San Bernardino County Stormwater Program
Order R8-2010-0036

Comprehensive
Bacteria Reduction Plan

Revised
June 28, 2011

Submitted to:
California Regional Water Quality Control Board,
Santa Ana Region

Submitted by:
San Bernardino County Flood Control District

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BMPs	Best Management Practices
BPS	Bacterial Prioritization Score
CAP	Compliance Assistance Program
CBRP	Comprehensive Bacteria Reduction Plan
CII	Commercial, Industrial, and Institutional
COPS	Community Oriented Policing Services
CUWCC	California Urban Water Conservation Council
CWA	Clean Water Act
CWP	Center for Watershed Protection
DWF	Dry Weather Flow
EPA	Environmental Protection Agency
IDDE	Illicit Discharge Detection and Elimination
IEUA	Inland Empire Utilities Agency
LID	Low Impact Development
mL	Milliliters
MS4	Municipal Separate Storm Sewer System
MSAR	Middle Santa Ana River
MST	Microbial Source Tracking
MWD	Metropolitan Water District
NPDES	National Pollutant Discharge Elimination System
OCWD	Orange county Water District
POTWs	Publicly-owned Treatment Works
QAPP	Quality Assurance Project Plan
RCFC&WCD	Riverside County Flood Control and Water Conservation District
REC-1	Water Contact Recreation
REC-2	Non-Contact Recreation
RWQCB	Regional Water Quality Control Board
SAR	Santa Ana River
SAWPA	Santa Ana Watershed Protection Authority
SBCFCD	San Bernardino County Flood Control District
SCAG	Southern California Association of Governments
SWQSTF	Stormwater Quality Standards Task Force
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
USEP	Urban Source Evaluation Plan
USGS	United States Geological Study
UWMP	Urban Water Management Plan
WAP	Watershed Action Plan
WBIC	Weather-based Irrigation Controller
WQMP	Water Quality Management Plan

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Section 1
Background and Purpose

The Santa Ana Regional Water Quality Control Board (RWQCB) adopted a Municipal Separate Storm Sewer System (MS4) permit for San Bernardino County on January 29, 2010 that requires the development of a Comprehensive Bacteria Reduction Plan (CBRP). The CBRP is a long term plan designed to achieve compliance with dry weather condition (April 1 – October 31) wasteload allocations for bacterial indicators established by the Middle Santa Ana River (MSAR) Bacterial Indicator Total Maximum Daily Load (TMDL) ("MSAR Bacterial Indicator TMDL"). This document fulfills this MS4 permit requirement. The following sections provide the regulatory background, purpose, and framework of the CBRP.

1.1 Regulatory Background

The 1972 Federal Water Pollution Control Act and its amendments comprise what is commonly known as the Clean Water Act (CWA). The CWA provides the basis for the protection of all inland surface waters, estuaries, and coastal waters. The federal Environmental Protection Agency (EPA) is responsible for ensuring the implementation of the CWA and its governing regulations (primarily Title 40 of the Code of Federal Regulations) at the state level.

California's Porter-Cologne Water Quality Control Act of 1970 and its implementing regulations establish the Santa Ana Regional Water Quality Control Board (RWQCB) as the agency responsible for implementing CWA requirements in the Santa Ana River Watershed. These requirements include adoption of a Water Quality Control Plan ("Basin Plan") to protect inland freshwaters and estuaries. The Basin Plan identifies the beneficial uses for waterbodies in the Santa Ana River watershed, establishes the water quality objectives required to protect those uses, and provides an implementation plan to protect water quality in the region (RWQCB 1995, as amended).

The CWA requires the RWQCB to routinely monitor and assess water quality in the Santa Ana River watershed. If this assessment indicates that beneficial uses are not met in a particular waterbody, then the waterbody is found to be impaired and placed on the state's impaired waters list (or 303(d) list[1]). This list is subject to EPA approval; the most recent EPA-approved 303(d) list for California is the 2006 list[2].

Waterbodies on the 303(d) list require development of a TMDL. A TMDL establishes the maximum amount of a pollutant that a waterbody can receive (from both point and nonpoint sources) and still meet water quality objectives.

[1] 303(d) is a reference to the CWA section that requires the development of an impaired waters list.

[2] The State Water Resources Control Board recently completed its 2010 303(d) List. This list is currently under review by the EPA.

1.2 Santa Ana River Watershed Basin Plan

The Basin Plan designates beneficial uses (including recreational uses) for surface waters in the Santa Ana River watershed (RWQCB 1995, as amended) (see Table 3-1 of the Basin Plan). The following sections describe existing and potential future Basin Plan requirements that are relevant to this CBRP.

1.2.1 Existing Basin Plan Requirements

The recreational uses applicable to waterbodies in the MSAR watershed include Water Contact Recreation (REC-1) and Non-Contact Recreation (REC-2). These are currently defined in the Basin Plan as follows:

- *REC-1* - Waters that are used for recreational activities involving body contact with water where ingestion of water is reasonably possible. These uses may include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.

- *REC-2* - Waters that are used for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water would be reasonably possible. These uses may include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, and aesthetic enjoyment in conjunction with the above activities.

To evaluate whether these recreational uses are protected in a given waterbody, the Basin Plan (Chapter 4) currently relies on fecal coliform[3] as a bacterial indicator for the potential presence of pathogens. Fecal coliform present at concentrations above certain thresholds are believed to be an indicator of the potential presence of fecal pollution and harmful pathogens, thus increasing the risk of gastroenteritis in recreational bathers exposed to the elevated levels. Section 4 of the Basin Plan specifies the following water quality objectives for protection of recreational uses:

- REC-1 - Fecal coliform: log mean less than 200 organisms/100 mL based on five or more samples/30-day period, and not more than 10 percent of the samples exceed 400 organisms/ 100 mL for any 30-day period.

- REC-2 - Fecal coliform: average less than 2000 organisms/100 mL and not more than 10 percent of samples exceed 4000 organisms/100 mL for any 30-day period

1.2.2 Proposed Amendments to the Basin Plan

The RWQCB is currently considering replacing the REC-1 bacterial indicator water quality objectives for fecal coliform with *E. coli* objectives. EPA published revised bacterial indicator guidance in 1986 (EPA 1986) that recommended the adoption of *E. coli* as the freshwater bacterial indicator for pathogens. This guidance was based on epidemiological studies that found that the positive correlation between *E. coli* concentrations and the frequency of gastroenteritis was better than the correlation between fecal coliform concentrations and gastroenteritis.

The RWQCB is considering this Basin Plan revision through the work of the Stormwater Quality Standards Task Force (SWQSTF). Since 2003, RWQCB staff and members of the SWQSTF (which

3 Fecal coliform and *E. Coli* are a group of bacteria considered by the Regional Board as bacterial indicators for pathogens. Within this CBRP, references to fecal coliform and *E. Coli* should be considered equivalent to the term bacterial indicators.

includes representatives from the Santa Ana Watershed Protection Authority [SAWPA]; the counties and cities of Orange, Riverside, and San Bernardino; Orange County Coastkeeper; Inland Empire Waterkeeper; among others) have been engaged in the implementation of a workplan that is evaluating both recreational uses and associated water quality objectives. The key proposed amendments, relevant to this MSAR Bacterial Indicator TMDL that are expected to be adopted by the RWQCB in fall 2011 include:

- Clarification of the definition of REC-1 waters;
- Deletion of the current fecal coliform objectives for REC-1 and REC-2 beneficial uses;
- Adoption of geometric mean *E. coli* objectives for REC-1 waters based on EPA (1986) guidance;
- Sub-categorization of REC-1 waters into classes and establishment of a class-specific method for assessing *E. coli* data in the absence of sufficient data to calculate a geometric mean;
- For waters designated only REC-2 (only after approval of a Use Attainability Analysis [UAA] that removes the presumptive REC-1 use), establishment of an antidegradation-based bacterial indicator water quality objective; and
- Temporary suspension of recreational uses during high flow conditions in freshwater streams.

The Basin Plan amendment includes several UAAs to modify presumptive REC-1 uses in the MSAR watershed. These UAAs and proposed recreational use changes include:

- *Cucamonga Creek* – Reach 1, confluence with Mill Creek (at Hellman Street) upstream to 23rd Street in Upland, California; remove both REC-1 and REC-2 uses.
- *Temescal Creek* – Reach 1, from approximately 100 feet downstream of Cota Street (33°53'29.904"N, 117°34'12.432") to the Arlington Drain confluence; remove REC-1 use.
- *Temescal Creek* – Reach 2, from the confluence with Arlington Drain (33° 52' 51.204"N, 117° 33' 15.732"W) to approximately 1,400 feet upstream of Magnolia Avenue (33° 52' 1.992"N, 117° 31' 30.108"W); remove REC-1 and REC-2 uses.

1.3 Middle Santa Ana River Bacterial Indicator TMDL

Water quality data collected in 1994 and 1998 from waterbodies in the MSAR watershed showed exceedances of fecal coliform bacterial indicator water quality objectives. Based on these data and potential impacts to recreational uses, the RWQCB recommended that the following waterbodies be placed on the 303(d) list:

- Santa Ana River, Reach 3 – Prado Dam to Mission Boulevard
- Chino Creek, Reach 1 – Santa Ana River confluence to beginning of hard lined channel south of Los Serranos Road
- Chino Creek, Reach 2 – Beginning of hard lined channel south of Los Serranos Road to confluence with San Antonio Creek
- Mill Creek (Prado Area) – Natural stream from Cucamonga Creek Reach 1 to Prado Basin
- Cucamonga Creek, Reach 1 – Confluence with Mill Creek to 23rd Street in City of Upland

- Prado Park Lake

As noted above, waterbodies on the 303(d) list are subject to the development of a TMDL. Accordingly, on August 26, 2005 the RWQCB adopted Resolution No. R8-2005-0001, amending the Basin Plan to incorporate bacterial indicator TMDLs for the above-listed waterbodies in the watershed (i.e., MSAR Bacterial Indicator TMDL) (RWQCB 2005). The TMDLs adopted by the RWQCB were subsequently approved by the State Water Resources Control Board on May 15, 2006, by the California Office of Administrative Law on September 1, 2006, and by EPA Region 9 on May 16, 2007. The EPA approval date is the TMDL effective date.

The MSAR Bacterial Indicator TMDL established wasteload allocations for urban MS4 and confined animal feeding operation discharges and load allocations for agricultural and natural sources. The wasteload and load allocations were established for both fecal coliform and *E. coli*:

- Fecal coliform: 5-sample/30-day logarithmic mean (or geometric mean) less than 180 organisms/100 mL and not more than 10 percent of the samples exceed 360 organisms/100 mL for any 30-day period.

- *E. coli*: 5-sample/30-day logarithmic mean (or geometric mean) less than 113 organisms/100 mL and not more than 10 percent of the samples exceed 212 organisms/100 mL for any 30-day period.

The urban discharger requirements are listed as tasks in the TMDL, with Tasks 1.2, 3, 4.1, 4.3, 4.5, and 6 having relevance to this CBRP for Riverside County (Table 1-1). Other tasks included in the TMDL either address urban discharges associated with San Bernardino County or other agricultural discharge requirements.

1.4 San Bernardino County MS4 Permit

The San Bernardino County MS4 program operates under a National Pollutant Discharge Elimination System (NPDES) MS4 permit issued by the Regional Board (Order No. 2010-0036, NPDES No. CAS618036). This permit regulates discharges to and from 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 and the following Cities: Big Bear Lake, Chino, Chino Hills, Colton, Fontana, Grand Terrace, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Bernardino, Upland, and Yucaipa. The SBCFCD is the Principal Permittee; the remaining jurisdictions are the Co-Permittees.

The Regional Board issued its first MS4 permit to San Bernardino County MS4 in 1990. This permit focused primarily on program development, which included establishment of the Drainage Area Management Plan (replaced in 2002 by the MSWMP) and implementation of public education and staff training on stormwater quality concerns.

Since the issuance of that permit, the MS4 program has gradually evolved from a very basic stormwater management program into a complex program with many requirements that go beyond the program as originally established. The second-term permit, which began in 1996, focused on continued program development, implementation, and reporting. Under this permit, program reporting requirements increased significantly, which required increased staff and financial resources. To address the increased reporting requirements, permittees developed an electronic data collection and management system for the MS4 Area-wide Program. The system provided for more consistent reporting among the permittees and provided a standardized approach for preparation of the required MS4 Annual Report.

The third-term permit, issued in 2002, increased the focus of the permit on program implementation and required more prescriptive data reporting to document program accomplishments. These requirements led to the development of the MS4 Solution Database, which documents well the extent to which program requirements are implemented throughout the County. It was during this period that the Regional Board began the adoption of TMDLs that included wasteload allocations applicable to urban stormwater discharges. Although the 2002 MS4 permit did not include specific TMDL implementation programs, the MS4 permittees actively participated in the development and implementation of these TMDLs.

The Regional Board adopted the fourth term MS4 permit on January 29, 2010. This permit contains many new requirements that will further increase the complexity and costs associated with the management of urban discharges in the permitted area. In addition, for the first time the MS4 permit explicitly includes TMDL implementation requirements applicable to waterbodies in San Bernardino County for which TMDLs are effective, specifically Big Bear Lake (nutrients) and the MSAR Bacterial Indicator TMDL. The development of this CBRP is a MS4 permit requirement associated with implementation of the MSAR Bacterial Indicator TMDL. The CBRP is designed to provide a comprehensive plan for attaining the MS4 permit's water quality based effluent limits for the MSAR TMDL by integrating existing control programs and efforts with new permit mandates and other additional activities necessary to address controllable urban sources of bacterial indicators.

1.5 Comprehensive Bacterial Indicator Reduction Plan

This section provides information on the requirements for CBRP development and the applicability of the plan to urban discharges in the San Bernardino County area. In addition, information is provided on the general framework of this plan and the process associated with its development.

1.5.1 Purpose and Requirements

The findings section of the San Bernardino County MS4 permit describes the purpose of the CBRP:

- Section II.F.13.c.vi - Based on the results of pre-compliance evaluation monitoring (Pre-compliance evaluation monitoring is monitoring conducted prior to the TMDL compliance date to assess the effectiveness of BMPs [Best Management Practices] implemented in reducing pollutant(s) of concern by the compliance date) it has been determined that the short-term solutions discussed above are not expected to achieve the WLAs [wasteload allocations] by the compliance dates. This Order requires the MSAR permittees to develop a long-term plan (a comprehensive bacteria reduction plan, CBRP) designed to achieve compliance with the WLAs by the compliance dates.

- *Section II.F.13.c.vii* - If necessary, the CBRP will be updated based on an evaluation of the effectiveness of the BMPs implemented. In the absence of an approved CBRP the WLAs become the final numeric water quality-based effluent limit that must be achieved by the compliance dates.

Table 1-1. MSAR Bacterial Indicator TMDL requirements applicable to portions of San Bernardino County.

Task	Subtask	Required Activity	Schedule/Status
Task 1 – Review/ Revise Existing Waste Discharge Requirements	Task 1.1 – WDR requirements for San Bernardino County MS4	Review and revise the Waste Discharge Requirements for the San Bernardino County MS4 permit as necessary to include the appropriate wasteload allocations, compliance schedules and or monitoring requirements	New MS4 permit was adopted on January 29, 2010. Relevant TMDL requirements, including the preparation of the CBRP for dry weather were included in the permit
Task 3 - Watershed-Wide Water Quality Monitoring Program	NA	All named responsible parties in the TMDL shall, as a group, submit to the Regional Board for approval a proposed watershed-wide monitoring program that will provide data necessary to review and update the TMDL.	All parties (except U.S. Forest Service) are implementing a Regional Board approved monitoring program collaboratively through the MSAR Task Force (see Attachment A)
Task 4 – Urban Discharges	Task 4.1 - Develop and Implement Bacterial Indicator Urban Source Evaluation Plan (USEP)	Responsible parties in San Bernardino County (as named in the TMDL) shall develop a Bacterial Indicator Urban Source Evaluation Plan. This plan shall include steps needed to identify specific activities, operations, and processes in urban areas that contribute bacterial indicators to MSAR watershed waterbodies. The plan shall also include a proposed schedule for completion of each of the steps identified. The proposed schedules can include contingency provisions that reflect uncertainty concerning the schedule for completion of the SWQSTF work and/or other investigations that may affect the steps that are proposed. The USEP shall be implemented upon Regional Board approval.	The Regional Board-approved USEP has been implemented by the responsible parties since 2008 (see Attachment A). In addition, this CBRP incorporates the principles/activities of the USEP and replaces its implementation requirements (See Attachment C).
	Task 4.2 – Revise the San Bernardino County Municipal Stormwater Management Program (MSWMP)	The Executive Office shall notify the MS4 permittees of the need to revise the MSWMP to incorporate measures to address the results of the USEP and/or other studies. The revised MSWMP will be implemented upon approval by the Regional Board.	The January 29, 2010 MS4 permit includes requirements for MSWMP revisions that are being coordinated with TMDL implementation
	Task 4.3 – Revise the San Bernardino County Water Quality Management Plan (WQMP)	The Executive Office shall notify the MS4 permittees of the need to revise the WQMP to incorporate measures to address recommendations of the SWQSTF or other investigations. The revised WQMP will be implemented upon approval by the Regional Board.	The January 29, 2010 MS4 permit includes requirements for WQMP revisions that are being coordinated with TMDL implementation and this CBRP
Task 6 – Review or Revision of the MSAR Bacterial Indicator TMDL	NA	Regional Board will review all data and information generated pursuant to the TMDL requirements on an ongoing basis (at least every three years). Based on results from the monitoring programs, special studies, modeling analysis, SWQSTF and/or special studies, changes to the TMDL, including revisions to the numeric targets, may be warranted.	The first Triennial Report was submitted on February 15, 2010; additional Triennial Reports will be prepared in 2013 and 2016 as part of this CBRP (see Attachment E)

Based on these findings, the Regional Board established specific requirements for the CBRP's content. These requirements, found in Section V.D.2.b.i in the San Bernardino County permit, include:

Section V.D.2.b.i - The MSAR permittees shall prepare for approval by the Regional Board a CBRP describing, in detail, the specific actions that have been taken or will be taken to achieve compliance with the urban wasteload allocation under dry weather conditions (April 1st through October 31st) by December 31, 2015. The CBRP must include:

a) The specific ordinance(s) adopted to reduce the concentration of indicator bacteria in urban sources.

b) The specific BMPs implemented to reduce the concentration of indicator bacteria from urban sources and the water quality improvements expected to result from these BMPs.

c) The specific inspection criteria used to identify and manage the urban sources most likely causing exceedances of water quality objectives for indicator bacteria.

d) The specific regional treatment facilities and the locations where such facilities will be built to reduce the concentration of indicator bacteria discharged from urban sources and the expected water quality improvements to result when the facilities are complete.

e) The scientific and technical documentation used to conclude that the CBRP, once fully implemented, is expected to achieve compliance with the urban wasteload allocation for indicator bacteria by December 31, 2015.

f) A detailed schedule for implementing the CBRP. The schedule must identify discrete milestones to assess satisfactory progress toward meeting the urban wasteload allocations for dry weather by December 31, 2015. The schedule must also indicate which agency or agencies are responsible for meeting each milestone.

g) The specific metric(s) that will be established to demonstrate the effectiveness of the CBRP and acceptable progress toward meeting the urban wasteload allocations for indicator bacteria by December 31, 2015.

h) MSWMP, WQMP, and Local Implementation Plans shall be revised consistent with the CBRP no more than 180 days after the CBRP is approved by the Regional Board.

i) Detailed descriptions of any additional BMPs planned, and the time required implementing those BMPs, in the event that data from the watershed-wide water quality monitoring program indicate that water quality objectives for indicator bacteria are still being exceeded after the CBRP is fully implemented.

j) A schedule for developing a CBRP needed to comply with the urban wasteload allocation for indicator bacteria during wet weather conditions (November 1st thru March 31st) to achieve compliance by December 31, 2025.

1.5.2 Applicability

The applicability of this CBRP is limited to the following:

- *Bacterial Indicator Sources* – The CBRP is designed to mitigate controllable urban sources of bacterial indicators that cause non-attainment of bacterial indicator water quality objectives at the watershed-wide compliance sites.
- *Jurisdiction* – Though additional responsible parties are named in the TMDL, this CBRP document only applies to the San Bernardino County MS4 permittees named in the TMDL: SBCFCD; San Bernardino County; the Cities of Ontario, Chino, Chino Hills, Montclair, Rancho Cucamonga, Upland, Rialto, and Fontana.
- *Hydrologic Condition* – This CBRP applies only to urban discharges from the MS4 during dry weather conditions that have the potential to impact the downstream watershed-wide TMDL compliance monitoring site.
- *Seasonal Condition* - This CBRP applies only to urban discharges from the MS4 during the period April 1st through October 31st.

1.5.3 Compliance with Urban Wasteload Allocation

The San Bernardino County MS4 permittees have developed a CBRP that is designed to achieve compliance with the dry season urban wasteload allocation by the compliance date of December 31, 2015. Compliance with the wasteload allocations can be measured in several ways:

- Water quality objectives are attained at the watershed-wide compliance sites established as part of the implementation of the TMDL (see Attachment C). If not attained, then it must be demonstrated that bacterial indicators from controllable urban sources are not the cause of non-attainment.
- Compliance with controllable urban source wasteload allocations demonstrated from specific MS4 facilities, e.g., sampling demonstrates that controllable urban sources discharged from MS4 outfalls or drains are in compliance with the wasteload allocation during dry weather conditions.
- MS4 facilities, e.g., outfalls, are dry, or that flows from these MS4 outfalls are infiltrating prior to connection with impaired waterbodies, and thus not contributing to dry weather flow (DWF) to downstream waters.

1.5.4 CBRP Conceptual Framework

CBRP implementation relies on a step-wise approach that implements key actions to identify controllable urban sources of bacterial indicators, evaluate and select a mitigation alternative, and, where necessary, construct structural BMPs to mitigate controllable sources. This pragmatic approach is a direct extension of the already RWQCB-approved watershed-wide compliance monitoring program, Urban Source Evaluation Plan (USEP), and framework being established by the SWQSTF. Coupled with this pragmatic approach is the incorporation of existing and relevant MS4 permit requirements. These requirements are supplemented, where needed, to target controllable urban sources of bacterial indicators.

The demonstration of compliance with the MSAR Bacteria TMDL (see Section 3) assumes RWQCB adoption of proposed Basin Plan amendments developed by the SWQSTF. These amendments establish the following framework:

First, the bacteria objectives and related wasteload allocations should only be applied to waterbodies designated REC-1 and the Regional Board is working closely to identify the various storm water channels that should be reclassified as REC-2 or REC-X. This assumption governs the range of compliance alternatives that could be proposed in the CBRP. In particular, the MSAR Permittees plan to install regional treatment facilities where needed to ensure urban discharges comply with bacteria objectives in 303(d) listed streams depends first on amending the Basin Plan to make clear that the same objectives are not intended to apply in the concrete-lined flood control channels that are tributary to natural streams. Without such clarifications, it is uncertain whether regional treatment facilities would be permitted under federal law. The MSAR Permittees have not identified any actions that would be taken to meet bacteria standards if the Basin Plan amendments are not approved because we know of no feasible means to assure compliance with the wasteload allocation at each urban stormwater outfall to every flood control channel.

Second, the CBRP is designed to mitigate controllable urban sources of bacteria to the maximum extent practicable because the MSAR Permittees lack sole authority to determine what mitigation measures will be permitted under law. Several different federal, state and local agencies must approve the various projects designed to achieve compliance with the urban wasteload allocation. And, there is no assurance that such approvals can be obtained given the need to simultaneously protect other designated beneficial uses (e.g. aquatic habitat, groundwater recharge) in the watershed. To the extent that the MSAR Permittees may be restricted from implementing the most effective methods for reducing urban discharges of bacteria, the only legal alternative is to select a different strategy that achieves compliance to the maximum extent practicable. This merely represents a practical regulatory reality and is not intended to serve as an excuse for making anything other than the best effort possible to meet water quality standards.

Third, the MSAR Permittees believe strongly that eliminating controllable discharges is, by far, the best way to assure compliance with the urban wasteload allocation. In general, there should be little or no urban stormwater discharges during dry weather conditions. Mass balance analysis indicates that the greatest water quality improvement would come from focusing on the relatively small nuisance flows associated with excess landscape irrigation and other common activities (car washing, driveway cleaning) common to residential areas. Reducing such flows not only offers the best method for reducing bacterial loads from controllable urban sources, it will help the MSAR Permittees comply with the conservation requirements specified in SB x7-7 (aka "20 percent by 2020"). The fact that similar efforts are already required in the MS4 permit only increases our commitment to implement the strategy with great diligence and a stronger sense of urgency.

Fourth, the CBRP presumes that compliance with the wasteload allocation must be demonstrated by actual water quality monitoring data. Such data will be regularly collected at monitoring sites designated by the Regional Board. Such locations are commonly referred to as "watershed-wide compliance sites." The MSAR Permittees recognize that the Basin Plan and the permit require discharges to meet water quality standards throughout the watershed regardless of which specific locations are selected for routine sampling. The text of the CBRP uses the phrase "watershed-wide compliance sites" to distinguish these locations from other sites, such as those that are part of the USEP, that are sampled far less frequently. The MSAR Permittees fully expect that all water quality monitoring requirements associated with the CBRP will be reviewed and updated on a regular basis and that the Regional Board may request new or different sampling locations before reauthorizing the monitoring plan.

Without adoption of Basin Plan amendments, the estimated cost of compliance with the MSAR Bacteria TMDL is in excess of $2 billion, which has the potential to cause significant societal economic hardship (CDM, 2010).

1.5.5 CBRP Development Process

The CBRP was developed collaboratively by the MSAR Permittees participating in the MSAR TMDL. Development was coordinated with the MSAR Permittees and MSAR TMDL Task Force (see Attachment A), as needed. Activities completed include:

- July 27, 2010 – Presentation was made to the MSAR TMDL Task Force to provide a status update on CBRP development. Presentation was posted by SAWPA on their website.
- August 18, 2010 – Presentation was made to the MSAR TMDL Task Force on the proposed CBRP program. Presentation was posted by SAWPA on their website.
- Following submittal of a draft CBRP to the RWQCB in December 2010, San Bernardino County MS4 program conducted a parallel public review process through the Santa Ana Watershed Project Authority. A draft CBRP was released for public review and opportunity for public comment was provided at a MSAR TMDL Task Force meeting on March 22, 2011. Written comments were received until March 31, 2011.
- RWQCB comments on the draft CBRP (dated March 30, 2011) were discussed with the RWQCB and stakeholders as part of the April 21, 2011 publicly noticed SWQSTF meeting.

1.5.6 CBRP Roadmap

The CBRP is presented in two parts: (1) primary sections that provide an executive level summary of the components, schedule, strategy, and technical basis for the CBRP; and (2) supporting attachments that provide additional information to support the primary sections. Following is a summary of the purpose and content of each part of the CBRP:

- ***Section 2*** – Provides an executive level summary of the following components of the CBRP: Implementation Steps, Program Elements, Implementation Schedule, and Compliance and Iterative/Adaptive Management Strategies.
- ***Section 3*** – Provides the technical basis for the conclusion that full implementation of the CBRP will achieve compliance with the urban wasteload allocation under dry weather conditions.
- ***Section 4*** - Provides the schedule for development of the CBRP for achieving compliance with urban wasteload allocations under wet weather conditions.

The above sections are supported by the following attachments:

- ***Attachment A, TMDL Implementation*** – Documents the outcome of the numerous TMDL monitoring and source evaluation activities completed to date.
- ***Attachment B, Watershed Characterization*** – Provides background information regarding the general characteristics of the MSAR watershed, including major subwatersheds, key jurisdictions and dominant land use.

- ***Attachment C, CBRP Program Elements*** – Provides additional information relevant to each of the Program Elements summarized in Section 2.2.
- ***Attachment D, Existing Urban Source Control Program*** - Documents existing MS4 permit activities that have been implemented by the San Bernardino County MS4 permit program.
- ***Attachment E, Implementation Schedule*** – Provides additional information regarding the implementation schedule summarized in Section 2.3.
- ***Attachment F, Glossary***
- ***Attachment G, References***

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Section 2
CBRP Implementation Program

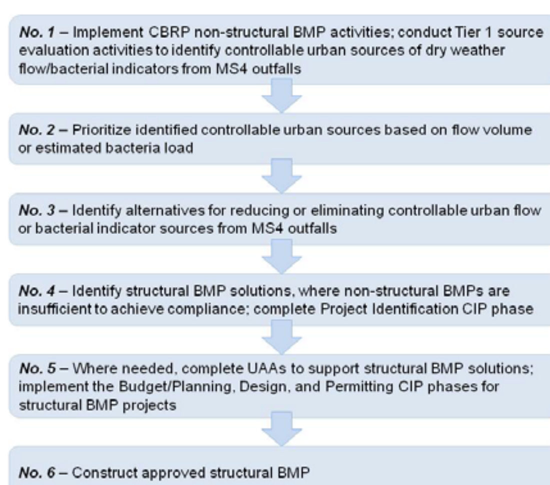
The MSAR Permittees intend to achieve compliance with the wasteload allocation using a variety of implementation strategies, including: Evaluating the need for new water conservation ordinances to reduce urban runoff from landscape irrigation, more rigorous enforcement of existing ordinances to reduce water waste and control pet waste, management of homeless encampments and other illicit discharges, enhanced septic system management, improved street sweeping programs, and other structural BMPs designed to intercept, retain, divert or treat controllable urban DWF during dry weather conditions. A multi-step procedure will be used to select and implement the most appropriate control strategy for each MS4 outfall in San Bernardino County that is tributary to an impaired waterbody.

It is important to note that the MSAR Permittee's programs with regard to the CBRP Implementation Steps and activities identified below are not uniform at this time. For example, cities with water utilities (Ontario and Chino) tend to have strong irrigation management programs, whereas MSAR Permittees without utilities may need to consider enhancing ordinances or building stronger partnerships with local water purveyors to better manage irrigation runoff. Specific combinations of actions necessary to address CBRP Implementation Steps are therefore dependent on each MSAR Permittee's current programs, available resources and opportunities, and local sub-watershed needs. Therefore, specific actions taken by a MSAR Permittee to address CBRP Implementation Steps will be described in more detail in the MSAR Permittee's Local Implementation Plans. The CBRP includes descriptions of the common Implementation Steps that all MSAR Permittees will take to address the MSAR TMDL; however, the level of individual action required of a Permittee will be dependent on multiple factors that will be and are more appropriately described and addressed in the MSAR Permittee Local Implementation Plans.

2.1 CBRP Implementation Steps

The San Bernardino County MS4 Permittees will implement the CBRP using a stepwise project approach. This approach incorporates three distinct steps encompassing six specific actions (Figure 2.1).

Figure 2.1 Key Implementation Actions



Step 1 – Identify, Prioritize, and Evaluate MS4 Dry Weather Flow Sources

Step 1 project activities include implementation of non-structural

BMPs (see CBRP Program Elements, below) and inspection activities (No. 1 – Figure 2.1). These inspections (or urban source evaluation investigations) occur systematically in each area draining to a watershed-wide compliance site. For each key drainage area source evaluation activities are implemented to (a) identify controllable MS4 dry weather flow sources and their contribution to elevated bacterial indicator concentrations; (b) prioritize controllable dry weather flow sources for follow-up mitigation activity (No. 2 – Figure 2.1); and (c) identify alternatives to mitigate prioritized controllable urban sources (No. 3 – Figure 2.1). Completion of Step 1 achieves four outcomes:

(1) Prioritized list drainage areas where mitigation of dry weather flow/bacterial indicators is deemed necessary to comply with urban wasteload allocations applicable to the MS4;

(2) For each prioritized drainage area requiring action, implementation of activities to identify non-structural or structural BMP alternatives to mitigate controllable urban bacterial indicator sources (No. 4 – Figure 2.1).

(3) If non-structural BMPs can mitigate the source(s), initiation of new, enhanced or more targeted non-structural BMPs (see CBRP Program Elements, below); and

(4) If structural BMPs are needed, completion of the Project Identification phase of the local Capital Improvement Project (CIP) process, if the project involves an individual Permittee, or identification of the need to implement a multi-jurisdictional process for projects involving multiple Permittees. of the MSAR Permittee's Capital Improvement Project (CIP) Process for projects involving individual Permittees (Figure 2.2). In addition, determination of the need for a Use Attainability Analysis (UAA) to facilitate a structural BMP solution.

CBRP Step 1 is iterative and will occur over an extended period so that MS4 outfalls in each drainage area can be properly prioritized, investigated and evaluated for mitigation. The expected outcomes from Step 1 activities will be complete in all drainage areas by the first quarter of 2015 (see CBRP Schedule, below).

Figure 2-2. Typical Capital Improvement Project (CIP) Process for Local Permittee Projects

Project Identification– Identification of a CIP project occurs through one of two mechanisms:

- Public agency assessment of a particular site's current conditions to evaluate the need for structural improvements. These needs may be identified from observations of agency staff, routine maintenance / replacement schedules, or other sources internal to the agency.
- Receipt of public complaints (presented directly to agency staff or a governing body) regarding an infrastructure concern (e.g., potholes, street flooding), which may result in a site investigation. Based on the outcome of the investigation, an agency may decide that a project needs to be constructed.

Budgeting / Planning - After a project need has been established, staff implement a process to have the proposed project included in the CIP. Agency staff begins preliminary planning steps to verify the viability of the project and prepares a cost estimate, which along with other new or ongoing infrastructure needs, is used to prioritize the project based on public need, necessity and available funds. This phase typically involves both project planning and preparation of a preliminary design to support development of the cost estimate. With a project budget prepared, staff seeks approval to incorporate the project in the CIP. In some cases preliminary planning efforts may determine that a proposed project is not viable due to environmental constraints, community opposition, engineering limitations or other factors. In such cases a project is typically abandoned and alternative solutions are considered.

Design - Once a project is in the CIP, design work to prepare construction drawings and project specifications can begin. Based on project complexity, the time required to complete the design varies from less than a year to several years. During the design phase, and sometimes beginning in the budgeting / planning phase, staff initiates the CEQA process. Depending on the nature of the project or the need for special permits, obtaining CEQA approval can significantly affect the timeline to construct a project. Projects may also be abandoned in the design phase as the project is further refined. Factors such as changes to the project's preliminary design parameters, soils, groundwater and utility investigations, and regulatory issues can impact the viability of a project during its refinement in the design stage.

Permitting– During this phase, all required permits and approvals for construction are obtained. The process for obtaining permits and approvals typically begins during the design phase and sometimes begins as early as the budgeting / planning phase. Depending on the nature of the project or the need for special permits, obtaining all required permits and approvals can significantly affect the timeline to construct a project and in some cases result in cancellation of the project. If this occurs, then alternative solutions are considered.

Construction– Construction can begin upon design completion, receipt of all required permits and approvals, and completion of all administrative requirements. Depending on the complexity and size of the project, right of way acquisition timelines, CEQA documentation and approvals, and involvement of other

Step 2 – Evaluate and Select Structural BMP Projects

The San Bernardino County MS4 Program anticipates that structural BMPs (outfall-specific or regional) will be required to mitigate some controllable urban sources of dry weather flow or bacterial indicators. A prioritized list with locations for these structural BMPs is a Step 1 outcome. Under Step 2, the identified structural BMP projects move forward in the CIP Process (No. 5 – Figure 2.1). Potential Step 2 outcomes include:

(1) Completion of UAAs deemed necessary to support implementation of a structural BMP project.

(2) Completion of the Budget/Planning, Design and Permitting CIP phases (see Figure 2.2) for each structural BMP project involving an individual Permittee or implementation of the multi-jurisdictional process to plan, design, and permit a small regional or sub-watershed treatment facility (Table 2-1).

Table 2-1. Estimated Timeline to Develop Small Regional or Sub-Watershed Treatment Facilities

Project Phase - Average Time to Complete	Project Step	Activity
1 - 18 months	Local Jurisdiction Preliminary Engineering Review	Identify project operational parameters within context of potential joint use arrangement
	Project Financial Feasibility and Funding Source Scoping	Identify project costs, land acquisition and funding mechanisms
	Project Placement Review	Identify placement parameters within context of potential joint use arrangement
2 - 18 months	Pre-Application Project Environmental Review	Identify environmental requirements and project constraints
	Joint Use Jurisdictional Agreement Formation Committee	Establish Joint Use Jurisdiction Agreement to guide project development
	Joint Use Project Development Committee	Review Final Project Concept within context of stakeholder interests
3 - 18 months	Underlying Landholder Project Coordination	Establish final structure for landholder agreements/acquisitions and long-term operational requirements to be included in landholder agreements/disclosures
	Joint Use Final Project Approval	Finalize construction funding mechanisms, joint use responsibilities, operational funding mechanisms, underlying property owners rights and responsibilities, and long-term environmental roles and responsibilities
	Joint Use Facility Project Development Committee: Procurement	Retain firms with appropriate engineering, environmental expertise to design project
4 - 18 months	Joint Use Facility Project Development Committee: Design & Permitting	Oversee design process, review plans and environmental submittals for compliance with project objectives
	Project Bidding and Contractor Qualification Phase	Solicit construction bids; contracts awarded only when all environmental clearances, permits and approvals obtained and full package submittals are signed and approved by authorizing jurisdiction

Similar to the Step 1 schedule, Step 2 will occur over an extended period to move each planned structural BMP project forward to the point where the final phase can be initiated – Construction. Because Step 2 includes initiation of the CEQA process and may include establishment of multi-jurisdictional agreements, the timeline for moving all planned structural BMPs to the point where construction can be initiated may be lengthy. Also, as noted above, situations may occur where through the planning and design phases a proposed project is determined to be infeasible. If that occurs, a different alternative to mitigate the controllable urban bacterial indicator source will be sought.

Step 3 – Construct Structural BMP Projects

Step 3 focuses on construction of structural BMP projects. The schedule for construction cannot be established at this time given MSAR Permittee's requirements that each project move through the appropriate planning, design and permitting processes. However, as construction dates become known, these will be reported to the RWQCB as part of the CBRP reporting process.

2.2 CBRP Program Elements

The MS4 Permit established four required CBRP program elements (Section VI.D.1.c.1, MS4 Permit). These elements, which are tools for implementing the CBRP, encompass a range of potential non-structural and structural BMP activities:

- Element 1 - Ordinances
- Element 2 - Specific BMPs
- Element 3 - Inspection Criteria (for the purposes of the CBRP, this element includes urban source evaluation activities)
- Element 4 - Regional Treatment (for the purposes of the CBRP, this element includes both outfall-specific and regional structural BMP projects)

Table 2.2 summarizes the relationship among these required CBRP program elements and the three implementation steps and associated implementation actions described above (see Figure 2-1). The following sections summarize the key components of each CBRP program element (see Attachment C for a detailed presentation of these elements).

Table 2.2. Relationship between Implementation Steps and Actions and Required CBRP Elements

CBRP Steps	Implementation Actions (Figure 2-1)	Relevant Required CBRP Elements
1	Nos. 1, 2, 3, and 4	Elements 1, 2, 3
2	No. 5	Element 4
3	No. 6	Element 4

Element 1 – Ordinances

The CBRP requires the identification of specific ordinances that will be adopted during implementation to reduce bacterial indicators in urban dry weather flow sources. Two types of ordinances have been included in the CBRP: Water Conservation and Pathogen Control. Following is a brief statement regarding the purpose and potential water quality benefits that may be incurred.

Water Conservation Ordinance

Purpose – Evaluate the existing water conservation ordinances to determine if adequate authority available to manage water use to reduce dry weather flows to the MS4.

Implementation Approach – Permittees will evaluate existing ordinances and authority (including enforcement authority) available to manage dry weather runoff from water use practices in their respective jurisdictions. Modifications to these ordinances will be made, where appropriate. This effort will be implemented in coordination with water purveyors and implementation of BMPs related to irrigation or water conservation practices (see below).

Expected Benefits – Improved water management reduces dry weather discharge to the MS4, which reduces opportunity for the discharge to or mobilization of bacteria in the MS4. A corollary benefit is enhanced water conservation consistent with other state policies and regulatory requirements.

Pathogen Control Ordinance

Purpose – Evaluate existing ordinances to improve management of animal wastes to control known pathogen or bacterial indicator sources.

Implementation Approach – Permittees will evaluate existing ordinances and consider adoption of new ordinances to implement this BMP. Based on this evaluation the Permittees will revise existing ordinances or adopt new ordinances, as needed, to fulfill this CBRP requirement and comply with the MS4 permit requirement to "promulgate and implement ordinances that would control known pathogen or bacterial indicator sources such as animal wastes, if necessary".

Expected Benefits – Establishing requirements to manage animal wastes in a manner that reduces opportunity for bacteria contained in these wastes to be entrained in dry weather flows reduces the potential for bacteria to be mobilized and discharged to receiving waters through the MS4

Element 2 – Specific BMPs

The CBRP requires the identification of specific BMPs that will be implemented to reduce controllable urban sources of bacterial indicator. Selected BMPs range from programmatic activities that set the stage for other CBRP elements (e.g., dry weather flow source evaluation activities) to specific activities that can reduce dry weather flows or mitigate controllable urban sources of bacterial indicators. Some of the included BMPs are also MS4 permit requirements. In addition, some of the selected BMPs may be coordinated between San Bernardino and Riverside County to streamline the level of effort required to implement the BMP.

Transient Camps

Purpose – Evaluate potential for transient camps to contribute bacterial indicators to MS4 dry weather flow, and if determined necessary, develop and implement transient camp closure activities.

Implementation Approach – The MSAR Permittees will identify locations of suspected transient encampments in receiving waters or MS4 facilities. Once identified, an investigation at one or more locations will evaluate potential DWF water quality impacts from transient camps. If transient camps are identified as a potential urban bacterial indicator source in DWF, MS4 Permittees will develop a model program to address transient encampments targeted for closing because of expected water quality impacts. As determined necessary, implement transient camp closures and follow-up activities to prevent re-establishment of closed camps in the same locations.

Expected Benefits – Closure of transient camps in locations where it is determined that the encampment is contributing bacterial indicators to dry weather flows eliminates a bacterial indicator source.

Illicit Discharge, Detection and Elimination Program

Purpose – The MS4 permit requires the development of an Illegal Discharge Detection and Elimination (IDDE) program to supplement ongoing permit implementation efforts. Completion of this requirement will enhance existing tools to reduce or eliminate dry weather flows to the MS4.

Implementation Approach – The MSAR Permittees will complete development of this program as required by the MS4 Permit. The program will be used to support MS4 inspection activities to reduce or eliminate dry weather flows to the MS4 (see below).

Expected Benefits – Completion of this program provides additional tools to guide efforts to reduce or eliminate dry weather flows to the MS4.

Street Sweeping

Purpose – Evaluate existing street sweeping programs to determine if the ongoing program can be enhanced to further reduce presence of bacterial indicators on street surfaces.

Implementation Approach – Each MSAR Permittees will evaluate the existing street sweeping program (e.g., method, frequency, and equipment) to determine potential to modify the program to further reduce bacteria on street surfaces. Where opportunities exist, changes will be made to the program. If it is determined that a change in equipment can provide water quality benefits, the MSAR Permittees will work with their respective governing bodies to obtain funding to upgrade/replace equipment.

Expected Benefits – Reductions in bacterial indicators in MS4 outfalls (as a result of mobilization by dry weather flows to the MS4) may occur where it is determined that enhancements to the existing street sweeping program will further reduce bacteria present on street surfaces.

Irrigation or Water Conservation Practices

Purpose – Implementation of BMP practices that reduce potential for over-irrigation and discharge of irrigation water to the MS4.

Implementation Approach – Each MSAR Permittee will evaluate options and minimum requirements for implementation of irrigation and outdoor water conservation BMPs. Implementation will be closely coordinated with the Water Conservation Ordinance activity described above and with local water purveyor conservation programs. Based on the findings of the evaluation and in coordination with other agencies tasked with implementation water conservation activities, the MSAR Permittees and water purveyors will coordinate implementation of outdoor water conservation BMPs.

Expected Benefits – Improved local water management will reduce dry weather water use discharges to the MS4, which will reduce opportunity for discharge or mobilization of bacteria as a result of MS4 discharge. A corollary benefit is enhanced water conservation consistent with other state policies and regulatory requirements.

Water Quality Management Plan Revision

Purpose – The MS4 Permit requires updates to the MS4 Permittee's WQMP Guidance to incorporate low impact development (LID) practices to reduce runoff from new development and significant redevelopment activities. This requirement is included as a BMP since implementation of LID practices can reduce dry weather flows to the MS4, especially where they are applied to significant redevelopment activities.

Implementation Approach – The MSAR Permittees will submit a revised WQMP Guidance to the Regional Board for approval by July 29, 2011. Once implemented, LID practices will be applied to development projects subject to the LID-based requirements.

Expected Benefits – For new development the benefits are expected to be mostly limited to wet weather runoff. However, for significant redevelopment projects, the potential for reduced dry weather flows to the MS4 will be realized through the reconfiguration of the site to accommodate LID practices (e.g., runoff from irrigation can be managed to stay onsite rather than runoff to the MS4).

Septic System Management

Purpose – Evaluate potential for septic systems in the County to contribute bacterial indicators to the MS4 during dry weather conditions.

Implementation Approach – The MSAR Permittees will develop an inventory of existing septic systems, map the location of these facilities relative to the MS4 to evaluate potential impacts to water quality in the MS4, conduct public education to ensure proper operation and maintenance of septic systems, and conduct inspection and enforcement activities, where appropriate to reduce potential for septic systems to impact water quality.

Expected Benefits – Implementation of this BMP reduces the potential for septic systems to contribute bacterial indicators to the MS4 during dry weather conditions.

Pet Waste Management

Purpose – Implementation of BMPs that target areas where there is a high volume and concentration of pet waste, e.g., dog parks and kennels.

Implementation Approach – Each MSAR Permittee will evaluate existing authority and programs to manage pet waste to identify opportunities to further target BMPs to manage pet waste. Where appropriate, MSAR Permittees will implement these BMPs. This effort will be coordinated with activities associated with the development of a bacterial indicator control ordinance (see Element 1).

Expected Benefits –BMPs targeted specifically to pet waste management (in association with a pathogen control ordinance) can support compliance at a local scale, where pet activities are concentrated.

Element 3 – Inspection Criteria (Urban Source Evaluation)

Purpose – Implementation of urban source evaluation activities provides the data required to determine the potential for an MS4 outfall or drainage area to discharge controllable sources of bacterial indicators. The results of this evaluation dictate next steps in the CBRP implementation process.

Implementation Approach – The MSAR Permittees will implement urban source evaluation activities using a comprehensive, methodical approach that provides data to make informed decisions regarding the potential for an MS4 outfall or group of outfalls to discharge controllable sources of bacterial indicators. This approach relies on the following activities:

- *Tier 1 Reconnaissance* – Tier 1 sites are defined as locations where urban sources of dry weather flow may directly discharge to a downstream watershed-wide compliance site. Some of the Tier 1 sites are at the same locations sampled as part of implementation of the USEP in 2007-2008. Additional Tier 1 sites have been included, where needed, to supplement existing information. Many of these Tier 1 locations may be dry, have minimal dry weather flow, or not be hydrologically connected to downstream waters. However, until a reconnaissance is completed, their potential to contribute controllable sources of bacterial indicators is unknown.

- *Prioritization* – Based on the findings from Tier 1 data collection activities, MS4 drainage areas with potentially controllable urban sources of bacterial indicators will be prioritized based on factors such as the magnitude of bacterial indicator concentrations and results from source tracking analyses. Areas with human sources (as compared to anthropogenic sources such as domestic pets) will receive the highest priority for action.

- *Evaluate Mitigation Alternatives –* In order of priority, prioritized drainage areas will be further evaluated to identify non-structural or structural alternatives (or some combination of both) for mitigating controllable sources of bacterial indicators. As needed, this controllability assessment will include reconnaissance of Tier 2 sites and the use of IDDE methods to identify and evaluate alternatives. Tier 2 sites are tributary to Tier 1 outfalls. Tier 2 sites are predominantly locations where underground storm drains discharge to open channels. If a Tier 2 site is determined to be a potential contributor to non-compliance, additional inspection activities may occur to identify the nature and source of the dry weather flow and bacterial indicators and evaluate controllability.

- *Select Mitigation Alternatives* – The MSAR Permittees will select a mitigation alternative to mitigate controllable urban bacterial indicator sources in each prioritized drainage area. If the selected alternative involves a structural BMP, the Project Identification phase of the CIP process is implemented to establish the project need.

Expected Benefits – This element is key to CBRP implementation as it provides the data required to make informed decisions regarding (1) selection of BMPs to mitigate controllable urban sources of bacterial indicators; (2) establishment of a priority, process, and schedule to implement the selected mitigation alternative.

Element 4 – Regional Treatment (Structural Controls)

Purpose – Plan, design and construct structural BMPs to mitigate controllable urban sources of dry weather flow and bacterial indicators. BMP projects may be regional (address controllable sources from multiple outfalls) or outfall-specific.

Implementation Approach – It is expected that the outcomes from CBRP Step 1 implementation will result in the identification of at least some structural BMPs to manage controllable urban bacterial indicator sources. The potential locations for a number of structural BMPs were identified by the San Bernardino County MS4 program as part of Phase 1 of the development of the Watershed Action Plan.. Under CBRP Step 1 the Permittees will use this work to support evaluation of alternatives for implementing structural BMPs to mitigate a controllable urban source.

Once a structural BMP project is identified the appropriate process for planning, design and permitting will commence. For localized projects the CIP phases described in Figure 2-2 will guide the process. However, if a small regional or sub-watershed treatment facility is planned, then the process described in Table 2-1 guides the process. In addition, if a UAA is needed to ensure the success of the project, UAA development will commence as well (see additional information, above). Completion of structural BMP projects is subject to governing body approval, CEQA approval and funding availability. Accordingly, the length of time from project identification to construction completion will be highly variable. Also, as noted above, situations may occur where through the planning and design phases of a proposed project is determined to be infeasible. If that occurs, a different alternative to mitigate the controllable urban bacterial indicator source will be sought.

Expected Benefits – Completion of structural BMPs, where determined necessary, will mitigate controllable urban sources of bacterial indicators.

2.3 Implementation Schedule

Figure 2-3 summarizes the CBRP implementation schedule for the various required CBRP elements. A more detailed schedule, which includes information regarding milestones, metrics and responsibilities, is provided in Attachment E. Color differences in the timeline for a particular activity illustrate shifts from BMP development to BMP implementation. For example, until a structural BMP has been successfully incorporated into the CIP or is being implemented as part of a multi-jurisdictional effort, the structural BMP is considered in development. However, once the planning, design and permitting phases are moving forward, the BMP is considered in the implementation phase, unless the project is determined to be infeasible during the final planning, design and/or permitting phases.

Elements 1, 2, and 3 will be completed and fully implemented by December 31, 2015. It is expected that Elements 1, 2 and 3 should independently attain the MS4 permit's water quality based effluent limits for the MSAR TMDL (See Section 3). However, Capital Projects may be more cost effective or necessary in some cases to attain the water quality based effluent limits. Element 4 will identify structural BMPs by December 31, 2015 believed necessary to attain the MS4 permit water quality-based effluent limits for the MSAR TMDL. Completion of subsequent project development phases will likely occur beyond the end of 2015 (gray shaded area of Figure 2-4).

Attachment E identifies responsibilities for implementation of CBRP activities. In general:

- Elements 1 and 2 – Individual MSAR Permittees will be responsible for most of these tasks, unless the area-wide MS4 program is identified as the lead for programmatic aspects; however, once specific actions are required at the local level, e.g., ordinance development, responsibility shifts to the individual MSAR Permittee.

- Element 3 – The MSAR Permittees will jointly, through partnerships with the RCFC&WCD and/or the MSAR TMDL Task Force, implement Tier 1 and Tier 2 data collection and identification of mitigation alternatives. Specific activities within prioritized areas will be lead by the MSAR Permittee with jurisdiction over the targeted drainage area.

- Element 4 – All BMP activities associated with this element will be led by the MSAR Permittee or Permittees with jurisdiction over the area targeted for a BMP.

2.4 Compliance and Iterative/Adaptive Management Strategies

The CBRP establishes a program to reduce controllable urban sources of bacterial indicators based on currently available information. Significant uncertainties remain considering the state of science regarding bacterial indicator management in urban environments (e.g., CREST 2007). Additionally, bacterial indicator sources are not static; e.g. homeless encampments are transitory in nature and the significance and magnitude of their impacts on water quality may be the function of various factors including the economy, available social service programs and other factors beyond the MSAR Permittees control. Similar issues impact irrigation runoff control programs, septic system management programs and other control programs for potential urban sources of bacterial indicators. Further, the RWQCB has indicated that it is not their goal to require the elimination of all dry weather runoff to impaired receiving waters as this may negatively impact other beneficial uses of those receiving waters. The RWQCB prefers a solution set that does not target the capture and elimination of other flows through the MS4 such as rising groundwater and water transfers. If the Permittees are to maintain these baseflows through their MS4 systems, the uncertainty of managing upstream bacterial indicator sources must be addressed.

Therefore, the CBRP includes a compliance strategy to guide decision-making during the implementation process, and an iterative and adaptive management strategy for making course corrections to the CBRP as new data are collected and evaluated.

Compliance Strategy

Figure 2-4 illustrates the overall CBRP compliance strategy, consistent with the three CBRP Steps and the Implementation Actions described above (e.g., Figure 2-1). The CBRP is designed to mitigate controllable[4] urban sources of bacterial indicators that cause non-attainment of water quality objectives at the watershed-wide compliance sites. The CBRP is not intended to address bacterial indicator impairments attributable to non-MS4 sources (e.g., agricultural or water transfers), or sources that cannot be accounted for, e.g., wildlife sources or sources that arise from within the impaired waterbody (per Findings, Sections I.D, and II.E.1 of the MS4 Permit).

Figure 2-4 highlights three key decision points that occur during implementation of the compliance strategy:

- ***Decision Point #1*** – Distinguish between controllable urban bacterial indicator sources associated with the MS4 and other potential non-urban sources of bacterial indicator impairment.
- ***Decision Point #2*** – Prioritize MS4 drainage areas for establishment of mitigation alternatives where MS4 outfalls are determined to be contributing to impairment at watershed-wide compliance sites.
- ***Decision Point #3*** – Select mitigation alternative – non-structural or structural BMPs.

Fundamental to the compliance strategy is the development and implementation of ordinances and specific BMPs targeted to reduce controllable urban sources of dry weather runoff and bacterial indicators from the MS4 (Figure 2-4, Box 1). To determine whether controllable urban sources are present, CBRP Step 1 includes comprehensive urban source evaluation activities to identify sources of dry weather flows to the MS4, especially those that contain bacterial indicator concentrations and sources that may cause or contribute to impairment at watershed-wide compliance sites (see Boxes 2 and 3).

The results from urban source evaluation activities lead to the first decision point in the compliance strategy. The MSAR Permittees will evaluate the potential for MS4 to be contributing controllable sources of bacterial indicators. Where controllable MS4 sources are identified, those areas of the MS4 remain under the CBRP (***Decision Point #1***, Boxes 4 and 5). Where controllable sources are not present and the MS4 is not the cause of impairment, those areas would be addressed outside of the CBRP (Boxes 12 through 14). Where necessary, the Permittees will work with the RWQCB to identify solutions; however, in some cases, the RWQCB may need to work with other entities to mitigate bacterial indicator sources.

[4] Controllable sources will be defined by the Basin Plan Amendment applicable to recreational uses and objectives (see Section 1.5.4).

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Figure 2-3. CBRP Implementation Schedule

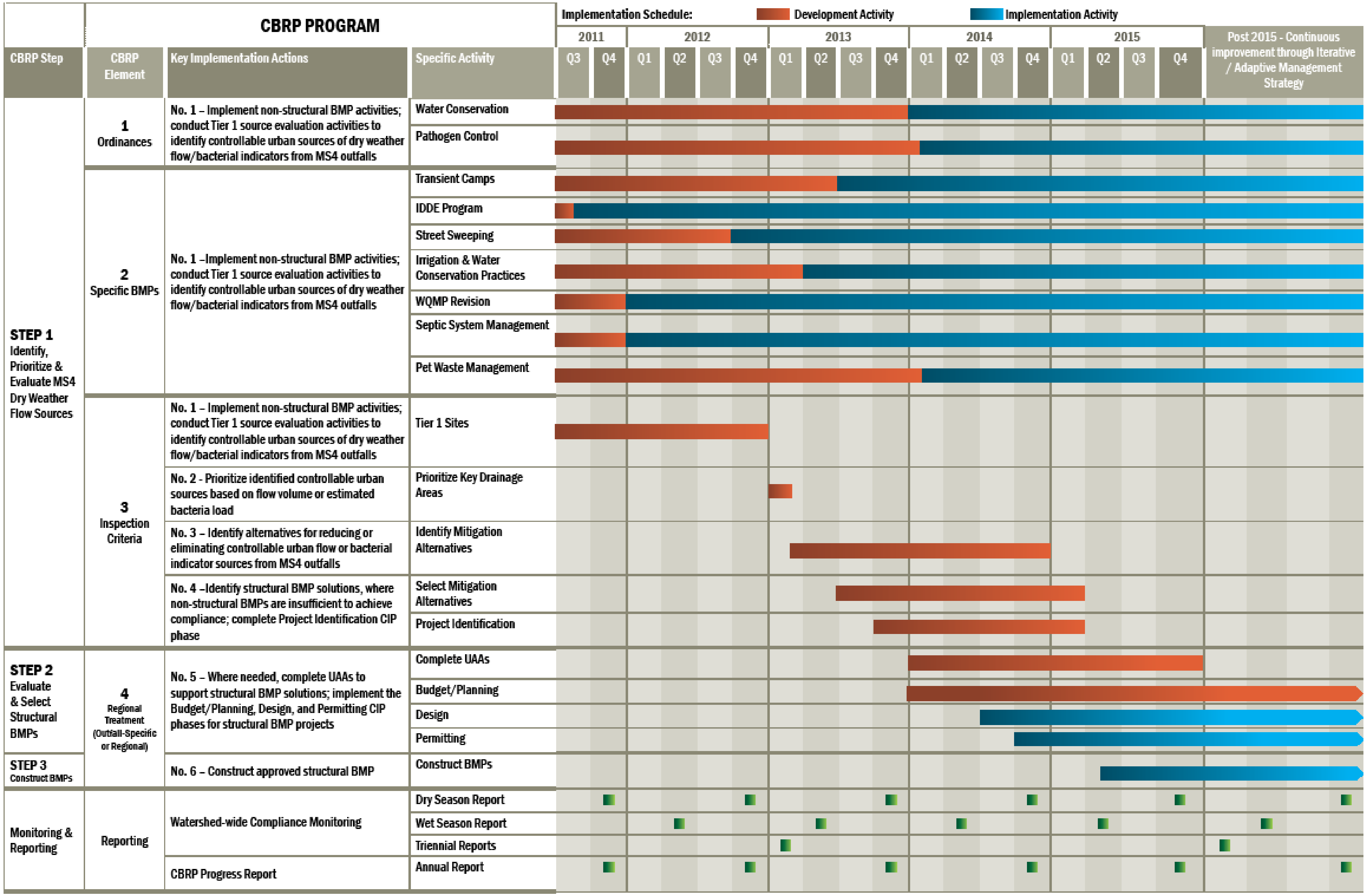
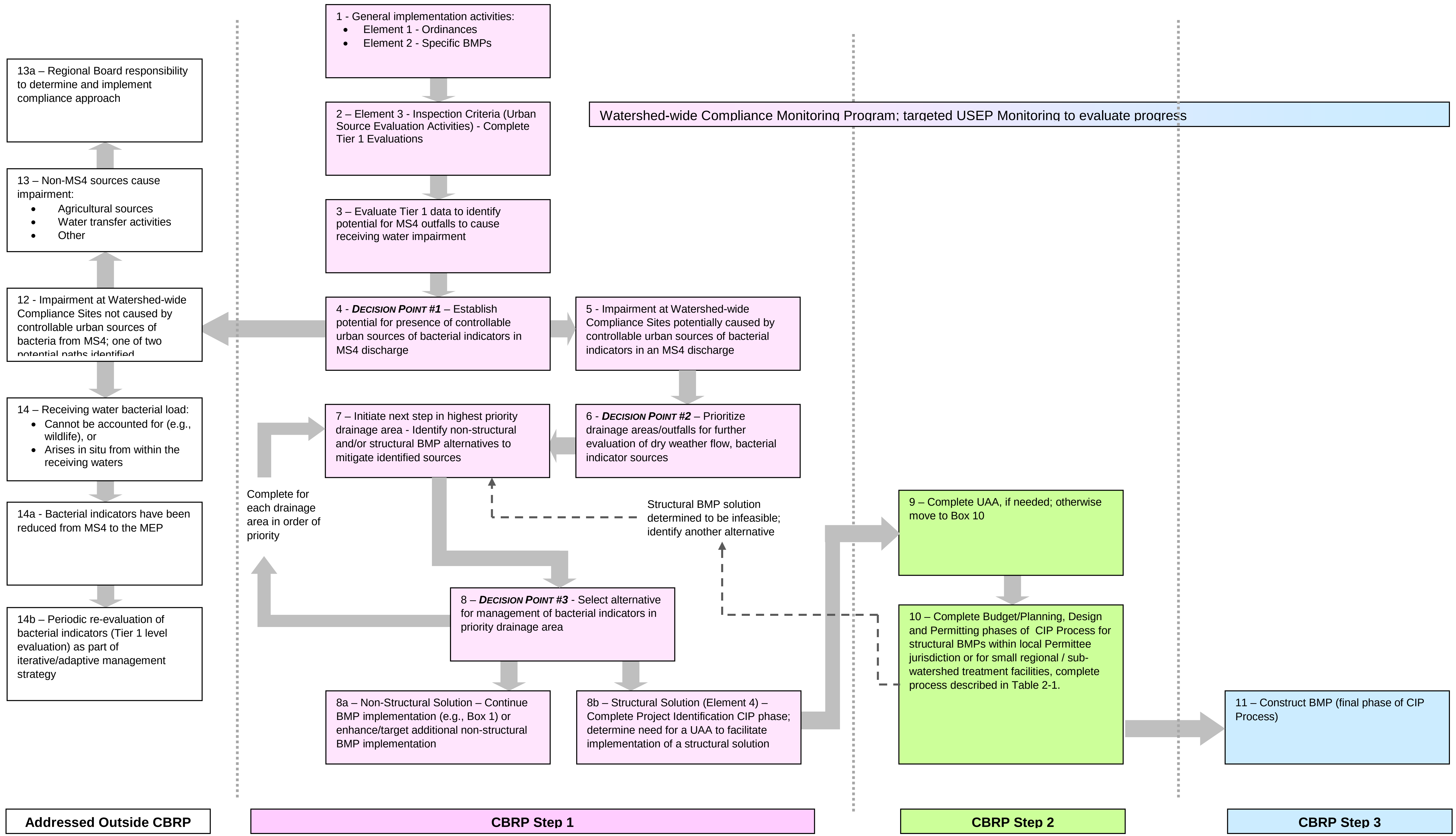


Figure 2-4. CBRP Implementation Strategy



For MS4 drainage areas that potentially contribute impairment at a watershed-wide compliance site, the Permittees will evaluate data from source evaluation activities to prioritize drainages areas or outfalls for continued work. Prioritization of drainage areas/outfalls is ***Decision Point #2*** (Box 6) and critical to CBRP implementation in an environment with limited resources. Prioritization will consider relative contribution and source of bacterial indicator loads. Highest priority areas are those where human sources of bacterial indicators are present and persistent.

Starting with the highest priority drainage area, the Permittees will conduct inspections and source evaluation activities as needed to identify and evaluate non-structural or structural BMP alternatives to mitigate sources (Box 7). This effort leads to ***Decision Point #3*** (Box 8) – selection of an alternative to mitigate the source. If a non-structural solution is available, the Permittees will implement new, enhanced, or more targeted BMPs. Where a structural solution is deemed necessary – the Permittees complete the Project Identification phase and determine the need for a UAA to support implementation of the structural BMP solution. Completion of the Project Identification phase establishes the project need and directs the project towards the appropriate process for working with local governing bodies or multi-jurisdictional stakeholders to move the project forward into planning, design and permitting (CBRP Step 2, Boxes 9 10).

Regardless of the size of the BMP project, implementation of a structural solution under CBRP Step 2 will require completion of the CEQA/NEPA process, and input from multiple stakeholders (e.g., regulatory agencies, city councils, environmental advocacy groups, and water supply utilities). Accordingly, from the time a project need is identified through completion of construction, consideration must be given to range of regional and local issues, including, but not limited to:

- Technical feasibility to mitigate the bacterial indicator source;
- Regional water supply management plans and objectives;
- Environmental considerations (e.g., CEQA requirements to assess project impacts on issues ranging from in-stream flow and habitat to energy and greenhouse gas emissions);
- Consideration of alternatives, including use of offset and trading strategies (e.g., a regional project in one area could provide offsets for overall bacterial indicator reductions needed within another area); and
- Economic feasibility, which will consider the capital cost and the long term operation and maintenance cost (which can in some instances exceed the original construction cost over the long-term).

Where a UAA is identified as a required element to support implementation of a structural BMP project (Box 9), the UAA will be completed in parallel with efforts to implement the BMP. Once the UAA is deemed complete by the RWQCB, it is expected that the RWQCB will move the UAA forward through the basin planning process to obtain approval of the UAA.

Following completion of CBRP Step 2 activities, the project will either move forward to construction, as funding is available; or be determined to be infeasible. Projects ready for construction are CBRP Step 3 Projects (Box 11). Projects determined to be infeasible will result in the MSAR Permittees returning to evaluation of other potential mitigation alternatives for the bacterial indicator source (Box 7).

Throughout all CBRP Steps, the Watershed-wide Compliance Monitoring Program will continue at the five watershed-wide compliance sites. Sample results from these sites along with collected urban source evaluation data provide the basis for evaluating progress towards compliance with TMDL requirements under dry weather conditions. Periodic reporting activities will provide the mechanism for evaluating progress and effectiveness of compliance strategy implementation. Where effectiveness evaluations identify the need to modify the CBRP, this need will be addressed as part of the iterative and adaptive management strategy, as described below.

Iterative and Adaptive Management Strategy

This CBRP is based on the current level of knowledge of controllable urban sources of bacterial indicators. As the CBRP is implemented and new data are generated (especially through source evaluation activities), it expected that this basic level of knowledge will change. Given this expectation, an iterative and adaptive management strategy has been built into the CBRP to provide opportunities to revise the CBRP implementation approach, where appropriate. These opportunities include the following elements:

- *Triennial Reports* – The TMDL requires these reports as part of TMDL implementation. These reports will include an evaluation of CBRP implementation including progress towards meeting the urban wasteload allocation for dry weather conditions in the dry season. This evaluation may include recommendations for CBRP revisions to the RWQCB regarding how new data or programmatic requirements will be incorporated into the CBRP. Two Triennial Reports are associated with the timeline for CBRP implementation:

  - *2013 Report* – This report will report on activities completed through 2012. The 2013 Report will include recommendations for new or revised BMPs.

  - *2016 Report* – This report (due on February 15, 2016) will evaluate the overall effectiveness of CBRP implementation and the status of all structural BMP projects in CBRP Steps 2 and 3. The report will provide the means to determine the extent to which compliance with urban wasteload allocations for dry weather conditions has been achieved. The 2016 Report will also provide detailed descriptions of any additional BMPs planned and the schedule for implementation in the event that water quality data (urban source evaluation activities; watershed-wide water quality monitoring program) indicate that a reasonable potential still exists that completed BMPs, as well as BMPs in process (e.g., structural BMPs still moving through the CIP Process), may not result in compliance with TMDL requirements applicable to the MS4.

- *MS4 Permit Annual Reports* –The MS4 permit Annual Report will include a summary of CBRP implementation activities. This summary will replace the semi-annual USEP reports as a USEP and MS4 permit reporting requirement. The MS4 Annual Reports will also include recommendations to the RWQCB for modifications to the CBRP if alternative approaches or actions are identified that will contribute to the goal to achieve compliance with urban wasteload allocation during dry weather conditions.

Successful CBRP implementation requires timely input and decisions by the RWQCB so that new information or outcomes (anything from completion of a UAA to interpretation of dry weather flow/bacterial indicator data) can be quickly integrated into the decision-making process. This is especially true for efficient implementation of the compliance strategy. Accordingly, the Principal

Permittee will provide as much advanced notice as possible regarding the need for RWQCB approval of decisions associated with CBRP implementation and any recommendations for CBRP modification.

Section 3
Compliance Analysis

3.1 Introduction

The MS4 permit requires that the CBRP provide the scientific and technical documentation used to conclude that the CBRP, once fully implemented, is expected to achieve compliance with the urban wasteload allocation for indicator bacteria by December 31, 2015 (MS4 permit Section VI.D.2.a). Compliance targets or wasteload allocations were developed for both fecal coliform and *E. coli* bacterial indicators:

- Fecal coliform: 5-sample/30-day Logarithmic Mean less than 180 organisms/ 100 mL and not more than 10 percent of the samples exceed 360 organisms/100 mL for any 30-day period.

- *E. coli*: 5-sample/30-day Logarithmic Mean less than 113 organisms/100 mL and not more than 10 percent of the samples exceed 212 organisms/100 mL for any 30-day period.

The compliance analysis presented in this section used the 5-sample/30-day logarithmic mean for *E. coli* of 113 cfu/100 mL to demonstrate that this plan, once implemented, is expected to achieve compliance with the urban wasteload allocation. This concentration-based wasteload allocation for MS4 permittees is a target for all urban sources of flow; however, it would be nearly impossible to monitor bacteria at all MS4 outfalls. Consequently, compliance with the bacterial indicator TMDL is assessed at five watershed-wide compliance monitoring locations. No analysis was done for the Prado Park Lake compliance location as there currently are no known MS4 facilities discharging DWF to the lake. This presumption will be verified during CBRP implementation.

3.1.1 Overview of Compliance Analysis

The compliance analysis for San Bernardino County MS4 permittees showed that *E. coli* concentrations at the compliance monitoring locations are higher than expected based on measured MS4 and POTW inputs alone. Target reductions in average daily *E. coli* load (billion cfu/day) to guide CBRP implementation were determined as a function of two key variables:

- The gap between current average dry season *E. coli* loads at the compliance monitoring sites and the load associated with the WQO concentration for *E. coli* of 126 cfu/100Ml, and

- The portion of *E. coli* load that is attributable to measured MS4 inputs .

The data suggest that exceedences of WQOs would continue even after achieving the target load reduction for discharges from MS4s to Chino Creek or Cucamonga Creek. For this reason, compliance with the TMDL is demonstrated by showing how the target load reduction could be achieved with potential implementation of a mix of ordinance enforcement, outdoor water conservation BMPs, and regional structural BMPs; or by implementing a rigorous inspection program to isolate sources in small drainages, which could be evaluated for controllability. The latter is most appropriate for the Chino Creek at Central Avenue and Mill-Cucamonga Creek at

Chino-Corona Road compliance monitoring sites, where the source contribution analysis described below shows a substantially greater load that cannot be accounted-for relative to 2007 dry season USEP measurements at all major MS4 discharges.

3.1.2 Compliance Analysis Approach

The following sections provide detailed description of the methodology employed to demonstrate compliance with the MSAR Bacterial Indicator TMDL WLA. The analysis involved several key questions, including:

- What is the relative contribution of urban DWF from MS4 outfalls to receiving waterbodies?
  This contribution determines the volume of DWF that is potentially controllable by the MS4 program. See Section 3.2.1.

- What are typical levels of *E. coli* in urban runoff during dry weather conditions?
  Applying a concentration to urban DWF volumes facilitates the computation of the total daily amount of bacterial indicators (cfu/day) that is potentially controllable by the MS4 program. See Section 3.2.2.

- How is compliance with the wasteload allocation for MS4 permittees best demonstrated?
  See Section 3.3

- To what level must *E. coli* (cfu/day) from urban sources of DWF from MS4 permittees be reduced to demonstrate compliance?
  This question assesses current bacterial indicator levels at the compliance monitoring locations in relation to the wasteload allocation in the TMDL. Only the portion of the baseline bacteria in excess of the TMDL wasteload allocation that are controllable by implementing BMPs within MS4 systems is targeted for bacteria indicator reduction by MS4 permittees. Section 3.4 computes this daily bacterial indicator level targeted for removal through CBRP implementation. Other sources of bacteria to downstream compliance monitoring sites, such as agricultural land uses, illegal discharges, transient encampments, wildlife, or environmental growth, are not well understood. The Inspection Program is designed to provide information to assist the permittees in developing an approach to manage these sources, determined to be uncontrollable within MS4 systems.

- What level of implementation of proposed CBRP elements would be sufficient to achieve the targeted daily *E. coli* (cfu/day) removal?
  Section 3.5 discusses the water quality benefits (quantifiable and non-quantifiable) expected from CBRP implementation.

3.2 Baseline Dry Weather Flow and Bacterial Indicator Data

3.2.1 DWF Sources to MS4

Regular DWF exist in many MSAR waterbodies. Sources of DWF include:

- Effluent from publicly owned treatment works (POTWs)
- Turnouts of imported water by MWD
- Well blow-offs
- Water transfers
- Groundwater inputs
- Other authorized discharges (as defined by permit)
- Urban water waste from excess irrigation and other outdoor water uses
- Non-permitted discharges

Each of these sources of runoff has a different pathway and potential to transport bacteria to receiving waterbodies. Thus, it is important to understand the relative role of each of these categories of DWF. Attachment B provided an overview of dry weather hydrology in the MSAR watershed. This information provides a basis for the compliance analysis described in this section of the CBRP. Additionally, some sources of bacteria are not directly related to DWF inputs such as birds and other wildlife within waterbodies, resuspension of bacteria in channel bottom sediment, air deposition, and transient encampments.

Flow and bacterial indicator level data are available from several sources for all of the compliance monitoring locations and most of the major tributaries to the impaired receiving waterbodies. Table 3-1 provides a summary of the sources of data used to characterize flow and bacterial indicator water quality in the MSAR Bacterial Indicator TMDL waterbodies and their tributaries.

Within the MSAR watershed there are many MS4 drainage areas that do not typically cause or contribute to flow at the compliance monitoring locations. DWF at these MS4 outfalls is hydrologically disconnected from the TMDL receiving waterbodies, by either purposefully recharging groundwater in constructed regional retention facilities or through losses in earthen channel bottoms, where the recharge capacity of underlying soils exceeds dry weather runoff generated in upstream drainage areas.

Flow data from these sources characterize the role of DWF from major tributaries and POTW effluent to baseline flow at the compliance monitoring locations. For each of the compliance monitoring locations, column 2 in Table 3-2 shows the median of DWF measurements from upstream USEP sites (major tributaries) and POTW effluent locations in the dry season. These values are determined by summing inputs from USEP subwatersheds and effluent from upstream POTWs. This approach ensures a balance of runoff between inflows and outflows. The downstream flow estimates fell within expected ranges based on long-term daily data collected at USGS gauging stations in the MSAR watershed. As expected, DWF at each of the compliance monitoring locations consists primarily of POTW effluent (Figure 3-1)

Table 3-1. Available Data for Characterization Of DWF and Bacterial Indicators in Areas Draining to Watershed-Wide Compliance Sites

Site	Flow	Bacterial Indicator Concentration
Downstream: Chino Creek at Central Ave (WW-C7)	Watershed-wide field measurements 2007-2009 (n=82)	Watershed-wide compliance monitoring 2007-2009 (n=82)
POTW Influent	Daily effluent at IEUA Carbon Canyon WRRF (2007 - 2008)	Assumed effluent of 2.2 MPN/100 mL
Carbon Canyon Creek Channel	SBCFCD Little Chino Creek gauge 2843 (2007-2008)	USEP samples (n=19)
Chino Creek above Schaeffer	U.S. Geological Survey (USGS) Gauge 11073360 (2005-2009)	USEP samples at San Antonio Channel (n=19)
Downstream: Mill Creek at Chino Corona Rd (WW-M5)	USGS Gauge at Merrill Ave 11073495 (2005-2009)	Watershed-wide compliance monitoring at Chino-Corona Road 2007-2009 (n=80)
POTW Influent	Daily effluent at outfall 001 of IEUA RP1 WRRF (2007 - 2008)	Assumed effluent of 2.2 MPN/100 mL
Lower Deer Creek (CHRIS)	USEP field measurements samples at CHRIS (n=17)	USEP samples at CHRIS (n=17)
County Line Channel (CLCH)	USEP field measurements samples at CLCH (n=16)	USEP samples at CLCH (n=7)
Cucamonga Creek (CUC) above IEUA RP1 WRRF	USEP field measurements at CUC (n=16)	USEP samples at CUC (n=16)
Downstream: Santa Ana River at MWD Crossing (WW-S1)	USGS Gauge at MWD Crossing 11066460 (2005-2009)	Watershed-wide compliance monitoring at MWD Crossing 2007-2009 (n=82)
POTW Influent	Daily effluent from RIX Facility and Rialto WWTP (2007 - 2008)	Assumed effluent of 2.2 MPN/100 mL
Sunnyslope Channel (SNCH)	USEP field measurements at SNCH (n=26)	USEP samples at SNCH (n=17)
Box Spring Channel (BXSP)	USEP field measurements at BXSP (n=26)	USEP samples at BXSP (n=17)
Downstream: Santa Ana River at Pedley Ave (WW-S4)	Sum of POTW effluent and estimated dry weather runoff from ANZA, DAY, and SSCH	Watershed-wide compliance monitoring at Pedley Ave 2007-2009 (n=82)
POTW Influent	Daily effluent from RIX Facility, Rialto WWTP, and Riverside WQCP (2007 - 2008)	Assumed effluent of 2.2 MPN/100 mL
Anza Drain (ANZA)	USEP field measurements at ANZA (n=19)	USEP samples at ANZA (n=18)
Day Creek (DAY)	USEP field measurements at DAY (n=13)	USEP samples at ANZA (n=13)
San Sevaine Channel (SSCH)	USEP field measurements at SSCH (n=13)	USEP samples at ANZA (n=13)

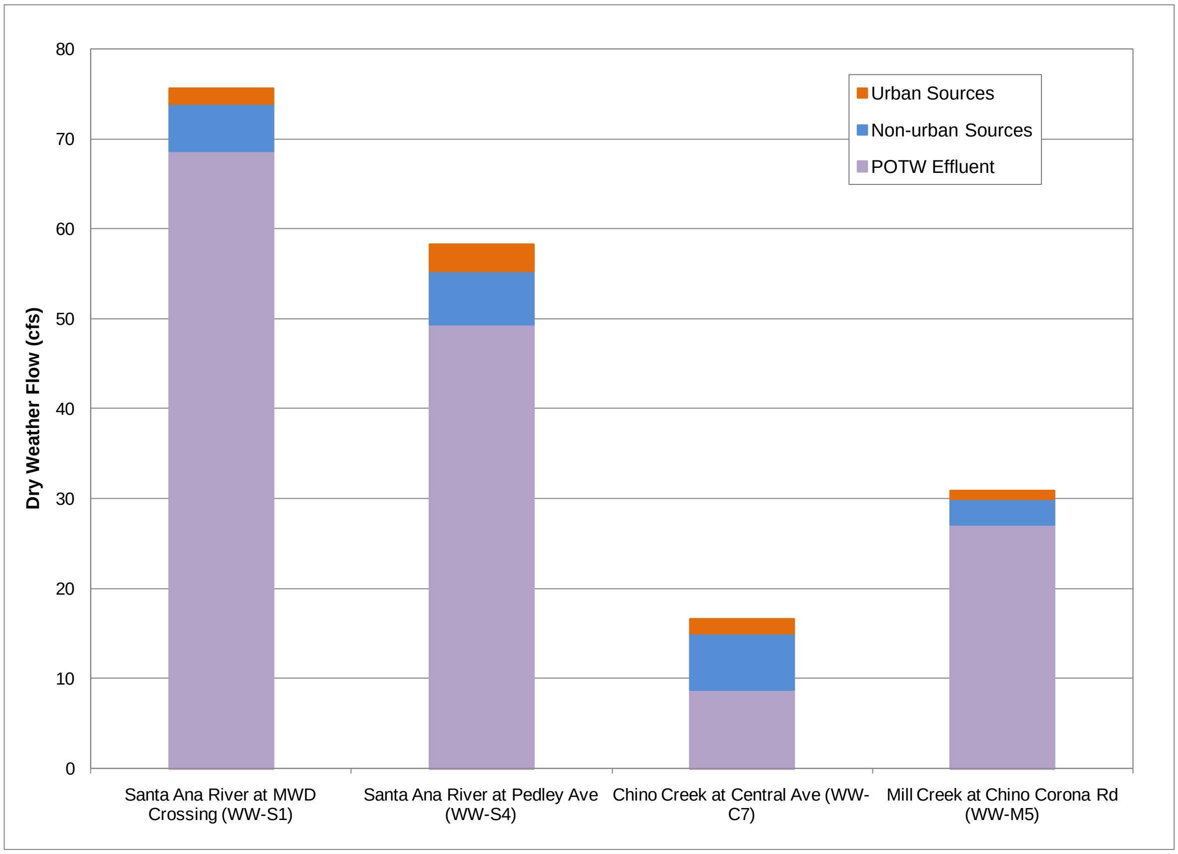


Figure 3-1. Estimated Relative DWF Contributions to Watershed-Wide Compliance Sites

Flow data was not available downstream of some portions of MS4 drainage areas; therefore it was necessary to approximate DWF from these areas to complete a water balance for each compliance monitoring location. However, such estimates are confounded by infiltration and rising groundwater conditions in the MSAR watershed. Within the Chino Basin portion of the MSAR watershed, IEUA measures flow at a number of locations to quantify groundwater recharge for water supply benefit. Flow measurements, on days when DWF is predominantly from urban sources, suggest that DWF from urban sources occur at a rate of 100 gal/acre/day in the MSAR watershed, ranging from 20 to 280 gal/acre/day (see Attachment B for summary of field measured flows). This is consistent with DWF generation rates developed to support the City of Los Angeles Integrated Resources Plan (2004), which estimated DWF rates from urban watersheds ranging from zero to 300 gal/acre/day. Thus, it was reasonable to use a rate of 100 gal/acre/day to approximate urban sources of DWF from "other MS4 areas" that may be contribute some DWF to a TMDL waterbody. The USEP flow measurements indicated that some tributaries have significantly greater DWF rates per acre of urbanized drainage area (column 3 of Table 3-2) than would be expected solely from urban sources. In these cases, the presence of a non-urban source was determined to be responsible for the elevated DWF rates.

Overall, the contribution of runoff during dry weather from urban sources relative to total downstream flow is very small in all of the TMDL waterbodies. This finding suggests that *E. coli* in the runoff from urban sources could be very high, assuming non-urban flows (potable water transfers, groundwater, etc.) and POTW effluent are largely free of fecal indicator bacteria. Alternatively, wildlife, environmental growth, recreational uses of receiving waters, or other sources could be significant contributors to impairments at TMDL waterbodies.

Table 3-2. Baseline DWF and Bacterial Indicator Concentrations in Areas that Drain to Watershed-Wide TMDL Compliance Monitoring Sites

Site	1 Hydrologically Connected Acres	2 Dry Weather Flow (cfs)	3 Total Dry Weather Flow Generation (gal/acre/day)	4 Dry Weather Geometric Mean of *E. coli* (cfu/100 mL)	5 Dry Weather *E. coli* (cfu/day)
SAR at MWD Crossing	10,727	73.2		149	267
POTW Influent	n/a	68.7	n/a	2	4
Sunnyslope Channel	2,104	2.0	623	183	9
Box Springs Channel	4,193	1.8	279	1,686	75
Other MS4 Areas	4,430	0.9	100	600 [3]	10
				Unaccounted-for Sources	170
SAR at Pedley Avenue	17,921	54.8		149	200
POTW Influent	n/a	49.4	n/a	2	3
Anza Drain	6,335	2.6	263	492	31
Day Creek	2,759	0.5	122	577	7
San Sevaine Channel	2,489	1.3	338	320	10
Other MS4 Areas	6,338	1.0	100	600 [3]	14
				Unaccounted-for Sources	135
Chino Creek at Central Ave	17,678	17.8		394	171
POTW Influent	n/a	8.8	n/a	2	0
Carbon Canyon Creek Ch.	1,766	6.5	2,396	139	22
San Antonio Channel	5,031	0.7	91	412	7
Other MS4 Areas	10,882	1.7	100	600 [3]	24
				Unaccounted-for Sources	117
Mill-Cucamonga Creek at Chino-Corona Rd	5,510	30.9		877	662
POTW Influent	n/a	27.1	n/a	2	1
Chris Basin (Lower Deer Ck.)	3,091	0.8	165	868	17
County Line Channel	373	0.1	95	4,053	5
Cucamonga Creek	1,216	2.8	1,472	863	58
Other MS4 Areas	830	0.1	100	600 [3]	2
				Unaccounted-for Sources	578

1) DWF generation up to 100 gal/acre/day is assumed to come from urban sources
2) n/a means value is not applicable
3) Geometric mean of all dry weather *E. coli* monitoring data from the USEP study

3.2.2 Bacteria Concentrations

Attachment B summarizes the bacterial indicator concentrations observed at watershed-wide compliance sites since 2007 and the concentrations observed during the USEP monitoring program implemented in 2007-2008. These data were used to provide baseline data for this compliance analysis.

The geometric mean of all dry weather *E. coli* concentrations measured at the watershed-wide compliance locations is shown in column 4 of Table 3-3. Geometric means of dry weather *E. coli* concentrations at each USEP site provide an estimate of baseline average daily dry season bacterial indicator levels from the major subwatersheds draining to each watershed-wide compliance site (column 4 of Table 3-2). These values show a wide range of observed *E. coli* concentrations, which suggests that targeted inspection and BMP implementation, would be an effective approach for mitigating controllable bacterial indicator sources.

Bacterial indicator data was not available downstream of some portions of MS4 drainage areas; therefore it was necessary to approximate *E. coli* concentrations from these areas to develop a compliance analysis for the entire MSAR watershed. For purposes of this compliance analysis, the geometric mean of all dry weather *E. coli* monitoring data from the USEP study of ~600 cfu/100 mL provides an initial estimate of bacterial indicator levels from drainage areas that have no available data. Monitoring of DWF rate and bacterial indicators downstream of these areas is a key component of the CBRP, and results will update this compliance analysis once available.

3.2.3 Relative Source Contribution

Relative source contribution analyses were prepared for each of the watershed-wide compliance locations. This analysis provided a comparison of monitored inputs of flow (Q_{inflow}) and bacterial indicator concentrations (C_{inflow}) from MS4 facilities and POTWs with downstream flow (Q_{comp}) and bacterial indicator concentrations (C_{comp}), as follows:

$$FIB_{comp} = Q_{comp} * C_{comp} = \left| \sum_{i}^{J} Q_{inflow} * C_{inflow} \right| + e$$

This type of analysis characterizes the relative role of different flow sources in the watershed on downstream bacterial indicator concentrations. An important outcome of this analysis is the identification of the level of bacterial indicators (*e*) at the compliance locations that cannot be explained by known flow sources within the watershed (referred to as "unaccounted-for sources"). The presence of an unbalanced set of inputs and outputs in relation to downstream bacterial indicator levels is not surprising, given the potential for increases in bacteria indicator levels from illegal and illicit discharges, direct input from wildlife, air deposition, transient encampments, environmental growth, or resuspension, or decreases in bacterial indicator levels due to environmental decay or settling.

The relative source contribution showed high amounts of unaccounted-for bacterial indicators at all four compliance points during DWF in the dry season. The inspection program will evaluate enhance the characterization of unaccounted-for sources and evaluate whether some portion come from a previously unmonitored controllable urban source. Figure 3-2 summarizes the relative contribution of bacterial indicators from various sources based on existing data. Figure 3-2 also shows that the contribution of bacterial indicators from POTW effluent, assuming a concentration of 2.2 cfu/100 ml is negligible.

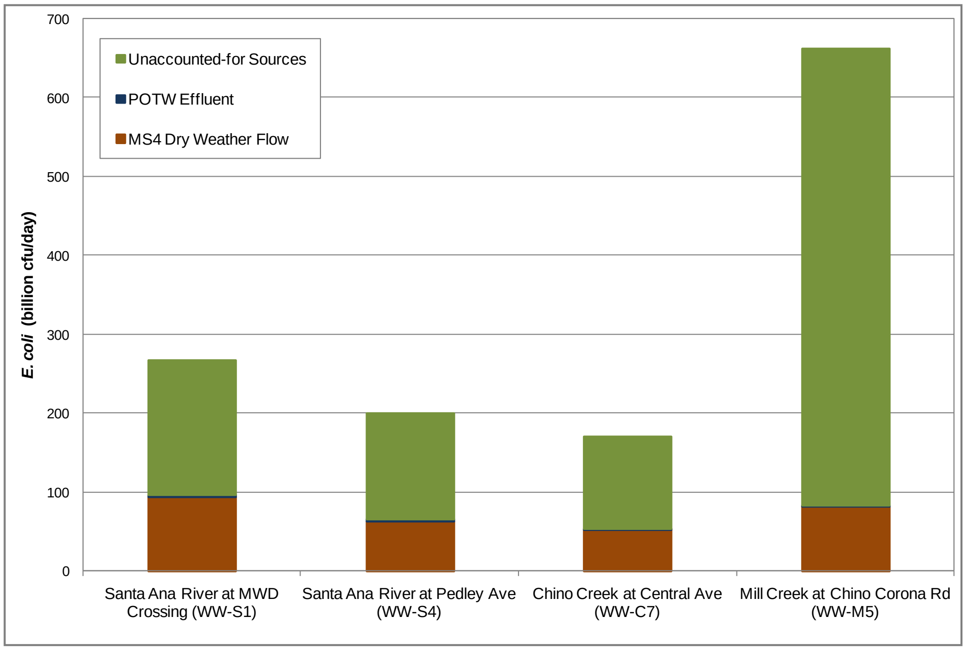


Figure 3-2. Estimated Relative Sources of Bacterial Indicators at Watershed-Wide Compliance Locations

3.3 Criteria for Demonstrating Compliance

Two alternative approaches were considered for demonstrating how implementation of the CBRP would achieve compliance with urban source wasteload allocations:

- Alternative 1 - Demonstrate that implementation of the CBRP would result in achieving the wasteload allocation at every outflow to a receiving waterbody. This approach can be achieved by either:
    - Reducing *E. coli* concentrations at flowing MS4 outfalls to 113 MPN/100 mL or;
    - Eliminating DWF from the majority of urban area draining to each outfall.

  While this approach may be feasible in small subwatersheds, it may be infeasible to implement watershed-wide.

- Alternative 2 – If data demonstrate that receiving water impairment is potentially caused by the MS4, then demonstrate sufficient reduction in controllable urban sources of bacterial indicator loads in DWF from MS4 facilities to not cause an exceedance of the *E. coli* WQOs at downstream watershed-wide compliance monitoring sites. Required bacterial indicator reductions are determined by comparing baseline *E. coli* loads at the watershed-wide compliance sites with the TMDL numeric target (product of DWF at compliance monitoring site and *E. coli* concentration equal to the WQO of 126 cfu/100 mL). Figure 3-2 shows that there are large amounts of unaccounted-for bacterial indicators in some watersheds.

The MSAR Permittees plan to use the second approach to evaluate compliance. This approach allows for a watershed-wide assessment of bacterial water quality in downstream receiving waterbodies and consideration of the relative role of MS4 sources in downstream receiving waterbody bacterial indicator water quality.

3.4 Bacterial Indicator Reduction from the MS4

3.4.1 Controllability

The relative source contribution analysis showed that substantial unaccounted-for sources of bacterial indicators exist in impaired waterbodies. Unaccounted-for sources make up the majority of bacterial indicators during dry weather at the Chino Creek and Mill-Cucamonga Creek TMDL compliance monitoring sites (see Figure 3-2). For the Santa Ana River compliance monitoring locations, approximately two thirds of *E. coli* is comprised of unaccounted-for sources. For this compliance analysis, contributions of unaccounted-for sources of bacterial indicators to the TMDL compliance monitoring sites are not the responsibility of the MS4 permittees. The USEP data used to develop the source contribution analysis were based on samples collected at the outlet from MS4 systems to receiving waters; therefore, unaccounted sources of bacteria are not attributable to MS4 inputs from areas upstream of USEP sites. However, for Tier 1 sites, the inspection program will gather updated data and assess additional MS4 outfalls not previously monitored in the USEP, which could provide more insight into these unaccounted-for sources and allow further refinement of MS4 contributions.

3.4.2 Gap Analysis for Bacterial Indicators

Bacterial indicator data collected from each of the watershed-wide TMDL compliance monitoring sites provide an estimate of existing *E. coli* concentrations in receiving waters. The magnitude of exceedances of the TMDL numeric target provides a basis for estimating the *E. coli* load removal needed from all sources to reduce current bacterial indicator concentrations to the WQO of 126 MPN/100 mL. Table 3-3 shows the daily amount of *E. coli* load at each compliance monitoring site based on average of DWF and bacterial indicator concentration (column 1). The basis for the values in Table 3-3 is geometric means of dry weather *E. coli* concentrations and field measurement of flow from the 2007-2008 dry season USEP monitoring, with a sample size of ~20 for most monitored drainages.

Concentration based TMDL numeric targets equal to the WQO of 126/cfu/100mL were converted to an *E. coli* load (column 2). The difference between current *E. coli* loads at the compliance monitoring sites (column 1) and the TMDL numeric target load (column 2) is the total bacterial indicator reduction needed to achieve compliance (column 3). The portion of the current bacterial indicator load at the compliance monitoring sites attributable to measured MS4 sources is shown as a percentage in column 4 (see Table 3-2 for details). This relative source contribution is applied to the total reduction needed in column 3 to approximate a target *E. coli* reduction for MS4 sources (column 5).

Two conditions are apparent from comparing the bacterial indicators coming from the MS4 with the bacterial indicator reduction needed to achieve compliance:

- *E. coli* load measured from all upstream MS4 discharges (Table 3-2, column 5) is less than the load reduction that would reduce bacteria to the numeric targets (Table 3-3, column 3). This makes it impossible to attain the water quality objective even if MS4 discharges were eliminated. Available data show this condition exists in both the Mill-Cucamonga and Chino Creek watersheds. The recommended course of action is then to determine whether the unaccounted source of bacteria is from a controllable non-urban source (e.g. agriculture, dairy etc.) or other non-MSAR Permittee urban sources (Cal-Trans, state, federal and tribal lands), or if the source is naturally occurring and uncontrollable.

Table 3-3. Relative Contribution to Bacterial Indicator Water Quality Objective Exceedances from MS4 DWFs

Compliance Monitoring Location	1 Baseline Dry Weather *E. coli* (billion cfu/day)	2 Numeric Target[1] (billion cfu/day)	3 Total Bacteria Reduction Needed (billion cfu/day)	4 Contribution of MS4 DWF to Bacteria at Compliance Monitoring Site	5 Bacteria Reduction Target from MS4 (billion cfu/day)
Santa Ana River at MWD Crossing[2]	267	226	41	35%	15
Santa Ana River at Pedley Ave [2,3]	200	169	31	31%	10
Chino Creek at Central Ave4	171	55	116	31%	37
Mill-Cucamonga Creek at Chino Corona Rd	662	95	567	12%	71

1) Water quality objective is a rolling five sample geometric mean of *E. coli* of 126 MPN/100 mL. TMDL numeric target is expressed as daily bacteria load.
2) Bacteria generated in both Riverside and San Bernardino Counties, with most coming from Riverside County
Values do not include the drainage area to the Santa Ana River at MWD Crossing
4) Bacteria generated in San Bernardino County only
5) Bacteria generated in both Riverside and San Bernardino Counties, with most coming from San Bernardino County

- Conversely, *E. coli* load measured from all upstream MS4 discharges is greater than the load reduction needed to reduce bacteria to the numeric targets, then it may be physically possible to attain the water quality objective by reducing bacteria loads from MS4 outfalls. Available data show this condition exists for the two subwatersheds draining to the Santa Ana River compliance sites. Under this condition, the MS4 permittees will implement BMPs within the MS4 drainage system and continue to collect water quality data to assess effectiveness. Options for implementation also could include a trading or offset approach for achieving compliance by mitigating unaccounted for sources of bacteria in lieu of directly controlling bacteria at MS4 outfalls. The following section describes *E. coli* load reductions that would be achieved from planned water conservation BMPs upstream of the Santa Ana River watershed-wide compliance monitoring locations.

3.5 Water Quality Benefit Estimates

Water quality benefits associated with implementation of the dry weather CBRP almost entirely rely on reduction or elimination of DWF from MS4 systems, through ordinance enforcement, water conservation, or structural controls. The most significant source of DWF flow from urban land uses in the MSAR watershed is irrigation excess. Therefore, one approach to demonstrate compliance would be to convert target reduction in *E. coli* loads (see column 5 of Table 3-3) to an equivalent area of irrigated land for reduction or elimination of DWF. Section 3.5.1 performs this conversion from *E. coli* load reduction to irrigated area target for individual CBRP activities. Section 3.5.2 demonstrates how specific CBRP activities planned in MS4 areas upstream of the Chino Creek and Mill-Cucamonga Creek watershed-wide compliance sites have the potential to achieve adequate levels of implementation to provide for the implementation target, express as managed irrigated area.

3.5.1 CBRP Activity Implementation Targets

The DWF rate reduction that could provide the targeted *E. coli* reduction was approximated by assuming a concentration of *E. coli* in reduced or eliminated DWF. Water quality data is not available to characterize bacteria concentration in DWF from individual urban source areas prior to reaching MS4 conveyance systems. However, it is generally accepted that DWF from urban source areas contains elevated levels of bacteria. For purposes of this compliance analysis, an *E. coli* concentration of 1,260 cfu/100mL is assumed (10 times the geometric mean WQO for *E. coli*) for DWF that is reduced or eliminated from entering the MS4. Table 3-4 shows the DWF reduction needed to provide the targeted *E coli* reduction for portions of the MS4 draining to the Chino Creek and Mill-Cucamonga Creek compliance monitoring locations. CBRP activities in the portion of San Bernardino County MS4 drainage area that is tributary to compliance monitoring sites in Reach 3 of the Santa Ana River are not shown in this compliance analysis. DWF control in these MS4 areas will be implemented based on findings of the inspection program.

Table 3-4. Approximate Level of CBRP Activity Implementation Needed to Achieve Target *E. coli* Reduction

Compliance Monitoring Location	Chino Creek at Central Ave	Mill-Cucamonga Creek at Chino-Corona Rd	Total
Hydrologically Connected Drainage (total acres)	17,678	5,510	23,188
Bacteria Reduction Target from MS4 (billion cfu/day)	37	71	107
Approximate Target DWF Reduction (gal/day)[1]	767,082	1,481,465	2,248,548
BMP Implementation necessary to provide target DWF Reduction (irrigated acres managed)[2]			
Enforce water conservation ordinances [3,6]	1,743	3,367	5,110
Replace grass with artificial turf [4]	1,534	2,963	4,497
Replace grass with native plants [4]	1,534	2,963	4,497
Installation of a WBIC [5]	1,826	3,527	5,354
Landscape irrigation audit [3,6]	1,743	3,367	5,110
Enhanced Sweeping [4,7,8]	21,420	41,440	62,860
WQMP with redevelopment [4]	1,534	2,963	4,497
Regional structural controls [4]	1,534	2,963	4,497

1) Assumes *E. coli* concentration in reduced of eliminated DWF of 1,260 cfu/100mL (10 times the geometric mean WQO for *E. coli*)
2) Values presented show the level of implementation that would be needed if CBRP implementation employed a singular activity. Implementation of CBRP will involve a combination of these activities as well as ongoing source inspection.
3) DWF generation rate of 750 gal/irrigated acre/day for properties with targeted water waste ordinance enforcement or landscape irrigation survey outreach
4) Average DWF generation rate of 500 gal/irrigated acre/day. Assume complete elimination for this amount of DWF for grass replacement BMPs, significant redevelopment projects, and regional structural controls. For vacuum assisted street sweeping, assume this DWF generation rate from tributary area
5) DWF reduction of 170 gal/irrigated acre/day from installing WBICs
6) DWF reduction of 190 gal/irrigated acre/day from conducting landscape audits
7) Biweekly frequency of vacuum assisted street sweeping (day^{-1})
8) *E. coli* concentration of 1,260 cfu/100mL (10 times the geometric mean WQO for *E. coli*) that would be attributable to release of bacteria from biofilms in street gutters. Assume vacuum assisted street sweeping eliminates biofilm for a period of one day

The types of CBRP activities, described in Section 2 and Attachment C, that will be employed to reduce or eliminate DWF from entering the MS4 have different effectiveness, therefore levels of implementation needed to provide the full target DWF reduction are variable. Table 3-4 shows the level of implementation that would be needed for each CBRP activity if it were to be used for the full DWF reduction target. Except for enhanced use of vacuum assisted street sweeping, levels of implementation shown in Table 3-4 do not vary substantially. This analysis indicates that *E. coli* reduction targets may be achieved by water waste ordinance enforcement, water conservation BMPs, or structural BMPs managing roughly 5,000 acres of irrigated area. It is important to note that compliance will be continue to be measured by water quality monitoring data collected at the watershed-wide compliance monitoring sites.

The basis used to quantify DWF generation and potential runoff reduction effectiveness of water conservation BMPs is from a recent study conducted by Metropolitan Water District of Orange County and Irvine Ranch Water District. The study evaluated the effectiveness of WBICs and landscape irrigation system audits for residential runoff reduction during dry weather (Jakubowski, 2008). Several key findings of this study provide estimates of DWF reduction that were used to quantify benefits of increased use of water conservation BMPs in the MSAR watershed, including:

- Dry weather flow measurements downstream of a residential neighborhood showed approximately 500 gal/irrigated acre/day . This rate is used to approximate the runoff reduction benefit of replacing grass lawns with artificial turf or native plants (i.e. no expected runoff following BMP implementation).

- Education and outreach reduced DWF by ~190 gal/irrigated acre/day. This rate is used to approximate the runoff reduction from education and outreach BMPs, including an on-site irrigation audit, and water waste enforcements.

- Installation of a weather based irrigation controller on a large portion of the urban landscape provided DWF reduction of 170 gal/irrigated acre/day.

Lastly, the effectiveness of street sweeping was quantified by estimating the *E. coli* load that would not be picked up as DWF contacts street gutters if biofilm and other bacteria habitats were effectively removed. Assuming that the release of *E. coli* from biofilms and other habitats in street gutters is responsible for adding 1,260 cfu/100 mL of *E. coli* to DWF as it flows to the MS4, then the target flow for treatment (not reduction) would be equivalent to other CBRP activities that target DWF from individual properties. However, the frequency of street sweeping is an important consideration. Following a sweeping, biofilms and other habitats for bacteria will begin to buildup within the street gutter. Accordingly, it was assumed that street sweeping is effective at removing sources of bacteria from gutters for a period of 24 hours. Taking this assumption, a bi-weekly street sweeping program would need to provide treatment for 14 times the irrigated area as the other proposed CBRP activities, as shown in Table 3-4.

3.5.2 San Bernardino County MS4 Permittee Compliance

It would be impossible to use just one CBRP activity to address the full *E. coli* load reduction target that would address the portion of controllable bacteria from MS4s needed to demonstrate compliance with the TMDL. The following sections describe several actions that will reduce E. coli loads during the dry season in Chino and Cucamonga Creeks.

Outdoor Water Conservation BMPs

Urban water management plans (UWMPs) for water purveyors serving areas within the MS4 drainages responsible for most urban DWF in Chino and Cucamonga Creeks incorporate outdoor water use conservation BMPs that will also provide DWF reduction benefits (drafts of 2010 UWMPs for Cities of Chino and Ontario, and Monte Vista Water District). The Water Conservation Bill of 2009 sets new performance requirements for gross per capita water demand (GPCD), with the primary goal of reducing statewide water use by 20 percent by 2020. Water agencies throughout the State of California are planning to implement a combination of recycled water use and water conservation BMPs to meet their respective urban water use targets for GPCD. By the year 2015, water agencies must show 50 percent progress toward achieving the final 2020 urban water use target GPCD. Estimates of the targeted irrigated area for outdoor water conservation BMPs by each water agency within the MS4 drainages responsible for most urban DWF in Chino and Cucamonga Creeks are summarized in Table 3-5. These estimates show that potential outdoor water conservation BMPs could provide most of the target *E. coli* load reduction by 2020 and about half of the target by 2015. This analysis is subject to change as the water agencies develop their respective programs aimed to reduce urban per capita water demand. MS4 permittees will collaborate with the water agencies to support use of outdoor water use conservation approaches to meeting the new 20 percent by 2020 requirements.

Table 3-5. Estimate of Irrigated Area Addressed by Potential Water Agency Implementation of Outdoor Water Conservation BMPs Planned for Compliance with 20x2020 Requirement

Agency	2020 Population[1]	Current (GPCD)[1]	2020 Urban Water Use Target (GPCD)[1]	Projected Outdoor Water Use Savings (AFY)[2]	Targeted Outdoor Water Demand (AFY)[3]	Approximate Irrigated Area (acres)[4,5]
City of Ontario	246,304	240	198	1,400	13,500	2,000
Monte Vista Water District	56,555	229	190	400	3,900	600
City of Chino	84,806	237	189	1,300	13,300	1,900
			Total	3,100	30,800	4,500

1) Source: Draft 2010 Urban Water Management Plans (UWMPs) for listed water agencies.
2) Assumes 70 percent of per capita demand reduction not achieved by new recycled water use comes from conservation BMPs that target outdoor water waste.
3) Water conservation savings of 20 percent is assumed for outdoor water conservation BMPs
4) Irrigation demand of 55 in/yr based on CIMIS Station 44 at UC Riverside
5) Excess irrigation water use factor of 1.5 for implementation actions targeting top users

Mill Creek Wetland Project

One regional facility is planned for implementation within San Bernardino County at the downstream end of the concrete lined section of Cucamonga Creek. This project would capture a portion of DWF from the entire watershed to the Mill-Cucamonga Creek at Chino-Corona Road (WW-M5) compliance monitoring site, and therefore has the potential to provide reduction in bacterial indicators. The project would divert DWF from the concrete lined channel to a debris basin northwest of the Chino-Corona Bridge over Mill-Cucamonga Creek and then under Chino Corona Road into a series of basins (Stephenson and Susilo 2009). The basins would be operated as free surface wetlands during dry weather to provide a hydraulic residence time of seven days. The treated DWF would then be discharged back to Mill-Cucamonga Creek, about 0.5 miles downstream of Chino-Corona Road. During wet weather, water level rise within the basins would result in the basins functioning as extended detention or wet ponds. The DWF that would be diverted is not yet determined, and will be influenced by the need to maintain existing habitat areas within Mill-Cucamonga Creek, between Hellman Avenue and ~0.5 miles downstream of Chino-Corona Road.

Preliminary estimates of *E. coli* load reduction potential for the Mill Creek Wetland project were developed based on an assumed removal effectiveness of 50 percent. This removal efficiency is conservative relative to literature values, which suggest removal in excess of 85 percent in several well-designed systems (SAWPA, 2009). If designed to treat approximately 7 cfs of DWF, this project could provide downstream *E. coli* load reduction of the MS4 target of 71 billion cfu/day.

The City of Ontario will fund a portion of this project through fees for the ~3,000 acre, New Model Colony development, located within the upstream drainage area. The project team is currently preparing grant proposals for the remaining funds needed to implement the proposed project concept. In addition to identifying funding, implementation of this project is subject to CEQA as well as other potential regulatory constraints.

Redevelopment

Redevelopment in the MSAR watershed prior to the December 31, 2015 compliance date may occur in 0.5 percent of the hydrologically connected MS4 drainage area. (23,200 urban acres * 0.005 = 116 acres of redevelopment). Assuming 30 percent of land cover on properties that will be redeveloped had been irrigated, then the CBRP benefit of implementing updated development planning requirements is 35 acres of irrigated area. This estimate is low relative to historical development rates, but redevelopment in the 2010-2015 time-period is expected to be reduced due to economic factors.

Other Activities

The CBRP also includes other recommended specific BMPs that have the potential to reduce bacterial indicator levels from urban DWF (see Attachment C). While these BMPs have been included to address potential urban bacterial indicator sources, the ability to quantify water quality benefits is greatly limited. For example, transient camps may be an important bacterial indicator source in certain areas, but the benefits of mitigation are unknown since studies have not been done to evaluate the water quality impacts of such camps under dry weather conditions. Given such limitation, the water quality benefits were not quantified. However, the potential reductions in bacterial indicator levels that will be achieved from implementing these BMPs provide an additional margin of safety toward achieving urban wasteload allocation by the compliance date.

3.5.3 Role of Inspection Program in Achieving Compliance

The inspection program involves rigorous monitoring of flow, bacterial indicators, and human sources of fecal bacteria indicators (using human *Bacteroides* markers) at key locations in the MS4. The purpose of conducting such monitoring activities is to identify smaller portions of MS4 drainage areas that may be responsible for a disproportionate amount of bacterial indicators (referred to as a "hot spot"). The temporal variability of available bacteria indicator levels from downstream monitoring sites (from both the USEP study and watershed-wide compliance monitoring) suggests that in some drainage areas, urban sources may be contributing to increases in downstream bacterial indicator levels. However, because of the high percentage of unaccounted-for sources of bacterial indicators apparent in the system, to what degree the MS4 is a contributor to elevated bacterial indicator levels needs to be evaluated.

The inspection program provides a means to identify urban sources and target mitigation activities. For instance, an MS4 outfall may be determined to be consistently dry or to contain a lower *E. coli* level than expected. If so, there would be no need to implement upstream BMPs for the purposes of reducing bacterial indicators. At the same time, the inspection program could identify drainage areas that generate DWF and have bacterial indicators at levels greater than was assumed in this quantification effort. Targeted BMPs within the watershed upstream would be prioritized and would likely provide more benefit than is estimated in this compliance analysis. Accordingly, the inspection program provides the information necessary to use an iterative adaptive watershed management approach, which allows for the best use of resources to mitigate urban bacterial indicator sources. Moreover, data collected under the inspection program will provide the means to improve the basis for the relative source contribution analysis for bacterial indicators in receiving waterbodies..

Section 4
Wet Weather Condition Program

The requirements for development of a dry weather condition CBRP include establishing a schedule for developing a wet weather condition CBRP (November 1st through March 31st) to comply with urban wasteload allocations for indicator bacteria by December 31, 2025.

The Regional Board will issue the next MS4 permit on or after January 29, 2015 when the existing MS4 permit expires. Similar to the requirements contained in the existing MS4 permit, it is recommended that the next MS4 permit include a requirement to develop a CBRP for wet weather conditions. Given the expected challenges associated with compliance with wasteload allocations under wet weather conditions, the wet weather CBRP will require more time to develop. Accordingly, the earliest a draft wet weather condition CBRP will be submitted to the Regional Board for review will be 24 months following adoption of the next MS4 permit.

Attachment A
TMDL Implementation

Contents

Figures

Tables

A.1 Introduction

The MSAR MS4 permittees have been actively engaged in implementation of the MSAR Bacterial Indicator TMDL since its 2005 adoption by the RWQCB (almost two years before the TMDL became effective upon EPA approval in 2007). All TMDL requirements with specific completion dates from establishment of a watershed-wide monitoring program to adoption and implementation of the USEP have been met. The outcomes of the various TMDLs completed to date provide the foundation for this CBRP. Each of these activities is described in more detail below.

A.2 MSAR TMDL Task Force

With formal adoption of the MSAR Bacterial Indicator TMDL on August 26, 2005, all responsible parties named in the TMDL began the process to create a formal cost-sharing body, or Task Force, to collaboratively implement a number of requirements defined in the TMDL. Task Force participants include:

- RCFC&WCD
- County of Riverside
- Cities of Corona, Norco, and, Riverside
- San Bernardino County Flood Control District (SBCFCD) (representing the Cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, and Rialto)
- Cities of Pomona and Claremont (Los Angeles County, pending formal agreement)
- Agricultural Pool and Milk Producers
- U.S. Department of Agriculture, U.S. Forest Service
- RWQCB
- SAWPA

SAWPA serves as administrator of the Task Force. In this role, SAWPA provides all Task Force meeting organization/facilitation, secretarial, clerical and administrative services, management of Task Force funds, annual reports of task force assets and expenditures and hiring of Task Force authorized consultants. All documents and presentation (including CBRP presentations to the Task Force) are posted on SAWPA's project website at: www.sawpa.org/roundtable-MSARTF.html.

A.3 Proposition 40 State Grant

In anticipation of EPA approval of the MSAR Bacterial Indicator TMDL, SAWPA, in cooperation with the urban dischargers (SBCFCD and RCFC&WCD) and on behalf of the Task Force submitted a California Proposition 40 grant proposal ("Grant Project") to the State Board to support implementation of the TMDL. The State Board approved the Grant Project in fall 2006 and the project was initiated in early 2007.

The overarching purpose of the Grant Project was to accelerate the TMDL implementation process by supporting efforts by urban dischargers to implement TMDL requirements, including the watershed-wide monitoring program and USEP (which are described in more detail below). Within this framework, the Grant Project focused on identifying sources of bacterial indicator contamination in the MSAR watershed and pilot testing BMP technologies designed to reduce bacterial indicators in storm drains (SAWPA 2010b). The results of these activities were used to support the development of this CBRP to achieve compliance with urban wasteload allocations during dry weather conditions.

A.4 Watershed-wide Compliance Monitoring

Task 3 of the TMDL implementation plan required the responsible jurisdictions named in the TMDL to submit to the RWQCB for approval a proposed watershed-wide compliance monitoring program. The purpose of this program is to provide the data necessary to review and update the TMDL as needed and evaluate compliance with the TMDL wasteload and load allocations. Using the Grant Project as a funding vehicle to initiate this TMDL task, the MSAR Task Force worked with the RWQCB to select compliance sites consistent with the purpose of this monitoring program. Compliance sites were selected based on two key criteria:

- The sites should be located on waterbodies that are impaired and subject to Bacterial Indicator TMDL compliance requirements; and

- The sites should be located in reaches of the impaired waterbodies where REC-1 activity is likely to occur, i.e., there is an increased risk from exposure to pathogens.

Based on these criteria, six watershed-wide compliance monitoring sites were selected originally as compliance sites (Table A-1). One of these sites, Icehouse Canyon Creek was later removed with RWQCB approval[1]. A Monitoring Plan and Quality Assurance Project Plan (QAPP) were prepared to support the monitoring program (www.sawpa.org/roundtable-MSARTF.html). Appendix B of the Monitoring Plan provides information regarding each of the monitoring sites listed in Table A-1.

The RWQCB approved the Monitoring Plan and QAPP, and the Task Force initiated sampling in summer 2007. Weekly sampling occurs over a 20-week period during the dry season (April 1 – October 31) and an 11-week period during the wet season (November 1 – March 31). Four samples are collected during and after one wet weather event each year. This sampling program is implemented annually since 2007.

Table A-1. Watershed-wide Monitoring Program Sample Sites

MSAR Waterbody	Sample Sites	Site Code[1]
Icehouse Canyon Creek [2]	Icehouse Canyon Creek	WW-C1
Prado Park Lake	Prado Park Lake at Lake Outlet	WW-C3
Chino Creek	Chino Creek at Central Avenue	WW-C7
Mill-Cucamonga Creek	Mill Creek at Chino-Corona Rd	WW-M5
Santa Ana River, Reach 3	Santa Ana River Reach 3 @ MWD Crossing	WW-S1
	Santa Ana River Reach 3 @ Pedley Ave	WW-S4

[1] – Location of sites shown on Figures 3-8 through 3-11.
[2] – Icehouse Canyon Creek was removed from the list of watershed-wide compliance monitoring sites with RWQCB approval.

[1] Bacterial indicator concentrations in Icehouse Canyon Creek were consistently non-detect. The MSAR Bacterial Indicator TMDL Taskforce and the RWQCB determined that this site is representative of water quality from natural background in higher elevation areas, and not representative of natural background in lowland areas, and therefore the site was removed from the list of compliance monitoring sites.

A.5 Urban Source Evaluation Plan

The MSAR Bacterial Indicator TMDL required permitted MS4 discharges to develop the USEP within six months after TMDL adoption or November 30, 2007. Per Section 4.1 of the TMDL (RWQCB 2005), the purpose of the USEP is to identify specific activities, operations, and processes in urban areas that contribute bacterial indicators to MSAR waterbodies. The plan should also include a proposed schedule for the activities identified and include contingency provisions as needed to reflect any uncertainty in the proposed activities or schedule.

The urban dischargers developed a USEP as part of Grant Project implementation activities. The RWQCB approved the USEP as compliant with TMDL requirements on April 18, 2008 (RWQCB Resolution R8-2008-0044[2]). The approved plan included a four step process for fulfilling the purpose of the USEP (as stated by the TMDL):

- *Step 1: Urban Source Evaluation Monitoring Program* – The first step in the plan is to conduct a monitoring program at key sites to gather bacterial indicator source data associated with urban land uses.

- *Step 2: Risk Characterization* – Step 2 couples the data obtained from Step 1 with other applicable watershed data to characterize the risk of exposure to bacterial indicators and prioritize urban sites for additional investigation.

- *Step 3: Site Investigations* – This step describes the types of actions that may be implemented to further investigate urban bacterial indicator sources. Per the outcome of Step 2, site investigation activities would be focused on high priority sites first.

- *Step 4: Adaptive Implementation* - As new data become available or if changes in recreational uses occur on waterbodies as a result of SWQSTF efforts, then site prioritization or the schedule for USEP implementation may change.

A summary of the elements contained within each of these steps follows. The complete USEP is available at www.sawpa.org/roundtable-MSARTF.html.

Urban Source Evaluation Plan Monitoring Program

The MSAR Task Force implemented the urban source monitoring program during both dry and wet seasons in 2007 and 2008. Monitoring activities occurred at 13 locations in the MSAR watershed, including all major subwatersheds that drain to waters listed as impaired for bacterial indicators in the MSAR watershed. Table A-2 provides information on the location of each monitoring site. Additional information about each sample location is available in Appendix C of the Monitoring Plan available at www.sawpa.org/roundtable-MSARTF.html.

[2] Available from the Regional Board's website at: www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/msar_tmdl.shtml

Table A-2. Urban Source Evaluation Plan Monitoring Program Sample Locations

MSAR Waterbody	Waterbody Reach[1]	Sample Location	Site Code[2]
Santa Ana River	Reach 3	Santa Ana River (SAR) at La Cadena Drive	US-SAR
		Box Springs Channel at Tequesquite Avenue	US-BXSP
		Sunnyslope Channel near confluence with SAR	US-SNCH
		Anza Drain near confluence with Riverside effluent channel	US-ANZA
		San Sevaine Channel in Riverside near confluence with SAR	US-SSCH
		Day Creek at Lucretia Avenue	US-DAY
		Temescal Wash at Lincoln Avenue	US-TEM
Chino Creek	Reach 1	Cypress Channel at Kimball Avenue	US-CYP
	Reach 2	San Antonio Channel at Walnut Ave	US-SACH
		Carbon Canyon Creek Channel at Pipeline Avenue	US-CCCH
Mill-Cucamonga Creek	Prado Area	Chris Basin Outflow (Lower Deer Creek)	US-CHRIS
		County Line Channel near confluence with Cucamonga Creek	US-CLCH
	Reach 1	Cucamonga Creek at Highway 60 (Above RP1)	US-CUC

[1] - Reaches are defined in the Basin Plan.
[2] – Location of sites shown on Figures 3-8 through 3-11.

To characterize bacterial indicator concentrations at each site (along with flow and other field parameters), samples were collected over four five-week periods in both the dry and wet seasons. Samples were collected from each site to identify sites where human, bovine or domestic canine sources of bacterial indicator were prevalent. Section 3.4.2 below provides a summary of the results of this monitoring program (see also SAWPA 2009). While human and domestic canine sources have a high potential to be found in most portions of the MS4 system, bovine sources are likely to be restricted to areas potentially influenced by dairy farming activities. In the MSAR watershed, the number of dairy farms has declined significantly in recent years and will continue to be replaced with new urban development (SAWPA 2010c).

Risk Characterization

The USEP established a framework for prioritizing sites for follow-up investigation of urban sources of bacterial indicators based on a characterization of risk of exposure to pathogens. Three key factors drive the characterization process:

- *Exceedance Factor* – The first factor to be evaluated in the framework is the frequency and magnitude by which the bacterial indicator exceeds the water quality objective. The greater the frequency and magnitude of recorded exceedances, the higher the likelihood that the contamination can be tracked back to its source. Intermittent, low intensity events are more difficult to detect and, therefore, more difficult to trace.

- *Contagion Factor* – Human beings, particularly children are believed to be at greater risk of infection from water-borne pathogens generated by other people (EPA 2007). Accordingly, the risk of illness resulting from recreational use is believed to be highest where microbial source tracking methods (e.g. *Bacteroides*) indicate the probable presence of human pathogens. After human sources, exposure to fecal contamination from agricultural animals is the next most important concern (EPA 2007).

- *Exposure Factor* - A higher investigation/implementation priority should be assigned to locations and conditions where recreational activities are most likely to occur. Exceedances that occur in natural channels, during warmer months with relatively moderate flows, merit a higher priority than those that may occur in a concrete flood control channel during a winter rainstorm. This different priority is based on the assumption that the number of persons likely to be exposed is much higher in the first case than in the second.

The factors described above drive the prioritization of urban source investigation activities established in the USEP. Figure A-1 provides a framework for priority ranking from high (1) to low (8). Generally speaking, the highest priority sites are those where:

- Magnitude and frequency of bacterial indicator exceedance are high;

- *Bacteroides* marker analysis indicates the persistent presence of human sources of bacterial indicators;

- The site is in an area, or is close to an area, where recreational activities are likely to occur; and

- Observed exceedances and the presence of human sources of bacterial indicators occur during periods when people are most likely to be present, e.g., during warm months and dry periods.

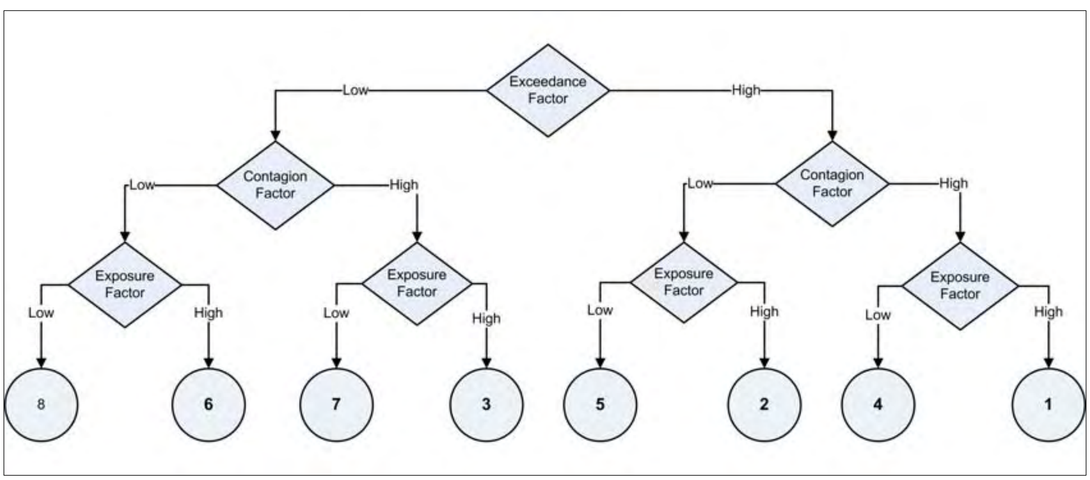


Figure A-1. Risk Characterization Framework

In contrast, the lowest priority sites for urban dischargers would be those where the bacterial indicator exceedance frequency and magnitude is low, human or other urban sources, e.g., domestic dogs, are not present, and the site is not used for water contact recreation, e.g., a concrete, vertical walled flood control channel. Sites with bacterial indicators from agricultural sources are referred to the RWQCB for follow-up action with agricultural dischargers.

The exceedance, contagion and exposure factors provide the basic foundation for prioritizing sites or areas for further investigative activities. As appropriate, additional factors may be considered to more clearly define the priority between several sites with similar priorities based on the three base factors, as described above. For example, other relevant considerations may include regulatory factors, e.g., the waterbody may be reclassified as a result of Basin Plan changes or the source is determined to be uncontrollable.

The results of the 2007-2008 USEP monitoring program provided the first opportunity to rank sites based on the factors described above. This prioritization is still valid with regards to the preparation of this CBRP. However, as additional data are developed during CBRP implementation, priorities may be revised (as envisioned in Step 4 of the USEP). Section 3.4.2 summarizes the results of the 2007-2008 USEP program and how this information was used to prioritize TMDL implementation activities.

Site Investigations

The USEP describes the types of actions that may be implemented to further investigate urban sources of bacterial indicators. Investigative strategies would be developed at six month intervals to address the highest priority needs. In principle, resources would be directed to the high priority areas first; implementation activities in lower priority sites would occur only after high priority sites have been addressed. However, when necessary, the priority for any site can be elevated, particularly if new data become available that changes the priority for action.

The USEP identifies three general types of investigative activities: Channel surveys; enhanced tracking methods; and controllability assessments. These activities would typically be implemented sequentially at a given site, e.g., complete channel survey work before implementing an enhanced tracking method, but a step could be skipped if the source of the elevated levels of bacterial indicators is generally known. Following is a summary of the investigative tools envisioned for implementation under each investigative activity type in the USEP:

- *Channel Surveys* – Surveys may be conducted to better define sources of bacterial indicators. Example survey tools could include:
  - UAA development (consistent with SWQSTF methods) to refine application of the recreational uses in the Basin Plan.

- Source tracking studies in tributaries or outfalls to better define the urban sources of bacterial indicators.

- Flow loading from tributaries and other outfalls to evaluate potential for these sources to contribute significant numbers of bacterial indicators.

- Preliminary source reconnaissance to identify potential sources of bacterial indicators including (a) direct human sources (e.g., leaking sewers or septic systems, transient camps, illicit discharges); (b) domesticated animals associated with urban land use, especially areas where domesticated animals are concentrated; and (c) wildlife concentration areas (e.g., birds, rodents, squirrels, rabbits, feral cats and dogs)

■ *Enhanced Tracking Methods* – These methods provide a means to narrow down urban sources of bacterial indicators, including where to prioritize implementation efforts. Examples of tools that may be used to support enhanced source tracking include:

  - Evaluation of relative contribution of bacterial indicators by flow sources to determine which tributaries or drains contribute the most numbers of bacterial indicators to the waterbody.

  - Use of constituent-specific sampling (analgesics, hormones, caffeine, antibiotics, nutrients, surfactants, etc.) to identify potential flow sources.

  - Use of patterns and trends analyses to identify conditions under which elevated levels of bacterial indicators occur.

■ *Controllability Assessments* – Where a bacterial indicator source requiring mitigation is identified, the final step in the investigative process is to determine the controllability of the source. Controllability is largely dependent on the nature of the source. For example, elevated levels of bacterial indicators attributable to wildlife or impacts associated with use of the waterbody as a conduit for water transfers may limit the controllability of the source. In these instances, it may not be feasible to control the source. Controllability assessments will consider three alternatives:

  - Prevention (or source control) activities, including for example repair of all sewer leaks, better control of domestic animals, moving transient camps, stronger enforcement of illicit discharges, etc.

  - Construction of low flow diversions to intercept DWFs and send the water to a facility for recharge or to a regional wastewater treatment facility.

  - Use of on-site or regional BMPs, e.g., detention ponds, wetlands and bioswales for regional treatment. The practicability of using these facilities would be considered on a site-specific basis.

Adaptive Implementation

Adaptive implementation is an iterative process commonly incorporated into TMDL implementation plans to provide a means to reassess compliance strategies based on new data or analyses. Given the large uncertainty associated with control of pollutants such as bacterial indicators, an adaptive implementation component was included in the USEP framework to provide opportunity, where appropriate, to reconsider priorities. This adaptive component has been carried forward into this CBRP (see Section 8).

USEP Implementation

The USEP contains an implementation schedule that centers around periodic implementation of source evaluation activities to identify sources of bacterial indicators for potential mitigation. Along with these activities, the USEP requires submittal of a semi-annual report to document ongoing and planned activities related to the management of urban sources of bacterial indicators. These reports have been submitted since July 2009.

In spring 2009 the Task Force established the first priority areas for further investigation based on the findings of the 2007-2008 USEP monitoring program and ongoing watershed-wide monitoring at the compliance sites (see Section 3.4.2 for a discussion of this prioritization process). In fall 2009 the Task Force authorized two USEP-based studies:

- Source Evaluation Activities in Carbon Canyon Creek and Cypress Channels in San Bernardino County – The data analysis report prepared after completion of 2007-2008 monitoring activities (SAWPA 2009a) prioritized the next steps for USEP implementation based on the risk characterization approach described above. USEP sample locations with a combination of the largest number of exceedances of bacterial indicator water quality objectives, highest levels of bacterial indicators, and most frequent indications of contamination by human sources were given the highest priority for additional source evaluation activities. Accordingly, the Cypress Channel subwatershed was ranked high for follow-up investigations. In contrast, the Carbon Canyon Creek subwatershed was ranked very low as both the frequency of exceedances of water quality objectives and the levels of bacterial indicators was relatively low.

  Both the Cypress Channel and Carbon Canyon Creek drainage areas were recommended for source evaluation studies. Evaluation of the Carbon Canyon Creek subwatershed was included to determine if any site-specific characteristics could be identified that provide insight into how to reduce bacterial indicator levels elsewhere. Source evaluation activities involved a desktop level characterization as well as field reconnaissance to identify subwatershed or in-stream characteristics which may contribute to high or low levels of bacterial indicators at either site. A technical memorandum summarizing the findings of this effort was prepared (SAWPA 2010d).

- *Dry Weather Runoff Controllability Assessment for Lower Deer Creek Subwatershed (Chris Basin) in San Bernardino County* – SAWPA (2009a) identified Chris Basin as a high priority site for bacteria source evaluation activities. Given its location at the confluence of Cucamonga Creek and Lower Deer Creek, Chris Basin has the potential to be retrofitted for use as a regional treatment BMP for dry weather runoff. The USEP study evaluated opportunities to retrofit the site to capture DWFs and eliminate the existing dry weather discharge to Cucamonga Creek. A technical memorandum summarizing the findings of this study was prepared (SAWPA 2010e).

Both of the above USEP studies recommended a number of follow-up actions applicable to both urban dischargers and the RWQCB. These actions will be incorporated as appropriate into future source evaluation activities conducted in these areas as the CBRP is implemented.

Urban dischargers are currently implementing the following source evaluation activities:

- During the 2007-2008 USEP monitoring program, human source bacteria were regularly detected and high bacterial indicator concentrations were present in Box Springs Channel. Following a local investigation in 2008, a sanitary/storm sewer cross connection was identified and corrected. Sampling is occurring in spring 2011 to evaluate current bacterial indicator levels and verify that human source bacteria are no longer present.

- When the USEP program was implemented in 2007-2008 no samples were collected from sites representing the Cities of Pomona and Claremont (portion of MSAR watershed in Los Angeles County). Sample collection is occurring under dry weather conditions in spring 2011 to provide a preliminary characterization of bacteria loading from this portion of the MSAR watershed.

- A source evaluation study is currently being implemented to obtain additional information regarding the variability of dry weather flows in stormwater channels/outfalls in the MSAR watershed. The information gained from this effort is being combined with other available dry weather hydrology data to draw conclusions regarding characteristics of typical dry weather flows, especially the nature of their variability. These data have been incorporated into the flow analyses included in the CBRP's compliance analysis.

Findings from the above source evaluation activities carried out a part of USEP implementation will be reported through the MSAR Task Force. In the future, source evaluation activities described in this CBRP will supersede the USEP and become the focus of bacterial indicator source evaluation activities planned for the MSAR watershed.

A.6 Triennial Review Summary

Task 6 in the implementation section of the MSAR Bacterial Indicator TMDL requires preparation of a water quality assessment every three years that summarizes the data collected for the preceding three year period and evaluates progress towards compliance with wasteload and load allocations. Referred to as a Triennial Report, the requirement for this assessment is also in the MS4 permit (Appendix 3, III.3.D.1.b). The first of these Triennial Reports was submitted to the RWQCB as required by February 15, 2010 (SAWPA 2010a).

The Triennial Report findings, relevant to the MS4 wasteload allocation, are provided in Attachment B of this CBRP (the full report is available at www.sawpa.org/roundtable-MSARTF.html). These findings provide the baseline for the CBRP analysis that demonstrates that implementation of this CBRP is expected to achieve compliance with the wasteload allocation by December 15, 2015. Additional Triennial Reports will be prepared in 2013 and 2016 as part of CBRP implementation.

Attachment B
Watershed Characterization

Contents

Figures

Tables

B.1 Middle Santa Ana River Watershed

The following sections provide background information regarding the general characteristics of the MSAR watershed, including major subwatersheds, key jurisdictions and dominant land use.

General Description

The Santa Ana River watershed, located in southern California, encompasses an area of approximately 2,800 square miles. Surface water flows begin in the San Bernardino and San Gabriel Mountains and flow in a generally northeast to southwest direction to the Pacific Ocean. Flows are interrupted by a number a number of features ranging from groundwater recharge basins to Prado Basin Dam. The MSAR watershed encompasses an area of approximately 488 square miles and is located generally in the north central portion of the Santa Ana River watershed (Figure B-1).

The MSAR watershed includes the southwestern part of San Bernardino County, the northwestern part of Riverside County, and a small portion of Los Angeles County (Figure B-1). Riverside County jurisdictions participating in this CBRP include the County of Riverside and the Cities of Corona, Norco, and Riverside (Figure B-2). The City of Eastvale recently incorporated in 2010 and will be required to be a participant in the CBRP. Jurupa Valley is also in the process of incorporating and currently incorporation is anticipated for July 2011.

Lying within an arid region, limited natural perennial surface water is present in the watershed. Flows derived from mountain areas (snowmelt or storm runoff) are mostly captured by dams or percolated in recharge basins. In the transition zone from mountains to lower lying valley areas, the sources of surface water flows vary, e.g., dry weather urban runoff, such as occurs from irrigation, stormwater runoff during rain events, treated municipal wastewater discharges, water transfers, dewatering discharges and other permitted discharges, and rising groundwater.

The largest order waterbody in the MSAR watershed is Reach 3 of the Santa Ana River which flows from Mission Boulevard to Prado Basin Dam, where Prado Dam controls flows from the middle to the lower part of the Santa Ana River watershed. Downstream of Mission Boulevard, there is less channelization of the Santa Ana River, allowing for larger meanders and riparian habitat extent within a wider floodplain. A number of major tributaries to the MSAR exist, many of which have been modified for flood control purposes.

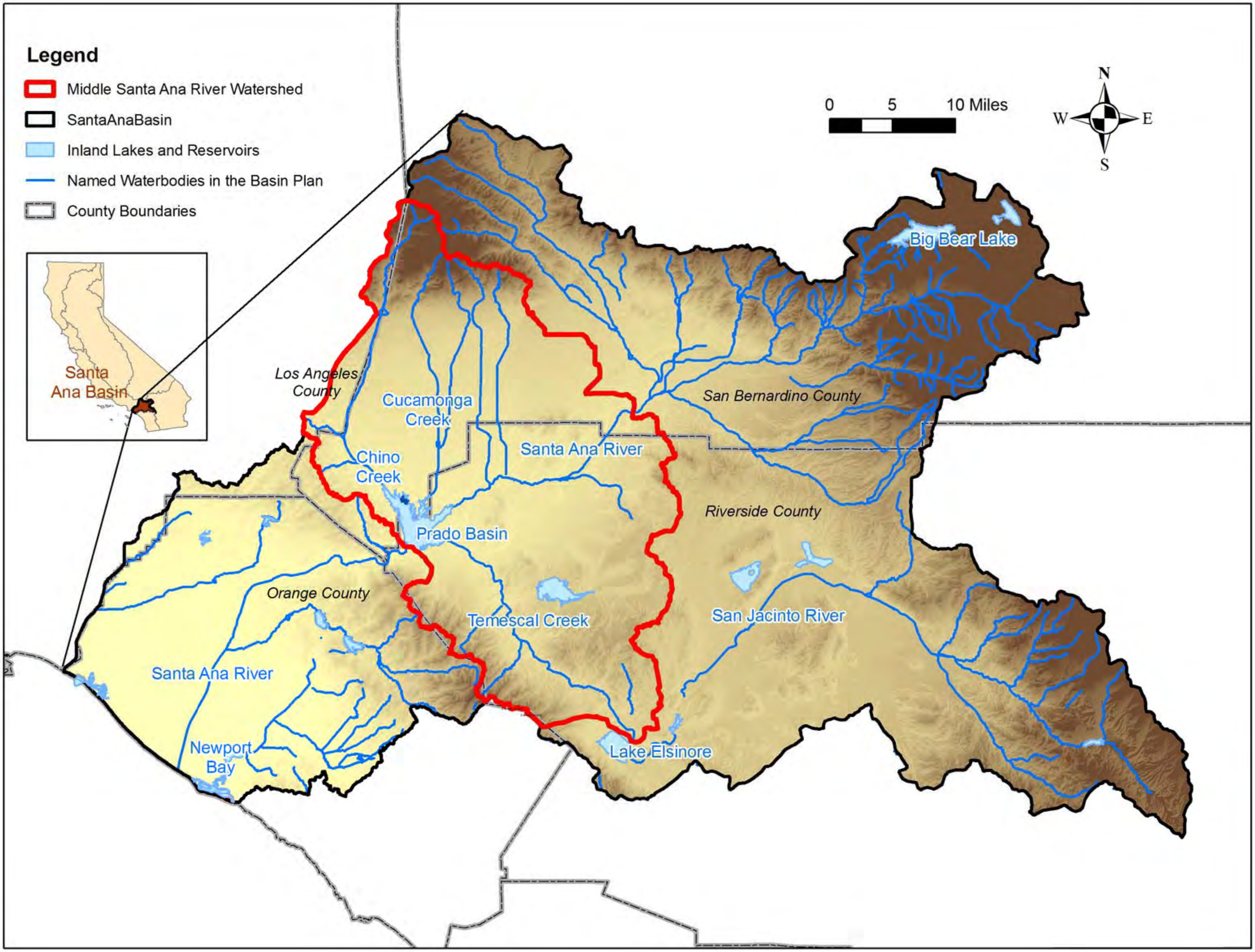


Figure B-1. Santa Ana River Watershed

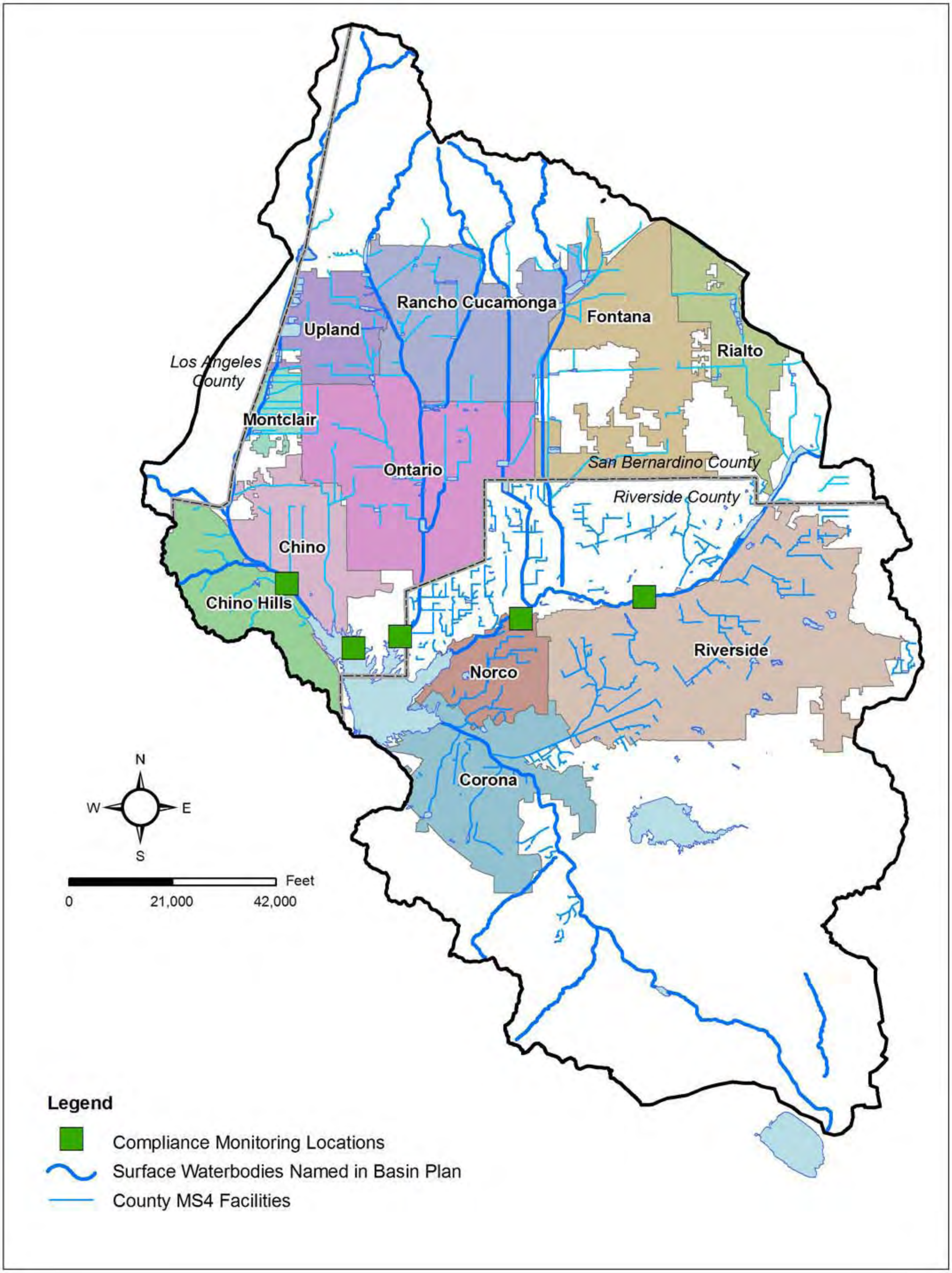


Figure B-2. Jurisdictional Areas

Based on 2000 census data, the population of the MSAR watershed is approximately 1.4 million people. Much of the lowland areas are highly developed; however, a portion of the watershed remains largely agricultural - the area formerly known as the Chino Dairy Preserve. This area is located in the south central part of the Chino Creek Basin subwatershed. At the time of TMDL development the area contained approximately 300,000 cows (RWQCB 2005). As of January 2009, this number was down to about 138,500 (email communication, Ed Kashak, RWQCB, to Pat Boldt, representative of agricultural interests and MSAR Task Force member, December 8, 2009). In recent years, the cities of Ontario, Chino, and Chino Hills annexed the unincorporated portions of this area in San Bernardino County. The remaining portion of the former preserve, which is in Riverside County, was recently incorporated in the City of Eastvale (http://www.rcip.org/pdf_files/maps_09_24_03/lowres/Fig3_4Eastvale.pdf).

Major Subwatersheds

The MSAR watershed is divided into several major subwatersheds to provide a basis for evaluating compliance with TMDL urban wasteload allocations. These subwatersheds drain to the following watershed-wide compliance points as established in the watershed-wide monitoring program (see Section 2.4) (Figure B-3; see Table A-1):

- Chino Creek at Central Avenue (WW-C7) – No portion of this subwatershed is in Riverside County.
- Mill-Cucamonga Creek at Chino-Corona Road (WW-M5) – With the exception of a small area in Riverside County, drainage area is mostly in San Bernardino County.
- Santa Ana River at MWD Crossing (WW-S1) – Areas of both Riverside and San Bernardino Counties drain to this site.
- Santa Ana River at Pedley Avenue (WW-S4) - Areas of both Riverside and San Bernardino Counties drain to this site.
- Prado Park Lake (WW-C3) – Entire drainage area to this location is in San Bernardino County.

Another important subwatershed in the MSAR watershed is Temescal Creek. Temescal Creek is tributary to Reach 3 of the Santa Ana River. The RWQCB has not listed Temescal Creek as impaired by bacterial indicators and, therefore, no watershed-wide compliance monitoring location has been established on this waterbody. The confluence of Temescal Creek and the Santa Ana River Reach 3 occurs in Prado Basin, well downstream of the watershed-wide bacterial indicator TMDL compliance monitoring site at Santa Ana River at Pedley Avenue.

The Temescal subwatershed is very large and significant portions of the upper part of the drainage area are hydrologically disconnected from downstream areas (see also Attachment B.2), including the portion upstream of Lake Elsinore, where the Lake

Elsinore Spillway retains DWFs, and the Lake Mathews watershed. Lake Matthews, which is a water supply reservoir owned by Metropolitan Water District (MWD), has no allowable recreational use and there are no discharges of dry or wet weather flow from this reservoir.

Jurisdictions

Table B-1 summarizes the jurisdictional area of each MS4-permitted city and unincorporated county area that drains to each of the MSAR watershed-wide compliance monitoring locations. Although this CBRP only applies to areas within San Bernardino County, the jurisdictional areas outside of San Bernardino County are included in Table B-1 to illustrate the relative importance of San Bernardino and Riverside County MS4 programs to the watershed-wide compliance locations.

Land Use

Land use distribution has the potential to affect flow volume and bacterial indicator concentrations under dry weather conditions. Table B-1 provides the land use distribution for each jurisdiction in each of the areas draining to the watershed-wide compliance monitoring locations.

Land use in the MSAR watershed includes a variety of categories as defined by the Southern California Association of Governments (SCAG 2005). Related categories were lumped together to reflect major types of land uses, e.g., agricultural or industrial related land uses. Figure B-4 illustrates the resulting spatial land use pattern, at least as most recently available in the 2005 SCAG dataset. Residential land uses make up the greatest fraction of urbanized drainage area in the MSAR watershed (~50 percent). In some areas there is more agricultural land use than urban. Accordingly, compliance activities targeted at agricultural lands might provide the most significant water quality benefits. These compliance activities are not the responsibility of the MS4 program; they are the responsibility of the agricultural dischargers named in the TMDL.

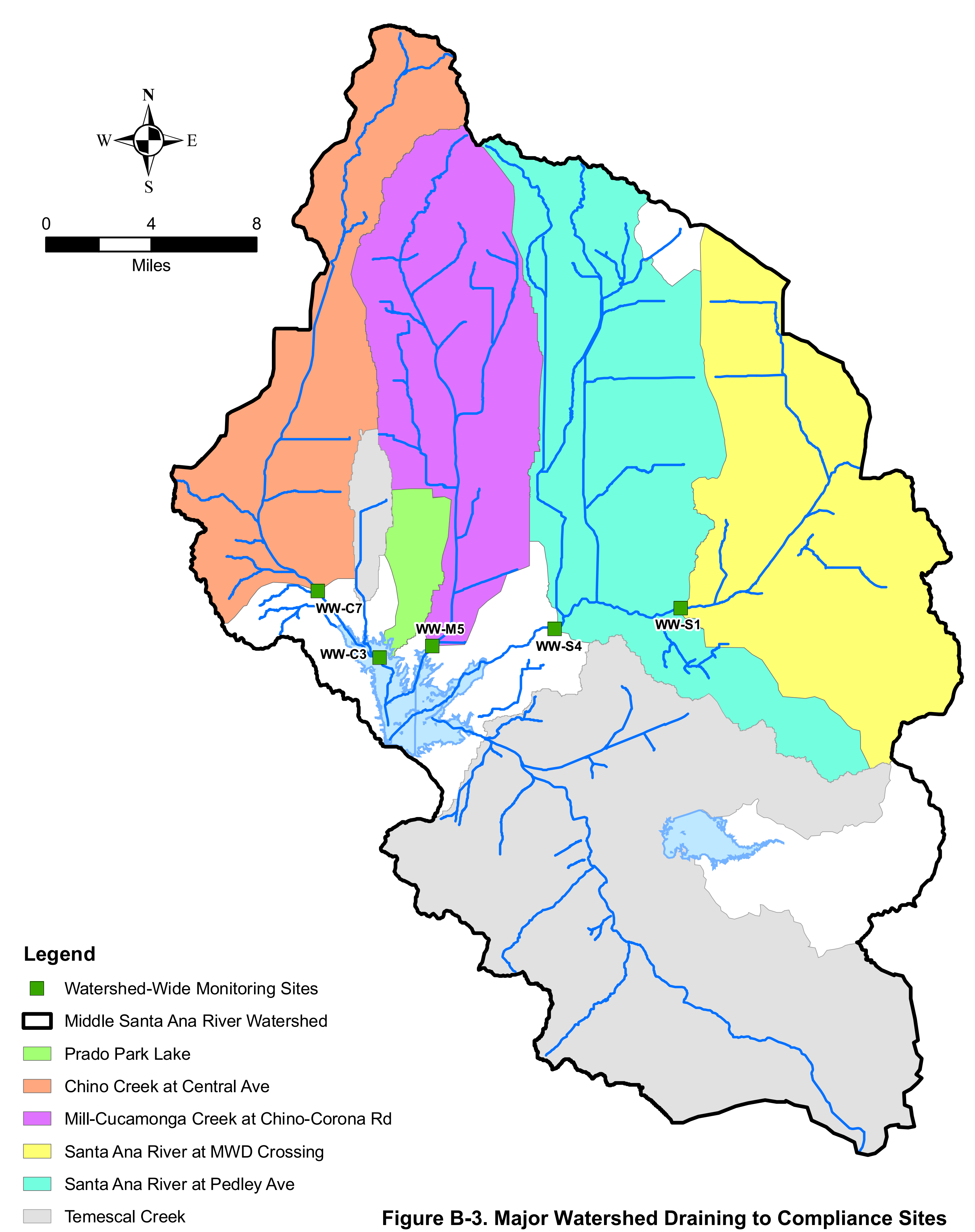


Figure B-3. Major Watershed Draining to Compliance Sites

Table B-1. Jurisdictional area and percent land use in each of the major MSAR subwatersheds (areas outside of San Bernardino County included to show land use percentages of all areas draining to watershed-wide compliance sites).

Jurisdictions within MSAR Subwatersheds	Drainage Area (acres)	Agricultural	Commercial Institutional	Industrial	Infrastructure	Mixed Urban	Natural Vacant	Open Space Recreation	Residential	Water Wetlands
Chino Creek at Central Avenue (WW-C7)	**54,607**									
Chino	7,659	10%	15%	25%	5%	1%	4%	2%	38%	0%
Chino Hills	6,125	6%	7%	0%	3%	0%	42%	2%	40%	0%
Montclair	3,537	1%	24%	12%	5%	1%	4%	2%	51%	0%
Ontario	2,721	3%	16%	6%	0%	1%	3%	4%	67%	0%
Upland	5,161	0%	13%	17%	7%	0%	11%	1%	51%	0%
Unincorporated San Bernardino	13,714	2%	1%	1%	1%	0%	81%	1%	13%	0%
Claremont	3,011	0%	21%	2%	6%	0%	30%	8%	32%	1%
Pomona	6,707	0%	15%	10%	6%	0%	9%	3%	57%	0%
Unincorporated Los Angeles	5,972	0%	0%	0%	0%	0%	99%	0%	1%	0%
Mill-Cucamonga Creek at Chino-Corona Road (WW-M5)	**55,456**									
Chino	618	65%	0%	0%	2%	2%	26%	0%	5%	0%
Ontario	18,006	20%	7%	19%	16%	1%	13%	2%	22%	0%
Rancho Cucamonga	5,256	1%	10%	8%	6%	1%	11%	3%	60%	0%
Upland	4,871	2%	10%	5%	7%	5%	4%	4%	62%	1%
Unincorporated San Bernardino	13,860	0%	0%	0%	4%	0%	91%	0%	5%	0%
Eastvale	2,815	32%	1%	10%	3%	5%	28%	1%	20%	0%
Unincorporated Riverside	30	1%	0%	20%	59%	0%	19%	0%	1%	0%
Prado Park Lake (WW-C3)	**6,878**									
Chino	2,255	45%	4%	1%	14%	10%	18%	5%	1%	2%
Ontario	4,623	66%	2%	0%	3%	0%	6%	2%	21%	0%
Santa Ana River at MWD Crossing (WW-S1)	**65,017**									
Fontana	4,486	1%	9%	1%	2%	0%	33%	1%	53%	0%

Table B-1. Jurisdictional area and percent land use in each of the major MSAR subwatersheds (areas outside of San Bernardino County included to show land use percentages of all areas draining to watershed-wide compliance sites).

Jurisdictions within MSAR Subwatersheds	Drainage Area (acres)	Agricultural	Commercial Institutional	Industrial	Infrastructure	Mixed Urban	Natural Vacant	Open Space Recreation	Residential	Water Wetlands
Rialto	11,490	0%	7%	13%	13%	4%	21%	1%	41%	0%
Riverside	26,442	3%	11%	7%	5%	2%	25%	4%	43%	0%
Unincorporated San Bernardino	5,867	4%	6%	12%	9%	1%	18%	3%	47%	0%
Jurupa Valley	8,772	7%	5%	10%	5%	0%	34%	11%	28%	0%
Unincorporated Riverside	7,155	7%	12%	1%	5%	3%	40%	22%	10%	0%
San Bernardino	804	1%	11%	2%	7%	1%	10%	2%	66%	0%
Santa Ana River at Pedley Avenue (WW-S4)	**89,253**									
Fontana	21,620	3%	9%	11%	8%	3%	25%	4%	37%	0%
Norco	141	4%	0%	0%	1%	0%	35%	7%	53%	0%
Ontario	3,819	0%	11%	59%	18%	0%	12%	0%	0%	0%
Rancho Cucamonga	10,457	1%	8%	13%	17%	6%	23%	1%	31%	0%
Riverside	12,990	14%	12%	4%	3%	1%	23%	2%	41%	0%
Unincorporated San Bernardino	19,047	0%	4%	12%	7%	1%	67%	0%	9%	0%
Eastvale	317	43%	1%	18%	29%	5%	3%	0%	1%	0%
Jurupa Valley	17,952	5%	5%	11%	4%	1%	25%	10%	39%	0%
Unincorporated Riverside	2,909	6%	2%	6%	10%	1%	23%	0%	52%	0%
Temescal Creek	**118,583**									
Corona	18,879	5%	9%	8%	7%	4%	22%	3%	42%	0%
Norco	2,372	4%	9%	4%	1%	1%	37%	4%	40%	0%
Riverside	11,998	15%	11%	2%	2%	2%	23%	1%	44%	0%
Unincorporated Riverside	85,333	4%	1%	2%	0%	2%	78%	1%	12%	0%
Lake Mathews	**24,671**									
Riverside	6	0%	49%	0%	0%	0%	0%	0%	51%	0%
Unincorporated Riverside	24,664	6%	3%	0%	0%	2%	54%	2%	22%	11%
Other Drainages to Prado Basin	**39,842**									
Chino	8,440	47%	3%	4%	5%	1%	19%	6%	14%	1%
Chino Hills	7,626	0%	2%	1%	4%	3%	56%	5%	29%	0%

Table B-1. Jurisdictional area and percent land use in each of the major MSAR subwatersheds (areas outside of San Bernardino County included to show land use percentages of all areas draining to watershed-wide compliance sites).

Jurisdictions within MSAR Subwatersheds	Drainage Area (acres)	Agricultural	Commercial Institutional	Industrial	Infrastructure	Mixed Urban	Natural Vacant	Open Space Recreation	Residential	Water Wetlands
Corona	3,483	0%	7%	23%	8%	0%	30%	4%	28%	0%
Norco	6,328	4%	13%	1%	3%	2%	21%	1%	54%	1%
Ontario	2,778	20%	12%	2%	5%	0%	3%	1%	57%	0%
Rialto	4	0%	0%	0%	11%	0%	63%	0%	26%	0%
Riverside	139	0%	0%	0%	1%	0%	98%	0%	1%	0%
Unincorporated San Bernardino	127	11%	0%	0%	2%	0%	59%	23%	0%	5%
Unincorporated Los Angeles	0	0%	0%	0%	0%	0%	100%	0%	0%	0%
Eastvale	6,279	26%	1%	0%	4%	16%	19%	9%	25%	0%
Jurupa Valley	382	13%	0%	0%	0%	0%	26%	11%	50%	0%
Unincorporated Riverside	4,256	1%	1%	2%	13%	0%	46%	27%	6%	4%

B.2 Dry Weather Hydrology

Regular flows exist in many MSAR waterbodies during dry weather conditions. Sources of flow during dry weather include:

- Effluent from POTWs
- Turnouts of imported water by the MWD
- Groundwater inputs
- Well blow-offs
- Water transfers
- Other authorized discharges (as defined by WDRs issued by the RWQCB)
- Non-permitted discharges including Phase II MS4 discharges.

Each of these sources of DWF has a different pathway and potential to transport bacterial indicators to receiving waterbodies. Thus, it is important to understand the relative role of each of these categories of DWF.

Within the MSAR watershed, many MS4 drainage areas do not typically cause or contribute to flow at the compliance monitoring sites. DWF from these drainage areas is hydrologically disconnected from the TMDL receiving waterbodies, by either purposefully recharging groundwater in constructed regional retention facilities or through losses in earthen channel bottoms, where the recharge capacity of underlying soils exceeds dry weather runoff generated in upstream drainage areas (Figure B-5).

Flow data was not available downstream of some portions of MS4 drainage areas; therefore it was necessary to approximate DWF from these areas to complete a water balance for each TMDL compliance monitoring site. Within the Chino Basin portion of the MSAR watershed, the Inland Empire Utilities Agency (IEUA) measures flow at a number of locations to quantify groundwater recharge for water supply benefit. Flow measurements, on days when DWF is predominantly from urban sources, suggest that DWF from urban sources occur at a rate of 100 gal/acre/day in the MSAR watershed, ranging from 20 to 280 gal/acre/day (Table B-2). This is consistent with DWF generation rates developed to support the City of Los Angeles Integrated Resources Plan (2004), which estimated DWF rates from urban watersheds ranging from zero to 300 gallons/acre/day. Thus, it was reasonable to use a rate of 100 gal/acre/day to approximate urban sources of DWF from unmonitored MS4 outfalls that may be hydrologically connected to a TMDL waterbody.

The USEP flow measurements indicated that some tributaries have significantly greater DWF rates per acre of urbanized drainage area than would be expected solely from urban sources. In these cases, the presence of a non-urban source was determined to be responsible for the elevated DWF rates. At a few locations, field measured runoff equated to less than 100 gal/acre/day; therefore it was assumed that non-urban sources in these subwatersheds are negligible.

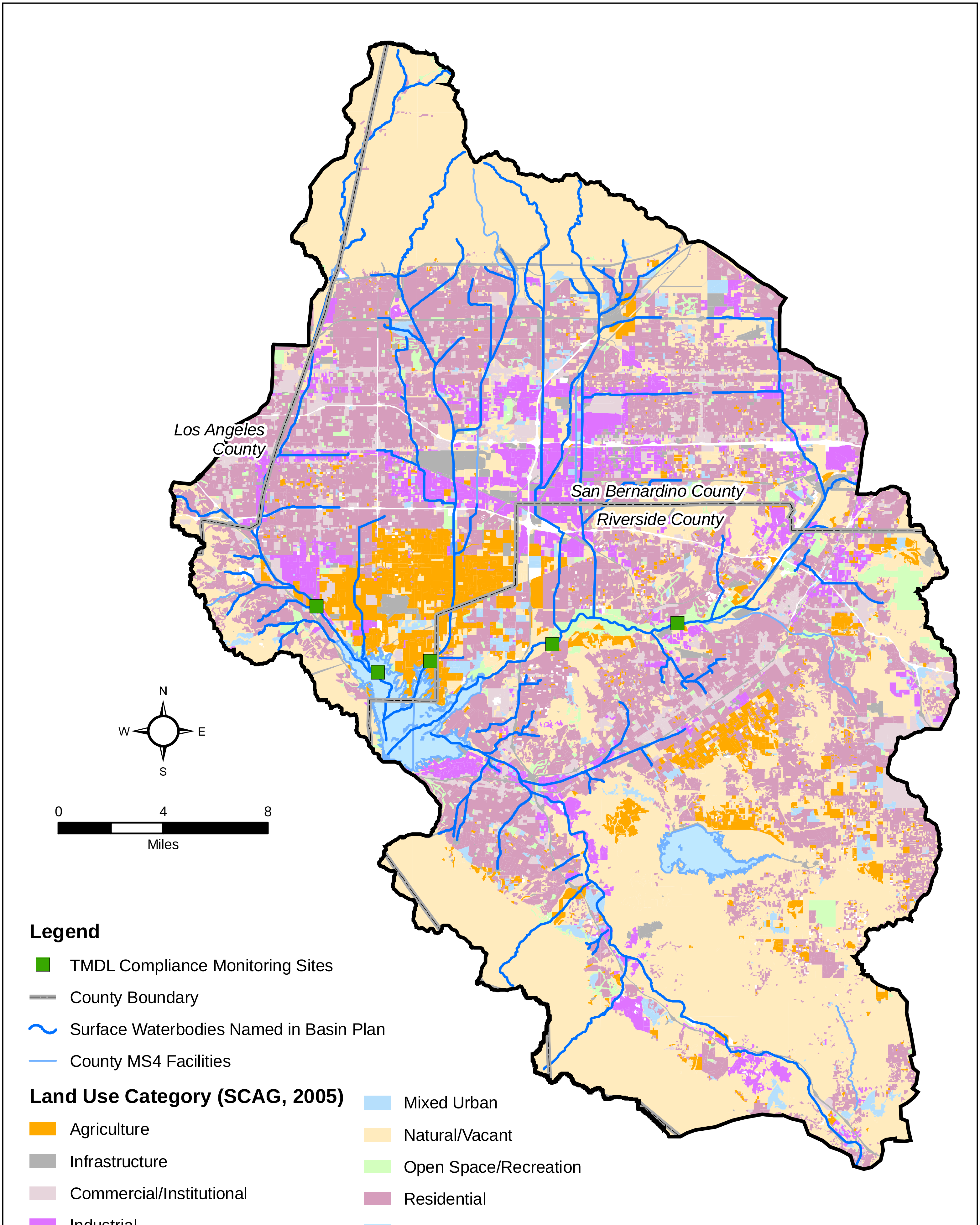


Figure B-4. Land Uses

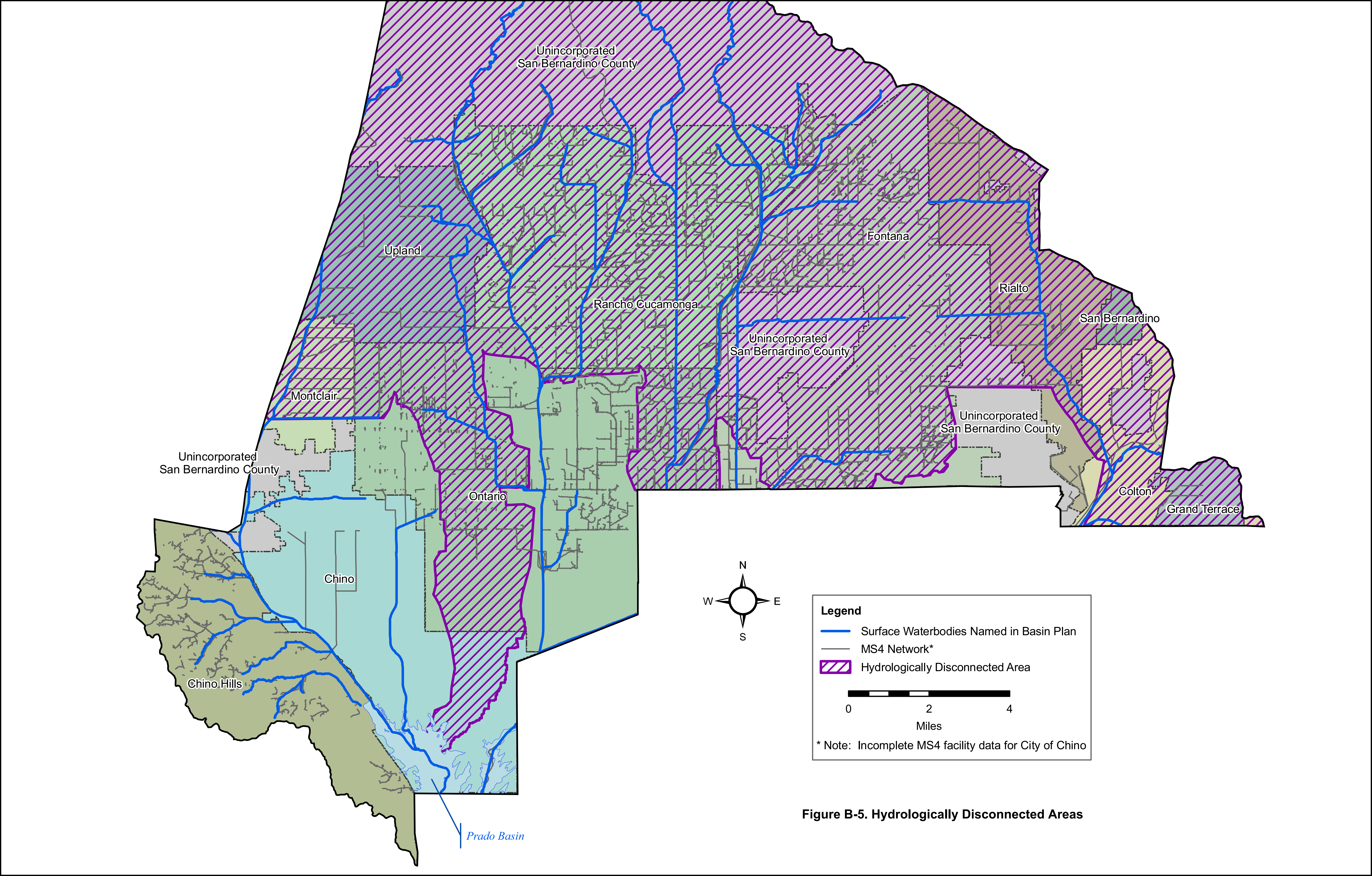


Figure B-5. Hydrologically Disconnected Areas

Table B-2. Urban dry weather flow in MSAR watershed upstream of IEUA flow measurement locations

Location	Average Dry Weather Flow (cfs)	Urban Runoff Rate (gal/ac/day)
Grove Basin	0.04	111
West State Street Storm Drain	0.05	19
8th St. Storm Drain into 8th St.	0.17	82
West Cucamonga Inlet @ 8th St. B	0.41	92
Turner 1 Inlet from Cucamonga Cr	0.49	36
Deer Creek Drop Inlet @ Turner 4	1.58	110
Deer Creek @ 4th St. Overpass	1.06	105
Turner 4 - Guasti Creek	0.19	219
Lower Day Basin Forebay Storm Dr	0.02	63
San Sevaine Basin 5 Storm Drain	0.19	81
Victoria Basin Inlet	0.05	49
RP3 Basin Distribution Channel Inlet	0.32	53
Declez Channel at Live Oak	0.27	282
Declez Channel by School	0.16	98
	Average of all Sites	100

Mill-Cucamonga Creek

DWF in Mill-Cucamonga Creek consists of primarily effluent from the IEUA RP1 WRRF. Effluent from IEUA RP1 WRRF to Cucamonga Creek contributes ~27 cfs, ranging from 16 to 42 cfs (Table B-3). A berm in the center of Cucamonga Creek keeps effluent separated from DWFs from MS4 outfalls, from the discharge location for about 1 mile to Chino Avenue.

MS4 drainage areas to Mill-Cucamonga Creek are predominantly within San Bernardino County. A small portion of MS4 drainage area in the City of Eastvale may generate urban DWF that has the potential to reach Mill- Cucamonga Creek.

Table B-3. Average daily effluent from POTWs in the MSAR watershed

Treatment Facility	Receiving Waterbody	Dry Season (cfs)
Riverside Water Quality Control Plant	Santa Ana River Reach 3	49
Colton/San Bernardino RIX	Santa Ana River Reach 4	59
Rialto WWTP	Santa Ana River Reach 4	10
IEUA RP1 WRRF Outfall 1	Cucamonga Creek	27
IEUA RP1 WRRF Outfall 2	Prado Park Lake	8
IEUA Carbon Canyon WRRF (CCWRF)	Chino Creek	9
Yucaipa Valley Water District	Santa Ana River Reach 4	6
Lee Lake WWTP	Temescal Creek	0.9
Corona WWTP No.1 and No.3	Temescal Creek	5
Western Municipal Water District (WMWD) West Riverside WWTP	Santa Ana River Reach 3	7
	Totals	**181**

Santa Ana River at MWD Crossing

Continuous DWF occurs in the Santa Ana River at the MWD Crossing. The primary source of this DWF is a combination of treated effluent from the Rialto WWTP and San Bernardino/Colton RIX facility. Combined, these sources of effluent discharge approximately 70 cfs to Reach 4 of the Santa Ana River, upstream of Riverside Avenue (B-3). There is typically no DWF in the Santa Ana River upstream of these plants. Additional sources of DWF, listed below, occur between these effluent discharges and the MWD Crossing compliance location.

In addition to the POTWs, DWF has been observed in outfalls from MS4 facilities along both sides of the Santa Ana River (USEP 2007-2008):

- The Highgrove Channel and Agua Mansa Channel outfall to the Santa Ana River upstream of University Wash. In a 2002 field survey, the Highgrove Channel was dry and the Agua Mansa Channel contained a small amount of DWF that could not be measured (Clark and Clem 2002). Assessments of DWF in the upcoming years would be needed to ensure these conditions still exist and are typical of dry weather conditions in the MSAR.

- The University Wash Storm Drain captures runoff from MS4 drainage areas in downtown Riverside. DWFs are retained either in Lake Evans in Fairmont Park or in the large open space downstream of the lake. These areas prevent DWFs from reaching the outfall to the Santa Ana River, as shown in Figure B-5 (personal communication with Steve Clark, May 10, 2010).

- Box Springs Channel drains an urbanized subwatershed in the City of Riverside. DWF measured in this channel is approximately 3 cfs (average of USEP field measurements in 2007-2008) and may consist of either or both, nuisance flow from urban drainages in the City of Riverside and de minimus water from Riverside Public Utilities (RPU).

- Sunnyslope Channel drains a low-density residential subwatershed in an unincorporated area of Riverside County. The headwaters of this channel are natural canyons within the Jurupa Hills. Measurements of 2-5 cfs from the ~5,000 acre subwatershed suggest that DWF is influenced by rising groundwater. This conclusion is supported by the observation of flow from weep holes along the concrete channel wall. This DWF rate is comparable to a measurement of 3.1 cfs in a field survey by RCFC&WCD in 2002 (Clark and Clem 2002).

Santa Ana River at Pedley Avenue

The TMDL compliance monitoring site at Pedley Avenue (WW-S4) is approximately 5 miles downstream of the MWD Crossing TMDL compliance monitoring site. Between these TMDL compliance monitoring sites, the Riverside Water Quality Control Plant (RWQCP) discharges ~50 cfs of treated effluent to the Santa Ana River (Table B-3). MS4 outfalls in this reach may be sources of DWF to the Santa Ana River. The most notable drainages with consistent DWF include:

- Anza Drain contributes nuisance runoff from urban drainages in the south side of the City of Riverside. Flow measurements conducted in the 2007 dry season for the USEP showed median DWFs of 6 cfs; however, measurements taken in the 2011 dry season, following a wet hydrologic year, showed a median DWF of 2.6 cfs. The field data collected in 2011 involved a better cross section for flow gauging and more readings for more precise measurement. The 2011 DWF measurements are more comparable to measurements taken during a single day field survey in 2002 by RCFC&WCD, which suggest that DWF flow is less than 1.5 cfs (Clark and Clem 2002). DWF in Anza Drain is influenced by rising groundwater that is caused by current operation of the Arlington desalter. RCFC&WCD is currently working with WMWD to develop an approach that would improve groundwater yield and eliminate losses to surface water.

- San Sevaine Channel DWF at the confluence with the Santa Ana River was highly variable during USEP sampling. In addition to nuisance flows (~1 cfs), there was a de minimus discharge of treated groundwater of approximately 7cfs from a pilot test by the Jurupa Community Services District during the 2007 dry season. In addition to urban DWF, there are intermittent turnouts from MWD's transmission system to San Sevaine Channel at CB-13 and CB-18 for recharge in the San Sevaine and Jurupa Basins, respectively. These flows remain within San Bernardino County and do not reach the Santa Ana River.

- Urban DWF from the Magnolia Center storm drain does not typically reach the Santa Ana River (Clark and Clem 2002; personal communication with Steve Clark, May 10, 2010).

- Urban DWF from San Bernardino County jurisdictions in the Day Creek watershed are retained within the Riverside Basin. Therefore, all urban DWF reaching the Santa Ana River from the Day Creek subwatershed comes from Riverside County jurisdictions. USEP monitoring program flow measurements in Day Creek at Lucretia Avenue, just upstream of the River Trails Park golf course ranged widely from 0.05 cfs to 7 cfs. A field survey in 2002 by RCFC&WCD estimated DWF at this location to be ~0.2 cfs (Clark and Clem 2002). Additional flow monitoring is warranted at this site to adequately characterize this variability. In addition to urban DWF, there are intermittent turnouts from MWD’s transmission system to Day Creek at CB-15 for recharge in the Riverside Basin. These flows remain within San Bernardino County and do not reach the Santa Ana River.

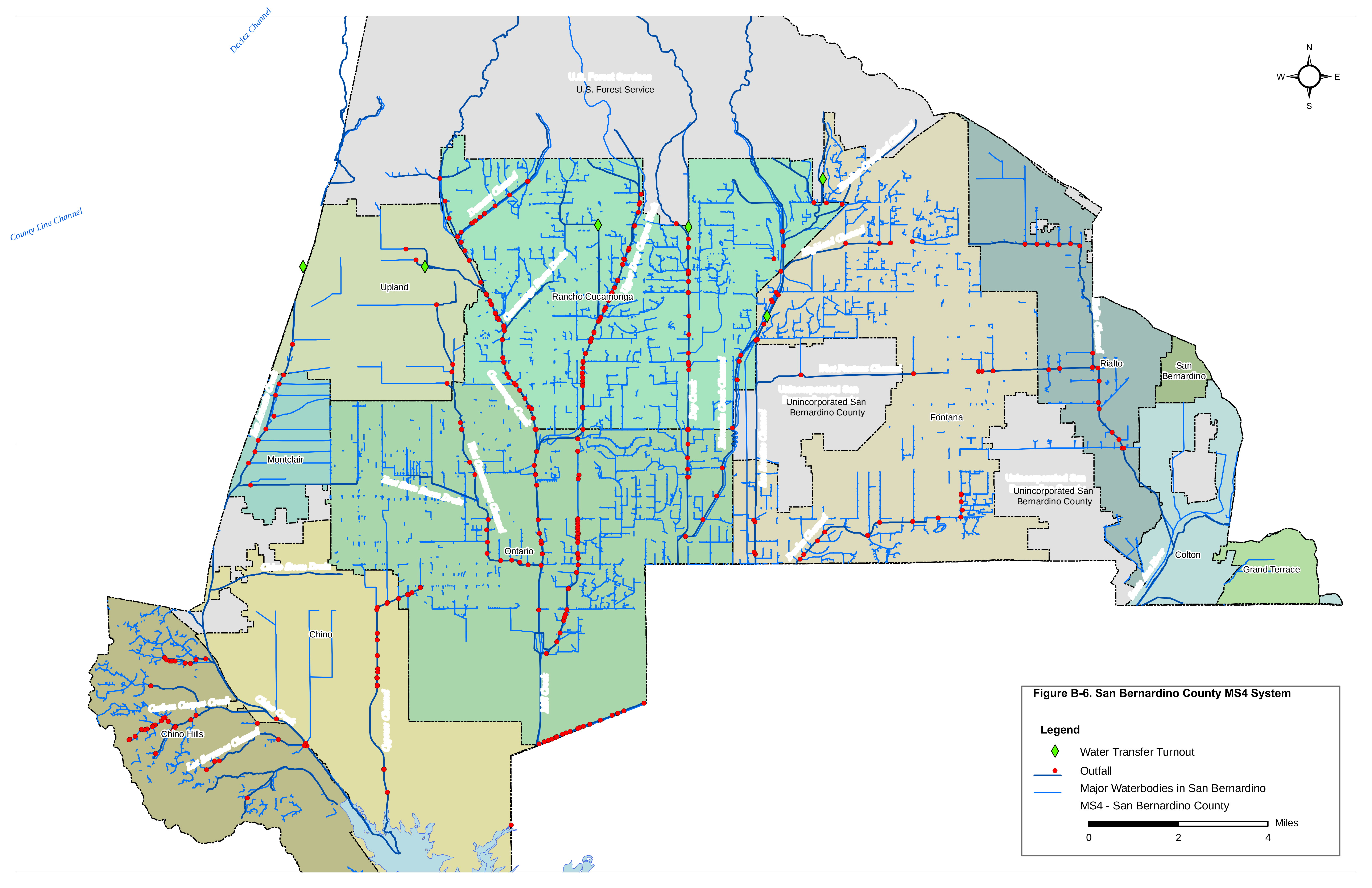
B.3 MS4 Facilities

This section describes the MS4 facilities within the major subwatershed areas draining to each of the watershed-wide compliance locations. Based on available MS4 facility data, Figure B-6 illustrates the MS4 facilities including major outfalls to waterbodies for permittees in San Bernardino County. This figure illustrates the significant number of major outfalls that drain to each of the watershed-wide compliance monitoring locations.

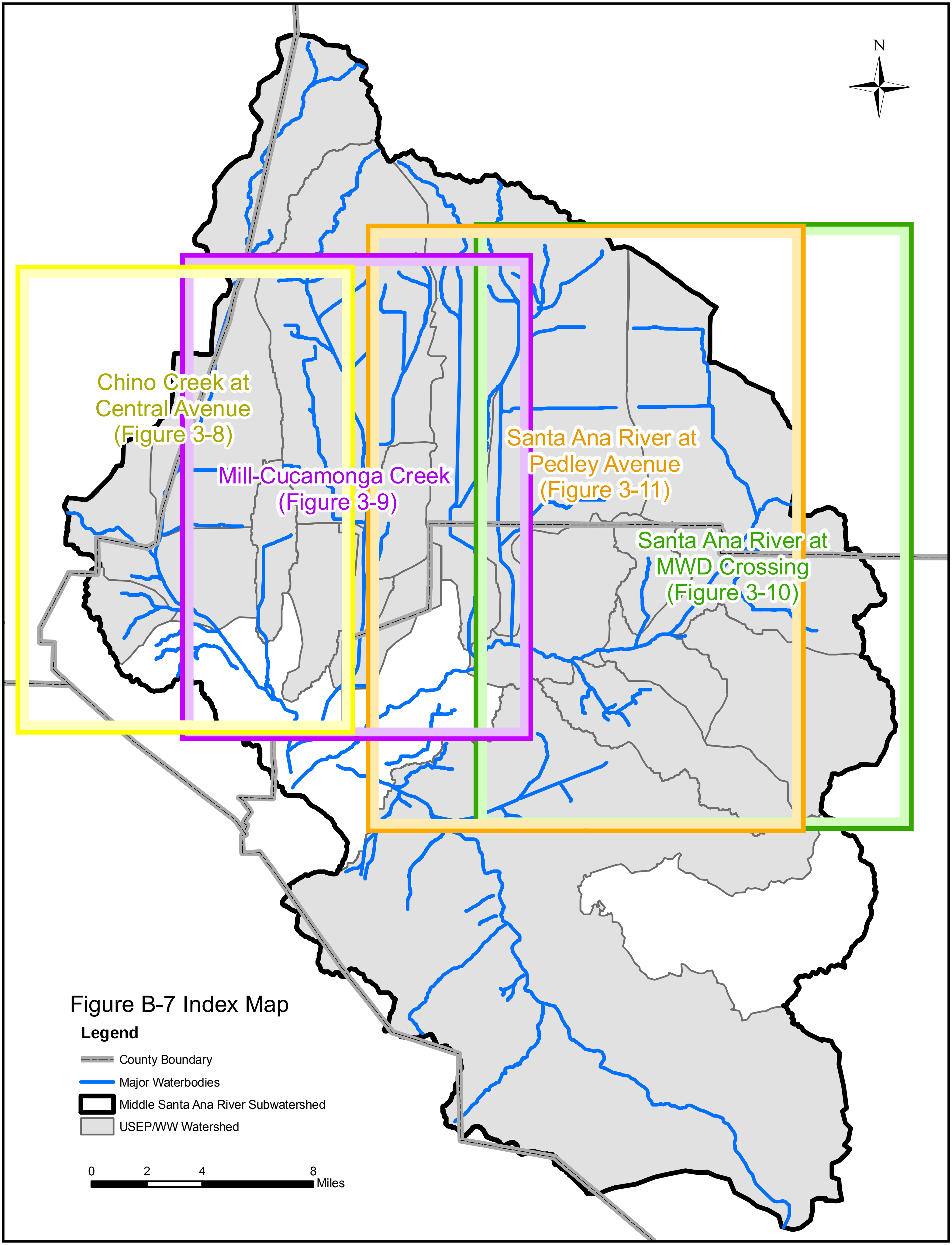
Figure B-7 provides an Index Map for subsequent detailed figures that depict key characteristics associated with the MS4 facilities located within each of the major MSAR subwatersheds. These figures include:

- Temescal Creek subwatershed (Figure B-8)
- Mill-Cucamonga Creek at Chino Corona Road (Figure B-9)
- Santa Ana River at MWD Crossing (Figure B-10)
- Santa Ana River at Pedley Avenue (Figure B-11)

The following sections provide more detailed descriptions of the primary MS4 characteristics and subwatershed features in each drainage area. The information on the physical characteristics of key waterbodies is provided as background to support the discussion regarding UAA opportunities in Attachment C.5



Declez Channel
County Line Channel
U.S. Forest Service
Upland
Rancho Cucamonga
Montclair
Ontario
Chino
Chino Hills
Unincorporated San Bernardino County
Fontana
Rialto
San Bernardino
Colton
Grand Terrace
N
S
E
W
Figure B-6. San Bernardino County MS4 System
Legend
Water Transfer Turnout
Outfall
Major Waterbodies in San Bernardino
MS4 - San Bernardino County
Miles
0
2
4


N
Chino Creek at
Central Avenue
(Figure 3-8)
Mill-Cucamonga Creek
(Figure 3-9)
Santa Ana River at
Pedley Avenue
(Figure 3-11)
Santa Ana River at
MWD Crossing
(Figure 3-10)
Figure B-7 Index Map
Legend
County Boundary
Major Waterbodies
Middle Santa Ana River Subwatershed
USEP/WW Watershed
0
2
4
8
Miles

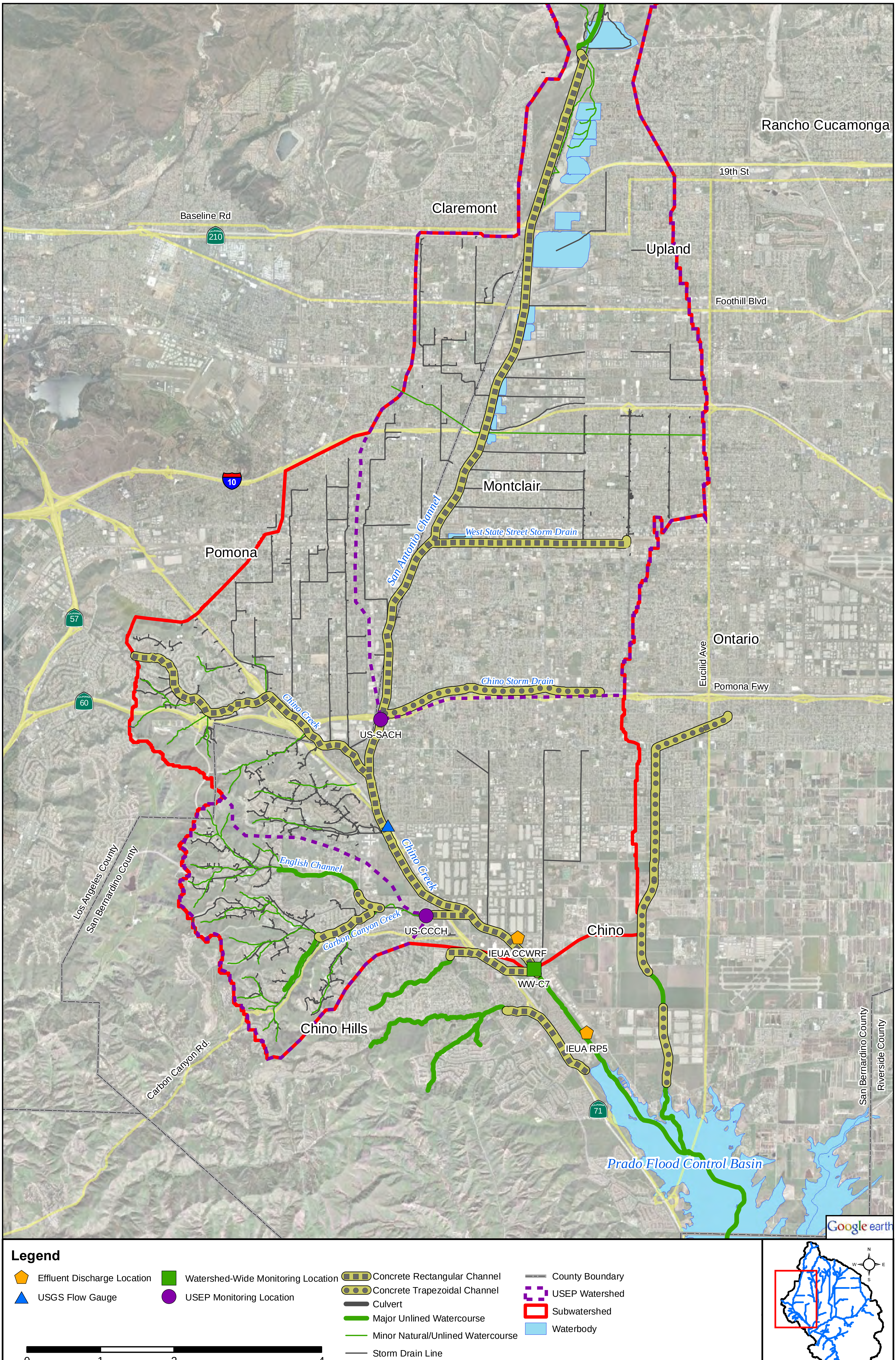


Figure B-8. Chino Creek at Central Avenue

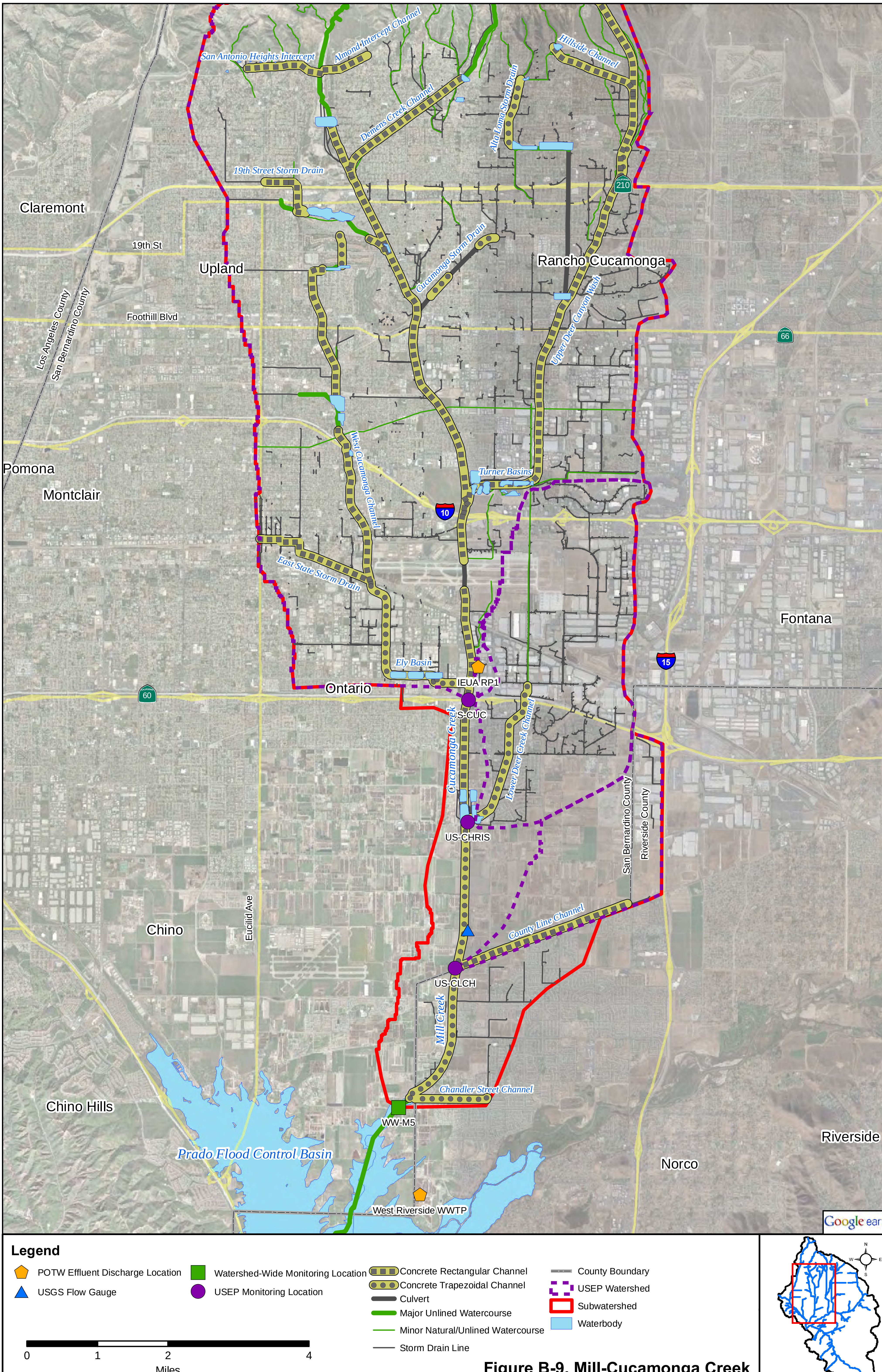


Figure B-9. Mill-Cucamonga Creek

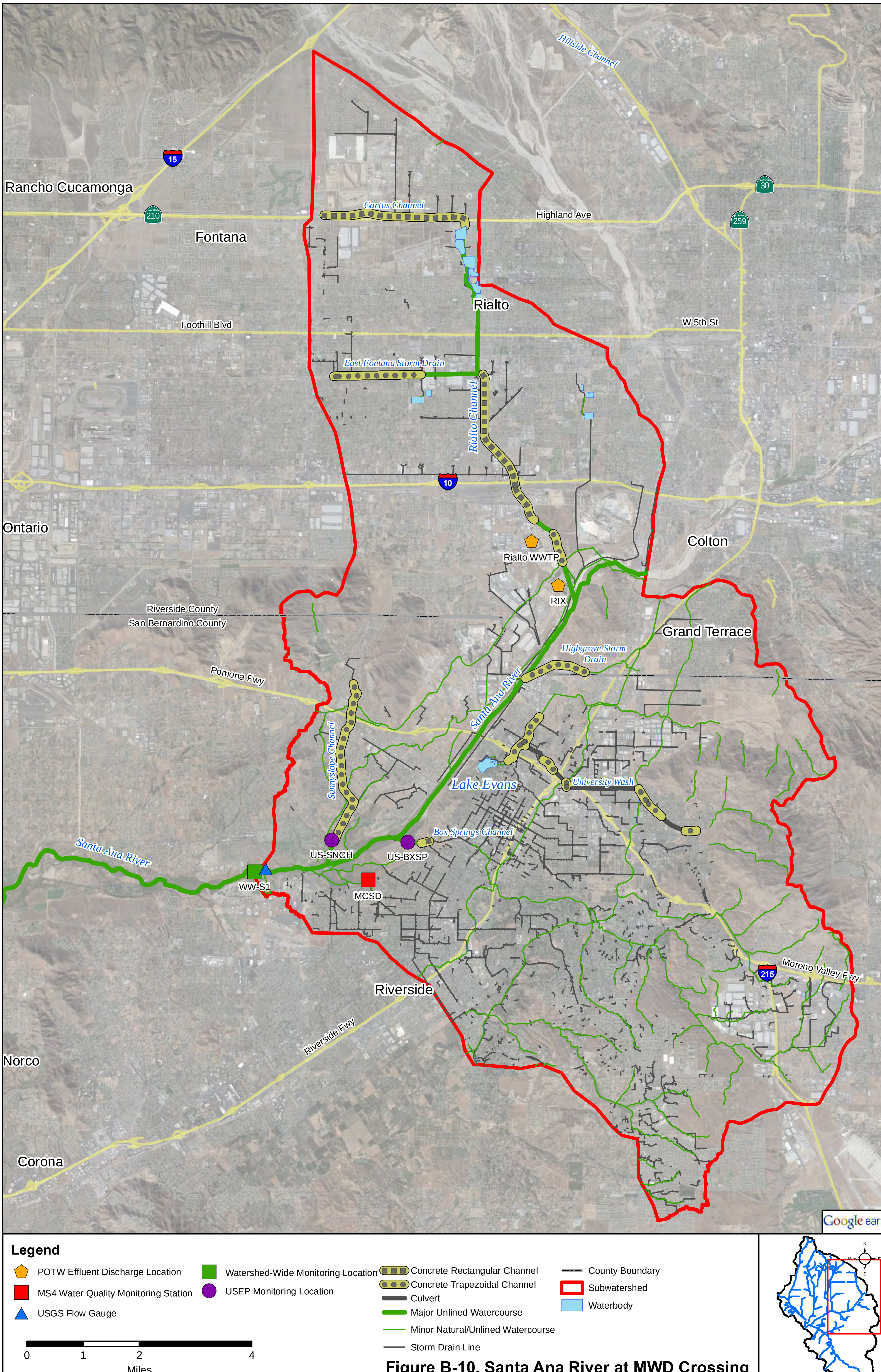


Figure B-10. Santa Ana River at MWD Crossing

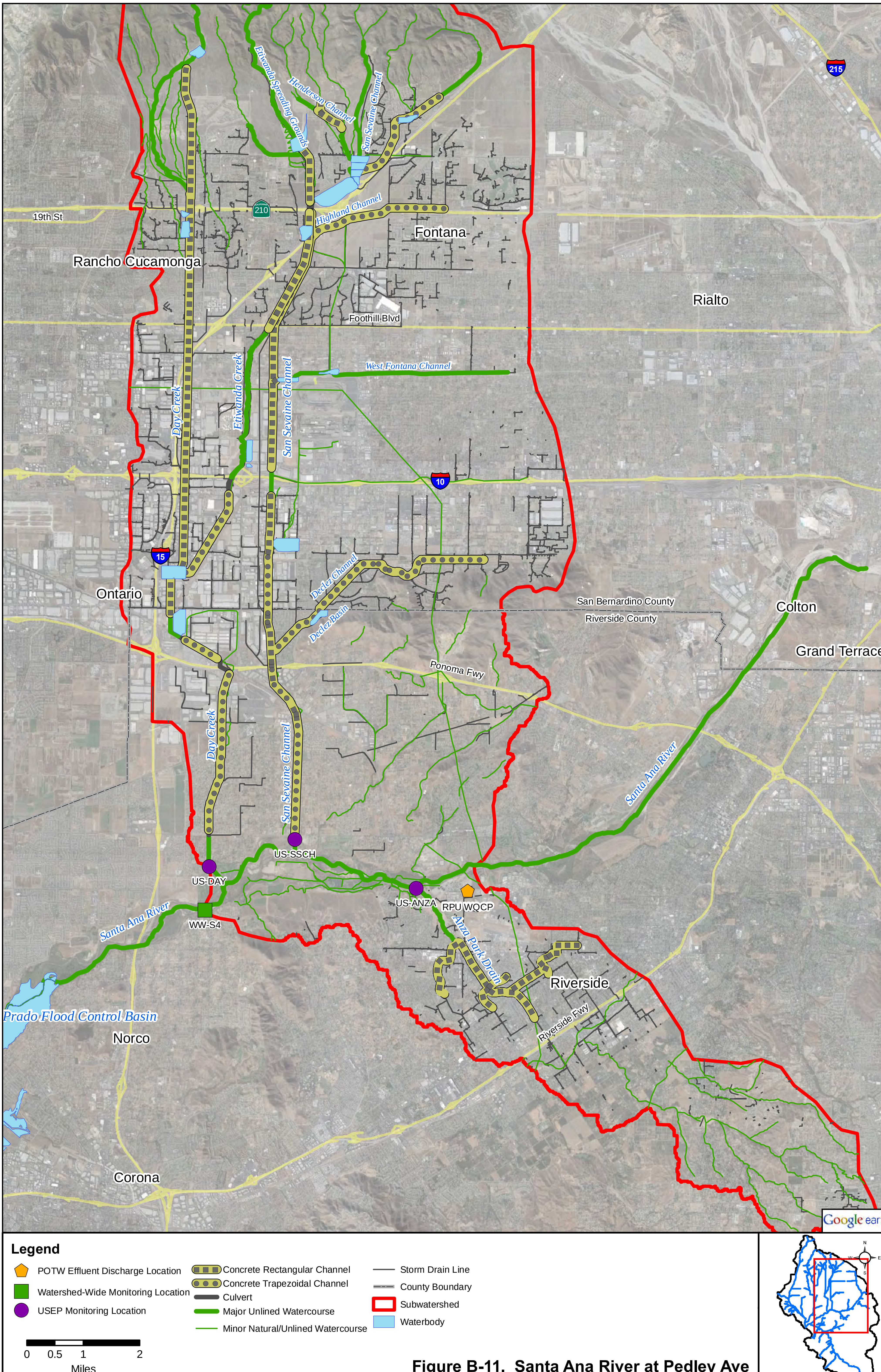


Figure B-11. Santa Ana River at Pedley Ave

Temescal Creek Subwatershed

Temescal Creek extends from the Lake Elsinore outlet channel to Prado Basin. The subwatershed drains approximately 207 sq. mi. Although Lake Elsinore does drain to Temescal Creek, discharges would only be expected to occur during extreme hydrologic cycles. Downstream of Lake Elsinore, Temescal Creek can be subdivided into three segments based on channel characteristics. Table B-4 describes the key waterbodies in the Temescal Creek subwatershed and describes the channel characteristics (Figure B-8).

Under normal hydrologic conditions Temescal Creek contains intermittent flows from water transfers and POTW discharges occur during the dry season. Typically, only reaches 1 and 2 of Temescal Creek are hydrologically connected to Prado Basin, with flow initiating from the small reservoir just south of Magnolia Avenue.

Table B-4. Channel characteristics of Temescal Creek and key tributaries

Reach	Segments	Description
Temescal Creek	Lake Elsinore Spillway to point upstream of Magnolia Ave.	~19 mi reach with natural characteristics; 14 outfalls identified as potential DWF sources
	Magnolia Ave. to downstream of Cota Street	~3 mi reach with trapezoidal and vertical concrete-lined banks
	Downstream of Cota Street	2.9 mi reach with natural characteristics
Arlington Channel	Headwaters to culvert section	Trapezoidal concrete-lined reach (~0.75 mi) transitions to culvert (~0.25 mi) reach
	Rectangular-lined segment west of La Sierra Ave to Temescal Creek confluence	~4.7 mi rectangular lined reach
La Sierra Channel	Headwaters to Arlington Channel confluence	Begins as culvert transitions to rectangular concrete-lined for 0.5 mi then to trapezoidal section; reverts to culvert then rectangular concrete-lined 1.5 mi
Main Street Channel	Headwaters to Temescal Creek confluence	~3.5 mi concrete-lined rectangular channel
Oak Street Channel	Headwaters to Temescal Creek confluence	~ 4 mi concrete-lined rectangular channel
Norco Channel	Headwaters to Temescal creek confluence	~ 3 mi rectangular concrete-lined and natural channel

Mill-Cucamonga Creek at Chino-Corona Road Subwatershed

The area encompassed by the Mill-Cucamonga Creek watershed-wide compliance site is 70 mi^2. In addition to the mainstem Cucamonga Creek, key tributaries include (Table B-5, Figure B-9):

- *Demens Creek in San Bernardino County* - This channel drains a 5.7 mi^2 subwatershed. It may be divided into two segments – one above and the other below the detention basins that capture flows from undeveloped canyon areas in the headwaters.

- *Upper Deer Creek in San Bernardino County* - This channel drains an 18 mi^2 subwatershed. It may be divided into two segments – one above and the other below the detention basins that capture flows from undeveloped canyon areas in the headwaters.

- *Lower Deer Creek in San Bernardino County* –– This waterbody drains a small subwatershed (~10 mi^2) entirely within the City of Ontario MS4 system. The SBCFCD owns and operates Chris Basin at the downstream end of Lower Deer Creek just upstream of the confluence of Lower Deer Creek with Cucamonga Creek. As a result of poor infiltration rates in the Chris Basin (due to soil characteristics), DWFs drain through the basin to Cucamonga Creek.

- *County Line Channel in Riverside and San Bernardino Counties* – This waterbody consists of a concrete-lined channel in the lower part of the subwatershed drains a small subwatershed (~6 mi^2). This channel drains subwatershed with mixed land use both north and south of the county line.

- *West Cucamonga Channel in San Bernardino County* – This channel is ~8.2 miles of a combination of concrete-lined rectangular and trapezoidal reaches; upper reach of this segment drains to 8th Street Basins.

In addition to the tributaries described above, the Cucamonga Storm Drain in San Bernardino County also discharges to Cucamonga Creek. Other potentially important storm drain facilities that discharge to tributaries to Cucamonga Creek include the Alta Loma Storm Drain and the East State Storm Drain.

Table B-5. Characteristics of channels draining to the Mill-Cucamonga Creek watershed-wide compliance monitoring location

Reach	Segments	Description
Cucamonga Creek	Headwaters to Cucamonga Canyon Dam (not included on Figure B-9)	Discharge from undeveloped canyon headwater area captured by Cucamonga Canyon Dam
	Below Cucamonga Canyon Dam to Hellman Avenue	14 mi concrete-lined reach; includes discharge from RP1 WRRF
	Hellman Ave. to Chino-Corona Rd	0.25 mi concrete-lined trapezoidal reach
	Chino-Corona Rd to Prado Basin	3.4 mi earthen bottom trapezoidal reach
Demens Creek	Headwaters to Detention Basin	Discharge from undeveloped canyon headwater area captured by detention basin
	Below Detention Basin to Cucamonga Cr. confluence	2.2 mi concrete-lined reach
Upper Deer Creek	Headwaters to Detention Basin	Discharge from undeveloped canyon headwater area captured by detention basin
	Below Detention Basin to Cucamonga Cr. confluence	3.6 mi concrete-lined reach
Lower Deer Creek (Chris Basin)	Headwaters to Chris Basin at Cucamonga Cr. confluence	2.1 mi concrete-lined reach
County Line Channel	Headwaters to Cucamonga Cr. confluence	2.6 mi concrete-lined reach
West Cucamonga Creek	Headwaters to Cucamonga Cr. confluence	8.2 mi combination of culvert and concrete-lined rectangular and trapezoidal reaches; upper reach of segment drains to 8th Street Basins
Cucamonga Storm Drain	Headwaters to Cucamonga Creek confluence	1.6 mi reach of concrete lined rectangular and culvert

Santa Ana River at MWD Crossing Subwatershed

The area upstream of this monitoring location encompasses the upper portion of the MSAR watershed (Figure B-10). In addition to drainage within the MSAR watershed, this portion of the MSAR receives flows from Santa Ana River Reach 4, but typically only during wet weather. Within the MSAR watershed, water flowing to this location drains 101 mi^2, much of it in Riverside County. Within San Bernardino County, the only key tributary or source of water to Santa Ana River Reach 3 upstream of the MWD Crossing is the Rialto Channel (Figure B-10), which is hydrologically disconnected during typical dry weather conditions. In Riverside County, key tributaries or sources of flow to Santa Ana River Reach 3 upstream of MWD Crossing include (Table B-6, Figure B-10):

- *High Grove Storm Drain in Riverside and San Bernardino Counties* – This drain has a trapezoidal concrete-lined segment at the headwaters that transitions to a natural segment. Approximately, 1.25 miles upstream of its confluence with the Santa Ana River, the channel is a trapezoidal lined segment.

- *University Wash in Riverside County* – This channel is a combination of culvert and trapezoidal concrete-lined segments (4.2 mi).

- *Box Springs in Riverside County* – Draining ~ 31 mi^2 area, this channel may be divided into two segments – an upstream engineered segment and a short natural segment at its confluence with the MSAR.

- *Sunnyslope Channel in Riverside County* - This channel drains an approximately 6 mi^2 area in unincorporated areas of Riverside County. It may be divided into two segments – an upstream engineered segment and a short natural segment at its confluence with the MSAR.

- *MS4 Outfalls Along Santa Ana River* – Several MS4 outfalls are located along the Santa Ana River in this area.

Table B-6. Characteristics of channels in Riverside County draining to the Santa Ana River MWD Crossing watershed-wide TMDL compliance monitoring site

Reach	Segments	Description
High Grove Storm Drain	Headwaters to Santa Ana River confluence	2.8 mi concrete-lined trapezoidal reach except for 1 mi natural segment
University Wash	Headwaters to east of Santa Ana River; open channels are 1 mi east of Santa Ana River	Combination of 4.2 mi concrete-lined trapezoidal reach and 2 mi of culvert reaches
Box Springs	Headwaters to confluence with Santa Ana River	0.2 mi vertical, concrete-lined channel for entire length except last 0.5 mi prior to confluence with MSAR
Sunnyslope Channel	Headwaters to point where segment transitions from concrete-lined to natural channel (Rancho Jurupa Park)	3.0 mi reach with trapezoidal concrete-lined banks
	Upstream end of natural section (Rancho Jurupa Park) to Santa Ana River confluence	0.4 mi reach with natural banks and bottom; in 2007, section not hydrologically connected to MSAR during dry weather

Santa Ana River at Pedley Avenue Subwatershed

This subwatershed (126 mi^2, not including the portion of the Santa Ana River Reach 3 watershed upstream of the MSAR Reach 3 MWD Crossing watershed-wide TMDL compliance monitoring site) generally encompasses the portion of the MSAR watershed upstream of Prado Basin Dam and below the MSAR Reach 3 MWD Crossing TMDL compliance monitoring site. This drainage area receives flow from the portion of the MSAR above the MWD Crossing TMDL compliance monitoring site. In addition, flow is received from three key tributaries. The upper reaches of two of these tributaries are located in San Bernardino County (Table B-7, Figure B-11):

- *Anza Drain in Riverside County* - This subwatershed encompasses a ~ 21 mi^2 area. The Anza Drain may be divided into two segments – an upstream engineered segment and a short natural segment just above its confluence with the MSAR. The natural segment at the confluence receives effluent from the RWQCP prior to discharging to the MSAR. Surveys conducted by the RWQCP facility (reported by the Stormwater Quality Standards Task Force) have noted that recreational activity is relatively common in the area (as compared to other areas in the MSAR watershed).

- *San Sevaine Channel* - This channel drains approximately 51 mi^2 and may be divided into two segments – a headwaters area that discharges to the San Sevaine Basins upstream of the MS4 (in San Bernardino County) and a lengthy engineered segment, the lower part of which is in Riverside County. Two important tributaries to San Sevaine Channel include the Highland Channel and Declez Channel. The Highland Channel enters San Sevaine in the upper part of its watershed in San Bernardino County. Declez Channel enters San Sevaine Channel in the lower part of the watershed in Riverside County, but the upper part of this channel is in San Bernardino County. Declez Channel is ~4.7 miles in length with a rectangular lined segment from the headwaters that transitions to a trapezoidal segment (except for a short culvert section) upstream of its confluence with San Sevaine Channel.

- *Day Creek/Etiwanda Channel* – The Day Creek drainage area encompasses an approximately 51 mi^2 area. It has one major tributary - Etiwanda Channel. The mainstem of Day Creek may be divided into four segments with varying characteristics and the Etiwanda tributary may be divided into two segments, a portion that is upstream of the MS4 and an engineered downstream segment.

Table B-7. Characteristics of channels draining to the Pedley Avenue MSAR watershed-wide TMDL compliance monitoring site

Reach	Segments	Description
Anza Drain	Headwaters to Arlington Avenue	Vertical-walled, concrete-lined channel
	Arlington Avenue to confluence with MSAR	Channel with natural characteristics
San Sevaine Channel & Tributaries	Headwaters to San Sevaine Basins	Discharge from headwater area captured by San Sevaine Basins
	San Sevaine Basins to confluence with MSAR	11 mi concrete-lined reach from San Sevaine Basins to confluence with MSAR
	Highland Channel - Headwaters to confluence with San Sevaine Channel	2.5 mi concrete-lined trapezoidal reach
	Declez Channel - Headwaters to confluence with San Sevaine Channel	~2.5 mi concrete-lined rectangular segment and 2.2 mi concrete lined trapezoidal reach; lower portion including confluence with San Sevaine Channel is in Riverside County.
Day Creek & Tributaries	Headwaters to Day Creek Basins	Discharge from undeveloped areas captured by Day Creek Basins
	Day Creek Basins to south of 63rd St	11 mi concrete-lined reach - lower end of this reach is in Riverside County
	Limonite Avenue to Lucretia Avenue	0.6 mi earthen bottom trapezoidal channel – within Riverside County
	Lucretia Avenue to confluence with MSAR	Natural characteristics – within Riverside County
	Etiwanda Channel - Headwaters to concrete-lined segment	Discharge from undeveloped areas captured in detention basins
	Etiwanda Channel - Beginning of concrete-lined segment to confluence with Day Creek	8.5 mi concrete-lined for entire length except for short segment between Foothill Boulevard and the Etiwanda Conservation Basins on either side of I-10 Fwy

B.4 Baseline Water Quality

Water quality monitoring in the MSAR watershed to support TMDL implementation has been ongoing since 2007 at all five watershed-wide compliance monitoring locations. To date, this effort has included (see also Attachment A):

- Collection of 20 bacterial indicator samples during each dry season (April 1 – October 31), under dry weather conditions in 2007, 2008, 2009 and 2010.

- Collection of 11 bacterial indicator samples during each wet season (November 1 – March 31), under dry weather conditions in 2007-08, 2008-09, 2009-10, and 2010-11.

- Collection of 4 bacterial indicator samples during and after a wet weather event in each of the wet seasons of 2007-08, 2008-09, 2009-10, and 2010-11.

- Collection of approximately 20 bacterial indicator samples during dry weather conditions in both dry and wet seasons from 13 USEP monitoring program locations in 2007-2008.

In addition to TMDL-related monitoring, sampling has been conducted by the SBCFCD to fulfill San Bernardino County MS4 permit monitoring requirements; however, this sampling occurs only during wet weather. The following sections summarize baseline water quality for bacterial indicators in the MSAR watershed. Detailed information is available in data reports prepared to support TMDL implementation: SAWPA (2009a) summarizes the findings from the 2007 dry season and 2007-08 wet season monitoring; SAWPA (2009b) and SAWPA (2009c) summarize the findings from the 2008 dry and 2008-2009 wet seasons, respectively; SAWPA (2009d) and SAWPA (2010c) summarize the results from the 2009 dry and 2009-2010 wet seasons; and SAWPA (2010f) summarizes the results from the 2010 dry season; and SAWPA (2011) summarizes results from the 2010-2011 wet season, respectively.

Watershed-wide Compliance Monitoring

Table B-8 and Figure B-12 present the geometric mean, median, and coefficient of variation of the *E. coli* concentrations from samples collected during dry weather in the dry and wet weather seasons at each of the compliance monitoring locations[3,4]. Although Prado Park Lake is not located within Riverside County, information on this waterbody is provided for informational purposes.

Generally, *E. coli* concentrations within the Santa Ana River are lower than in Chino Creek and Mill-Cucamonga Creek. *E. coli* concentrations in Prado Park Lake are also

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[3] Similar data are available for fecal coliform, but are not presented in this document (they may be viewed in the SAWPA references provided above). It is expected that the Regional Board will adopt a Basin Plan amendment in 2011 replacing fecal coliform water quality objectives with *E. coli* objectives. Accordingly, all bacterial indicator summaries and analyses in this CBRP are based on *E. coli*.

[4] The wet season data collected under dry conditions is provided in this CBRP for informational purposes only. This CBRP only applies to dry weather conditions from April 1 – October 31.

comparatively low. These summary statistics are presented to provide an overall view of water quality; actual measures of attainment of proposed *E. coli* water quality objectives are based on geometric mean calculations from samples collected over a period of no more than 30 days. Exceedances of *E. coli* water quality objectives expected to be adopted in the ongoing Basin Plan amendment process (see Section 1.2.2) occur regularly at all sites. In addition, exceedances of the TMDL urban wasteload allocations regularly occur.

Figures B-13 through B-17 illustrate the pattern in single sample and geometric mean results for *E. coli* over the 2007-2010 period for all five compliance monitoring sites. In general, the observed overall dry weather season geometric mean *E. coli* concentrations at each watershed-wide TMDL compliance monitoring site declined over the period from 2007-2009, but then increased in 2010 (dry season). Bacterial indicator concentrations remain well above the urban wasteload allocations at the Mill-Cucamonga Creek and Chino Creek compliance monitoring sites.

Table B-8. Summary statistics for *E. coli* levels (cfu/100 mL) and data variability by sample location during dry weather conditions in the dry and wet seasons (2007-2010)

Site	Dry Season				Wet Season			
	N	Geometric Mean	Median	Coefficient of Variation[1]	N	Geometric Mean	Median	Coefficient of Variation[1]
Prado Park Lake (WW-C3)	57	80	80	0.25	48	178	145	0.20
Chino Creek at Central Ave (WW-C7)	55	394	370	0.13	46	256	215	0.19
Mill-Cucamonga Creek at Chino-Corona Rd (WW-M5)	56	877	770	0.11	44	284	260	0.21
Santa Ana River at MWD Crossing (WW-S1)	58	149	140	0.12	41	132	130	0.21
Santa Ana River at Pedley Ave (WW-S4)	55	149	140	0.14	43	116	120	0.20

[1] - Coefficient of variation was calculated using natural log-transformed data

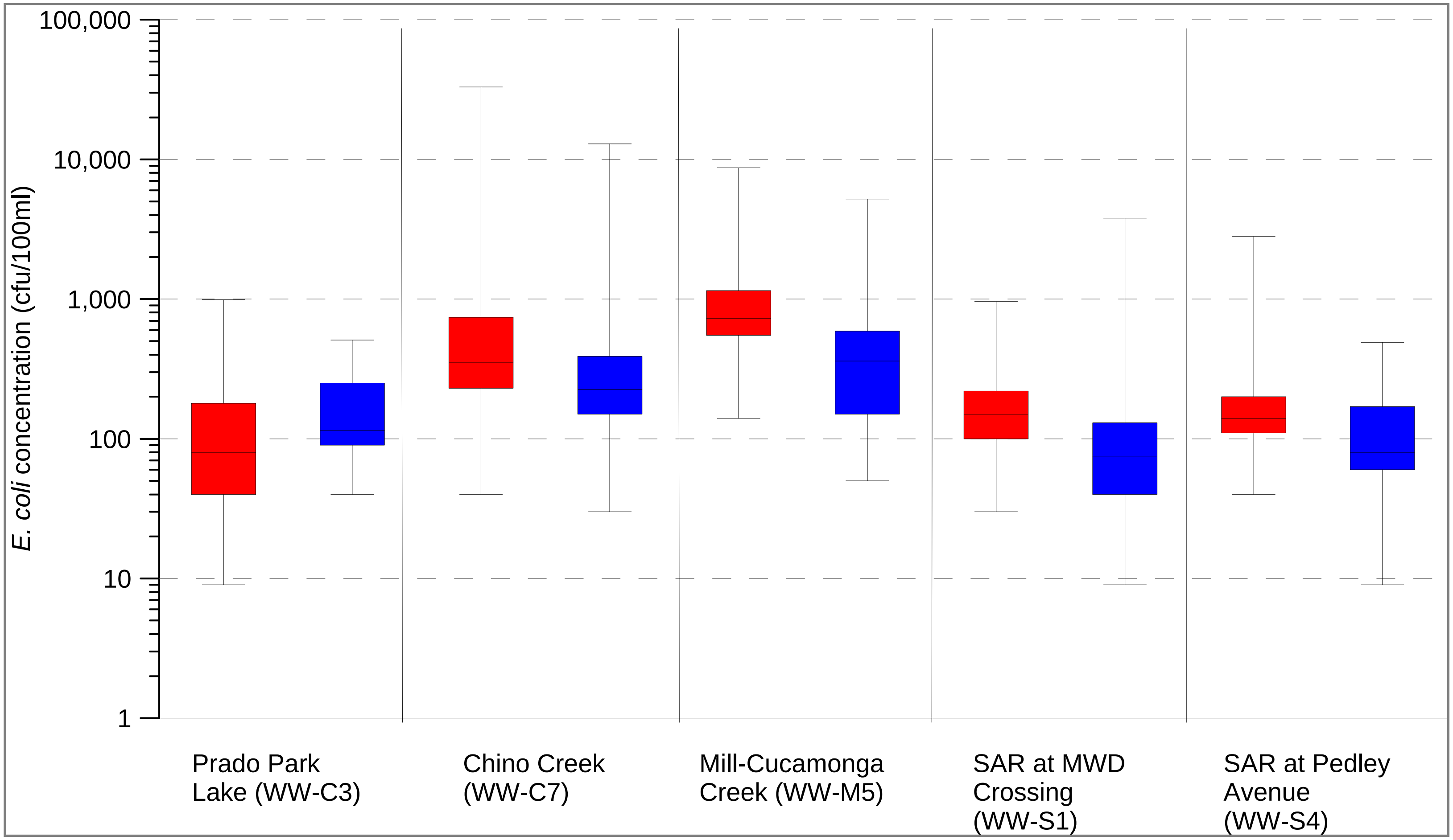


Figure B-12. Box-Whisker Plots of *E. coli* levels in samples collected under dry weather conditions during the dry season (red) and wet season (blue) at MSAR watershed-wide TMDL compliance monitoring sites

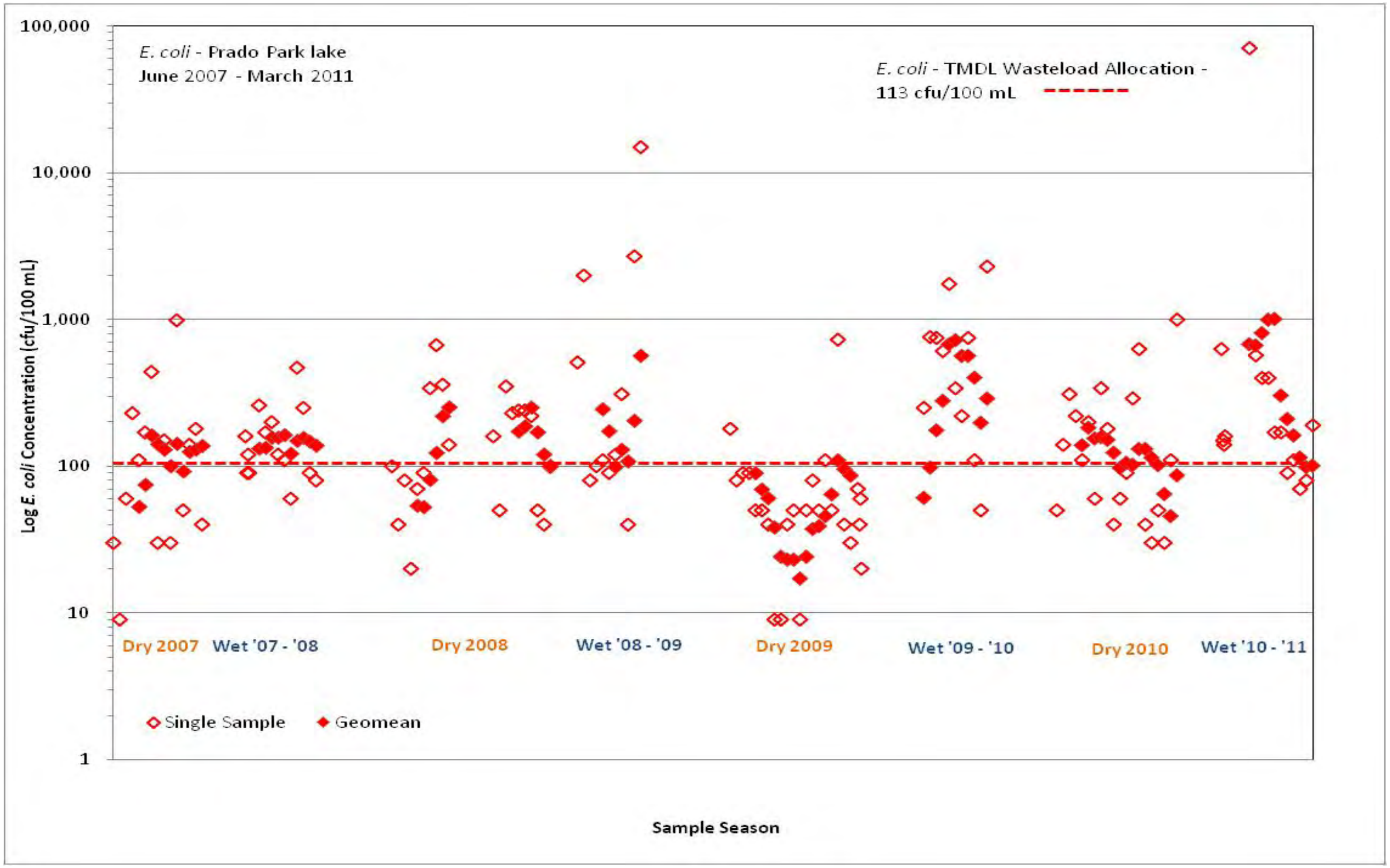


Figure B-13. Time series plot of *E. coli* single sample results and geometric means for samples collected from Prado Park Lake (WW-C3, 2007-2011). Geometric mean was calculated only if five samples were collected during the previous five weeks.

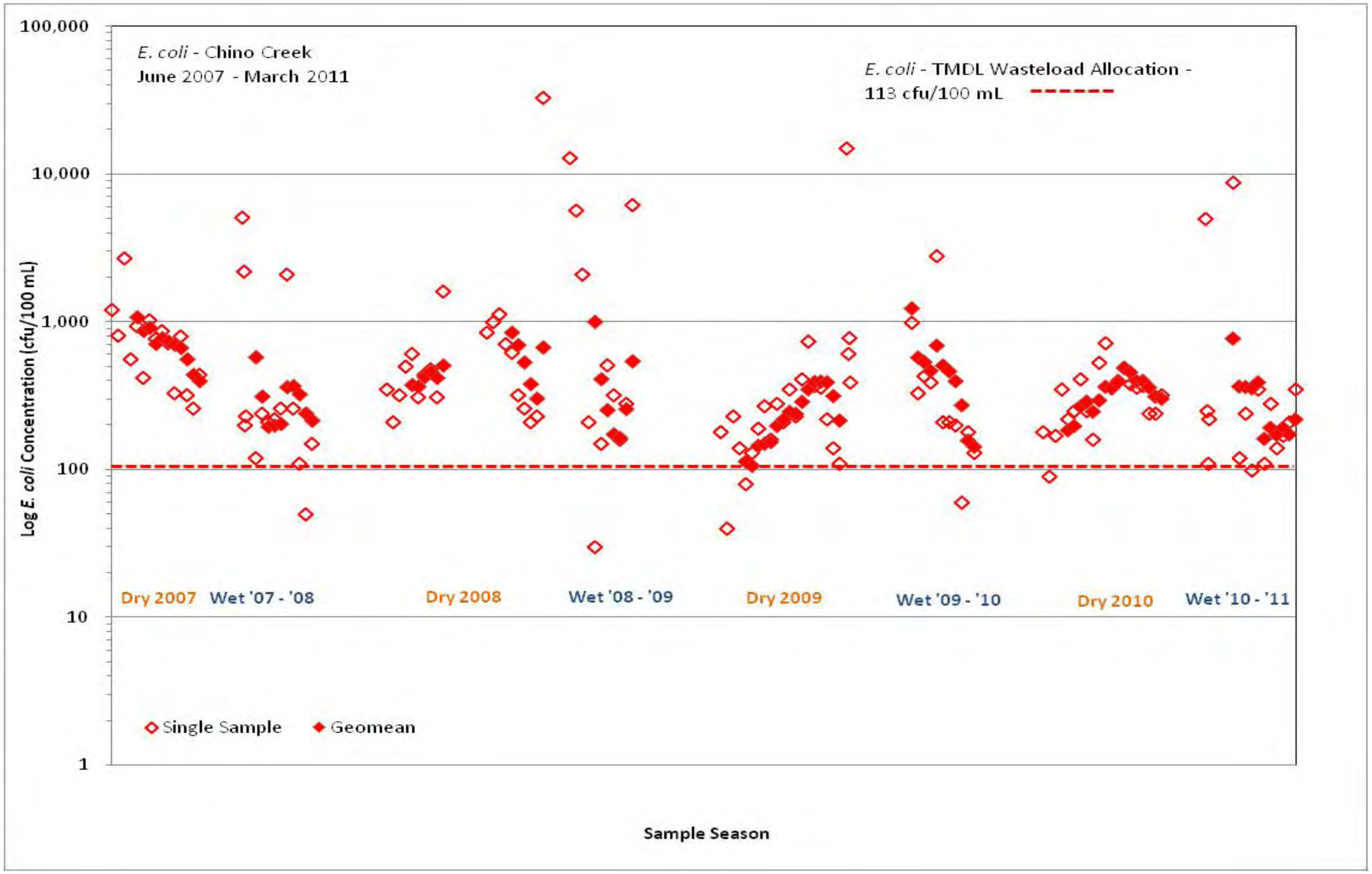


Figure B-14. Time series plot of *E. coli* single sample results and geometric means for samples collected from Chino Creek (WW-C7, 2007-2011). Geometric mean was calculated only if five samples were collected during the previous five weeks.

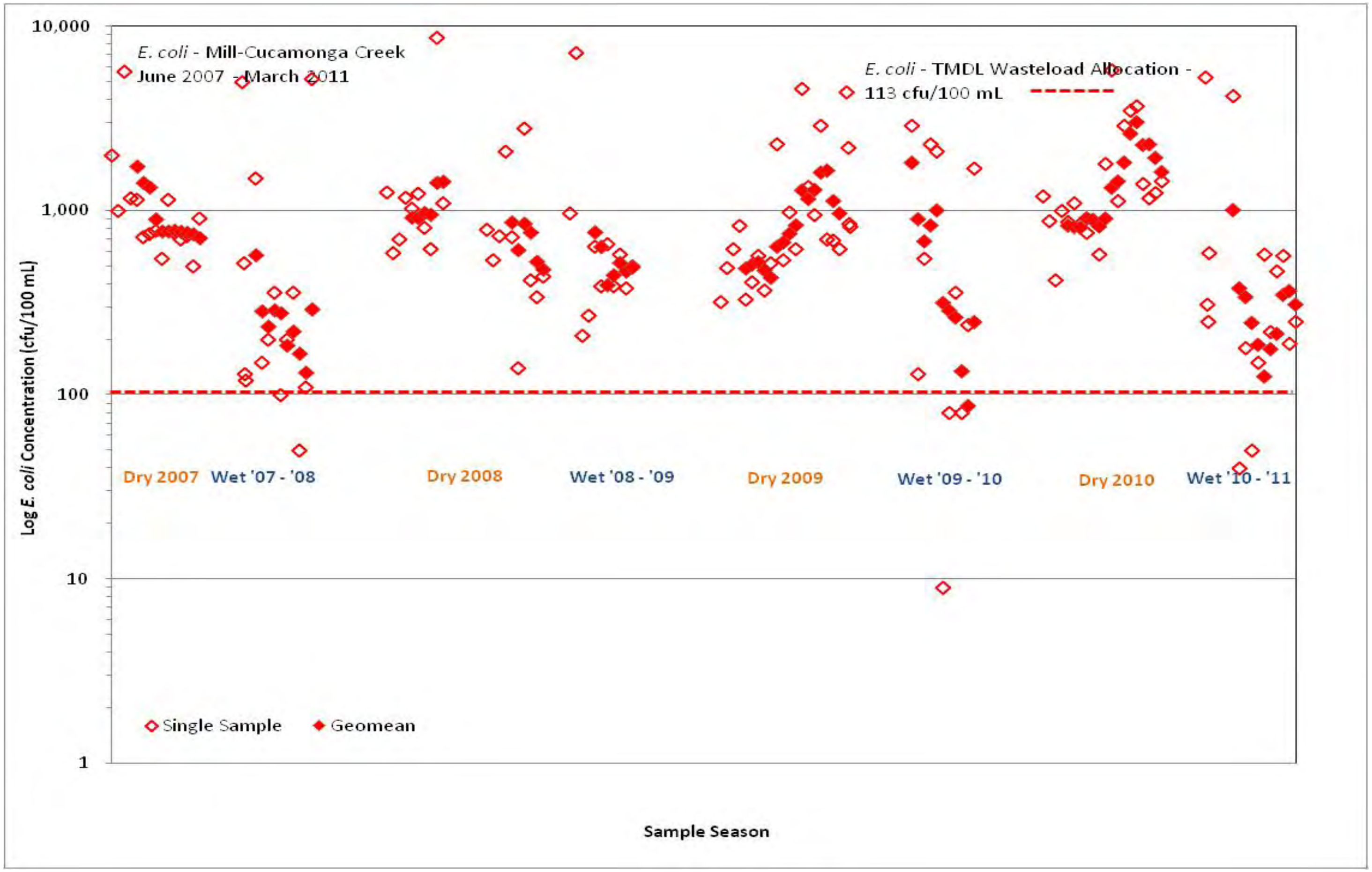


Figure B-15. Time series plot of *E. coli* single sample results and geometric means for samples collected from Mill-Cucamonga Creek (WW-M5, 2007-2011). Geometric mean was calculated only if five samples were collected during the previous five weeks.

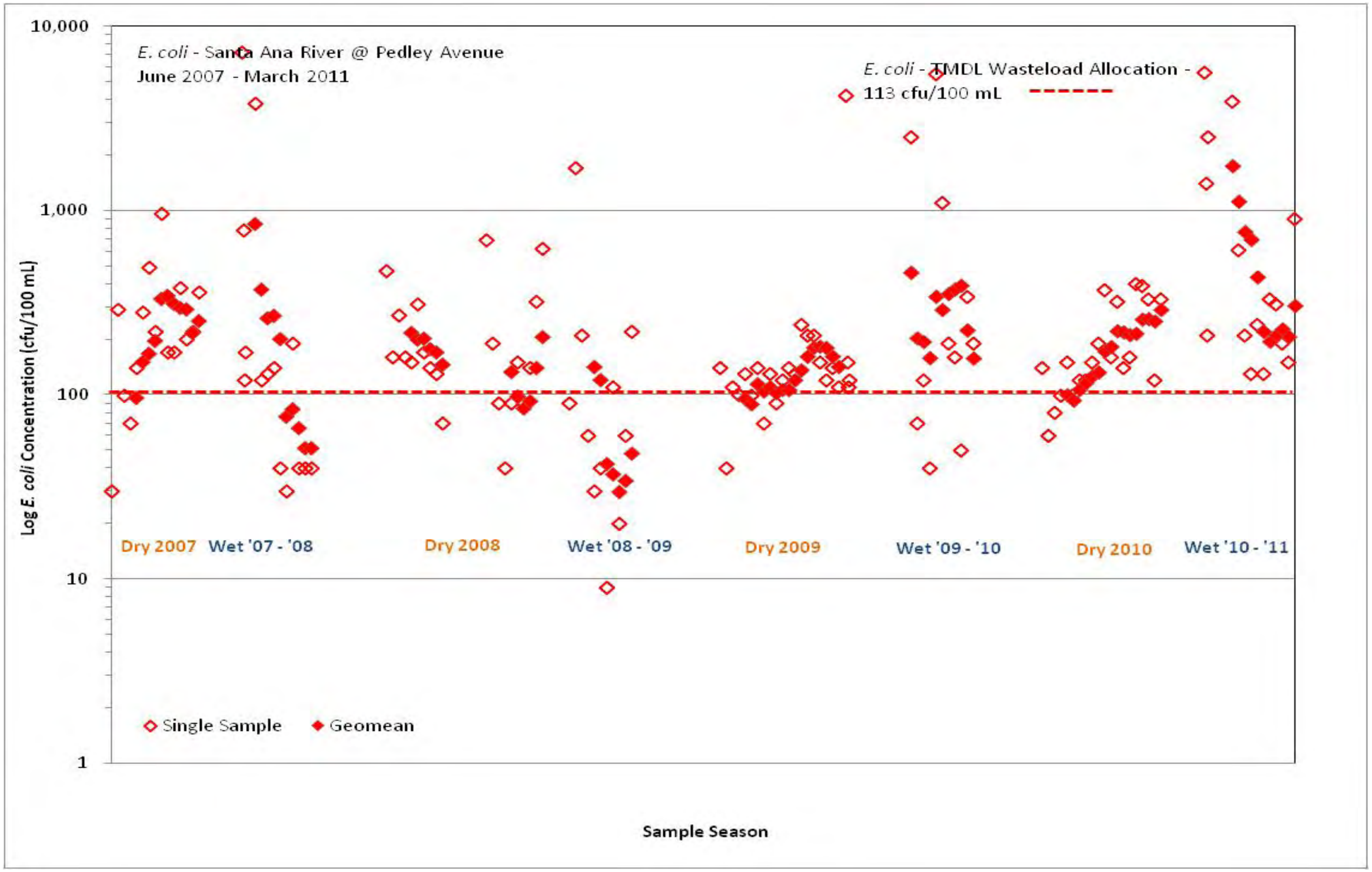


Figure B-16. Time series plot of *E. coli* single sample and geometric mean results for samples collected from Santa Ana River @ Pedley Avenue (WW-S4, 2007-2011). Geometric mean was calculated only if five samples were collected during the previous five weeks.

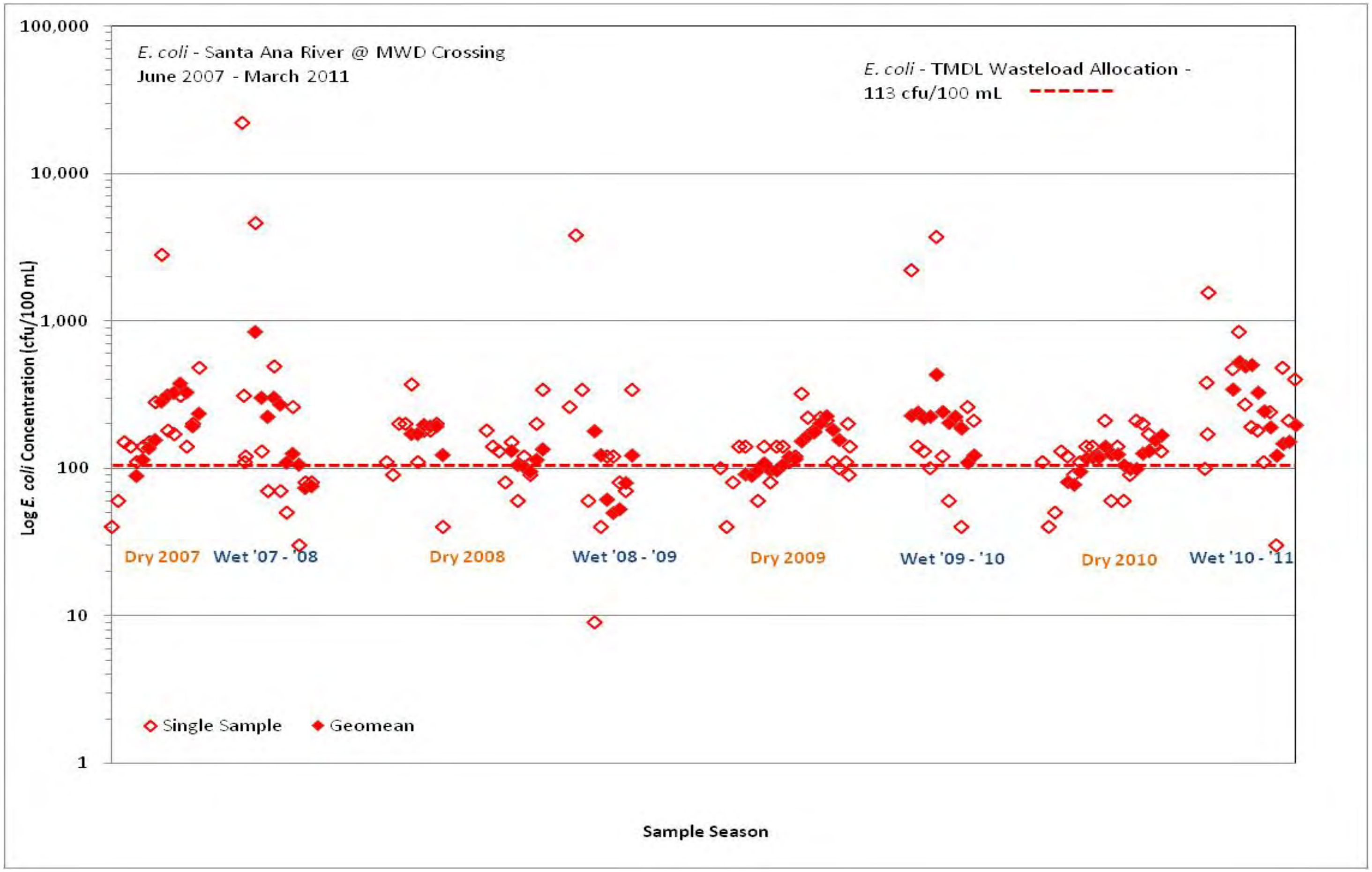


Figure B-17. Time series plot of *E. coli* single sample and geometric mean results for samples collected from Santa Ana River @ MWD Crossing (WW-S1, 2007-2011). Geometric mean was calculated only if five samples were collected during the previous five weeks.

Table B-9 summarizes the frequency of compliance with single sample and geometric mean Basin Plan REC-1 water quality objectives proposed for *E. coli (*235 cfu/mL for single sample and 126 cfu/mL for geometric mean) during dry weather conditions in the dry season 2007-2010. At some locations there has been an improvement in compliance frequency since data collection began in 2007, e.g., as observed at the Santa Ana River watershed-wide compliance monitoring locations.

Table B-9. Compliance frequency for *E. coli* under dry weather conditions during the 2007 -2010 dry seasons (as compared to proposed Basin Plan objectives for *E. coli*)

Site	Single Sample Criterion Exceedance Frequency (%)				Geometric Mean Criterion Exceedance Frequency (%)			
	2007	2008	2009	2010	2007	2008	2009	2010
Prado Park Lake	20%	30%	5%	5%	64%	50%	0%	6%
Chino Creek	100%	85%	35%	55%	100%	100%	88%	100%
Mill-Cucamonga Creek	100%	95%	100%	95%	100%	100%	100%	100%
SAR @ MWD Crossing	40%	15%	5%	30%	91%	58%	44%	63%
SAR @ Pedley Ave.	27%	25%	5%	5%	82%	75%	44%	19%

Urban Source Evaluation Plan Monitoring

The USEP monitoring program (2007-2008) analyzed bacterial indicator levels and sources (using microbial source tracking [MST] tools) to characterize key urban MS4 facilities in Riverside and San Bernardino Counties. The MSAR Task Force used the 2007-2008 USEP data results to prioritize steps for mitigating controllable urban sources of bacterial indicators within the MSAR watershed. High priority sites included those where:

- Magnitude and frequency of bacterial indicator exceedances was high;
- Microbial source tracking analysis indicated presence of human sources of bacterial indicators relatively frequently;
- Site is in an area, or is close to an area, where water contact recreational activities are likely to occur; and
- Observed bacterial indicator exceedances and presence of human bacterial indicator sources occur during periods when people are most likely to be present, e.g., during warm months and dry weather periods.

In contrast, the lowest priority sites for urban dischargers would be those where the bacterial indicator exceedance frequency and magnitude is low, human or other urban sources, e.g., dogs, are not present, and the site is not used for water contact recreation, e.g., the site is a concrete-lined, vertical-walled flood control channel.

A complete summary of USEP monitoring results may be found in SAWPA (2009a). Compliance with Basin Plan objectives was evaluated using geometric mean and single sample results (Table B-10). Geometric means of bacterial indicator levels were calculated only when at least five sample results were available from the previous five week period. Bacterial indicator levels frequently exceeded water quality objectives at most of the sampling locations. Despite this commonality, the range of bacterial indicator levels varied significantly among sites (Figure B-18).

MST analyses detected bacterial indicators originating from human sources at some sites. The detection frequency of bacterial indicators originating from human sources indicated that some tributaries to impaired waterbodies could pose a greater risk of contributing harmful pathogens to downstream waters than others (Table B-11). Sites were ranked based on three factors:

- Frequency of exceedances of water quality objectives (R_F)
- Magnitude of bacterial indicator concentration (R_C)
- Number of detections of human source bacteria (R_D)

From these ranks, a single normalized index referred to as a Bacterial Prioritization Score (BPS) was calculated using the following equation:

$$BPS = \frac{R_F * R_C * R_D}{MAX_{R_F * R_C * R_D}}$$

Table B-12 shows the relative ranks and computed BPS for each of the subwatersheds represented by USEP monitoring locations. These BPS values are being used as the basis for prioritizing TMDL implementation activities within each of the areas draining to watershed-wide compliance monitoring sites. This analysis shows that highest priority drainage areas within larger subwatersheds are Box Springs and Lower Deer Creek (Chris Basin). In contrast, drainage areas that appear to be of low priority include Sunnyslope Channel and Carbon Canyon Creek.

Table B-10. Compliance frequency based on proposed *E. coli* water quality objectives at USEP monitoring program sites during dry weather

USEP Site	Single Sample Criterion Exceedance Frequency (%)		Geometric Mean (cfu/100 mL)				Geomean Criterion Exceedance Frequency (%)
	Dry Season	Wet Season	Dry Season 2007 (7/14 – 8/11)	Dry Season 2007 (9/1 – 9/29)	Wet Season 2008 (1/19 – 2/16)	Wet Season 2008 (1/26 – 2/23)	
Anza Drain[1]	80%	25%	380	638	177	341	100%
Box Springs Channel[1]	89%	75%	1,149	4,793	655	939	100%
Carbon Canyon Cr.	20%	25%	44	84	200	177	50%
Chris Basin	80%	100%	1,758	429	1,530	1,447	100%
County Line Channel[2]	80%	50%	1,194	n/a	n/a	n/a	100%
Cucamonga Cr.	50%	38%	74	262	176	356	50%
Cypress Channel	100%	100%	4,745	1,981	n/a	n/a	100%
Day Creek[2]	71%	60%	n/a	n/a	n/a	n/a	n/a
San Antonio Channel	78%	56%	n/a	718	2,085	1,394	100%
SAR @ La Cadena[2]	100%	50%	n/a	n/a	n/a	n/a	n/a
Sunnyslope Channel[1]	20%	33%	165	204	72	207	75%
San Sevaine Channel[2]	75%	83%	n/a	n/a	n/a	n/a	n/a
Temescal Cr. [1]	89%	43%	491	3,127	162	143	100%

[1] – Site in Riverside County
[2] – Site receives DWF from both counties

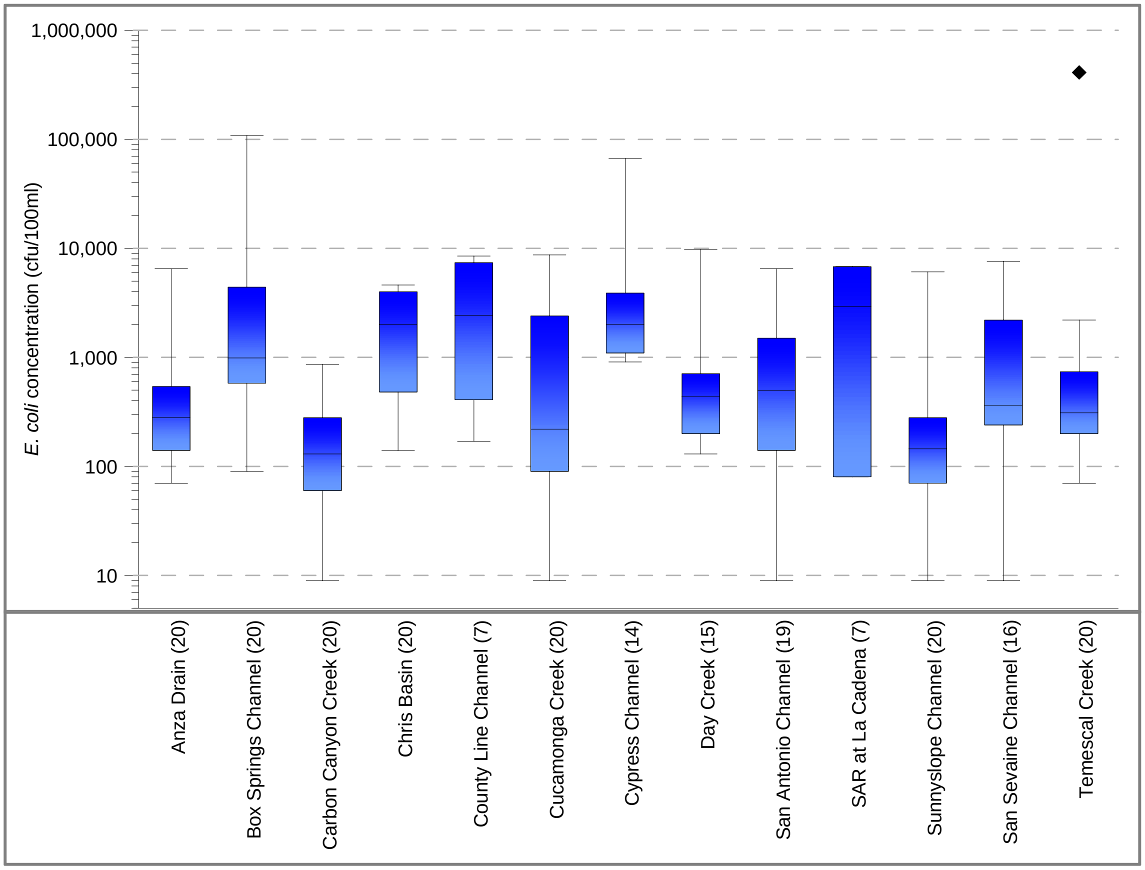


Figure B-18. *E. coli* levels at USEP monitoring program sites during dry weather conditions

Table B-11. Summary of human source bacteria detections at USEP monitoring program sites

USEP Site	N	Number of Detections of Human Sources (Maximum N = 20)	Frequency of Detection
Anza Drain	20	1	5%
Box Springs Channel	20	18	90%
Carbon Canyon Creek[1]	20	0	0%
Lower Deer Creek (Chris Basin) [1]	20	5	25%
County Line Channel[2]	7	0	0%
Cucamonga Creek[1]	20	1	5%
Cypress Channel[1]	14	1	7%
Day Creek[2]	15	1	7%
San Antonio Channel[1]	19	3	16%
San Sevaine Channel[2]	7	3	43%
Santa Ana River at La Cadena[2]	20	3	15%
Sunnyslope Channel	16	2	13%
Temescal Creek	20	1	5%

[1] – Site in San Bernardino County
[2] – Site receives DWF from both counties

Table B-12. Bacteria Prioritization Score for USEP monitoring program sites

Site	Relative Rank of Bacterial Indicator Water Quality			Normalized BPS
	Frequency of Single Sample Exceedance (R_F)	Magnitude of Exceedance (R_C)	Proportion of Human Detect (R_D)	
Box Springs Channel[1]	11	13	13	100
Chris Basin Outflow	12	11	11	78
Cypress Channel	13	12	7	59
San Antonio Channel	6	9	10	29
Santa Ana River @ La Cadena[2]	5	8	12	26
San Sevaine Channel[2]	10	4	8	17
Day Creek[2]	8	6	6	15
County Line Channel[2]	9	10	1	5
Cucamonga Creek	3	7	3	3
Anza Drain[1]	4	5	3	3
Temescal Creek[1]	7	2	3	2
Sunnyslope Channel[1]	1	3	9	1
Carbon Canyon Creek	1	1	1	0

[1] – Site in Riverside County
[2] – Site receives DWF from both counties

NPDES Monitoring Activities

Monitoring activities within the MSAR watershed to comply with the San Bernardino County MS4 permit have occurred during wet weather. Accordingly, no dry weather data from this monitoring program were included in CBRP water quality analyses. The Integrated Watershed Management Plan, currently being developed as an MS4 permit requirement, will expand the monitoring program to include dry weather events. As data become available from this monitoring, they will be included in CBRP data reviews.

SAR at MWD Crossing has been designated as a trend analysis site for a watershed-wide study, coordinated by the Southern California Coastal Water Research Project (Regional Monitoring of California's Coastal Watersheds, Stormwater Monitoring Coalition Bio-assessment Working Group, Technical Report 539, December 2007). A dry weather monitoring event is required, that includes a suite of parameters, e.g., biological toxicity, nutrients and organics. The first dry weather monitoring event was completed in September 2010. This location most likely will be relocated to the Santa Ana River at Pedley site, given the availability of historic data at this location. As data become available, they will be considered along with CBRP monitoring data.

Special Water Quality Studies

Periodically, special studies have been completed to evaluate specific water quality issues. Within San Bernardino County one such study was recently completed that provided data relevant to this CBRP. A recent study was conducted to determine the sources of elevated bacterial indicator levels in Cucamonga Creek (Surbeck et. al., 2010). To evaluate the bacterial indicator sources to the creek, the project team collected samples at eight locations along the creek during seven sample events that characterized a range of air temperatures and antecedent dry periods. Additionally, microcosm studies were performed using treated wastewater and urban DWF collected during the sampling program to investigate bacteria growth when bacterial indicators were exposed to nutrients and dissolved organic carbon (DOC).

Study findings demonstrated that almost 100 percent of the bacterial indicator loading can be attributed to urban DWF while treated wastewater was found to be the primary source of nutrient loading. Microcosm studies demonstrated that *E. coli* levels are strongly dependent upon DOC and phosphorus. Levels of 7.0 mg/L DOC and 0.07 mg/L total phosphorous, were identified as thresholds for creating conditions that favor growth (at higher levels) and decay (at lower levels).

Attachment C
Comprehensive Bacterial Indicator Reduction Program

Contents

Figures

Tables

C.1 Introduction

This section describes the CBRP program planned for implementation by the Riverside County permittees to achieve compliance with urban wasteload allocations under dry weather conditions. The CBRP program relies on a combination of ordinance adoption or revision, implementation of specific BMPs, a comprehensive inspection program (i.e., source evaluation program), development of UAAs, and where determined necessary, regional treatment (with options ranging from ultraviolet disinfection, natural treatment systems to diversions to POTWs). The recommended approach focuses both on the elimination of DWFs from MS4 facilities and reductions of urban bacterial indicator sources.

As discussed in CBRP Section 1.2.1, Section V.D.2.b.i of the San Bernardino County MS4 permit lists the requirements for preparation of the CBRP. These requirements call for the inclusion of four key program elements. These elements and their corresponding reference in the CBRP are as follows:

- Ordinances – Element 1
- Specific BMPs - Element 2
- Inspection Criteria – Element 3
- Regional Treatment – Element 4

The following sections describe the CBRP program activities planned for implementation under each of these elements.

C.2 Element 1 - Ordinances

The CBRP requires the identification of specific ordinances that will be adopted during implementation that reduce the levels of indicator bacteria in urban sources. Two options for ordinance adoption are described in the sections below: Water Conservation and Pathogen Control.

Water Conservation Ordinance

Water purveyors are required to comply with the Urban Water Management Plan Act (UWMP) and prepare an UWMP every five years. As part of the UWMP requirements, these agencies are required to address water waste prohibitions during normal water conditions and during various stages of water shortages (catastrophic interruptions and during droughts). To varying degrees, the jurisdictions have adopted water conservation ordinances incorporating these requirements (see Table C-1).

Under normal water conditions, water conservation ordinances prohibit specific outdoor water use activities that have the potential to create DWF in the MS4.Normal water conditions are when there are no expected shortages in water supplies. Specifically, prohibited activities during normal water conditions may include allowing runoff to leave a property from over-irrigation, washing of impervious surfaces, and failure to repair leaks. Actual prohibitions vary by the adopted ordinances of the water purveyors as illustrated in Table C-1. During water shortages the ordinances further limit water use, including outdoor water use and subsequently the potential to create further DWFs, in relation to the degree of the shortage such as limiting outdoor water use to specific days, hours, and durations.

Water Efficient Landscape Ordinance

The Water Conservation in Landscaping Act of 2006, Assembly Bill 1881 (AB 1881), requires adoption of the Model Water Efficient Landscape Ordinance designed to improve public and private landscaping and irrigation practices for new development projects or rehabilitation of significant landscape areas. The ordinance reduces outdoor water waste through improvements in irrigation efficiency and selection of plants requiring less water. The ordinance requires development of water budgets for landscaping, use of recycled water if available, routine irrigation audits, and scheduling of irrigation based on localized climate. For existing landscapes greater than one-acre in size, the water purveyors are required to implement programs, such as irrigation water use analyses, irrigation surveys, and irrigation audits to reduce landscape water use to a level not exceeding the Maximum Applied Water Allowance (MAWA) as specified in the ordinance. Landscape audits are required to be conducted by a certified landscape auditor. Local purveyors are also required to prevent outdoor water waste resulting from inefficient landscape irrigation and establish penalties for violating these prohibitions. Specifically, local purveyors are to prohibit runoff from leaving the targeted landscape areas. San Bernardino County MS4 Permittees have adopted the Chino Basin Water Efficient Landscape Ordinance, which was developed collaboratively by cities and water agencies in the Chino Basin as a regional model ordinance that meets AB 1881 requirements.

Table C-1. Existing water conservation ordinances in the San Bernardino County portion of the MSAR watershed

Proponent	Ordinance Name	Applicability	Key Prohibitions
City of Chino	Water Conservation	City of Chino	• Runoff of irrigation water to impermeable surfaces • Operation of sprinklers for > 15 minutes/day/station for spray irrigation • Scheduling of spray irrigation between the hours of 6:00 am and 8:00 pm • Failure to repair a water leak • Use of water to wash any impervious surfaces
Cucamonga Valley Water District	Water Use Efficiency	Cities of Fontana, Ontario, Rancho Cucamonga, Upland, and portions of unincorporated San Bernardino County	• Any irrigation water leaving the property • Failure to repair a water leak
City of Ontario	Stormwater Drainage System	City of Ontario	• Runoff of wastewater from most potential outdoor washing activities • Draining of pools or fountains and pool filter backwash containing chlorine or other harmful chemicals
City of Upland	Water Conservation	City of Upland	• Scheduling of spray irrigation between the hours of 10:00 am and 6:00 pm • Failure to repair a water leak • Use of water to wash any impervious surfaces
City of Chino Hills	Water Conservation	City of Chino Hills	• No prohibitions, voluntary conservation measures only
Monte Vista Water District	Water Use Efficiency Best Practices	City of Chino, Montclair, and portions of unincorporated San Bernardino County	• Any irrigation water leaving the property • Operation of sprinklers for > 15 minutes/day/station for spray irrigation • Scheduling of spray irrigation between the hours of 8:00 am and 8:00 pm • Irrigation when it is raining • Failure to repair a water leak
City of Rialto	Water Conservation Requirements; Stormwater	City of Rialto	• No prohibitions; ordinance discourages specific activities that waste water and encourages minimizing off site runoff to the MEP

CBRP Implementation: Generally speaking, the permittees' ability to enforce water conservation and water efficient landscape ordinances on their own is somewhat limited. Local water districts measure water use, set rates, and set water use policies, including fines for water waste. Local stormwater ordinances can complement these measures, but water district participation and implementation of the conservation requirements is critical to a successful water conservation program that also provides water quality benefits. Accordingly, CBRP activity in the area of water conservation ordinance enforcement will be coordinated with water local water purveyors.

During CBRP implementation, the permittees will evaluate whether existing authority is adequate to manage DWFs to reduce bacterial indicator levels in receiving waters. Some MS4 permittees or water purveyors may opt to focus efforts on implementation of specific BMPs (see Element 2) rather than enforcement of water conservation ordinances. Evaluation of different approaches will be coordinated with the development of San Bernardino County's WAP.

Bacterial Indicator Control Ordinance

Pathogen control through ordinance development is a component of the San Bernardino County MS4 permit:

> *San Bernardino County MS4 permit Section VII.D* – "Within 3 years of adoption of this Order, the permittees shall implement fully adopted ordinances that would specify control measures for known pathogen or bacterial sources such as animal wastes if those types of sources are present within their jurisdiction."

With a permit adoption date of January 29, 2010, this MS4 permit requirement must be addressed by January 29, 2013. The permit language specifically mentions animal wastes but could address other bacterial indicator sources as well. A pathogen ordinance may also support development of the Residential Program, as required by the MS4 permit by January 29, 2013.

Some municipalities in the MSAR watershed have existing ordinances prohibiting the discharge of domestic waste from sewer lines overflows, septic tanks, portable toilets, boats, and animal feces. Typical ordinances make unlawful the failure to exercise due care or control over an animal such that solid waste is to allowed to be deposited on any public sidewalks, parks or other public property, or private property other than that of the owner.

CBRP Implementation: Existing ordinances do not establish specific requirements to properly dispose of pet waste with accompanying penalties for failure to comply. As part of CBRP implementation, the permittees will re-visit existing ordinances that address any type of animal waste and look at ways to enhance waste management requirements, compliance and enforcement. For example, a pathogen control ordinance could specifically require owners/keepers of pets to properly dispose of pet waste that is deposited on any property, whether public or private. Proper disposal would be defined as placement of pet waste in waste receptacles or containers that are regularly emptied or to a sanitary sewage system for proper treatment. Penalties or fines could be also included.

In addition to the above recommendations, it is possible that during implementation of the inspection program (Element 3), additional ordinance needs may be identified that could be addressed through a pathogen control ordinance. This potential will be evaluated continually during CBRP implementation.

C.3 Element 2 - Specific BMPs

The CBRP requires the identification of specific BMPs that will be implemented to reduce bacterial indicator levels in receiving waters. The following sections describe in no particular order the specific BMPs that have been incorporated into the CBRP. These BMPs range from programmatic activities that set the stage for other CBRP elements (e.g., DWF inspections) to specific activities that can reduce DWFs or control bacterial indicators at the source. Some of the recommended BMPs are also MS4 permit requirements, which will be noted as appropriate. In addition, some of these BMP activities may be coordinated between San Bernardino and Riverside County to streamline the level of effort required to implement the activity.

Transient Camps

Transient encampments near receiving waters or within MS4 facilities are often cited as a potential source for bacterial indicators and a reason for closure of these encampments. As this source of bacterial indicators is directly associated with human waste / human pathogens, this is a high priority source for control. It is not certain to what degree water quality is impacted by these encampments, especially under dry weather conditions. However, facilities for proper management of human and food wastes are typically not present at transient encampments. A difficulty in addressing transient encampments as a source of bacterial indicators is that they are transitory, existing for periods that may range from days to weeks. In some instances, sites may be used intermittently by transients. Two essential questions need to be evaluated prior to fully engaging in a process that involves eliminating transient camps that have the potential to impact water quality:

- *Where are transient encampments in relation to the MS4?* Transient encampments are commonly located under bridges, in channels, or near or adjacent to waterbodies within the flood control facility right-of-way or within a natural channel. RCFC&WCD owns and operates the vast majority of MS4 that can support transient encampments. Through annual inspections of its MS4, the RCFC&WCD identifies encampments within its MS4 that are a threat to public health and safety or downstream receiving waters. These encampments are relocated and cleaned through a coordinated program with local municipalities, social service providers and law enforcement.

  Encampments outside of MS4 rights-of-way may also provide a threat to water quality in some cases. To assist in source evaluations for specific MS4 facilities, the Riverside County permittees can conduct reconnaissance to identify locations for transient encampments that may have the highest potential to impact water quality as part of their source assessment program. As transient encampments are mobile, it is appropriate to conduct reconnaissance after source assessments indicates a potential human contamination in a MS4.

- *What is the water quality impact of transient encampments?* Once a transient encampment has been identified as part of an MS4 inspection or source assessment follow-up, an investigation can be conducted to examine to what degree transient activities, including illicit discharges, are impacting DWFs. It may be possible that such encampments are more of a wet weather concern. Such an investigation may include field observations of camp activities and water quality sampling upstream and downstream of selected camps located adjacent to waterbodies.

Based on the findings from the above activities, an evaluation of the potential benefits of enhancing existing transient encampment management strategies to focus on eliminating camps near waterbodies will be made. Specifically, this evaluation will look at the social, financial impacts of program enhancement relative to the water quality benefits achieved as compared to other bacterial indicator reduction strategies. This evaluation is needed prior to implementation since camp closure requires participation by multiple agencies, which will tax already limited resources, e.g., law enforcement, public works, environmental health, and social services.

If the decision is made to expand efforts to eliminate transient encampments to support CBRP implementation an area-wide model program will be developed to guide jurisdictional agencies. For example, The Center for Problem-Oriented Policing and the U.S. Department of Justice Office of Community Oriented Policing Services developed *Homeless Encampments* (2009 guidance document), which presents recommended steps for closing down transient camps. These steps are summarized as follows:

- Assess encampment to identify the number of occupants and any hazardous conditions - This initial step is critical as it provides information regarding what additional local resources (law enforcement, public works, and social services) would be required to close the camp.
- Determine jurisdiction for multi-agency coordination – The exact location of the encampment determines which municipal entities and department should be involved.
- Arrange alternative shelter prior to removal of individuals from encampments to prevent legal challenges.
- Engage homeless advocacy groups to explain what process will be followed and what alternative shelter arrangements are available; this will ease tensions and controversy prior to implementing camp closure activities.
- Understand jurisdictional laws regarding removal of transient/ property to prevent latter claims of violations of such laws.
- Provide and post written advance notice to camp occupants that they are trespassing, provide a deadline to vacate and remove all property, and identify location(s) of alternative shelter.

- Issue citations after passage of the first deadline and notify occupants that they are subject to arrest and property seizure if the camp is not vacated after a second deadline.

- Conduct arrests if occupants have not vacated and removed property by second deadline.

- Clean-up site after camp has been vacated, and remove and cut back foliage/natural cover as this action tends to remove incentive for the camps to be rebuilt in the same location; it also provides unobstructed views of the area.

- Inspect the site periodically to ensure camp is not reestablished.

- Post signage prohibiting establishment of encampments in the area.

Other methods which have been used in the local area will be considered as well. For example, in Riverside County the City of Corona and the RCFC&WCD have local experience working with a transient task force to address concerns associated with transient camps.

CBRP Implementation: The following activities will be implemented as part of this BMP:

- Identify locations of suspected transient encampments in receiving waters or MS4 facilities.

- Implement an investigation at one or more locations to evaluate potential DWF water quality impacts from transient camps.

- If transient camps are identified as a potential urban bacterial indicator source in DWFs, develop a model program to address transient encampments targeted for closing because of expected water quality impacts.

- As determined necessary, implement transient camp closures and follow-up activities to prevent re-establishment of closed camps in the same locations.

Illicit Discharge, Detection and Elimination Program (IDDE)

The MS4 permit for San Bernardino County requires the development of a pro-active IDDE program (MS4 permit Section VIII). This effort is to review and update ongoing MS4 permit activities to eliminate illegal connections and illicit discharges to the MS4. The purpose of this program is to specify a procedure to conduct focused, systematic field investigations, outfall reconnaissance surveys, indicator monitoring and tracking of discharges to their sources. The CBRP will benefit from the development of the IDDE procedures, which should be effective in identifying and eliminating or reducing DWFs to the MS4.

The Regional Board recommends that the IDDE program be based on the IDDE Guidance Manual developed by the Center for Watershed Protection (CWP 2005) or an equivalent program. Key elements recommended by the CWP document include mapping, field observation and survey, monitoring and spatial analysis.

The MS4 Area-wide Program currently implements many effective IDDE elements. The Program already utilizes an in-depth business inspection system, as well as training to all employees to observe and report illegal discharges. Each agency employs the centralized MS4 database to standardize the reporting format, and a model enforcement document has been prepared. Procedures to locate and remediate illegal discharges are implemented by each Agency, and reported to the Regional Board.

The IDDE will specify the required documentation of these procedures, as well as outlining additional measures that can be implemented to improve the effectiveness of the IDDE program.

CBRP Implementation: San Bernardino County permittees will develop the IDDE Program as required by the MS4 permit. Development of this program is critical to the implementation of an inspection program (Element 3 – Attachment C.4). The San Bernardino County MS4 permit contains no defined date for development of the IDDE program. However, given that establishment of the IDDE program is a precursor to full implementation of the CBRP inspection program, a schedule for development of this program has been included in the CBRP schedule.

Street Sweeping

Trash and other materials accumulated in streets and within MS4 facilities may provide a habitat and food source for bacterial indicators. DWF in street gutters, drains, and catch basins keeps these facilities damp, which supports bacterial indicator survivability. Biofilms may develop under these types of conditions within catch basins, along street gutters, or within flood control channels (e.g., see Skinner et al., 2010; Fergusson 2006). Biofilms are dynamic microbial communities that go through an attachment phase and then ultimately a detachment, erosion or "sloughing" phase from the surface to which they are attached.

Managing or eliminating biofilm development has the potential to substantially reduce bacterial indicator levels. A recent study by the City of San Diego shows that enhanced cleaning of catch basins provided minimal benefits in terms of reducing bacterial indicator levels. However, there is evidence that enhanced street sweeping will provide benefits. This can be accomplished by using vacuum street sweepers to reduce biofilms and their habitat and food sources from street gutters. Skinner et al. (2010) found very high bacterial indicator counts in initially bacteria free hose water running along street gutters. Implementing improved street sweeping practices resulted in an order of magnitude reduction in fecal coliform concentration (14,000 MPN/100 mL to 870 MPN/100 mL) in a 300 feet section of gutter before and after street sweeping. This finding suggests that the use of newer vacuum street sweepers targeting the street gutter could provide increased control of this source of bacterial indicators.

CBRP Implementation: San Bernardino County MS4 permittees will evaluate existing street sweeping programs (e.g., method, frequency, equipment) to determine potential to modify programs to reduce bacterial indicator sources. Based on the findings of this evaluation, a plan and schedule will be developed for implementation.

Irrigation or Water Conservation BMPs

Attachment C.2 describes expectations associated with water conservation ordinance enforcement under this plan. A separate but related CBRP element is the implementation of BMPs that target irrigation practices with a goal of reducing/eliminating DWFs to the MS4. These practices not only benefit water quality but reduce water use. The development and implementation of these practices will be carried out collaboratively with water purveyors to support development of the Residential Program, as required by the MS4 permit by January 29, 2013. . At the regional level, IEUA developed a *Water Use Efficiency Business Plan* (WUEBP). Between now and 2020 the program will target water conservation, with an emphasis on outdoor water use. Specific practices that would be effective at reducing dry weather runoff include:

- *Replacement of grass with artificial turf* – The use of artificial turf provides a low maintenance, no irrigation alternative to grass lawns. Costs of materials and installation to replace a grass lawn with artificial turf can range from $6-14 per square foot. In the past in neighboring Riverside County, through partnerships with MWD and Western Municipal Water District, Cities of Riverside and Corona have offered a $1 per square foot rebate for property owners that replace existing grass lawns with artificial turf.

- *Replacement of grass with drought tolerant native plant species* – California drought tolerant native plants/gardens require minimal watering and therefore reduce the likelihood of off-site dry weather runoff (see the California Native Plant Society webpage for more information at www.cnps.org). In neighboring Riverside County , property owners that replace existing grass lawns with drought tolerant plants in the Cities of Riverside and Corona have through past programs been eligible to receive a rebate of $0.90/square foot (sq. ft.) and $0.40/sq. ft., respectively.

- *Installation of Weather Based Irrigation Controllers (WBICs)* – WBICs use climate measurements to determine the amount of water needed to meet evapotranspiration requirements of grass lawns and other landscaped areas on a given day. Limiting irrigation to the needs of the plants can reduce the amount of water that leaves a property as dry weather runoff. WBICs can be distributed to potential users via several types of programs, including partial rebates/vouchers, equipment exchanges, or direct installation. As part of the WUEBP, IEUA will implement a direct installation rebate program.

Typical costs for WBICs range from $300 - $800 for a small residential application, to $2,000 - $3,000 for a property with large landscaped areas. The cost effectiveness of installing WBICs to a property owner or water agency is dependent upon the existing water use (potential to reduce demand), avoided cost of water, water rates, and expected lifespan of the device (Mayer et al. 2009). Given these variables, it would likely not be cost effective to distribute WBICs to individual homeowners who do not typically over-irrigate. Conversely, applications of WBICs would likely be cost effective on large landscape properties where excess water is used and the potential to generate off-site runoff is high. The most cost effective implementation approach would need to be evaluated by the local jurisdiction.

- *Landscape irrigation audits* – IEUA offers commercial and single family residential audits throughout its wholesale service area through the Chino Basin Water Conservation District.. An audit involves checking the irrigation system for leaks, ensuring spray heads are properly directed and operational, capping unused spray heads, and providing a watering schedule based on precipitation rate, local climate, irrigation system performance, and landscape conditions. Customers are also provided with information regarding rebates and incentives designed to reduce outdoor water use. A potential implementation approach would be to target landscape audits in areas that are hydrologically connected to downstream receiving waterbodies/compliance sites. The cost of conducting a landscape irrigation audit is low relative to other irrigation practice BMPs; however, the effectiveness is unpredictable. To be effective, property owners would need to consistently implement the audit recommendations.

- *Public education and outreach* - Public education and outreach activities to encourage water conservation are already ongoing (both by the MS4 programs and water purveyors). The CBRP does not recommend any new or modified public education and outreach activities unless it is determined that potential additional benefits could be achieved from additional collaboration between the MS4 permittees and water purveyors in this area.

- *Water Budgets* –A water budget provides customers with a site specific water budget based on lot size, local climate, and seasons. This program is a part of IEUA's Plan is targeted towards dedicated landscape meter customers with the potential to incorporate single-family residences. After a budget is developed customers are sent a report with each water bill showing the budget versus actual usage. Customers exceeding the budget are provided recommendations to reduce water use. A similar program was implemented by the Municipal Water District of Orange County and reduced water use by 20% for participating customers.

- *GeoSmart Landscape Finance Program* – IEUA is developing this program through its Plan to assist homeowners with improving landscape water efficiency by offering low cost loans. The program will be designed to target the combined measure of turf removal, installation of low water use plants, and retrofits to low water use irrigation systems. Customers may also receive financing for irrigation system replacement, smart controller installation, and sprinkler nozzle retrofits to high efficiency nozzles

The benefits expected from each of the above BMPs vary (see Table 5-1). For grass replacement BMPs, dry weather runoff is mostly eliminated while WBICs can reduce dry weather runoff by approximately 50 percent (Jakubowski 2008). Runoff reduction from landscape irrigation audits and ongoing public education and outreach activities are more difficult to quantify, as they are largely dependent on changing human behavior. These types of BMPs may reduce runoff from an individual property by only a small amount; however, because implementation may be more widespread the overall benefit may be relatively high. Factors associated with each of the above BMPs impact will affect decisions on how such BMP practices can be developed and implemented at the local level as part of the CBRP. These factors include cost, public perception, reliability, ease of implementation, and expected runoff reduction. Table C-2 provides an evaluation of each of these factors by ranking them has low, medium or high with regards to expected benefits from their implementation.

Table C-2. Evaluation matrix for irrigation practices/ water conservation BMPs (high benefit ●; medium benefit ⦿; low benefit ○)

Water Conservation BMP	Dry Weather Runoff Reduction	Cost	Ease of Implementation	Water Conservation
Replacement of grass with artificial turf	●	○	○	●
Replacement of grass with drought tolerant plant species	●	⦿	○	●
Installation of WBICs	⦿	○	⦿	⦿
Landscape irrigation audits	○	●	●	○
Public education and outreach	○	●	●	○
Water budgets	⦿	●	●	●
GeoSmart landscape finance program	●	○	○	●

Other types of water conservation BMPs could be used in-lieu of the ones included in this CBRP such as high efficiency spay nozzle installations, water brooms, and large landscape water budgets. The effectiveness of these BMPs would need to be evaluated further to estimate the DWF and associated bacteria reduction that could be achieved.

CBRP Implementation: Development and implementation of these BMPs will be closely coordinated with water purveyors within the MS4 drainage area. Water demand management measures (DMM), also known as BMPs, are required to be evaluated in urban water management plans (UWMPs). The UWMP Act (http://www.water.ca.gov/urbanwatermanagement/docs/water_code-10610-10656.pdf) lists 14 DMMs for evaluation of which 7 take partly into consideration outdoor water use and could potentially reduce DWF. Water purveyors are required to describe and provide a schedule for implementation of each DMM. For DMMs not implemented or not scheduled for implementation in the next five years, water purveyors are required to evaluate each DMM, by considering DMMs that offer lower incremental costs than obtaining additional water supplies. This evaluation must take into account a cost-benefit analysis, economic factors, non-economic factors identify funding for any water supply projects providing water at higher unit cost than the DMM, and describe the legal authority of the and ability of the purveyor to work with other agencies in implementing the DMM.

All water purveyors applying for state-funded grants or loans must comply with AB 1420. AB 1420 states a water purveyor must be deemed compliant with the DMMs before funding can be provided by the State. DMMs with the potential to impact DWF are described below:

- **DMM A – Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers.** This DMM requires water survey programs for both indoor and landscape water use. As determined, by the CUWCC the landscape water use portion of this measure involves offering landscape water conservation surveys to not less than 20 percent of single- and multi-family residential customers every two years, and completing surveys for not less than 15 percent of single- and multi-family residential customers within 10 years of program initiation. After the ten-year period, water purveyors will maintain the program at the same level as high water bill complaints or no less than 0.75 percent per year of single-family accounts. Landscape water surveys shall include, but are not limited to checking irrigation system and timers for maintenance and repairs, estimating landscape measured areas, developing customer irrigation schedules, reviewing the schedule with customers, provide information handouts to customers, and providing the customer with evaluation results and recommendations to save water.

- **DMM E – Large Landscape Conservation Programs.** As determined by the CUWCC, this measure consists of three parts focusing on commercial, industrial, and institutional customers with large landscape irrigation needs. CUWCC assumes the DMM will result in a 15 to 20 percent demand reduction for landscape irrigation for customers participating. The first part requires developing evapotranspiration (ET)-based water budgets for accounts with dedicated irrigation meters. Water budgets cannot equal more than an average of 70% of the annual average local reference ET per square foot of landscape area. Budgets must be developed at an average rate of 9 percent per year over ten years, so budgets are developed for 90 percent of dedicated irrigation meter accounts within ten years of implementation. Upon completion, notices are required to be provided with each billing cycle showing the water consumed versus the budget. Within 6 years of implementation, the water provider must annually provide site-specific technical assistance to all customers exceeding their budgets by 20 percent or more. The second part involves providing large landscape surveys to not less than 15 percent of commercial, industrial, and institutional (CII) accounts with mixed-use meters within 10 years of program initiation. The third part requires offering financial incentives to support parts 1 and 2. Rebates for water conservation through IEUA via its participation in MWD's Save A Buck Program for CII customers. Rebates offered by IEUA with the potential to reduce DWF are weather based irrigation controllers, central computer irrigation controllers, rotating spray nozzles retrofits, and high efficiency nozzle retrofits for large rotary sprinklers.

- **DMM G – Public Information Programs.** This DMM requires implementation of public information programs with the goal informing customers about why water conservation is important, methods customers can use to conserve water, and to encourage water users to conserve water. The CUWCC has established minimum program requirements. Minimum requirements are:

  1. Contacts with the public at a minimum on a quarterly basis
  2. Contacts with the media at a minimum on a quarterly basis
  3. Maintenance of a website on a quarterly basis
  4. Describe the materials used to meet items 1 and 2.
  5. Annual budget for public information program
  6. Describe all other outreach programs.

- **DMM H – School Education Programs.** This DMM is designed to educate students regarding the importance of conserving water and to develop good water conservation habits at an early age. CUWCC requires purveyors to implement a school education program promoting water conservation and to work with both private and public schools in providing education materials, instructional assistance, and presentations about the local watershed. At a minimum the program should include the following:

  1. Curriculum materials provided by the water purveyor including confirmation from the materials meet State education framework requirements and are age appropriate.
  2. Materials are distributed to grades K-6 students and if possible grades 7 - 12.

3. Descriptions of the materials used to meet the minimum requirements.

4. Provide an annual budget for the program

5. Describe all other water purveyor educational programs.

- **DMM I – Conservation Programs for Commercial, Industrial, and Institutional Accounts.** The CUWCC defines this measure as requiring water purveyors to implement water conservation measures for CII customers to achieve a 10 percent water savings for the CII sector as a whole using 2008 as a baseline over a 10 year period. Purveyors can either implement measures on CUWCC's list with documented savings or implement purveyor developed measures, but the purveyor must document how it is determining the savings. Measures may target indoor and/or outdoor water use.

- **DMM K – Conservation Pricing.** CUWCC defines conservation pricing as providing economic incentives to customers to use water in an efficient manner. Acceptable types of rate plans include uniform, seasonal, tiered, and allocated based rates as long as purveyors can illustrate their rates meet CUWCC established formulas for determining if rates reflect conservation pricing. Conservation pricing has the potential to reduce outdoor water waste and subsequently DWF.

- **DMM M – Water Waste Prohibition.** This measure requires water purveyors to prevent water waste for new developments and existing users and to develop water shortage response measures (see Water Conservation Ordinance in Element 1). For outdoor water use, this measure addresses irrigation inefficiencies and other outdoor water uses. Purveyors can meet these requirements by adopting water waste ordinances or developing terms of service prohibiting water waste. Prohibiting water waste and enforcing ordinances and terms of service agreements has the potential to reduce DWF.

Water Quality Management Plan Revision

The San Bernardino County MS4 program is required to update its WQMP Guidance and Templates to incorporate low impact development (LID) practices to reduce runoff from new development and significant redevelopment activities. BMP emphasis will be on infiltration, capture and use, evapotranspiration, and treatment through use of biotreatment type BMPs. Revised WQMP documents are required for submittal to the Regional Board for review by July 29, 2011.

The revised WQMP program will provide water quality benefits, but these benefits will be somewhat limited for DWFs. For example, for new development projects the water quality benefit will apply only to wet weather runoff since the pre-project condition would not have produced any dry weather runoff. However, for significant redevelopment projects, the WQMP approval process will result in the introduction of LID practices to existing developed areas where dry weather runoff may be occurring.

The presumption is, that for these existing developments, stormwater management controls were not designed to control non-storm runoff. Therefore, some degree of runoff (e.g., from irrigation runoff) likely currently occurs under dry weather conditions. With significant redevelopment of the project site, an approved WQMP would require implementation of site design, source control, and/or structural control BMPs to address pollutants of concern by reducing or treating runoff during dry and wet seasons.

While water quality benefits are expected to be achieved for significant redevelopment projects, the pace at which such projects are expected to be completed in the MSAR watershed is likely to be slow given economic factors. Moreover, even if the rate of development activities increase in the near term, given the December 31, 2015 compliance date for meeting urban wasteload allocations for dry weather conditions in the dry season, the numbers of acres of redevelopment relative to the total numbers of acres where dry weather runoff likely occurs will be relatively small. Over a much longer time horizon, e.g., 50-100 years, the cumulative benefits will be much greater.

CBRP Implementation: Revision of the WQMP Guidance and Template is a permit requirement that will be completed by July 29, 2011. Implementation will occur after review by the Regional Board and submittal of a final WQMP Guidance, likely by 2012.

Septic System Management

The San Bernardino County MS4 permit requires permittees to develop a septic system inventory and a septic system program to minimize failure rates of septic systems. Poorly operating septic systems can potentially lead to the discharge of pollutants to surface waters; however, the extent to which septic systems are currently a source of bacterial indicators in DWFs from the MS4 is unknown. Moreover, while development of this inventory may identify areas with problematic septic systems, the potential for water quality improvement may be limited to surface water impacts that occur only during wet weather runoff events.

CBRP Implementation: CBRP implementation will include fulfillment of the MS4 permit requirements to ensure that septic systems are not contributing bacterial indicators to the MS4 under dry weather conditions. Activities will include:

- *Develop septic system inventory* – Develop an inventory of septic systems which includes, to the extent practicable, information such as location, system type and age, depth to groundwater, and soil type. This database can be used to then better track other operations and maintenance information such as dates of inspection, service and failures.

- *Evaluate potential water quality impacts* - With an accurate inventory, mapping the location of septic systems relative to MS4 facilities provides an opportunity to evaluate the potential impact to water quality under dry weather conditions, if a septic system is failing.

- *Conduct public education* – Educate owners regarding how to properly maintain their on-site systems and distribute materials explaining recommended operation and maintenance schedules.

- *Conduct inspections and initiate enforcement, where appropriate* – Where the potential for water quality impacts is identified, conduct inspections to determine the need for mitigation. Where appropriate, conduct enforcement actions to mitigate the water quality concern.

C.4 Element 3 - Inspection Criteria

Element 3 addresses the CBRP requirement for inclusion of specific inspection criteria to identify and manage the urban sources most likely causing exceedances of water quality objectives for indicator bacteria. Implementation of urban source evaluation activities provides the data required to determine the potential for an MS4 outfall or drainage area to discharge controllable sources of bacterial indicators. The results of this evaluation dictate next steps in the CBRP implementation process. This required element is incorporated into what is being termed the inspection program. The inspection program envisioned for the CBRP is a systematic campaign to conduct DWF and bacterial indicator source evaluation activities within each subwatershed draining to a watershed-wide compliance site. The foundation for this approach is defined by the USEP, prepared by the MSAR TMDL Task Force to satisfy a TMDL requirement (see Attachment A). USEP activities are currently being implemented by the MSAR TMDL Task Force; however, under the CBRP the pace and extent of these activities will be significantly increased to eliminate or reduce controllable urban sources of DWF.

As noted above, several of the specific BMPs included in Element 2 directly support the implementation of Element 3, e.g., development of the IDDE program and implementation of water conservation BMPs. Completion of these elements will help guide implementation of the inspection program. Conversely, implementation of the inspection program may impact how or where specific BMPs are implemented or how decisions are made regarding the need for additional ordinance authority. For example, over time the inspection program may identify a particular bacterial indicator or DWF source that can be managed better by the adoption of an ordinance.

The MSAR Permittees will implement urban source evaluation activities using a comprehensive, methodical approach that provides data to make informed decisions regarding the potential for an MS4 outfall or group of outfalls to discharge controllable sources of bacterial indicators. This approach relies on implementation activities associated with the inspection program element, which are described in the following sections.

Tier 1 Reconnaissance

Tier 1 sites are defined as locations where urban sources of dry weather flow may directly discharge to a downstream watershed-wide compliance site. Some of the Tier 1 sites are at the same locations sampled as part of implementation of the USEP in 2007-2008. Additional Tier 1 sites have been included, where needed, to supplement existing information. Many of these Tier 1 locations may be dry, have minimal dry weather flow, or not be hydrologically connected to downstream waters. However, until a reconnaissance is completed, their potential to contribute controllable sources of bacterial indicators is unknown. It should be noted that none of the recommended Tier 1 sites are located in areas that have been determined to be hydrologically disconnected from impaired waterbodies during dry weather conditions (see hatched areas in Figures C-1 through C-5).

Prioritization

Based on the findings from Tier 1 data collection activities, MS4 drainage areas with potentially controllable urban sources of bacterial indicators will be prioritized based on factors such as the magnitude of bacterial indicator concentrations and results from source tracking analyses. Areas with human sources (as compared to anthropogenic sources such as domestic pets) will receive the highest priority for action. Results of IDDE inspections at Major Outfalls will be used to supplement Tier 1 reconnaissance data during the prioritization step.

Evaluate Mitigation Alternatives

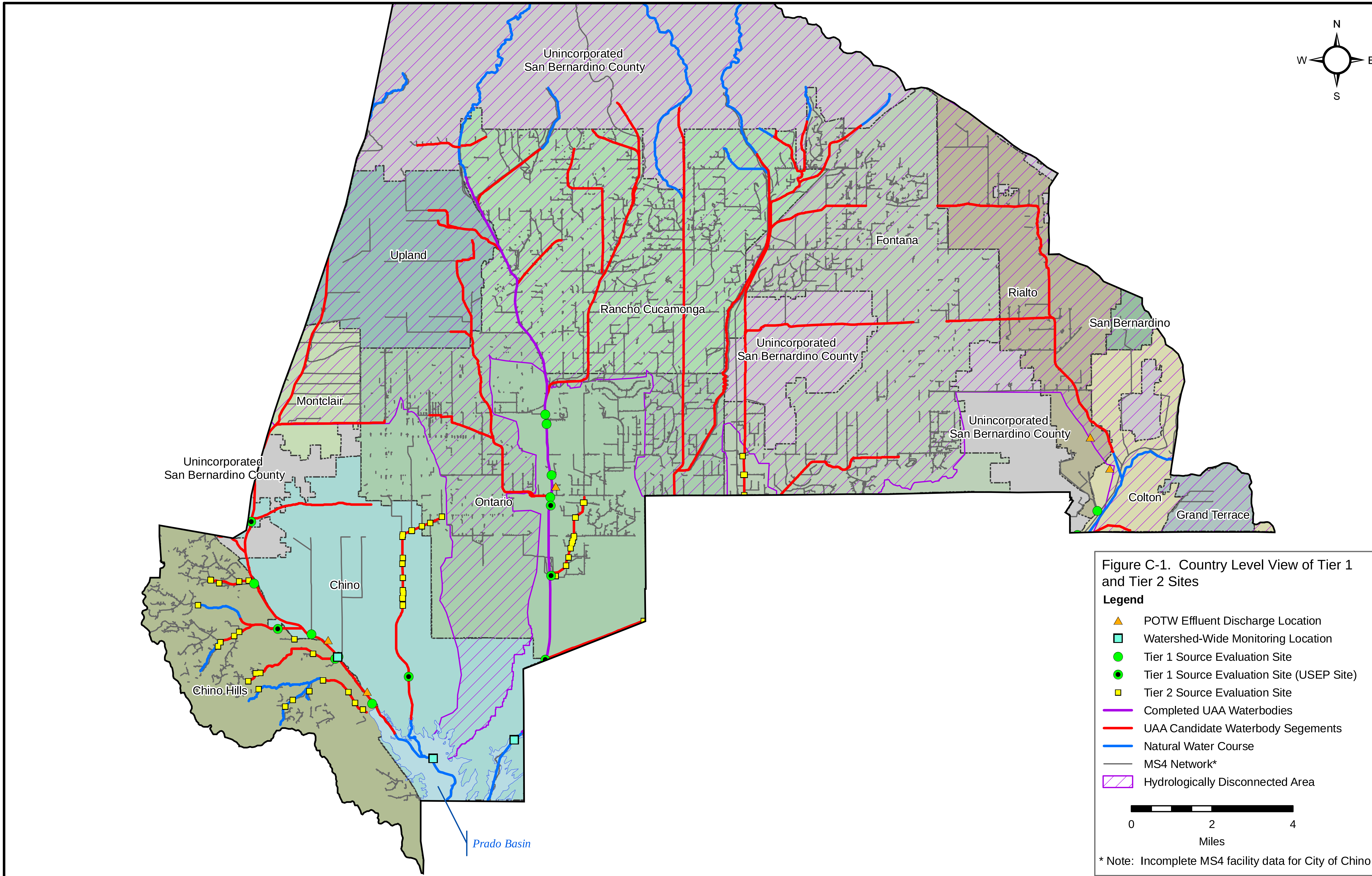
In order of priority, prioritized drainage areas will be further evaluated to identify non-structural or structural alternatives (or some combination of both) for mitigating controllable sources of bacterial indicators. As needed, this controllability assessment will include reconnaissance of Tier 2 sites and the use of IDDE methods to identify and evaluate alternatives. Tier 2 sites are tributary to Tier 1 outfalls. Tier 2 sites are predominantly locations where underground storm drains discharge to open channels. If a Tier 2 site is determined to be a potential contributor to non-compliance, additional inspection activities may occur to identify the nature and source of the dry weather flow and bacterial indicators and evaluate controllability.

Figure C-1 provides a map of recommended Tier 1 and Tier 2 source evaluation sites for the entire San Bernardino County MS4 permit area and Figures C-2 through C-5 provide individual maps for jurisdictions where Tier 1 and 2 sites are recommended (respectively, Cities of Chino, Chino Hills, Fontana, and Ontario). Table C-3 summarizes the number of Tier 1 and Tier 2 sites that are recommended for inspection for each San Bernardino County jurisdiction.

Table C-3. Summary of recommended Tier 1 and Tier 2 nodes in each San Bernardino County jurisdiction

Jurisdiction	Receiving Waters	Tier 1	Tier 2
Chino	Chino Creek, Cypress Channel [1]	4	13
Chino Hills	Carbon Canyon Creek, English Canyon, Boys Republic South Channel, Chino Creek, Lake Los Serranos Channel	4	23
Fontana	San Sevaine Channel	0	4
Montclair	City is hydrologically disconnected from downstream impaired waters under dry weather conditions [1]	0	0
Ontario	Cypress Creek, Lower Deer Creek, County Line Channel	6	16
Rancho Cucamonga	City is hydrologically disconnected from downstream impaired waters under dry weather conditions	0	0
Rialto	Rialto Channel	1	0
Unincorporated San Bernardino County	Jurisdiction is hydrologically disconnected from downstream impaired waters under dry weather conditions	0	0
Upland	City is hydrologically disconnected from downstream impaired waters under dry weather conditions [1]	0	0
	Total	**15**	**52**

1) Intermittent turnouts of imported water at OC-59 from MWD purchased by OCWD create a condition of hydrologic connectivity between urban DWF from MS4s and Chino Creek


Unincorporated San Bernardino County
Upland
Rancho Cucamonga
Fontana
Rialto
San Bernardino
Unincorporated San Bernardino County
Montclair
Unincorporated San Bernardino County
Unincorporated San Bernardino County
Ontario
Colton
Grand Terrace
Chino
Chino Hills
Prado Basin
N
W
E
S
Figure C-1. Country Level View of Tier 1 and Tier 2 Sites
Legend
POTW Effluent Discharge Location
Watershed-Wide Monitoring Location
Tier 1 Source Evaluation Site
Tier 1 Source Evaluation Site (USEP Site)
Tier 2 Source Evaluation Site
Completed UAA Waterbodies
UAA Candidate Waterbody Segements
Natural Water Course
MS4 Network*
Hydrologically Disconnected Area
0
2
4
Miles
* Note: Incomplete MS4 facility data for City of Chino

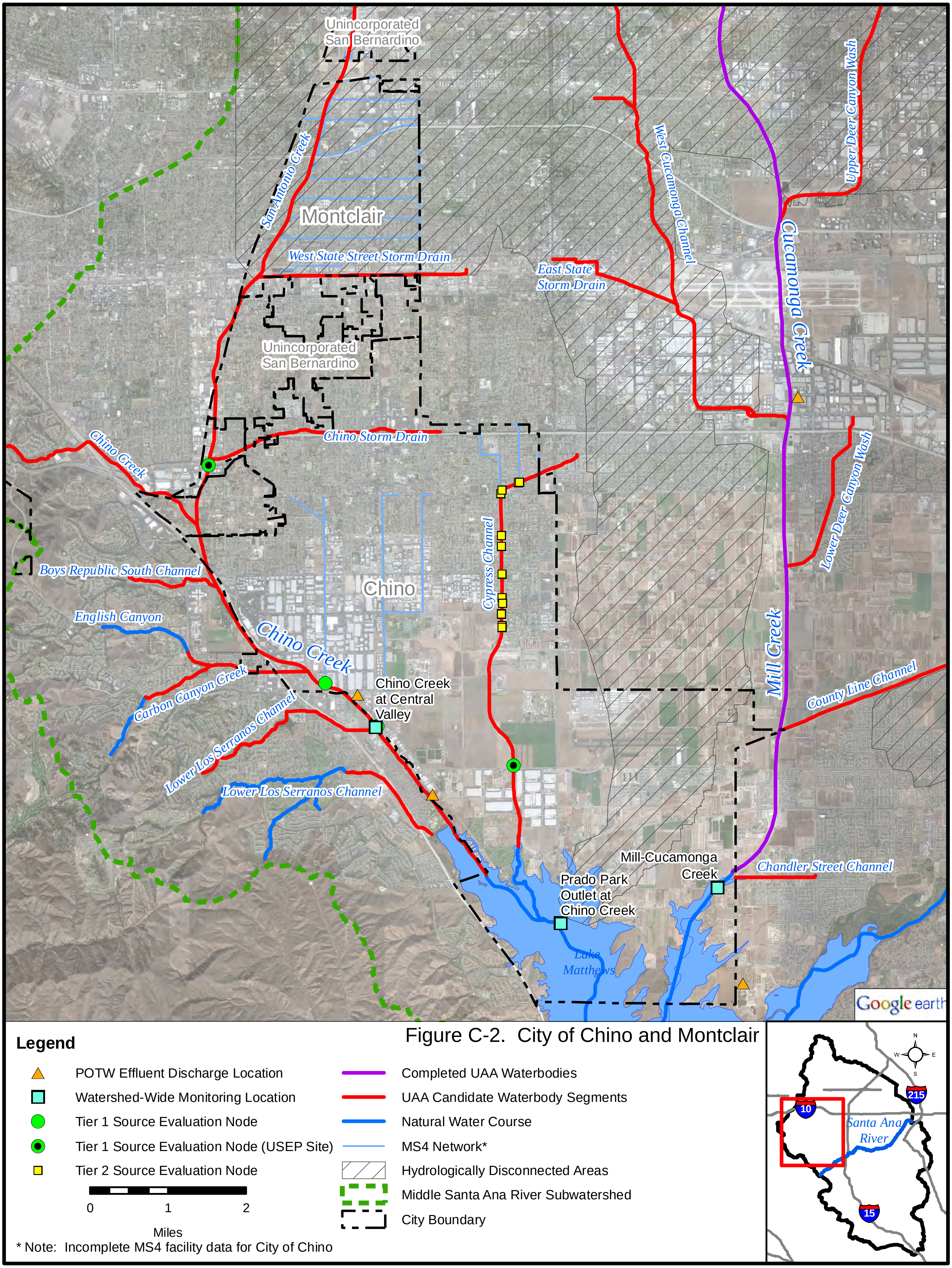


Figure C-2. City of Chino and Montclair

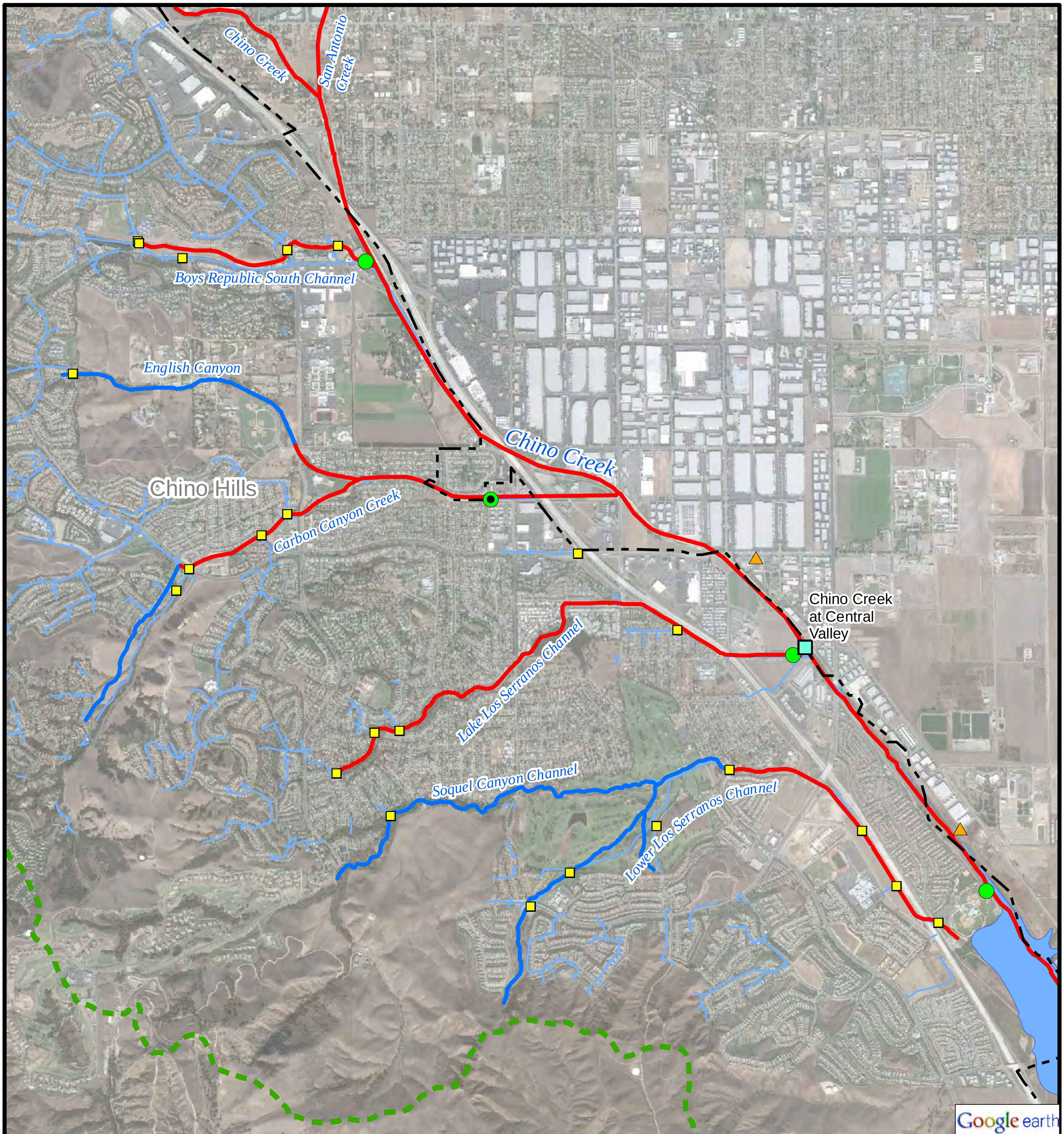
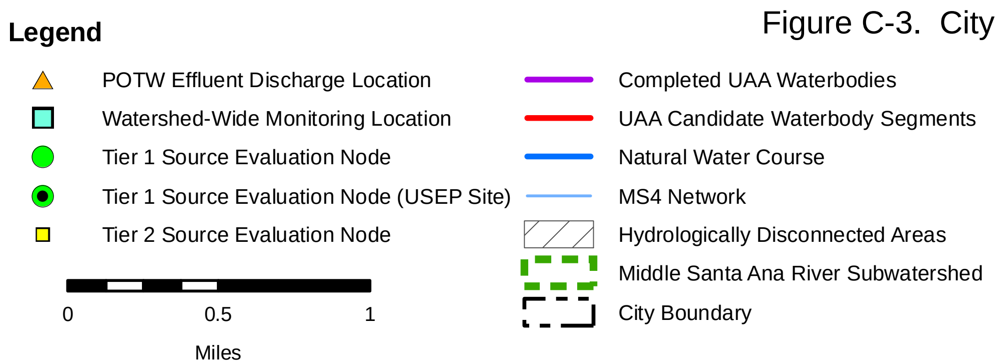
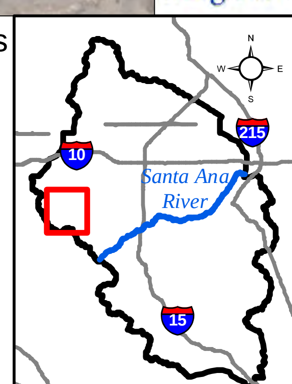


Figure C-3. City of Chino Hills





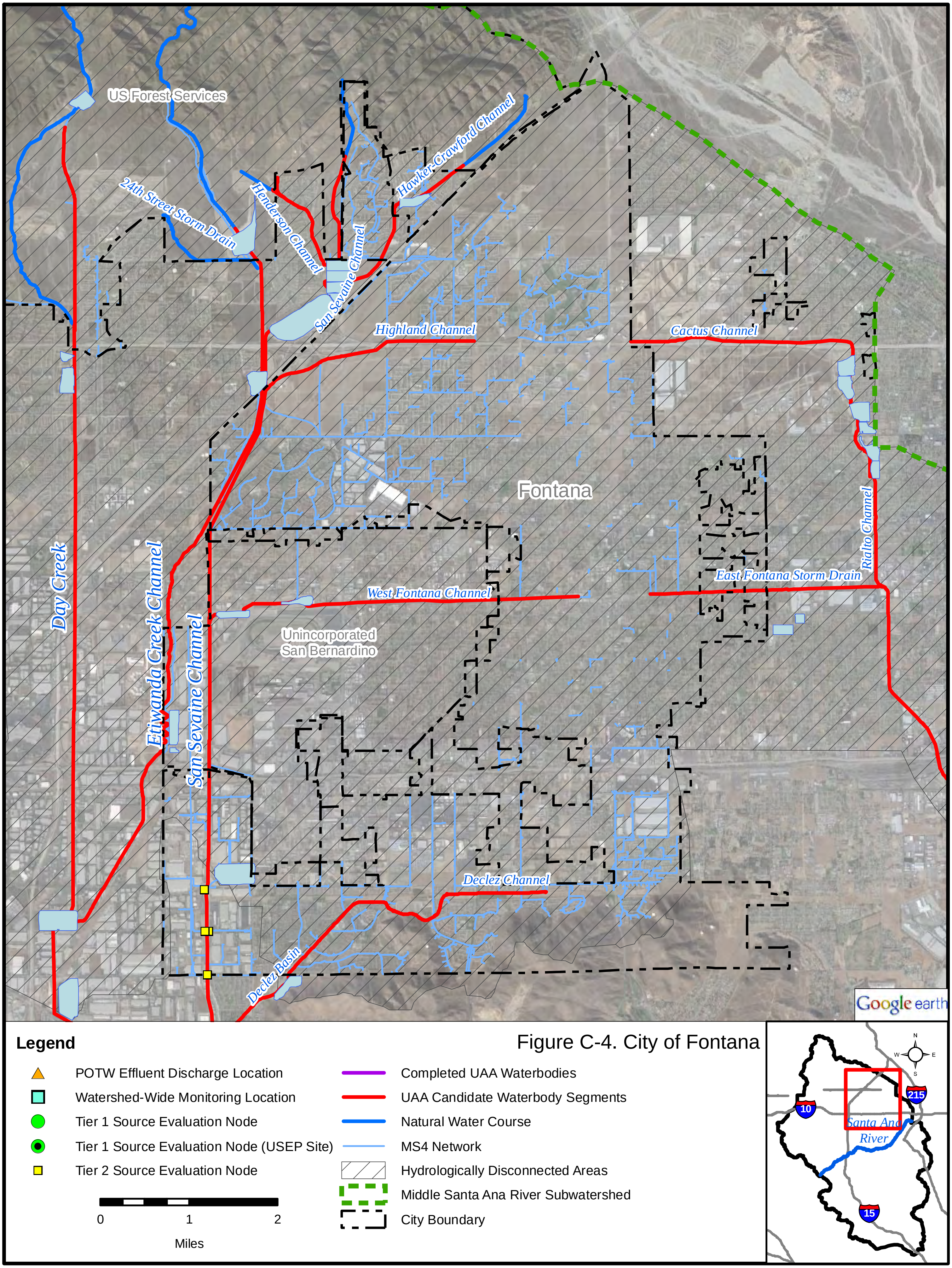


Figure C-4. City of Fontana

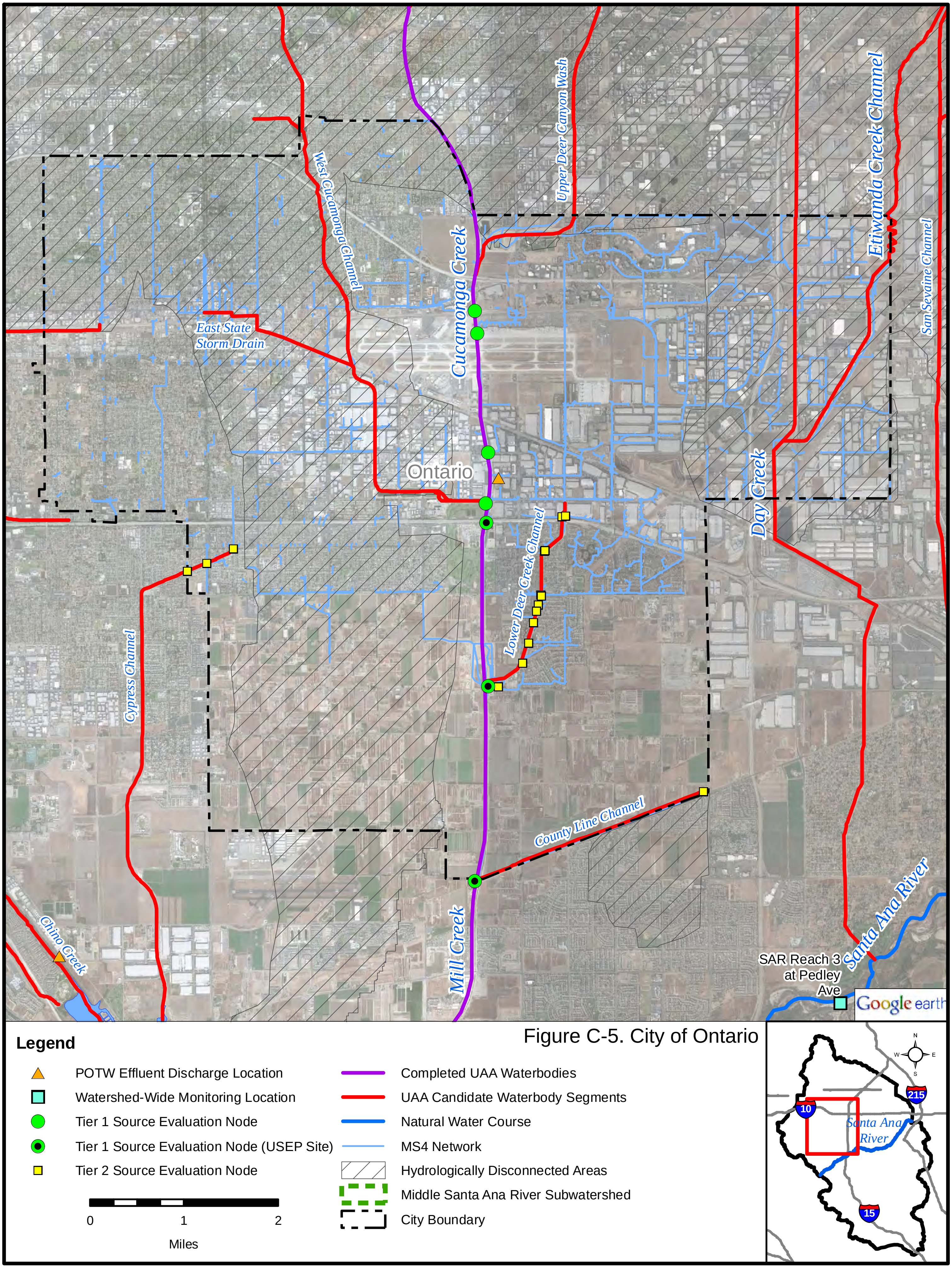


Figure C-5. City of Ontario

In the evaluation of mitigation alternatives, it may be demonstrated that a MS4 Permittee would not require selection of a mitigation alternative for some drainage areas if it can be shown to be absent of DWF (i.e. hydrologically disconnected from the receiving waterbody), or if the source of bacterial indicators is found to come from non-urban sources. The following criteria establish guidelines for making these determinations from data collected in the inspection program:

- *Absence of DWF* – Determining the presence or absence of DWF at a given MS4 outfall is a critical step. Routine field observation and measurement (if possible) will be conducted during dry weather at varying times of day and on different days of the week for up to one year to develop sufficient data to characterize frequency/volume of DWFs at Tier 1 sites. Ideally, at least 10 field visits will be made over a one-year monitoring period. If the site is dry on at least 80 percent of the visits, the area upstream of the site can be assumed to have little to no impact on downstream water quality. While up to a year is recommended to collect flow data to look at seasonal variability, if a site is found to have persistent or substantial flow after only as few as three visits that occur over a short period of time, it can be presumed that the area draining to the site is a candidate for additional inspection activity to determine the source of the DWF. If a site is found to be typically dry after ten visits, then only occasional inspections would be required in the future to provide certainty that this conclusion remains correct. If a Tier 1 site indicates the need for additional inspection, then a similar level of effort may be necessary for Tier 2 sites tributary to the Tier 1 node.

- *Non-Urban DWF Sources* - If there are any non-urban sources of DWF to a MS4 site (such as from a well blow off, water transfer, or rising groundwater), it is important to identify the frequency and relative contribution of these flows. Generally, it is assumed that these non-urban DWF sources will have very low concentrations of bacterial indicators. However, it is possible that the physical nature of the discharge generates sufficient shear stress to mobilize bacterial indicators associated with sediment or biofilms present in the receiving water (as compared to the low shear stress generated from MS4 urban DWF due to their relatively low flow rates). Elimination of the non-urban source could also result in conditions that enhance decay of bacterial indicators in channel bottom sediments or biofilms, resulting in fewer bacterial indicators available for mobilization during wet weather events. If the non-urban flow source is suspected as the cause of downstream exceedances, a site-specific study would need to be implemented to verify the assumption. The nature of such a study would be dictated by local circumstances, but could require a fairly complex sample plan. If it is determined that the non-urban source is contributing to the exceedance of bacterial indicator water quality objectives, resolution of the issue may occur independent of the MS4 permit in collaboration with the RWQCB.

Select Mitigation Alternatives

The ultimate goal of the inspection program is to select a mitigation alternative for DWFs or bacterial indicator sources. As described above, systematically conducting source evaluation activities in the MS4 should identify which outfalls or channels are primary contributors of DWF and elevated bacterial indicators. The controllability of DWF is largely dependent on the source (specific vs. diffuse) and the controllability of bacterial indicators is largely dependent on the nature of the source, with urban sources likely to be more controllable than non-urban sources, e.g., wildlife. In many cases, it is likely that the elimination or significant reduction of the DWF will also mitigate elevated levels of bacterial indicators.

The MSAR Permittees will select a mitigation alternative to mitigate controllable urban bacterial indicator sources in each prioritized drainage area. The MS4 Permittees will consider alternatives such as:

- *Prevention (or source control)* – As noted above, if the source of the water or bacterial indicators can be specifically identified, then implementation of local control measures is the best approach for mitigating the problem. The controllability assessment consists of evaluating which BMPs or programmatic tools can be applied to the situation to reduce or eliminate the source. If a targeted solution is not available, then the controllability assessment may need to consider more costly solutions, as described below.

- *Retention Structures or Low Flow Diversions* – The implementation of relatively local structural controls to prevent the DWFs from impacting downstream waters may be an outcome of the controllability assessment. Options may range from the modification of existing retention structures to capture all DWFs to the construction of new retention facilities or construction of diversions to intercept the DWFs and conveying them to a treatment facility.

- *On-Site or Regional Treatment* – The use of on-site treatment facilities, e.g., bioretention (drainage area < 20 acres) and subsurface flow wetlands (drainage area < 1,000 acres), is largely dependent on drainage area, facility sizing criteria and land availability. The practicability of these systems will have to be considered on a site-specific and subwatershed specific basis. In many cases, implementation of a regional treatment solution such as conveying DWF to a regional storage basin requires successful completion of a UAA for upstream waters, which also provides greater flexibility where the regional treatment may be sited. The MS4 permit for Riverside County requires the completion of a system-wide evaluation to identify retrofit opportunities of existing stormwater conveyances. Development of this information coupled with the establishment of the County's Watershed Action Plan (WAP) will support the identification and evaluation of structural solutions (see Attachment C-5).

Inspection Criteria Summary

CBRP Element 3 – Inspection Criteria implements the USEP to its fullest extent, building on source evaluation work already completed in the watershed. Execution of this element is the key to the success of CBRP implementation. Understanding the localized nature of DWFs and associated bacterial indicators provides the basis for determining where BMPs need to be targeted (Element 2 – Specific BMPs, Attachment C.3), whether there is a need for additional ordinance authority (Element 1 – Ordinances, Attachment C.2), and where regional structural controls may be necessary (Element 4 – Regional Treatment, Attachment C.5).

C.5 Element 4 - Regional Treatment (Structural Controls)

Element 4 focuses on the planning, design and construction of structural BMPs to mitigate controllable sources of dry weather flow and bacterial indicators. BMP structural projects may be regional (address controllable urban sources from multiple outfalls) or outfall-specific. Where appropriate to support implementation of a structural solution, Use Attainability Analyses (UAA) will be completed. In addition, the implementation of structural BMP projects will occur in a manner that is consistent with watershed planning-related activities required by the MS4 permit, specifically development of a Watershed Action Plan (WAP).

Structural Controls

A large portion of upper part of the MSAR watershed in San Bernardino County is hydrologically disconnected from impaired waters. This is primarily because of the extensive use of basins to capture and recharge dry and wet weather flows. The desire to recharge water in the watershed coupled with the development of the WAP and outcome of source evaluation program findings (Element 3) will drive decisions regarding siting of structural BMP facilities. As a result, for the most part, the emphasis of CBRP Step 2 and 3 activities will be focused on the lower portions of the MSAR watershed in San Bernardino County.

With the exception of the proposed Mill Creek Wetland (see below), it is too soon to propose specific locations for new structural BMP facilities given the lack of knowledge regarding the best locations to site such facilities (e.g., regional vs. outfall specific). Also, too little is known regarding urban sources of dry weather flow and the relative bacterial indicator concentrations associated with these sources. Implementation of the Element 3 components of CBRP Step 1 has been designed to address this knowledge void. The key outcome from this effort will be the evaluation and selection of solutions to mitigate controllable urban sources of bacterial indicators. Where a structural solution is identified, then responsible jurisdictions (those permittees responsible for drainage to the targeted outfall or outfalls) will implement CBRP Steps 2 and 3 for the project site.

Structural controls identified under CBRP Step 1 are developed in accordance with the CIP Process for outfall-specific or permittee-specific projects (see Section 2.1, Figure 2-2). Completion of the CIP Process is intended to result in fully-constructed structural BMPs (Steps 2 and 3 of the CBRP implementation process). Larger regional or sub-watershed treatment projects require additional planning and coordination, as described in Table 2.1. Completion of these projects also occurs under CBRP Steps 2 and 3. Regardless of project size, it is possible that during the planning, design and permitting phases under CBRP Step 2 a determination will be made that the planned structural BMP project is infeasible. If such a finding is made, the Permittees will go back to CBRP Step 1 and re-evaluate mitigation alternatives for the affected drainage area to identify a new approach for achieving compliance.

If a UAA is needed to ensure the success of a structural BMP project, UAA development will commence in parallel to the planning, design and permitting process (see additional information, below). Completion of structural BMP projects is subject to governing and regulatory approvals as well as funding. Accordingly, the length of time from project identification to construction completion will be highly variable. Annual reporting will document the status of each identified structural BMP project.

It is expected that the outcomes from implementation of CBRP Step 1 will result in the identification of at least some structural BMPs to manage controllable urban bacterial indicator sources. Potential locations for structural BMPs will be considered in a manner consistent with the developing WAP and along with other watershed planning activities associated with water management in the MSAR watershed including the Mill Creek Wetland project and IEUA recharge activities. Each of these activities is described in more detail in the following sections.

Watershed Planning

If through implementation of the inspection program (Element 3) the evaluation of mitigation alternatives determines that a structural BMP is the best solution at a given MS4 outfall or for a collection of outfalls, then a structural BMP project may be proposed as a solution. This type of analysis and decision will be closely coordinated with the principles contained in the San Bernardino County WAP (under development by MS4 Permittees, see MS4 permit Section XI.B.3) and the needs of water agencies such as IEUA.

WAP development is being completed in two phases. Phase 1 (submitted to the RWQCB May 31, 2011) included a system-wide evaluation to identify potential BMP retrofit sites to help preserve or restore the structure and function of natural streams, and protect surface and groundwater quality to the maximum extent practicable. The information developed from this evaluation will be used to support the evaluation of mitigation alternatives where a structural BMP solution may be necessary. Under Phase 2 of WAP development additional evaluation of potential BMP retrofit sites will occur. This effort will be coordinated with CBRP implementation.

Mill Creek Wetland Project

One regional facility is currently planned for implementation within San Bernardino County at the downstream end of the concrete lined section of Cucamonga Creek. This project would capture a portion of DWF from the entire watershed to the Mill-Cucamonga Creek at Chino-Corona Road (WW-M5) compliance monitoring site, and therefore has the potential to provide reduction in bacterial indicators. The project would divert DWF from the concrete lined channel to a debris basin northwest of the Chino-Corona Bridge over Mill-Cucamonga Creek and then under Chino Corona Road into a series of basins (Stephenson and Susilo 2009). The basins would be operated as free surface wetlands during dry weather to provide a hydraulic residence time of seven days. The treated DWF would then be discharged back to

Mill-Cucamonga Creek, about 0.5 miles downstream of Chino-Corona Road. During wet weather, water level rise within the basins would result in the basins functioning as extended detention or wet ponds. The DWF that would be diverted is not yet determined, and will be influenced by the need to maintain existing habitat areas within Mill-Cucamonga Creek, between Hellman Avenue and ~0.5 miles downstream of Chino-Corona Road, and by the wetland treatment capacity, which is a function of the hydraulic residence time selected for optimal pollutant removal.

The City of Ontario will fund a portion of this project through fees for the ~3,000 acre, New Model Colony development, located within the upstream drainage area. The project team is currently preparing grant proposals for the remaining funds needed to implement the proposed project concept. Once implemented, the effectiveness of this regional BMP should be incorporated into future water quality evaluations for the Mill-Cucamonga Creek watershed.

Groundwater Recharge of Dry Weather Flows

Regional storage basins overlying the Chino groundwater basin, primarily owned by SBCFCD or the Chino Basin Water Conservation District, provide regional capture of dry weather runoff from upstream MS4 facilities. IEUA conducts groundwater recharge operations in many of these basins, to maximize recharge of groundwater using a combination of dry weather runoff, stormwater, and supplemental imported water, while maintaining the flood control functionality required by SBCFCD. The recharge activities in these facilities capture a significant large portion of urban DWF from large drainage areas within the Cities of Upland, Montclair, Rancho Cucamonga, Ontario, and Fontana (see Figure C-1).

The Chino Basin Watermaster recently completed its 2010 Recharge Master Plan Update (CBRMP). The purpose of the CBRMP is to maximize the capture of stormwater for recharging groundwater to reduce reliance on imported sources of water and improve groundwater quality. Proposed projects in the initial phases of the plan only serve to enhance capture of wet weather runoff from larger storms or to provide additional capacity for supplemental imported water, and do not provide any additional benefit toward achieving compliance with the urban wasteload allocation applicable to dry weather conditions during the dry season.

Chino Basin Watermaster and IEUA's existing groundwater recharge system is effective in capturing most DWF from MS4 drainage areas north of Highway 60. One project concept evaluated in the CBRMP is to convey stormwater from areas with limited recharge potential (generally south of Highway 60) to basins where underlying soils are more favorable to support groundwater recharge. This project concept is considered for implementation at a later phase of the CBRMP, and involves a new large in-line detention facility on lower Cucamonga Channel to store dry and wet weather runoff to be pumped to a recharge facility in the upper part of the basin. This is a very preliminary concept and has not been fully evaluated for cost, technical feasibility, environmental concerns and other issues. However, if there were such a detention facility on lower Cucamonga Channel, it could be technically feasible to capture DWF from additional MS4 drainage areas in the City of Ontario. The need for this type of project is an example of how the findings of the inspection program will be key for determining if such a regional facility would provide sufficient wasteload allocation compliance benefits to justify a portion of the cost. Consideration of these issues would occur under CBRP Step 1 when mitigation alternatives are being evaluated.

Use Attainability Analyses

The development of a UAA may become an integral part of the implementation of a structural BMP solution. The following sections provide information regarding the development of UAAs in the MSAR watershed.

All waterbodies in the MSAR watershed are presumptively classified as REC-1 protected waterbodies. This means that all waterbodies in the watershed must meet the REC-1 water quality objectives regardless of their characteristics and ability to support REC-1 type activity. The REC-1 presumption may be inappropriate for a number of reasons including channel physical attributes and flow volume. To establish more appropriate recreational uses that recognize these factors, a UAA is required. As defined by the Basin Plan, the purpose of a UAA is "to evaluate the physical, biological, chemical, and hydrological conditions of a river to determine what specific beneficial uses the waterbody can support." For a UAA to be implemented it must receive regulatory approval, from the RWQCB, State Board and EPA Region 9.

The outcome of a UAA could be removal of either the REC-1 use or removal of both REC-1 and REC-2 uses. Either outcome would substantially change the basis for determining compliance with water quality objectives and compliance with bacterial indicator TMDL urban wasteload allocations. For example, if the waterbody is not designated REC-1, then the applicable bacterial indicator water quality objectives are much less stringent than would be the case if the REC-1 use was applicable. These changes could greatly reduce the number of locations where implementation of water quality control activities is necessary to achieve compliance. Modification of recreational uses would also provide additional flexibility for deciding *where* implementation of a water quality control measure is needed. For example, if a structural BMP is needed to meet compliance at a downstream site, the number of potential locations where that facility can be sited is increased.

Section 1.2.2 described ongoing work by the RWQCB to adopt a Basin Plan amendment to modify recreational uses and associated water quality objectives. The RWQCB is developing this Basin Plan revision in collaboration with the SWQSTF. Adoption of the Basin Plan amendment, planned for fall 2011, will include the establishment of a UAA for the following San Bernardino County waterbodies:

- *Cucamonga Creek* – Reach 1, Hellman Avenue (33°56′57.156″N, 117°36′37.476″W) to approximately 750 feet downstream of the confluence of Cucamonga Creek and Lower Deer Creek (34°0′8.7474″N, 117°35′57.372″W).

UAA Template

The Cucamonga Creek UAAs will be used as the template for all future UAAs developed in San Bernardino County. These UAAs will include the following key sections:

- *Waterbody Description*, including candidate reach coordinates and channel characterization;
- *Eligibility Analysis*, including existing and probable future recreational use based on water quality data and known recreational use activity; and
- *UAA Factor Evaluation*, which provides the justification for modifying recreational uses based on federal and state regulatory requirements.

The recreational use survey database developed by the SWQSTF will be used to support development of UAAs. This database was developed using remote camera technology coupled with occasional site visits to document area recreational activity at 17 locations in the Santa Ana River watershed (Table C-4). Eight of these sites are located in the MSAR watershed; several are in San Bernardino County.

With the exception of recreational use activity data, which is part of the eligibility analysis, most of the information required for each of the UAA sections is relatively simple to compile. It is expected that the existing large recreational use survey image dataset will provide a basis for predicting the level of recreational use activity in unsurveyed waterbodies based on similarities in waterbody characteristics. As a result, for some future UAAs it may not be necessary to collect additional recreational use survey data. However, if unusual site-specific conditions exist, e.g., in areas where a waterbody is within a residential area or near a school and access to the channel is not restricted, there may be some concern with relying solely on the recreational use survey image database to document the existing or potential for recreational use activities in the waterbody. In these situations, it is understood that the RWQCB may require the collection of site-specific use survey data.

The RWQCB's decision to approve a UAA and modify recreational uses is largely based on an evaluation of the potential risk of human exposure to bacterial indicators in a particular waterbody. The potential risk is related to the characteristics of the waterbody and the likelihood of water contact recreational activities occurring given those characteristics. For example, where water contact recreation is likely to occur, such as a natural waterbody with sufficient flow, the risk of exposure is higher than where such recreation is unlikely, e.g. in a vertical-walled concrete-lined engineered channel.

Table C-4. Summary of recreational use surveys completed by SWQSTF in the Santa Ana River watershed

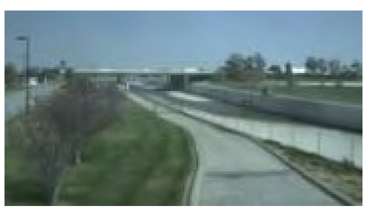
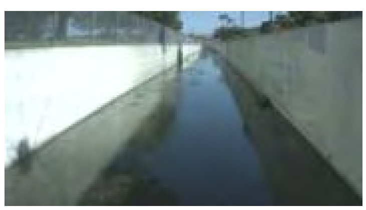
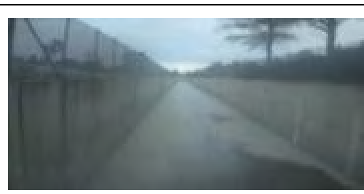
Representative Photo of Site	Summary of Recreational Use Survey
	**Greenville Banning Channel at Adams Avenue Bridge** ■ Concrete lined, vertical walled channel ■ Land use: Residential and open space ■ Period of Survey: 11/17/05 – 1/3/06 ■ Images collected: 2552 ■ Water contact recreational use events: 0
	**Greenville Banning Channel at Pedestrian Bridge** ■ Concrete lined, vertical walled channel ■ Land use: Residential and vacant natural land ■ Period of Survey: 7/7/2005 – 7/27/2005 ■ Images Collected: 45 ■ Water contact recreational use events: 0
	**Santa Ana Delhi Channel at Mesa Ave** ■ Concrete lined, vertical walled channel ■ Land use: Residential / open space and recreation ■ Period of Survey 6/20/2005 – 7/13/2006 ■ Images Collected: 21,284 ■ Water contact recreational use events: 0
	**Cucamonga Creek at RP1** ■ Concrete lined, vertical walled channel ■ Land use: Industrial/commercial and open space/recreation ■ Period of Survey 10/2/2007 – 10/10/2008 ■ Images Collected: 27,122 ■ Water contact recreational use events: 0
	**Anza Channel at John Bryant Park** ■ Concrete lined, vertical walled channel ■ Land use: Residential and open space/ public park ■ Period of Survey 6/6/2008 – 9/29/2009 ■ Images Collected: 20,386 ■ Water contact recreational use events: 2
	**Demens Channel** ■ Concrete lined, vertical walled channel ■ Land use: Residential and open space ■ Period of Survey 2/1/2008 – 2/9/2009 ■ Images Collected: 21,382 ■ Water contact recreational use events: 0

Table C-4. Summary of recreational use surveys completed by SWQSTF in the Santa Ana River watershed

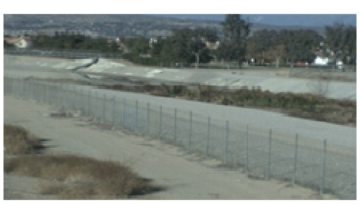
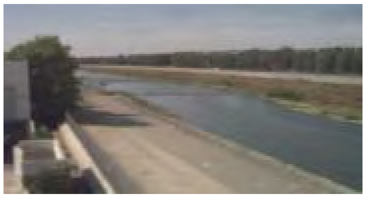
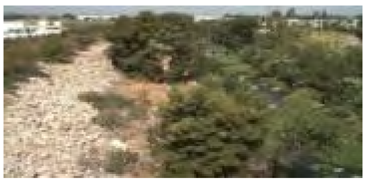
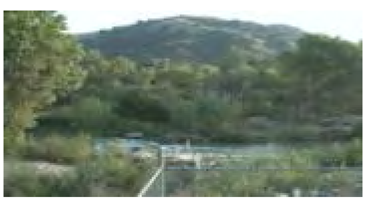
Representative Photo of Site	Summary of Recreational Use Survey
	**Cucamonga Creek at Hellman Ave (Upstream)** ■ Trapezoidal channel, concreted lined wall and bottom ■ Land use: Agriculture ■ Period of Survey 11/1/2005 – 11/1/2006 ■ Images Collected: 2,546 ■ Water contact recreational use events: 0
	**Temescal at Main Street** ■ Trapezoidal channel, concreted lined wall and bottom ■ Land use: Industrial / Commercial ■ Period of Survey 7/26/2005 – 8/4/2005 ■ Images Collected: 513 ■ Water contact recreational use events: 1
	**Temescal at City of Corona WWTP No. 2** ■ Trapezoidal channel, concreted lined wall and bottom ■ Land use: Industrial / Commercial ■ Period of Survey 11/1/2005 – 11/1/2006 ■ Images Collected: 10,653 ■ Water contact recreational use events: 1
	**Santa Ana Delhi Channel at Sunflower Ave** ■ Trapezoidal channel, rip rap side slopes, natural bottom ■ Land use: Commercial/ residential/ school ■ Period of Survey 7/7/2005 – 7/9/2006 ■ Images Collected: 20,978 ■ Water contact recreational use events: 1
	**Cucamonga Creek at Hellman Ave (Downstream)** ■ Trapezoidal channel, rip rap side slopes, natural bottom ■ Land use: Agriculture ■ Period of Survey 7/26/2005 – 11/1/2006 ■ Images Collected: 16,678 ■ Water contact recreational use events: 8
	**Perris Valley Channel at Moreno Valley WRF** ■ Trapezoidal channel / concrete lined side slope and concrete/natural bottom ■ Land use: Industrial/ Residential/school and open space/public park ■ Period of Survey 10/3/2007 – 10/10/2008 ■ Images Collected: 21,962 ■ Water contact recreational use events: 0

Table C-4. Summary of recreational use surveys completed by SWQSTF in the Santa Ana River watershed

Representative Photo of Site	Summary of Recreational Use Survey
	**SAR at Anaheim** ■ Trapezoidal channel, rip rap side slopes, natural bottom ■ Land use: Industrial/ commercial and open space/public park ■ Period of Survey 10/2/2007 – 10/5/2008 ■ Images Collected: 25,904 ■ Water contact recreational use events: 0
	**Chino Creek at Central Ave** ■ Trapezoidal channel / rip rap slope and bottom ■ Land use: Industrial / commercial ■ Period of Survey 12/19/2007 – 5/23/2009 ■ Images Collected: 23,913 ■ Water contact recreational use events: 10
	**San Diego Creek at Irvine** ■ Trapezoidal channel / natural side slopes and bottom ■ Land use: Residential/commercial/school and open space ■ Period of Survey 6/10/2008 – 9/30/2009 ■ Images Collected: 24,801 ■ Water contact recreational use events: 4
	**Santa Ana Delhi Channel at Newport Bay** ■ Natural Channel ■ Land use: Open space / commercial ■ Period of Survey 6/20/2005 – 6/6/2006 ■ Images Collected: 20,203 ■ Water contact recreational use events: 2
	**SAR at Yorba Linda** ■ Natural Channel ■ Land use: Residential / open space ■ Period of Survey 4/11/2006 – 4/6/2007 ■ Images Collected: 12,645 ■ Water contact recreational use events: 0

Results from SWQSTF surveys, which are now stored in the recreational use survey image database (currently available at SAWPA), show that channel characteristics are a strong indicator of existing and potential recreational use activity in the Santa Ana River watershed (however, ultimately it is up to the RWQCB to determine applicable uses):

- *Vertical-walled, Concrete-lined Channels* - Based on over 93,000 images collected from all seasons and different areas of the Santa Ana River watershed, no water contact recreation has been observed in vertical-walled channels. Accordingly, no exposure risk has been identified and a UAA could result in the removal of both REC-1 and REC-2 uses.

- *Trapezoidal-walled, Concrete-lined bottom Channels* - Based on over 35,000 images collected from all seasons and different areas of the watershed, only one contact with water was observed – a person kneeling at the edge of a low flow channel contacted the water on two occasions for a period of less than 30 minutes. In these situations, a UAA could result in the removal of the REC-1 use.

- *Trapezoidal-walled, Natural bottom Channels* – Based on over 113,000 images, only a few images (23) showed some type of contact with the water, but limited to shallow wading, e.g., Chino Creek at Central Avenue where 10 observations occurred. The outcome of the UAA in these situations is unclear and site-specific recreational use survey may need to be collected.

- *Natural Stream Channels* – Three natural or somewhat natural stream channels have been surveyed (Santa Ana Delhi Channel at Newport Bay and Reach 2 of the Santa Ana River at Yorba Linda and Anaheim). Based on over 32,000 images, only two observations of contact with the water were observed and these occurrences were limited to hand/water contact at the Santa Ana Delhi Channel at Newport Bay site.

UAA Candidate Segments

Figure C-6 provides an overview of where UAAs have been completed in the MSAR watershed or where they could potentially be developed in the future to support a structural BMP project. Table C-5 summarizes the potential UAAs within each drainage area and jurisdiction in San Bernardino County. The identification of these potential UAAs is based on the channel characteristics and UAA findings already completed by the SWQSTF.

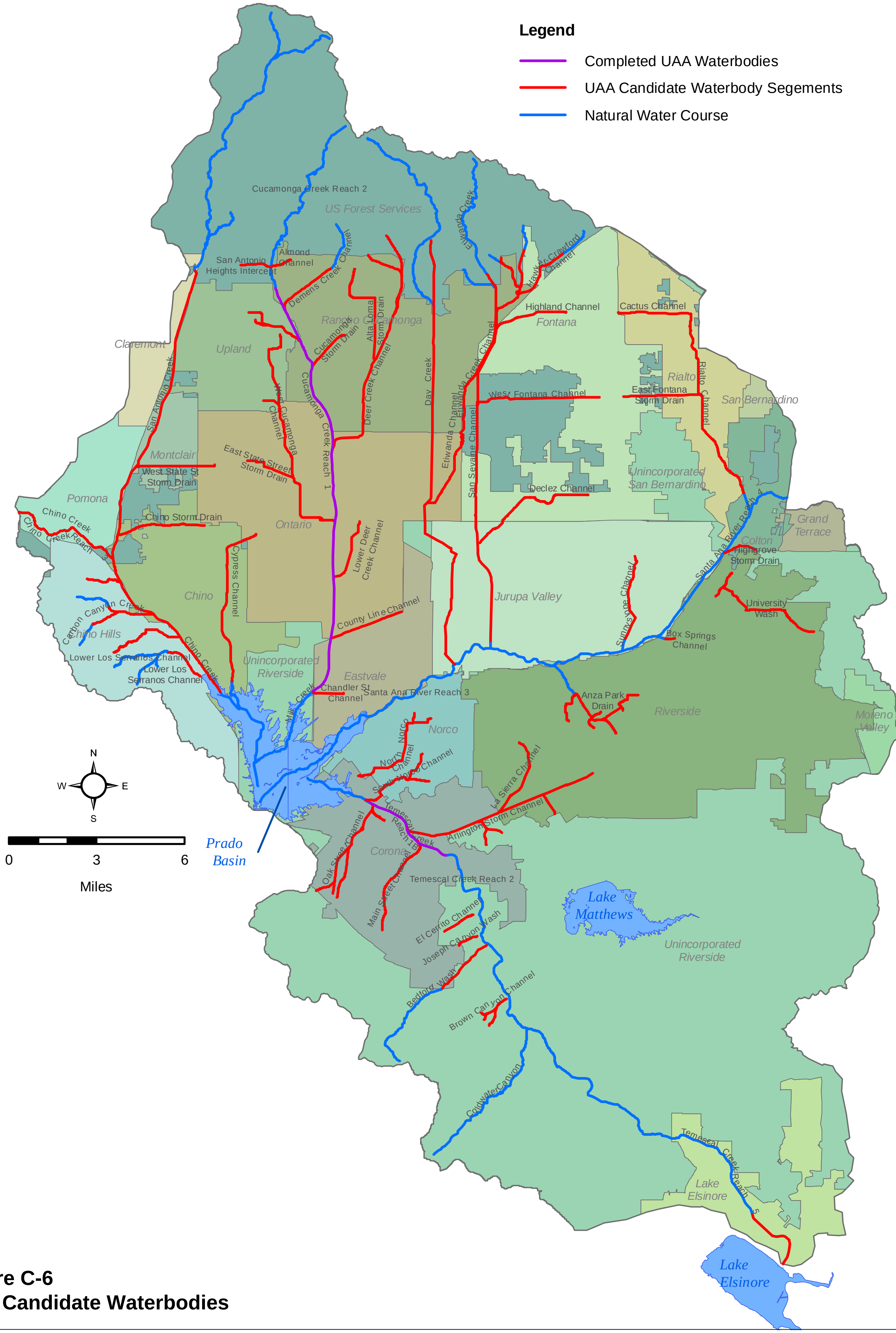


Figure C-6
UAA Candidate Waterbodies

Table C-5. UAA candidate waterbodies in San Bernardino County

Primary Jurisdiction of Waterbody	UAA Candidate Waterbody	Additional Jurisdictions	Waterbody Length (miles) Classified as UAA Candidate
Chino	Chino Storm Drain	Unincorporated San Bernardino	3.05
	Cypress Channel	Ontario	5.78
Chino Hills	Boys Republic South Channel		1.24
	Carbon Canyon Creek	Chino	2.21
	Lake Los Serranos Channel		2.69
	Lower Los Serranos Channel		1.44
Fontana	Declez Channel	Unincorporated Riverside	4.75
	Highland Channel		2.54
	San Sevaine Channel	Unincorporated Riverside, Unincorporated San Bernardino, Rancho Cucamonga	17.62
Montclair	San Antonio Creek	Unincorporated San Bernardino, Claremont, Upland, Chino	10.44
	West State Street Storm Drain	Ontario	2.73
Ontario	County Line Channel		2.59
	East State Storm Drain		1.86
	Lower Deer Canyon Wash		2.08
	Lower Etiwanda Creek Channel		2.15
	West Cucamonga Channel	Upland	7.12
Rancho Cucamonga	Almond Intercept Channel	Unincorporated San Bernardino	0.65
	Alta Loma Storm Drain		3.87
	Cucamonga Storm Drain		1.56
	Demens Creek Channel	Upland	2.21
	Etiwanda Creek Channel	Unincorporated San Bernardino, Ontario, Fontana	3.66
	Henderson Channel	Chino Hills	2.16
	Hillside Channel		1.42
	Upper Deer Canyon Wash	Ontario	7.59
Rialto	Cactus Channel		2.62
	East Fontana Storm Drain	Fontana, Unincorporated San Bernardino	2.61
	Rialto Channel	Unincorporated Riverside	6.79
Upland	8th Street Storm Drain		0.37
Unincorporated San Bernardino County	Chino Creek	Chino Hills, Chino	10.26
	Deer Creek Channel	Rancho Cucamonga	1.52
	Hawker-Crawford Channel	Rancho Cucamonga, Fontana	2.11
	San Antonio Heights Intercept		1.06
	West Fontana Channel	Fontana	4.19
Unincorporated Riverside County	Day Creek	Ontario, Rancho Cucamonga, and unincorporated San Bernardino	15.43

UAA Development Process

RWQCB staff will be consulted prior to initiating development of any UAA. It is anticipated that development of a UAA would rely on the following process:

- Conduct meeting with RWQCB to obtain agreement on the following:
  - UAA to be developed, e.g., upper and lower boundaries;
  - Minimum water quality data requirements;
  - Requirements for additional recreational survey data collection (if any); and
  - UAA structure and content, i.e., is the existing UAA template adequate or are there any site-specific issues that need to be addressed.
- Collect any necessary data (time period could range from a few weeks or months to a year if substantial recreational use survey data is required).
- Submit draft UAA to the RWQCB for review and comment. Draft UAA will be in the same format as the existing Cucamonga Creek UAA.
- Prepare revised UAA to the RWQCB for adoption as a Basin Plan amendment.

Attachment D
Existing Urban Source Control Program

Contents

Tables

D.1 Introduction

This section documents existing MS4 permit activities that have been implemented by the San Bernardino County MS4 permit program. Emphasis was on non-structural and structural BMP actions implemented or completed since January 1, 2005 (year of MSAR Bacterial Indicator TMDL adoption), that are providing water quality benefits to the MSAR watershed.

D.2 Non-Structural BMPs

This section describes all completed non-structural BMP program activities implemented by the San Bernardino County MS4 permittees since TMDL adoption by the Regional Board in 2005. Program areas evaluated for the potential to reduce bacterial indicators under dry weather conditions include:

- WQMP Implementation
- Public Education and Outreach Targeting Bacterial Indicators
- Ordinance Adoption
- Inspection and Enforcement activities
- Illicit Discharge/Spill Response
- Street Sweeping
- MS4 Facility Inspection and Cleaning Programs

Water Quality Management Plan Implementation

WQMPs are prepared for new development or significant redevelopment projects classified as category projects. This section examines WQMPs completed for projects since the beginning of 2005 which have resulted in the implementation of BMPs expected to reduce bacterial indicator loads above and beyond what would have been expected from the area if the project had not been implemented.

Using WQMP records provided by the MS4 Area-wide Program, projects were screened for those approved after 2005 and designated as "significant redevelopment" projects. The presumption is that for existing developments, stormwater management controls were not designed to today's standards, which encourage the use of site design and source control BMPs, and therefore some degree of DWF occurred prior to redevelopment. With significant redevelopment of the project site, an approved WQMP may include BMPs that provide capture or treatment of DWF, as site design and source control BMPs were encouraged in the San Bernardino County Stormwater Program's 2005 Model WQMP Guidance. New development projects that included a WQMP that may reduce or eliminate off-site DWF were not included in this analysis because these projects replace previously undeveloped land that likely did not generate any runoff under dry weather conditions.

The MS4 Area-wide Program provided WQMP data from the MS4 Solution Database for each of the permittees within the MSAR watershed. Table D-1 describes for each jurisdiction the number of approved WQMPs for significant redevelopment projects and the total project development area. A brief description of the type of BMPs implemented for each project is provided.

Public Education and Outreach

Through the MS4 Area-wide Program, the MS4 permittees collectively participate in public education and outreach efforts to emphasize stormwater pollution prevention. Each permittee also conducts its own education and outreach with varying levels of attention to bacteria in DWF. Although outreach events may not specifically focus on reducing bacterial indicators, events which highlight the elimination or reduction of debris or pollutants from entering the MS4 system or runoff under dry weather conditions have the potential to reduce bacterial indicators.

Information related to public education outreach efforts is maintained in the stormwater program's MS4 Solution Database. The database includes information regarding each outreach event type, the date conducted, a brief description of materials distributed, and the number of "impressions" (estimated number of persons contacted through personal communication, audience attendance, or brochure distribution). Activities have included billboard placement, mail inserts, presentations at schools and pet stores, and educational displays at community and regional fairs.

Most of the recorded events educate the public on general stormwater pollution prevention and water conservation (Table D-2). The table identifies relevant events, i.e., those that have the potential to reduce bacterial indicators; the description of the materials presented was used to determine applicability. Events that provided materials focusing on paint waste, household hazardous waste, pesticide disposal, and automotive waste disposal were not included.

The public education sub-committee is developing informational flyers to address bacterial contamination issues. The topics of trash bin enclosures and pet waste have been high priorities. Flyers on those topics will be ready before the end of 2010. Multi-dwelling complexes and restaurants will be targeted for the trash bin flyers. Flyers for pet and horse owners will be distributed at appropriate venues. The MS4 permittees are also developing a portable toilet educational flyer that can be handed out at City permit counters for large events.

Table D-1. Summary of WQMPs approved for significant redevelopment projects, San Bernardino County, 2005-2009

Jurisdiction	No. of Projects	Total Acres	Description
Chino	4	13	Four significant redevelopment projects were approved from 2006 to 2008. BMPs implemented included efficient irrigation, buffer strips/bioswales, and proprietary flow-based BMPs
Chino Hills	-	-	No significant redevelopment projects listed
Fontana	6	38	Six re-development projects approved from 2005 to 2008 which implemented a variety of BMPs such as efficient irrigation, vegetated swales, infiltrations basins, and proprietary flow-based BMPs
Montclair	8	14	Eight significant redevelopment projects approved from 2007 to 2008. BMPs included efficient irrigation, bio-retention, permeable pavement, vegetated swales, water quality inlets
Ontario	8	26	Eight significant redevelopment projects approved from 2005 to 2007. BMPs included efficient irrigation, bio-retention, vegetated swales, infiltration basins, and flow-based proprietary devices at catch basins.
Rancho Cucamonga	3	6	Three significant redevelopment projects approved from 2005 to 2006. BMPs included efficient irrigation, water quality inlets, media filters, extended detention basins
Rialto	5	27	Five significant BMPs approved from 2006 to 2008 implemented a variety of BMPs such as buffer strips/bioswales, media filters, vegetated swales, infiltration basins, efficient irrigation, and proprietary flow-based BMPs.
San Bernardino County	4	7	Four significant redevelopment projects were approved from 2007 to 2008. BMPs included efficient irrigation, vegetated swale, infiltration basin, extended detention basin, and bio-retention system
Upland	3	1	Two significant redevelopment projects approved from 2006 to 2007. BMPs implemented include bio-retention BMPs
Total	**43**	**133**	

Table D-2. Public education and outreach activities for San Bernardino County MS4 Program, 2005-2009 (IMP = Impressions)

Jurisdiction	2005		2006		2007		2008		2009		Comments
	No. of Events	No. of IMPs	No. of Events	No. of IMPs	No. of Event s	No. of IMPs	No. of Events	No. of IMPs	No. of Events	No. of IMPs	
Chino	5	4,215	27	20,730	37	9,325	29	3,900	6	650	Touring theatrical production depicting resource conservation and pollution prevention recorded 8,000 impressions. Pet owners were targeted by 26 of the events.
Chino Hills	9	328	2	740	0	0	3	265	1	30	Events consist of presentations in schools and libraries, booths at community fairs, and displays set up at pet stores and clinics. Enviroscape models, PowerPoint presentations, posters and brochures used as appropriate. One event targeted directly at pet owners; remaining events focused on educating the public about their impact on stormwater quality.
Fontana	3	360	49	8,610	13	2,645	12	8,915	3	5,000	Outreach events in Fontana were almost exclusively science fairs and large regional or local fairs.
Montclair	1	0	1	1,200	0	0	0	0	1	1,200	Outreach events in Montclair consisted of booths at two Earth Day festivals and a Home Improvement and Outdoors Fair where brochures, magnets, etc., were distributed.
Ontario	5	56,533	6	163,959	5	109,531	2	57,953	2	100	This outreach effort included exhibits at various fairs and festivals. In addition, outreach efforts included extensive print media distribution through (1) letters sent to new businesses; and (2) yearly calendars sent to residents (50,000+). Seven of the 20 Ontario outreach events recorded distribution of over 50,000 fliers/letters each.
Rancho Cucamonga	2	1,600	2	70	1	2,500	9	644,614	14	199,195	Outreach events consisted of school presentations, booths at large fairs and minor league baseball games, and advertisements in media outlets (radio, newspaper: 792,000 impressions).
Rialto	0	0	12	4,481	18	3,893	7	1,452	2	1,800	Outreach events consisted of displays at local fairs, school presentations, and the distribution of flyers at home improvement stores, pet stores, and animal hospitals. Impressions were not recorded for these flyer events.

Table D-2. Public education and outreach activities for San Bernardino County MS4 Program, 2005-2009 (IMP = Impressions)

Jurisdiction	2005		2006		2007		2008		2009		Comments
	No. of Events	No. of IMPs	No. of Events	No. of IMPs	No. of Events	No. of IMPs	No. of Events	No. of IMPs	No. of Events	No. of IMPs	
Upland	19	3,633	31	4,505	28	7,860	5	1,184	11	897	62 of the 94 outreach events consisted of the distribution of print media or the placement of a display at pet facilities (stores, hospitals, groomers) and home improvement retail establishments. Remaining events were primarily school visits/presentations.
SBCFCD	1	289	6	2,270	1	0	1	7,880	1	0	Seven of the 10 events consisted of displays with cards and brochures placed at local and regional fairs.
San Bernardino Co.	1	0	1	150	1	650	2	313	2	0	Four of the events consisted of displays and handouts at regional events, while the other three consisted of school visits/presentations. Impression numbers were not always available.
Total	**46**	**66,958**	**137**	**206,715**	**104**	**136,404**	**65**	**726,824**	**41**	**207,072**	

Ordinance Adoption

The CBRP requires the identification of specific ordinances that will be adopted during implementation that reduce the level of indicator bacteria in urban sources. All San Bernardino County MS4 permittees have adopted ordinances which provide legal authority to control non-permitted discharges from entering the MS4 system. The majority of these ordinances were originally established in 1993. They have been amended as needed in subsequent years to strengthen their applicability. San Bernardino County MS4 permittees have adopted ordinances which provide legal authority to:

- Control discharges associated with industrial activities (all permittees)
- Prohibit illicit discharges (all permittees)
- Control the discharge of materials other than stormwater
- Require compliance with regulators (all permittees)
- Conduct inspections, surveillance, and monitoring (all permittees)

In addition to adopting ordinances to provide legal authority to control non-permitted discharges, some permittees have adopted water conservation ordinances which can reduce the volume of runoff under dry weather conditions. As shown in Table D-3, legal authority already exists in many areas to manage outdoor water use. Ordinance prohibitions include failure to repair water leaks, use of water to wash any impervious surface, and irrigation water from flowing off property.

In addition to local water conservation ordinances, recently adopted Assembly Bill 1881 (AB 1881) requires improved landscaping and irrigation practices on some types of new and significant redevelopment projects. Jurisdictions in the MSAR watershed have already adopted landscaping and irrigation ordinances that are at least as stringent as the statewide guidelines developed to support implementation of AB 1881. These ordinances include the Chino Basin Water Efficient Landscape Ordinance, which was developed collaboratively by cities and water agencies in the Chino Basin as a regional model ordinance that meets AB 1881 requirements

Because AB 1881 applies only to new development and significant redevelopment projects, the water quality benefits expected from implementation of these new requirements are expected to be limited within the next five years, especially under dry weather conditions.

Table D-3. Existing water conservation ordinances in the San Bernardino County portion of the MSAR watershed

Proponent	Ordinance Name	Applicability	Key Prohibitions
City of Chino	Water Conservation	City of Chino	• Runoff of irrigation water to impermeable surfaces • Operation of sprinklers for > 15 minutes/day/station for spray irrigation • Scheduling of spray irrigation between the hours of 6:00 am and 8:00 pm • Failure to repair a water leak • Use of water to wash any impervious surfaces
Cucamonga Valley Water District	Water Use Efficiency	Cities of Fontana, Ontario, Rancho Cucamonga, Upland, and portions of unincorporated San Bernardino County	• Any irrigation water leaving the property • Failure to repair a water leak
City of Ontario	Stormwater Drainage System	City of Ontario	• Runoff of wastewater from most potential outdoor washing activities • Draining of pools or fountains and pool filter backwash containing chlorine or other harmful chemicals
City of Upland	Water Conservation	City of Upland	• Scheduling of spray irrigation between the hours of 10:00 am and 6:00 pm • Failure to repair a water leak • Use of water to wash any impervious surfaces
City of Chino Hills	Water Conservation	City of Chino Hills	• No prohibitions, voluntary conservation measures only
Monte Vista Water District	Water Use Efficiency Best Practices	City of Chino, Montclair, and portions of unincorporated San Bernardino County	• Any irrigation water leaving the property • Operation of sprinklers for > 15 minutes/day/station for spray irrigation • Scheduling of spray irrigation between the hours of 8:00 am and 8:00 pm • Irrigation when it is raining • Failure to repair a water leak
City of Rialto	Water Conservation Requirements; Stormwater	City of Rialto	• No prohibitions; ordinance discourages specific activities that waste water and encourages minimizing off site runoff to the MEP

Inspection and Enforcement Activities

MS4 permittees conduct inspections of commercial and industrial facilities as part of municipal NPDES programs to assess compliance of facilities with local stormwater ordinances and, where applicable, potential noncompliance with California's General Permit for Storm Water Discharges Associated with Industrial Activities.

In evaluation of these programs for water quality benefits, restaurant inspections are of particular interest since restaurant activities are potential sources of indicator bacteria. The permittees have developed a model restaurant inspection program, as well as a poster targeted for restaurant BMPs. Restaurants are automatically assigned a high priority rating for inspection and development purposes. The trash bin educational materials will be targeted at restaurants, and a new restaurant BMP flyer is being developed.

The enforcement of trash and pet waste issues are especially difficult, as they usually occur at the residential level. Residential inspections are not required; however, a residential inspection program is under development. Pet waste flyers are being developed, and will be distributed at appropriate venues. Trash bin outreach materials will be targeted at apartment and condominium complex managers.

San Bernardino County MS4 permittees maintain inventories of commercial and industrial facilities within their jurisdictions. The facilities in these inventories are prioritized and inspection schedules are established based on this prioritization. The San Bernardino County MS4 Area-wide Program provides annual reports regarding inspection and enforcement activities. This information reports the number of annual inspections of commercial and industrial facilities; however, the data could not be quantified in a manner that could be then be related specifically to restaurant inspections and the control of bacterial indicators.

Illicit Discharge/Spill Response

San Bernardino County permittees implement programs to reduce illicit discharges and prevent spills from reaching the MS4. San Bernardino County permittees collect data annually on illicit discharge/spill response activities. The discharge database records include the following information:

- Discharge type
- Discharge description and estimated quantity of material discharged
- Response action

Events which involve the discharge of sewage and trash have the highest potential to result in significant bacterial inputs to MS4 facilities. A review of database records for the period 2005-2009 shows that many discharge or spill events involved raw sewage. Table D-4 summarizes the total number of reported incidents and estimated quantity of sewage and other bacteria containing spills within MS4 drainage areas. The table does not show the portion of that was contained and recovered, which ranges from zero to 100 percent, depending upon the nature of the spill and timing and effectiveness of reporting and jurisdiction response.

Street Sweeping

Street sweeping removes debris, which has been shown to contain bacteria (see Section 5.2.2.3, and 6.5.2.2). Bacteria become entrained in urban runoff, which is then discharged to the MS4. While the benefits of street sweeping are assumed to be most closely associated with wet weather runoff, which has the greatest capacity to flush unswept debris into the storm drain, there is recent evidence that DWFs along curbs have the potential to mobilize significant numbers of bacteria (Skinner et al 2010; Ferguson 2006).

San Bernardino County permittees annually report their annual street sweeping efforts by the approximate number of curb-miles swept. Table D-5 shows only the curb-miles swept by each jurisdiction for the period of 2005 to 2009. Several permittees sweep streets more than once per week in some areas. The total volume of debris removed during sweeping activities is reported individually by each permittee. It may represent an actual total collected, or an estimated quantity derived from an extrapolated value based on a test area.

MS4 Facility Inspection and Cleaning Programs

The MS4 permittees implement MS4 facility inspection and cleaning programs to satisfy minimum facility maintenance requirements contained in their MS4 permit. The debris that builds up in MS4 facilities has the potential to become a significant bacteria reservoir that can be mobilized when water moves through. While wet weather flows would be most likely to mobilize this debris and associated bacteria, steady flows through the facility under dry weather conditions also have the potential to move bacteria into downstream receiving waters. Tables D-6 and D-7 summarize the amount of debris removed annually from drain inlets, open channels, below ground drains, and debris basins in San Bernardino County area. The amount of debris removed fluctuates on an annual basis and is particularly influenced by the volume removed by SBCFCD from its debris and detention basins.

Table D-4. Illicit Discharge Spill Response, San Bernardino County MS4 Program, 2005-2009

Jurisdiction	2005		2006		2007		2008		2009	
	Incidents	Quantity (gal)	Incidents	Quantity (gal)	Incidents	Quantity (gal)	Incidents	Quantity (gal)	Incidents	Quantity (gal)
Chino	7	5,875	2	2,010	-	-	-	-	1	2,000
Chino Hills	0	0	1	0	1	0	4	831	6	10,332
Fontana	-	-	3	2,100	-	-	-	-	-	-
Montclair	1	1,600	-	-	-	-	-	-	-	-
Ontario	7	5,261-	4	11,625	7	11,400	9	2,220	11	44,435
Rancho Cucamonga	1	1,750	-	-	1	3,000	-	-	-	-
Rialto	-	-	-	-	-	-	1	1,000	-	-
Upland	1	50	-	-	-	-	-	-	1	200
San Bernardino County	-	-	1	250	-	-	2	1,200	-	-
SBCFCD	2	1,001,000	1	200-500 (gpm)	1	500	1	1,000	1	500

Note: Incidents shown in this table are those reported as "sewage" in the MS4 database or other discharges that were determined to have a high potential to contain elevated levels of bacteria; The quantity shown is the total volume of the spill, including both the portion that is contained and the portion that could not be contained

Table D-5. Summary of annual street sweeping activity (number of curb miles), San Bernardino County MS4 Program

Jurisdiction	2005	2006	2007	2008	2009	Comments
Chino	518	519	520	526	526	
Chino Hills	385	385	385	388	388	
Fontana	903	955	1,015	1,019	837	
Montclair	132	144	147	151	155	
Ontario	1,075	1,075	1,075	1,078	1,078	
Rancho Cucamonga	1,164	1,164	1,164	1,179	1,179	
Rialto	585	585	525	525	525	
San Bernardino County	0	0	0	0	0	Majority of roads in unincorporated County streets are natural earthen and asphalt swales not suitable for street sweeping
Upland	510	515	437	437	437	
SBCFCD	NA	NA	NA	NA	NA	SBCFCD does not own or operate streets facilities
Total Miles	**5,272**	**5,342**	**5,268**	**5,303**	**5,125**	

Table D-6. Debris collected from drain inlets and open channels, San Bernardino County MS4 Program, 2005 - 2009

Jurisdiction	Drain Inlets (cubic yards)					Open Channels (cubic yards)				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
Chino	20	20	20	20	20	40	40	40	40	33
Chino Hills	3	4	30	3	30	10	100	100	50	50
Fontana	101	109	114	121	108	21	19	9	12	14
Montclair	60	80	75	70	60	25	26	25	35	40
Ontario	3,000	3,000	3,200	3,570	1,800	240	200	175	150	125
Rancho Cucamonga	200	225	280	240	180	1	10	12	8	10
Rialto	0	12	24	300	500	0	225	350	450	400
San Bernardino County	0	160	34	36	127	0	50	35	20	57
SBCFCD	NA	NA	NA	NA	NA	700,000	100,000	500	0	100
Upland	4	4	23	20	23	5	5	39	31	20
Total	**3,388**	**3,614**	**3,800**	**4,380**	**2,848**	**700,342**	**100,675**	**1,285**	**796**	**849**

Table D-7. Debris collected from underground drains and debris/detention basins, San Bernardino County MS4 Program, 2005 - 2009

Jurisdiction	Underground Drains (cubic yards)					Debris & Detention Basins (cubic yards)				
	2005	**2006**	**2007**	**2008**	**2009**	**2005**	**2006**	**2007**	**2008**	**2009**
Chino	10	2	16	16	16	0	0	0	0	0
Chino Hills	0	1	1	8	8	50	80	60	38	38
Fontana	11	11	12	14	11	49	51	36	38	58
Montclair	1	1	1	1	0	0	0	0	0	30
Ontario	5,140	5,140	3,650	4,560	5,400	0	0	0	0	0
Rancho Cucamonga	0	0	2	2	4	0	0	0	100	100
Rialto	0	30	0	0	0	0	0	0	0	18
San Bernardino County	0	315	100	100	234	0	20	0	0	0
SBCFCD	100	0	0	0	0	1,700,000	100,000	1,000	0	500
Upland	2	2	16	19	16	200	200	96	37	23
Total	**5,264**	**5,502**	**3,798**	**4,720**	**5,689**	**1,700,299**	**100,351**	**1,192**	**213**	**767**

D.3 Structural BMPs

This section describes relatively large-scale projects that include structural BMPs that reduce urban runoff under dry weather conditions that have been completed since January 1, 2005. Two large scale projects with capacity to address runoff under dry weather conditions constructed since 2005 were identified:

- In the City of Chino, as part of the development of the Preserve master development, an extended detention basin/wetland (Bickmore Basin) was constructed in early 2006. Bickmore Basin is located on the southwest corner of Bickmore Avenue and Rincon Meadows Avenue. The basin has a drainage area of approximately 270 acres. It is estimated that at complete build-out the community surrounding the basins will have approximately 2,400 homes. During dry weather conditions, urban runoff from the residential development flows into the basin to sustain the wetland. No supplemental recycled water is required to sustain the wetland.

- In the City of Chino, as part of mitigation for future development and flood control, the Kimball Basin (extended detention basin/constructed wetland) was constructed in 2006-2007. The Kimball Basin is comprised of a series of three basins covering approximately 40 acres and located east of Rincon Meadows on the southern side of Kimball Avenue in Chino. The basin has a tributary area of over 1,200 acres with tributary areas to include portions of northern Chino and Ontario (Ontario Airport and New Model Colony West). The basin has significant capacity to treat DWF. The basin is currently fully dependent on supplemental recycled water to sustain the wetland.

Attachment E
CBRP Implementation Plan

Contents

Tables

E.1 Introduction

The MS4 permit establishes the minimum required schedule-related elements for inclusion in the CBRP. These elements include:

- A detailed schedule with discrete milestones to assess satisfactory progress toward meeting urban wasteload allocations for dry weather;
- Designation of responsibility for meeting each milestone; and
- Specific metrics to demonstrate the effectiveness of the CBRP and acceptable progress for meeting the urban wasteload allocations for dry weather.

Section 2.3 provides an overview of the schedule for the CBRP implementation program. The following sections present the additional information required by the MS4 permit.

E.2 CBRP Program Elements

This section provides the implementation plan for each of the four required CBRP elements. Each plan includes the following information:

- *CBRP Activity* – Programmatic area to be implemented.
- *Milestones* – Discrete actions associated with the completion of each CBRP activity.
- *Metrics* – Specific outcomes to demonstrate completion of each milestone; in addition, metrics for some activities are related to mitigation of identified controllable urban sources of bacterial indicators and provide a means to measure effectiveness of activity.
- *Responsible Agency* – Assignment of the activity to either the area-wide MS4 program or to MS4 permittees with jurisdiction over a targeted area.
- *Completion Date* – Completion dates are provided where possible. CBRP Step 2 and 3 activities are expected to extend beyond the December 31, 2015 compliance date given the length of time involved with the design, permitting and construction of a structural BMP.

Element 1 – Ordinances

Two activities comprise Element 1 - water conservation and pathogen control ordinances. Table E-1 provides the implementation activities planned for each of these CBRP activities. Evaluations of legal authority and the development of minimum ordinance requirements are expected to be completed collectively by the area-wide MS4 program. Local ordinance development will be implemented by individual MS4 permittees, where necessary. Activities associated with the development of a pathogen control ordinance are an MS4 permit requirement and the completion date is consistent with the permit. Progress towards implementing Element 1 activities will be summarized and reported in the Annual Report prepared under the MS4 permit.

Element 2 – Specific BMPs

Seven specific BMPs are included in Element 2. Table E-2 provides the implementation plan associated with each of these activities. Implementation responsibility for specific activities varies between the area-wide MS4 program and MS4 Permittees. Some activities are closely linked to other CBRP elements, e.g., implementation of irrigation practices is closely linked with the water conservation ordinance activities described under Element 1. Several activities are also MS4 permit requirements, e.g., IDDE program development, WQMP revisions, and septic system management. The completion dates for these activities are consistent with the MS4 permit requirements. Progress implementing Element 2 activities will be summarized and reported in the Annual Report prepared under the MS4 permit.

Element 3 – Inspection Criteria

This element includes the activities dedicated to identifying controllable urban dry weather flow and bacterial indicator sources, prioritizing mitigation evaluations, completing mitigation alternative evaluations, and initiating the implementation of selected mitigation alternatives (Table E-3). Element 3 activities require data collection, the results of which support decisions regarding next steps to mitigate controllable sources. Deliverables range from selection and initiation of a structural BMP project to implementation of more targeted non-structural BMPs. Structural BMPs selected under Element 3 are designed and constructed as part of Element 4. Where the results of source evaluation activities indicate that sources are uncontrollable or are not the responsibility of the MS4, the RWQCB will be notified and the source will be addressed outside of the CBRP.

Currently, the USEP (approved by the RWQCB in 2008) and the 2010 MS4 permit require the completion of semi-annual USEP reports to describe progress and plans associated with the implementation of urban source evaluation activities. Element 3 activities will replace the need to periodically identify source evaluation activities for implementation. Reports regarding the findings of mitigation evaluations and selection of mitigation alternatives will be summarized in the MS4 permit Annual Reports.

Table E-1. Implementation Plan for CBRP Element 1 – Ordinances

CBRP Activity	Milestones	Metrics	Responsibility	Complete by
1.A - Water Conservation Ordinance	1.A.i – Evaluate existing legal authority to manage and enforce DWF	Establish minimum DWF management and enforcement requirements for the area	Area-wide MS4 Program	June 30, 2012
	1.A.ii - Evaluate opportunities to collaborate with water purveyors on implementation of SB7 to maximize use of outdoor water use efficiency BMPs and reduce DWF			
	1.A.iii – Evaluate need to revise local ordinances to incorporate more stringent DWF management requirements	Prepare draft revised ordinances in the local jurisdiction, as needed	Permittees	December 31, 2012
	1.A.iv - Adopt revised water conservation ordinances (as appropriate)	As appropriate to the local jurisdiction, revised ordinances adopted	Permittees	December 31, 2013
1.B – Pathogen Control Ordinance	1.B.i – Evaluate existing legal authority to manage animal wastes	Establish minimum requirements for the control of bacterial indicator sources	Area-wide MS4 Program	June 30, 2012
	1.B.ii – Identify other controllable bacterial indicator sources (other than pet waste) that may contribute to bacterial indicator exceedances in the MS4			
	1.B.iii – Evaluate need to establish/revise local ordinances to incorporate minimum bacterial indicator control requirements	Prepare draft revised ordinances in the local jurisdiction, as needed	Permittees	December 31, 2012
	1.B.iv – Adopt/revise pathogen control ordinances	As appropriate to the local jurisdiction, revised ordinances adopted	Permittees	January 29, 2013[1]
1.C - Reporting	1.C.i – Provide annual summary of ordinance development activities and recommendations for CBRP modification as identified by Element 1 implementation	Incorporate summary into MS4 permit Annual Report	Area-wide MS4 Program	Annually by November 15

[1] - Consistent with MS4 permit requirement

Table E-2. Implementation Plan for CBRP Element 2 – Specific BMPs

Activity	Milestones	Metrics	Responsibility	Complete by
2.A – Transient Camps	2.A.i - Identify locations of transient encampments outside of MS4 rights-of-way that may be contributing to elevated bacterial indicators in dry weather flows in MS4 facilities, evaluate potential impacts from identified camps, and develop plan to mitigate camps determine to be a water quality concern	Report findings	Area-wide MS4 Program	September 30, 2012
	2.A.ii - Develop model program for mitigating water quality impacts from transient encampments	Establish model program for use by local jurisdictions	Area-wide MS4 Program	December 31, 2012
	2.A.iii - Develop targeted transient camp mitigation plan	Based on the outcome of 2.A.i and 2.A.ii, prepare mitigation plan (with schedule) for implementation by local jurisdiction	Permittees	June 30, 2013
	2.A.iv - Implement transient camp mitigation plan	Complete targeted activities based on mitigation plan	Permittees	December 31, 2014
2.B – IDDE	2.B.i - Develop draft IDDE Program that is consistent with permit requirements and supports CBRP Element 3 (Inspection Program)	Develop program guidance based on MS4 permit requirements and needs of inspection program	Area-wide MS4 Program	December 31, 2012[1]
	2.B.ii – Develop final IDDE Program for submittal to the RWQCB	Submit final guidance to RWQCB	Area-wide MS4 Program	December 31, 2012[1]
	2.B.iii – Implement IDDE Program	Implementation of Inspection Program as required by 3.C	Area-wide MS4 Program & Permittees	As required by Element 3
2.C - Street Sweeping	2.C.i – Literature review of street sweeping programs (e.g., method, frequency, equipment) to determine potential to modify programs to reduce bacterial indicator sources	Develop recommendations for modified street sweeping program targeted at bacterial indicators	Area-wide MS4 Program	June 30, 2012
	2.C.ii - Develop plan/schedule for implementation of modified program (as appropriate)	Establish plan/schedule for implementation of modified street sweeping program, as appropriate to local jurisdictions	Permittees	September 30, 2012
	2.C.iii – Implement modified street sweeping program	Compliance with established plan/schedule	Permittees	As required by 2.C.ii

Table E-2. Implementation Plan for CBRP Element 2 – Specific BMPs

Activity	Milestones	Metrics	Responsibility	Complete by
2.D – Irrigation or Water Conservation Practices	2.D.i - Develop irrigation and water conservation BMP programs in coordination CBRP activity 1.A	Identify recommended irrigation and water conservation BMP practices for implementation	Area-wide MS4 Program	December 31, 2012
	2.D.ii - Develop plan/schedule for implementation of BMP practices	Establish plan/schedule for implementation of BMP practices, as appropriate within local jurisdictions	Permittees	March 31, 2013
	2.D.iii – Implement BMP practices	Compliance with established plan/schedule	Permittees	As required by 2.D.ii
2.E – Water Quality Management Plan Revision	2.E.i - Submit draft WQMP revision to RWQCB	Submit draft WQMP Guidance and Template revisions as required by permit	Area-wide MS4 Program	July 29, 2011[2]
	2.E.ii - Submit final WQMP to RWQCB	Submit final WQMP Guidance and Template as required by permit	Area-wide MS4 Program	Based on Regional Response to Draft[2]
	2.E.iii - Incorporate WQMP revisions into training programs	Establish revised training modules to incorporate new WQMP provisions	Area-wide MS4 Program	July 29, 2012[2]
	2.E.iv – Implement revised WQMP	WQMP approved by RWQCB	Permittees	Within 90 days of Board approval[2]
2.F –Septic System Management	2.F.i – Analyze relationship between location of septic systems and MS4 facilities to evaluate potential for impacts from septic systems on water quality under dry weather conditions	Using existing septic system inventory, identify areas where septic systems have the potential to impact the MS4; establish plan to target areas for education, inspection and enforcement activities	Area-wide MS4 Program	January 29, 2012[2]
	2.F.ii – Develop educational materials and conduct public education activities to inform septic system owners on proper maintenance of septic systems	Complete targeted educational activities	Area-wide MS4 Program	January 29, 2012[2]
	2.F.iii – Conduct inspection and enforcement activities as needed, to ensure potential water quality impacts to MS4 are mitigated	Complete targeted inspections and implement enforcement actions as needed	Permittees	December 31, 2014
2.G – Pet Waste Management	2.G.i – Evaluate pet waste management BMPs within local jurisdictions to identify any opportunities to enhance BMPs to better target bacterial indicator sources; coordinate evaluation with CBRP Activity 1.B	Identification of new or enhanced BMPs for implementation	Permittees	September 30, 2012
	2.G.i – Develop and implement BMPs identified in 2.G.i.	Implementation of BMPs identified in 2.G.i	Permittees	January 29, 2013[1]

Table E-2. Implementation Plan for CBRP Element 2 – Specific BMPs

Activity	Milestones	Metrics	Responsibility	Complete by
2.H - Reporting	2.H.i – Provide annual summary of BMP activities and recommendations for CBRP modification as identified by Element 2 implementation	Incorporate summary into MS4 permit Annual Report	Area-wide MS4 Program	Annually by November 15

[1] - Program guidance is an MS4 permit requirement with no due date; the CBRP establishes a due date consistent with CBRP implementation needs
[2] - Consistent with MS4 permit requirement

Table E-3. Implementation Plan for CBRP Element 3 – Inspection Criteria[1]

Activity	Milestones	Metrics	Responsibility	Complete by
3.A –Tier 1 Source Evaluation	3.A.i - Revise Watershed-wide Monitoring Program Monitoring Plan and QAPP, as needed	Revised Monitoring Plan and QAPP approved by RWQCB	Area-wide MS4 Program through MSAR Task Force	March 31, 2012
	3.A.ii - Collect data from Tier 1 sites	Completed sampling; laboratory data received and included in MSAR database maintained by SAWPA	Area-wide MS4 Program through MSAR Task Force	December 31, 2012
3.B – Prioritization of Drainage Areas	3.B.i – Prepare Data Analysis Report with prioritized drainage areas based on data collected under 3.A	Data Analysis Report summarizing Tier 1 results to support Decision Points #1 and #2 in the Compliance Strategy (Figure 2-4)	Area-wide MS4 Program through MSAR Task Force	March 31, 2013
3.C – Identify Alternatives for Reducing or Eliminating Controllable Flow or Bacterial Indicator Sources	3.C.i - Based on the findings of Elements 3.B.i, collect data from Tier 2 sites and develop alternatives to mitigate controllable dry weather flow or bacterial indicator sources for each prioritized drainage area starting with the highest priority area (subsequent drainage areas evaluated in order of priority)	Prepare documentation regarding the alternatives identified for each evaluated drainage area (documentation prepared for each drainage area in order of priority and included in Annual Report)	Permittees	December 31, 2014
3.D – Identify and Select Mitigation Alternatives	3.D.i – Select mitigation alternative based on findings established under 3.C.i	Prepare documentation regarding the selected alternative for mitigating controllable sources in each drainage area (documentation prepared for each drainage area in order of priority and included in Annual Report)	Permittees	March 31, 2015
	3.D.ii – Implement targeted non-structural BMPs if part of mitigation alternative	Document implementation of non-structural BMPs through Annual Report	Permittees	December 31, 2015
	3.D.iii – Complete Project Identification phase of CIP process where structural BMPs selected	Establish Project Need and move structural BMP project into CBRP Step 2 (see Table E-4.)	Permittees	March 31, 2015
3.E - Reporting	3.E.i – Provide annual summary of Element 3 implementation activities	Incorporate into Annual Report	Area-wide MS4 Program	Annually by November 15

[1] – Element 3 activities will not occur in the Prado Park Lake Subwatershed

Element 4 – Regional Treatment

This element includes all CBRP Step 2 and 3 activities and programmatic activities including the WAP (Table E-4). Preparation of the WAP is an MS4 permit requirement. The milestones, metrics and schedule associated with these activities are consistent with the MS4 permit.

The outcomes of CBRP Step 1 (selection of BMP alternatives for each prioritized drainage area) determine the schedule for implementation of structural BMP projects and the specific permittees responsible for BMP implementation (e.g., responsibility for implementation of the BMP rests with the permittees located within the drainage area that drains to the structural BMP). Wherever structural BMP solutions are selected for implementation, a project-specific schedule will be developed. This schedule will take into account the nature of the project (e.g., local outfall-specific project vs. small regional or sub-watershed treatment project) and the usual factors that affect implementation of capital improvement projects, e.g., available funding or permitting requirements. If under CBRP Step 2 a selected alternative is determined to be infeasible, a process will be initiated to identify another alternative for the targeted drainage area.

The CBRP schedule shows CBRP Steps 2 and 3 likely extending beyond the December 31, 2015 to allow for the CIP process to be implemented within each responsible jurisdiction. The status of CBRP BMP projects will be annually summarized and reported in the Annual Report prepared for the MS4 permit program.

E.3 Monitoring & Reporting

A watershed-wide compliance monitoring program was established in 2007; it will continue as designed under the CBRP. A report summarizing sample results from dry weather conditions from April 1 to October 31 is submitted to the RWQCB by December 31st of each year. Similarly, a report summarizing sample results from November 1 through March 31 is submitted to the RWQCB by May 31st of each year. In addition to these biannual reports, a 3-year summary (or Triennial Report) is due to the RWQCB by February 15th every three years since TMDL adoption. The first of these reports was submitted on February 15, 2010 (see Attachment B for synopsis of the 2010 report). Subsequent reports are due in 2013 and 2016.

Table E-5 summarizes the monitoring and reporting activities associated with the CBRP. Under the CBRP, the watershed-wide compliance monitoring program will continue to be the primary means of evaluating progress toward meeting the wasteload allocations for dry weather. The existing Monitoring Plan and QAPP will be revised as needed to facilitate source evaluation activities implemented as part of Element 3 – in particular allowing the use of alternative EPA-approved bacterial indicator laboratory analysis methods.

The CBRP schedule includes the regular reporting of seasonal sampling results that is ongoing. In addition, during CBRP implementation two Triennial Reports will be prepared that will provide opportunity to evaluate newly collected data and the effectiveness of CBRP implementation over the long term:

Table E-4. Implementation Plan for CBRP Element 4 – Regional Treatment (Structural BMPs)

Activity	Milestones	Metrics	Responsibility	Complete by
4.A – Complete UAAs, as needed	4.A.i - Meet with RWQCB to establish UAA development schedule and waterbody-specific data requirements	UAA schedule and waterbody specific approach established	Permittees	Schedule specific Structural BMP Projects
	4.A.ii- Collect required data and complete UAA	Submit completed UAA to RWQCB	Permittees	Schedule linked to Structural BMP Projects
4.B – Budget / Planning CIP Phase	4.B.i – Prepare preliminary design and cost estimate for identified structural BMP project	Completed project cost estimate	Permittees	Schedule linked to Structural BMP Projects
	4.B.ii – Incorporate into CIP or implement multi-jurisdictional process to develop project (see Table 2-1).	Incorporation of structural BMP project into CIP or implementation of multi-jurisdictional process	Permittees	Schedule linked to Structural BMP Projects
4.C – Design CIP Phase	4.C.i – Develop design for structural BMPs included in the CIP, as funding allows	Completed structural BMP design	Permittees	Schedule linked to Structural BMP Projects
	4.C.ii – Initiate CEQA process for projects in design	CEQA process initiated	Permittees	Schedule linked to Structural BMP Projects
4.D – Permitting CIP Phase	4.D.i – Complete CEQA process	CEQA approval obtained	Permittees	Schedule linked to Structural BMP Projects
	4.D.ii – Obtain all required permits and approvals	All permits and approvals for construction obtained	Permittees	Schedule linked to Structural BMP Projects
4.E – Construction CIP Phase	4.E.i – Construct BMP, as available funding allows	BMP constructed	Permittees	Schedule linked to Structural BMP Projects
4.F – Watershed Action Plan	4.A.i – Complete WAP Phase 2	WAP submitted to RWQCB	Area-wide MS4 Program	Within 12 months of approval of Phase 1 WAP[1]
	4.A.ii - Implement WAP	Compliance with established WAP and associated schedule	To be determined as part of WAP development	WAP dependent
4.G - Reporting	4.F.i – Provide summary of status of each structural BMP project	Incorporate summary into Annual Report	Area-wide MS4 Program	Annually by November 15

[1] - Consistent with MS4 permit requirement

Table E-5. Implementation of activities to assess compliance with urban wasteload allocations

CBRP Activity	Milestones	Metrics	Responsibility	Complete by
Watershed-wide Compliance Monitoring	Revise Monitoring Plan and QAPP as needed to facilitate Element 3 activities, including modifying the approved *E. coli* laboratory analysis method to another EPA-approved method to allow use of local laboratories[1]	Revised Monitoring Plan and QAPP approved by RWQCB	Area-wide MS4 Program through MSAR Task Force	December 31, 2011
	Collect 20-weekly samples during dry season (April 1 – October 31)	Submittal of Dry Season Report to RWQCB	Area-wide MS4 Program through MSAR Task Force	Ongoing annual activity
	Collect 11 weekly samples during wet season (November 1 – March 31) Collect 4 samples during and after one wet weather event	Submittal of Wet Season Report to the RWQCB	Area-wide MS4 Program through MSAR Task Force	Ongoing annual activity
2013 Triennial Report	Review and revise compliance analysis contained in CBRP Section 6 based on most recent data (e.g., flow, bacterial indicators, special studies) including additional analysis on relative contribution of bacterial indicators from controllable urban sources	Revised compliance analysis for incorporation into the 2013 Triennial Report	Area-wide MS4 Program through MSAR Task Force	December 31, 2012
	As part of 2013 report, evaluate progress towards meeting urban wasteload allocations, in particular during dry weather conditions (April 1 – October 31)	Submit Triennial Report to the RWQCB by February 15, 2013; incorporate recommendations for modifications to CBRP	Area-wide MS4 Program through MSAR Task Force	February 15, 2013
2016 Triennial Report	Review and revise compliance analysis contained in CBRP Section 6 based on most recent data (e.g., flow, bacterial indicators, special studies) including additional analysis on relative contribution of bacterial indicators from controllable urban sources	Revised compliance analysis for incorporation into the 2016 Triennial Report	Area-wide MS4 Program through MSAR Task Force	December 31, 2015
	As part of 2016 report, evaluate progress towards meeting urban wasteload allocations, in particular during dry weather conditions (April 1 – October 31)	Submit Triennial Report to the RWQCB by February 15, 2016; incorporate recommendations for modifications to CBRP including additional BMPs planned if compliance monitoring indicates additional measures are required	Area-wide MS4 Program through MSAR Task Force	February 15, 2016

Table E-5. Implementation of activities to assess compliance with urban wasteload allocations

CBRP Activity	Milestones	Metrics	Responsibility	Complete by
Water Quality Objective Review	Based on the findings/outcomes of CBRP implementation activities, evaluate whether to revise geometric mean *E. coli* water quality objective applicable to Chino Creek, Mill-Cucamonga Creek, Santa Ana River Reach 3 and Prado Park Lake from 126 to 206 cfu/100 mL	RWQCB decision on whether to implement Basin Plan amendment process	RWQCB with MSAR Task Force	Spring 2016

[1] The Basin Plan amendment under development by the SWQSTF allows for the use any EPA-approved *E. coli* method for evaluating compliance. Implementation of the CBRP will require use of local laboratories to facilitate inspection program activities; the existing Monitoring Plan will be revised to accommodate this requirement.

- *2013 Triennial Report* – This report will provide an interim evaluation of progress towards meeting the urban wasteload allocation by the December 21, 2015 compliance date. As part of the preparation of this report, the compliance analysis contained in CBRP Section 3 will be reviewed, and where appropriate, revised to take into account newly available bacterial indicator, flow, and special study data which provide additional information regarding controllable urban sources and the relative contribution of bacteria from the MS4 to impaired waters.

- *2016 Triennial Report* – This report, due to the RWQCB by February 15, 2016, will provide an analysis of the most recent dry weather condition results obtained through October 2015. As part of the preparation of this report, the compliance analysis contained in CBRP Section 3 (and potentially revised in 2013) will be reviewed, and where appropriate, further revised to take into account newly available bacterial indicator, flow, and special study data which provide additional information regarding controllable urban sources and the relative contribution of bacteria from the MS4 to impaired waters.

Attachment F
Glossary

Many of the following glossary terms were adapted from Appendix 4, Glossary, San Bernardino County MS4 Permit, Order No. R8-2010-0036. Several new terms are included that are specific to this CBRP.

303(d) list - Provides information on impaired waters, likely pollutant sources, and priority for TMDL development.

Bacterial Indicator - Indicator for the potential presence of pathogens.

Basin Plan – Water Quality Control Plan developed by the Regional Board for the Santa Ana River watershed.

Bacterial Prioritization Score [BPS] – Scoring given to a Middle Santa Ana River subwatershed on the basis of frequency and magnitude of water quality objective exceedences and number of human detections over the course of the 2007-2008 USEP monitoring period.

Beneficial Use – Uses of water necessary for the survival or well being of man, plants, and wildlife. These uses of water serve to promote the tangible and intangible economic, social, and environmental goals. "Beneficial Uses" that may be protected include, but are not limited to: domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. Existing Beneficial Uses are those that were attained in the surface or ground water on or after November 28, 1975; and potential Beneficial Uses are those that would probably develop in future years through the implementation of various control measures. "Beneficial Uses" are equivalent to "Designated Uses" under federal law. [California Water Code Section 13050(f)] Beneficial Uses for the Receiving Waters are identified in the Basin Plan.

BMP [Best Management Practices] – Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the Pollution of Waters of the U.S. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of MS4 permits, BMPs are typically used in place of Numeric Effluent Limits.

Comprehensive Bacteria Reduction Plan [CBRP] – A plan presenting a long-term solution designed to achieve compliance with the WLAs by the dates specified in the MSAR Bacteria Indicator TMDL. This plan includes a description of the proposed BMPs and the documentation demonstrating that the BMPs are expected to attain the WLAs by the compliance dates when implemented.

Controllable Bacteria Sources - Bacteria source for which reasonable actions can be taken, to the maximum extent practicable, through best management practices or other mechanisms to reduce or eliminate the contribution of those sources within the watershed. These sources are predominately anthropogenic in nature and can be reduced in varying degrees. Specific anthropogenic controllable indictor bacteria sources within the Santa Ana Watershed may include:

- Improper use of fertilizers on residential and commercial properties and agricultural lands
- Improper handling of pet waste
- Cross-connections between the sanitary and storm sewer systems
- Leaky sanitary sewer conveyances
- Discharges from POTWs
- Improper handling and disposal of food waste
- Improper management of CAFO waste and washwater
- Runoff from yards containing fertilizers, pet waste, and lawn trimmings
- Transient encampments

Dry Season – For the CBRP, the dry season is defined by the period from April 1 through October 31 of each year.

Dry Weather Flow [DWF] – Flow in MS4 drains or receiving waterbodies during dry weather in either wet or dry seasons.

Dry Weather – a condition where daily rainfall does not exceed 0.1 inches.

lllegal Discharge –Defined at 40 CFR 122.26(b)(2) as any discharge to the MS4 that is not composed entirely of storm water, except discharges pursuant to an NPDES permit, discharges that are identified in Section VI.A. of this Order, and discharges authorized by the Executive Officer.

Illicit Connection – Any connection to the MS4 that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term Illicit Connection includes all non storm-water discharges and connections except discharges pursuant to an NPDES permit, discharges that are identified in Section V, Effluent Limitations and Discharge Specifications, of this Order, and discharges authorized by the Executive Officer.

Impaired Waterbody / Impaired Waters – Section 303(b) of the CWA requires each of California's Regional Water Quality Control Boards to routinely monitor and assess the quality of waters of their respective regions. If this assessment indicates that Beneficial Uses are not met, then that waterbody must be listed under Section 303(d) of the CWA as an Impaired Waterbody. The 2006 water quality assessment found a number of water bodies as Impaired pursuant to Section 303(d). The Santa Ana River, Reach 3 is listed as an impaired waterbody for pathogens.

Impressions – The most common measure is "gross impressions" that includes repetitions. This means if the same person sees an advertisement or hears a radio or sees a TV advertisement a thousand times, that will be counted as 1000 Impressions.

Load Allocations [LA] – Distribution or assignment of TMDL Pollutant loads to entities or sources for existing and future Non-Point Sources, including background loads.

Local Implementation Plan (LIP) – Document describing an individual Permittee's procedures, ordinances, databases, plans, and reporting materials for compliance with the MS4 Permit.

Low Impact Development (LID) – Comprises a set of technologically feasible and cost-effective approaches to storm water management and land development that combines a hydrologically functional site design with Pollution Prevention measures to compensate for land development impacts on hydrology and water quality. LID techniques mimic the site's predevelopment hydrology by using site design techniques that store, infiltrate, evapotranspire, bio-treat, bio-filter, bio-retain or detain runoff close to its source.

Major Outfall – Outfalls from MS4 systems expected to contribute a measurable amount of dry weather flow based on desktop GIS analysis of upstream drainage area. It is expected that this desktop GIS analysis is moderately comparable with the NPDES Permit definition of a major outfall as an outfall "with a pipe diameter of 36 inches or greater or drainage areas draining 50 acres or more".

Maximum Extent Practicable [MEP] – Is not defined in the CWA; it refers to management practices, control techniques, and system design and engineering methods for the control of pollutants taking into account considerations of synergistic, additive, and competing factors, including, but not limited to pollutant removal effectiveness, regulatory compliance, gravity of the problem, public acceptance, social benefits, cost and technological feasibility. January 29, 2010 (Final) Order No. R8-2010-0036 (NPDES No. CAS 618036) Page 113 of 125 Area-wide Urban Storm Water Runoff Management Program San Bernardino County MS4 Permit MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that operators of MS4s must meet. Technology-based standards establish the level of pollutant reductions that dischargers must achieve, typically by treatment or by a combination of source control and treatment control BMPs. MEP generally emphasizes pollution prevention and source control BMPs primarily (as the first line of defense) in combination with treatment methods serving as a backup (additional line of defense). MEP considers economics and is generally, but not necessarily, less stringent than BAT. A definition for MEP is not provided either in the statute or in the regulations. Instead, the definition of MEP is dynamic and will be defined by the following process over time: municipalities propose their definition of MEP by way of their urban runoff management programs. Their total collective and individual activities conducted pursuant to the urban runoff management programs becomes their proposal for MEP as it applies both to their overall effort, as well as to specific activities (e.g., MEP for street sweeping, or MEP for MS4 maintenance). In the absence of a proposal acceptable to the Regional Board, the Regional Board defines MEP.

MS4 – [Municipal Separate Storm Sewer System] – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, natural drainage features or channels, modified natural channels, man-made channels, or storm drains): (i) Owned or operated by a State, city town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to Waters of the U.S.; (ii) Designated or used for collecting of conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the POTW as defined at 40 CFR 122.2.

New Development – The categories of development identified in Section XI.D of this Order. New Development does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of a facility, nor does it include emergency New Development required to protect public health and safety. Dischargers should confirm with Regional Board staff whether or not a particular routine maintenance activity is subject to this Order.

Non-Point Source – Refers to diffuse, widespread sources of Pollution. These sources may be large or small, but are generally numerous throughout a watershed. Non-Point Sources, include but are not limited to urban, agricultural or industrial area, roads, highways, construction sites, communities served by septic systems, recreational boating activities, timber harvesting, mining, livestock grazing, as well as physical changes to stream channels, and habitat degradation. Non-Point Source Pollution can occur year round any time rainfall, snowmelt, irrigation, or any other source of water runs over land or through the ground, picks up Pollutants from these numerous, diffuse sources and deposits them into rivers, lakes and coastal waters or introduces them into groundwater.

National Pollutant Discharge Elimination System (NPDES) – A national program under Section 402 of the Clean Water Act for regulation of discharges of pollutants from point sources to waters of the United States. Discharges are illegal unless authorized by an NPDES permit.

Point Source – Any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft from which pollutants are or may be discharged.

POTW – [Publicly Owned Treatment Works] – Wastewater treatment facilities owned by a public agency.

ROWD [Report of Waste Discharge] – Application for issuance or re-issuance of WDRs.

Non-structural BMPs – In general, activities or programs to educate the public or provide low cost non-physical solutions, as well as facility design or practices aimed to limit the contact between Pollutant sources and storm water or authorized Non-Storm Water. Examples include: activity schedules, prohibitions of practices, street sweeping, facility maintenance, detection and elimination of IC/IDs, and other non-structural measures. Facility design (structural) examples include providing attached lids to trash containers, canopies for fueling islands, secondary containment, or roof or awning over material and trash storage areas to prevent direct contact between water and Pollutants.

Significant Redevelopment -The addition or creation of 5,000, or more, square feet of impervious surface on an existing developed site. This includes, but is not limited to, construction of additional buildings and/or structures, extension of the existing footprint of a building, construction of impervious or compacted soil parking lots. Significant Redevelopment does not include routine maintenance activities that are conducted to maintain original line and grade, hydraulic capacity, the original purpose of the constructed facility or emergency actions required to protect public health and safety.

Structural BMPs – Physical facilities or controls that may include secondary containment, treatment measures, (e.g. low flow diversion, detention/retention basins, and oil/grease separators), run-off controls (e.g., grass swales, infiltration trenches/basins, etc.), and engineering and design modification of existing structures.

Total Maximum Daily Load [TMDL] - The TMDL is the maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under Clean Water Act Section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology based controls.

Uncontrollable Bacteria Sources - Contributions of bacteria within the watershed from nonpoint sources that are not readily managed through technological or natural mechanisms and that may result in exceedances of water quality objectives for indicator bacteria. Uncontrollable sources can occur from both natural and anthropogenic sources, and include runoff from the roadways, residential, industrial and agricultural land use, and wildlife activity. Specific uncontrollable indicator bacteria sources within the Santa Ana Watershed may include:

- Wildlife activity and waste
- Bacterial regrowth within sediment
- Resuspension from disturbed sediment
- Marine vegetation (wrack) along high tide line
- Concentration (flocks) of semi-wild water fowl
- Shedding during swimming

Waste Load Allocations (WLAs)– Maximum quantity of Pollutants a discharger of waste is allowed to release into a particular waterway, as set by a regulatory authority. Discharge limits usually are required for each specific water quality criterion being, or expected to be, violated. Distribution or assignment of TMDL Pollutant loads to entities or sources for existing and future Point Sources.

Water Quality Objectives – Means the numeric or narrative limits or levels of water quality constituents or characteristics which are established for the reasonable protection of Beneficial Uses of water or the prevention of Nuisance within a specific area. [California Water Code Section 13050(h)]

Water Quality Standards –The water quality goals of a waterbody (or a portion of the waterbody) designating Beneficial Uses to be made of the water and the Water Quality Objectives or criteria necessary to protect those uses. These standards also include California's anti-degradation policy.

Watershed Action Plan (WAP) – Integrated plans for managing a watershed that include consideration of water quality, hydromodification, water supply and habitat protection. The Watershed Action Plan integrates existing watershed based planning efforts and incorporates watershed tools to manage cumulative impacts of development on vulnerable streams, preserve structure and function of streams, and protect source, surface and groundwater quality and water supply in the Permit Area. The Watershed Action Plan should integrate Hydromodification and water quality management strategies with land use planning policies, ordinances, and plans within each jurisdiction.

Wet Season - For the CBRP, the wet season is defined by the period from November 1 to March 31, of each year.

Water Quality Management Plan [WQMP] – a plan developed to mitigate the impacts of urban runoff from Priority Development Projects.