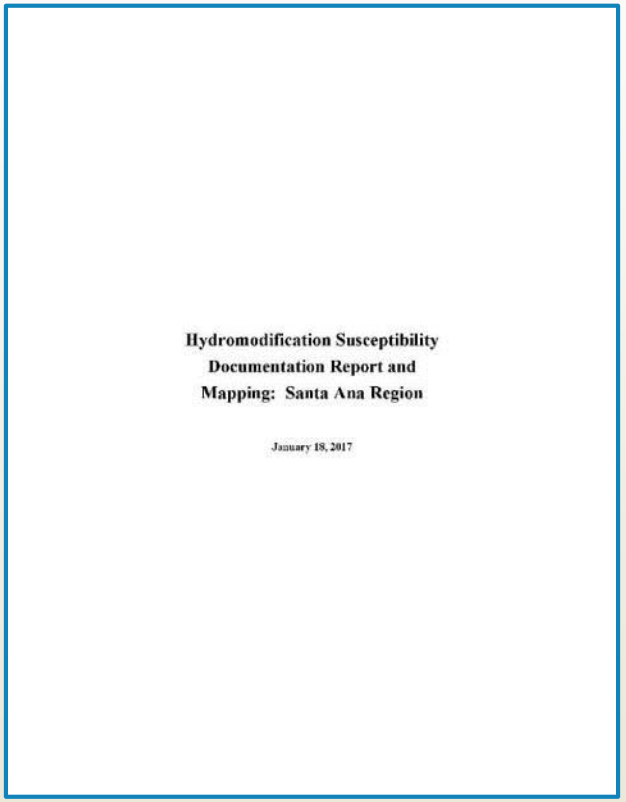
- Will be posted in both redline and final versions
  - Highlights changes made to Guidance
  - Dated May 11, 2018



# Overview of Guidance Updates

rcwatershed.org

- Updates made to incorporate WAP
  - Exhibit H – WAP Appendix A
    - Hydromodification Susceptibility Documentation Report
  - Exhibit I – WAP Appendix E
    - Hydromodification Plan


Hydromodification Susceptibility
Documentation Report and
Mapping: Santa Ana Region

January 18, 2017

# Introduction – Page 2

rcwatershed.org

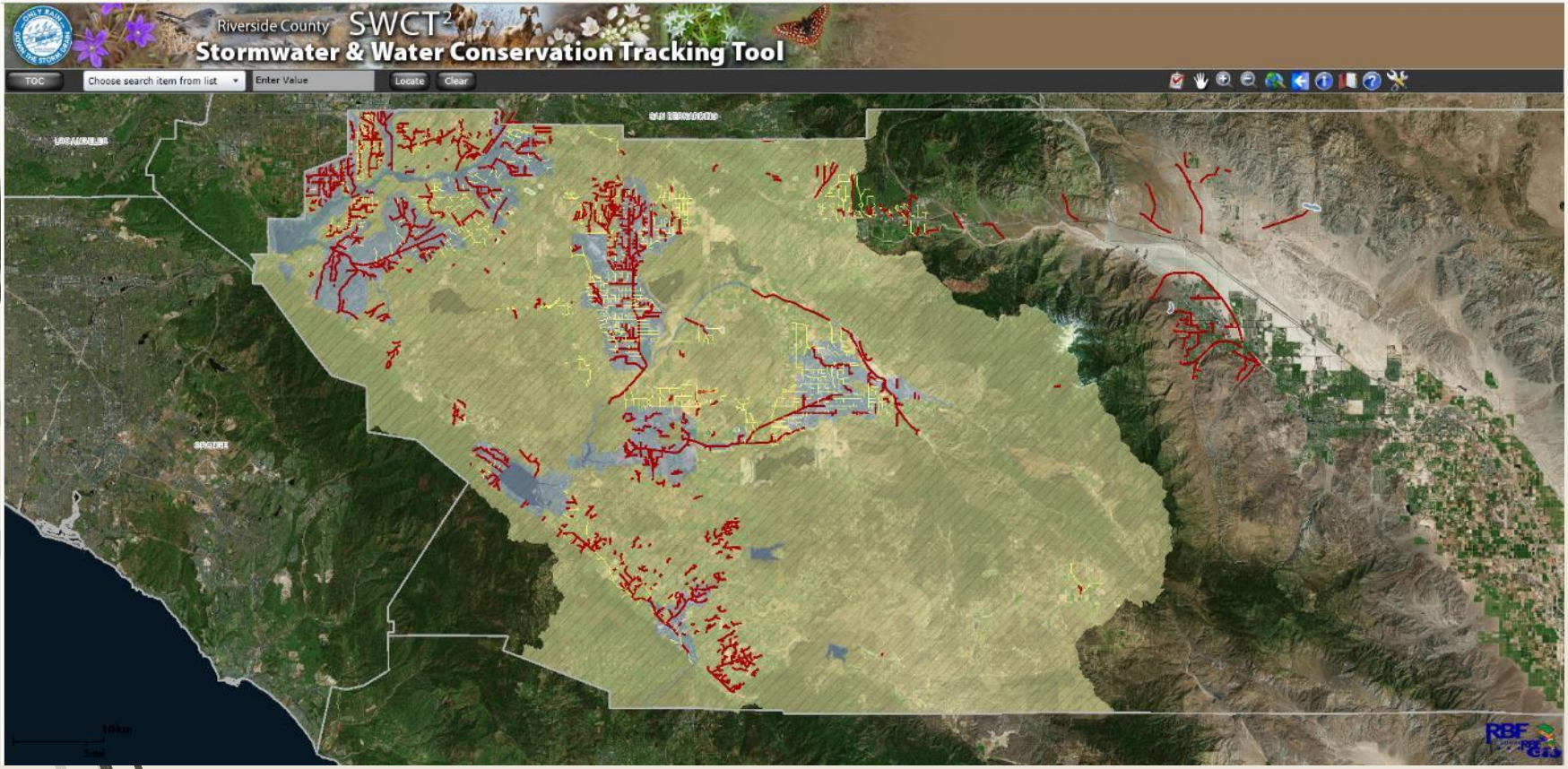
- Adds language for "highest and best use"
  - Exemption for highest and best use applies to:
    - "Projects discharging directly to Lake Elsinore

City of Lake Elsinore. (2018). Lake Opening Day. *News*. Retrieved from http://www.lake-elsinore.org/Home/Components/News/News/2439/26

# Introduction – Page 2

rcwatershed.org

- Adds language for HCOC measures
  - Hydrologic control measures will be required for all projects presenting a HCOC

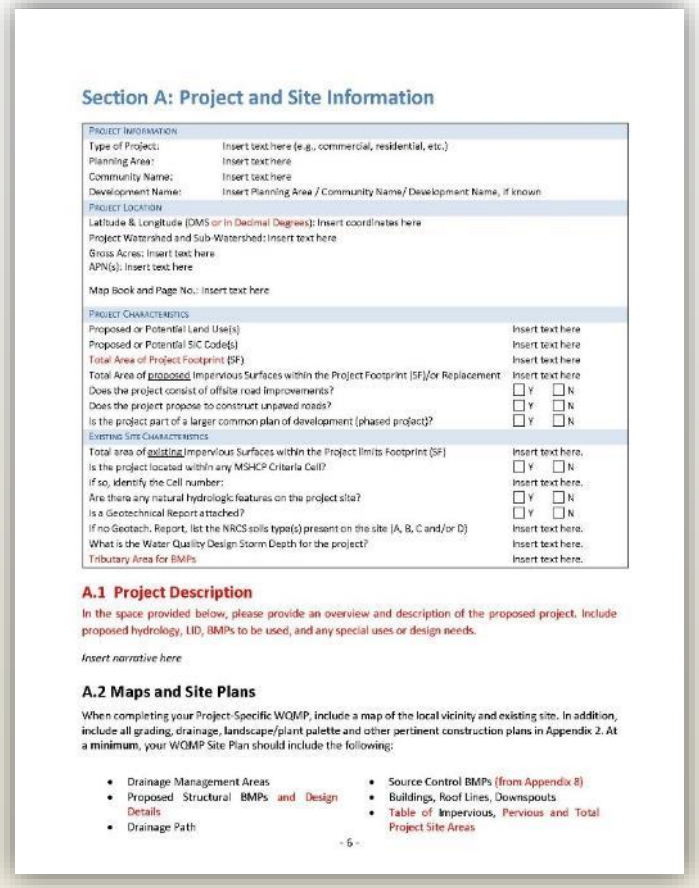


# WQMP Template Updates

# Section A

rcwatershed.org

- Added new information
  - Total Project Area
  - Narrative description of complete project
    - Proposed hydrology
    - LID BMPs
    - Special uses or design needs



## Section A: Project and Site Information

| | |
|---|---|
| **Project Information** | |
| Type of Project: | Insert text here (e.g., commercial, residential, etc.) |
| Planning Area: | Insert text here |
| Community Name: | Insert text here |
| Development Name: | Insert Planning Area / Community Name/ Development Name, if known |
| **Project Location** | |
| Latitude & Longitude (DMS or in Decimal Degrees): Insert coordinates here | |
| Project Watershed and Sub-Watershed: Insert text here | |
| Gross Acres: Insert text here | |
| APN(s): Insert text here | |
| Map Book and Page No.: Insert text here | |
| **Project Characteristics** | |
| Proposed or Potential Land Use(s) | Insert text here |
| Proposed or Potential SIC Code(s) | Insert text here |
| Total Area of Project Footprint (SF) | Insert text here |
| Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement | Insert text here |
| Does the project consist of offsite road improvements? | ☐ Y ☐ N |
| Does the project propose to construct unpaved roads? | ☐ Y ☐ N |
| Is the project part of a larger common plan of development (phased project)? | ☐ Y ☐ N |
| **Existing Site Characteristics** | |
| Total area of existing Impervious Surfaces within the Project limits Footprint (SF) | Insert text here. |
| Is the project located within any MSHCP Criteria Cell? | ☐ Y ☐ N |
| If so, identify the Cell number: | Insert text here. |
| Are there any natural hydrologic features on the project site? | ☐ Y ☐ N |
| Is a Geotechnical Report attached? | ☐ Y ☐ N |
| If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D) | Insert text here. |
| What is the Water Quality Design Storm Depth for the project? | Insert text here. |
| Tributary Area for BMPs | Insert text here. |

### A.1 Project Description

In the space provided below, please provide an overview and description of the proposed project. Include proposed hydrology, LID, BMPs to be used, and any special uses or design needs.

*Insert narrative here*

### A.2 Maps and Site Plans

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

- Drainage Management Areas
- Proposed Structural BMPs and Design Details
- Drainage Path
- Source Control BMPs (from Appendix 8)
- Buildings, Roof Lines, Downspouts
- Table of Impervious, Pervious and Total Project Site Areas

- 6 -

# Section F - Hydromodification

rcwatershed.org

- This section updated to reflect the approved Watershed Action Plan
- The remaining template changes are related to hydromodification…

# Hydromodification Updates

# Section 2.2.3 Hydromodification Impacts

rcwatershed.org

## 2.2.3. Hydromodification Impacts

The changes in the magnitude and frequency of stream flows and the associated sediment load resulting from urbanization are referred to as hydromodification. In some stream systems, hydromodification can cause erosion or aggradation of stream banks and beds, alter the transport of bed and wash load sediments, and degrade the in-stream habitat.

Once altered, natural streams and their ecosystems may have diminished beneficial uses. However, the stream may reach a new geomorphic equilibrium if proper management measures are implemented, and beneficial uses may be partially or fully recovered. Managing runoff from a single development site may seem inconsequential, but by changing the way most sites are developed (and redeveloped), we may be able to protect and ultimately rehabilitate stream ecosystems downstream of urban and urbanizing areas.

# Section 2.2.3 Hydromodification Impacts

rcwatershed.org

- A project does not cause a HCOC if any of the following are met:
  - Disturbs less than 1 acre
  - Drains to channel that conveys stormwater to engineered and stable channel – Figures 3.8 & 3.9
  - Conveys stormwater to Controlled Release Point – Figure 10
  - Considered a Watershed Protection Project – stormwater context

# Section 2.2.3 Hydromodification Impacts continued…

rcwatershed.org

- A project does not cause a HCOC if any of the following are met:
  - Prado Dam beneficial uses will benefit from project
  - Conveys stormwater to Natural Resistant Features or Stable Channels – Exhibit I
  - Project demonstrates that HCOC impacts are negligible or will be controlled

# Section 2.2.3 Hydromodification Impacts continued…

rcwatershed.org

- A project does not cause a HCOC if any of the following are met:
  - Project is routine roadway maintenance that maintains original line and grade, hydraulic capacity, original purpose or
    - Emergency roadway maintenance activities that are required to protect public health and safety
  - If volume and time of concentration of runoff is not significantly different – 5% or less is considered insignificant

# Section 2.2.3 Hydromodification Impacts continued…

rcwatershed.org

- A project does not cause a HCOC if any of the following are met:
  - If volume and time of concentration of runoff is not significantly different – 5% or less is considered insignificant
  - Projects must demonstrate:
    - Post-development condition TOC of 95% or more of the pre-development TOC
    - Post –development condition runoff volume of 105% or less of the pre-development runoff volume

# Section 2.2.3 Hydromodification Impacts continued…

rcwatershed.org

- If a Project does not meet any of those conditions, then:
  - Projects must compare the 2-year, 24-hour volumes in pre- and post-development conditions
- Calculations include:
  - Modified runoff curve number method
  - Short-cut synthetic unit hydrograph method on a 24-hour storm duration and a 15-minute unit time
  - Other acceptable method to the Permittee

# HCOC Requirement

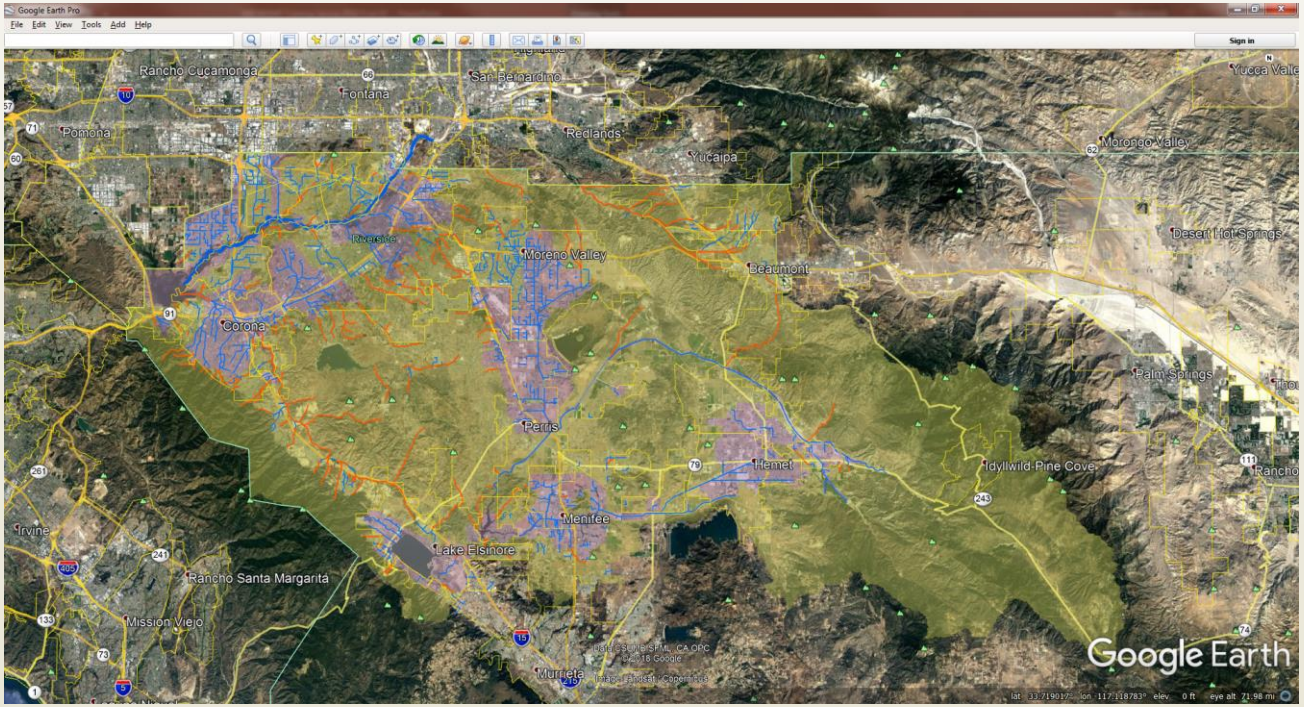
rcwatershed.org

- Properly designed energy dissipation systems are required for all development project outfalls to unlined channels
- Designed based on engineered acceptable methods to reduce impacts from concentrated outfalls

# HCOC Exhibits – Compiled In One Location

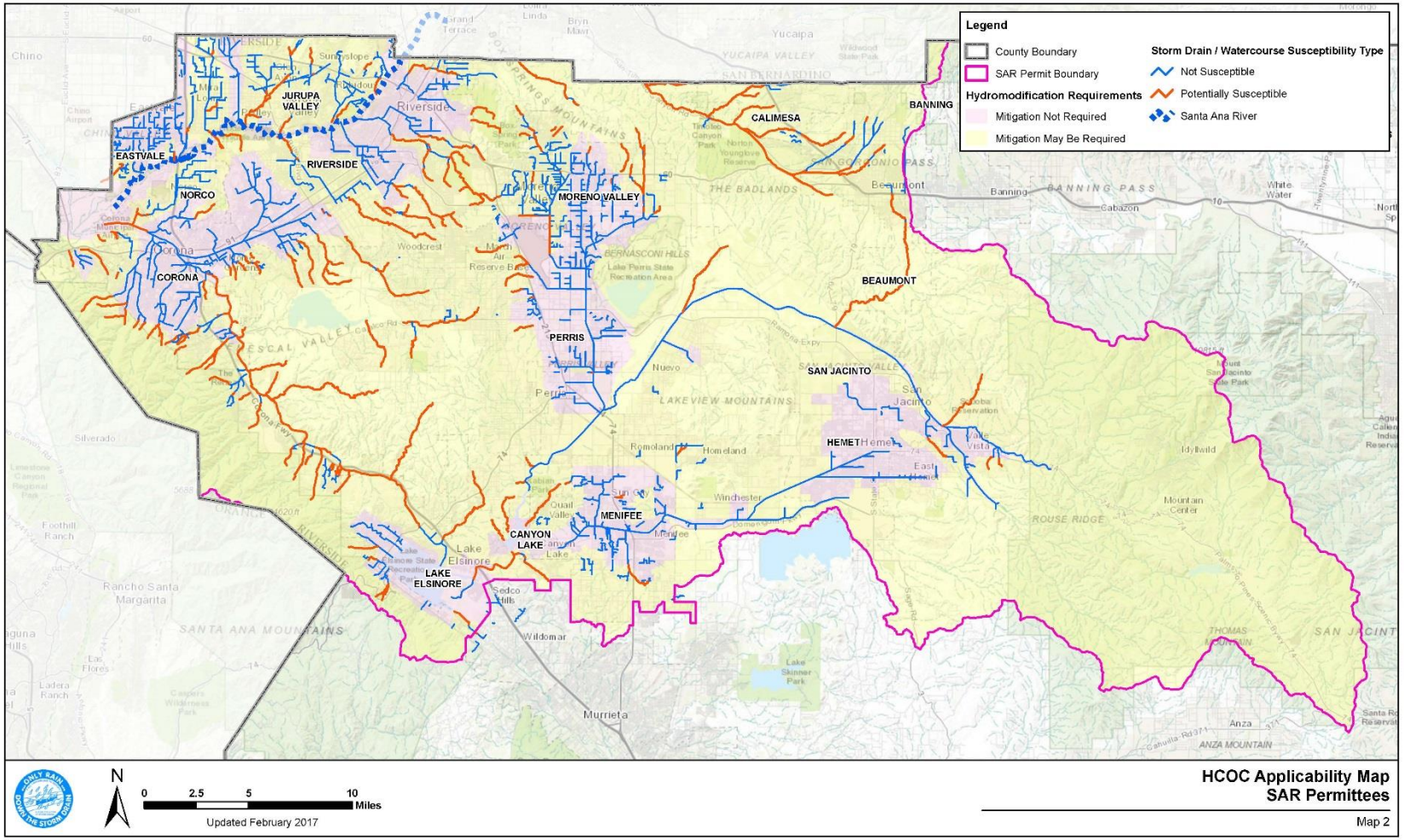
rcwatershed.org

- **Guidance Document Exhibit J:**
  - HCOC Exemption Exhibits
  - KMZ files are also available for Google Earth



# Example Exhibit – HCOC Applicability Map

rcwatershed.org



# Example Exhibit - Controlled Release Points

rcwatershed.org

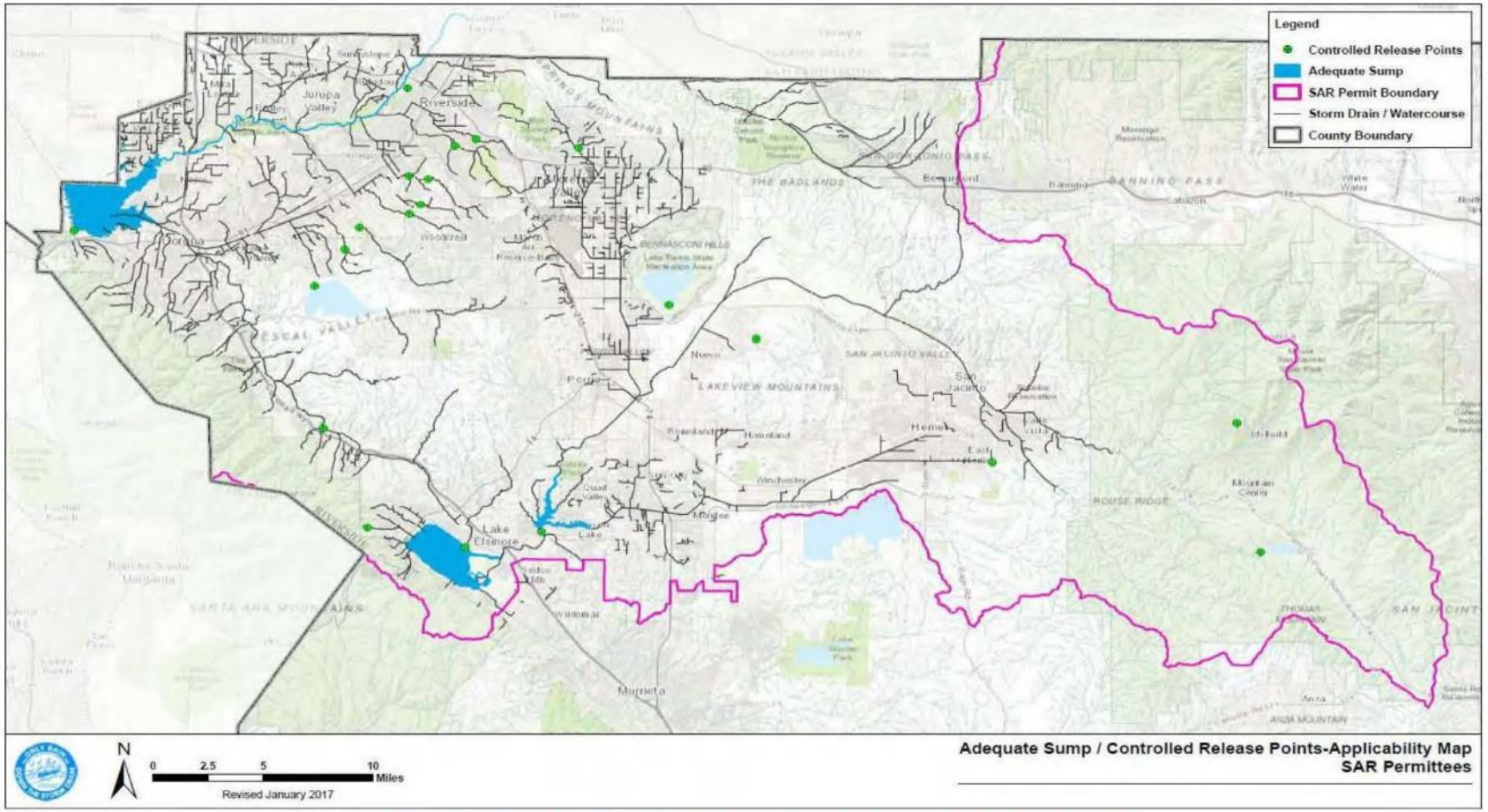



Figure 3-10. Adequate Sumps/Control Release Points Applicability Map—Figure 2 in Appendix E of the Watershed Action Plan

# Example Exhibit – Prado Basin Beneficial Uses

rcwatershed.org

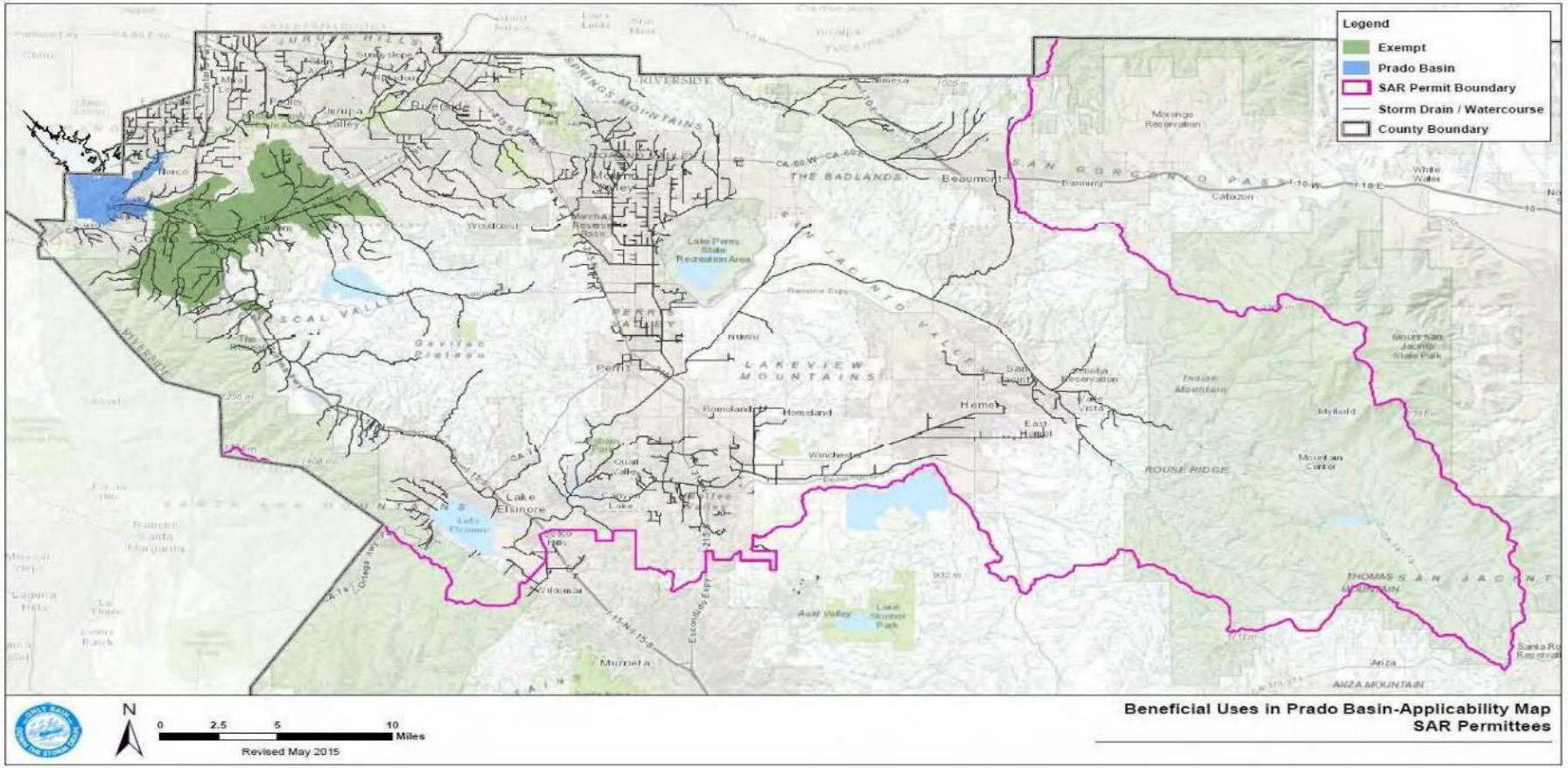



Figure 3-11. Areas draining to Temescal Wash between the Prado Basin and the U/S confluence with Bedford Canyon Wash—Map 3 in Appendix E of the Watershed Action Plan

# LID BMP Handbook Updates

# LID BMP Handbook Update

rcwatershed.org

- County LID BMP Handbooks have all been revised so that there is now a single design handbook for each watershed:
  - Santa Ana River
  - Whitewater River
  - Santa Margarita River
- Santa Ana River LID BMP Design Handbook
  - Dated May 11, 2018

# Let's take a look at some common BMPs…

# BMP Photos

rcwatershed.org

BMP NAME

Porous Pavement

# BMP Photos

rcwatershed.org

BMP NAME

Porous Pavement

# BMP Photos

rcwatershed.org

BMP NAME

Porous Pavement

# BMP Photos

rcwatershed.org

## BMP NAME
## Infiltration Trench

# BMP Photos

rcwatershed.org

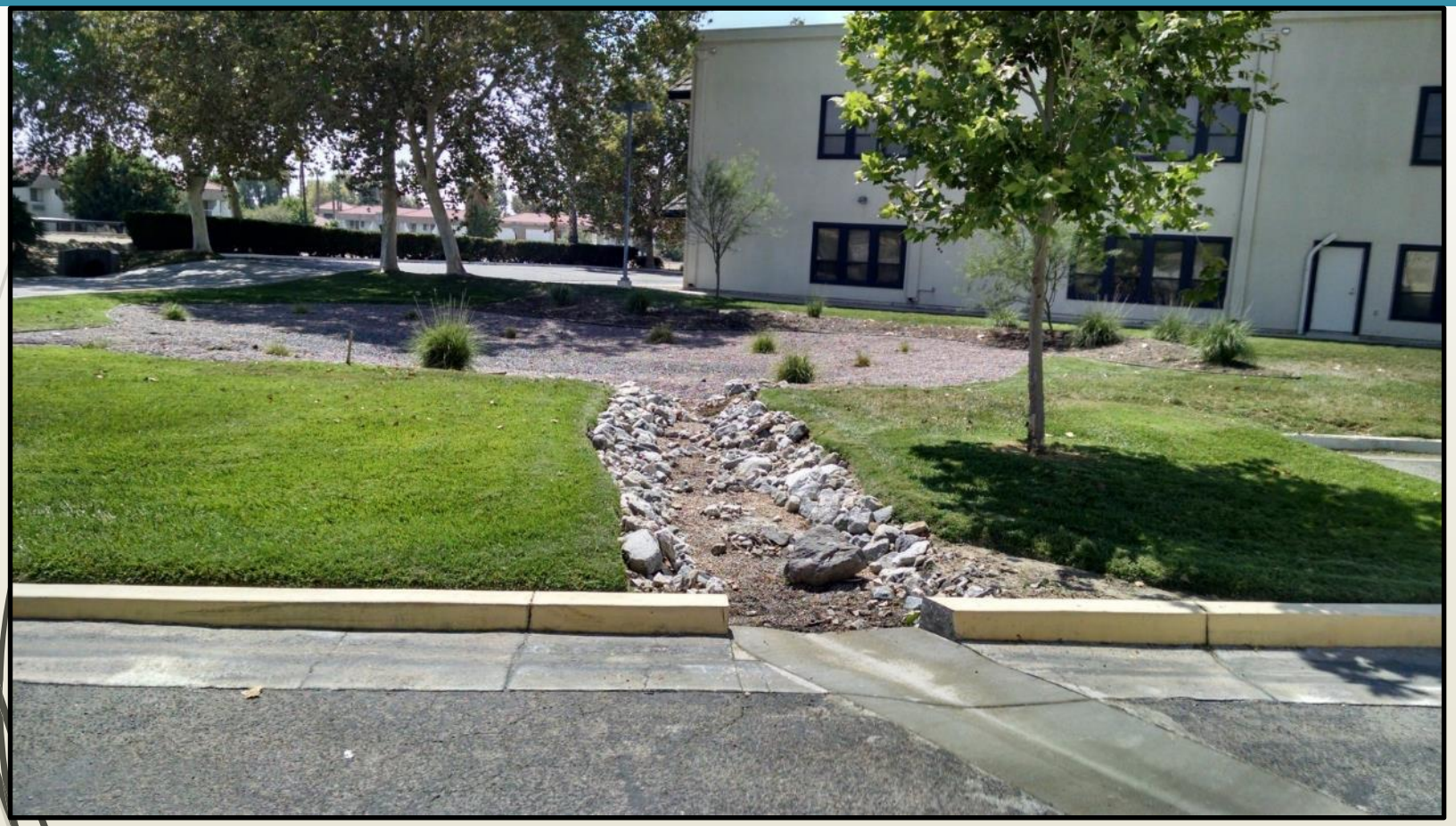
BMP NAME

Infiltration Trench

# BMP Photos

rcwatershed.org

## BMP NAME
## Shallow Infiltration Basin



# BMP Photos

rcwatershed.org

## BMP NAME
## Shallow Infiltration Basin

# BMP Photos

BMP NAME

Bioretention

# BMP Photos

BMP NAME

Bioretention


# BMP Photos

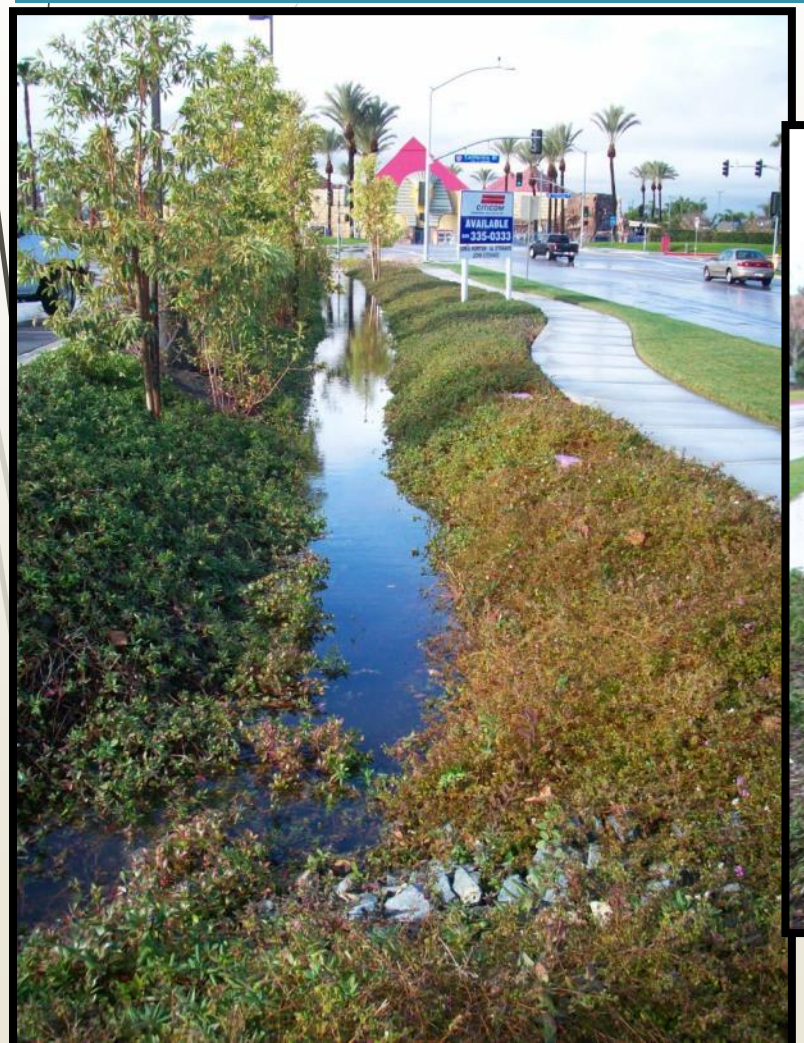
BMP NAME

Bioretention

# BMP Photos

BMP NAME

Bioretention



# BMP Photos

rcwatershed.org

## BMP NAME
## Bioretention

# BMP Photos

rcwatershed.org

BMP NAME

Bioretention

# BMP Photos

rcwatershed.org

## BMP NAME
## Extended Detention Basin

# BMP Photos

rcwatershed.org

## BMP NAME
## Extended Detention Basin

# BMP Photos

rcwatershed.org

## BMP NAME
## Extended Detention Basin


# BMP Photos

rcwatershed.org

## BMP NAME
## Extended Detention Basin

# BMP Photos

rcwatershed.org

## BMP NAME
## Extended Detention Basin/Sand Filter

# BMP Photos

rcwatershed.org

## BMP NAME

## Non-Structural Source Control - Education


# BMP Photos

rcwatershed.org

## BMP NAME
## Source Control – Material Storage


# BMP Photos

rcwatershed.org

## BMP NAME
## Source Control - MS4 Stenciling and Signage


# O&M Plans & Resources

# Section I - Operation, Maintenance, Funding

rcwatershed.org

- Chapter 5 of WQMP guidance document contains detailed requirements and procedures for the O&M Plan (see pages 89-92 of Guidance Document)
  - LID BMPs require detailed O&M information
  - LID Principle areas will not require specialized O&M procedures and can typically be maintained with normal landscape maintenance
- Intent is to create a living document that will require periodic updates
  - Updates to the O&M plan must be maintained and implemented and made available to local jurisdiction's inspectors
- Must include local jurisdictions Access and Maintenance Transfer Agreement mechanism

# Section I - Operation, Maintenance, Funding

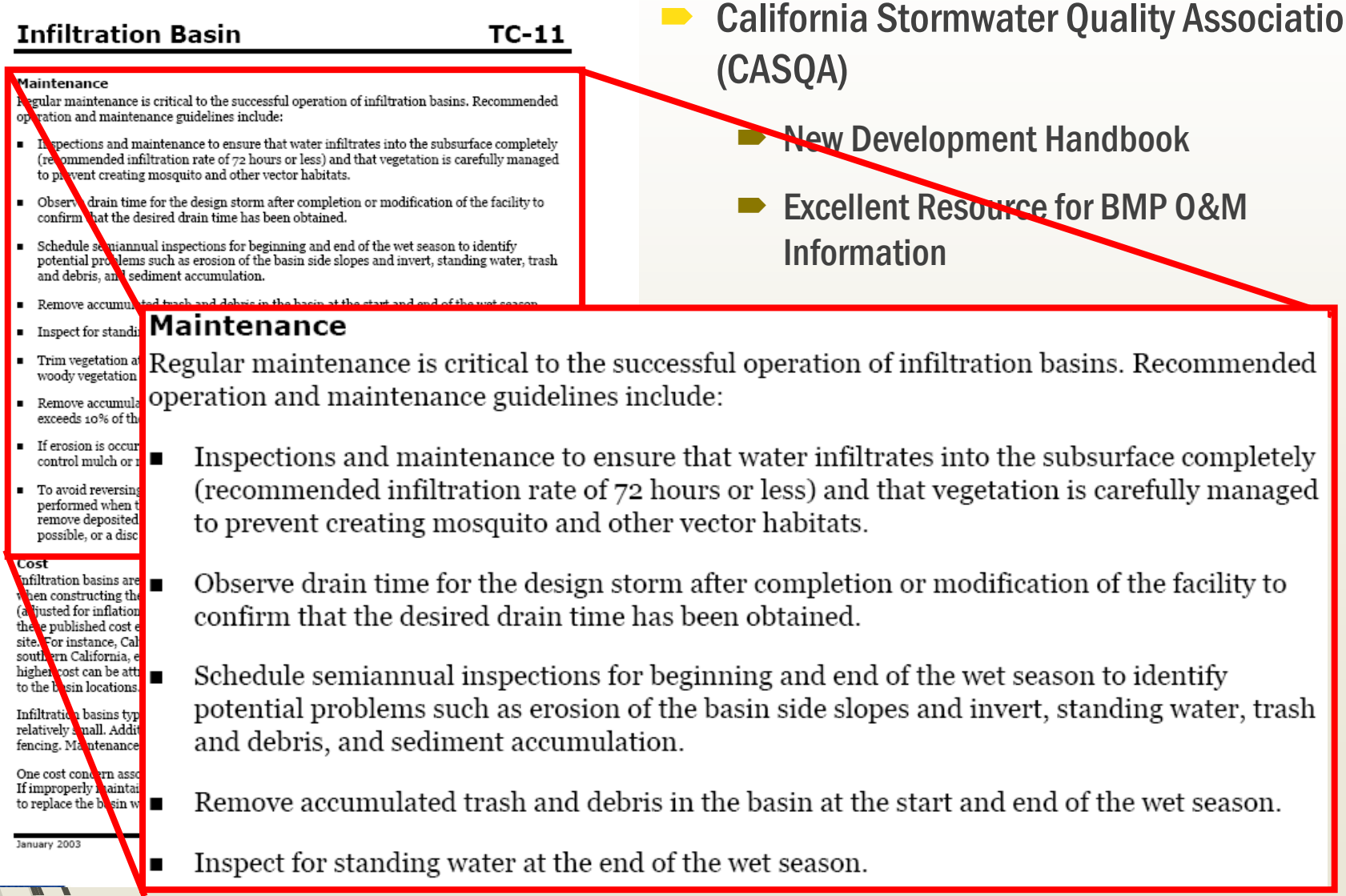
rcwatershed.org

- Operation and Maintenance Details to Include in the WQMP
  - Responsible parties
  - Identify each BMP that requires O&M
  - Frequency of O&M
  - Description of O&M activities and process including the handling and placement of wastes
  - Access controls (keys to facility)
  - Describe self-inspections and record keeping requirements
  - Describe any required monitoring
  - As-Built drawings for structural BMPs
  - Figures outlining areas with respect to perviousness

# Section I - Operation, Maintenance, Funding

rcwatershed.org

- California Stormwater Quality Association (CASQA)
  - New Development Handbook
  - Excellent Resource for BMP O&M Information



**Infiltration Basin** **TC-11**

**Maintenance**

Regular maintenance is critical to the successful operation of infiltration basins. Recommended operation and maintenance guidelines include:

- Inspections and maintenance to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 72 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats.
- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.
- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.
- Remove accumulated trash and debris in the basin at the start and end of the wet season.
- Inspect for standing water at the end of the wet season.

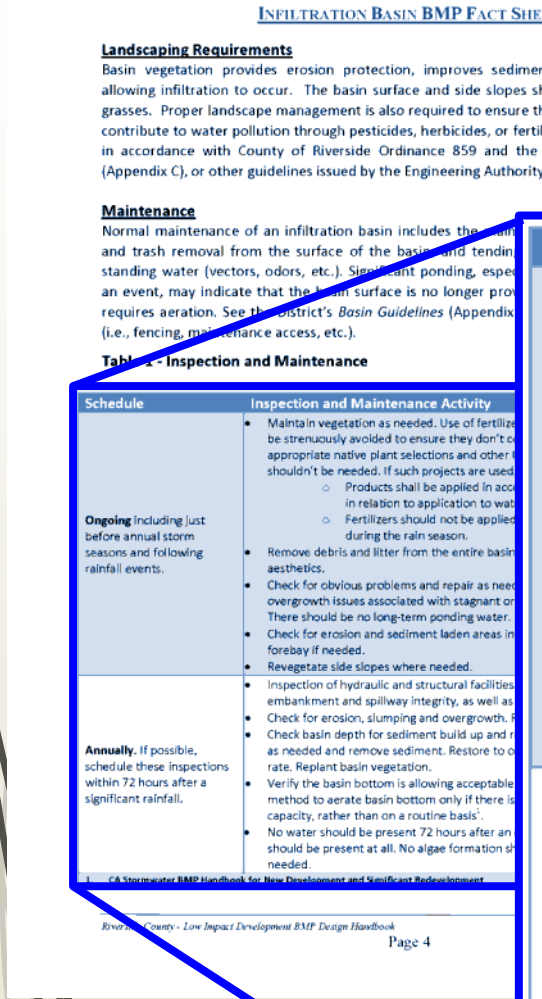
**Cost**

January 2003

# Section I - Operation, Maintenance, Funding

rcwatershed.org

- Riverside County LID BMP Design Handbook



INFILTRATION BASIN BMP FACT SHEET

**Landscaping Requirements**

Basin vegetation provides erosion protection, improves sediment removal and assists in allowing infiltration to occur. The basin surface and side slopes shall be planted with native grasses. Proper landscape management is also required to ensure that the vegetation does not contribute to water pollution through pesticides, herbicides, or fertilizers. Landscaping shall be in accordance with County of Riverside Ordinance 859 and the District's *Basin Guidelines* (Appendix C), or other guidelines issued by the Engineering Authority.

**Maintenance**

Normal maintenance of an infiltration basin includes the
and trash removal from the surface of the basin and tendin
standing water (vectors, odors, etc.). Sig nt ponding, espe
an event, may indicate that the basin surface is no longer pro
requires aeration. See the District's *Basin Guidelines* (Appendix
(i.e., fencing, maintenance access, etc.).

**Table 1 - Inspection and Maintenance**

| Schedule | Inspection and Maintenance Activity |
|---|---|
| **Ongoing** including just before annual storm seasons and following rainfall events. | • Maintain vegetation as needed. Use of fertiliz be strenuously avoided to ensure they don't c appropriate native plant selections and other shouldn't be needed. If such projects are used<br>○ Products shall be applied in acc in relation to application to wat<br>○ Fertilizers should not be applied during the rain season.<br>• Remove debris and litter from the entire basin aesthetics.<br>• Check for obvious problems and repair as nee overgrowth issues associated with stagnant or There should be no long-term ponding water.<br>• Check for erosion and sediment laden areas in forebay if needed.<br>• Revegetate side slopes where needed. |
| **Annually.** If possible, schedule these inspections within 72 hours after a significant rainfall. | • Inspection of hydraulic and structural facilities embankment and spillway integrity, as well as<br>• Check for erosion, slumping and overgrowth.<br>• Check basin depth for sediment build up and as needed and remove sediment. Restore to o rate. Replant basin vegetation.<br>• Verify the basin bottom is allowing acceptable method to aerate basin bottom only if there is capacity, rather than on a routine basis[1].<br>• No water should be present 72 hours after an should be present at all. No algae formation sh needed. |

1. CA Stormwater BMP Handbook for New Development and Significant Redevelopment



| Schedule | Inspection and Maintenance Activity |
|---|---|
| **Ongoing** including just before annual storm seasons and following rainfall events. | • Maintain vegetation as needed. Use of fertilizers, pesticides and herbicides should be strenuously avoided to ensure they don't contribute to water pollution. If appropriate native plant selections and other IPM methods are used, such products shouldn't be needed. If such projects are used,<br>○ Products shall be applied in accordance with their labeling, especially in relation to application to water, and in areas subjected to flooding.<br>○ Fertilizers should not be applied within 15 days before, after, or during the rain season.<br>• Remove debris and litter from the entire basin to minimize clogging and improve aesthetics.<br>• Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues associated with stagnant or standing water in the basin bottom. There should be no long-term ponding water.<br>• Check for erosion and sediment laden areas in the basin. Repair as needed. Clean forebay if needed.<br>• Revegetate side slopes where needed. |
| **Annually.** If possible, schedule these inspections within 72 hours after a significant rainfall. | • Inspection of hydraulic and structural facilities. Examine the inlet for blockage, the embankment and spillway integrity, as well as damage to any structural element.<br>• Check for erosion, slumping and overgrowth. Repair as needed.<br>• Check basin depth for sediment build up and reduced total capacity. Scrape bottom as needed and remove sediment. Restore to original cross-section and infiltration rate. Replant basin vegetation.<br>• Verify the basin bottom is allowing acceptable infiltration. Use a disc or other method to aerate basin bottom only if there is actual significant loss of infiltrative capacity, rather than on a routine basis[1].<br>• No water should be present 72 hours after an event. No long term standing water should be present at all. No algae formation should be visible. Correct problem as needed. |

1. **CA Stormwater BMP Handbook for New Development and Significant Redevelopment**

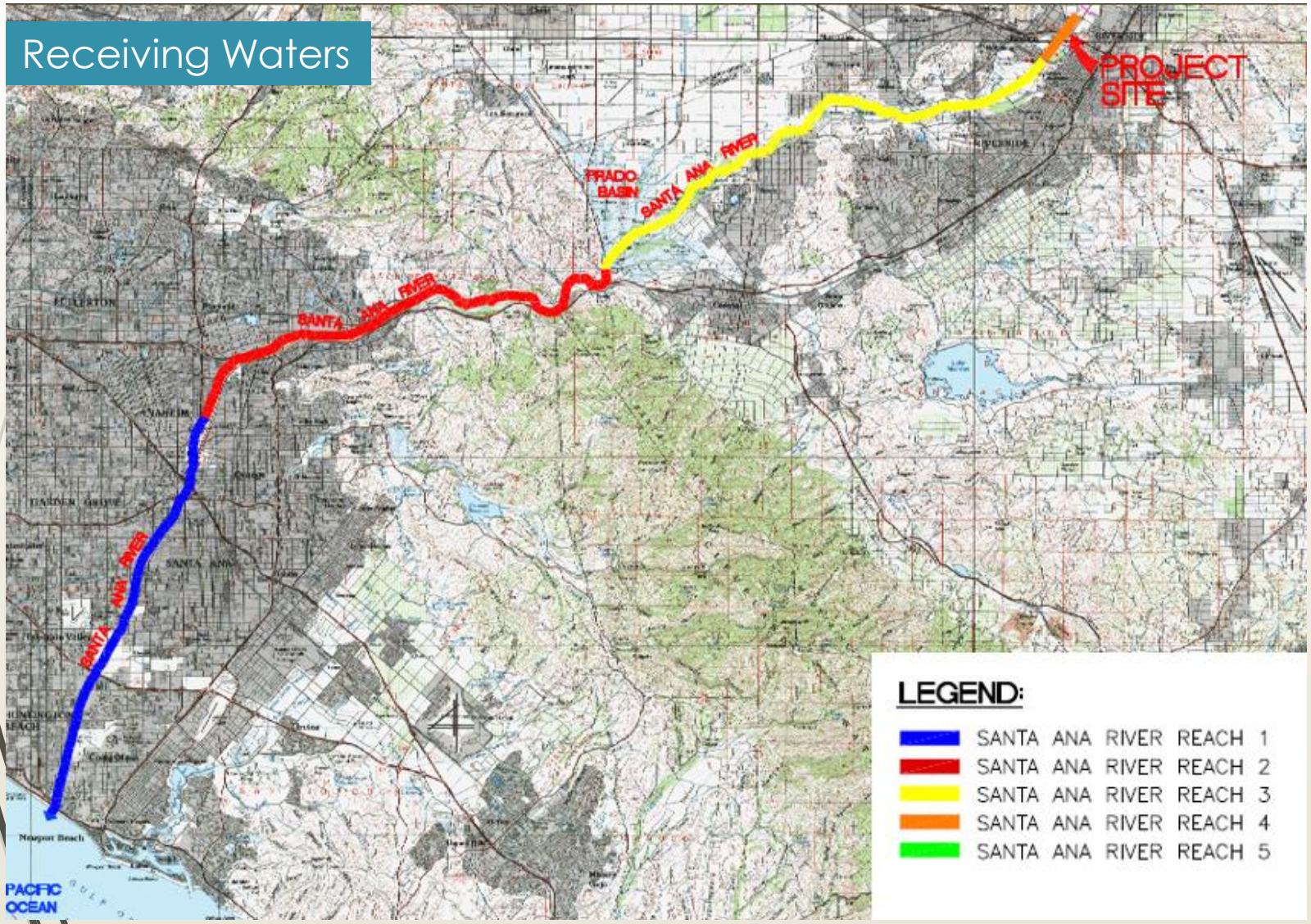
rcwatershed.org

# WQMP Plans and Appendices

# Appendix 1- Maps and Site Plans

rcwatershed.org

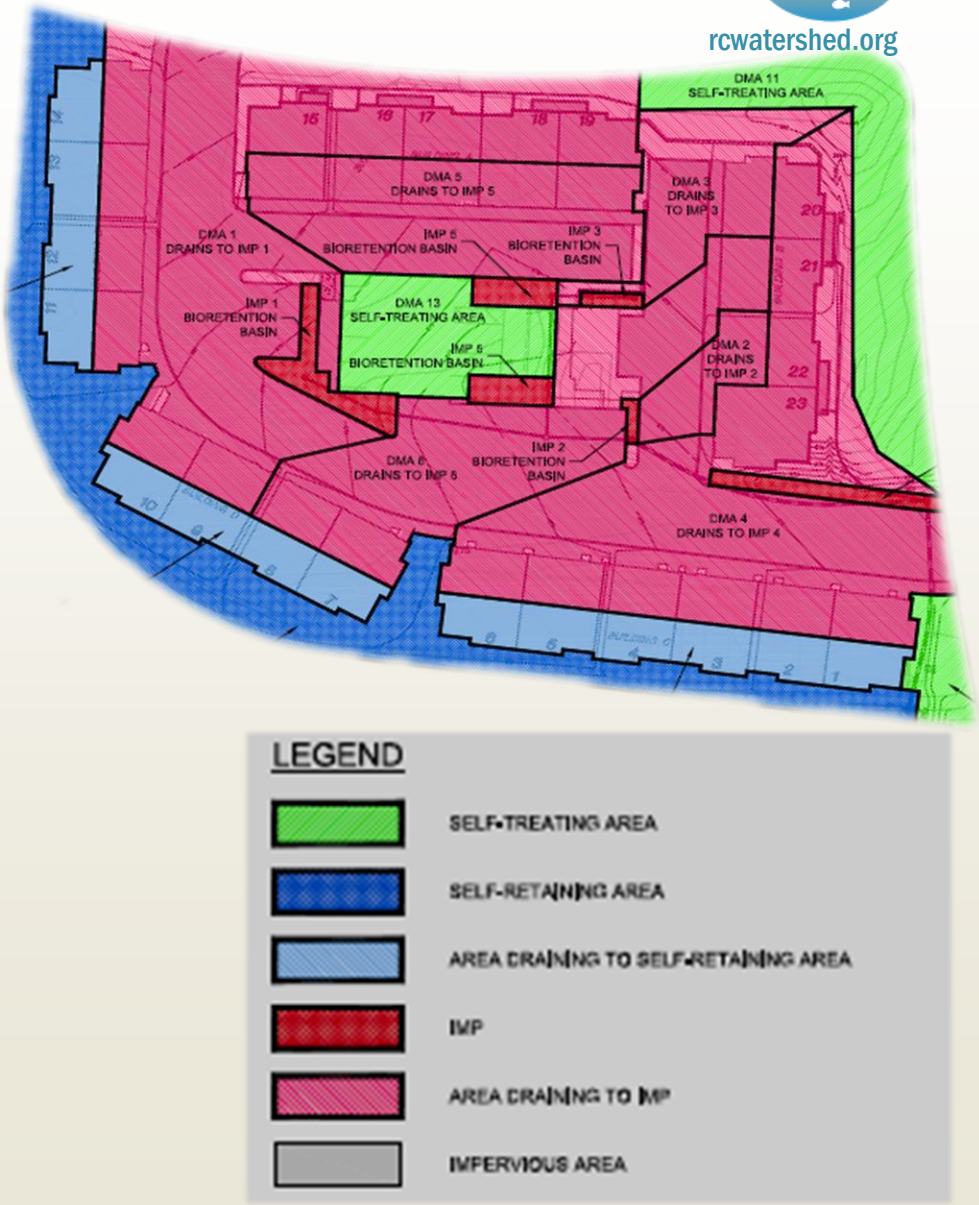
## Receiving Waters



# Appendix 1 - Maps and Site Plans

rcwatershed.org

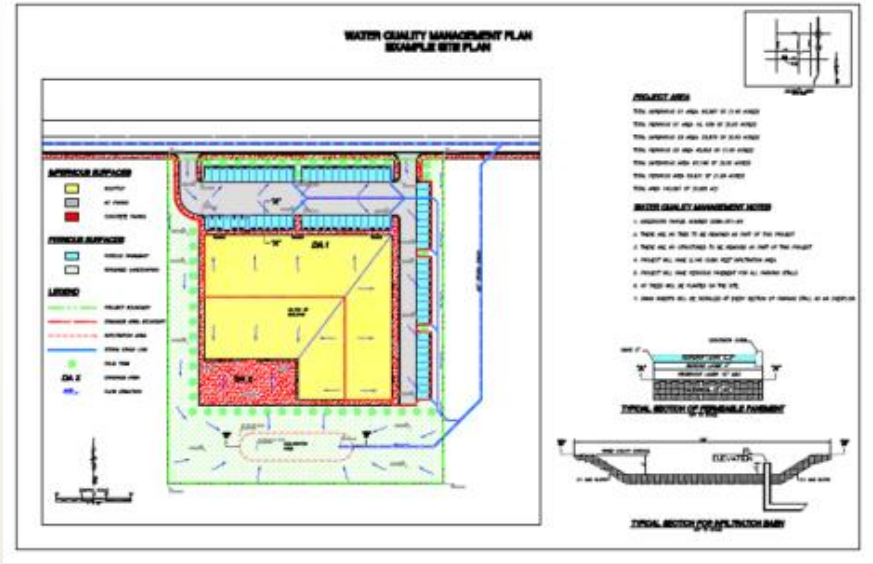
- Standard sized engineering drawings are required by most agencies
- Multiple drawings are appropriate for all but the most basic projects
- The WQMP is for Post-construction
- Do Not include SWPPP details on the WQMP Site Plan



# Appendix 1 – Maps and Site Plans

rcwatershed.org

- Site Plan should provide:
  - Vicinity Map
  - Project boundary
  - Pervious area
  - Impervious area
  - Building area
  - Land uses and land covers
  - DMA boundaries and flow arrows (may be a separate exhibit) for each DCV
  - Design elevations and benchmark utilized
  - Pre- and Post-topography

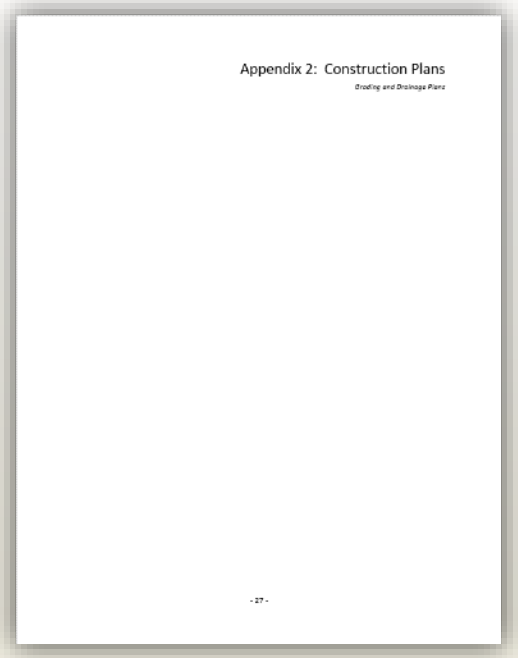


  - All source control BMPs identified
  - LID BMP details and x-sections
  - Drainage connections
  - Standard site labeling

# Appendix 2 – Construction Plans

rcwatershed.org

- Provide Project Construction Plans
  - Grading Plans
  - Drainage plans
  - Landscape plans
  - Utility Plans


Appendix 2: Construction Plans

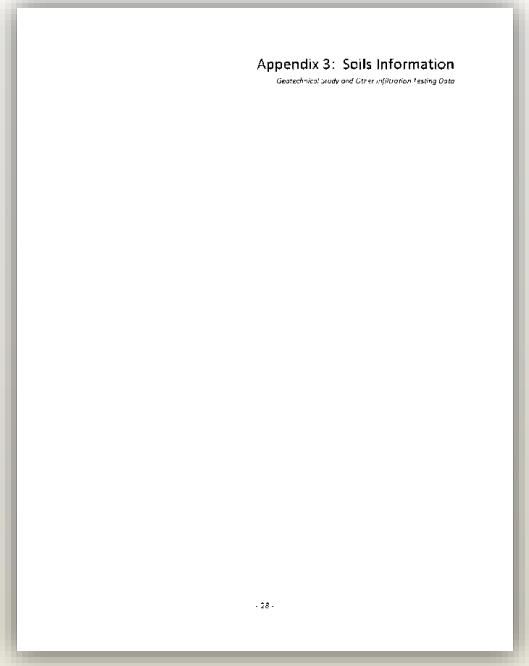
Grading and Drainage Plans

- 27 -

# Appendix 3 – Soils Information

rcwatershed.org

- Geotechnical Study
- Infiltration Testing Data
  - Soils report must be included
  - Must be in compliance with Appendix A of County LID BMP Design Handbook
    - Borings or exploration pits to document soil conditions below infiltration BMPs, and the presence of groundwater
    - Infiltration tests to determine the steady-state infiltration rate of the soils.


Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

- 28 -

# Appendix 3 – Soils Information

rcwatershed.org

- Appendix A – Table 1 Infiltration Testing Requirements
  - Provides 4 test regime options and their corresponding factors of safety
  - Broken down by specific Infiltration LID BMPs
    - Infiltration trench
    - Infiltration basin
    - Infiltration bioretention
    - Permeable pavement

LID BMP Design Handbook
Appendix A – Infiltration Testing
Table 1

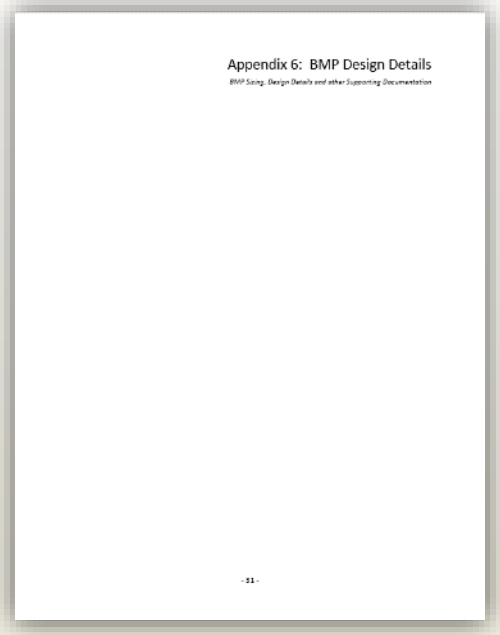
**Table 1 - Infiltration Testing Requirements**

| Infiltration BMP | Testing Options | Ring Infiltrometer Tests[1] | Percolation Test[2] | Test Pits or Boring Logs[3] | Final Report[4] | Hydrology Manual[5] | Factor of Safety |
|---|---|---|---|---|---|---|---|
| Infiltration Trench | Option 1 | 2 tests min. with at least 1 per trench | not used | 1 boring or test pit per trench | Required | not used | FS = 3 |
| | Option 2► | not used | 4 tests min. with at least two per trench | 1 boring or test pit per trench | Required | not used | FS = 3 |
| | Option 3[7]► | not used | not used | 1 boring or test pit per trench | Required | not used | FS = 6 |
| | Option 4► | not used | not used | 1 boring or test pit per site | not used | only | FS = 10 |
| Infiltration Basin | Option 1 | 2 tests min. with at least 1 per basin[6] | not used | 1 boring or test pit per basin | Required | not used | FS = 3 |
| | Option 2► | not used | 4 tests min. with at least 2 per basin[6] | 1 boring or test pit per trench | Required | not used | FS = 3 |
| | Option 3[7]► | not used | not used | 1 boring or test pit per basin | Required | not used | FS = 6 |
| | Option 4► | not used | not used | 1 boring or test pit per site | not used | only | FS = 10 |
| Permeable Pavement | Option 1 | 2 tests min. with at least 1 every 10,000 $ft^2$ | not used | 1 boring or test pit every 10,000 $ft^2$ | Required | not used | FS = 3 |
| | Option 2► | not used | 4 tests min. with at least 2 every 10,000 $ft^2$ | 1 boring or test pit every 10,000 $ft^2$ | Required | not used | FS = 3 |

# Appendix 6 – BMP Design Details

rcwatershed.org

- BMP Sizing Calculations and Design Details
  - Include calculations for:
    - DCV – Worksheets
      - One worksheet for each BMP
    - Volume of each BMP
    - Flow of each BMP, if applicable
    - Specific design features of each BMP
  - Worksheets located in the County LID BMP Design Handbook


Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

- 51 -

# Appendix 4 & 5

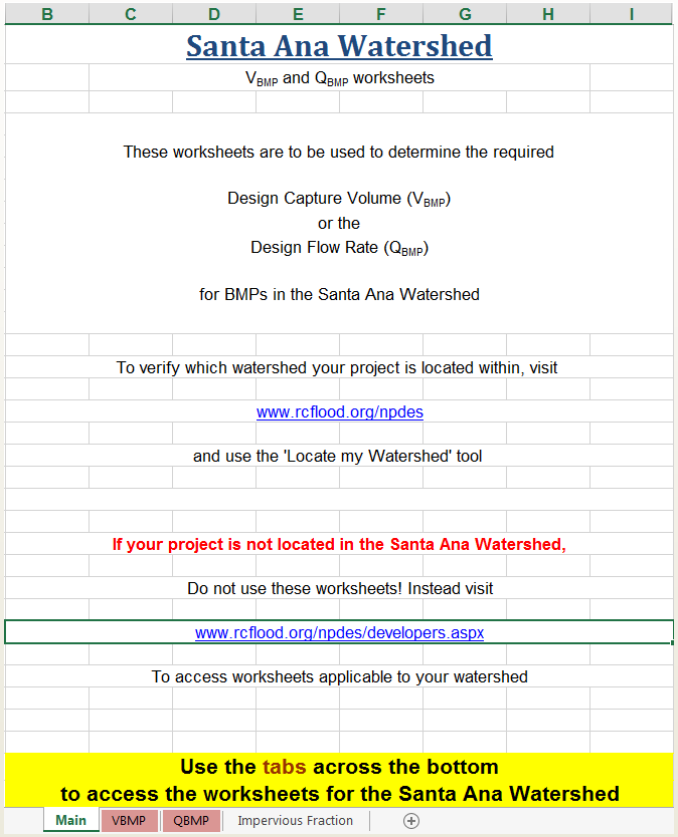
rcwatershed.org

- Appendix 4
  - Historical site conditions information
  - Site Assessments
- Appendix 5
  - LID Infeasibility information
  - Alternative compliance information

# Appendix 6 – DCV Worksheets

rcwatershed.org

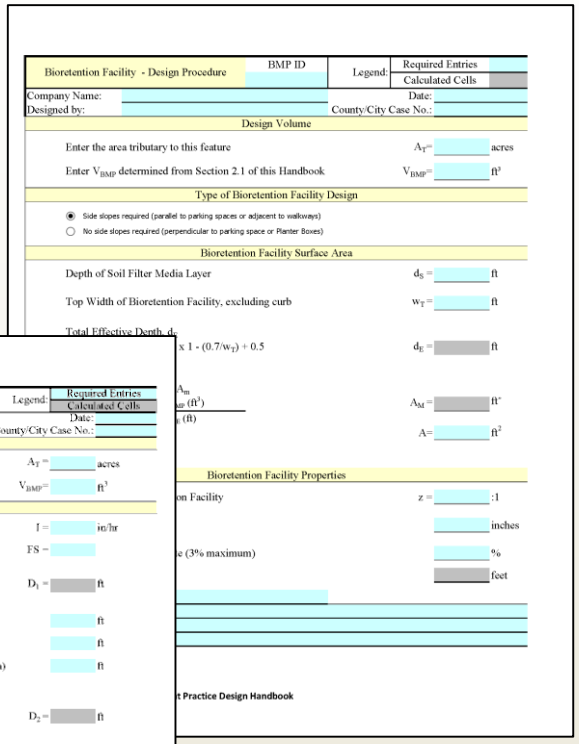
- There are separate workbooks for each watershed
  - Ensure correct workbook
  - Worksheets to be used for determining:
    - Design Capture Volume ($V_{BMP}$)
    - Design Flow Rate ($Q_{BMP}$) (used only by Lower tier BMPs)
  - Excel Format



# Appendix 6 – BMP Design Worksheets

rcwatershed.org

- Appendix 6 should also include a BMP design worksheet for every proposed LID BMP
  - Design worksheets included in County LID BMP Handbook:
    - Infiltration basin
    - Infiltration trench
    - Permeable pavement
    - Bioretention
    - Extended detention



Bioretention Facility - Design Procedure | BMP ID | Legend: Required Entries / Calculated Cells

Company Name: | Date:

Designed by: | County/City Case No.:

Design Volume

Enter the area tributary to this feature — $A_T$ = acres

Enter $V_{BMP}$ determined from Section 2.1 of this Handbook — $V_{BMP}$ = ft³

Type of Bioretention Facility Design

- Side slopes required (parallel to parking spaces or adjacent to walkways)
- No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — $d_S$ = ft

Top Width of Bioretention Facility, excluding curb — $w_T$ = ft

Total Effective Depth, $d_e$

x 1 - (0.7/$w_T$) + 0.5 — $d_E$ = ft

$A_m$

($ft^3$)

(ft) — $A_M$ = $ft^2$

A= $ft^2$

Bioretention Facility Properties

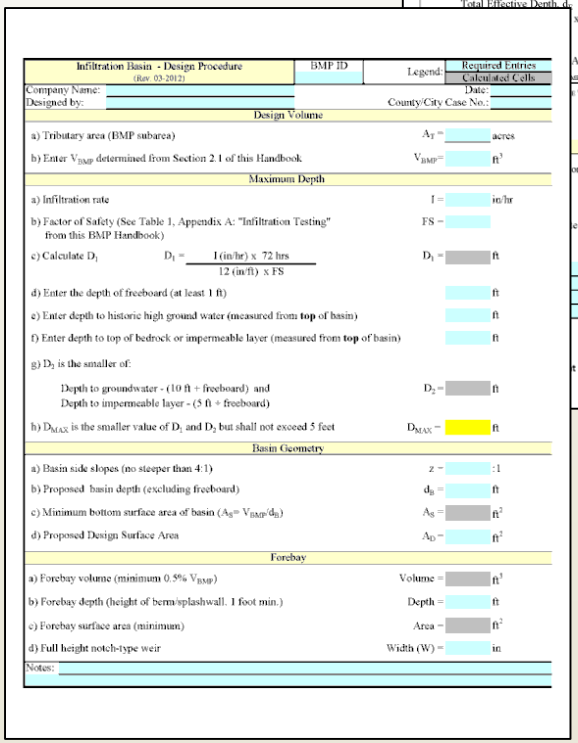
on Facility — z = :1

inches

e (3% maximum) %

feet

t Practice Design Handbook



Infiltration Basin - Design Procedure (Rev. 03-2012) | BMP ID | Legend: Required Entries / Calculated Cells

Company Name: | Date:

Designed by: | County/City Case No.:

Design Volume

a) Tributary area (BMP subarea) — $A_T$ = acres

b) Enter $V_{BMP}$ determined from Section 2.1 of this Handbook — $V_{BMP}$ = $ft^3$

Maximum Depth

a) Infiltration rate — I = in/hr

b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook) — FS =

c) Calculate $D_1$ — $D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times FS}$ — $D_1$ = ft

d) Enter the depth of freeboard (at least 1 ft) — ft

e) Enter depth to historic high ground water (measured from **top** of basin) — ft

f) Enter depth to top of bedrock or impermeable layer (measured from **top** of basin) — ft

g) $D_2$ is the smaller of:

Depth to groundwater - (10 ft + freeboard) and
Depth to impermeable layer - (5 ft + freeboard) — $D_2$ = ft

h) $D_{MAX}$ is the smaller value of $D_1$ and $D_2$ but shall not exceed 5 feet — $D_{MAX}$ = ft

Basin Geometry

a) Basin side slopes (no steeper than 4:1) — z = :1

b) Proposed basin depth (excluding freeboard) — $d_B$ = ft

c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$) — $A_S$ = $ft^2$

d) Proposed Design Surface Area — $A_D$ = $ft^2$

Forebay

a) Forebay volume (minimum 0.5% $V_{BMP}$) — Volume = $ft^3$

b) Forebay depth (height of berm/splashwall. 1 foot min.) — Depth = ft

c) Forebay surface area (minimum) — Area = $ft^2$

d) Full height notch-type weir — Width (W) = in

Notes:

# Appendix 7 - Hydromodification

rcwatershed.org

- Hydromodification Substantiation may include:
  - Substantiated hydraulic analysis for HCOC exemption 2
  - Riverside County Hydrology manual
  - Technical Release 55
  - Written confirmation of adequate sump for HCOC exemption 3
  - Hydrographs and other pertinent supporting documents addressing HCOC mitigation (if necessary)


Appendix 7: Hydromodification

# Appendix 8 – Source Control

rcwatershed.org

## STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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

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

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

# Appendix 9 – O&M

rcwatershed.org

I. Inspection and Maintenance Log

II. Updates, Revisions and Errata

III. Introduction
- A. Narrative overview describing the site; drainage areas, routing and discharge points; and Stormwater BMPs

IV. Responsibility for Maintenance
- A. General
  1. Name and contact information for responsible individual(s)
  2. Organization chart or charts showing organization of the maintenance function and location within the overall organization
  3. Reference to Operation and Maintenance Agreement (if any). A copy of the agreement should be attached
  4. Maintenance Funding
     - a) *Sources of funds for maintenance*
     - b) *Budget category or line item*
     - c) *Description of procedure and process for ensuring adequate funding for maintenance*
- B. Staff Training Program
- C. Records
- D. Safety

V. Summary of Drainage Management Areas and Stormwater BMPs
- A. Drainage Areas
  1. Drawings showing pervious and impervious areas (copied or adapted from Project-Specific WQMP)
  2. Designation and description of each Drainage Management Area and how flow is routed to the corresponding Stormwater BMP
- B. Structural Post-Construction BMPs
  1. Drawings showing location and type of each Structural Post-Construction BMP
  2. General description of each facility (consider a table if more than two BMPs)
     - a) *Drainage Management Area and routing of discharge*
     - b) *Stormwater BMP type and size*
- C. Self-Retaining Areas or Other (e.g. LID Principles)
  1. Drawings showing the location of self-retaining areas or areas addressed by LID Principles that do not require specialized maintenance beyond that of typical landscape maintenance

VI. Stormwater BMP Design Documentation
- A. "As-built" drawings of each Stormwater BMP (design drawings in the draft Plan)
- B. Manufacturer's data, manuals, and maintenance requirements for pumps, mechanical or electrical equipment and proprietary facilities (include a "placeholder" in the draft Operations and Maintenance plan for information not yet available)
- C. Specific operation and maintenance concerns and troubleshooting

VII. Maintenance Schedule or Matrix
- A. Maintenance Schedule for each facility with specific requirements for:
  1. Routine inspection and maintenance
  2. Annual inspection and maintenance
  3. Inspection and maintenance after major storms
- B. Service Agreement Information

O&M Report Required Outline

# Appendix 10 – Educational Materials

rcwatershed.org

- BMP Fact sheets
- Maintenance Guidelines
- Other End-User BMP Info
  - Include water pollution control educational materials for educating:
  - Owners
  - Operators
  - Employees
  - Residents, etc.
  - Source Control BMP educational materials are to be included in this Appendix.

# Available Resources

rcwatershed.org

## SWCT$^2$

## Stormwater &

## Water Conservation

## Tracking Tool

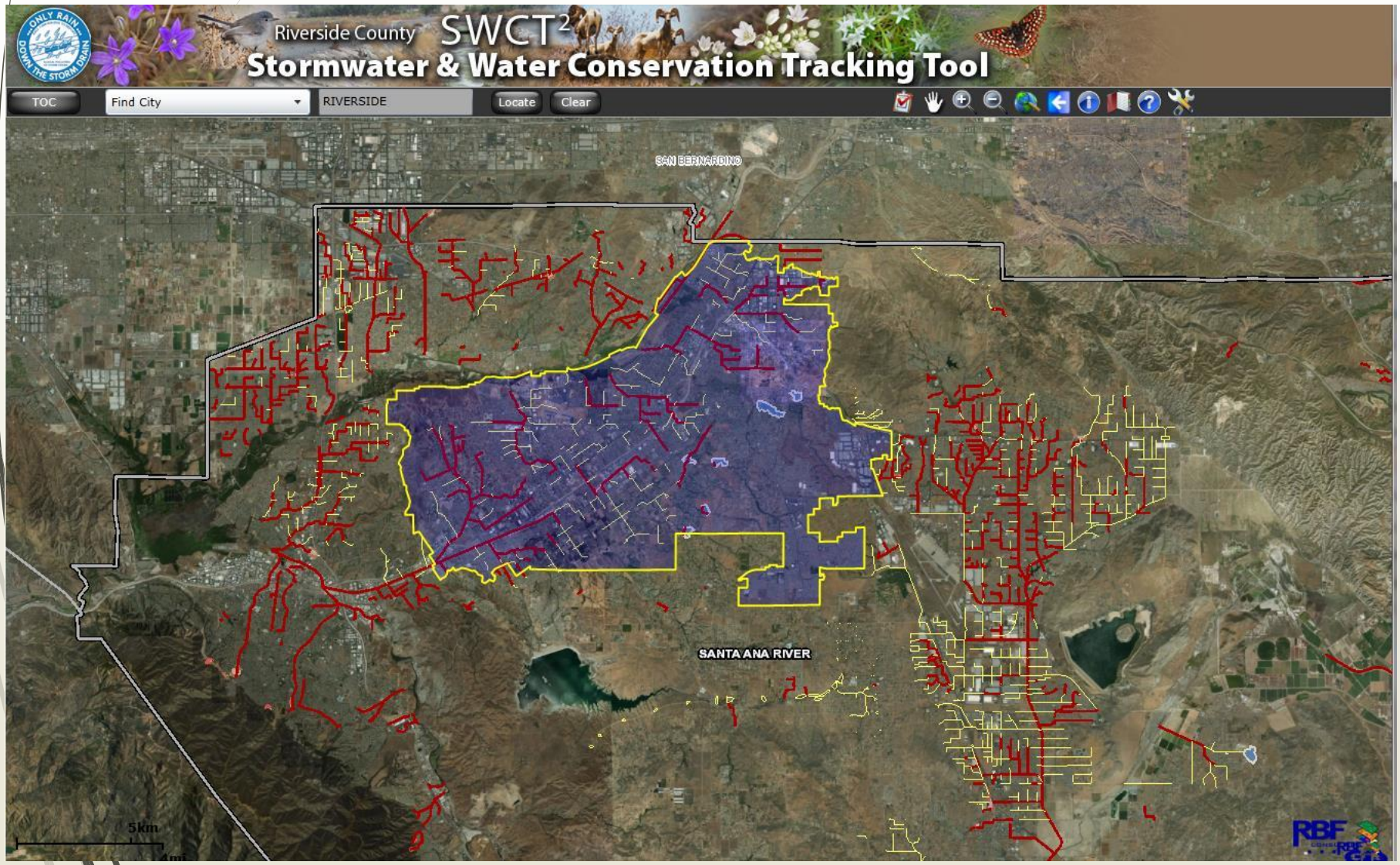
## (a.k.a. The Regional Geodatabase)

## A Useful Tool for Preparing and Plan Checking WQMPs

# Site Specific Assessments

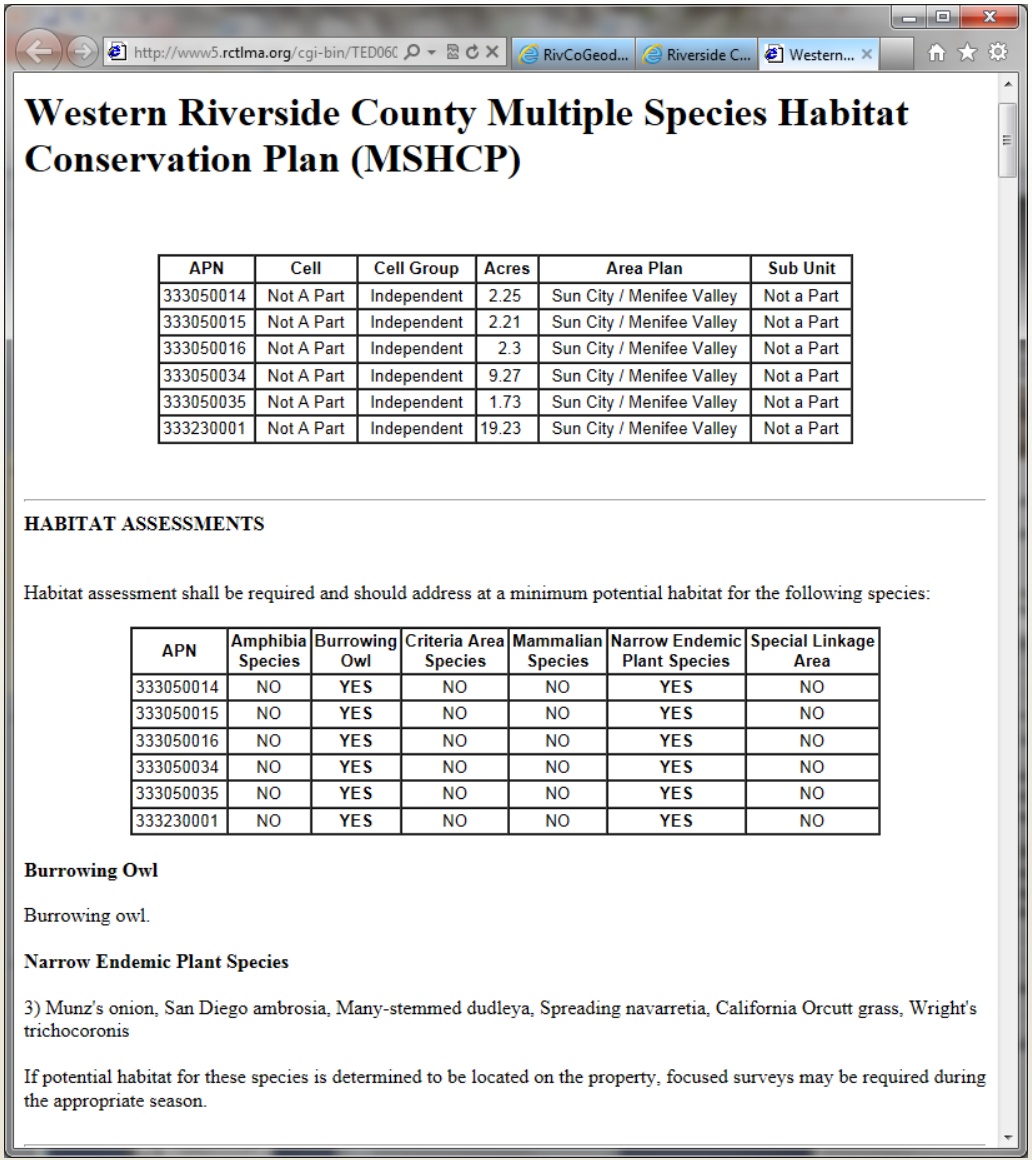
## Outline Project Site or Select Parcels

rcwatershed.org



# MSHCP Report for Parcels

rcwatershed.org



http://www5.rctlma.org/cgi-bin/TED06( RivCoGeod... Riverside C... Western...

## Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP)

| APN | Cell | Cell Group | Acres | Area Plan | Sub Unit |
|---|---|---|---|---|---|
| 333050014 | Not A Part | Independent | 2.25 | Sun City / Menifee Valley | Not a Part |
| 333050015 | Not A Part | Independent | 2.21 | Sun City / Menifee Valley | Not a Part |
| 333050016 | Not A Part | Independent | 2.3 | Sun City / Menifee Valley | Not a Part |
| 333050034 | Not A Part | Independent | 9.27 | Sun City / Menifee Valley | Not a Part |
| 333050035 | Not A Part | Independent | 1.73 | Sun City / Menifee Valley | Not a Part |
| 333230001 | Not A Part | Independent | 19.23 | Sun City / Menifee Valley | Not a Part |

**HABITAT ASSESSMENTS**

Habitat assessment shall be required and should address at a minimum potential habitat for the following species:

| APN | Amphibia Species | Burrowing Owl | Criteria Area Species | Mammalian Species | Narrow Endemic Plant Species | Special Linkage Area |
|---|---|---|---|---|---|---|
| 333050014 | NO | **YES** | NO | NO | **YES** | NO |
| 333050015 | NO | **YES** | NO | NO | **YES** | NO |
| 333050016 | NO | **YES** | NO | NO | **YES** | NO |
| 333050034 | NO | **YES** | NO | NO | **YES** | NO |
| 333050035 | NO | **YES** | NO | NO | **YES** | NO |
| 333230001 | NO | **YES** | NO | NO | **YES** | NO |

**Burrowing Owl**

Burrowing owl.

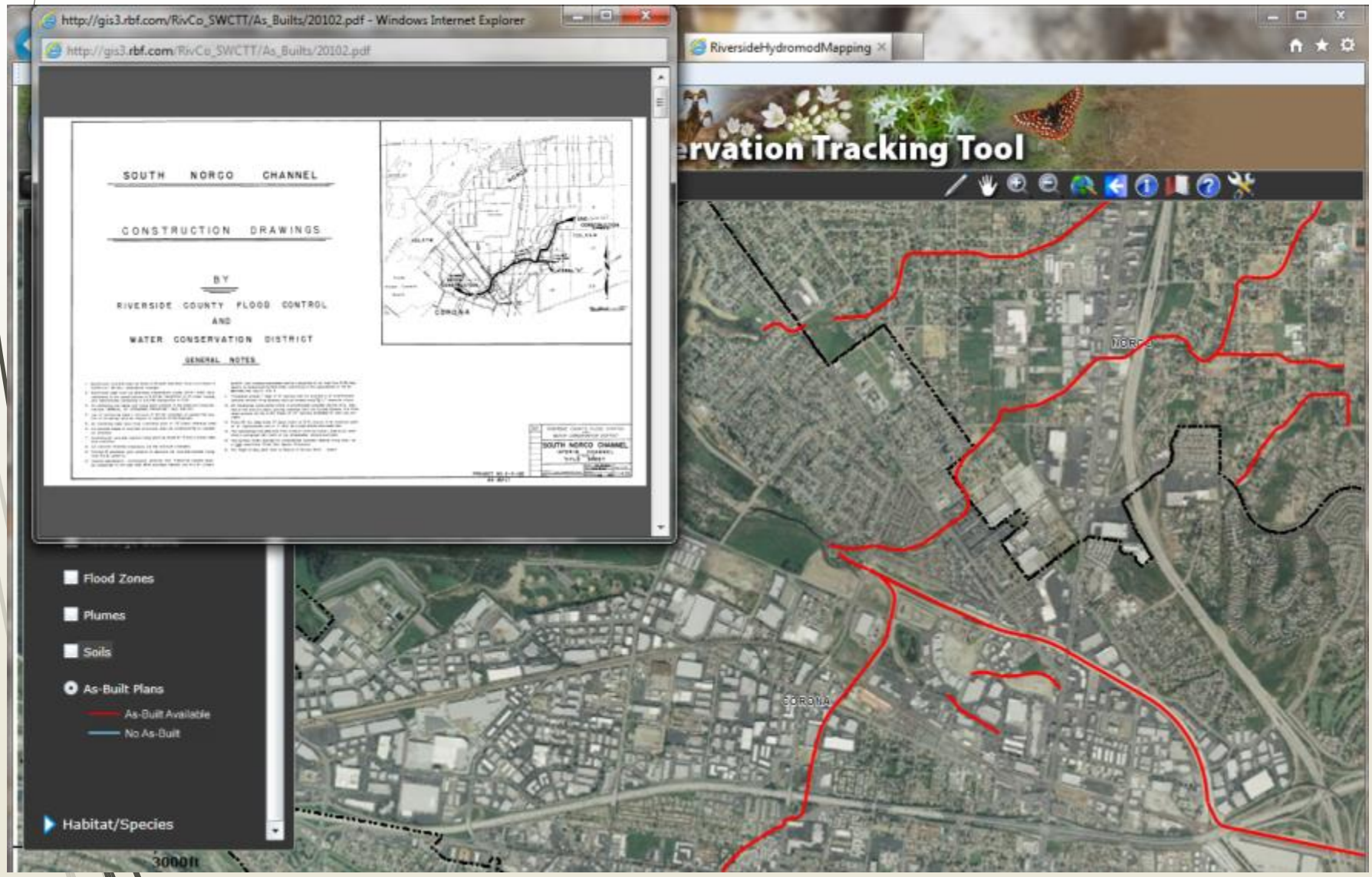
**Narrow Endemic Plant Species**

3) Munz's onion, San Diego ambrosia, Many-stemmed dudleya, Spreading navarretia, California Orcutt grass, Wright's trichocoronis

If potential habitat for these species is determined to be located on the property, focused surveys may be required during the appropriate season.

# Storm Drain As-Built Information

rcwatershed.org



# Available Resources Continued…

rcwatershed.org

## Remember…

- Watershed Mapping Tool is available - information must be verified
  - Location: http://rivco.permitrack.com/
- LID BMP Design Handbook and Outreach materials available at:
  - http://rcflood.org/npdes/
- Informational pamphlets available in main lobby at Riverside County Flood Control and Water Conservation District

rcwatershed.org

# Discussion Questions?

# BMP Projects Harvest and Use

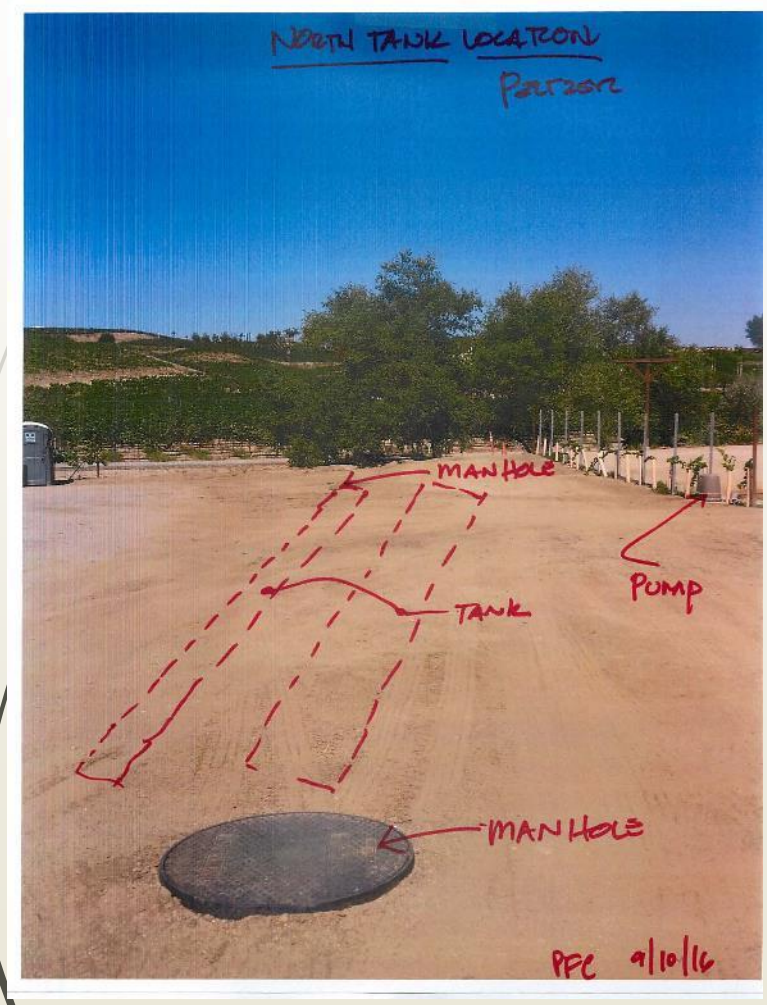
## Permittee Highlights

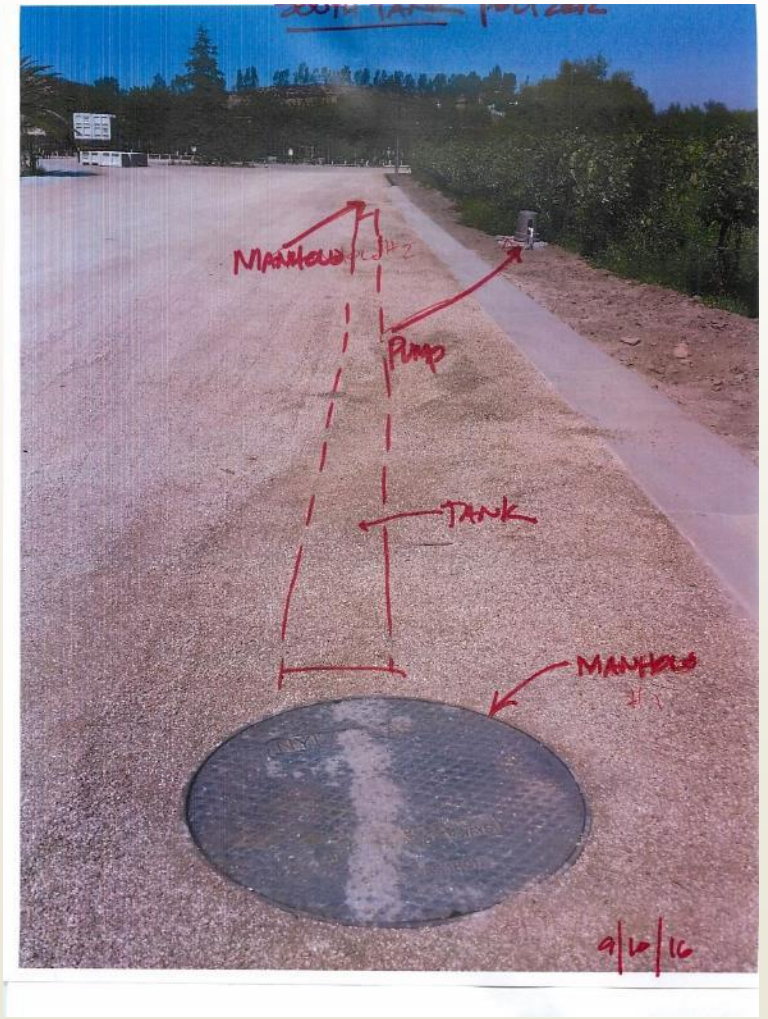
# Winery – Infiltration Basin BMP

rcwatershed.org

# Winery – Harvest and Use BMP

rcwatershed.org



# Winery – Harvest and Use BMP

rcwatershed.org

## Peltzer Rainwater Harvesting Tanks

Jan 18–Jan 19 · Shared

Monday, Sep 12, 2016 08:16 AM

# Corona Self-Storage Project

Permittee Highlight

# Self-Storage Before Photo

rcwatershed.org

# Self-Storage After Photo

rcwatershed.org

rcwatershed.org



# Porous Pavers

Permittee Highlight

# Porous Pavers

rcwatershed.org

rcwatershed.org



# Things to Consider in Construction

Permittee Highlight

# Verification Against Approved Plans

rcwatershed.org

# Verification Against Approved Plans at All Stages

rcwatershed.org

# Questions?

rcwatershed.org