SAN BERNARDINO COUNTY PUBLIC WORKS

SAN BERNARDINO COUNTY
SANTA ANA RIVER WATERSHED STORMWATER RESOURCE PLAN

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San Bernardino County Santa Ana River Watershed Stormwater Resource Plan

FINAL

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Acronyms

AES	Advanced Engineering Software
AF	Acre-Feet
AFY	Acre-Feet per Year
AGR	Agricultural Supply
ASBI	Area of Special Biological Importance
ASBS	Areas of Special Biological Significance
BBL	Big Bear Lake
BBLN	Big Bear Lake Nutrient and Nuisance Aquatic Plants
BBMWD	Big Bear Municipal Water District
BMP	Best Management Practice
BPA	Basin Plan Amendment
BVMWC	Bear Valley Mutual Water Company
CASQA	California Stormwater Quality Association
CBRP	Comprehensive Bacteria Reduction Plan
CBWCD	Chino Basin Water Conservation District
CBWM	Chino Basin Watermaster
CDFW	California Department of Fish and Wildlife
CDS	Continuous Deflection Separator
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	Construction General Permit
COLD	Cold Freshwater Habitat
CRAM	California Rapid Assessment Methods
CTR	California Toxics Rule
CWA	Clean Water Act
DAC	Disadvantaged Community
DDT	Dichlorodiphenyltrichloroethane
EIR	Environmental Impact Report
ESA	Endangered Species Act
EVWD	East Valley Water District
FCS	Full Capture Systems
GAC	Granular Activated Carbon
GIS	Geographic Information System
GWR	Groundwater Recharge
HEC-HMS	Hydrologic Engineering Center – Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center – River Analysis System
HSPF	Hydrological Simulation Program – Fortran
IEUA	Inland Empire Utilities Agency
IGP	Industrial General Permit
IRWM	Integrated Regional Water Management

IRWMP	Integrated Regional Water Management Plan
IS	Initial Study
ISWEBE	Inland Surface Waters, Enclosed Bays, and Estuaries
LA	Load Allocation
MCL	Maximum Contaminant Level
MND	Mitigated Negative Declaration
MS4	Municipal Separate Storm Sewer System
MSAR	Middle Santa Ana River
MUN	Municipal and Domestic Water Supply
MWD	Metropolitan Water District of Southern California
MZ	Management Zones
ND	Negative Declaration
NGO	Non-Governmental Organization
NL	Notification Level
NPDES	National Pollutant Discharge Elimination System
OAL	Office of Administrative Law
OCWD	Orange County Water District
OWOW	One Water, One Watershed
OWTS	Onsite Wastewater Treatment Systems
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethylene
POTW	Publicly-Owned Treatment Works
POW	Hydropower Generation
QAPP	Quality Assurance Program Plan
RARE	Rare, Threatened, or Endangered Species
RCP	Reinforced Concrete Pipe
REC1	Water Contact Recreation
REC2	Water Non-contact Recreation
RHWC	Riverside Highland Water Company
ROWD	Report of Waste Discharge
SANBAG	San Bernardino Associated Governments
SARW	Santa Ana River Watershed
SARWQCB	Santa Ana Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SBC	San Bernardino County
SBCDPW	San Bernardino County Department of Public Works
SBCFCD	San Bernardino County Flood Control District
SBMWD	San Bernardino Municipal Water District
SBPAT	Structural Best Management Practice Prioritization and Analysis Tool
SBVMWD	San Bernardino Valley Municipal Water District
SBVWCD	San Bernardino Valley Water Conservation District
SCS	Soil Conservation Service
SDWA	Safe Drinking Water Act

SPOEEP	Stakeholder and Public Outreach, Education, and Engagement Plan
SPWN	Spawning, Reproduction, and Development
SUSTAIN	System for Urban Stormwater Treatment and Analysis Integration
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Stormwater Management Model
SWRCB	State Water Resources Control Board
SWRP	Stormwater Resource Plan
TAC	Technical Advisory Committee
TCE	Trichloroethylene
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UA	Unincorporated Areas
UAA	Use Attainability Analyses
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VOCs	Volatile Organic Compounds
WARM	Warm Freshwater Habitat
WEI	Wildermuth Environmental, Inc.
WILD	Wildlife Habitat
WLA	Waste Load Allocation
WLAM	Wasteload Allocation Model
WMS	Watershed Modeling System
WMWD	Western Municipal Water District
WQO	Water Quality Objective
WSPG	Water Surface Pressure Gradient
WWTP	Wastewater Treatment Plant
WVWD	West Valley Water District
YVWD	Yucaipa Valley Water District

Executive Summary

This Stormwater Resource Plan (SWRP) was prepared to develop a regional, watershed-based plan for management and improvement of stormwater resources within the Santa Ana River Watershed (SARW) portion of San Bernardino County (SBC). This SWRP is a document that complies with the requirements and guidelines set forth by the State Water Resources Control Board (SWRCB) mandated by Senate Bill 985 (SB 985), passed by the California State Legislature and signed into law by Governor Jerry Brown on September 25, 2014.

The intent of the SWRP is to develop a regional plan of stormwater resources to maximize benefits within the SBC portion of the SARW, an area of 1,015 square miles and home to nearly 2 million people, or about 80% of the overall population of the county. The SBC SARW contains the headwaters of the Santa Ana River and the headwaters of many of its tributaries draining from the San Bernardino and San Gabriel Mountains. The SWRP establishes stormwater and dry-weather runoff goals and objectives for the entire SBC SARW to provide water quality, water supply, flood management, environmental, and community benefits. The intention of this SWRP is not to preclude a stakeholder from fulfilling their agency's primary mission, but to identify and prioritize multi-benefit projects when feasible.

The SBC SARW SWRP includes a section on the water quality objectives within the watershed. Meeting existing water quality objectives is an important component of the SWRP. Existing planning efforts have been identified, as the intent of the SWRP is not to replace existing efforts, but rather to work in conjunction with existing goals already defined in regulations and planning efforts. Stakeholders were identified, along with a process for collaborating with organizations, stakeholders, and the public.

The SWRP contains a number of potential stormwater and dry-weather runoff projects. The types of projects include low-flow capture, infiltration basins, channel improvements, bioretention projects, habitat remediation, public use areas, and green streets projects. Each project included provides multiple benefits to the community and contributes towards the achievement of stormwater goals and objectives. The multiple benefits are quantified and projects are prioritized based on an integrated metrics-based analysis. An implementation strategy and a rough estimation of a schedule for each project is included in the plan.

The SWRP was prepared with community and stakeholder involvement at each step of the process. The outreach, collaboration, and educational components are summarized within the SWRP. The SWRP is a living document which can be used for many years and will be adaptively managed based on the changing needs and resource goals within the SBC SARW. The SWRP will be submitted to the Santa Ana Watershed Protection Authority (SAWPA) for inclusion in their One Water, One Watershed (OWOW) Plan.

1. Introduction

California voters passed the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) during the general election of November 4, 2014. As a precursor to the passage of Proposition 1, the California State Legislature adopted Senate Bill (SB) 985 entitled the Stormwater Resource Planning Act (SB 985), requiring the development of a Stormwater Resource Plan (SWRP) to be eligible to receive grants from a bond act approved after January 1, 2014, for stormwater and dry-weather runoff capture projects. A SWRP is a stormwater management document developed on a watershed basis that identifies a prioritized list of projects to address stormwater and dry-weather runoff, while also providing multiple benefits, such as water supply, flood management, and environmental and community enhancements. The State Water Resources Control Board (SWRCB) developed Stormwater Resource Plan Guidelines (2015) to facilitate the preparation of SWRPs or equivalent documents. Proposition 1 includes numerous project categories to be funded, one being the Stormwater Grant Program. Planning and implementation grants were included in the Stormwater Grant Program. Planning grants were used for developing SWRPs and/or conducting studies prior to project implementation while the implementation grants were used to fund projects identified in a SWRP or equivalent document.

The San Bernardino County Flood Control District (SBCFCD) was awarded Proposition 1 planning grant funds through the Stormwater Grant Program for the development of the San Bernardino County Santa Ana River Watershed (SBC SARW) SWRP (Grant Agreement No. D1612627). The SBC SARW area encompasses the upper limits of the SARW that lies within the San Bernardino County jurisdictional boundary and is comprised of 14 subwatersheds associated with major tributaries to the Santa Ana River. The SBC SARW SWRP has been developed with funding provided by this planning grant program based on the conditions of the grant agreement.

The following subsections provide background information on the history of stormwater management legislation in California, the intended use of this SWRP, and the existing regulations and planning efforts that this SWRP will complement. **Section 1.5** introduces the stormwater management objectives addressed by the SBC SARW SWRP, and **Section 1.6** outlines the structure of this document.

1.1 Background

Stormwater and dry-weather runoff are resources that must be managed on a regional scale to maximize benefits. The California State Legislature found that "improved management of stormwater and dry-weather runoff, including capture, treatment, and reuse by using the natural functions of soils and plants, can improve water quality, reduce localized flooding, and increase water supplies for beneficial uses and the environment." That finding was included with the passage of SB 985 in 2014, the Stormwater Management Planning Act.

Historically, stormwater management focused on the conveyance of stormwater offsite as quickly as possible. The conveyance of stormwater has been generally regarded as separate from the concept of water supply infrastructure and water quality management. Conveyance of stormwater through Municipal Separate Storm Sewer Systems (MS4s) and flood control infrastructure was combined with water quality regulations in California with the passage of the Porter-Cologne Water Quality Control Act of 1969, followed soon thereafter nationally by the Clean Water Act (CWA) of 1972. The CWA prohibited any entity from discharging pollutants through a point source into a water of the United States unless that entity had a National Pollutant Discharge Elimination System (NPDES) permit. Through these regulations, water quality became a priority for municipalities on par with flood control management.

The traditional approach to stormwater management as a flood control and water quality issue did not address projects that could attain multiple benefits, such as the augmentation of the water supply or protection of the local ecology. In general, the conveyance of stormwater through storm drains and channels reduced the ability of the environment to capture runoff and treat it through natural hydrology and watershed processes. Municipalities sacrificed opportunities to use stormwater runoff to augment water supply by favoring the quick conveyance of stormwater runoff downstream rather than capturing the runoff and storing it. As a result, municipalities are forced to import costly water from the California State Water Project and deplete local groundwater basins to meet water demands.

The California State Legislature passed the Integrated Regional Water Management (IRWM) Planning Act of 2002, which encouraged the establishment of regional water management groups, which would then prepare a regional plan to address the quantity, quality, and reliability of water supplies. The Act established the idea of creating a regional planning document, an Integrated Regional Water Management Plan (IRWMP), as a framework for integrating various programs and projects with the primary goal of enhancing water supplies, but with a secondary goal of providing flood protection, improving water quality, and undertaking environmental restoration or enhancement. Since the Act passed in 2002, various bond acts approved by California voters have provided over $1.5 billion in funding to support multi-benefit regional projects (DWR, 2018).

By 2009, the State of California had established funding for projects to encourage water supply through the IRWM groups, and requirements for projects to enhance water quality. The existing programs did not encourage the implementation of multi-benefit stormwater projects. In response, the California State Legislature passed SB 790, the Stormwater Resource Planning Act, authored by Senator Fran Pavley, which introduced the concept of a SWRP. SB 790 authorized a city, county, or special district to develop, jointly or individually, a SWRP. The purpose of a SWRP was to identify, on a watershed basis, projects and programs that could augment local water supplies, control pollution, enhance habitat, and provide other multiple community benefits. The Stormwater Resource Planning Act "change[d] perspective on stormwater from being a water quality problem to recognizing that stormwater could be a source of water supply for a variety of purposes," according to Pavley (2009).

In 2014, the Stormwater Resource Planning Act was amended by SB 985, also authored by Pavley, which expanded the standards to include dry-weather runoff and made the development of a SWRP a prerequisite for receiving money from any bond act approved by California voters after January 1, 2014. One such bond act, known as the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1), was approved by voters in November of 2014. Proposition 1 authorized $7.545 billion in general obligation bonds to fund ecosystems and watershed protection and restoration, water supply infrastructure projects (including surface and groundwater storage), and drinking water protection.

SB 985 required the State of California to establish guidelines for the development of SWRPs. The SWRCB published the SWRP Guidelines in December of 2015 to establish guidance for public agencies interested in developing SWRPs. The SWRP Guidelines "serve as a guide for the State Water Board and other bond fund-dispensing agencies to use in determining whether an adequate Stormwater Resource Plan has been prepared prior to the granting of funds for stormwater and dry-weather runoff capture projects." This SWRP has been developed in consideration of the SWRP Guidelines.

1.2 Intended Use of the SWRP

The purpose of the SBC SARW SWRP is to create a plan that characterizes the SBC SARW, provides a template for interagency coordination and outreach, quantifies potential solutions to achieve stormwater management goals and objectives, and outlines a strategy for implementation. The intent is not to create a plan that replaces objectives that already exist within the SBC SARW but rather to work in conjunction with existing goals already defined in regulations and planning efforts.

1.3 Consistency with Applicable Regulations

Effective stormwater planning and management on a watershed level basis requires agreement of applicable water quality provisions developed and implemented by the United States Environmental Protection Agency (USEPA), SWRCB, Santa Ana Regional Water Quality Control Board (SARWQCB), and local agencies and stakeholders. Projects identified within this SWRP are consistent with applicable requirements of the provisions outlined in subsequent sections.

1.3.1 California Environmental Quality Act

Stormwater related projects proposed for the study area by public agencies must comply with the California Environmental Quality Act (CEQA) statute, California Public Resources Code § 21000 et seq., purposed to disclose to the public the significant environmental effects of proposed discretionary projects, through the preparation of an Initial Study (IS) and Negative Declaration (ND), Mitigated Negative Declaration (MND), or Environmental Impact Report (EIR). CEQA requires that any impacts determined to be significant must be mitigated to a level of non-significance.

Each project and/or program identified in this SWRP will be reviewed and documentation will be prepared in accordance with CEQA requirements prior to implementation of the project/program. The agency responsible for implementation will also be responsible for the CEQA requirements.

1.3.2 Clean Water Act

The CWA established the structure for regulating point source discharges of pollutants into the waters of the United States and water quality standards for surface waters. Under the CWA, USEPA has implemented pollution control programs and set water quality standards for contaminants in surface waters. One program that ties water quality standards and surface waters is the 303(d) listing of impaired waters. The list serves as a tracking system for water bodies and associated pollutants causing impairments. Waste discharge requirements regulate discharge water quality through the assignment of Total Maximum Daily Loads (TMDLs), based on the severity of the pollution and sensitivity of the beneficial uses to be protected. Water bodies currently on the 303(d) list within the SBC SARW are identified in **Section 3.1**.

The Porter-Cologne Water Quality Control Act, also known as the California Water Code, Section 7, was established to protect water quality as well as its beneficial uses and consists of three elements: beneficial uses, water quality objectives, and an implementation program. The Regional Water Quality Control Boards implement the applicable Basin Plan(s) by issuing and enforcing waste discharge requirements to individuals, municipalities, and/or businesses whose point source or non-point source waste discharges can impact water quality.

1.3.2.1 NPDES MS4 Permit Order No R8-2010-0036

The NPDES Permit and Waste Discharge Requirements for the SBCFCD, the County of San Bernardino, and the Incorporated Cities of San Bernardino County within the Santa Ana Region, Order No. R8-2010-0036 (MS4 Permit) was adopted on January 29, 2010, and expired on January 29, 2015. The MS4 Permit was administratively extended until a new permit is issued. The MS4 Permit regulates the discharge of pollutants from anthropogenic sources from MS4s. Among many things, the MS4 Permit outlines the responsibilities of the Permittees, defines discharge prohibitions and receiving water limitations, and identifies programs that must be implemented in an effort to minimize pollutant discharges. The MS4 Permit requires that Permittees establish legal authority for inspections, enforcement, prohibition of waste discharge, and other actions necessary to uphold the MS4 Permit requirements. Although the expiration date has passed, the MS4 Permit must be abided by until a new MS4 Permit is adopted by the SARWQCB. The MS4 Permit applies to the SBC SARW area and the SWRP was developed to be consistent with the requirements contained within it.

1.3.2.2 Report of Waste Discharge: Application for Renewal of the Municipal NPDES Stormwater Permit (NPDES Permit No. CAS618036)

The Report of Waste Discharge (ROWD) was prepared as part of the MS4 Permit renewal application process, which will result in the development and adoption of a fifth-term MS4 Permit by the SARWQCB. The ROWD was submitted August 1, 2014, to the SARWQCB. The ROWD identifies the accomplishments of the San Bernardino County Areawide Stormwater Program (Areawide Program), which implements the shared requirements set forth by the MS4 Permit, and develops priorities for the watershed area. The ROWD presents iterative Best Management Practice (BMP) approaches that continue to be successful. The data and findings included within the ROWD were referenced throughout the SWRP development and are used to support approaches taken to address the SWRP Guidelines (2015).

1.3.2.3 Clean Water Act, Section 401

Section 401 of the CWA requires that any person applying for a federal permit or license, which may result in the discharge of pollutants into waters of the United States, must obtain a state water quality certification that the activity complies with all water quality standards, limitations, and restrictions. Certification or a waiver under Section 401 is required prior to other federal agency certifications or licenses. This certification is required prior to construction and is only applicable during construction activities. The authority to certify projects has been delegated to local Regional Water Quality Control Boards, which in this case is the SARWQCB. Several projects included in this SWRP are located within open conveyances and will need to comply with Section 401 requirements. The projects will be designed to preserve beneficial uses, satisfy water quality objectives, and be consistent with the Antidegradation Policy according to CWA 40 Code of Federal Regulations (CFR) 131. The agency responsible for a project’s implementation is also responsible for compliance with Section 401.

1.3.2.4 Clean Water Act, Section 404

Section 404 of the CWA establishes a program that requires a permit to be obtained prior to construction to regulate the discharge of dredged or fill material into the waters of the United States. The basic premise of the program is that no discharge of dredged or fill material may be permitted if a practicable alternative exists that is less damaging to the aquatic environment or the nation's waters would be significantly degraded. When applying for a permit, it must be clear that steps have been taken to minimize potential impacts and that compensation will be provided for all remaining unavoidable impacts. Individual permits are reviewed by the United States Army Corps of Engineers (USACE) and applications are evaluated under public interest review as well as Section 404 guidelines. For most discharges that will have only minimal adverse effects, a general permit may be suitable. General permits are issued on a nationwide, regional, or state basis for particular categories of activities. Several projects included in this SWRP are located within open conveyances and will need to comply with Section 404 requirements. The agency responsible for a project's implementation is also responsible for compliance with Section 404.

1.3.3 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) gives the USEPA authority to set drinking water standards. Projects that have been identified in the SBC SARW SWRP have no components foreseen to be applicable to the SDWA.

1.3.4 Water Rights Permits

An entity must have a water right to capture or divert stream flows from natural streams, including flows incurred during peak storm events, to artificially recharge groundwater aquifers. Except where the storage and beneficial use are authorized under an existing appropriative right or a change in an existing right, this will require filing an application with the SWRCB to obtain a water right permit. Exceptions to acquiring water rights exist for flood control projects, those designed and used solely for flood protection and not for beneficial use. Exceptions also exist for pre-1914 rights, projects diverting water under a valid pre-1914 appropriative right.

The type of application required for a given project is dependent upon the duration of operation and urgency of water needs. The two types are outlined below:

- Temporary Permits – expire within 180 days of issuance and are typically appropriate for short-term or infrequent diversions where an urgent need may exist.
- Standard Permits – appropriate for long-term projects and may take several years to issue.

1.3.5 Areas of Special Biological Significance

Areas of Special Biological Significance (ASBS) are important areas outlined in the California Ocean Plan for which additional water quality protection may be necessary. State regulations mandate that "waste shall not be discharged to designated Areas of Special Biological Significance…" Currently, there are no ASBSs applicable to the projects identified in this SWRP.

1.3.6 Total Maximum Daily Loads

TMDLs are developed for water bodies on the CWA 303(d) List and define how much of a pollutant can be present in a water body and still meet water quality standards and protect beneficial uses. There are two TMDLs in the SBC SARW: Big Bear Lake Nutrients and Nuisance Aquatic Plants TMDL and the Middle Santa Ana River Bacterial Indicator TMDL. Additional details pertaining to these TMDLs are provided in **Section 3**.

1.3.7 Other Federal and/or State Laws, Regulations, and Permits

In addition to federal and state laws, regulations, and permits described above, compliance will be demonstrated for the following programs as listed below.

1.3.7.1 United States Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) governs the Endangered Species Act (ESA), which directs all Federal agencies to conserve endangered and threatened species and use their authorities to further the purpose of the Act. Section 7 of the Act, called "Interagency Cooperation," is the mechanism by which Federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species. Based on preliminary review, endangered and/or threatened species exist in the SBC SARW and projects may need to comply with these requirements on a project by project basis. The agency responsible for project implementation is responsible for complying with these requirements, as applicable.

Under Section 7, Federal agencies must consult with the USFWS when they carry out any action, funds, or authorizations (such as through a permit) which may affect a listed endangered or threatened species. This process usually begins as an informal consultation, as the Federal agency approaches the USFWS in the early stages of a project to discuss the types of listed species that may be in the project area and what effect the project may have on those species. If the Federal agency and the USFWS determine that the proposed project is not likely to affect any listed species in the project area, the informal consultation is complete and the proposed project can move forward. If it appears that the project may affect a listed species, the Federal agency will coordinate with the applicant to prepare a biological assessment to assist in the determination of the project's effect on the species.

1.3.7.2 California Department of Fish and Wildlife Code Section 1602

The Fish and Game Code Section 1602 requires an entity to notify the California Department of Fish and Wildlife (CDFW) prior to the commencement of any activity that may do one or more of the following:

1. Substantially divert or obstruct the natural flow of any river, stream, or lake;
2. Substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or
3. Deposit or dispose of debris, waste, or other materials containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The Notification of Lake or Streambed Alteration form must be completed and submitted along with the applicable fee to the Central Region (Region 4) to notify the CDFW regarding the project once it is scheduled to be implemented. Applicable special status studies, biological assessments, and hydrological studies must be included in the submittal package. When there is a potential for endangered and/or threatened species to exist in the project vicinity, then these requirements must be complied with. Special status studies and biological assessments will be required for these species plus any other endangered and/or threatened species known in the area. The agency responsible for implementation of a given project must also evaluate the applicability of these requirements and conform as necessary.

1.3.7.3 Mosquito Abatement and Vector Control District Law

The Mosquito Abatement Act of 1915 allows municipalities and counties to create Mosquito Abatement Districts. Projects identified in the SBC SARW SWRP will comply with requirements of the local mosquito abatement district. The San Bernardino County Department of Public Health, Division of Environmental Health Services, Mosquito and Vector Control Program provide mosquito abatement services within the San Bernardino County Region. Vector control is applicable to projects that have the potential for standing water. The agency responsible for a project's implementation is also responsible for coordination pertaining to vector control.

1.4 Existing Planning Efforts

Various local plans currently exist and are in effect within the SBC SARW related to water management. The intent of the SBC SARW SWRP is not to supersede these plans, but to improve water management objectives in the SBC SARW in conjunction with already existing efforts. Current planning efforts in the region that were considered throughout the development of this SWRP are described in detail in the Annotated List of Data and Reports Technical Memorandum (**Attachment A**) and **Section 4.2**. One major existing planning effort that is referenced throughout the SWRP is the Santa Ana Watershed Project Authority's (SAWPA's) One Water, One Watershed (OWOW) 2.0 Plan (2014). The OWOW Plan is the IRWMP for the SARW.

1.5 Stormwater Management Objectives

Stormwater management objectives have been identified for the SBC SARW to guide project/program identification, prioritization, and implementation within the watershed. The SWRP Guidelines (2015) state that plans must "discuss how the various stormwater management objectives within the watershed will protect or improve water quality, water supply reliability, and/or achieve other objectives."

1.5.1 Objectives Specific to the SBC SARW SWRP

The stormwater management objectives for the SBC SARW SWRP are spread across five categories of stormwater management goals. These goals are as follows, while **Table 1-1** summarizes the specific stormwater objectives:

1. Enhance water quality
2. Maximize water supply
3. Improve flood management
4. Protect the environment
5. Provide community benefits

Table 1-1 Stormwater Management Objectives

Goal	Objective	Description of Objective
Enhance Water Quality	Pollutant Load Reduction	Reduce the pollutant load from the contributing drainage area to achieve water quality objectives in downstream receiving waters, focusing on the water quality priorities identified in **Section 3.4**.
	Stormwater Runoff Reduction	Reduce volume of stormwater runoff from the project tributary area to downstream receiving waters to improve water quality by reducing the discharge of polluted runoff.
Maximize Water Supply	Stormwater Recharge	Increase the amount of stormwater runoff captured and infiltrated into groundwater basins.
	Recycled Water Recharge	Increase the amount of recycled water captured and infiltrated into groundwater basins.
Improve Flood Management	Runoff Rate Reduction	Reduce the peak runoff rate for the 100-year storm event, such that flooding is reduced.
	Runoff Volume Reduction	Reduce the volume of floodwaters reaching downstream conveyances, such that additional capacity is available downstream and flooding is reduced.
	Flood Elevation Reduction	Reduce flood elevation (water surface elevation) of the 100-year flood in conveyances downstream, which reduces the risk to property damage or loss caused by flooding.
	Removal of Parcels/ Structures from the Floodplain	Remove parcels/structures from the 100-year floodplain, decreasing the risk of losing property or human life due to flooding.
	Property Value Saved	Decrease property losses due to flooding.
Protect the Environment	Wetlands Enhancement/ Creation	Enhance/create wetlands to protect and improve habitat for species dependent on aquatic habitats for survival. Wetlands enhancement/creation replaces wetland habitat lost due to the process of urbanization.
	Riparian Area Enhancement	Riparian area enhancement helps protect and improve riparian habitat, which is important to protecting biodiversity, maintaining/improving water quality, and protecting channel slopes, among other benefits.
	Streambed Restoration	Restore or enhance natural streambeds for the protection of fish and wildlife habitat. Streambed restoration can also stimulate the natural scour and sedimentation processes essential to creating coarse sandy loam habitat for the endangered San Bernardino kangaroo rat.
	Increased Urban Green Space	Increase urban green space by providing trees, shrubs, and grasses that can filter pollution from air, water, and soils. Urban green space also provides community benefits of increased access to spaces for recreation, exercise, communing with nature, neighborhood cohesion, and intangible social benefits associated with lower crime rates and improved property values.

Goal	Objective	Description of Objective
Provide Community Benefits	Provide Employment Opportunities	Increase the number of jobs for members of the community.
	Increase Public Education	Increase public education associated with stormwater quality and multi-benefit project implementation, such that the public's understanding of water quality protection results in water quality improvements.
	Increase Community Involvement	Enhance public participation in the design phase of a project. Project buy-in can occur when designers have taken the time to involve the community, which yields long-term community cohesion benefits.
	Recreational Path Enhancement/ Creation	Enhance/create walking paths, sidewalks, and bike trails, which provide community benefits by increasing connectivity, supporting multi-modal transportation, and encouraging a healthy community.
	Public Use Area Enhancement/ Creation	Provide space for communities to gather and recreate, especially within disadvantaged communities, which have been neglected historically in terms of the development of public spaces. Enhancing/creating certain types of public use areas may result in health and social benefits.

The stormwater management objectives will be met through the implementation of the projects and programs described in this SWRP. An evaluation of these stormwater management objectives is included in **Section 6.4**.

1.5.2 Compatibility with IRWMP Goals

The SBC SARW SWRP will be submitted to SAWPA for incorporation into the local IRWMP (OWOW Plan) and the objectives included in this SWRP are consistent with those identified in the OWOW Plan, as shown below. **Table 1-2** lists the goals enumerated in the OWOW 2.0 Plan and the SBC SARW SWRP watershed management objectives that address these goals. Each stormwater management objective specific to the SBC SARW SWRP furthers at least one goal from the OWOW 2.0 Plan.

Table 1-2 Compatibility with IRWMP Goals

OWOW 2.0 Plan Goals	SBC SARW SWRP Objectives
Maintain reliable and resilient water supplies and reduce dependency on imported water	➢ Stormwater Recharge ➢ Recycled Water Recharge
Manage at the watershed scale for preservation and enhancement of the natural hydrology to benefit human and natural communities	➢ Wetlands Enhancement/Creation ➢ Riparian Area Enhancement ➢ Streambed Restoration
Preserve and enhance the ecosystem services provided by open space and habitat within the watershed	➢ Wetlands Enhancement/Creation ➢ Riparian Area Enhancement ➢ Streambed Restoration ➢ Increased Urban Green Space

OWOW 2.0 Plan Goals	SBC SARW SWRP Objectives
Protect beneficial uses to ensure high quality water for human and natural communities	➢ Pollutant Load Reduction ➢ Stormwater Runoff Reduction
Accomplish effective, equitable, and collaborative integrated watershed management	➢ Pollutant Load Reduction ➢ Stormwater Runoff Reduction ➢ Stormwater Recharge ➢ Recycled Water Recharge ➢ Runoff Rate Reduction ➢ Runoff Volume Reduction ➢ Flood Elevation Reduction ➢ Removal of Parcels/Structures from the Floodplain ➢ Property Value Saved ➢ Provide Employment Opportunities ➢ Increase Public Education ➢ Increase Community Involvement ➢ Recreational Paths Enhancement/Creation ➢ Public Use Area Enhancement/Creation

1.6 Elements of the SWRP

The SWRP consists of the following sections:

- **Section 2 – Watershed Identification**

  Internal boundaries within the SBC SARW area are defined and include the following boundaries: watershed and subwatersheds, planning areas, public agency, water utility, and surface and groundwater resources. This section includes the characterization of land use and natural/open space. Identification of the watershed and its characteristics sets the stage for project partners and stakeholder identification, water quality derivations, and potential regional projects.

- **Section 3 – Water Quality**

  Data from existing monitoring programs was compiled from various sources. Existing TMDLs and CWA 303(d) listed impairments are identified for receiving waters within the SBC SARW along with applicable Water Quality Objectives (WQOs). Data was analyzed to determine the exceedance frequency for each of the receiving waters to identify water quality priorities. The identified water quality priorities help guide the implementation efforts for the quantification of project benefits. Water quality data was also used to establish baseline water quality conditions in the SARW area.

- **Section 4 – Organizations, Coordination, and Collaboration**

  Stakeholders, the public, regulators, and Non-Governmental Organizations (NGOs) were solicited for input throughout the development of the SWRP. This section describes the coordination and collaboration that occurred and how it impacted the final SWRP.

- **Section 5 – Quantitative Methods**

  The water management objectives for the SBC SARW will be met through various multi-benefit stormwater management projects located within the SBC SARW. This section presents the approach taken to develop quantitative methodologies for integrated identification, prioritization, and analysis of multi-benefit projects and programs. Existing hydrologic/hydraulic models, water quality models, and other Geographic Information System (GIS) and spreadsheet-based decision support tools were reviewed to determine if they could be used to support the metric-based benefit analysis and prioritization of projects. A weighted scoring approach to conduct the metric-based analysis was established and is described in this section.

- **Section 6 – Project Identification and Prioritization**

  The approach described in the previous section was used to quantify benefits and prioritize projects. This section summarizes the results of the analysis and includes an assessment of the stormwater management objectives.

- **Section 7 – Implementation Strategy and Schedule**

  The implementation strategy is described in this section for future implementation of the projects/programs identified in the previous sections. The implementation approach, resources, schedule, funding, adaptive management, and performance assessments are described in detail. The information contained in this section supports the next steps following the SWRP approval.

- **Section 8 – Education, Outreach, and Public Participation**

  This section discusses the education/outreach materials and strategies used to engage the public and stakeholders. The approach, implementation, and outcomes are detailed to demonstrate how the community and stakeholders impacted the SWRP development.

2. Watershed Identification

This section identifies and describes the SBC SARW, its surface water and groundwater resources, and its internal boundaries, including public agency (jurisdictional), water and wastewater services, groundwater basin, and land use boundaries. This section includes a description of the native habitats, parks, and open spaces within the watershed. In total, the SBC SARW area is 1,015 square miles, or 649,513 acres, with a population of just under two million. The SBC SARW is further subdivided into 14 subwatersheds. The watershed characteristics presented in this section were considered as part of the project and program identification, quantification, and prioritization further described in this SWRP.

2.1 San Bernardino County Santa Ana River Watershed

The SARW encompasses nearly 2,650 square miles of mountains, foothills, and valleys, and is home to more than six million people. The watershed contains portions of Los Angeles, Orange, Riverside, and San Bernardino Counties, as depicted in **Figure 2-1**.

The SARW is characterized by the flat, arid basin of southwestern San Bernardino and western Riverside Counties and the coastal plain of north-central Orange County, and is bisected by the Santa Ana Mountains, which runs northwest to southeast, nearly perpendicular to the Santa Ana River. The Santa Ana River begins in the San Bernardino Mountains, upstream of Seven Oaks Dam, and drains into the Pacific Ocean in the City of Huntington Beach. There are over 50 major tributaries to the once free-flowing and perennial river, some of which are identified in **Figure 2-2**. Ancient igneous, metamorphic, and sedimentary rock underlies and forms the geologic base of the Santa Ana River. Most of the strata in the flat valleys and basins of the watershed are underlain by thousands of feet of sediment deposited by transient seas during climate changes and erosion (Mitchell, 2006).

Diverse and complex faulting and geologic instability have shaped the SARW. The San Andreas Fault runs across the northern section of the watershed and is responsible for causing the uplift of the San Bernardino Mountains, part of the Transverse Ranges of Southern California. The Elsinore–Whittier Fault Zone crosses the Santa Ana River further downstream, near the Orange County/Riverside County boundary. This fault caused the rising of the Santa Ana Mountains, Puente Hills, East Orange Hills, Chino Hills, Loma Ridge, and the other mountain ranges and ridges that run northwest-southeast across the lower section of the watershed, comprising the coastal Peninsular Ranges. While the larger San Andreas Fault allowed the Transverse Ranges to rise to above 10,000 feet in many places, the Peninsular Ranges are only about half that height.

The SBC SARW boundary, as illustrated in **Figure 2-2**, encompasses the upper limits or the headwaters of the Santa Ana River, with the SBC jurisdictional boundary as the southern limit. The jurisdictional boundary is utilized for the SWRP area instead of the hydrologic boundary. This approach was taken in an effort to have a more centralized analysis and planning study as compared to the efforts of the local IRWM (SAWPA) with the OWOW Plan, which encompasses the full SARW.

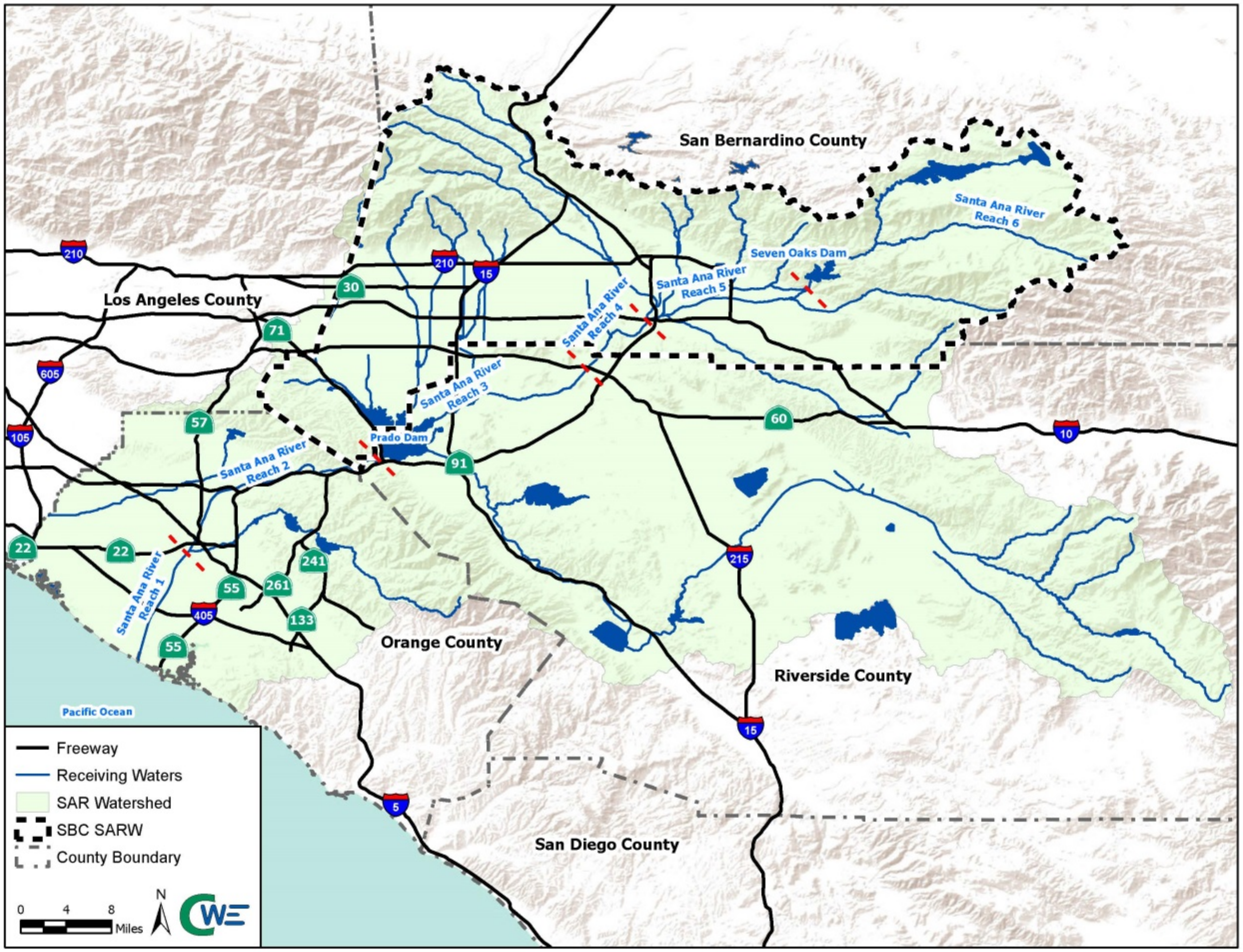


Figure 2-1 Santa Ana River Watershed

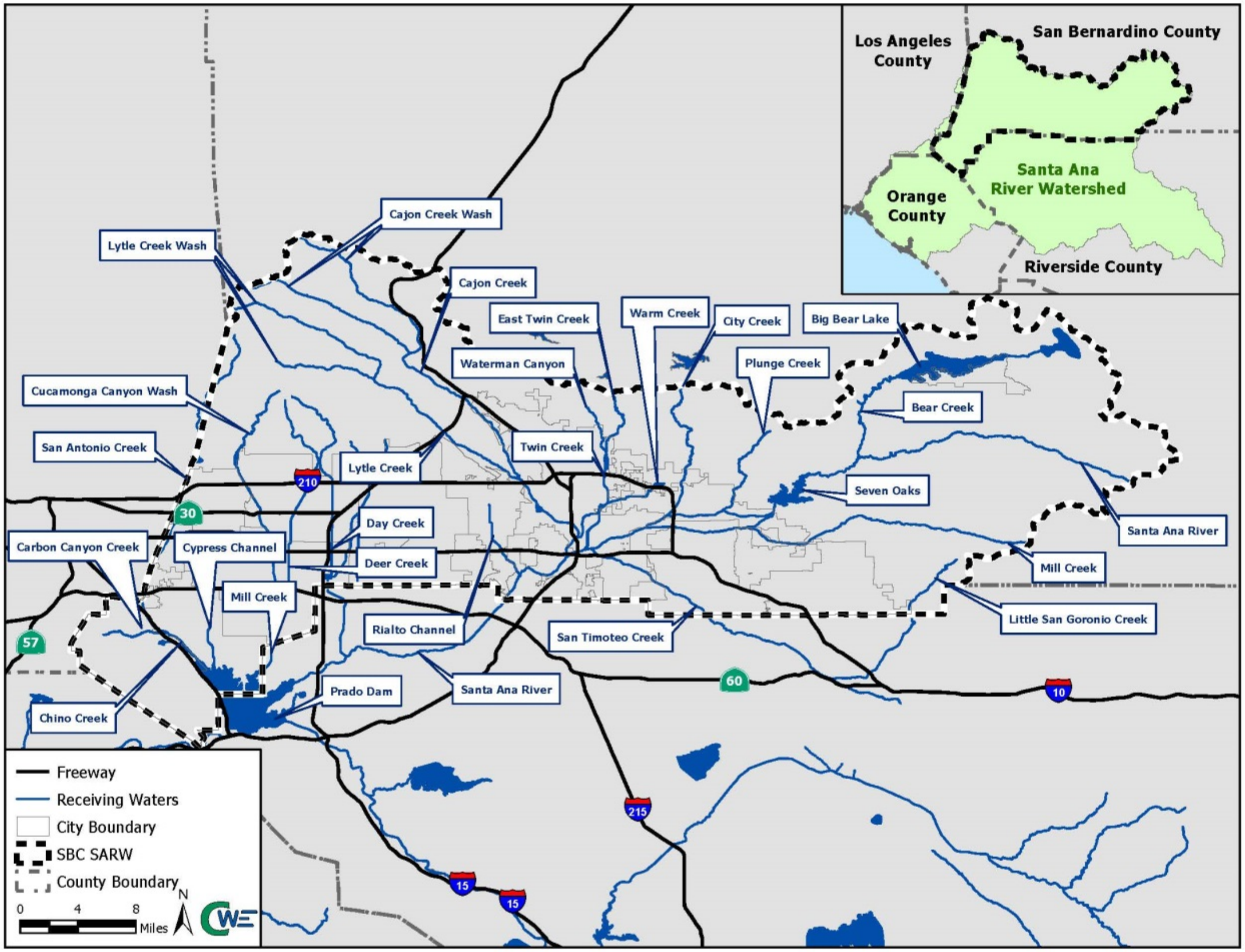


Figure 2-2 San Bernardino County Portion of the Santa Ana River Watershed

2.1.1 Internal Boundaries

The SBC SARW area encompasses several boundaries such as public agency (jurisdictional), water service, wastewater service, groundwater basin, and land use boundaries. The following subsections describe these boundaries within the SBC SARW.

2.1.1.1 Jurisdictional Boundaries

Sixteen cities encompass the SBC SARW area as well as Unincorporated Areas (UA) of SBC as shown in **Figure 2-3**. The City of San Bernardino is the largest city, followed by the Cities of Ontario, Chino Hills, Fontana, Rancho Cucamonga, Redlands, Chino, Yucaipa, Rialto, Highland, Colton, Upland, Loma Linda, Big Bear Lake, Montclair, and Grand Terrace. **Table 2-1** provides a summary of the area from each jurisdiction that makes up the SBC SARW.

Table 2-1 Jurisdictional Areas within SBC SARW

Jurisdiction	Area (Acres)	Percent (%)
Big Bear Lake	4,181	0.6
Chino	18,978	2.9
Chino Hills	28,640	4.4
Colton	10,265	1.6
Fontana	27,156	4.2
Grand Terrace	2,241	0.4
Highland	12,089	1.9
Loma Linda	4,811	0.7
Montclair	3,531	0.5
Ontario	32,005	4.9
Rancho Cucamonga	25,517	3.9
Redlands	23,313	3.6
Rialto	14,314	2.2
San Bernardino	38,171	5.9
Upland	10,016	1.5
Yucaipa	17,852	2.8
SBC UA	376,433	58.0
Total:	**649,513**	**100**

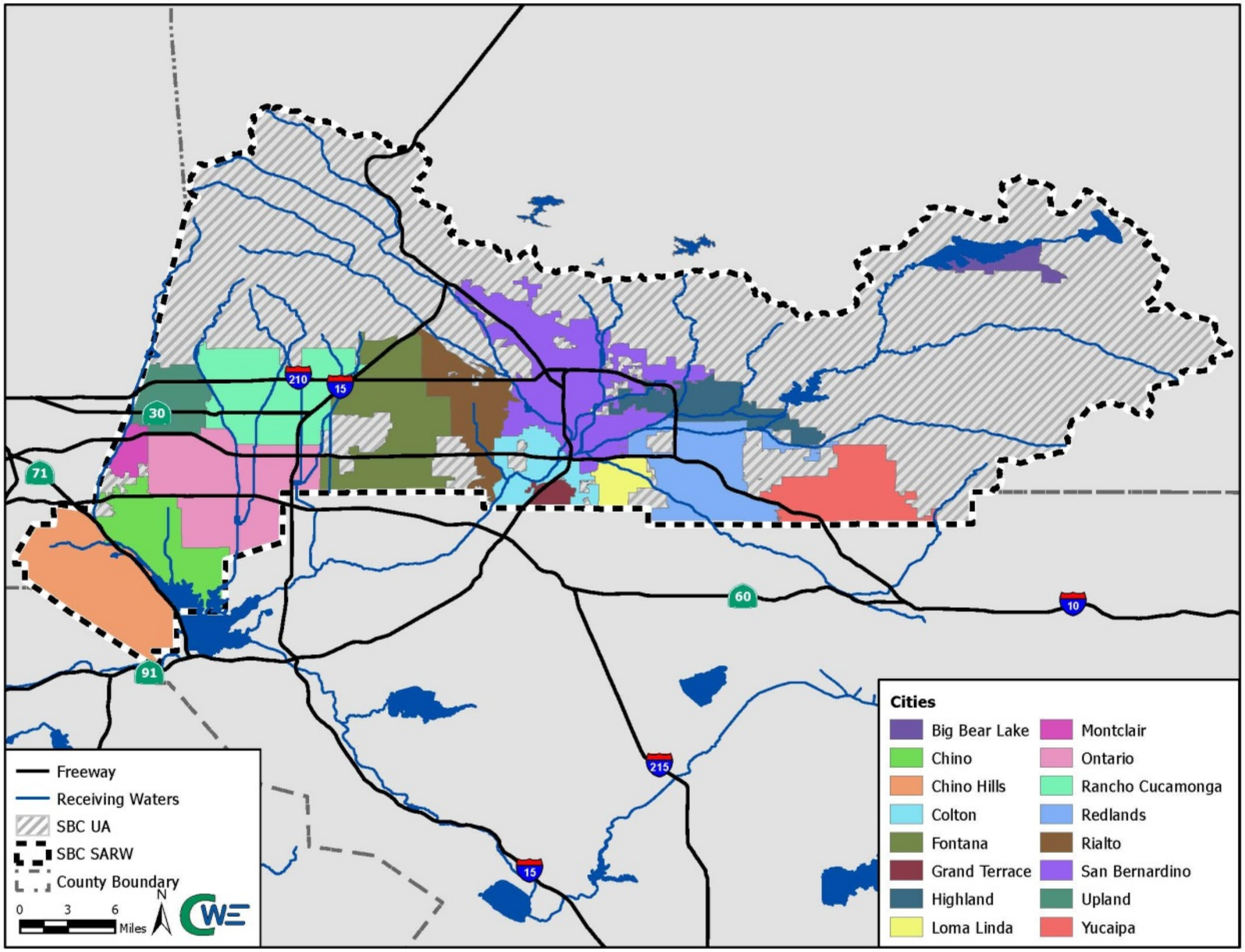


Figure 2-3 Jurisdictional Boundaries within the SBC SARW Area

2.1.1.2 Water and Wastewater Service Areas

There are three main water suppliers, San Bernardino Valley Municipal Water District (SBVMWD), Inland Empire Utilities Agency (IEUA), and Big Bear Municipal Water District (BBMWD) located within the SBC SARW area, as presented in **Figure 2-4**. **Table 2-2** summarizes the estimated total annual water demands associated with these water suppliers based on their Urban Water Management Plans (UWMPs).

Table 2-2 Projected Water Demands from the Water Suppliers

Water Supplier	Total Water Demands (AF)				
	2020	2025	2030	2035	2040
SBVMWD[a]	250,027	260,542	270,747	281,697	289,821
IEUA	210,588	225,923	242,732	254,721	278,017
BBMWD	6,500	6,500	6,500	6,500	6,500

[a] Includes water supplied on BBMWD's behalf for in-lieu of Big Bear Lake releases to Bear Valley Mutual Water Company (BVMWC).

SBVMWD was formed in 1954, under the Municipal Water District Act of 1911, as a regional agency to plan for long-range water supply in the San Bernardino Valley. SBVMWD covers approximately 221,820 acres within the SBC SARW. SBVMWD spans the eastern two-thirds of the San Bernardino Valley, and includes a portion of Yucaipa Valley. SBVMWD is responsible for long-range water supply management which includes local groundwater basins and replenishing these groundwater basins with imported water from the California State Water Project. SBVMWD has specific responsibilities for monitoring groundwater supplies in the San Bernardino Basin Area and Rialto-Colton Subbasin, and for a portion of the minimum Santa Ana River flow required at the Riverside Narrows (SBVMWD, 2016).

IEUA was formed in 1950 as the Chino Basin Municipal Water District. The same year, the agency joined the Metropolitan Water District (MWD) of Southern California. In 1998, the agency changed its name to IEUA. IEUA covers approximately 152,800 acres within the SBC SARW area. IEUA is focused on providing four key services: 1) treating wastewater; 2) developing recycled water, local water resources, and water use efficiency programs that will reduce the region's dependence on imported water supplies and drought-proof the service area; 3) converting biosolids and waste products into a high quality compost made from recycled materials; and 4) generating electrical energy from renewable sources (IEUA, 2016b).

BBMWD was formed in 1964 and is responsible for the overall management of Big Bear Lake (BBL). The primary goals of the BBMWD are the stabilization of the water level at BBL, given the availability of water and financing; maintaining the surrounding lake environment; and maintaining the irrigation interest of downstream communities. Through a judgment executed in 1977, BBMWD purchased from BVMWC the BBL bottom, Bear Valley Dam, and the right to utilize and manage the surface of BBL for recreation and wildlife. In return, deliveries to reduce the amount of lake releases to BVMWC were capped at 65,000 acre-feet in any ten-year period. These deliveries are made in the form of lake releases or other sources "in-lieu" of lake releases (in-lieu water deliveries) (SBVMWD, 2016).

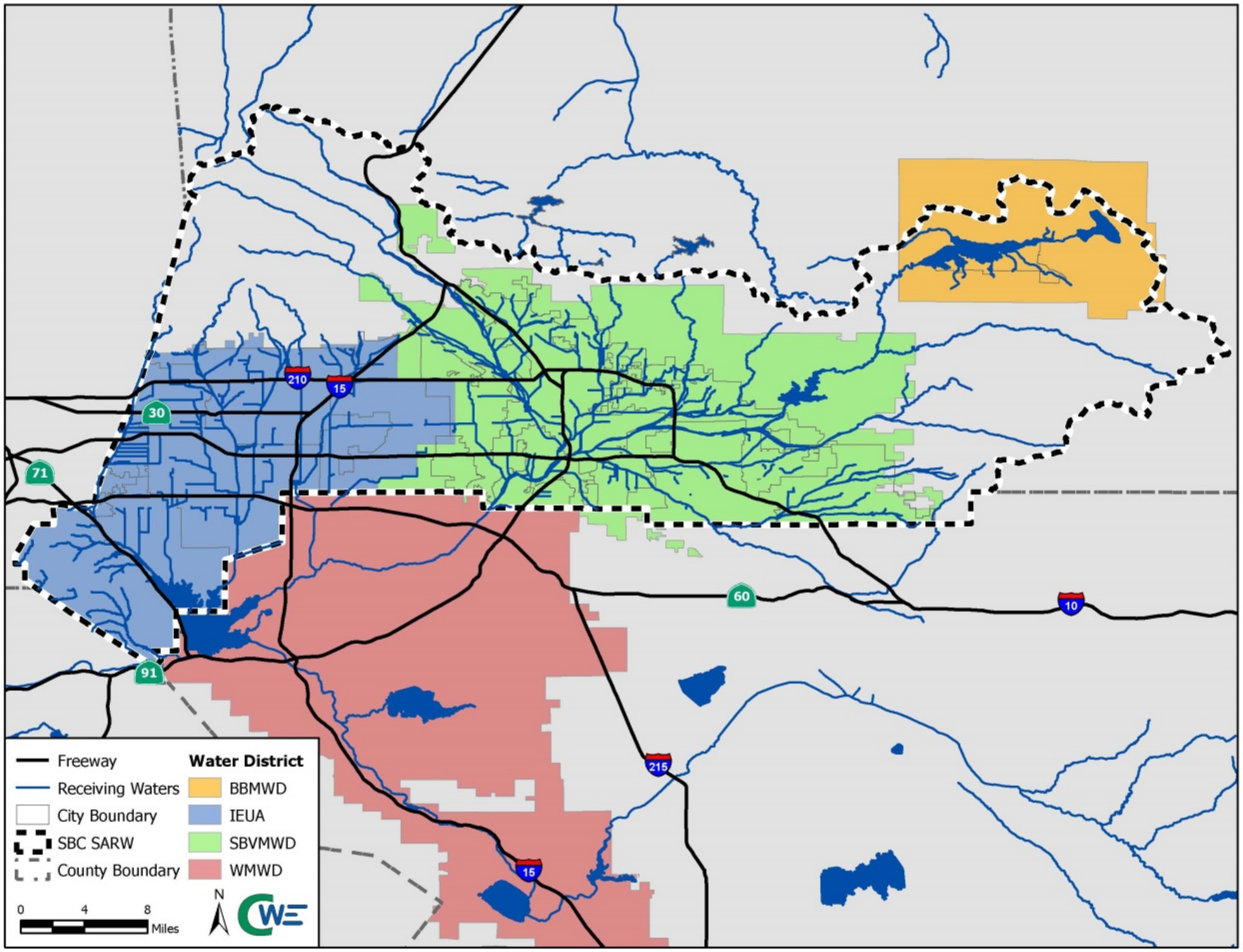


Figure 2-4 Water Supplier Boundaries within the SBC SARW Area

Western Municipal Water District (WMWD) is located beyond the boundary of the SBC SARW; however, WMWD has groundwater rights within the SBC SARW area. The water pumped out from the SBC SARW area is transported into WMWD's Riverside Division through an agreement with the City of Riverside.

Thirty-one water purveyors are located within the SBC SARW, as summarized in **Table 2-3**. The table summarizes the estimated volume of potable water supplied in acre-feet (AF) in 2015.

Table 2-3 Water Supplied through Water Purveyors in 2015

Water Purveyor	Population Served	Potable and Drinking Water Supplied (AF)
SBVMWD (based on individual reports/Annual Reports by each purveyor)		
City of Colton	45,496	9,008
City of Loma Linda	23,298	4,682
City of Redlands	85,276	21,290
City of Rialto	54,453	8,771
East Valley Water District (EVWD)	104,457	16,942
Marygold Mutual Water Company	6,818	--
Muscoy Mutual Water Company	13,255	--
Riverside Highland Water Company (RHWC)	16,007	2,964
San Bernardino Municipal Water District (SBMWD)	199,657	36,035
San Bernardino Valley Conservation District	--	--
South Mesa Water Company	4,830	--
Terrace Water Company	2,200	--
West Valley Water District (WVWD)	80,161	17,131
Western Heights Water Company	7,120	--
Yucaipa Valley Water District (YVWD)	44,745	9,595
Subtotal:	**687,773**	**126,418**
IEUA (based on Fiscal Year 2015-16 data presented in the Annual Water Use Report)		
City of Chino	74,000	20,163
City of Chino Hills	77,600	12,993
City of Ontario	168,780	36,096
City of Upland	75,790	16,807
Crawford Canyon Municipal Water Company	10	--
Cucamonga Valley Water District	200,460	40,166
Fontana Water Company	215,500	32,681
Monte Vista Water District	54,200	8,012
San Antonio Water Company	3,150	1,882
Subtotal:	**869,490**	**168,800**
BBMWD		
BVMWC	--	--
Outside of Agency Areas (based on individual reports/Annual Reports by each purveyor)		
City of BBL Water Department	15,520	2,166
Big Bear City Community Service District	11,528	890
Fallsvale Service Company	959	200

Water Purveyor	Population Served	Potable and Drinking Water Supplied (AF)
Lake Arrowhead Community Services District	7,183	1,600
Lytle Creek Springs Water Company	475	--
Running Springs Water District	4,806	350
Total:	**1,597,734**	**300,424**

-- Information not available at this time

Sixteen out of the 31 water purveyors also provide wastewater services along with the SBC Special Districts Department, which only provides wastewater services and is not a water purveyor. The water agencies that also provide wastewater services are the Cities of Colton, Fontana, Grand Terrace, Loma Linda, Rancho Cucamonga, Redlands, and Rialto, Big Bear Area Regional Wastewater Agency, Big Bear City Community Services District, EVWD, IEUA, Lake Arrowhead Community Services District, Lytle Creek Community Services District, Running Springs Water District, SBMWD, and YVWD. In addition, approximately 2,300 parcels within the SBC SARW area utilize Onsite Wastewater Treatment Systems (OWTS or septic systems). **Figure 2-5** depicts the locations of the OWTS within the SBC SARW area.

2.1.1.3 Groundwater Basin Boundaries

Six groundwater basins are located within the SBC SARW area totaling approximately 340,412 acres, all of which are located within the South Coast Hydrologic Region. The six basins included Bear Valley, Big Meadows Valley, Coastal Plain of Orange County, San Gabriel Valley, Seven Oaks Valley, and Upper Santa Ana Valley, as shown in **Figure 2-6**. The largest groundwater basin, as summarized in **Table 2-4**, is the Upper Santa Ana Valley basin covering approximately 46 percent of the SBC SARW area. The Upper Santa Ana Valley basin is further divided into eight subbasins which are Bunker Hill, Cajon, Chino, Cucamonga, Rialto-Colton, Riverside-Arlington, San Timoteo, and Yucaipa, as illustrated in **Figure 2-7**. Existing groundwater quality data is summarized in **Section 3.2**.

Table 2-4 Groundwater Basins within the SBC SARW

Groundwater Basin	Area (Acres)	Percent of SBC SARW (%)
Bear Valley	18,573	2.9
Big Meadows Valley	14,162	2.2
Coastal Plain of Orange County	134	< 0.1
San Gabriel Valley	2,756	0.4
Seven Oaks Valley	4,075	0.6
Upper Santa Ana Valley	300,712	46.3
Total:	**340,412**	**52.4**

The groundwater basins do not line up exactly with the surface watersheds described in **Section 2.2**. Surface watersheds are based on surface topography and manmade structures (storm conveyances, basins, pumps, etc.). Groundwater basin delineation is dependent on hydraulic properties of an aquifer, input and outflow, and geological factors. Surficial aquifers (water table) generally mimic surface watersheds and their flow does not cross surface boundaries. Deeper (confined) aquifers are less likely to conform to surface watersheds. Some of the groundwater basins/subbasins depicted below are confined and do not line up with the surface watersheds (DNR, 2018).

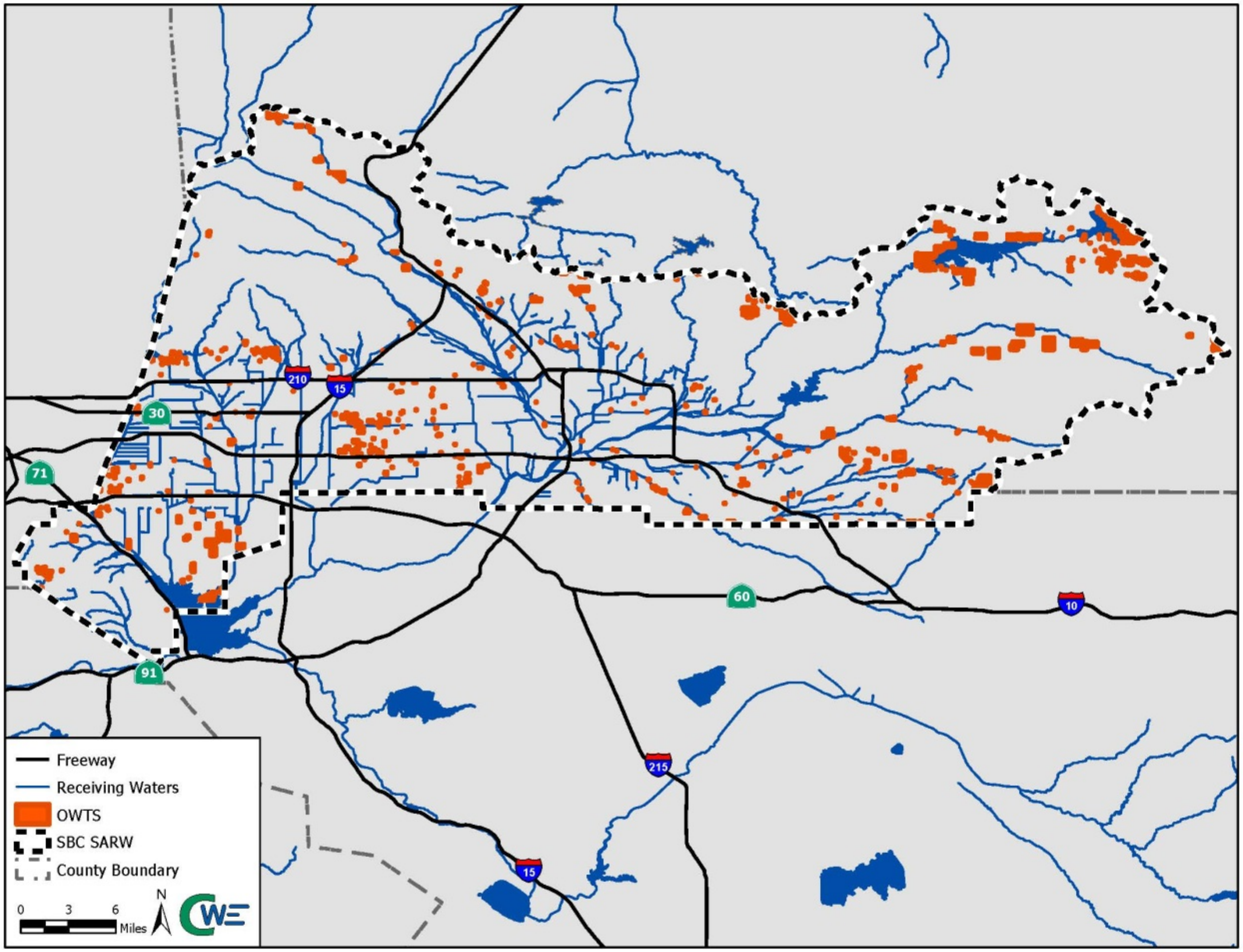


Figure 2-5 Onsite Wastewater Treatment Systems within the SBC SARW Area

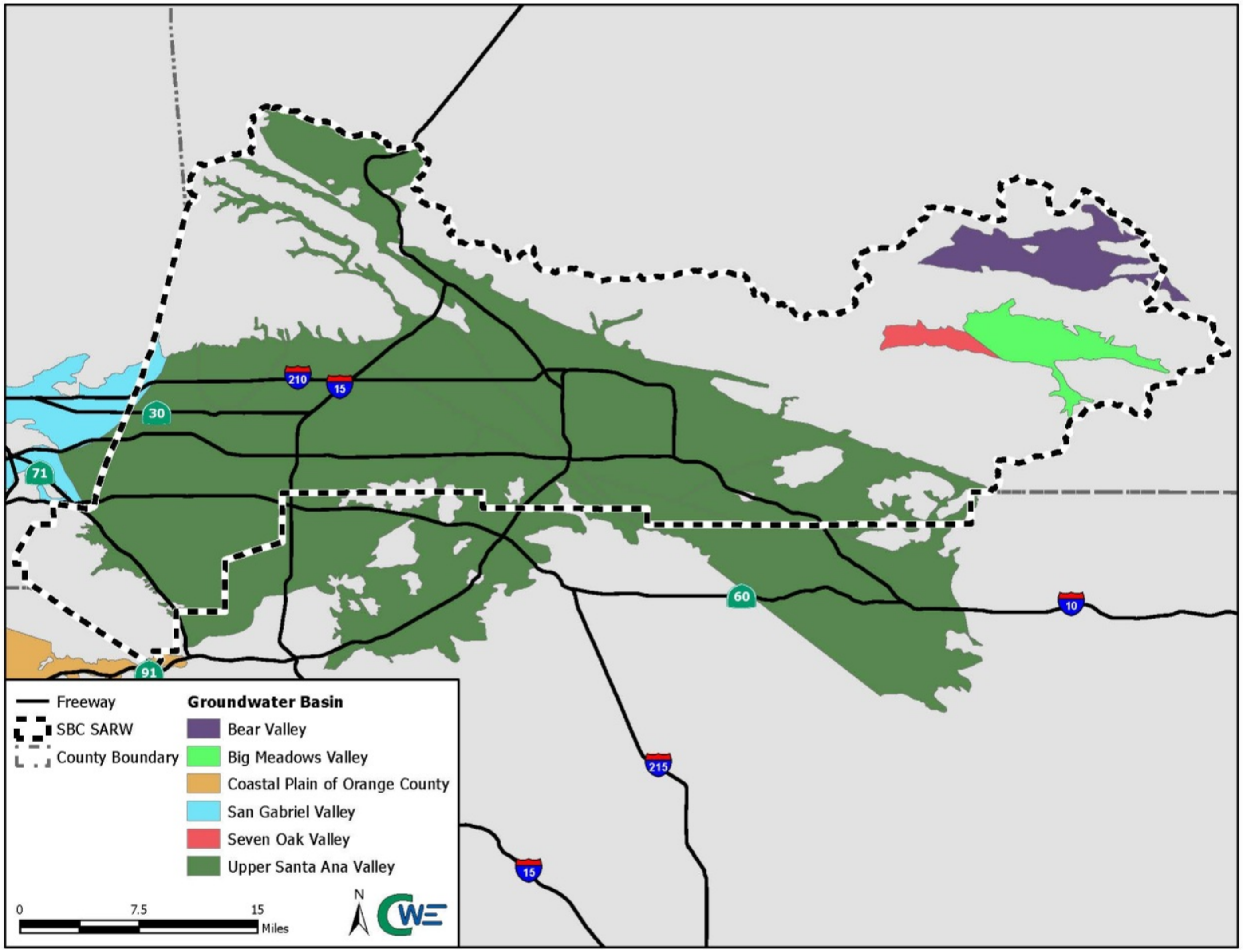


Figure 2-6 Groundwater Basins within the SBC SARW Area

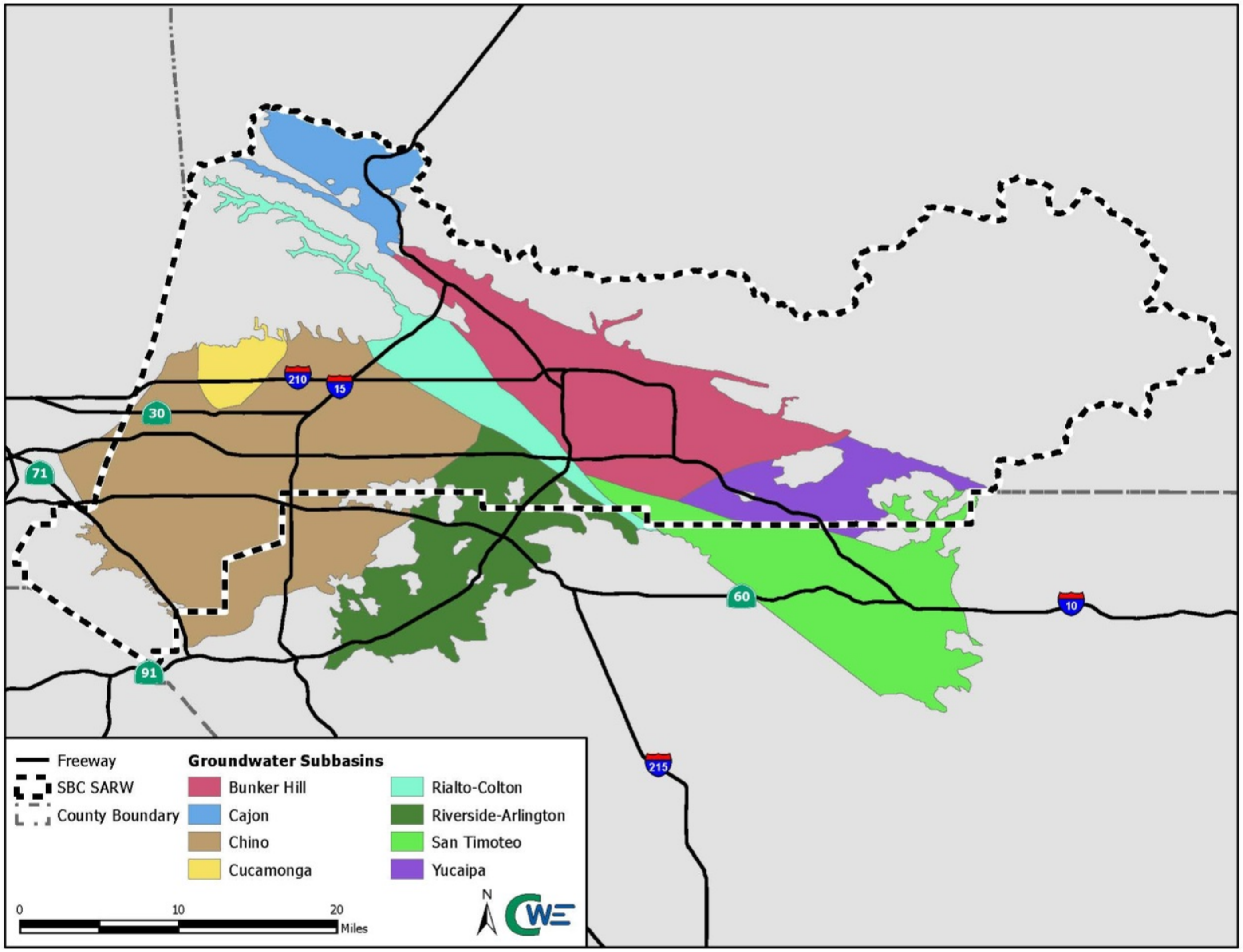


Figure 2-7 Upper Santa Ana Valley Groundwater Subbasins within the SBC SARW Area

2.1.1.4 Land Use

Land use within the SBC SARW area is shown in **Figure 2-8.** General Plan land use (2013) information from the San Bernardino Associated Governments (SANBAG) was used to categorize land use within the SBC SARW area. The General Plan land use represents the projected future built out land use, rather than the existing. This is more appropriate for planning purposes as compared to existing land use. The 2013 SANBAG General Plan land use data includes a total of 22 land use descriptions. The land use descriptions were re-categorized into seven land use categories which include agriculture, commercial, education, industrial, residential, transportation, and vacant. **Attachment B** provides the list of land use descriptions and the assigned land use category. The predominant land use category is vacant land, as tabulated in **Table 2-5**, which is reflective of the large mountainous areas within the SBC SARW. Of the planned urbanized area, the residential land use is the largest area covering 162,877 acres or 25.1 percent of the total SBC SARW area, while the education land use category makes up the lowest percentage.

Table 2-5 Categorized Land Use of Total SBC SARW Area

Land Use	Area (Acres)	Percent (%)
Agriculture	9,307	1.4
Commercial	45,933	7.1
Education	6,371	1.0
Industrial	42,094	6.5
Residential	162,877	25.1
Transportation	8,359	1.3
Vacant	374,572	57.6
Total:	**649,513**	**100.0**

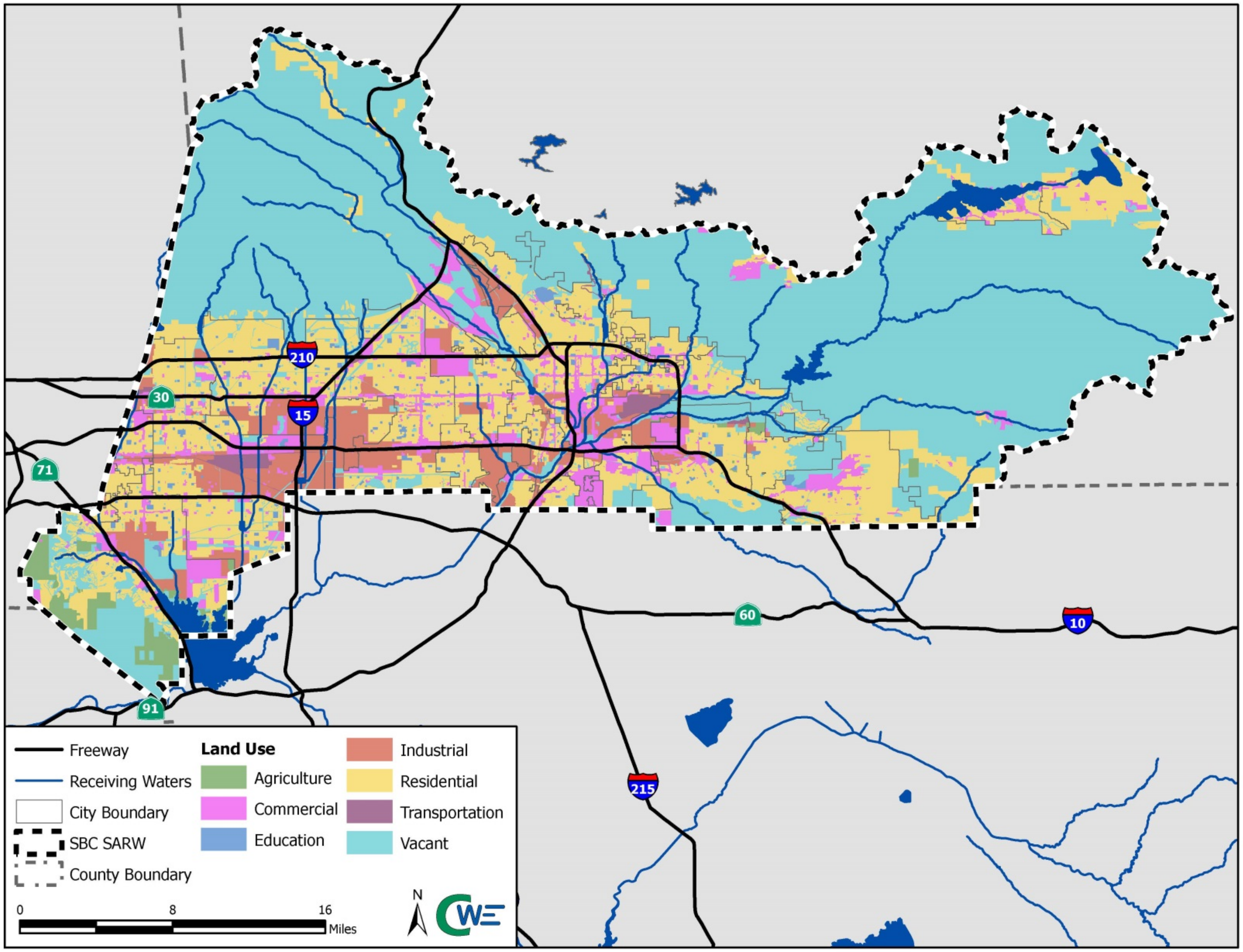


Figure 2-8 General Plan Land Use within the SBC SARW Area

2.1.2 Surface Water

The Santa Ana River is 96 miles long and divided into six reaches. The river starts upstream of Seven Oaks Dam and discharges into the Pacific Ocean, as seen in **Figure 2-1**. The Santa Ana River begins in Santa Ana Canyon in the Southern San Bernardino Mountains, on the northern flank of San Gorgonio Mountain. The river initially flows west through a broad and deep gorge, and receives its first major tributary, Bear Creek, which flows southwest from BBL. Flows from this portion of the Santa Ana River consist mostly of snowmelt and storm runoff in undeveloped mountainous area, resulting in good water quality. The river turns south, passing westward towards Seven Oaks Dam and the City of San Bernardino. As it passes through to the urban areas, it receives flow from City Creek and enters a flood control channel flanked by earthen levees on both sides. Not long after the confluence with City Creek, Lytle Creek connects with the Santa Ana River. Lytle Creek is one of the largest tributaries of the Santa Ana River, rising in three forks of the San Gabriel Mountains and flowing southeast, becoming the Lytle Creek Wash before discharging into the main stem. From there, the Santa Ana River flows southwest, where the Rialto Channel confluences inside the SBC boundary, continuing on to Riverside County. Further downstream, flows from Day Creek join the main stem before discharging into the flood control reservoir formed by Prado Dam. Within the SBC SARW, three other major tributaries of the river join the reservoir area (Prado Dam): Chino Creek, Cypress Channel, and Mill Creek (Prado Area). After flowing out of the Prado Dam, the Santa Ana River flows between the northern Santa Ana Mountains and Chino Hills, crosses into Orange County and discharges into the Pacific Ocean. Details on the surface water quality are included in **Section 3**.

2.1.3 Native Habitats, Parks, and Open Space

SBC consists of three sub-regions: valley, mountain, and desert regions. The SBC SARW area is within two of these regions: valley and mountain regions. These two regions contain diverse habitats, differing in climates and geography which in turn sustain differing biological environments.

2.1.3.1 Valley Region

The valley region is urbanized with few existing natural open space areas (SBC, 2007b). The habitats within the undeveloped areas of the valley are alluvial sage scrub, chaparral, coastal sage scrub, deciduous woodlands, grasslands, riverine, and wetlands (SBC, 2007b). Vegetation in urbanized areas consists primarily of introduced landscape species. The most sensitive vegetation types found within the study area are wetlands, including riparian woodland, riparian scrub, and freshwater marsh. The valley region provides habitat to several sensitive species such as burrowing owl, California bedstraw, coastal California gnatcatcher, least bell's vireo, Los Angeles pocket mouse, northwestern San Diego pocket mouse, rufous-crowned sparrow, San Bernardino kangaroo rat, San Diego horned lizard, Stephens' kangaroo rat, southwestern willow flycatcher, and western yellow-billed cuckoo (SBC, 2007b). Natural preserves and parks found within the valley region are illustrated in **Figure 2-9** and further detailed below.

- **Chino Hills State Park** – Chino Hills State Park is an open-space area in the hills of Santa Ana Canyon (SBC, 2017d). The State Park is a critical link in the Puente-Chino Hills biological corridor. It encompasses stands of oaks and sycamores, Riversidean sage scrub, and grassy hills that stretch nearly 31 miles, from the Santa Ana Mountains to the Whittier Hills. The Riversidean sage scrub community supports a sensitive bird species, the coastal California gnatcatcher.

- **Cucamonga-Guasti Regional Park** – Cucamonga-Guasti Regional Park is a 150-acre park located in the City of Ontario. It offers a wide range of activities, including two lakes for fishing, a swim complex with water slides, zero depth water play park, picnic tables, and group picnic shelters (SBC, 2017d).
- **Glen Helen Regional Park** – Glen Helen Regional Park is located at the base of the chaparral covered hills of the Cajon Pass, the park offers scenic views of both the San Gabriel and San Bernardino Mountains. The 1,340-acre park offers recreational activities which include two lakes for fishing, a swim complex with pool, sandy area, dual water slides, zero depth water play park, large group shelter picnic areas, and amphitheater (SBC, 2017d).
- **North Etiwanda Preserve** – The preserve encompasses 763 acres primarily of a unique Riversidean alluvial fan sage scrub habitat that also contains a water marsh (SBC, 2007b). The area was acquired in 1998 by SANBAG, as mitigation for the Interstate 215 Freeway extension. It was later assigned to SBC for management in conjunction with the CDFW and an advisory committee. Ongoing conservation efforts have enabled expansion of the Preserve to over 1,200 acres.
- **Prado Basin Mitigation Area** – An agreement in 1995 between the Orange County Water District (OCWD), USACE, and USFWS, resulted in the water level behind Prado Dam to be raised, doubling the amount of water stored behind the dam. The agreement between the agencies resulted in cooperative efforts to enhance the water conservation and environmental values of Prado Basin, and to also enhance the breeding grounds of the endangered least bell's vireo. The OCWD owns 2,150 acres behind Prado Dam in Riverside County. There are nearly 465 acres of constructed wetlands within the OCWD property and adjacent lands, which have effectively demonstrated the ability to reduce nitrogen levels in the Santa Ana River.
- **Prado Regional Park** – Prado Regional Park is in the Chino Valley Basin where San Bernardino, Riverside, Orange, and Los Angeles Counties connect. The name Prado is derived from California's early Spanish days when the countryside was known as a "prado" or meadow. This park offers a number of recreational activities which include fishing, camping, hiking, biking nature trails, meeting room, disc golf, and picnic facilities.
- **Santa Ana Wooly Star and Slender-Horned Spine Flower Mitigation Lands in the Upper Santa Ana Wash** – The 760-acre wooly star preserve was established by the USACE along the Santa Ana River Wash as mitigation for the Seven Oaks Dam project.
- **Vulcan Materials Alluvial Fan Sage Scrub Mitigation Bank** – Vulcan Materials established a 1,378-acre habitat conservation management area along a six mile stretch of Cajon Creek (SBC, 2007b). Enclosed within this sage and scrub community are 24 sensitive species, including numerous wildflowers, the coastal California gnatcatcher, and the endangered San Bernardino kangaroo rat.
- **Yucaipa Regional Park** – The Yucaipa Regional Park is located near Oak Glen, Redlands, and mountain communities. It includes a wide range of outdoor recreation such as fishing in three lakes, a swim complex with water slides, sandy beach area, and picnic shelters (SBC, 2017d).

2.1.3.2 Mountain Region

The mountain region lies in the southwestern portion of SBC and contains the San Bernardino Mountains and the eastern end of the San Gabriel Mountains. The major habitats found in the region include chaparral, conifer forest, sage shrubs, oak woodlands, wetlands (including woodlands, scrub, marsh, meadows, and riverine), and the relic pavement plains (SBC, 2007c). There are 71 threatened or endangered wildlife species inhabiting the forest. The mountain region provide habitat to several sensitive species such as the California bald eagle, mountain yellow-legged frogs, southern rubber boa, peregrine falcons, bighorn sheep, and many endangered plants (SBC, 2007c). Bear Creek is a CDFW designated wild trout stream and contains high quality riparian resources. Low-elevation riparian resources include cottonwood-willow, sycamore/coast live oak, and white alder communities. Locally rare riparian resources include the aspen groves in the San Bernardino Mountains.

The CDFW recognizes 14 Areas of Special Biological Importance (ASBIs) within the mountain region of SBC. Key areas are identified among the ASBIs that support herds of both resident and seasonally migratory mule deer. Good deer fawning areas, generally located near wet meadows and riparian thickets, occur from Manzanita Flat to Plunge Creek in the Alder Creek area and near Keller Meadows and the forks of Plunge Creek, east of Harrison Mountain. Deer winter ranges occur north of Barton Flats and summer ranges occur northwest of Delamar Mountain. The CDFW also recognizes principal wintering area for waterfowl migrating along the Pacific Flyway. Waterfowl have been observed at Baldwin Lake and BBL within the mountain region. The lake areas also provide wintering habitat for the bald eagle, and recognized by the CDFW as ASBIs. Natural preserves and parks found within the region are illustrated in **Figure 2-10** and further detailed below.

- **Baldwin Lake Ecological Reserve** – The 156-acre Baldwin Lake Ecological Reserve includes a unique pebble plain plant community as well as vernal wet meadow habitat. The site is also significant for its wintering population of bald eagles. The CDFW purchased the property from the Natural Conservancy in 1989, and designated it as an ecological reserve in 1991. It was acquired to protect existing populations of rare and endangered plants.
- **Bluff Lake Reserve** – The Bluff Lake Reserve is an ecological reserve with towering pines, a 20-acre lake and meadow, and majestic outcrops of quartz monzonite. The reserve includes Southern California's finest intact mountain marsh and meadow complex that contains the federally threatened Bear Valley bluegrass, the federally endangered Big Bear checkerbloom, and California dandelion. Botanically, the meadow is remarkable with 16 species of sedges, eight species of wire grass, and 14 species of native grass. Mature forests of lodgepole pine, Jeffrey pine, and white fir surround the meadow.
- **Castle Glen Bald Eagle Preserve** – The 125-acre preserve is situated in the Castle Glen area of BBL and was set aside as habitat for the bald eagle. Bald eagles have been known to migrate here during winter, from frigid nesting grounds in the Pacific Northwest, to roost in scraggly pine trees and hunt for fish and waterfowl in the lake. Many bald eagles gather at Baker Pond, a shallow waterfowl refuge at the eastern end of the 15-mile-long lake where plentiful tall pine trees provide the federally endangered birds with a commanding view of hunting grounds below.
- **Cucamonga Wilderness Area** – The Cucamonga Wilderness Area is composed of 12,781 acres along the boundaries of the Angeles National Forest – San Gabriel Mountains National Monument and the San Bernardino National Forest (USDA, 2017a). This wilderness consists of a sub-alpine setting, which is primarily composed of mixed conifers ranging in age class such as Ponderosa, Jeffrey, and Douglas-fir pines. Numerous wildlife species do well in the area, including deer, bear, mountain lions, and Nelson bighorn sheep (USDA, 2017a).

- **San Gorgonio Wilderness Area** – The 56,749-acre area is located in the eastern San Bernardino Mountains (USDA, 2017b). San Gorgonio Wilderness Area is the largest established wilderness area in Southern California and one of the most publicly used within the nation. The wilderness is part of the eastern slope of the San Bernardino Mountains, with topography rapidly changing from low rolling foothills and canyons to steep rugged mountains. The wilderness reflects a transition between desert, coastal, and mountain environments, including the different types of vegetation representative of each elevation due to the elevation gradient (USDA, 2017b).
- **Wildland Park, Pebble Plain Preserve** – Pebble Plain geologic formation only occurs in Big Bear and Holcomb Valley and nowhere else in the world. As a result, the flora and fauna growing on the Pebble Plain are unique to the areas and interested groups have joined together to ensure plants and insects will be forever protected.

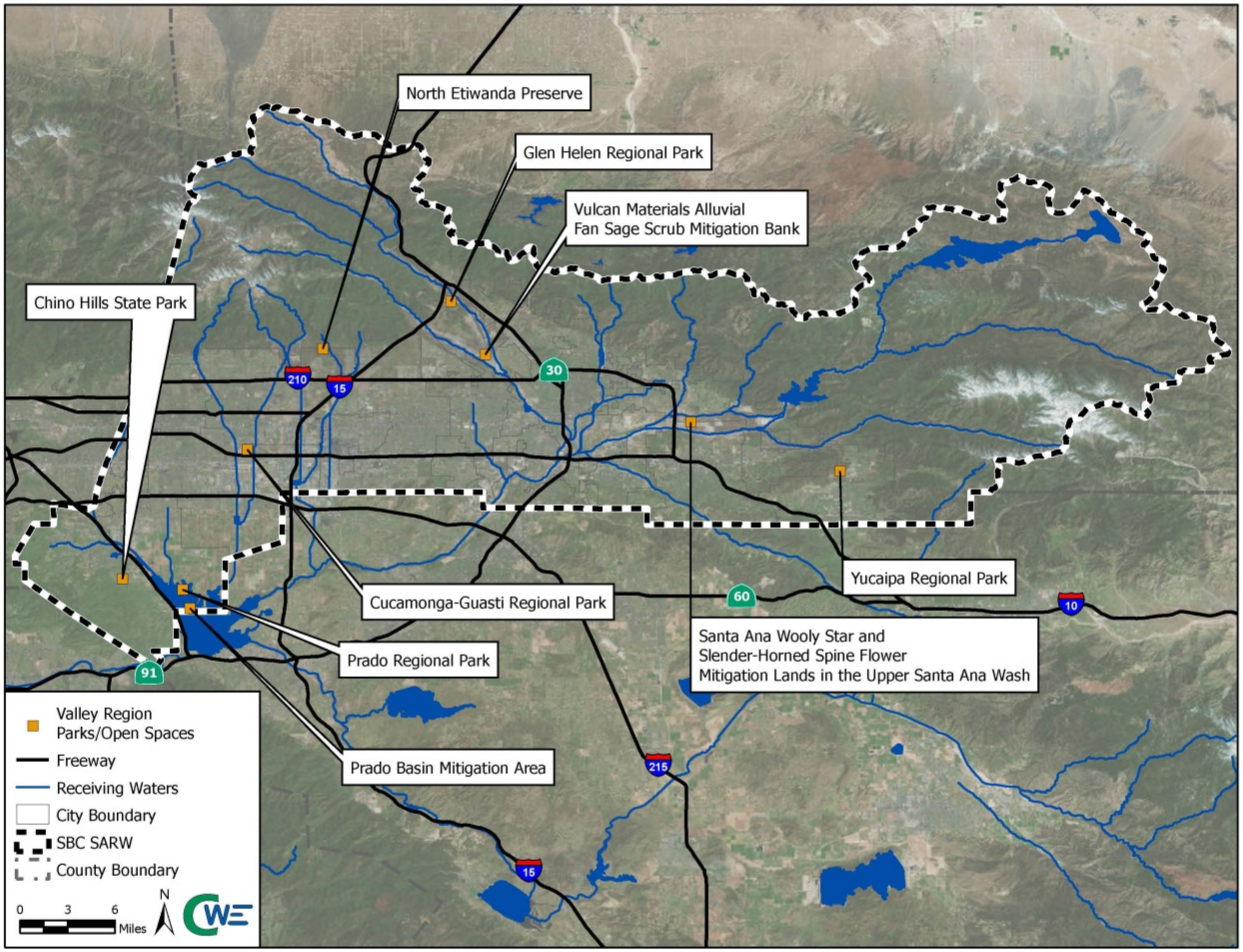


Figure 2-9 Native Habitats, Parks, and Open Space within the SBC SARW Valley Region

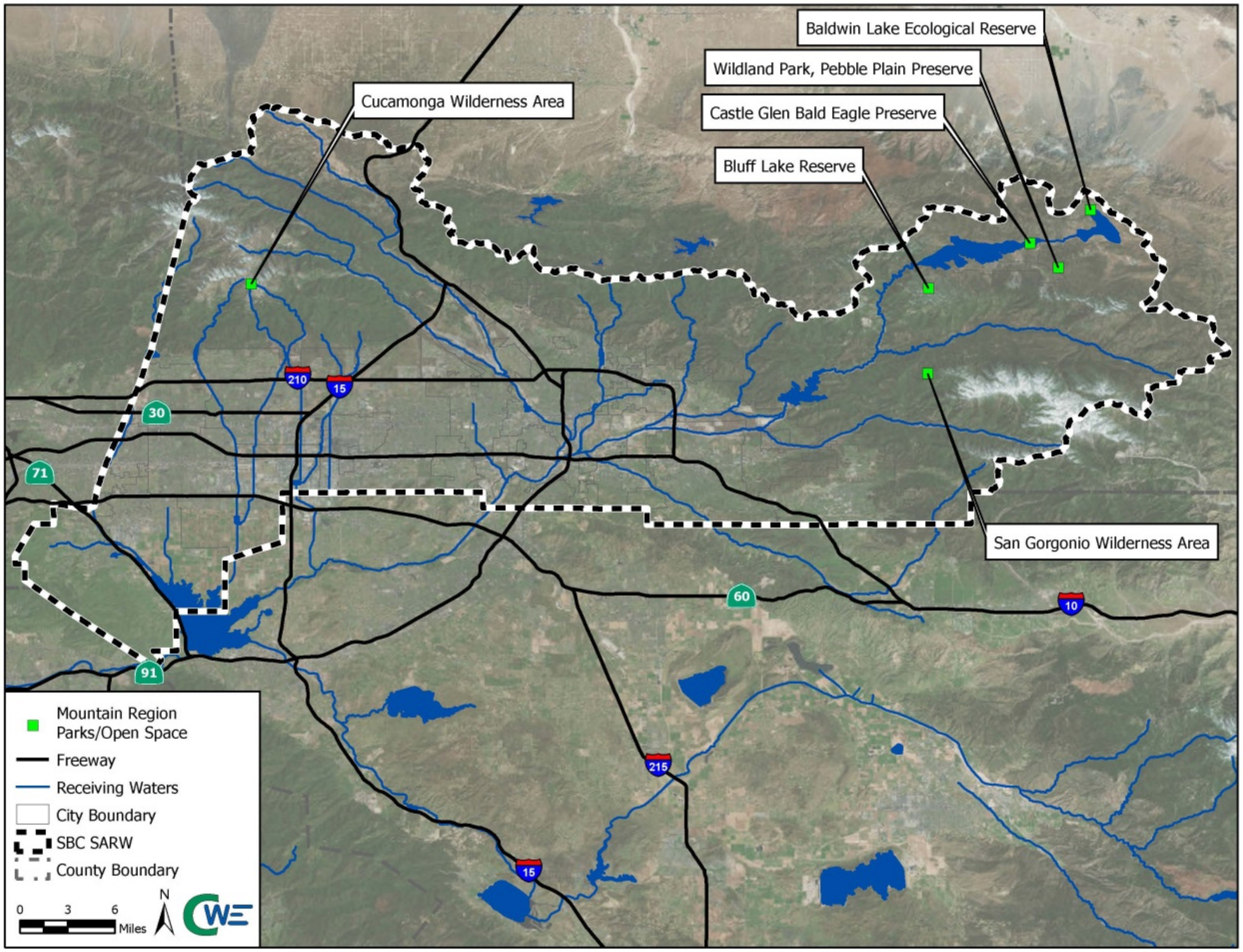


Figure 2-10 Native Habitats, Parks, and Open Space within the SBC SARW Mountain Region

2.1.4 Natural Watershed Processes

Before human activity created developed land in the San Bernardino Valley, water quality in receiving waters was maintained through natural watershed processes. The specific processes varied spatially and temporally because of the semi-arid climate and the seasonal distribution of rainfall. Processes involving the movement of sediment and the interface between surface water and groundwater were prevalent within natural stream channels. Permanent wetlands were not common within San Bernardino County, where the Santa Ana River and its tributaries only flowed during storm events. Outside of natural stream channels, the watershed processes of overland flow, groundwater recharge, interflow, and evapotranspiration dominated.

Pre-development water quality in the San Bernardino Valley was maintained through biological and chemical processes that were transient in nature due to the temporary nature of flows. The vast open scrublands and grasslands soaked up rainfall from high-frequency low-runoff storm events. Stormwater runoff from larger storms would drain in an uncontrolled manner to the channels, scouring and depositing sediments as it flowed downstream and creating habitat for native species.

San Bernardino Valley became more and more developed over time. Lands that had previously been able to absorb rain from most storms were paved over so that runoff was directed into engineered stormwater channels. Channels were dammed and diverted, thus eliminating the watershed's ability to dissipate energy through natural sedimentation and deposition.

The sections below provide in more detail an identification of the natural watershed processes that occur within the SBC SARW and a description of how they have been disrupted over time. The processes identified include overland flow, groundwater recharge, interflow, evapotranspiration, sedimentation, and chemical and biological transformation. The SBC SARW SWRP seeks to restore some of these identified natural watershed processes as a way of achieving the stormwater management objectives of the SBC SARW.

The processes identified below are described qualitatively rather than quantitatively. Most natural watershed processes described below are difficult to define quantitatively because they represent different flow paths of stormwater other than what can be measured with flow meters in channels. The task becomes even more difficult when comparing present natural watershed processes to natural watershed processes from the past, where no possibility exists for monitoring of flow processes. However, the processes can be qualitatively described, and in most cases urban development has led to the incidental impairment of natural watershed processes.

2.1.4.1 Overland Flow

Precipitation reaching the ground surface that does not immediately infiltrate runs off as overland flow. Most uncompacted vegetated soils have infiltration capacities of one to several inches per hour at the ground surface, which exceeds the rainfall intensity of even unusually intense storms. In contrast, pavement and hard surfaces reduce the effective infiltration capacity of the ground surface to zero, ensuring overland flow regardless of the meteorological attributes of a storm.

Most precipitation that fell to earth in the SARW prior to development either became groundwater or evaporated. The predominant hydrologic soil group in the San Bernardino Valley is type A, typified by low overland flow rates and high infiltration rates. The inverse is true in the mountainous regions of the

SARW where the hydrologic soil group is most commonly type D, featuring high potential for overland flow and stormwater runoff into canyons and valleys. The overland flow in mountainous regions has largely remained unchanged with time, but the overland flow in the San Bernardino Valley has increased with increasing urban development.

2.1.4.2 Groundwater Recharge and Infiltration

Groundwater recharge and infiltration are closely-linked hydrologic processes that are dominant across much of California's intact landscapes. Infiltration of rainfall into the soil prior to development was widespread on virtually any geologic material and on all but the steepest slopes. Urbanization covered the land with more impervious surfaces and reduced the watershed's natural ability to improve water quality through infiltration.

The effect of urbanization has also had an effect on the natural stream channels of the SBC SARW. The capacity of streams and riverbeds to recharge the underground aquifers decreased as urbanization occurred. Many tributaries within the SBC SARW were diverted, channelized, and paved over with concrete. **Figure 2-11** shows how streambed infiltration from four channels from within IEUA's service area that travel from the San Gabriel Mountains to the Santa Ana River has been sharply reduced over time. **Figure 2-11** was created using groundwater model data from the Chino Basin Watermaster and was included in IEUA's 2016 Chino Basin Stormwater Resource Plan. Additional studies would be necessary to evaluate additional streams, which are not included as part of this SWRP.

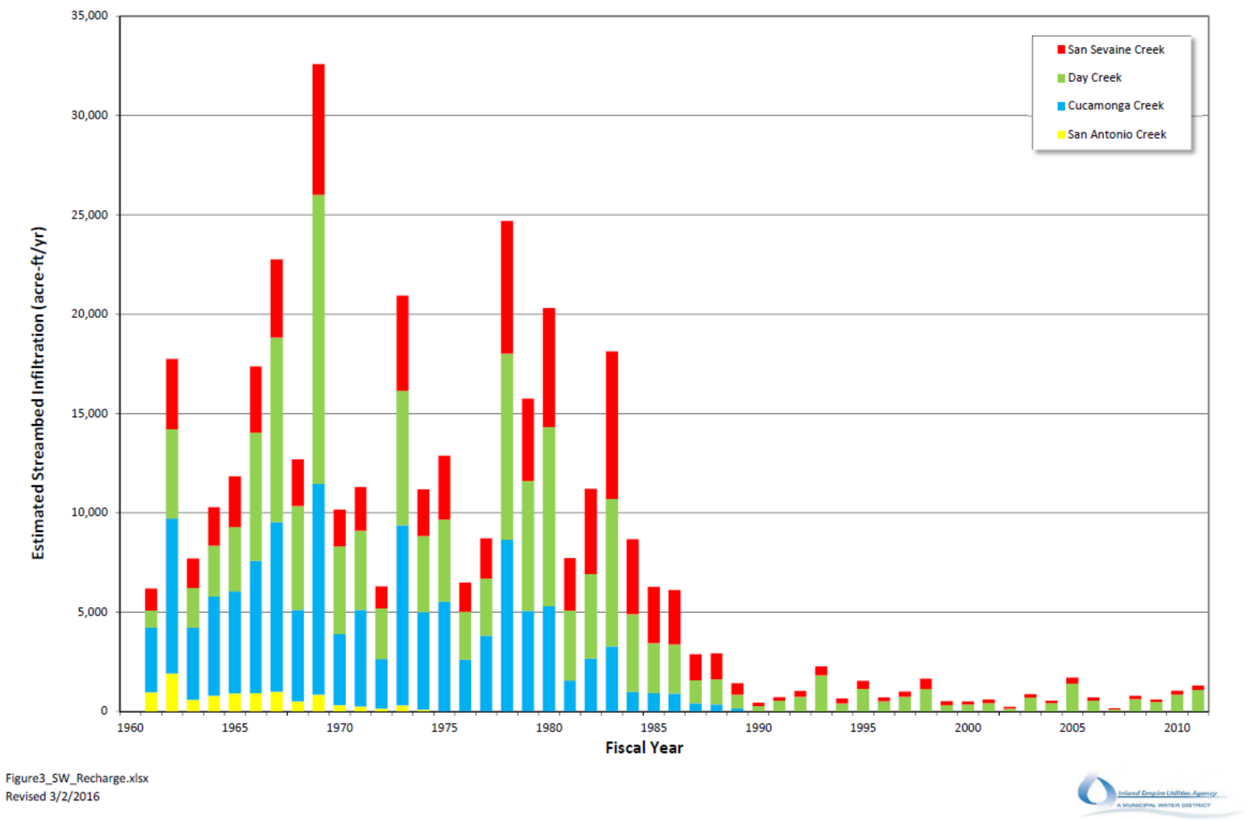


Figure 2-11 Groundwater Recharge from Streambeds (from 2016 Chino Basin SWRP)

2.1.4.3 Interflow

Interflow takes place following storm events as shallow subsurface flow (usually within three to six feet of the surface) occurring in a more permeable soil layer above a less permeable substrate. During a rainfall event, some of the water leaves the area as surface runoff, and some infiltrates to a shallow subsurface soil layer. If the shallow layer is more permeable than the layers underneath, water will tend to flow laterally underground rather than percolate to deeper soil layers. This lateral movement of shallow groundwater is interflow. The process of interflow can flatten and elongate the hydrograph of a watershed in certain locations, which can reduce velocities and flood flow rates during a storm. The magnitude of the effect can be quite pronounced in some geologic settings but small to negligible in others.

Urban development reduces infiltration and thus interflow, as well as reducing the footprint of the area supporting interflow volume. Larger acreages of impervious area along with development of underground storm drains and the paving and straightening of open drainage channels have reduced the capacity for vadose zone movements of water. As the SBC SARW has continued to develop, more precipitation that centuries ago would have become interflow and groundwater have now become overland flow and surface runoff.

2.1.4.4 Evapotranspiration

In undisturbed humid-region watersheds, the process of returning water to the atmosphere by direct evaporation from soil and vegetation surfaces, and by the active transpiration by plants, can account for nearly one-half of the total annual water balance. This fraction can be even higher in more arid regions. While evaporation is related to characteristics of meteorology such as heat, humidity, and wind, transpiration is related to plant types and the amount of moisture in the soil. Native plants are often replaced with turf, which requires additional irrigated water, especially throughout the summer months.

Though the capacity of the atmosphere to reduce the volume of standing water through evapotranspiration has remained relatively unchanged over time, evapotranspiration throughout the SBC SARW has likely increased due to land development and the introduction of non-native plant species. Non-native plant species tend to use more water and be less tolerant of droughts. The introduction of plant species that require more water has likely removed a higher volume of water from the soil column than in pre-development times.

2.1.4.5 Sedimentation

Sediment delivery into the channel network is a critical process for the maintenance of various habitat features in fluvial systems, including in the SBC SARW. Endangered species adapted to a particular natural sedimentation process. Continued development of the SBC SARW has changed this natural process.

Urban development has led to a measurable decrease in sediment flows in the Santa Ana River over time. **Figure 2-12**, from Warrick and Rubin (2007), shows how suspended sediment concentrations, while still related to total stormwater discharge in the Santa Ana River, decreased over time between 1967 and 2001.

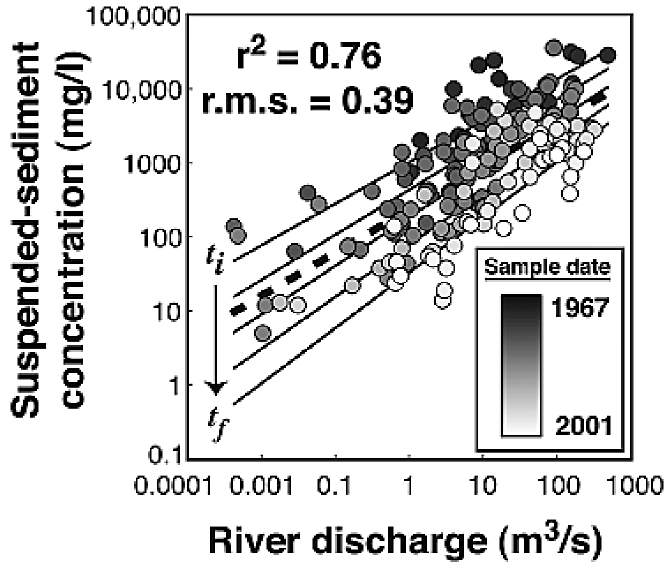


Figure 2-12 Suspended Sediment Concentration in the Santa Ana River Over Time

Delivery of both organic and inorganic sediment to the Santa Ana River tributaries upstream of Prado Dam has been disrupted by the decrease in erodible land through development, and by the addition of debris basins and groundwater recharge basins in the tributaries of the SBC SARW.

2.1.4.6 Chemical and Biological Transformation

Chemical and biological transformation encompasses the suite of watershed processes that alter the chemical composition of water as it passes through the soil column on its path to, and following entry into, a receiving water. The conversion of subsurface flow to overland flow in a developed landscape eliminates much of the opportunity for attenuation and transformations within the soil column, and this is commonly expressed as degraded water quality. The dependency of these processes on watershed conditions is complex in detail, but in general, a greater residence time of stormwater in the soil is correlated with greater activity for this group of processes.

The residence time of stormwater within the soil has decreased within the SBC SARW when compared to historic conditions. The urbanization of the watershed has led to more impervious area preventing stormwater infiltration, thereby disrupting chemical and biological transformation processes. Storm drains and concrete lined channels have further reduced the watershed's natural ability to treat stormwater through chemical and biological processes.

2.2 San Bernardino County Santa Ana River Subwatersheds

The SBC SARW is comprised of 14 subwatersheds as shown in **Figure 2-13**. The subwatersheds are associated with major tributaries to the Santa Ana River within the SBC SARW area. **Table 2-6** shows the percentage of each subwatershed within the SBC SARW by acreage. The largest subwatershed is the Santa Ana River subwatershed, which makes up just over 35 percent of the SBC SARW area. The Santa Ana River subwatersheds represent areas that are directly tributary to the river. The smallest subwatershed is Little San Gorgonio Creek which covers less than one percent of the SBC SARW area. The subwatershed water quality and characteristics were considered as part of the project quantification and may be used to prioritize future implementation, as discussed in **Section 7**. These subwatersheds are appropriate for use in assessing projects/programs that manage stormwater and provide multiple benefits.

Table 2-6 Summary of Subwatershed Percentages within the SBC SARW

Subwatershed	Area (Acres)	Percent (%)
BBL	46,104	7.1
Cucamonga Channel	66,486	10.2
Cypress Channel	5,670	0.9
Day Creek Channel	12,931	2.0
Little San Gorgonio Creek	5,005	0.8
Lytle-Cajon Creek Channel	111,867	17.2
Mill Creek	34,758	5.4
Rialto Channel	12,180	1.9
San Antonio Channel	27,505	4.2
San Sevaine Channel	42,108	6.5
San Timoteo Creek	34,014	5.2
Santa Ana River	198,144	30.5
Upper San Antonio Channel	11,147	1.7
Warm Channel	41,594	6.4
Total:	**649,513**	**100.0**

The SBC SARW is composed of 16 cities and the UA of SBC, as mentioned in **Section 2.1.1.1**. **Table 2-7** provides a breakdown of the corresponding jurisdictions within each subwatershed. The Santa Ana River subwatershed includes 12 jurisdictions, the largest number of jurisdictions among the subwatersheds. Upper San Antonio subwatershed is composed of the least with just the UA of SBC within the subwatershed area.

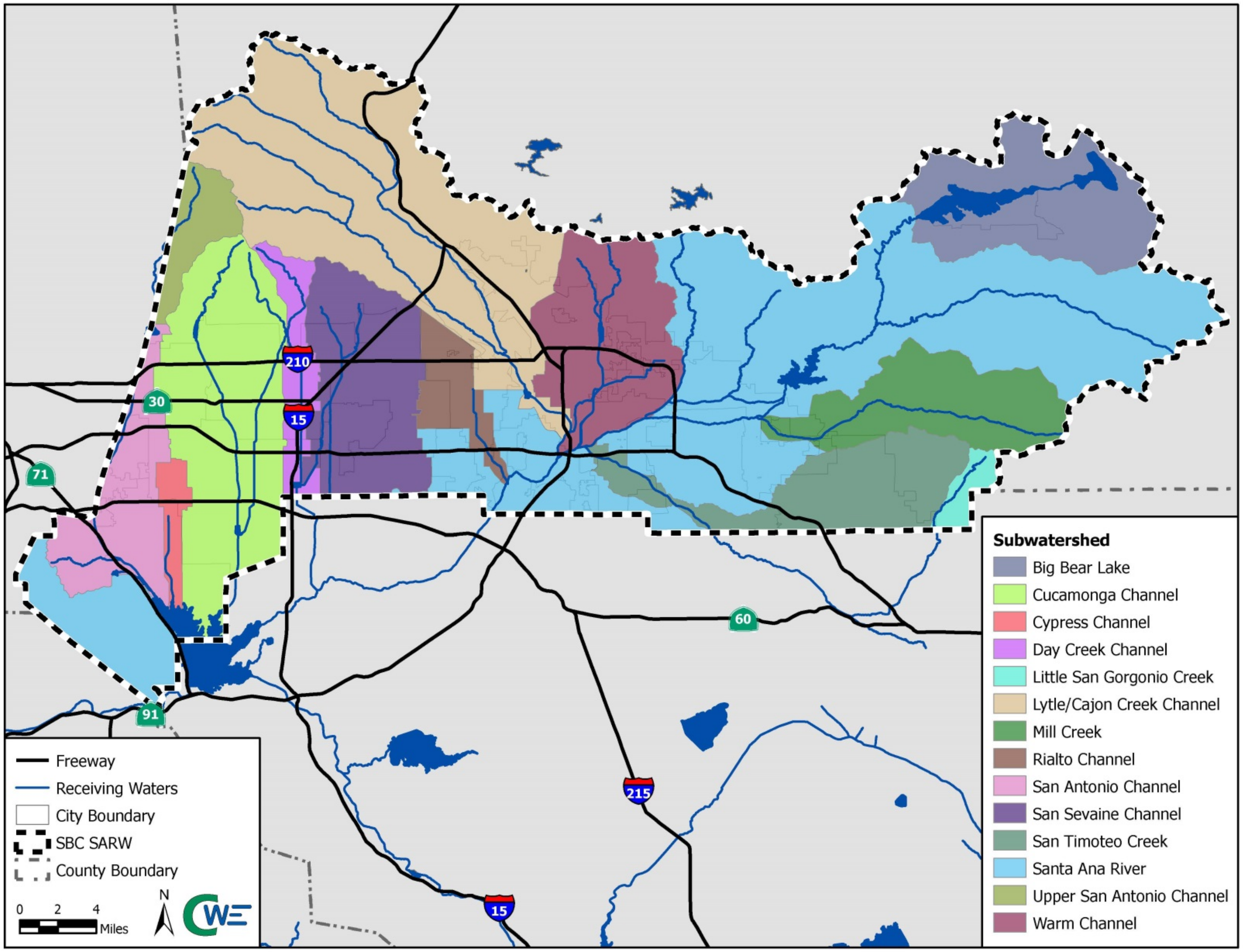


Figure 2-13 SBC SARW Subwatersheds

Table 2-7 Jurisdictional Areas within SBC SARW Subwatersheds

Jurisdictions	Subwatersheds													
	BBL	Cucamonga Channel	Cypress Channel	Day Creek Channel	Little San Gorgonio Creek	Lytle-Cajon Creek Channel	Mill Creek	Rialto Channel	San Antonio Channel	San Sevaine Channel	San Timoteo Creek	Santa Ana River	Upper San Antonio Channel	Warm Channel
BBL	X													
Chino		X	X						X			X		
Chino Hills		X							X			X		
Colton						X		X				X		X
Fontana						X		X		X		X		
Grand Terrace												X		
Highland							X					X		X
Loma Linda											X	X		
Montclair									X					
Ontario		X	X	X					X	X				
Rancho Cucamonga		X		X						X				
Redlands							X				X	X		X
Rialto						X		X		X		X		
San Bernardino						X					X	X		X
Upland		X							X					
Yucaipa					X		X				X	X		
UA SBC	X	X		X	X	X	X	X	X	X	X	X	X	X

Similarly, land use categories associated with each subwatershed are presented in **Table 2-8**. Land use categories vary from subwatershed to subwatershed, and similar to the whole of the SBC SARW, the residential and vacant land use categories have the largest area for all of the 14 subwatersheds (six subwatersheds have residential as the largest category and eight have vacant). **Attachment C** includes several figures depicting the jurisdictional boundaries, land use categories, and water storage facilities (basins) within each of the 14 subwatersheds.

Table 2-8 Land Use Composition within SBC SARW Subwatersheds

Subwatershed	Land Use Category (%)						
	Agriculture	Commercial	Education	Industrial	Residential	Transportation	Vacant
BBL	0.0	3.7	0.0	0.1	25.0	0.0	71.2
Cucamonga Channel	1.0	10.9	2.0	12.7	41.0	3.5	28.9
Cypress Channel	2.2	4.8	2.1	15.6	58.5	1.2	15.6
Day Creek Channel	0.0	7.8	1.0	24.7	18.0	3.4	45.1
Little San Gorgonio Creek	0.0	0.1	0.0	0.0	40.0	0.0	59.9
Lytle-Cajon Creek Channel	0.0	4.4	0.5	3.5	12.9	0.5	78.2
Mill Creek	0.0	1.4	<0.1	0.0	5.2	0.0	93.4
Rialto Channel	0.0	23.4	2.6	19.6	50.2	0.1	4.1
San Antonio Channel	1.6	14.5	2.7	14.9	46.3	2.5	17.5
San Sevaine Channel	0.0	8.8	2.2	21.7	38.2	2.6	26.5
San Timoteo Creek	1.0	11.3	1.0	0.4	45.4	0.4	40.5
Santa Ana River	3.8	5.3	0.6	3.8	16.8	0.6	69.1
Upper San Antonio Channel	0.0	0.5	0.0	0.0	0.0	0.0	99.5
Warm Channel	0.0	12.6	2.0	5.5	39.6	4.4	35.9

3. Water Quality Priorities

The SARWQCB Basin Plan contains the region's water quality regulations and implementation programs designed to preserve and enhance water quality and protect the beneficial uses of waters within the region. Specifically, the Basin Plan:

1. Identifies beneficial uses for surface and ground waters;
2. Includes the narrative and numerical WQOs that must be attained or maintained to protect the designated beneficial uses and conform to the State's anti-degradation policy; and
3. Describes implementation programs and other actions that are necessary to achieve the WQOs established in the Basin Plan.

In combination, beneficial uses and their corresponding WQOs are called Water Quality Standards. A beneficial use is one of the various ways that water can be used for the benefit of people and/or wildlife. A water body is placed on the CWA 303(d) impaired waters list due to exceedances of Basin Plan WQOs of the beneficial uses for that water body. If the pollutant is identified to be causing the impairment, then the water body is assigned a priority for the development of a TMDL, based on the severity of the pollution and the sensitivity of the uses to be made of the waters.

Existing TMDLs and impaired water bodies identified in the 2016 Clean Water Act Section 303(d) List Integrated Report (2016 CWA 303(d) List) were considered as water quality priorities within the SBC SARW which are further discussed in **Section 3.1** to **Section 3.3**. Monitoring data from the Areawide Program was compared to applicable WQOs for each of the receiving waters to further identify priority pollutants in **Section 3.4**. Water quality data from the Areawide Program was also used to establish baseline water quality conditions in the SARW area. The identified priority pollutants from monitoring data, along with TMDL and 303(d) listed impairments, is one aspect that guides the implementation efforts for quantification and prioritization of potential multi-benefit stormwater management projects discussed in **Section 6.1**.

3.1 Existing Surface Water Impairments

The Basin Plan identifies beneficial uses for the Santa Ana River and associated tributaries within the SBC SARW. Water bodies within the SBC SARW support beneficial uses such as:

- Municipal and domestic water supply (MUN)
- Agricultural supply (AGR)
- Groundwater recharge (GWR)
- Hydropower generation (POW)
- Water contact and non-contact recreation (REC1 and REC2)
- Warm freshwater habitat (WARM)
- Cold freshwater habitat (COLD)
- Wildlife habitat (WILD)

- Rare, threatened, or endangered species (RARE)
- Spawning, reproduction, and development (SPWN)

Table 3-1 presents the beneficial uses of the Santa Ana River Reaches within the SBC SARW (illustrated in **Figure 2-1**). Narrative and numerical WQOs are set within the Basin Plan to protect the designated beneficial uses and conform to the State's Anti-Degradation Policy. In addition to the WQOs in the Basin Plan, the California Toxics Rule (CTR) is often referenced as a source of water quality assessment criteria to identify water body impairments, especially those developed through the Federal CWA 303(d) listing process (Federal Register, 2000).

Table 3-1 Santa Ana River Reach 6 through 3 Beneficial Uses

Reach	MUN	AGR	GWR	POW	REC1	REC2	WARM	COLD	WILD	RARE	SPWN
6	X	X	X	X	X	X		X	X		X
5	X*	X	X		X[1]	X	X		X	X	
4	+		X		X[1]	X	X		X	X	X
3	+	X	X		X	X	X		X	X	X

X Existing or Potential Beneficial Use
\+ Excepted from MUN
* **MUN** applies upstream of Orange Avenue (Redlands); downstream, water is excepted from MUN
[1] Access prohibited in some portions per agency with jurisdiction

The following sections describe the relevant CWA 303(d) List impaired water bodies and TMDLs within the SBC SARW. Impairments of the beneficial uses identified above exist in nine water bodies, as described in **Section 3.1.1**. TMDLs have been developed for BBL for Noxious Aquatic Plants Nutrients and Middle Santa Ana River (MSAR) for Indicator Bacteria as further discussed in **Section 3.1.2**. Water quality priorities within the SBC SARW are based on the TMDL listings, while considering the impaired water bodies identified in the 2016 CWA 303(d) List.

3.1.1 CWA 303(d) List

The CWA required the State of California to prepare, and then periodically update, a list of impaired water bodies, including those pollutants or conditions causing the impairment and supporting information such as assessment criteria. The current 2016 CWA 303(d) List of water body impairments within the SBC SARW are presented in **Table 3-2** and **Figure 3-1** (SWRCB, 2017a).

On April 28, 2017, the SARWQCB adopted Order No. R8-2017-0013, *Approval of Recommendations for the Federal Clean Water Act Section 303(d) List* (2016 CWA 303(d) List) (SARWQCB, 2017). The SWRCB evaluated the data submitted as part of Order No. R8-2017-0013, for completeness and consistency with the *Water Quality Control Policy for Developing California's CWA Section 303(d) List* (Listing Policy) (SWRCB, 2004). On June 9, 2017, the SWRCB issued the draft *2014 and 2016 California Integrated Report Clean Water Act Sections 303(d) and 305(b)* (2014 and 2016 Integrated Report) outlining the findings from the SWRCB's assessment and recommendations for new listing and delisting to the CWA 303(d) List (SWRCB, 2017a). The 2014 and 2016 Integrated Report recommended delisting a number of water body-pollutant combinations noted in the 2016 CWA 303(d) List. New listing and delisting per the 2016 CWA 303(d) List and SWRCB 2014 and 2016 Integrated Report are noted in **Table 3-2**. The 2016 list obtained final approval from the Office of Administrative Law (OAL) and the USEPA on April 6, 2018, and was utilized in water quality data analysis in **Section 3.3**.

Table 3-2 2016 CWA 303(d) List of Impairments within SBC SARW

Water Body	2016 CWA 303(d) List of Impairments
BBL	Mercury, PCBs, Noxious (Nuisance) Aquatic Plants, Nutrients, Chlordane, DDT (Dichlorodiphenyltrichloroethane)
Chino Creek Reach 1A	Nutrients, Indicator Bacteria
Chino Creek Reach 1B	COD, Nutrients, Indicator Bacteria
Chino Creek Reach 2	pH, Indicator Bacteria
Cucamonga Creek Reach 1	Cadmium, Copper, Lead, Zinc, Indicator Bacteria
Cucamonga Creek Reach 2	pH
Grout Creek	Nutrients
Knickerbocker Creek	Indicator Bacteria
Lytle Creek	None
Mill Creek (Prado Area)	Nutrients, Indicator Bacteria, TSS
Mill Creek Reach 1	Indicator Bacteria
Mill Creek Reach 2	None
Mountain Home Creek	Indicator Bacteria
Mountain Home Creek, East Fork	Indicator Bacteria
Prado Park Lake	Nutrients, Indicator Bacteria
Prado Flood Control Basin	pH
Rathbone (Rathbun) Creek	Cadmium, Copper, Nutrients, Sedimentation/Siltation
San Antonio Creek	pH
Santa Ana River Reach 3	Copper, Lead, Indicator Bacteria
Santa Ana River Reach 4	Indicator Bacteria
Santa Ana River Reach 6	Cadmium, Copper, Lead
Summit Creek	Nutrients

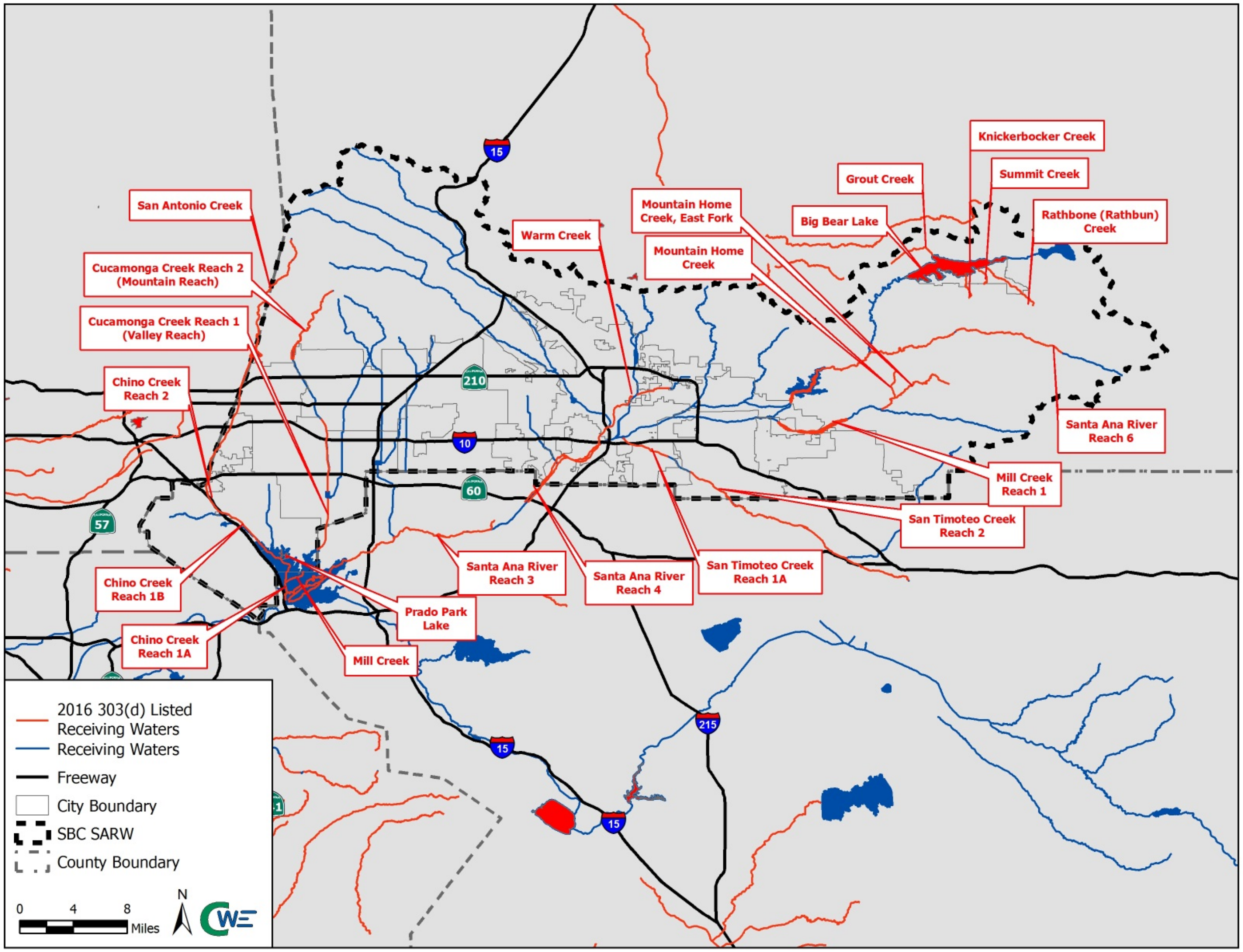


Figure 3-1 2016 CWA 303(d) List of Impaired Water Bodies within SBC SARW

3.1.2 Total Maximum Daily Loads

A TMDL must be developed for water bodies placed on the CWA 303(d) List. For water bodies needing a TMDL or alternative planning tool, a completion schedule is developed by the SARWQCB as outlined in the Listing Policy (SWRCB, 2017a). A TMDL defines how much of a pollutant can be present in a water body and still meet water quality standards and protect beneficial uses. Each TMDL must account for contributions from point and non-point sources and provide a Waste Load Allocation (WLA) and Load Allocation (LA), respectively. **Table 3-3** lists two applicable TMDLs in the SBC SARW and subsections below present additional details regarding these TMDLs.

Table 3-3 TMDLs Developed within the SBC SARW

Water Body(ies)	TMDL
BBL	Nutrients and Nuisance Aquatic Plants
MSAR – Chino Creek Reach 1, Chino Creek Reach 2, Cucamonga Creek Reach 1, Mill Creek (Prado Area), Prado Park Lake, Santa Ana River Reach 3	Indicator Bacteria

3.1.2.1 Big Bear Lake Nutrients and Nuisance Aquatic Plants TMDL

Proliferation of nuisance (also referred to as noxious) aquatic plants has been recorded in BBL since the 1970s and nutrient discharges have helped promote the growth of nuisance aquatic plants. These nuisance aquatic plants serve as both a sink and source of nutrients. BBL's designated beneficial uses impacted by low dissolved oxygen levels, caused by excess nutrients and nuisance aquatic plants, include COLD, REC1, REC2, WARM, WILD, and RARE. As a result, BBL is on the CWA 303(d) List and a TMDL was developed to limit nutrient loading. The Big Bear Lake Nutrient (BBLN) TMDL was adopted by the SARWQCB in April 2006, and approved by the USEPA on September 25, 2007. The BBLN TMDL numeric targets are shown in **Table 3-4** (SARWQCB, 2006). BBLN TMDL numeric targets during dry hydrologic conditions are required as of 2015 and all other conditions by 2020. In addition, BBLN TMDL WLA and LA established for total phosphorus during dry hydrological conditions are presented in **Table 3-5** (SARWQCB, 2006).

Table 3-4 Big Bear Lake Nutrient TMDL Numeric Targets

Parameter	Target Values	Compliance Date[a]	
		Interim – Dry Hydro Conditions	Final – All Other Conditions
Total Phosphorus	35 µg/L (annual average[b])	2015	2020[c]
Macrophyte Coverage	30-40% on a total lake area basis		2020[c,d]
Percentage of Nuisance Aquatic Vascular Plant Species	95% eradication on a total area basis of Eurasian Watermilfoil and any other invasive aquatic plant species		2020[c,d]
Chlorophyll *a*	14 µg/L (growing season[e] average)		2020[c]

[a] Compliance with the targets to be achieved as soon as possible, but no later than the date specified.

[b] Annual average determined by the following methodology: the nutrient data from both the photic composite and discrete bottom samples are averaged by station number and month; a calendar year average is obtained for each sampling location by averaging the average of each month; and finally, the separate annual averages for each location are averaged to determine the lake-wide average.

[c] Compliance date for wet and/or average hydrological conditions may change in response to approved TMDLs for wet/average hydrological conditions.

[d] Calculated as a 5-year running average based on measurements taken at peak macrophyte growth as determined in the Aquatic Plant Management Plan.

[e] Growing season is the period from May 1 through October 31 of each year. The chlorophyll *a* data from the photic samples are averaged by station number and month; a growing season average is obtained for each sampling location by averaging the average of each month; and finally, the separate growing season averages for each location are averaged to determine the lake-wide average.

Table 3-5 Phosphorus WLAs and LAs for Dry Hydrological Conditions

Big Bear Lake Nutrient TMDL for Dry Hydrological Conditions	Total Phosphorus Load Allocation (lbs/yr)[a,b]
WLA	**475**
Urban	475
LA	**25,537**
Internal Sediment	8,555
Internal macrophyte	15,700
Atmospheric Deposition	1,074
Forest	175
Resort	33
TMDL	**26,012**

[a] Allocation compliance to be achieved as soon as possible, but no later than December 31, 2015.

[b] Specified as an annual average for dry hydrological conditions only.

3.1.2.2 Middle Santa Ana River Bacterial Indicator TMDL

Water bodies within the MSAR Watershed portion of the SBC SARW, in the MSAR Bacterial Indicator TMDL were identified as follows (SARWQCB, 2005c):

- Chino Creek, Reach 1
- Chino Creek, Reach 2

- Cucamonga Creek, Reach 1
- Mill Creek (Prado Area)
- Prado Park Lake
- Santa Ana River, Reach 3

Elevated fecal coliform densities adversely affecting REC1 designated beneficial uses were identified within the MSAR water bodies. As a result, the MSAR water bodies were placed on the CWA 303(d) List and a TMDL was developed to address the impairment. The MSAR Bacterial Indicator TMDL was adopted by the SARWQCB on August 26, 2005, and approved by the USEPA on May 16, 2007 (SARWQCB, 2005c). The MSAR Bacterial Indicator TMDL establishes WLAs, LAs, and compliance targets for fecal coliform and *E. coli* during the wet and dry season. **Table 3-6** identifies the MSAR Bacterial Indicator WLAs, LAs, and TMDL requirements applicable to the SBC SARW area. It is important to note that the targets identified in the table below are associated with the original TMDL requirements. The Basin Plan WQO for *E. coli* (126 organisms/100 milliliters for a 5-day/30-day geomean) is used to assess compliance based on the discussion below.

Table 3-6 TMDLs, WLAs, and LAs for Bacterial Indicators in MSAR Water Bodies

Indicator	Original Compliance Target[a,b,c]
Fecal coliform	5-sample/30-day Logarithmic Mean less than 180 organisms/100mL, and not more than 10% of the samples exceed 360 organisms/100mL for any 30-day period.
E. coli	5-sample/30-day Logarithmic Mean less than 113 organisms/100mL, and not more than 10% of the samples exceed 212 organisms/100mL for any 30-day period.

[a] To be achieved as soon as possible, but no later than December 31, 2015, for both dry summer and wet winter conditions.

[b] Compliance target include a 10% margin of safety.

[c] The fecal coliform compliance target has become ineffective upon the replacement of the REC1 fecal coliform objectives in the Basin Plan by approved REC1 objectives based on *E. coli*. SARWQCB Resolution: R8-2012-0001, June 15, 2012 (SARWQCB, 2012b).

On June 15, 2012, the SARWQCB adopted the Basin Plan Amendment (BPA) Resolution R8-2012-0001, to Revise Recreation Standards for Inland Freshwaters in the Santa Ana Region (SARWQCB, 2012b). This BPA resulted in the following key modifications to the Basin Plan:

- Addition of "Primary Contact Recreation" as an alternative name for the REC1 (water contact recreation) beneficial use;
- Addition of narrative text clarifying the nature of REC1 activities and the bacteria objectives established to protect these activities;
- Differentiation of inland surface REC1 waters on the basis of frequency of use and other characteristics for the purposes of assigning applicable single sample maximum values;
- Revision of REC1/REC2 (non-contact water recreation) designations for specific inland surface waters based on the results of completed Use Attainability Analyses (UAA) (SARWQCB, 2012a and 2013);
- Revised water quality objectives to protect the REC1 use of inland freshwaters; and

- Identification of criteria for temporary suspension of recreation use designations and objectives (high flow suspension).

The BPA Resolution R8-2012-0001 was approved by the SWRCB on January 21, 2014, and the OAL on July 2, 2014. The USEPA issued its letter of approval/disapproval on April 8, 2015, and provided a letter of clarification on August 3, 2015. Upon USEPA approval of the BPA Resolution R8-2012-0001 the compliance target for fecal coliform, as indicated in **Table 3-6**, is ineffective, as *E. coli* is the only compliance target for bacterial indicators.

3.1.3 Trash Amendments

Trash generated by human activities frequently end up in waterways. The presence of trash in waterways adversely affects beneficial uses and threatens aquatic life, wildlife, and public health. On April 7, 2015, the SWRCB adopted Resolution No. 2015-0019 which approved *Amendment to the Water Quality Control Plan for Ocean Waters of California (Ocean Plan) to Control Trash* and *Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries* (ISWEBE Plan), collectively referred to as the Trash Amendments (2015a). The USEPA approved the Trash Amendments on January 12, 2016, which applies to all surface waters within the State of California, except waters within the jurisdiction of the Los Angeles Region where trash or debris TMDLs are in effect prior to the effective date of the Trash Amendments. The narrative WQO for the Trash Amendments are as follows:

- For the Ocean Plan: Trash shall not be present in ocean waters, along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.
- For the ISWEBE Plan: Trash shall not be present in inland surface waters, enclosed bays, estuaries, and along shorelines or adjacent areas in amounts that adversely affect beneficial uses or cause nuisance.

The Trash Amendments requirements are to be incorporated into Phase I and II MS4 Permits, Industrial General Permit (IGP), Construction General Permit (CGP), and the California Department of Transportation (Caltrans) NPDES Permit. NPDES Permittees with regulatory authority over land uses are to prohibit the discharge of trash under a dual alternative compliance approach or “Tracks” through the implementation defined by either Track 1 or Track 2. Both Tracks require Permittees to focus their trash control efforts on priority land uses, as outlined in **Table 3-7**. The priority land uses are defined as developed land uses that are high density residential, industrial, commercial, mixed urban, and public transportation stations.

Table 3-7 Overview of Proposed Compliance Tracks for NPDES Stormwater Permits

Element	Track 1	Track 2
NPDES Stormwater Permit	Phase I and II MS4 IGP/CGP[a]	Phase I and II MS4 Caltrans IGP/CGP[a]
Plan of Implementation	Install, operate, and maintain Full Capture Systems (FCSs) in storm drains that capture runoff from one or more of the priority land uses/facility/site.	Implement a plan with a combination of FCSs, multi-benefit projects, institutional controls, and/or other treatment controls to achieve FCSs equivalency.
Time Schedule	10 years from first implementing permit but no later than 15 years from the effective date of the Trash Amendments.[b]	
Monitoring and Reporting	Demonstrate installation, operation, and maintenance of FCSs and provide mapped location and drainage area served by FCSs.[c]	Develop and implement set of monitoring objectives that demonstrate effectiveness of the selected combination of controls and compliance with FCS equivalency.[c]

[a] IGP/CGP Permittees would first demonstrate inability to comply with the outright prohibition of discharge of trash.

[b] Where a permitting authority makes a determination that a specific land use or location generates a substantial amount of trash, the permitting authority has the discretion to determine a time schedule with a maximum of ten years. IGP/CGP Permittees would demonstrate full compliance with deadlines contained in the first implementing permit.

[c] No trash monitoring requirements for IGP/CGP; however, IGP/CGP Permittees would be required to report trash controls.

3.2 Existing Groundwater Quality

Groundwater accounts for a majority of the domestic water supply in the SBC SARW. Groundwater quality varies among the region's groundwater basins, as they cover a large geographic area. Various agencies throughout the SBC SARW participate in regional efforts to monitor groundwater quality. This section summarizes groundwater quality data based on past monitoring efforts.

3.2.1 Chino Groundwater Basin

The Chino Groundwater Basin (illustrated in **Figure 2-7**) comprises an area of approximately 235 square miles that extends from the Prado Basin in the southwestern corner, bounded by the Chino Hills and Puente Hills to the west, the San Jose and Red Hill Faults along the San Gabriel Mountains to the northwest, the Rialto-Colton Fault to the northeast, and the Jurupa Mountains and La Sierra Hills to the southeast. The Chino Groundwater Basin consists of five Management Zones (MZ) and four basin delineations – Chino North comprised of MZ1, MZ2, MZ3 with about 90 percent in San Bernardino County; Chino-East (MZ4); Chino-South (MZ5); Prado Basin (parts of MZ1, MZ2, MZ3, and MZ5); and MZ4 and MZ5 are in Riverside County.

The Chino Groundwater Basin is administered by the Chino Basin Watermaster (CBWM) which prepares a Maximum Benefit Annual Report (2018) and a State of the Basin Report (2017) that tabulates the findings of the monitoring effort in the Chino Groundwater Basin. The monitoring program consists of two main components: groundwater-level monitoring and groundwater-quality monitoring. Groundwater-quality is the focus of this section. The CBWM initiated a comprehensive monitoring program to perform systematic sampling of wells. Details of the monitoring programs as of fiscal year 2015-2016 are as follows:

- **Chino Basin Data Collection –** the CBWM routinely collects groundwater quality data from well owners, municipal producers, and government agencies. Data is also collected as part of special studies and monitoring taken under orders from the RWQCB, e.g., landfills, groundwater quality investigations, Department of Toxic Substances, United State Geological Survey (USGS), and others. Data is typically collected twice a year. In 2016, data was collected for over 780 wells as part of the Chino Basin Data Collection.
- **CBWM Field Groundwater Quality Monitoring Programs –** continued sampling of privately owned wells and its own monitoring wells on a routine basis as follows:
  - **Private Wells** – approximately 109 private wells, mostly located in the southern portion of the Chino Groundwater Basin, are sampled at various frequencies depending on their proximity to known point source contamination plumes. Eighty-nine wells are sampled on a triennial basis, and 20 wells near contaminant plumes are sampled annually.
  - **CBWM Monitoring Wells** – approximately 22 multi-nested monitoring wells including nine Hydraulic Control Monitoring Program wells, nine Prado Basin Habitat Sustainability Program wells, and four wells near contaminant plumes in MZ3.
  - **Other wells** – four near-river wells, Archibald 1 and Archibald 2 (USGS), and two SAR Water Company wells (9 and 11).

Groundwater quality data is checked by CBWM staff and uploaded to a centralized database management system accessed online through HydroDaVE. The data is used to comply with two maximum benefit salinity management commitments, prepare the biennial State of the Basin Report, support groundwater modeling, characterize non-point source contamination and plumes associated with point source discharges, and characterize long-term trends in water quality.

The State of the Basin Report (2017) includes groundwater quality data for a five year period from July 2011 to June 2016. Groundwater quality is characterized with respect to constituents where groundwater exceeds Primary or Secondary California Maximum Contaminant Levels (MCLs) or Notification Levels (NLs). Wells with constituent concentrations greater than a Primary MCL represent areas of concern and the spatial distribution of these wells indicates areas in the Basin where groundwater may be impaired from a beneficial use standpoint.

The following is a list of the regulatory and voluntary groundwater quality contamination monitoring efforts in the Chino Basin that are tracked by CBWM:

- Alumax Aluminum Recycling Facility - Constituents of Concern: Total Dissolved Solids (TDS), sulfate, nitrate, chloride.
  Order: RWQCB Cleanup and Abatement Order 99-38
- Alger Manufacturing Co. - Constituents of Concern: Volatile Organic Compounds (VOCs).
  Order: Voluntary Cleanup and Monitoring
- Chino Airport - Constituents of Concern: VOCs.
  Order: RWQCB Cleanup and Abatement Order 90-134
- California Institute for Men (No Further Action status) - Constituents of Concern: VOCs.
  Order: Voluntary Cleanup and Monitoring

- Former Crown Coach International Facility - Constituents of Concern: VOCs and solvents.
  Order: Voluntary Cleanup and Monitoring
- General Electric Flatiron Facility - Constituents of Concern: VOCs and hexavalent chromium.
  Order: Voluntary Cleanup and Monitoring
- General Electric Test Cell Facility - Constituents of Concern: VOCs.
  Order: Voluntary Cleanup and Monitoring
- Former Kaiser Steel Mill - Constituents of Concern: TDS, total organic carbon (TOC), VOCs.
  Order: RWQCB Order 91-40 Closed. Kaiser granted capacity to the Chino II Desalter to remediate.
- Former Kaiser Steel Mill – CCG Property - Constituents of Concern: chromium, hexavalent chromium, other metals, VOCs.
  Order: DTSC Consent Order 00/01-001
- Milliken Sanitary Landfill - Constituents of Concern: VOCs.
  Order: RWQCB Order 81-003
- Upland Sanitary Landfill - Constituents of Concern: VOCs.
  Order: RWQCB Order No 98-99-07
- South Archibald Plume - Constituents of Concern: VOCs.
  Order: This plume is currently being voluntarily investigated by a group of potentially responsible parties per seven Draft Cleanup and Abatement Orders
- Stringfellow NPL Site - Constituents of Concern: VOCs, perchlorate, Nitrosodimethylamine (NDMA), trace metals.
  Order: The Stringfellow Site is the subject of USEPA Records of Decision: EPA/ROD/R09-84/007, EPA/ROD/R09-83/005, EPA/ROD/R09-87/016, and EPA/ROD/R09-90/048.

There were a total of 1,358 wells within the Chino Basin where water quality data was available from July 2011 to June 2016. **Table 3-8** includes a tabulation of the findings of the program for that period specified by the number of wells that exceeded the MCL for the constituents of concern. Of these, 828 wells were sampled in Fiscal Year 2016.

Table 3-8 Groundwater Quality in the Chino Groundwater Basin (CBWM, 2017)

Analyte	California MCL	No. of Wells Exceeding MCL
Primary Contaminant		
1,1,2-Trichloroethane	5 µg/L	1
1,1-Dichloroethane	5 µg/L	2
1,1-Dichloroethene (1,1-DCE)	6 µg/L	16
1,2,4-Trichlorobenzene	5 µg/L	34
1,2-Dibromo-3-chloropropane	0.2 µg/L	5
1,2-Dichlorobenzene	600 µg/L	47
1,2-Dichloroethane	0.5 µg/L	64
1,2-Dichloropropane	5 µg/L	2
1,4-Dichlorobenzene	5 µg/L	110
Aluminum	1 mg/L	94

Analyte	California MCL	No. of Wells Exceeding MCL
Antimony	6 µg/L	1
Arsenic	10 µg/L	71
Barium	1 mg/L	13
Benzene	1 µg/L	98
Beryllium	4 µg/L	21
Bromate	10 µg/L	9
Cadmium	5 µg/L	57
Carbon Tetrachloride	0.5 µg/L	12
Chlorobenzene	70 µg/L	73
Chromium (VI)	10 µg/L	91
Chromium	50 µg/L	193
cis-1,2-Dichloroethene	6 µg/L	61
Copper	1.3 mg/L	20
Cyanide	150 µg/L	2
Di(2-ethylhexyl)phthalate	4 µg/L	28
Dichloromethane (Freon 30)	5 µg/L	108
Ethylbenzene	300 µg/L	51
Fluoride	2 mg/L	53
Gross Alpha	15 pCi/L	12
Heptachlor	0.01 µg/L	1
Hepthachlor Epoxide	0.01 µg/L	2
Lead	15 µg/L	27
Mercury	2 µg/L	3
Methyl Tert-Butyl Ether (MTBE)	13 µg/L	76
Nickel	0.1 µg/L	65
Nitrate-Nitrogen	10 mg/L	606
Nitrite-Nitrogen	1 mg/L	26
Pentachlorophenol	1 µg/L	1
Perchlorate	6 µg/L	457
Ra 226 + Ra 228	5 pCi/L	1
Selenium	50 µg/L	9
Tetrachloroethene (PCE)	5 µg/L	110
Thallium	2 µg/L	7
Toluene	150 µg/L	38
Total Xylene	1750 µg/L	24
Trichloroethylene (TCE)	5 µg/L	285
Uranium	20 pCi/L	1
Vinyl Chloride	0.5 µg/L	6
Secondary Contaminant		
Aluminum	1 mg/L	121
Chloride	500 mg/L	6

Analyte	California MCL	No. of Wells Exceeding MCL
Copper	1.3 mg/L	22
Iron	0.3 mg/L	344
Manganese	50 µg/L	287
Methyl Tert-Butyl Ether (MTBE)	13 µg/L	98
Odor	3 TON	2
Specific Conductance	1600 µS/cm	120
Sulfate	250 mg/l	134
TDS	1000 MG/l	122
Turbidity	5 NTU	59
Zinc	5 mg/L	30

The CBWM defines constituents of potential concern as the following. Findings from July 2011 to June 2016 related to each constituent of concern is further discussed in the 2016 State of the Basin Report (CBWM, 2017)

- Constituents associated with salt and nutrient management planning (i.e., TDS and nitrate).
- Constituents where a primary MCL was exceeded in twenty or more wells from July 2011 to June 2016 and where the majority of wells with exceedances are not primarily exclusive to known point source contamination plumes (i.e., the Stringfellow NPL Site, Milliken Landfill, etc.). These constituents include nitrate, perchlorate, total chromium, hexavalent chromium, arsenic, TCE, and PCE.
- Constituents for which the California Division of Drinking Water is in the process of developing an MCL that may impact future beneficial uses of groundwater. This includes 1,2,3-trichloropropane (1,2,3-TCP), which currently is monitored under a NL.

3.2.2 San Bernardino Valley Municipal Water District

SBVMWD conducts a groundwater monitoring program, which is further described in this subsection. Details pertaining to the monitoring program are summarized in the Upper SARW IRWMP (SBVMWD, 2015). The approach to the groundwater monitoring program is somewhat different than in the Chino Groundwater Basin. Instead of an overall listing of contaminants and the number of wells exceeding the MCLs for any particular constituent, the SBVMWD groups the findings into separate groundwater basins with the number of wells sampled and the number of wells exceeding the respective MCL. The findings are truncated to seven water quality constituents with groupings of:

1. Inorganics (primary)
2. Radiological
3. Nitrates
4. Pesticides
5. VOCs and SOCs
6. Inorganics (secondary)
7. Perchlorate

Primary inorganics include: arsenic, barium, beryllium, borate, cadmium, chromium, copper, cyanide, flouride, lead, mercury, nickel, selenium, and thallium. Secondary inorganics include: aluminum, chlorine, iron, manganese, silver, sodium, and zinc. VOCs include benzene, carbon tetrachloride, TCE, PCE, and others.

In addition to the above listed constituents, TDS concentrations are published in a range from minimum to maximum detected with a cumulative average for each individual groundwater basin (if detected).

The SBVMWD service area groundwater basins/subbasins are adjacent to and east of the Chino Groundwater Basin. There are nine groundwater subbasins in the SBVMWD service area/upper SAR region, as illustrated in **Figure 2-7** (with the exception of those noted below, which are illustrated in the Upper SARW IRWMP [SBVMWD, 2015]):

1. San Bernardino Basin Area – Bunker Hill Subbasin
2. Rialto-Colton Subbasin
3. Cajon Subbasin
4. Riverside-Arlington Subbasin
5. San Timoteo Subbasin
6. Yucaipa Subbasin
7. Bear Valley Subbasin (located near Big Bear Lake – not illustrated in **Figure 2-7**)
8. Big Meadows Valley Subbasin (located south of Big Bear Lake – not illustrated in **Figure 2-7**)
9. Seven Oaks Valley Subbasin (located west of Big Meadows Valley – not illustrated in **Figure 2-7**)

The Bear Valley, Big Meadows Valley, and Seven Oaks Valley Subbasins are not within the SBVMWD service area but are within the Upper SAR Watershed and are reported in California's Groundwater Bulletin 118.

Table 3-9 summarizes groundwater quality data reported in the Upper SARW IRWMP (SBVMWD, 2015). Additional discussion pertaining to these result are included in the referenced report, while the table below represents a summary.

Table 3-9 Groundwater Quality Reported in the Upper SARW IRWMP (SBVMWD, 2015)

Analyte	No. Wells Sampled	No. of Wells Exceeding MCL
San Bernardino Basin Area		
Inorganics (primary)	212	13
Radiological	207	34
Nitrates	214	34
Pesticides	211	20
VOCs and SOCs	211	32
Inorganics (secondary)	212	25
Perchlorate	369	156[1]
Rialto-Colton Subbasin		
Inorganics (primary)	38	0

Analyte	No. Wells Sampled	No. of Wells Exceeding MCL
Radiological	40	0
Nitrates	38	2
Pesticides	40	0
VOCs and SOCs	40	3
Inorganics (secondary)	38	3
Perchlorate	38	7
Cajon Subbasin		
No recorded exceedances of MCL at two wells sampled		
Riverside-Arlington Subbasin		
Inorganics (primary)	48	2
Radiological	48	11
Nitrates	51	21
Pesticides	50	19
VOCs and SOCs	50	8
Inorganics (secondary)	38	3
San Timoteo Subbasin		
Only one of the 27 wells sampled had secondary inorganics exceeding the MCL		
Yucaipa Subbasin		
Inorganics (primary)	43	1
Radiological	44	1
Nitrates	46	12
Pesticides	43	4
VOCs and SOCs	44	1
Inorganics (secondary)	43	4
Bear Valley Groundwater Basin		
Inorganics (primary)	33	7
Radiological	37	0
Nitrates	32	0
Pesticides	20	0
VOCs and SOCs	31	0
Inorganics (secondary)	33	5
Big Meadows Valley Basin		
No recorded exceedances of MCL		
Seven Oaks Valley Basin		
No data available		

3.2.3 Plumes

Several plumes are identified within the SBC SARW area. **Figure 3-2** illustrates the plume locations based on GIS data available in the Watershed Action Plan Geodatabase prepared by the Areawide Program. The following plumes are detailed in the Upper SARW IRWMP (SBVMWD, 2015).

- Crafton-Redlands plume: contaminated with TCE and lower levels of PCE, debromochloropropane (DBCP), and perchlorate
- Norton Air Force Base: TCE and PCE plume, which stretches 2.5 miles from its source and contaminates 100,000 acre-feet of groundwater
- Newmark-Muscoy plume: near the Shandon Hills, which is a Superfund site with TCE and PCE
- Santa Fe plume: contaminated with PCE, TCE, and 1,2 dichloroethylene (1,2-DCE)

The Crafton-Redlands plume consists of two intermingled plumes impacting water supply wells owned by the Cities of Riverside, Redlands, and Loma Linda. One plume has TCE measured at >100 μg/L (MCL= 6 μg/L), while the other has perchlorate to 77 μg/L (MCL=4 μg/L). TCE is treated with Granular Activated Carbon (GAC) treatment units, and perchlorate is treated by ion-exchange units. The Newark-Muscoy plumes are also treated by GAC.

The Norton Air Force Base plume is a major contaminant plume consisting mainly of PCE and TCE and is treated by soil gas extraction, soil removal, and groundwater treatment (GAC and ion-exchange). The treatment units are currently on standby mode (SBVMWD, 2015).

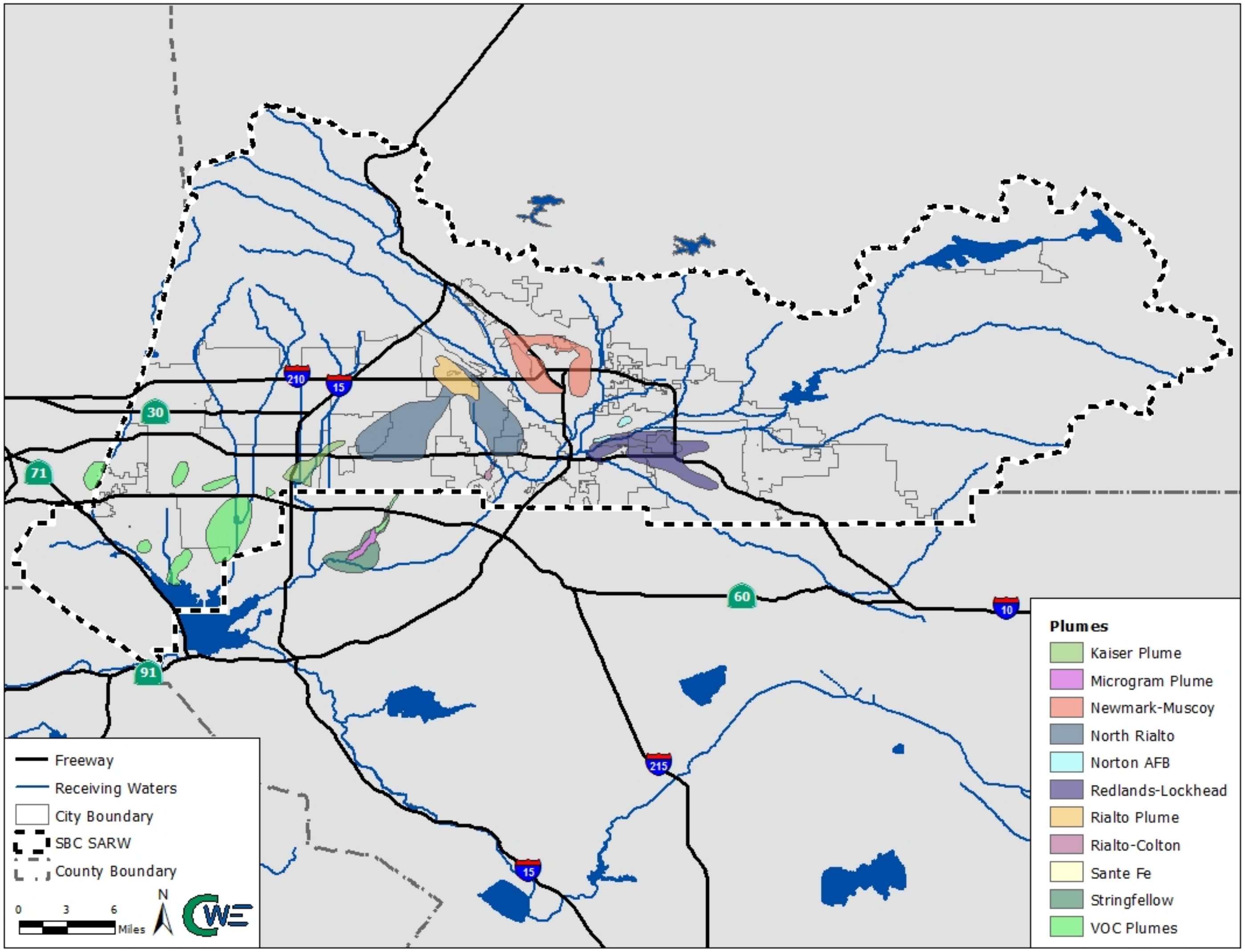


Figure 3-2 Plumes within the SBC SARW Area

3.3 Existing Water Quality Data Sources

Water quality monitoring data, from 2006 to 2016, was collected from numerous sources, but the most useful and highest quality data relevant to the SBC SARW were obtained from SBC Areawide Stormwater Monitoring Programs, which include the following:

- Core and Urban Discharge Mass Emission Monitoring Program (Core Monitoring)
- BBLN TMDL Monitoring:
    - BBL Watershed-Wide Nutrient Monitoring
    - BBL In-Lake Monitoring
- MSAR Bacterial Indicator TMDL/WLA Monitoring

The SBC Areawide Stormwater Monitoring Programs were implemented to fulfill the MS4 Permit requirements. **Table 3-10** summarizes the data availability and utilization for the analysis further detailed in **Section 3.4**. Monitoring locations from these sources are located throughout the SBC SARW area, as illustrated in **Figure 3-3** through **Figure 3-5**. Monitoring data associated with the implementation of these monitoring programs was analyzed to evaluate water quality priorities. This data was utilized to assess the need for projects/programs at key locations within the SBC SARW and quantify benefits related to water quality improvements through load reductions.

The monitoring data from the programs listed above was utilized to assess the baseline water quality of the water bodies within the SBC SARW for which data is available. Core Monitoring sites include permanent and rotating sites, which are organized within the SBCFCD Zones 1, 2, and 3, as shown in **Figure 3-3**. Additional details of the Core Monitoring sites are summarized in **Table 3-11**, BBLN TMDL Monitoring in **Table 3-12**, and MSAR Bacterial Indicator TMDL Monitoring in **Table 3-13**.

Table 3-10 Monitoring Data Availability and Use

Monitoring Program	Dry-Weather		Wet-Weather	
	Data Available	Data Utilized	Data Available	Data Utilized
Core Monitoring				
Permanent Sites	2006-2016[a]	2006-2016[a]	1993-2016	2006-2016
Rotating Sites	2012-2016	2012-2016	2012-2016	2012-2016
BBLN TMDL Monitoring				
BBL Watershed-Wide Nutrient Monitoring	2009-2016	2009-2016	2009-2016	2009-2016
BBL In-Lake Monitoring	2009-2016	2009-2016	2009-2016	2009-2016
MSAR Bacterial Indicator TMDL/WLA Monitoring	2008-2016	2008-2016	2008-2016	2008-2016

[a] Only for Permanent Site 2. Data from 2012-2016 available and utilized for all other Permanent Sites.

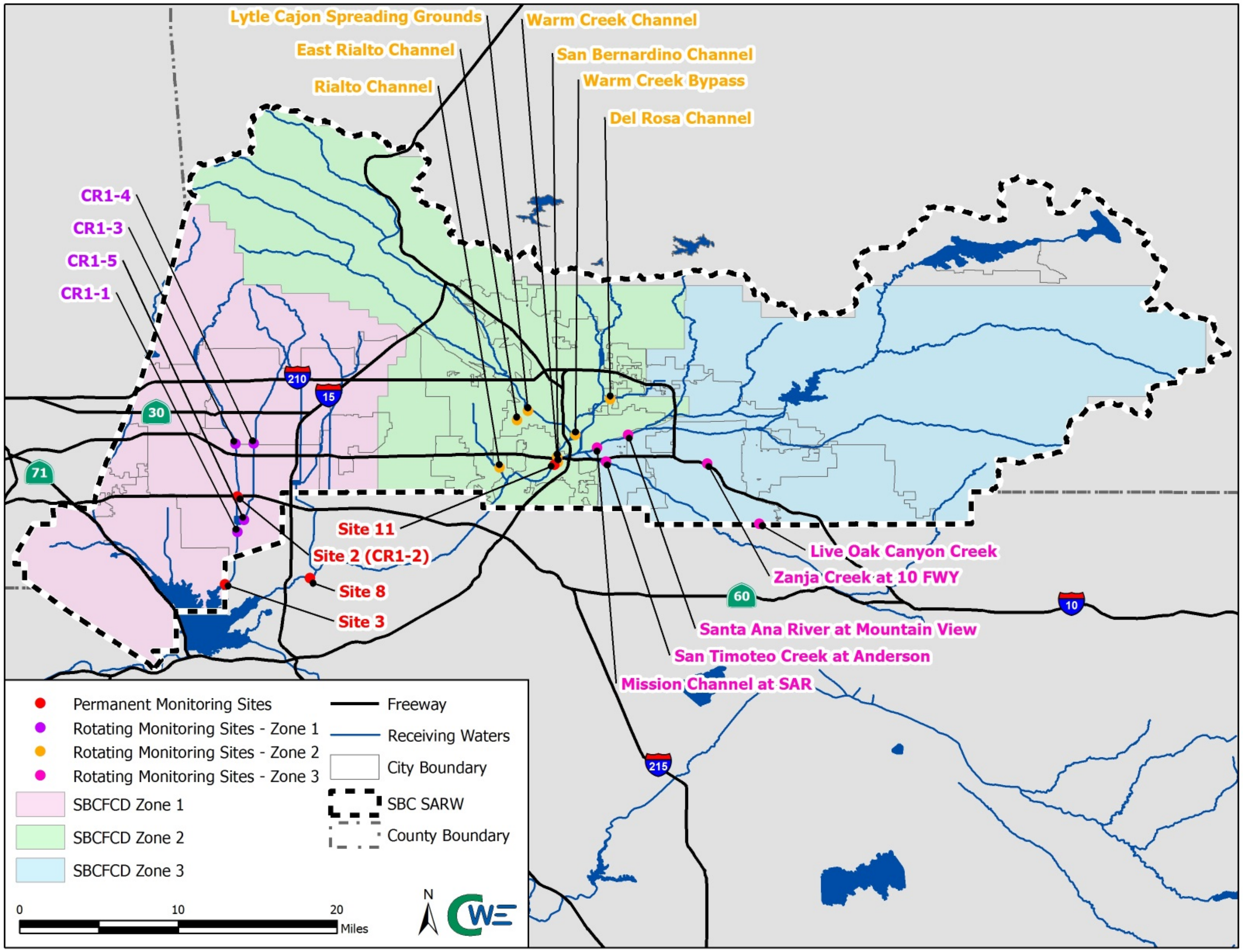


Figure 3-3 Core and Urban Discharge Mass Emission Monitoring Sites

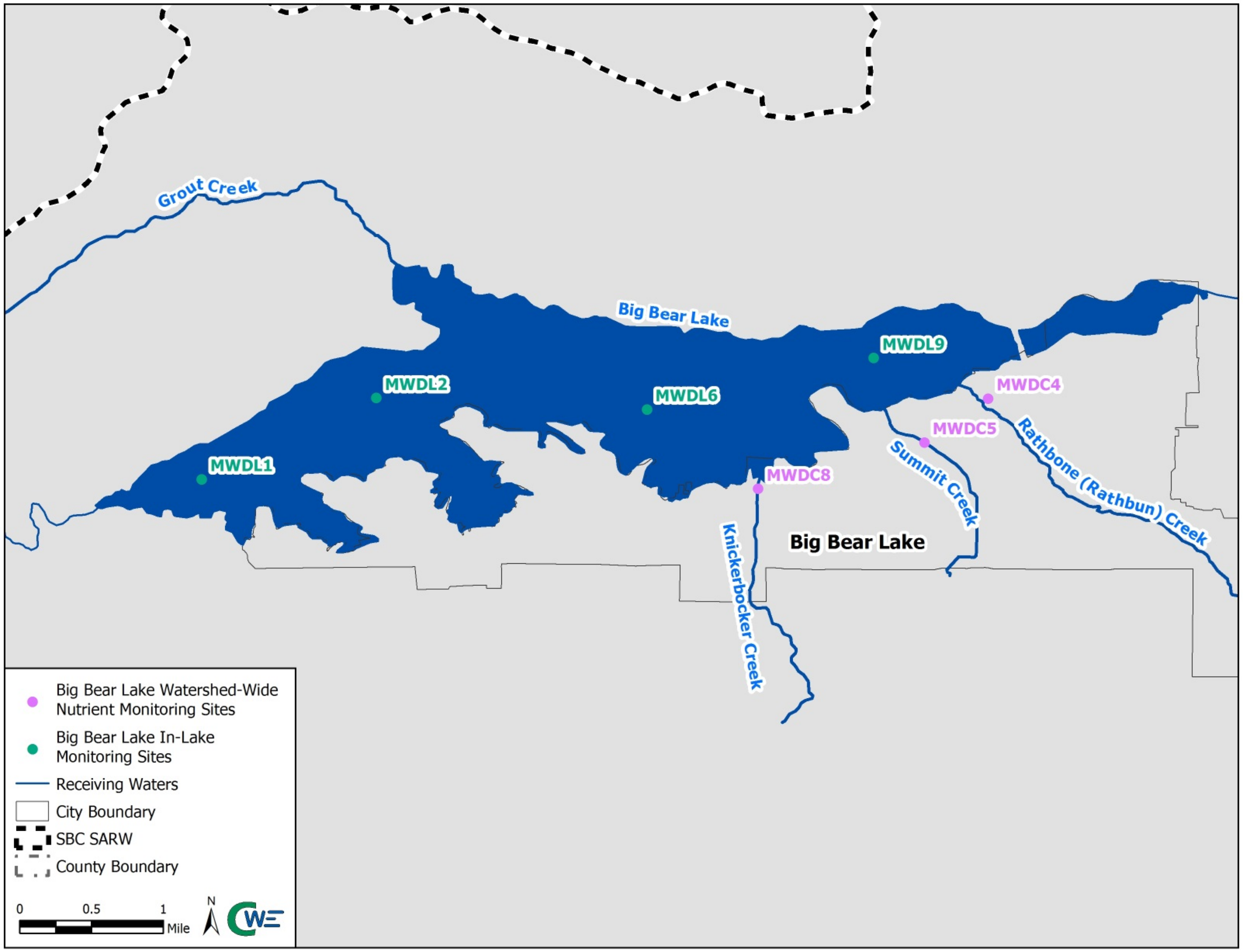


Figure 3-4 Big Bear Lake TMDL Monitoring Sites

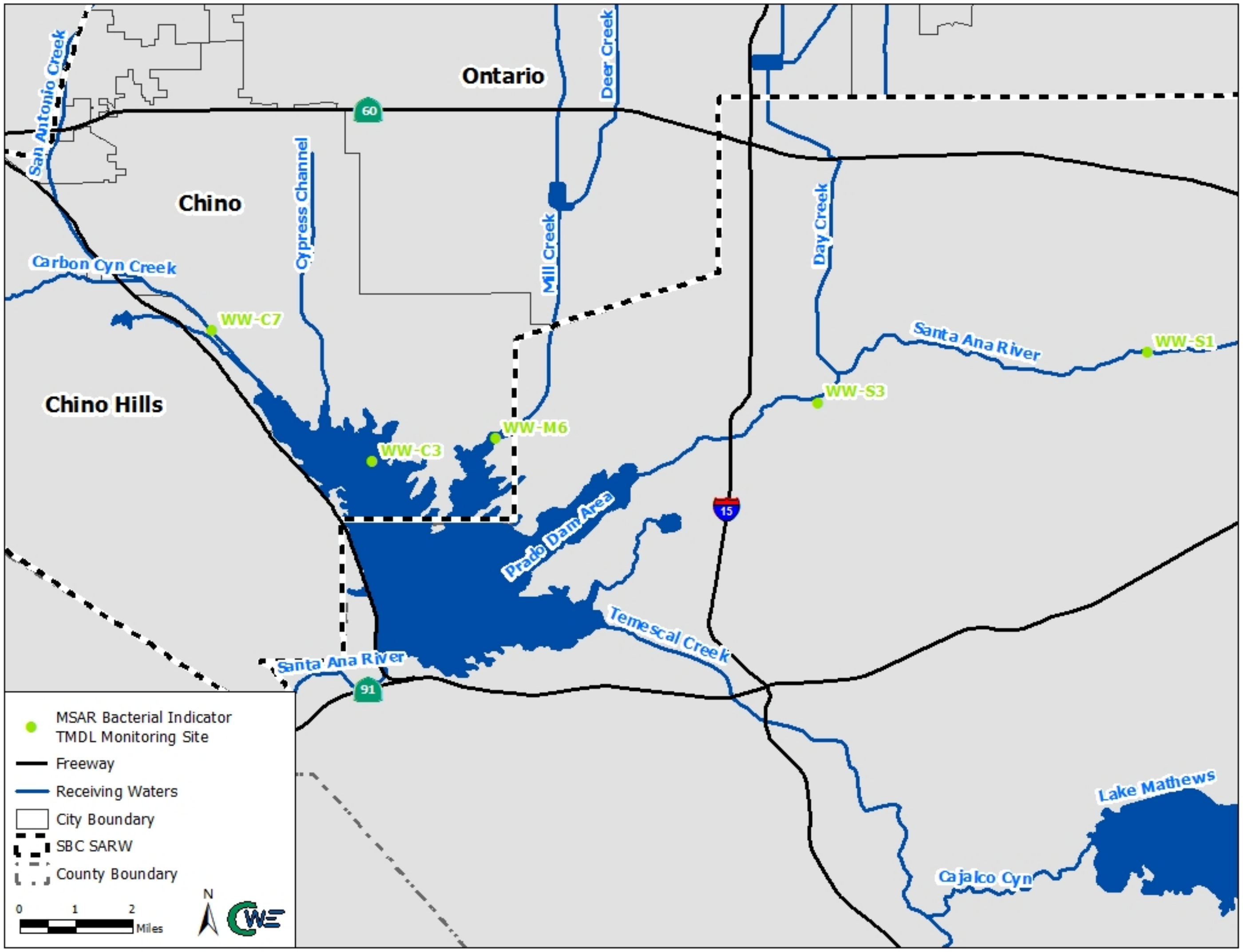


Figure 3-5 MSAR Bacterial Indicator TMDL Monitoring Sites

Table 3-11 Core and Urban Discharge Mass Emission Monitoring Sites

Site No.	Receiving Water	Location	Coordinates	
			Latitude	Longitude
Permanent				
Site 2 (CR1-2)	Cucamonga Creek Reach 1	Cucamonga Creek at Highway 60	34.0295	-117.5993
Site 3	Mill Creek	Cucamonga Channel at Hellman	33.9495	-117.6104
Site 8	SAR Reach 3	SAR at Pedley	33.9552	-117.5328
Site 11	SAR Reach 4	Santa Ana River at Mount Vernon	34.0584	-117.3100
Zone 1 (Rotating)				
CR1-1	Cucamonga Creek Reach 1	Cucamonga Creek at Edison	33.9972	-117.5992
CR1-3	Cucamonga Creek Reach 1	Cucamonga Creek below Turner Basins	34.0775	-117.6010
CR1-4	Deer Creek	Deer Creek above Archibald	34.0755	-117.5935
CR1-5	Deer Creek	Lower Deer Creek above Chris Basin	34.0082	-117.5931
Zone 2 (Rotating)				
WCB	Warm Creek	Warm Creek Bypass	34.0857	-117.2908
DRC	Rialto Channel	Rialto Channel	34.0559	-117.3599
ERC	Rialto Channel	East Rialto Channel	34.0994	-117.3439
SBC	SAR Reach 4	San Bernardino Channel	34.0606	-117.3068
WCC	Warm Creek	Warm Creek Channel	34.0656	-117.3073
DRC	Warm Creek	Del Rosa Channel	34.1184	-117.2589
LCSG	Lytle Creek	Lytle Cajon Spreading Grounds	34.1078	-117.3340
Zone 3 (Rotating)				
LOC3-1	Live Oak Canyon Creek	Live Oak Canyon Creek at County Line	34.0046	-117.1228
STC3-2	San Timoteo Creek Reach 1A	San Timoteo Creek at Anderson	34.0614	-117.2626
MCH3-3	SAR Reach 5	Mission Creek Channel at Santa Ana River	34.0743	-117.2711
ZCC3-4	Zanja Creek	Zanja Creek at Interstate 10 Freeway	34.0595	-117.1704
SAR3-5	SAR Reach 5	SAR at Mountain View	34.0857	-117.2427

Table 3-12 Big Bear Lake TMDL Monitoring Sites

Site ID	Site Description	Latitude	Longitude
Watershed-Wide Nutrient Monitoring			
MWDC4	Rathbun Creek at Sandalwood Avenue	34.2531	-116.8874
MWDC5	West Summit Creek at Swan Drive	34.2487	-116.8938
MWDC8	Knickerbocker Creek at Highway 18	34.2440	-116.9105
In-Lake Monitoring			
MWDL1	BBL – Dam	34.2450	-116.9666
MWDL2	BBL – Gilner Point	34.2532	-116.9490
MWDL6	BBL – Mid Lake Middle	34.2520	-116.9218
MWDL9	BBL – Stanfield Middle	34.2572	-116.8989

Table 3-13 MSAR Bacterial Indicator TMDL Monitoring Sites

Site ID	Location	Latitude	Longitude
WW-C3	Prado Park Lake at Lake Outlet	33.9400	-117.6473
WW-C7	Chino Creek at Central Avenue	33.9737	-117.6884
WW-M6	Mill-Cucamonga Creek below Wetlands	33.9268	-117.6250
WW-S1	SAR Reach 3 at MWD Crossing	33.9681	-117.4479
WW-S3	SAR Reach 3 at Pedley Avenue	33.9552	-117.5328

3.4 Data Analysis Summary

The following subsections describe the water quality conditions based on the Core Monitoring and TMDL monitoring data. The attainment of TMDL numeric targets and Basin Plan WQOs is also discussed.

3.4.1 Core Monitoring Data Analysis

Core Monitoring data was evaluated to determine parameters exceeding water quality standards. The Core Monitoring data was compared to the WQOs for each of the receiving waters. A summary of the findings from the monitoring data evaluation are presented in **Attachment D**. The monitoring data were evaluated with TMDL numeric values, Basin Plan WQOs, and CTR standards for each receiving water when data was available. CTR standards for metals were calculated to correlate with the observed hardness values from each respective sampling event. The tables in **Attachment D** identify a ratio of the total number of exceedances to the total number of available analytical data values in instances where monitoring data exceeded WQOs. The data was also compared in five and ten year data sets in **Attachment D**. A majority of the data from Core Monitoring was collected within the last five years with the exception of Permanent Sites 2, 3, 8, and 11. These monitoring sites have the greatest amount of analytical data available.

The evaluation of the Core Monitoring data suggests a majority of exceedances occur during wet-weather monitoring. Core Monitoring Site 2, located within Cucamonga Creek, mainly exceeded indicator bacteria and copper. Site 3 in Cucamonga Channel, Site 8 at SAR Reach 3, and Site 11 at SAR Reach 4 had higher exceedances ratios for Chemical Oxygen Demand (COD) as well as indicator bacteria. Copper, silver, and zinc also have exceeded wet-weather WQOs throughout many of the sampling locations in the three rotating zones. In comparison to the Core Monitoring sites during the dry-weather monitoring, data shows exceedances of COD and indicator bacteria, which demonstrate consistent exceedances in either hydrologic condition. However, dry-weather monitoring at SAR Reach 3 showed exceedances of sodium. Due to a limited amount of dry-weather sampling events over a short period of time for the rotating sites, comprehensive data was not available to fully assess the dry-weather conditions of receiving waters within the three rotating zones.

Constituents that show a higher exceedance ratio (greater than 50 percent), excluding priority pollutants from the TMDL and CWA 303(d) List, may be considered priority pollutants in the future, as additional data is available to support that determination. Prioritized pollutants guide the implementation efforts in an attempt to meet TMDL numeric targets and improve water quality within the SBC SARW.

3.4.2 Big Bear Lake Nutrient TMDL

As previously discussed in **Section 3.1.2.1**, conditions for BBLN TMDL and the WLAs and LAs are established for dry hydrological conditions only, which are defined by the conditions observed from 1999-2003: average tributary inflow to BBL is less than 3,049 AF, average lake elevation ranges from 6,671 to 6,735 feet, and annual precipitation ranges from 0 to 23 inches.

Dry hydrologic conditions were not met from 2009-2016; therefore, the TMDL numeric targets do not apply. **Table 3-14** summarizes the average concentrations of chlorophyll *a* and total phosphorus based on the BBL TMDL Annual Reports (2015b). Chlorophyll *a* and total phosphorus numeric TMDL objectives in all other hydrologic conditions do not apply until 2020.

The growing season for chlorophyll *a* is from May 1 to October 31; therefore, data outside of this period were not used to calculate the lake-wide averages. Data for total phosphorus were averaged by taking the arithmetic mean of bottom zone and photic zone samples to get a station sampling date average (see **Figure 3-4** for BBL In-Lake Sampling Stations). Station sampling data averages were then averaged again to get the arithmetic mean over the sampling period.

Table 3-14 BBL In-Lake Chlorophyll *a* and Total Phosphorus Average Concentrations

Year	Chlorophyll *a* Growing Season Average[a] Concentration (µg/L)	Total Phosphorus Annual Average[b] (µg/L)
2009[c]	11.3	41.3
2010[c]	8.6	45.4
2011[c]	7.0	35.9
2012[c]	6.7	34.1
2013[c]	17.1	46.7
2014[c]	15.1	67.1
2015[c]	28.2	50.3
2016[c]	41.8	85.9

[a] Lake-wide average during growing season (May 1 to October 31) no greater than 14 µg/L to be attained no later than 2015 (dry hydrological conditions), 2020 (all other times).
[b] Lake-wide annual average no greater than 35 µg/L to be attained no later than 2015 (dry hydrological conditions), 2020 (all other times).
[c] Wet hydrologic condition, TMDL numeric targets do not apply to wet hydrologic conditions.

Although total phosphorus shows a slight increasing trend, efforts have been made to sequester phosphorus. The 2016 BBLN TMDL Annual Water Quality Report recognizes in mid-2015, the City of Big Bear Lake, SBC, and SBCFCD initiated a joint project with BBMWD to apply 1,553 tons (dry weight) of alum to BBL. The project team applied approximately 574,832 gallons of alum slurry to the lake. The project cost of $747,282 was shared between BBMWD, the Areawide Program Permittees, and the Resorts. It is estimated that this amount of alum sequestered approximately 14,100 pounds of phosphorus and rendered unavailable for plant uptake. Combined with the application conducted in 2004, these parties have sequestered over 31,000 pounds of phosphorus.

BBMWD has primary responsibility for implementing the aquatic weed control program and uses a combination of physical harvesting and USEPA-approved herbicides to reduce Eurasion Water Milfoil. In the year 2000, when SARWQCB staff first began working to develop the TMDL, Eurasion Water Milfoil infested more than one-third of the lake (1,000+ acres). By 2014, routine surveys detected this invasive aquatic plant in less than 100 acres, a 99 percent reduction (see **Figure 3-6**). BBL has been consistently meeting the 2020 TMDL target for eradication of Eurasion Water Milfoil since 2013 (Areawide Program, 2015b).

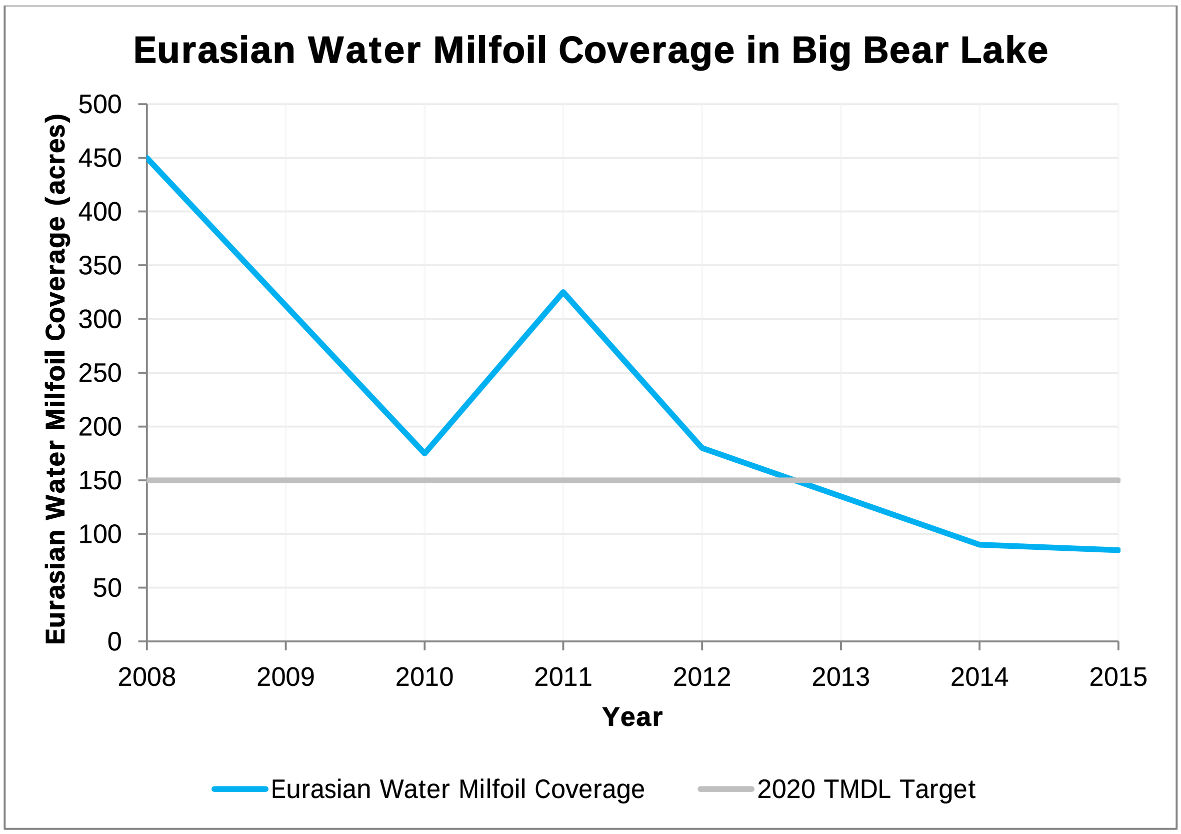


Figure 3-6 Eurasian Water Milfoil Coverage in Big Bear Lake

3.4.3 Middle Santa Ana River Bacterial Indicator TMDL/WLA Monitoring

Stakeholders established the MSAR TMDL Task Force to coordinate TMDL implementation activities designed to manage or eliminate sources of bacterial indicators to water bodies listed as impaired. The TMDL required the establishment of a watershed-wide compliance monitoring program to measure compliance with numeric targets established by the TMDL, which were derived from Basin Plan objectives established to protect the REC1 beneficial use. The MSAR TMDL Task Force implemented the Santa Ana River Watershed Bacteria Monitoring Program and prepared and submitted the MSAR Water Quality Monitoring Plan and associated Water Quality Assurance Project Plan (QAPP) to the SARWQCB. The TMDL monitoring program was implemented in July 2007, with SARWQCB formal approval in April 2008. Water bodies within the MSAR watershed portion of the SBC SARW and identified in the MSAR Bacterial Indicator TMDL are listed in **Section 3.1.2.2**.

Table 3-15 summarizes the *E. coli* geometric mean criterion exceedance frequency during the 2007-2015 dry seasons. Exceedances were determined based on the REC1 *E. coli* objective of log mean less than 126 organisms/100 milliliters for a 5-day/30-day geomean. The geomean data was prepared using available MSAR Bacterial Indicator TMDL Dry Season Reports and Wet Season Reports. Generally the lowest dry season exceedance frequencies were observed at Prado Park Lake, while Mill-Cucamonga Creek and Chino Creek exhibit the highest exceedance frequencies consistently.

Table 3-15 Frequency of *E. coli* Geomean Exceedances during Dry Seasons

Site	2007[1]	2008	2009	2010	2011	2012	2013	2014	2015
WW-C3 Prado Park Lake	64%	50%	0%	44%	0%	25%	38%	50%	0%
WW-C7 Chino Creek	100%	100%	88%	100%	100%	100%	100%	100%	100%
WW-M6 Mill-Cucamonga Creek	100%	100%	100%	100%	100%	100%	100%	100%	100%
WW-S1 SAR @ MWD Crossing	91%	58%	44%	75%	56%	94%	100%	100%	63%
WW-S3 SAR @ Pedley Avenue	82%	75%	44%	25%	50%	50%	75%	56%	81%

[1] Data retrieved from MSAR Bacterial Indicator TMDL 2010 Triennial Report.

Table 3-16 summarizes the frequency of exceedances based on the proposed *E. coli* objective during the 2007-2008 and 2015-2016 wet seasons. Wet season annual results were variable for Prado Park Lake, SAR at MWD Crossing, and SAR at Pedley Avenue, while the highest exceedance frequencies were consistently observed at Mill-Cucamonga Creek and Chino Creek.

Table 3-16 Frequency of *E. coli* Geomean Exceedances during Wet Seasons

Site	2007-2008[1]	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
WW-C3 Prado Park Lake	53%	70%	82%	73%	45%	9%	0%	45%	53%
WW-C7 Chino Creek	100%	100%	100%	100%	100%	82%	64%	82%	100%
WW-M6 Mill-Cucamonga Creek	100%	100%	91%	91%	100%	100%	100%	63%	100%
WW-S1 SAR @ MWD Crossing	73%	40%	100%	91%	0%	36%	45%	82%	73%
WW-S3 SAR @ Pedley Avenue	63%	40%	82%	100%	100%	36%	36%	27%	63%

[1] Data retrieved from MSAR Bacterial Indicator TMDL 2010 Triennial Report.

3.5 Water Quality Prioritization

Priority pollutants for the SBC SARW were determined based on the number of times a specific pollutant appears on the CWA Section 303(d) List within the SBC SARW, as outlined in **Table 3-17**. The priority pollutants include indicator bacteria, nutrients, and metals (zinc, copper, lead) as identified in **Table 3-18**. The priority pollutants identified in **Table 3-18** are similar to the pollutants identified with a higher percentage of exceedances based on the analyses described above. The TMDL pollutants have been identified as a top priority regardless of the number of times that specific pollutant appeared on the CWA 303(d) List, as a schedule has already been established to address these pollutants in specific water bodies. The number of water bodies impaired (as indicated in the table) was used to prioritize non-TMDL pollutants. Metal constituents were grouped together, which explains why the number of water bodies impaired varies within that prioritization group varies and is not sequential. The top priority pollutant (indicator bacteria) was incorporated into the Stormwater Management Objectives (**Section 1.5**), as further described below **Table 3-18**.

Table 3-17 2016 CWA 303(d) List of Impairments within SBC SARW Priorities

Water Body	Cadmium	Chlordane	COD	Copper	DDT	Lead	Mercury	Noxious / Nuisance Aquatic Plants	Nutrients	Indicator Bacteria	PCBs	pH	Sediment / Siltation	TSS	Zinc
BBL		X			X		X	X	X		X				
Chino Creek Reach 1A									X	X					
Chino Creek Reach 1B			X						X	X					
Chino Creek Reach 2										X		X			
Cucamonga Creek Reach 1	X			X		X				X					X
Cucamonga Creek Reach 2												X			
Grout Creek									X						
Knickerbocker Creek										X					
Mill Creek (Prado Area)									X	X				X	
Mill Creek Reach 1										X					
Mountain Home Creek										X					
Mountain Home Creek, East Fork										X					
Prado Park Lake									X	X					
Prado Flood Control Basin												X			
Rathbone (Rathbun) Creek	X			X					X				X		
San Antonio Creek												X			
San Timoteo Creek Reach 1A										X					
San Timoteo Creek Reach 2										X					
Santa Ana River Reach 3				X		X				X					
Santa Ana River Reach 4										X					
Santa Ana River Reach 6	X			X		X									
Summit Creek									X						
Warm Creek										X					
Total	**3**	**1**	**1**	**4**	**1**	**3**	**1**	**1**	**8**	**15**	**1**	**4**	**1**	**1**	**1**

Table 3-18 Prioritization of Pollutants within the SBC SARW

Priority Ranking	Pollutant Listed on CWA 303(d) List	TMDL	Total # Water Bodies Impaired
1	Indicator bacteria	X	15
2	Noxious (nuisance) aquatic plants	X	1
3	Nutrients	X	8
4 (Metals)	Cadmium		3
	Copper		4
	Lead		3
	Mercury		1
	Zinc		1
5	pH		4
Not Priority	Chlordane		1
	COD		
	DDT		
	PCBs		
	Sediment		
	TSS		

The priority ranking indicates that indicator bacteria is the highest priority of pollutants within the SBC SARW. Indicator bacteria was incorporated into the stormwater management objectives for the entire SBC SARW, as indicated in **Table 1-1**, because it is the highest priority pollutant within the SBC SARW. Indicator bacteria is also associated with the Santa Ana River Bacteria TMDL, which has a deadline for implementation. Using indicator bacteria as a stormwater management objective is a sensible choice for a watershed-wide priority because every possible project within the SBC SARW drains to a water body impaired by indicator bacteria (Chino Creek, Mill Creek – Cucamonga Creek, Prado Park Lake, or Santa Ana River Reach 3). Other pollutants were not included in the stormwater management objectives of SBC SARW because the impairments are of a lower priority or because their impacts are less widespread. However, projects that reduce the pollutant loading of indicator bacteria on impaired watersheds also reduce the pollutant loading of other lower-priority pollutants.

3.6 Contributors to Surface Water Impairments

Dry-weather runoff and stormwater have been characterized as a major source of pollution to the nation's waterways. Various activities within the SBC SARW are identified as potential pollutant sources contributing to water body impairments. This section discusses the priority pollutants impairing the water bodies within the SBC SARW, provides a summary of potential contributors of these pollutants in dry-weather and stormwater runoff, and summarizes the correlation between land use types and pollutant generation. Priority pollutants within the SBC SARW are presented in **Table 3-18**. Potential contributing sources for these priority pollutants include urban development, industrial activities, and agricultural lands, as further discussed below.

Indicator Bacteria/Pathogens

Sources of indicator bacteria within the SBC SARW may be associated with runoff from a mix of urban, agricultural, and open space areas. During dry-weather, receiving water bodies accept nuisance non-stormwater discharges from urban areas. Urban areas contribute to the growth of indicator bacteria within the receiving waters through the discharge of trash, pet waste, and/or sewage leaks. Agricultural areas contribute to indicator bacteria through livestock auction lots and confined feeding operations. Discharges from these agricultural land use areas may include stormwater runoff from manured areas, process wastewater from agricultural operations, and tailings from irrigation of agricultural lands. In the MSAR, the remaining agricultural area is formerly known as the Chino Dairy Preserve, which contains approximately 300,000 cows that can generate the waste equivalent of over two million people. During wet-weather conditions, agricultural land uses are likely to be a major contributor to indicator bacteria.

Nutrients and Noxious (Nuisance) Aquatic Plants

Sources of nutrients (nitrogen and phosphorus) include ubiquitous atmospheric deposition, animal waste, fertilizer use, and soil erosion generated by dairies and other agricultural land uses. Specific regions within the SBC SARW with increased nutrient loads as a result of these sources are the BBL, Cucamonga Channel (lower), Cypress Channel (lower), and San Antonio Channel (lower) Subwatersheds. These areas are also becoming urbanized with increased fertilizer use, yard and pet waste, and car washing activities. These activities also contribute to an increase in nutrient transport that enter the MS4 in dry- and wet-weather runoff and lead to eutrophication in water bodies. Nutrients deposited in the water body can be re-suspended in the water column and become available for biological uptake. Nutrients are also bound in living and dead organic material. Excessive nutrients associated with sedimentation in BBL has led to increased macrophyte (noxious aquatic plants) and algae production, which has adverse effects on aquatic habitat and recreation. Decomposition of the organic material consumes oxygen, resulting in depleted oxygen levels in the water column and can lead to periodic fish kills in BBL.

Metals

Metals loadings vary depending on the seasons; as noted in the Los Angeles Region Regional Water Quality Control Board's Los Angeles River Metals TMDL Basin Plan Amendment (2015), metal loadings during dry-weather are mostly dissolved and attributed to Publicly-Owned Treatment Works (POTWs) that discharge to receiving waters and the MS4 in the form of low-volume non-stormwater discharges from urbanized areas. During wet-weather, metals loadings come in the form of particulates and are normally transported into receiving waters through MS4 stormwater runoff (LARWQCB, 2015). As the tributary areas of Cucamonga Creek Reach 1 and the SAR become more urbanized, metallic loading into receiving bodies through stormwater runoff can be expected to increase. Additionally, metals loadings can occur through atmospheric deposition from paved and unpaved road dust, tire wear, construction dust, timber/brush fires, or other anthropogenic sources (LARWQCB, 2015). These metals are either directly deposited into the receiving water, or more likely, the atmospheric deposition of metals occurs over land surfaces which is later washed into receiving waters by dry-weather runoff and/or storm events. Increased urbanization, and the associated construction activities, can attribute to sediment and metal loading. Metals are known to bind themselves to sediments and may be disturbed from the receiving water's bottom, or the water body's highly erosive tributary area, and transported throughout the watershed during dry- and wet-weather events. Atmospheric deposition of metals and its adsorption to sediment can also be considered a likely source.

Mercury

The mercury impairment in BBL originates from atmospheric deposition, attributed to coal-fired power plants, steel recycling facilities, waste incinerators, cement and lime kilns, smelters and gold mine roasters, pulp and paper mills, and chloralkali factories, as identified in the Big Bear Lake Technical Support Document for Mercury TMDL (2008). It should be noted that this TMDL was never approved. Despite the distance of these facilities being 200 miles away, gaseous elemental mercury [Hg(0)] remains in the atmosphere and contributes to long range transport. Divalent mercury [Hg(II)] is highly soluble and has a tendency to attach to particles. Divalent mercury [Hg(II)] redeposits relatively close to the source, usually within 100 miles. The top five facilities that produce mercury fall under two types, cement manufacturing facilities (four facilities) and one oil refinery. In 2006, 40 percent of total reported mercury emissions in Southern California were attributable to a cement manufacturing company, located approximately 100 miles from the watershed. During wetter years, dissolved loading associated with storm event runoff is assumed to dominate mercury loading to BBL. During dry and normal precipitation years, dry deposition to the lake surface constitutes the majority of loading.

A direct geological source of mercury is also attributable to mineralized areas along fault lines. While BBL Watershed is located in the Transverse Range of the San Bernardino Mountains on the east side of the San Andres Fault, naturally elevated mercury levels have not yet been confirmed. However, potential sources of mercury have been associated with dredging of BBL and the sedimentation basins located at the mouth of associated tributaries. Dredging in BBL is assumed to stir up and distribute methylmercury buried within the sediment. Methylmercury is easily taken up by organisms and bioaccumulates at each trophic level. Fish in BBL have accumulated unacceptable tissue concentrations of mercury even though the ambient water quality standard is met. Other indirect geological sources can stem from historic gold mines in the southwest quadrant of San Bernardino County, and also from brief historical prospecting activities that occurred north and east of Bear Valley.

pH

Water bodies within the SBC SARW area with pH impacts include Chino Creek Reach 2, Cucamonga Creek Reach 1, San Antonio Creek, and the Prado Flood Control Basin. Water bodies impacted by pH are considered to have either low or high pH. The SBC SARW water bodies exceeded pH for both high and low pH, as indicated in **Attachment D**. The Basin Plan indicates water bodies are considered to have low pH when the pH is below 6.5. Source discharge that can contribute to low pH include mine wastes, historic mine sites, acid-generating rocks/soils, industrial plants and other sources of acidic gases, coal pile runoff, industrial effluents, landfill leachate, confined animal feeding operations, dairy runoff, instream oxidation or reduction processes, and recent draining of naturally inundated wetlands or floodplains (USEPA, 2016). A water body is considered to have a high pH, if pH exceeds 8.5 for prolonged periods of time or with high frequency. High pH is less common than low pH as anthropogenic sources are more often acidic than basic. High pH can be caused by discharges from industries that use lime, lye, or sodium hydroxide (NaOH); from agricultural runoff of fertilizers high in lime; and/or industrial landfill leachates that contain solvents or lye. In particular, cement, asphalt, and soap manufacturing may be sources of high pH due to the use of lime or lye. Runoff from limestone gravel roads may increase pH. High pH can be caused in rare cases by natural conditions and mineralogy such as weathering of chalk rock high in carbonates or olivine basalts; however, even in these cases, it is rare for stream pH to exceed 9.5. Leaching of naturally alkaline rocks and soils is exacerbated by physical disturbances such as tilling, mining, and construction. An additional cause of elevated pH is high photosynthetic activity, which removes carbon dioxide from water favoring equilibrium toward carbonate and a higher pH (USEPA, 2016).

3.6.1 Land Use Type and Potential Pollutants

Urban and stormwater runoff from pervious (lawns, landscaping, parks, construction sites, vacant fields, etc.) and impervious areas (streets, parking lots, storage yards, roofs, etc.) delivers accumulated constituents and pollutants (metals, bacteria, fertilizers, hydrocarbons, etc.) to the MS4 and receiving waters. Although admittedly broad-brushed and variable, past studies suggest that some land use types are greater sources of specific pollutants than others. Manufacturing and industrial facilities have often been reported to generate high concentrations of industrial pollutants, such as metals and oils, while commercial areas are often reported to produce trash or bacteria, and residential areas are associated with nutrients and bacteria. Correlations between land use and potential pollutant generation are presented in **Table 3-19**. This correlation may provide insight as to whether projects/programs proposed in the SWRP at future development stages will result in a pollutant load reduction that benefits a known impairment based on the land use types within the tributary area. The information presented in the table is based on various sources, mainly the California Stormwater Quality Association (CASQA) Stormwater Best Management Practice Handbook: New Development and Redevelopment (2003) and A User's Guide for Structural BMP Prioritization and Analysis Tool (SBPAT) Technical Appendices (2008).

Table 3-19 Correlations Between Land Use Type and Pollutant Generation

Land Use Types	General Pollutant Categories								
	Trash & Debris	Sediments	Nutrients	Oil & Grease	Organic Compounds	Pathogens	Heavy Metal	Oxygen Demanding Substances	Pesticides
Agriculture		X	X			X	X	P(1)	X
Commercial	X	P(1)	P(1)	X	P(2)	P(4)		P(5)	P(5)
Education	X	P(1)	P(1)	P(2)	P(2)	P(4)		P(1)	X
Industrial	X	P(1)	P(1)	X	P(2)	P(4)		P(5)	P(5)
Multi-Family Residential	X	X	X	P(2)		P		P(1)	X
Single Family Residential	X	X	X	X		X		X	X
Transportation	X	X	P(1)	X	X(3)		X	P(5)	
Vacant		X	X			P			

X = Anticipated; P = Potential

(1) A potential pollutant if landscaping exists onsite

(2) A potential pollutant if the project includes uncovered parking area

(3) Including petroleum hydrocarbons

(4) A potential pollutant if land use involves food or animal waste products

(5) Including solvents

3.7 Potential Strategies to Address Water Quality Priorities

This section presents a catalog of stormwater and dry-weather runoff capture project types most effective in addressing priority pollutants. Projects and programs that provide multiple benefits, specifically water quality, water supply, flood management, environmental, and community benefits, were identified and prioritized in **Section 6**. The list of project types included herein are intended to address water quality. Projects related to other benefit categories, such as water supply, flood management, environmental, and community, are not discussed below; however, those project types may be enhanced by including stormwater strategies summarized below to provide multiple benefits. The following project types are further detailed within this section:

- Surface infiltration basin
- Underground cistern
- Subsurface infiltration system
- Extended retention wetland
- Seasonal dry detention pond
- Constructed/subsurface flow wetland
- Low-flow diversion pump station
- Sand and media filter
- Membrane filtration
- Ion exchange
- Bioretention planter/rain garden
- Rain barrel
- Infiltration pit/drywell
- Infiltration trench
- Porous/pervious pavement
- Green roof
- Green street
- Connector pipe screen
- Automatic retractable screen
- Hydrodynamic separation device

Details provided below are based on new stormwater projects. Retrofit opportunities may also exist, which are not described in detail below.

Surface Infiltration Basin

Surface infiltration basins make an important contribution towards groundwater management. A key characteristic of these basins is placement over alluvial soils that allow rapid drawdown following a storm event. Careful planning, along with multiple infiltration tests, should be conducted to verify site specific infiltration capabilities. Surface infiltration basins require a larger footprint on the surface as compared to other BMPs. Maintenance of surface infiltration facilities typically requires removal of accumulated sediment and maintenance of vegetation.

Underground Cistern

For areas were infiltration is deemed infeasible, capture and use projects are most favorable, which can be supported using underground cisterns that temporarily store the runoff until needed for non-potable use such as for irrigation. These systems can take many forms such as below grade water tanks, medium sized modular precast concrete units, or very large precast bridge or arch structures. Modular units are installed over a water proof geotextile to retain the water within the cistern. Holding times are a concern with underground cisterns and vector control measures should be implemented if holding times are greater than 72 hours. Additionally, the Department of Public Health may have specific criteria for blended irrigation systems which should be reviewed during the preliminary design period. Well placed access points are necessary to perform the required maintenance, which includes sediment and debris removal using a vacuum truck. Underground storage systems may also be used to support diversion to the sanitary sewer or treatment facilities.

Subsurface Infiltration System

In areas where infiltration is favorable, a similar subsurface cistern design can be used, except the geotextile is omitted so that the runoff may infiltrate into the ground below the cistern and be naturally filtered before recharging the groundwater table. Multiple infiltration tests must be conducted to verify site specific infiltration capabilities, as this BMP requires adequate infiltration to allow the system to drain within 72 hours. Alternatively, vector controls may be implemented to avoid vector concerns. These systems can be implemented with little to no surface area available, which is often desirable when there is limited open space. Maintenance of subsurface infiltration facilities is comparable to the maintenance required for underground cisterns.

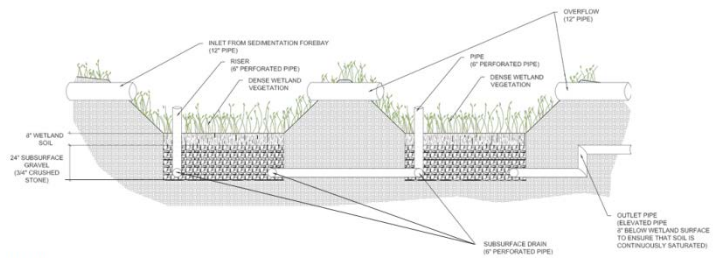
Extended Retention Wetland

Extended retention wetlands are favored where rainfall or runoff is present year round so that replenishment water is available to maintain the wetland and aquatic life. They must also discharge when large storm events or storm event series are encountered. Water depths in extended retention wetlands are greater than depths seen in subsurface flow wetlands; therefore, the area requirements are lessened and there is a significant risk of the water becoming stagnant and overgrown with algae mats. Depending on the anticipated rainfall depth, the volume required for retention could be excessively large, demanding a large wetland area. Maintenance typically requires vegetation management and sediment removal.

Seasonal Dry Detention Pond

Seasonal detention ponds are an effective method for detaining runoff so that it can be metered out through secondary treatment, such as a bioswale, sand filter, or media filter. They are also effective in avoiding damage associated with hydromodification or flooding due to limited downstream conveyance capacity. Maintenance for detention ponds consists of sediment removal and vegetation management.

Constructed/Subsurface Flow Wetland



Adapted from:
Subsurface Gravel Wetland
University of New Hampshire Stormwater Center. 2007 Annual Report.

Unless extensive land area and substrate is available, subsurface flow wetlands are generally reserved as a tertiary treatment or polish for the effluent from wastewater treatment facilities, but can be utilized in relatively small catchments where nutrients are a significant issue. The design is generally based on either a relatively dependable and consistent inflow or the ability to primarily function in detention rather than extended retention. They may also be practical for remediation of dry-weather and very low first flush runoff drainage systems, so long as higher flows may be diverted away. They are impractical where water depths of over a few feet would be present for more than 72 hours. Maintenance of subsurface wetlands is similar to that of constructed wetlands with additional activities related to maintaining media layers and subsurface piping.

Low-Flow Diversion Pump Station

Low-flow diversion pump stations are operationally straight forward, but connection to the sanitary sewer system can be problematic due to capacity issues, connection limitations, treatment costs, and unexpected prohibitions due to changes in the water quality. Low-flow diversion pump stations are effective at diverting dry-weather flows. Typically, they are constructed adjacent to manholes and are slightly deeper than the adjacent drainage channels such that low-flow runoff is diverted. It is possible to use the low-flow diversion in connection with a detention basin where larger flows can be held during a storm event and/or larger dry-weather events are slowly discharged to the sanitary sewers for treatment. Maintenance for low-flow diversion pump stations can be more expensive than non-mechanical BMPs, as pumps require more specialized maintenance.

Sand and Media Filter

Surface, or Austin sand filters, are at ground-level and typically earthen. They are easy to maintain, but have a large footprint. Perimeter, or Delaware, sand filters consist of two parallel trench chambers located in concrete vaults below an impervious surface, such as a parking lot. Media filters detain and treat stormwater via filtration and adsorption of pollutants to the filter media. Media filters containing both organic and mineral filtration materials generally have greater ion exchange capacity than sand filters, and therefore can more effectively remove soluble metals and other dissolved pollutants. This renders media filters particularly effective for roadways and highly industrial sites that contribute higher concentrations of metals to stormwater runoff, particularly zinc and copper. Maintenance of sand and media filters requires sediment and debris removal and replacement of the filters as necessary.

Membrane Filtration

Membrane filtration water treatment systems use semi-permeable membranes under high pressure to exude clean product water, leaving behind a brine with the pollutants. The higher pressure membrane types such as reverse osmosis or ultra filtration are highly effective at removing dissolved contaminants, while lower pressure systems filter bacteria and viruses. These systems usually require pretreatment as particulate matter can foul the ion selective membrane and reduce performance. Operation and maintenance costs associated with membrane filtration are high due to the large consumption of energy required for filtration.

Ion Exchange

Ion exchange is a polishing step that specifically targets polar dissolved constituents, such as sulfate. Pretreatment is required prior to ion exchange as suspended solids will clog the exchange columns. Ion exchange systems can be used to treat stormwater from pollution generating impervious surfaces at the end of pipe using a pump system. They are also commonly used to treat contaminated groundwater. Operation and maintenance costs associated with ion exchange are high due to the large consumption of energy required to run an exchange system.

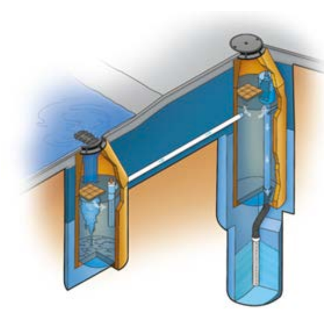
Bioretention Planter/Rain Garden

Bioretention is a promising solution that relies on inundation tolerant vegetation and native or engineered soils with high organic content, to capture, infiltrate, and transpire runoff, while retaining pollutants. If designed properly, especially where native soils are sufficiently permeable and without other constraints to infiltration, rain gardens and larger bioretention facilities can be aesthetic amenities in addition to being cost-effective and scalable stormwater retention sites that are easily integrated into highly urbanized retrofit projects. The planters must be flat and require maintenance such as weeding, trimming, and the replacement of dead plants. These BMPs can be used as infiltration BMPs if soil testing demonstrates suitable rates, otherwise, underdrains can be used and the BMP would be considered a biotreatment BMP.

Rain Barrel

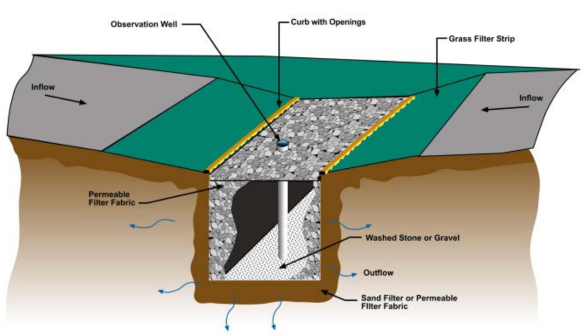
Rain barrels hold roof runoff, usually delivered by rain gutters and downspouts, and store the water for later use. Screen installations at the downspout inlets prevent sediment, leaves, debris, and mosquitoes from entering the rain barrel. Rain barrels are easily constructed for aesthetic purposes to compliment adjacent structures. Overall, maintenance requirements are minimal and include frequent visual inspections during the storm season and removal of accumulated sediment or debris. When effectively designed to capture and contain the runoff from a rooftop structure, a rain barrel can prevent runoff from small frequency storm events from ever leaving the property. This will reduce onsite water usage and the amount of pollutants that may potentially be carried offsite. This BMP can be implemented throughout residential areas.

Infiltration Pit/Drywell



Infiltration pits are typically constructed by digging pits sized to accommodate the runoff source and design storm, lined with geotextile filter fabric, and filled with gravel or aggregate. Infiltration testing will be required to verify infiltration is feasible. The retention volume can be increased using various open retention systems or large diameter plastic half pipes in addition to the aggregate. The surface can be open to accept incoming runoff. A drywell is operationally similar to an infiltration pit, but larger and more formally constructed. Pretreatment techniques are recommended to prevent clogging and maintain infiltration. A drywell can be bored, drilled, a driven shaft, or a dug hole that is deeper than its widest surface dimension, it may be classified as a Class V injection well and requires permitting through the USEPA. Maintenance typically includes removal of sediment and debris from the pretreatment system and monitoring and maintaining adequate infiltration.

Infiltration Trench



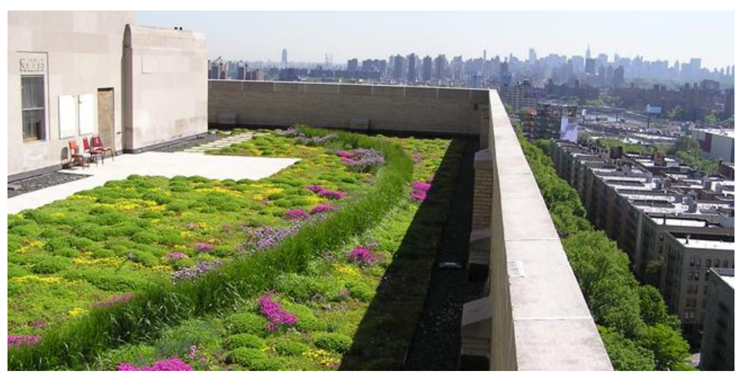
An infiltration trench is a shallow impoundment over permeable soil that holds and stores runoff until infiltration can occur, using the natural filtering ability of the soil, or other media such as gravel/sand, to filter out pollutants. Infiltration testing will need to be performed to verify infiltration is feasible. This BMP is effective at retaining sediment associated pollutants, but can become clogged, requiring removal of the upper media. Use of a vegetated swale, or other pretreatment methods, will extend the systems longevity and reduce maintenance costs.

Porous/Pervious Pavement

Porous/pervious pavement allows rainfall to drain into an aggregate bed or structural retention unit where it is stored until infiltration can occur. There are many pervious pavements including porous concrete, plastic grid systems, interlocking paving stones, brick, grass pavers, gravel pavers, and crushed stones. These materials allow for onsite infiltration that efficiently filters out pollutants. Infiltration rates of the native soil are a key element to the overall design and will need to be verified with infiltration testing. This type of BMP can be used to disconnect directly connected impervious areas such as rooftops and parking lots. Vegetated runoff should not drain onto the pervious pavement as it may clog the system and require more frequent maintenance. Permeable pavements may be used in many locations where conventional pavements are used, such as parking lots, driveways, and walkways. Areas with the potential for spills, such as gas stations, should be avoided. Using proper maintenance techniques, pervious pavement can remove a significant portion of pollutants in stormwater runoff and reduce pavement ponding. If infiltration is not supported within a site, underdrains may be used in combination with the pervious pavement section to support a treatment type BMP.

Green Roof

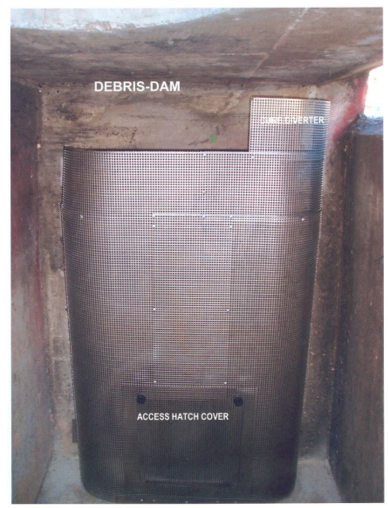
Green roofs are appropriate in some climates, but may be challenging to maintain or support in areas with a risk of brush fires and little annual rainfall. Intensive systems have large depths and cover much of the roof while extensive systems feature minimal plantings that require little maintenance. Green roofs enhance water quality, reduce runoff, and are visually appealing as a rest area above office buildings. The amount of stormwater that a green roof can contain is proportional to the area of coverage, types of plants, slope, and many other factors. Green roofs can be constructed during the building's construction phase or included as a retrofit. When retrofitting, it must be noted that the building needs to support the weight of the green roof under fully saturated conditions. A waterproof membrane should be laid over the building to protect it from structural damage and overflow should be addressed through a drainage layer. Green roofs also provide insulation, help reduce building temperatures during summer months, and counter the heat island effect.



Green Street

Green street design is strongly encouraged and can take many forms, such as an inverted street cross section with a vegetated low center median, vegetated curb extensions, parkways that trap and hold gutter flows, or planter boxes connected to the gutter and filled with highly porous soil and appropriate vegetation. Green streets are most successful in areas were sediment generation is limited or can be accommodated by pretreatment through a bioswale. Porous concrete may be used to construct gutters so that flows may infiltrate. Green streets may include a combination of the BMP types described in this section that can be placed within a street's right-of-way.

Connector Pipe Screen

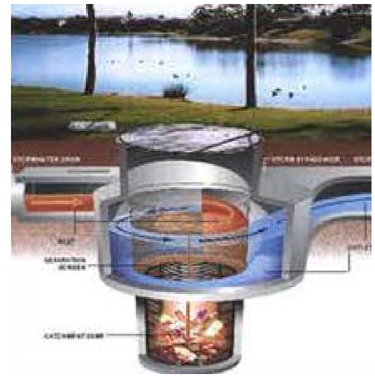


While several devices have been certified as meeting the definition of FCSs, one commonly installed device is a connector pipe screen. These screens are typically made from stainless steel mesh, with five millimeter openings, that stretch in front of the lateral or outlet from a catch basin and are secured to the walls and floor of the catch basin, with an opening above the screen that is greater in area than the outlet. During most events, runoff will flow through the screen leaving the trash upstream of, or on, the screen. During high intensity storms or if the mesh becomes occluded, runoff can flow over the screen and drain from the catch basin to prevent flooding. Approximately 75-90 percent or more of catch basins can be retrofitted with this device. While regular maintenance to remove debris trapped on and on the upstream side of the screen is required, the intensity of maintenance is correlated with the amount of trash and debris collected. Implementation is relatively straight forward. In locations where the trash load results in excessive maintenance costs, or to provide additional efforts to reduce trash, many jurisdictions also install automatic retracting screens, as further detailed below.

Automatic Retractable Screen

An automatic retractable screen extends across the opening or "mouth" of a catch basin and traps trash and debris at street level where street sweepers or hand crews may remove the trash before it can enter into the catch basin or drain. The screens will open or retract to allow larger flows and trash to enter the catch basin and be trapped on the connector pipe screen to avoid flooding and reduce maintenance costs. Areas that generate sufficient trash and debris to warrant the use of an automatic retractable screen in combination with a connector pipe screen are usually also subject to enhanced street sweeping on a weekly or even more frequent basis.

Hydrodynamic Separation Device



Hydrodynamic separation devices such as a Continuous Deflection Separator (CDS) unit can be used to remove trash from runoff and serve as a pretreatment device for many of the BMPs previously discussed. A CDS unit effectively screens, separates, and traps debris, sediment, oil, and grease from stormwater and urban runoff. As flows travel through the system, a very fine screen deflects the pollutants, which are captured in a litter sump in the center of the system. The water velocities within the swirl chamber continually shear debris off the screen to keep it clean. CDS units are ineffective in removing soluble pollutants and smaller, less-settleable solids. It is recommended that the CDS unit be inspected at least once every thirty days after the wet season. Floatables should be removed and the sump cleaned out. It is also recommended that the CDS be pumped out and the screen inspected for damage at least once per year.

4. Organizations, Coordination, and Collaboration

Many different types of local agencies can directly benefit from projects that address stormwater. These beneficiaries have the potential to be partners and/or collaborators. This section discusses the organizations that the SBCFCD coordinated and collaborated with and/or will need to coordinate with during SWRP implementation. This section also describes what came out/will come out of that coordination and collaboration.

4.1 Local IRWMP

The OWOW 2.0 Plan was prepared by SAWPA and is the current SARW IRWMP. SAWPA spans three counties in Southern California and seeks to provide a collaborative planning process that addresses various aspects of water resources in the SARW. The plan includes an approach for identifying and prioritizing multi-benefit projects and programs, presents innovative solutions, and addresses other water resource related issues.

SAWPA has a planned OWOW Plan update scheduled for 2018. The SBCFCD has been in coordination with SAWPA in an effort to maintain consistency between the OWOW Plan and this SWRP. The geographic focus of the SBC SARW SWRP is limited to the uppermost reaches of the SAR and its tributaries in SBC. The SBC SARW SWRP will be submitted to SAWPA for incorporation into the OWOW Plan, as required based on the SWRP Guidelines (SWRCB, 2015).

4.2 SWRP Consistency with other Plans and Programs

Various plans and programs relevant to this SWRP have been prepared by SBC, local agencies, groups of agencies, and regulatory entities. These documents were reviewed as part of the SWRP development in an effort to maintain consistency and identify opportunities for partnerships and aligning programs. An Annotated List of Data and Reports Technical Memorandum was prepared summarizing the following planning and reference documents and is included in **Attachment A**.

- Integrated Water Management Plans
  - SAWPA's OWOW 2.0 Plan (2014)
  - IEUA's Integrated Water Resources Plan (2016c)
  - SBVMWD's Upper SAR Watershed IRWMP (2015)
  - WMWD's Updated Integrated Regional Water Management Plan (2008)
- Water Quality and Monitoring Plans
  - Basin Plan (SARWQCB, 2005)
  - BBL Watershed-Wide Nutrient Monitoring Plan (SBCFCD, 2012)
  - Comprehensive Bacteria Reduction Plan (CBRP) (SBCFCD, 2011)
  - Hydromodification Management and Monitoring Plan (SBC Areawide Program, 2013a)
  - Integrated Watershed Monitoring Program (SBC Areawide Program, 2011)
  - SARW Bacteria Monitoring Plan (SAWPA, 2016)

- San Bernardino County Stormwater Planning
  - SBC Watershed Action Plan (SBC Areawide Program, 2013c)
  - Technical Guidance Document for Water Quality Management Plans (SBC Areawide Program, 2013b)
  - Municipal Stormwater Management Plan (SBC Areawide Program, 2015a)
- Urban Water Management Plans (UWMPs)
  - IEUA and Water Facilities Authority's 2010 UWMP (2010)
  - SBVMWD's San Bernardino Valley Regional UWMP (2016)
- Other Planning Documents
  - Chino Basin SWRP Functional Equivalency Document (IEUA, 2016a)
  - Chino Basin Watermaster and IEUA's Recharge Master Plan Update (2013)
  - San Bernardino County Department of Public Works (SBCDPW) Master Plans of Drainage
  - SBCDPW's Comprehensive Storm Drain Plans

4.3 Contribution from Local, State, and Federal Agencies

Local, state, and federal agencies, along with NGOs, were consulted during the development of the SBC SARW SWRP. The section below and **Section 8** identify different audiences (agencies and organizations) that were reached out to during the SWRP development, either as part of the Technical Advisory Committee (TAC) and/or stakeholder outreach events. These audiences included elected and appointed officials, municipal and county staff, watershed groups, local water agencies, and NGOs. Multiple events were held during the course of the planning process to gain input from local agencies and NGOs. These events are described further in **Sections 4.4**, **4.5**, and **4.6**.

Section 6 demonstrates that many project partnerships identified in the SWRP involved the SBCFCD and local water agencies. In most cases, agreements are in place between the SBCFCD and the local water agencies, which will allow projects to be more easily implemented, as new agreements are not required. In instances where new agreements are required, the responsible and partnering parties will negotiate terms and develop agreements prior to project/program implementation. New governance structures are not anticipated.

It is not anticipated that local, state, and/or federal regulatory agencies will be required to make decisions during the SWRP implementation phases, except in reference to various permitting requirements that may be applicable, some of which are discussed in **Section 1.3**. Existing monitoring efforts have been approved by local regulatory agencies and will not be altered based on SWRP implementation.

4.4 Technical Advisory Committee

Local agencies and NGOs were invited to form the TAC to support the development of the SBC SARW SWRP. Expert advice and technical support was solicited from the TAC throughout SWRP development. The SWRCB, SARWQCB, and other interested parties were invited based on proximity to the SBC SARW, involvement in similar efforts (watershed planning, multi-benefit projects, etc.), and existing relationships/partnerships. TAC member attendees include the Chino Basin Water Conservation District (CBWCD), IEUA, SARWQCB, SAWPA, SBCDPW, SBCFCD, SBVMWD, and WMWD. **Table 4-1** summarizes the roles and responsibility of each agency, including those agencies/organizations which were invited, but did not participate in the TAC.

Table 4-1 TAC Roles and Responsibilities

Agency	Status	Role/Responsibility
Bureau of Reclamation	Unable to Participate	Not applicable
CBWCD	Active	Guidance on water accounting and project selection
IEUA	Active	Guidance on water supply, wastewater, recycled water, and joint use project selection
Riverside County Flood Control and Water Conservation District	Invited, No Response	Not applicable
SARWQCB	Active	Guidance on permit requirements and project selection
SAWPA	Active	Guidance on regional water and project selection
San Bernardino County Department of Public Works, NPDES	Active	TAC lead
SBCFCD, Flood Planning	Active	Guidance on flood control and project selection
SBVMWD	Active	Guidance on water supply, groundwater recharge, and project selection
WMWD	Pending	Guidance on groundwater recharge in service area and project selection

A kickoff meeting was conducted on April 12, 2017, followed by three additional meetings, all of which were hosted by the SBCFCD at the SBCDPW building. The kickoff meeting was convened to develop the SWRP water management goals and objectives, formalize roles and responsibilities, and develop scheduling for future meetings. Each TAC member holds the responsibility to represent their agency and provide information related to their agency, as it relates to the SWRP. TAC members were asked to identify documentation, references, and data that would be beneficial in supporting the development of the SWRP. At each meeting, TAC members provided input at major milestones of the SWRP, including project identification, project prioritization, and the draft SWRP. **Table 4-2** summarizes the TAC meeting schedule and purpose, which includes the kickoff meeting and three additional meetings.

Table 4-2 TAC Meeting Schedule and Purpose

TAC Meeting	Schedule	Purpose
Kickoff Meeting	April 12, 2017	➢ Present background/overview of SBC SARW SWRP ➢ Define roles and responsibilities ➢ Discuss water management goals and objectives ➢ Outline TAC involvement and schedule
Meeting #2 (Quantifiable Benefits and Projects)	July 6, 2017	➢ Examine quantifiable benefit goals and targets to be included in the SWRP ➢ Review multi-benefit projects identified in other planning documents that may be included in the SBC SARW SWRP ➢ Identify data needed for projects to quantify benefits

TAC Meeting	Schedule	Purpose
Meeting #3 (Projects)	September 28, 2017	➢ Present/discuss results associated with benefit quantification for example projects ➢ Collaborate on project concepts ➢ Evaluate opportunities to enhance projects to provide additional benefits
Meeting #4 (Draft SWRP)	April 25, 2018	➢ Walk through the Draft SBC SARW SWRP ➢ Discuss structure and key sections ➢ Solicit feedback, comments, questions, and suggestions

4.5 Public Engagement

It is important that the public is aware of the efforts made by the SBCFCD to development the SWRP and are in support of the development and implementation. Their involvement provides meaningful input and ideas that will contribute to the proposed implementation. A Stakeholder and Public Outreach, Education, and Engagement Plan (SPOEEP) was prepared in the early stages of the SWRP development to identify the approach to involve and engage the public. A copy of the SPOEEP is included in **Attachment E**.

Public participation was provided for during the SWRP development in accordance with the SPOEEP. Community participation was most directly accomplished through the public outreach event, which was held following the SWRP Draft development on July 24, 2018. **Section 8.3** discusses the public outreach event in more detail. Additionally, community participation was accomplished through printed materials, development of a SWRP webpage, and through promotion on social media. The SBCFCD solicited public involvement through invitations on social media and distributed print materials for public feedback and review.

4.6 Stakeholder Engagement

The SBCFCD sought opportunities to partner with local stakeholders in the development of this SWRP, project identification/prioritization, and future implementation. Stakeholders participated in the TAC and also attended stakeholder outreach events. Similar to the public engagement discussed above, the stakeholder outreach events were performed in accordance with the SPOEEP included in **Attachment E**. The SBCFCD utilized stakeholder events to solicit technical information and identify projects that include partnerships with the SBCFCD. Potential participants were invited to the stakeholder events held on August 30 and 31, 2017. Educational materials were provided during the stakeholder presentation and comments cards were available for attendees to leave feedback. Additional information is included in **Section 8.2**.

5. Quantitative Methods

The stormwater management objectives for the SBC SARW will be met through various multi-benefit projects located within the SBC SARW. This section presents the approach taken to develop quantitative methodologies for integrated identification, prioritization, and analysis of multi-benefit projects and programs. An overview is provided, which summarizes the applicable Water Code requirements, which provides a context. Existing hydrologic/hydraulic models, water quality models, and other GIS and spreadsheet-based decision support tools and modeling suitable to conduct the metric-based benefit analysis and prioritization of projects was evaluated with respect to the SWRP development. An approach to conduct the metric-based analysis was established based on the evaluation of existing models/tools.

5.1 Overview

California Water Code Section 10562 describes the minimum requirements for development of a SWRP. An outline of how stormwater projects are included, analyzed, and prioritized within the SWRP is included within the minimum requirements. Water Code Section 10562.(b)(2) states that a SWRP shall "identify and prioritize stormwater and dry-weather runoff capture projects for implementation in a quantitative manner, using a metrics-based and integrated evaluation and analysis of multiple benefits to maximize water supply, water quality, flood management, environmental, and other community benefits within the watershed." Water Code Section 10562.(e) states that "a stormwater resource plan shall use measurable factors to identify, quantify, and prioritize potential stormwater and dry-weather runoff capture projects." **Figure 5-1** illustrates the steps necessary to identify, quantify, and prioritize projects. The following subsections further describe the actions taken as part of the SBC SARW SWRP development to address the Water Code specifications.

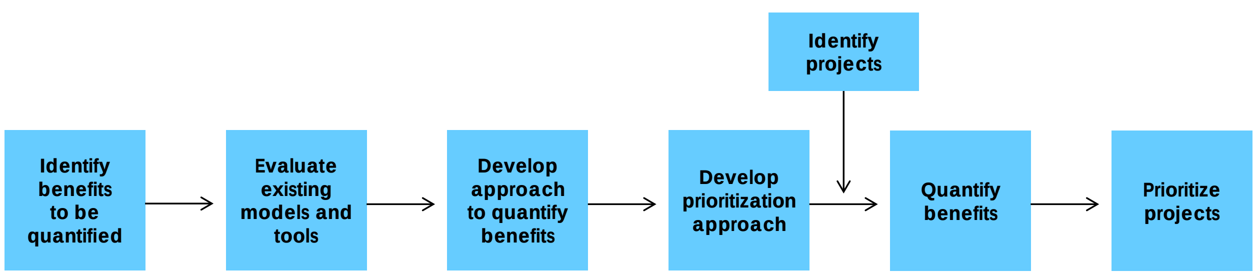


Figure 5-1 Project Identification, Quantification, and Prioritization

5.1.1 Identify

The first step mentioned in the quote above pertaining to Water Code Section 10562.(e) is to identify stormwater projects. A request for projects was made to public entities within the SBC SARW area through the TAC and stakeholder outreach events. Projects received were screened and removed if they did not fit the goals and objectives of the SBC SARW SWRP. Projects were submitted by the local stakeholders listed below:

- SBCFCD
- San Bernardino County Regional Parks Department (SBC Parks)
- CBWCD
- IEUA
- San Bernardino Valley Water Conservation District (SBVWCD)
- SBVMWD
- WMWD
- City of Big Bear Lake
- City of Chino Hills
- City of Montclair
- City of Redlands

5.1.2 Quantify

The second step mentioned in Water Code Section 10562.(e) is to quantify stormwater project benefits. The identification of benefits to be quantified and the methodologies by which benefits were estimated is the focus of this section (**Section 5**). The benefits for quantification fall into the five overarching benefit categories referenced in Water Code Section 10562.(b)(2) and listed in Table 3 of the SWRP Guidelines:

- Water quality
- Water supply
- Flood management
- Environmental
- Community

Table 3 in the SWRP Guidelines (SWRCB, 2015) goes on to give examples of appropriate metrics for each benefit category. Some of the examples given would be difficult to apply to the SBC SARW SWRP. One reason for this is that certain benefit examples are not "measurable," which is a requirement of the Water Code. Another reason is that some of the benefits apply to watersheds in other parts of the state where permanent base flow is a characteristic of the watershed. However, the guidelines also state that "other metrics and methodologies for integrated evaluation and analysis of multiple benefits may be considered, as appropriate."

Table 5-1 identifies the benefits to be quantified as part of the SBC SARW SWRP based on the SWRP Guidelines and local conditions. **Section 5.3** details the approach to quantify the benefits identified in the table below. Each project identified for inclusion will provide benefits from at least two benefit categories (water quality, water supply, flood management, environmental, and community), consistent with SWRP Guidelines Section VI.D.2.

Table 5-1 Multiple Benefits Quantified

Benefit Category	Multiple Benefits Quantified
Water Quality	Pollutant load reduction
	Stormwater runoff reduction
Water Supply	Stormwater recharge
	Recycled water recharge
Flood Management	Runoff rate reduction
	Runoff volume reduction
	Flood elevation reduction
	Removal of parcels/structures from the 100-year floodplain
	Property value saved
Environmental	Wetlands enhancement/creation
	Riparian area enhancement
	Streambed restoration
	Increased urban green space
Community	Provide employment opportunities
	Increase public education
	Increase community involvement
	Walking paths, sidewalks, and bike trails enhancement/creation
	Public use areas enhancement/creation

5.1.3 Prioritize

The third step mentioned in Water Code Section 10562.(e) is to prioritize stormwater projects. Once benefits were quantified, projects were prioritized based on an integrated metrics-based analysis of quantitative and practical factors. The quantitative factors are listed in **Table 5-1**. The practical factors broadly fit into the categories of cost and project readiness. Additional details on the prioritization elements are included in **Section 5.4**. The integrated metrics-based analysis of quantitative and practical factors on a project-specific basis is included in **Section 6**.

5.2 Review of Existing Models and Tools

Existing models and tools were evaluated for use in quantifying benefits. This evaluation includes an analysis of hydrologic/hydraulic models, water quality models, and other GIS and spreadsheet-based decision support tools and modeling suitable to conduct the metrics-based benefit analysis and prioritization of projects. This subsection focuses on the suitability of various models and decision support tools to quantify benefits. Existing models and tools that can be used to quantify the benefits from **Table 5-1** were reviewed and incorporated into the approach as applicable, which is defined further in **Section 5.3**.

5.2.1 Hydrologic/Hydraulic Models

Hydrologic and hydraulic models are used to quantify volumes and rates of water for quantifying water supply and flood control benefits. Hydrologic models identify the volume and timing of stormwater runoff based on watershed properties and geographic location, while hydraulic models generally focus on localized characteristics of water surface height, width, flow velocity, and energy. Hydrologic models found capable of producing output used to quantify benefits include:

- Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) from USACE
- Watershed Modeling System (WMS) from Aquaveo
- Hydrological Simulation Program – Fortran (HSPF) from USGS
- Wasteload Allocation Model (WLAM) from Wildermuth Environmental, Inc. (WEI)

Computer programs exist that also assist with the calculation of simple hydrologic estimates such as the Rational Method and the unit hydrograph method, which are described in the San Bernardino County Hydrology Manual. CivilDesign Corporation and Advanced Engineering Software (AES) developed software that computes information conforming to the methodology detailed in the San Bernardino County Hydrology Manual. Hydraulic models found capable of producing output used to quantify flood control benefits include:

- Hydrologic Engineering Center – River Analysis System (HEC-RAS) from USACE
- Water Surface Pressure Gradient (WSPG) from the Los Angeles County Flood Control District

5.2.2 Water Quality Models

Water quality models are used to quantify project performance in an effort to establish water quality benefits for projects included in the SWRP. Some water quality models are public domain software and could be used to assess pollutant loading. These models require significant base data for calibration, which is typically not available over extremely large areas like the SBC SARW. Water quality models found capable of producing output used to quantify water quality benefits include:

- Stormwater Management Model (SWMM) from USEPA
- SBPAT from Geosyntec Consultants
- System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN) from USEPA

5.2.3 GIS-Based Decision Support Tools and Models

GIS is a critical component in quantifying benefits that are used to prioritize projects within the SWRP. Decision support tools using GIS have been included in watershed plans throughout the state. In local watershed planning studies, GIS-based tools/models were used to assemble spatial information such as soil type, land use, ground slope, impervious areas, parcels of land, and bodies of water. Points were assigned to each parcel of land that corresponded with prioritization criteria, and parcels were ranked based on the number of points each parcel received, with high scores indicating sites where stormwater projects would be most beneficial or easiest to implement.

With regard to the SBC SARW SWRP, projects have already been identified by stakeholders, and the type of application identified above would not be applicable. However, GIS is critical to the development of input data for hydrologic, hydraulic, and water quality models.

5.2.4 Spreadsheet-Based Decision Support Tools and Models

Spreadsheet-based decision support tools are critical during all phases of the SWRP. Spreadsheets are a necessary component to almost every type of hydrologic, hydraulic, and water quality model discussed in the previous sections. In particular, long-term simulation of watershed hydrology using rain gage data can be calculated with spreadsheets programmed with hydrologic equations. Many other analyses necessary for GIS-based calculations also require spreadsheets.

Spreadsheet-based decision support tools are most helpful during the prioritization phase of project benefit quantification. There are many watershed planning document examples where spreadsheet-based decision support tools were used to prioritize projects given an array of benefits. Some of these tools are readily available through the developers and/or local agencies, while project specific tools are typically developed by the user and tailored to the specific project goals.

5.3 Approach to Quantify Benefits

The benefits used in the SWRP are described in the subsections below. They are arranged according to the five benefit categories listed in Water Code Section 10562.(b)(2), which are also listed in Table 3 of the SWRP Guidelines (SWRCB, 2015). Included in each benefit description is a section on how the benefit achieves the stormwater management goals and objectives, types of projects that can attain the benefit, approach to quantifying the benefit, and metric used to evaluate the benefit.

In some instances, project sponsors had completed studies/analyses that quantified the benefits being considered in the SWRP. For projects where benefits had already been quantified, no further analysis was necessary as a part of the SBC SARW SWRP. This is an appropriate approach to avoid duplicative and unnecessary analysis costs and results. Though in most cases these types of benefits calculations predate the determination of the approach to quantify benefits, the calculations are still valid for the SBC SARW SWRP because they incorporate the physical structure and location of the projects. This approach also avoids having conflicting benefit quantifications. It is understood this may result in a non-uniform comparison. Project sponsors were given the opportunity to review the information included in the SWRP prior to finalization and there were no protests regarding this approach. The approaches outlined below were used for projects where benefits had not already been quantified by the responsible agency.

Projects included in the SWRP are at different stages of planning/design, ranging from ideas to full design plans. Assumptions were made to perform the analyses necessary to quantify benefits when projects lacked certain details necessary to quantify benefits. The benefits quantified as a part of the SBC SARW SWRP are preliminary and refinement will be necessary as the project designs progress.

Benefits described in this section are tangible, measurable, and quantifiable. Additionally, projects included in the SWRP also provide additional intangible, non-measurable benefits that fall under these benefit categories. These intangible benefits are not highlighted in this section.

5.3.1 Water Quality

Water quality benefit goals include opportunities to control stormwater pollution through infiltration and/or treatment processes. **Section 3** describes the water quality priorities within the SBC SARW area. Projects that address the priorities identified provide the greatest benefit to the watershed. Water quality benefits achieved by projects included in the SWRP include pollutant load reduction and stormwater runoff reduction. The tables below summarize the approach to quantify each water quality benefit for the projects identified in the SWRP. Assumptions were made when input data was not readily available. Each of the tables also identifies the project types that would provide the specific benefit.

Table 5-2 Approach to Quantify Pollutant Load Reductions

<table>
<tr><th colspan="2">Goal:</th></tr>
<tr><td colspan="2">Reduce the pollutant load from the contributing drainage area to achieve water quality objectives in downstream receiving waters, focusing on the water quality priorities identified in Section 3.</td></tr>
<tr><th colspan="2">Applicable Models and Tools:</th></tr>
<tr><td colspan="2">Custom spreadsheet-based decision support tools with ArcGIS
Soil Conservation Service (SCS) Runoff Curve Number method
Runoff volume estimation methodology from San Bernardino County Hydrology Manual
Data analysis from San Bernardino Areawide Stormwater Monitoring Program
Stormwater BMP Database effectiveness calculations</td></tr>
<tr><th>Input</th><th>Output</th></tr>
<tr><td>➢ Drainage area
➢ Land use/land cover
➢ Rain depth/patterns (rain gage data)
➢ Infiltration rates
➢ Existing water quality</td><td>➢ Volume of runoff
➢ Pollutant load reduction</td></tr>
<tr><th colspan="2">Metric:</th></tr>
<tr><td colspan="2">Removal of ______ E. coli per year</td></tr>
<tr><th colspan="2">Potential Project Types:</th></tr>
<tr><td colspan="2">Projects involving infiltration (basins and/or soft-bottom channels) or treatment BMPs (bioswales)</td></tr>
</table>

Table 5-3 Approach to Quantify Stormwater Runoff Reductions

Goal:	
Reduce volume of stormwater runoff from the project tributary area to downstream receiving waters to improve water quality by reducing the discharge of polluted runoff.	
Applicable Models and Tools:	
Custom spreadsheet-based decision support tools with ArcGIS SCS Runoff Curve Number method Runoff volume estimation methodology from San Bernardino County Hydrology Manual	
Input	**Output**
➢ Drainage area ➢ Land use/land cover ➢ Rain depth/patterns (rain gage data) ➢ Infiltration rates	➢ Volume of runoff captured/infiltrated
Metric:	
_____ acre-feet of runoff reduced per year (AFY)	
Potential Project Types:	
Projects involving basin outlet controls and/or infiltration (includes basins, soft-bottom channels, and/or treatment BMPs that support infiltration [bioswales])	

5.3.2 Water Supply

Water supply benefit goals include opportunities to augment local water sources by storing water in groundwater basins. Water supply benefits quantified as part of the SBC SARW SWRP include groundwater recharge and recycled water recharge. A table for each water supply benefit is included below summarizing how benefits were quantified and which types of projects achieve the specific benefit. Assumptions were made for input variables when information was not readily available.

Table 5-4 Approach to Quantify Stormwater Recharge

Goal:	
Increase the amount of stormwater runoff captured and infiltrated into groundwater basins.	
Applicable Models and Tools:	
Custom spreadsheet-based decision support tools with ArcGIS SCS Runoff Curve Number method Runoff volume estimation methodology from San Bernardino County Hydrology Manual	
Input	**Output**
➢ Drainage area ➢ Land use/land cover ➢ Rain depth/patterns (rain gage data) ➢ Infiltration rates	➢ Volume of runoff infiltrated
Metric:	
_____ acre-feet of stormwater runoff recharged per year (AFY)	
Potential Project Types:	
Projects involving infiltrating at a rate or volume above the existing condition (includes basins, soft-bottom channels, and/or treatment BMPs that support infiltration [bioswales])	

Table 5-5 Approach to Quantify Recycled Water Recharge

Goal:	
Increase the amount of recycled water captured and infiltrated into groundwater basins.	
Applicable Models and Tools:	
Benefit is quantified when analysis available by others, typically the project sponsor	
Input	**Output**
➢ Results from existing hydrologic studies	➢ Volume of recycled water infiltrated
Metric:	
_____ acre-feet of recycled water recharged per year (AFY)	
Potential Project Types:	
Projects able to capture recycled water and involving infiltration at a rate or volume above the existing condition (includes basins, soft-bottom channels, and/or treatment BMPs that support infiltration [bioswales])	

5.3.3 Flood Management

Flood management benefit goals include opportunities to decrease flood risk and minimize property losses. Flood management benefits quantified as part of the SWRP include runoff rate reduction, runoff volume reduction, flood elevation reduction, removal of parcels/structures from the 100-year floodplain, and property value saved. Tables are included below summarizing the approach to quantify each flood management benefit. Example project types that achieve the benefit are included in the table. Assumptions were made when input information was not readily available.

Table 5-6 Approach to Quantify Runoff Rate Reductions

Goal:	
Reduce the peak runoff rate for the 100-year storm event, such that flooding is reduced.	
Applicable Models and Tools:	
Custom spreadsheet-based decision support tools with ArcGIS SCS Runoff Curve Number method Synthetic unit hydrograph estimation methodology from San Bernardino County Hydrology Manual Stage-storage, stage-discharge, and culvert analysis from Hydraflow Express Flow routing and timing using HEC-HMS	
Input	**Output**
➢ Drainage area ➢ Land use/land cover ➢ As-built plans ➢ Infiltration rates ➢ 100-year storm event rainfall	➢ Peak flow rate reduction due to diversion or infiltration improvements ➢ Peak flow rate reduction due to basin outlet reconfiguration
Metric:	
Runoff rate reduction of _____ cubic feet per second (cfs) during the 100-year storm event	
Potential Project Types:	
Projects that detain stormwater and/or enhance infiltration (includes basins and soft-bottom channels)	

Table 5-7 Approach to Quantify Runoff Volume Reductions

Goal:	
Reduce the volume of floodwaters reaching downstream conveyances, such that additional capacity is available downstream and flooding is reduced.	
Applicable Models and Tools:	
Custom spreadsheet-based decision support tools with ArcGIS SCS Runoff Curve Number method Runoff volume estimation methodology from San Bernardino County Hydrology Manual	
Input	**Output**
➢ Drainage area ➢ Land use/land cover ➢ Rain depth/patterns (rain gage data) ➢ Infiltration rates	➢ Volume of runoff diverted from downstream conveyances
Metric:	
Runoff reduction of _____ acre-feet per year (AFY)	
Potential Project Types:	
Project designed to detain stormwater, including infiltration (includes basins, soft-bottom channels, and/or treatment BMPs that support infiltration [bioswales])	

Table 5-8 Approach to Quantify Flood Elevation Reductions

Goal:	
Reduce flood elevation (water surface elevation) of the 100-year flood in conveyances downstream, which reduces the risk to property damage or loss caused by flooding.	
Applicable Models and Tools:	
Hydraulic analysis using HEC-RAS SCS Runoff Curve Number method Synthetic unit hydrograph estimation methodology from San Bernardino County Hydrology Manual Stage-storage, stage-discharge, and culvert analysis from Hydraflow Express Flow routing and timing using HEC-HMS	
Input	**Output**
➢ Drainage area ➢ Land use/land cover ➢ As-built and proposed channel plans ➢ 100-year storm event rainfall	➢ Water surface elevation profile
Metric:	
Water surface elevation reduction of _____ feet during the 100-year storm event	
Potential Project Types:	
Projects where channels are enlarged to convey additional flow or provide a runoff peak rate reduction through detention of flood flows (include channel widening/improvement and infiltration basin projects where infiltration is enhanced by manipulating the geometry of outflow structures)	

Table 5-9 Approach to Quantify Removal of Parcels/Structures from the Floodplain

Goal:	
Remove parcels/structures from the 100-year floodplain, decreasing the risk of losing property or human life due to flooding.	
Applicable Models and Tools:	
Custom spreadsheet-based decision support tools with ArcGIS Hydraulic analysis using HEC-RAS	
Input	**Output**
➢ Flood maps from FEMA ➢ San Bernardino County parcel maps ➢ HEC-RAS flood elevation analysis	➢ List of parcels removed from flood hazard area
Metric:	
Removal of _____ parcels/structures from the 100-year floodplain (measured in units of parcels or structures, depending on what makes the most sense for each geographic location)	
Potential Project Types:	
See project types identified under the flood elevation reduction benefit (**Table 5-8**)	

Table 5-10 Approach to Quantify Property Value Saved

Goal:	
Decrease property losses due to flooding.	
Applicable Models and Tools:	
List of parcels removed from flood hazard area San Bernardino County assessor data Home price estimates from Zillow.com	
Input	**Output**
➢ Parcels and structures removed from flood hazard areas	➢ Total value of parcels and structures removed from flood hazard areas
Metric:	
$_____ saved (in 2017 dollars) during one 100-year flood event	
Potential Project Types:	
See project types identified under the flood elevation reduction benefit (**Table 5-8**)	

5.3.4 Environmental

Environmental benefit goals include opportunities to enhance habitat and open space through the implementation of stormwater projects. Environmental benefits being quantified in the SWRP include wetlands enhancement/creation, riparian area enhancement, streambed restoration, and increased urban green space. A table is included below for each benefit. The tables summarize the approach used to quantify the benefit and the types of projects the benefit is applicable to. Assumptions were made when quantifying benefits if the input data was not readily available.

Table 5-11 Approach to Quantify Wetlands Enhancement/Creation

Goal:	
Enhance/create wetlands to protect and improve habitat for species dependent on aquatic habitats for survival. Wetlands enhancement/creation replaces wetland habitat lost due to the process of urbanization.	
Applicable Models and Tools:	
ArcGIS	
Input	**Output**
➢ Conceptual plans ➢ Construction plans	➢ Areas where wetlands will be enhanced/created
Metric:	
_____ acres of wetlands enhanced/created	
Potential Project Types:	
Projects involving wetland enhancement/creation	

Table 5-12 Approach to Quantify Riparian Area Enhancement

Goal:	
Riparian area enhancement helps protect and improve riparian habitat, which is important to protecting biodiversity, maintaining/improving water quality, and protecting channel slopes, among other benefits.	
Applicable Models and Tools:	
ArcGIS	
Input	**Output**
➢ Conceptual plans ➢ Construction plans	➢ Areas where riparian area is created/enhanced
Metric:	
_____ acres of riparian area enhanced	
Potential Project Types:	
Enhancing riparian areas in highly urbanized/semi-arid areas is difficult given the ecological stresses imposed by development and drought. Achieving biodiversity in an artificially-created riparian zone is possible and can be managed through careful design of channel-side bioswales. In non-urbanized areas, riparian areas can be enhanced by creating channel conveyances that mimic natural conditions.	

Table 5-13 Approach to Quantify Streambed Restoration

Goal:	
Restore or enhance natural streambeds for the protection of fish and wildlife habitat. Streambed restoration can also stimulate the natural scour and sedimentation processes essential to creating coarse sandy loam habitat for the endangered San Bernardino kangaroo rat.	
Applicable Models and Tools:	
ArcGIS	
Input	**Output**
➢ Conceptual plans ➢ Construction plans	➢ Areas where streambeds will be constructed to mimic natural conditions
Metric:	
_____ feet of streambed restored, improved, or enhanced	
Potential Project Types:	
Channel enhancement projects located in natural sections of receiving waters (commonly in the eastern portion of the SBC SARW area)	

Table 5-14 Approach to Quantify Increased Urban Green Space

Goal:	
Increase urban green space by providing trees, shrubs, and grasses that can filter pollution from air, water, and soils. Urban green space also provides community benefits of increased access to spaces for recreation, exercise, communing with nature, neighborhood cohesion, and intangible social benefits associated with lower crime rates and improved property values.	
Applicable Models and Tools:	
ArcGIS	
Input	**Output**
➢ Conceptual plans ➢ Construction plans	➢ Areas where urban green space will be created or enhanced
Metric:	
_____ acres of urban green space added	
Potential Project Types:	
Projects that involve public use, where landscaping and tree-planting are essential components of the project (includes trail projects adjoining channels and projects with biological treatment of stormwater, where plants constitute a necessary water quality component)	

5.3.5 Community

Community benefit goals include opportunities to improve community health, safety, recreation, and sense of cohesiveness, particularly within disadvantaged communities. Community benefits being quantified in the SWRP include providing employment opportunities; increasing public education; increasing community involvement; walking paths, sidewalks, and bike trails enhancement/creation; and public use areas enhancement/creation. The approach used to quantify each community benefit is summarized in the tables below, which also identify project types that would achieve the specific benefit. Assumptions were made during the analysis when input data was not readily available.

Table 5-15 Approach to Quantify Provided Employment Opportunities

Goal:	
Increase the number of jobs for members of the community.	
Applicable Models and Tools:	
Estimates of job creation rates due to government infrastructure spending from the American Recovery and Reinvestment Act (Executive Office of the President – Council of Economic Advisors, 2009)	
Input	**Output**
➢ Project cost estimates	➢ Jobs created, in job-years (one job for a year)
Metric:	
_____ employment opportunities provided	
Potential Project Types:	
All projects, as short-term employment is provided to implement the project and long-term employment may be introduced based on continued operation and maintenance of the facilities.	

Table 5-16 Approach to Quantify Increased Public Education

Goal:	
Increase public education associated with stormwater quality and multi-benefit project implementation, such that the public's understanding of water quality protection results in water quality improvements.	
Applicable Models and Tools:	
Not applicable	
Input	**Output**
➢ Concept plans ➢ Construction plans ➢ Project-specific implementation plans	➢ Number of interpretive signs installed as part of the project
Metric:	
_____ interpretive signs installed as part of the project	
Potential Project Types:	
Projects that involve educational signage, which are typical for projects that are in public right-of-way or include public use benefits, such as trails along channels.	

Table 5-17 Approach to Quantify Increased Community Involvement

Goal:	
Enhance public participation in the design/implementation phase of a project. Project buy-in can occur when designers have taken the time to involve the community, which yields long-term community cohesion benefits.	
Applicable Models and Tools:	
Not applicable	
Input	**Output**
➢ Project-specific implementation plans	➢ Number of community meetings planned
Metric:	
_____ community meetings planned	
Potential Project Types:	
Projects that involve community meetings during the design and implementation phases, which is typical of larger projects that include public use benefits, such as along a trail/park.	

Table 5-18 Approach to Quantify Path, Sidewalk, and Bike Trail Enhancement/Creation

Goal:	
Enhance/create walking paths, sidewalks, and bike trails, which provide community benefits by increasing connectivity, supporting multi-modal transportation, and encouraging a healthy community.	
Applicable Models and Tools:	
ArcGIS	
Input	**Output**
➢ Concept plans ➢ Construction plans	➢ Linear feet of walking paths/trails, sidewalks, and/or bike trails enhanced or created
Metric:	
_____ feet of walking paths, sidewalks, and/or bike trails enhanced/created	
Potential Project Types:	
Projects that involve walking paths, sidewalks, and/or bike trails, which are most likely along channel improvement projects.	

Table 5-19 Approach to Quantify Public Use Area Enhancements/Creation

Goal:	
Provide space for communities to gather and recreate, especially within disadvantaged communities, which have been neglected historically in terms of the development of public spaces. Enhancing/creating certain types of public use areas may result in health and social benefits.	
Applicable Models and Tools:	
ArcGIS	
Input	**Output**
➢ Concept plans ➢ Construction plans	➢ Acreage of public use areas created or enhanced
Metric:	
_____ acres of public use area enhanced/created	
Potential Project Types:	
Projects that involve publically accessed parks, trails, and open spaces, which may be included in projects inclusive of trails along channel improvements.	

5.4 Prioritizing Projects based on Multiple Benefits

Section D.1 of the SWRP Guidelines (2015) provides guidance for prioritizing stormwater and dry-weather runoff capture projects within a watershed. The guidance indicates that the prioritization of individual projects and programs for implementation should be based on an integration of quantitative factors and elements. The elements are listed in the following order (Section D.1.a through Section D.1.f).

a. Projects/programs supported by entities that have created permanent, local, or regional funding

b. Projects or programs that use a metrics-driven approach and an appropriately detailed geospatial analysis of multiple benefits to maximize water supply, water quality, flood management, environmental, and community benefits within the watershed

c. Projects located on lands with public ownership

d. Projects that augment local water supplies

e. Projects and programs that preserve, restore, or enhance watershed processes that yield a broad suite of water quality benefits and support beneficial uses

f. Projects and programs that create or restore habitat, open space, parks, recreation, or green open space in disadvantaged communities with a high deficit of tree canopy, parks, and open space

The prioritization for the SBC SARW SWRP is based on an integrated metrics-based analysis of these factors. The interpretation and quantification of these factors is discussed further in **Section 5.4.1**, including the assignment of numeric codes based on these prioritization elements. The methodology for combining the codes into a prioritization matrix is discussed further in **Section 5.4.2**.

5.4.1 Prioritization Elements

A discussion of each prioritization factor and element proposed for the SBC SARW SWRP based on these guidelines is included in the following subsections. Each element will convert into a numeric code to evaluate the project's conformance with each element. The codes will be developed such that low numbers indicate the more preferred values.

The prioritization of projects in the SBC SARW SWRP is based on a strict hierarchal prioritization discussed in the sections below. That is, the prioritization methodology favors projects that perform well on the first categories over projects that perform well over later categories. This approach aligns with the order of prioritization factors listed in Section D.1 of the SWRP Guidelines (2015). More information about each prioritization factor is included in the subsections below.

5.4.1.1 Project Readiness

Section D.1.a of the SWRP Guidelines (2015) indicates that the SWRCB places a high priority on projects or programs that are already supported by a public agency that is responsible for funding both capital improvements and operations and maintenance. The best way to indicate whether or not a given project is already supported by a public agency is if that public agency has signed off on detailed concept plans or construction plans developed to any level of completeness. The existence of plan drawings and/or concepts indicates a level of intent from a public agency that they are willing to commit time and resources to the project. Also, projects that have plans are more ready for construction than projects that are currently just ideas or rough concepts.

Accordingly, the first prioritization factor in the SBC SARW SWRP will be a Project Readiness factor that indicates whether or not a public agency has signed off on concept plans or construction plans. If the public agency has approved plans for the project, the project will be deemed approved or ready. If no plans exist for the project, the project will be deemed not approved or ready. **Table 5-20** summarizes the prioritization code for this factor.

Table 5-20 Project Readiness Code Definition

Code Value	Project Readiness
1	Approved or ready
2	Not approved or ready

5.4.1.2 Cost Estimate

Another quantitative proxy for a project's readiness is the existence of a cost estimate prepared by an engineer. The existence of a cost estimate indicates that a public agency has examined the project from an engineer's perspective to estimate the time and materials needed to complete the project, even if the cost estimate is preliminary. The second prioritization factor in the SBC SARW SWRP will be a Cost Estimate factor that indicates whether or not a cost estimate exists for the project. **Table 5-21** indicates the prioritization code for this factor.

Table 5-21 Cost Estimate Code Definition

Code Value	Cost Estimate
1	Cost estimate has been prepared
2	Cost estimate has not been prepared

5.4.1.3 Quantification

Section D.1.b. of the SWRP Guidelines (2015) states that "[p]rojects or programs that use a metrics-driven approach and an appropriately detailed geospatial analysis of multiple benefits to maximize water supply, water quality, flood management, environmental, and community benefits within the watershed" should be prioritized in an SWRP. Therefore, projects where an analysis has been performed quantifying these benefits should be prioritized in the SBC SARW SWRP over projects where the benefits have simply been assumed to exist. Benefit quantification is also an indication of project readiness; only when an element of a project is defined and described can the element's effect on public water quality and supply be evaluated to any level of certainty.

The third prioritization factor in the SBC SARW SWRP will be a Quantification factor that indicates whether or not a metrics-based analysis of a project's multiple benefits has been performed. **Table 5-22** reveals the prioritization code for this factor.

Table 5-22 Quantification Code Definition

Code Value	Quantification
1	Benefits have been quantified
2	Benefits have not been quantified

5.4.1.4 Benefit Categories

The intention of the Water Code requirements is to encourage stormwater and dry-weather runoff projects that provide multiple public water quality and supply benefits, according to the SWRP Guidelines (SWRCB, 2015). The SWRP Guidelines go on to explain that each project or program included in an SWRP should address at least two or more main benefits and as many feasible additional benefits as possible. This guidance indicates that the SWRCB considers the number of benefit categories as an important factor with which to prioritize projects in the SWRP.

The fourth prioritization factor in the SBC SARW SWRP will be a Benefit Categories factor that describes the number of benefit categories that a project will provide. The five benefit categories, as described in Water Code Section 10562.(b)(2), which are also listed in Table 3 of the SWRP Guidelines and described in **Section 5.3**, are water supply, water quality, flood management, environmental, and community benefits. **Table 5-23** describes the prioritization code for this factor.

Table 5-23 Benefit Categories Code Definition

Code Value	Benefit Categories
1	Project provides benefits across five (5) categories
2	Project provides benefits across four (4) categories
3	Project provides benefits across three (3) categories
4	Project provides benefits across two (2) categories
5	Project provides benefits in one (1) category

5.4.1.5 Water Supply Cost

Section D.1.d of the SWRP Guidelines (SWRCB, 2015) indicates that a SWRP should prioritize projects that augment local water supplies such as projects that use captured stormwater and dry-weather runoff to recharge groundwater. Project readiness elements and multiple benefits are a greater priority than this element based on the prioritization elements listed in the SWRP Guidelines. For this reason, the Water Supply Cost prioritization element will be placed in the SBC SARW SWRP after these elements of project prioritization.

The SBC SARW SWRP contains a mix of both large and small projects. Large projects tend to capture large quantities of stormwater, but at a higher project cost than small projects. If projects were prioritized only by the quantity of stormwater supplied, large costly projects would always be placed ahead of small projects regardless of the cost effectiveness of the project. This is a potential waste of public money. Therefore, in the SBC SARW SWRP, prioritization for water supply benefits provided will be normalized according to the cost of water supplied per acre-foot per year. The breakdown of the range of water supply costs is described in **Table 5-24**.

Table 5-24 Water Supply Cost Code Definition

Code Value	Water Supply Cost per Acre-Foot per Year
1	Less than $5,000
2	Between $5,000 and $10,000
3	Between $10,000 and $50,000
4	Between $50,000 and $100,000
5	Between $100,000 and $200,000
6	Between $200,000 and $500,000
7	Between $500,000 and $1,000,000
8	Greater than $1,000,000
9	Project provides no benefit to groundwater recharge/benefits are unquantified

5.4.1.6 Water Quality Cost

Section D.1.e of the SWRP Guidelines (SWRCB, 2015) states that "[p]rojects and programs that preserve, restore, or enhance watershed processes that yield a broad suite of water quality benefits and support beneficial uses" should be prioritized in an SWRP. This element is placed sixth on the list after the elements described above.

In the SBC SARW, the beneficial uses of the water bodies within the watershed are impacted primarily by the presence of indicator bacteria, which is further discussed in **Section 3**. Within the SBC SARW SWRP a water quality benefit will be assigned primarily on projects that reduce the quantity of *E. coli* bacteria.

Similar to the Water Supply Cost prioritization element described in **Section 5.4.1.5**, the Water Quality Cost prioritization element is structured in a way to level the playing field between large and small projects by comparing the project cost and bacteria removal. The most cost efficient projects will attain a lower code value, as described in **Table 5-25**.

Table 5-25 Water Quality Cost Code Definition

Code Value	Water Quality Cost per Billion *E. coli* Bacteria Removed per Year
1	Less than $50
2	Between $50 and $100
3	Between $100 and $500
4	Between $500 and $1,000
5	Between $1,000 and $2,000
6	Between $2,000 and $5,000
7	Between $5,000 and $10,000
8	Greater than $10,000
9	Project provides no water quality benefit/benefits are unquantified

5.4.2 Ranking Methodology

The projects are included in a prioritization matrix and assigned prioritization codes based on the elements described in **Section 5.4.1**. The one-digit codes in the six prioritization elements will be combined into a six-digit ranking code for each project, assembled from the prioritization elements in the order listed in **Section 5.4.1**. This order is related to the order of prioritization elements listed in Section D.1 of the SWRP Guidelines (SWRCB, 2015).

The projects will then be ordered from first to last, with the lowest numeric value of ranking code being listed first and higher numeric value of ranking code being listed last. The completed prioritization matrix is further discussed in **Section 6.3**.

6. Project Identification and Prioritization

Multi-benefit stormwater management projects located throughout the SBC SARW will help achieve the stormwater management objectives for the watershed. The projects propose enhancement of existing stormwater infrastructure and construction of new improvements to capture stormwater and dry-weather runoff and achieve multiple benefits. This section describes the process used to identify projects, results of the benefit analysis utilizing the approach described in **Section 5.3**, project prioritization in accordance to the approach included in **Section 5.4**. This section also includes an assessment of the stormwater management objectives, as originally defined in **Section 1.5**.

6.1 Project Identification

A project must be included in a SWRP to receive grant funding from the State of California, according to state law. California Water Code Section 10563 (c)(1) states that "the development of a stormwater resource plan … shall be required to receive grants for stormwater and dry-weather runoff capture projects from a bond act approved by the voters after January 1, 2014."

As mentioned above, the SBCFCD received input from the following agencies for inclusion in the SWRP in response to project solicitation through the TAC and stakeholder outreach events:

- SBCFCD
- SBC Parks
- CBWCD
- IEUA
- SBVWCD
- SBVMWD
- WMWD
- City of Big Bear Lake
- City of Chino Hills
- City of Montclair
- City of Redlands

Figure 6-1 illustrates the project locations and **Table 6-1** lists the projects approved for inclusion in this SWRP. The order listed in the page is not associated with the prioritization, which is further discussed in **Section 6.3**. The table identifies the lead/responsible agency for each project with a brief project description. Figures illustrating the project locations are included in **Attachment F**.

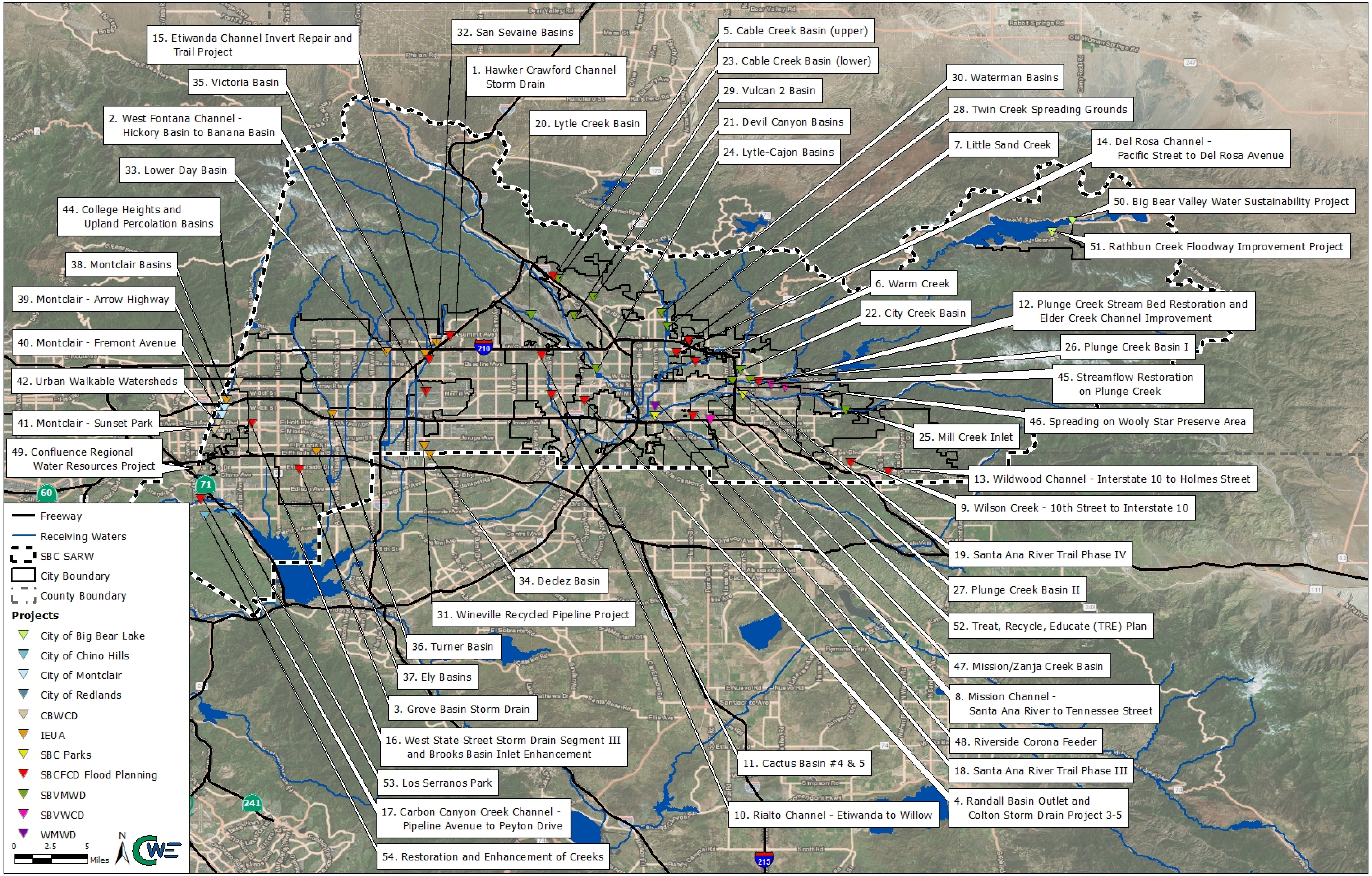


Figure 6-1 SWRP Projects

Table 6-1 SWRP Projects

Project Number	Project	Responsible Agency	Project Description
1	Hawker Crawford Channel Storm Drain	SBCFCD	An existing undersized trapezoidal channel cuts through a field and discharges into San Sevaine Basin No. 3, which has an infiltration rate of 0.5 feet per day. The proposed project will take flow into a box culvert sized to carry the 100-year flow rate and discharge into San Sevaine Basin No. 1, which has a higher infiltration rate (2.5 feet/day). The project will increase the stormwater and dry-weather runoff captured and infiltrated to the groundwater by 12 acre-feet per year.
2	West Fontana Channel - Hickory Basin to Banana Basin	SBCFCD	The existing undersized riprap-lined trapezoidal channel floods surrounding parcels during high return interval storm events. The proposed project will enlarge the channel to contain the 100-year storm event and add a bioswale to the north side that treats runoff from areas north of the channel.
3	Grove Basin Storm Drain	SBCFCD	Grove Basin has a gated outlet structure which is connected to a 66-inch Reinforced Concrete Pipe (RCP). This 66-inch RCP discharges onto Grove Avenue, causing street flooding, and the potentially polluted discharge eventually reaches Prado Park Lake. The proposed project will reroute the flows to a 108-inch RCP going eastward along Chino Avenue and discharge to Lower Cucamonga Spreading Grounds, allowing for additional groundwater infiltration.
4	Randall Basin Outlet and Colton Storm Drain Project 3-5	SBCFCD	Randall Basin is a flood control basin that can only discharge excess flows overland in an uncontrolled emergency spillway to Randall Avenue. The proposed project will allow Randall Basin to be managed as a recharge facility by including a control structure at the basin outlet and a new storm drain to the Santa Ana River.
5	Cable Creek Basin (Upper)	SBCFCD	Uncontrolled and unregulated flows from Cable Creek discharge to the Cajon Wash. The proposed project will create a new basin on Cable Creek upstream of Little League Drive in north San Bernardino. The basin will capture sediment and polluted runoff. The project will also provide a water supply benefit to the Bunker Hill groundwater basin through groundwater recharge.

Project Number	Project	Responsible Agency	Project Description
6.1	Warm Creek - Baseline Street to Sand Creek Confluence - Concept 1	SBCFCD	Warm Creek is an undersized earth-lined trapezoidal channel between Baseline Street and the improved confluence with Sand Creek. Warm Creek Concept 1 will increase the width of the channel, which will provide an increase in infiltration. The channel will be lined with riprap, and the velocity will be controlled by grouted riprap grade breaks. A trail is also proposed along a portion of the site, to be maintained by the Cities of San Bernardino and Highland.
6.2	Warm Creek - Del Rosa Confluence to Sand Creek Confluence - Concept 2	SBCFCD	Warm Creek Concept 2 will improve water quality by adding bioretention facilities on each side of the channel at locations where it is feasible to capture runoff from intersecting storm drains. Walls will separate the bioretention facilities from the flood control channel, and the channel will be deep enough to contain the entire 100-year flood flow. The project will incorporate a trail to be maintained by the Cities of San Bernardino and Highland.
7.1	Little Sand Creek - Concept 1	SBCFCD	Little Sand Creek is a channel with a riprap bottom and rail-and-wire revetment with sheet metal backing on the sides. Concept 1 will improve water quality and flood control with the incorporation of a bioretention facility to capture and treat stormwater flows entering from the north side of the channel. The bioretention facility will be separated from the improved flood control channel by a concrete wall.
7.2	Little Sand Creek - Concept 2	SBCFCD	Little Sand Creek Concept 2 will take advantage of publicly owned lands on the north side of the channel to improve water supply and water quality. A small basin will be constructed that will take diverted dry-weather runoff from Little Sand Creek for infiltration into the groundwater basin.
8	Mission Channel - Santa Ana River to Tennessee Street	SBCFCD	Mission Channel is an undersized earth and riprap trapezoidal channel that bisects a Disadvantaged Community (DAC) in eastern San Bernardino and western Redlands. The proposed project will benefit the community by adding a trail connecting the Santa Ana River Trail and the Orange Blossom Trail while upgrading the channel to be capable of carrying the 100-year storm event. The channel will continue to be an earthen channel, and the increased width will increase the volume of infiltration.

Project Number	Project	Responsible Agency	Project Description
9	Wilson Creek - 10th Street to Interstate 10	SBCFCD	Wilson Creek flows through west Yucaipa as a 60-foot wide channel with rail and wire revetment on the side slopes. The efficiency of infiltration from the earth-lined channel is less than optimal, as the channel is prone to scour and deposition, which alters the stream bed and constricts the spread of flows. The proposed project will improve infiltration efficiency, reduce scour, enhance the flood capacity, and improve the trail system along the channel.
10.1	Rialto Channel - Etiwanda to Willow - Concept 1	SBCFCD	Rialto Channel conveys urban stormwater and outflow from the Cactus Basins in an undersized earth and rock-lined trapezoidal channel. The proposed project concept will widen the channel to allow for more infiltration while deepening the channel to provide additional flood capacity. The project will also provide community benefits to a severely DAC within the City of Rialto through the creation of a multi-use trail to connect with the popular Pacific Electric Trail.
10.2	Rialto Channel - Etiwanda to Willow - Concept 2	SBCFCD	Rialto Channel Concept 2 will widen and deepen Rialto Channel to provide flood protection for surrounding residents and businesses. The concept will increase infiltration in the upper portion through Armorflex blocks, while the lower portion will convey flood flows through a concrete lined rectangular channel. The project will include a multi-use trail as mentioned above.
11	Cactus Basin #4 and 5	SBCFCD	Cactus Basin #4 and 5 will provide multiple beneficial uses for DACs in Rialto and the Inland Empire. The project will provide a large increase in the volume of stormwater captured to recharge groundwater. The project will enhance water quality by removing bacteria and other pollutants from downstream water bodies. The project will also protect thousands of structures from flooding.
12	Plunge Creek Stream Bed Restoration and Elder Creek Channel Improvement	SBCFCD	The Elder Creek/Plunge Creek confluence project, a continuation of SBVWCD's Plunge Creek restoration project, will rehabilitate the ecological function of the wash. The project will spread stormwater through braided channels to restore natural watershed processes, enhance groundwater recharge, and improve downstream water quality. The project will also improve Elder Gulch upstream of the confluence to reduce sedimentation and protect surrounding areas from flooding.

Project Number	Project	Responsible Agency	Project Description
13	Wildwood Channel - Interstate 10 to Holmes Street	SBCFCD	Wildwood Channel conveys flows in an undersized channel lined with sand and gravel. The proposed project will widen the channel to increase infiltration capacity and flood protection while providing grade breaks that will reduce velocities. The project will also enhance the existing multi-use trails in this DAC.
14.1	Del Rosa Channel - Pacific Street to Del Rosa Avenue - Concept 1	SBCFCD	Del Rosa Channel is an undersized rectangular channel with a riprap-lined bottom and rail-and-wire revetment on the sides. The limited amount of public right-of-way reduces the opportunities for additional enhancements. Concept 1 will widen the channel from 20 feet to 30 feet and deepen it to handle flood flows. The composition of the channel bottom will remain porous for infiltration. A new culvert will be required across Pacific Avenue.
14.2	Del Rosa Channel - Pacific Street to Del Rosa Avenue - Concept 2	SBCFCD	Del Rosa Channel Concept 2 will widen the channel without deepening it. The slopes will be protected with stair-stepped rock gabion walls, eliminating the need for permanent concrete structures within the channel right-of-way. Flooding will be reduced, but the channel will not be capable of carrying the 100-year flood. The existing culvert at Pacific Avenue will remain in place.
15	Etiwanda Channel Invert Repair and Trail Project	SBCFCD	Etiwanda Channel and San Sevaine Channel are two rectangular concrete channels laterally contiguous to one another separated by a channel wall. The channels are subject to scour issues. The proposed project will remove the wall between the channels, address the scouring issues, and provide a trail improvement benefiting the community as a part of the San Sevaine Trail Phase I Segment 2 in the City of Fontana.
16	West State Street Storm Drain Segment III and Brooks Basin Inlet Enhancement	SBCFCD	West State Street Storm Drain is an open channel that runs between West State Street and the Union Pacific Railroad in the Cities of Montclair and Ontario. The storm drain conveys runoff westward to San Antonio Creek Channel, but upstream of the confluence with San Antonio Creek Channel there is an inlet that diverts low flows into Brooks Basin. The project will enlarge the inlet and enhance the channel to provide flood protection and capture, convey, and divert more stormwater to Brooks Basin for infiltration (groundwater recharge).

Project Number	Project	Responsible Agency	Project Description
17	Carbon Canyon Creek Channel - Pipeline Avenue to Peyton Drive	SBCFCD	Carbon Canyon Creek Channel is a riprap-lined undersized trapezoidal channel between Pipeline Avenue and Peyton Drive. The proposed project will widen the channel, while maintaining a soft bottom. This design will increase flood protection and provide additional opportunity for stormwater flows to infiltrate and recharge groundwater.
18	Santa Ana River Trail Phase III	SBC Parks	Santa Ana River Trail Phase III will extend the popular public use trail from its current endpoint at Waterman Avenue in San Bernardino to California Street in Redlands. Stormwater improvements along the trail will be sized for the 100-year flood flow from future development conditions. The trail provides public use areas and green space for DACs.
19	Santa Ana River Trail Phase IV	SBC Parks	Santa Ana River Trail Phase IV will complete the trail to Garnet Street in Mentone. The project will include similar stormwater improvements as Phase III, provide public use areas, and enhance green space. The project will also feature interpretive signage as a public education component.
20	Lytle Creek Basin	SBVMWD	The proposed Lytle Creek Basin will be located in the City of Rialto east of Interstate 15, upstream of an existing CEMEX plant. The 60 acre site will capture unregulated flood flows from Lytle Creek and allow an estimated average of 4,023 acre-feet of stormwater per year to infiltrate and recharge the Bunker Hill groundwater subbasin.
21	Devil Canyon Basins	SBVMWD	The existing Devil Canyon Spreading Grounds diverts flow from Devil Creek during very high flow events. The proposed project would increase the capacity of the diversion through the construction of an inflatable armored dam across Devil Creek. Two new recharge cells will be constructed below the existing Basin No. 1, and the transfer structures between the existing basins will be improved. The improvements will allow an estimated average of 3,631 acre-feet of stormwater per year to infiltrate.

Project Number	Project	Responsible Agency	Project Description
22	City Creek Basin	SBVMWD	The series of nine proposed basins will be constructed along over a mile of City Creek on both sides of the 210 Freeway in the City of Highland. Infiltrated stormwater from the City Creek Basin project will recharge the Bunker Hill groundwater subbasin by an estimated average of 5,247 acre-feet per year. The basins will be connected at the downstream end to the proposed Plunge Basin II project, though the projects can be constructed independently of one another.
23	Cable Creek Basin (Lower)	SBVMWD	This Cable Creek Basin project will be located just downstream of the proposed SBCFCD Cable Creek Basin project (Project No. 5). Unlike the SBCFCD project, flow will be diverted into the lower Cable Creek Basin project from the main channel via an inflatable rubber dam. The Bunker Hill groundwater subbasin will be recharged by an estimated average of 2,978 acre-feet of stormwater per year as a result of this project.
24	Lytle-Cajon Basins	SBVMWD	The Lytle-Cajon Basins project will be located just upstream of the Lytle-Cajon Radial Gate and spillway. The proposed project will result in the construction of eight in-channel recharge basins. In total, the project will result in an estimated average of 3,408 acre-feet of additional infiltrated stormwater to recharge the Bunker Hill groundwater subbasin.
25	Mill Creek Inlet	SBVMWD	The Mill Creek Inlet project will improve the transfer of flow from Mill Creek into the existing series of percolation basins in the Mill Creek wash area. The capacity of the existing inlet will be increased from 110 cubic feet per second (cfs) to 210 cfs and involve the replacement of culverts underneath the existing flood control levee. The improvements will allow 196 acre-feet more stormwater to infiltrate per year.
26	Plunge Creek Basin I	SBVMWD	The Plunge Creek Basin I project will place a basin downstream of the SBVWCD and SBCFCD Plunge Creek Restoration Projects. The single cell basin will capture water using an inflatable rubber dam diversion across Plunge Creek, resulting in an increase in groundwater recharge of an estimated 2,481 acre-feet per year.

Project Number	Project	Responsible Agency	Project Description
27	Plunge Creek Basin II	SBVMWD	The Plunge Creek Basin II project will be located just upstream of the confluence of Plunge Creek and City Creek. The basin will receive flows from an inflatable dam placed across Plunge Creek. Groundwater recharge due to construction of the basin will be increased by approximately 1,050 acre-feet per year.
28	Twin Creek Spreading Grounds	SBVMWD	The existing Twin Creek Spreading Grounds are flow-through basins located within Twin Creek north of Lynwood Drive in the City of San Bernardino. Existing basins within the spreading grounds were originally built to attenuate flows, but over the years the basin walls have been eroded or purposely breached, allowing flows to pass through unobstructed. The proposed project will reconstruct and armor the basin walls, construct one new cell, and provide new transfer structures between the basin cells. These improvements will provide flood protection and groundwater infiltration benefits.
29	Vulcan 2 Basin	SBVMWD	The Vulcan 2 Basin project will improve groundwater recharge in a new basin located near the severely DAC of Muscoy. The project will divert flow from the Devil Creek Diversion Channel using an inflatable dam. The Vulcan 2 Basin will allow the diverted flow to infiltrate, recharging the Bunker Hill groundwater subbasin by an average of 3,441 acre-feet per year.
30	Waterman Basins	SBVMWD	The Waterman Basins project will improve the existing diversion structure at the Waterman Basins northeast of Waterman Avenue and 40th Street in the City of San Bernardino. The improvements will refurbish two existing radial gate systems and provide two new gates for a maximum diversion capacity of 1,000 cfs. Upon completion, Waterman Basins will put an estimated average of 1,675 more acre-feet of stormwater per year into the groundwater aquifer.

Project Number	Project	Responsible Agency	Project Description
31	Wineville Recycled Pipeline Project	IEUA	The Wineville Recycled Pipeline Project will make changes to three basins. The project will include upgrading Wineville Basin to be capable of infiltration by adding a gate to the outlet and improving the dam. Detained stormwater will be pumped to Jurupa Basin via a new pump and conveyance pipeline. Stormwater will then be pumped from Jurupa Basin through existing lines to the RP3 Basins, which will be enlarged and improved to accept more stormwater and recycled water. Combined, the upgrades will add over 6,500 acre-feet per year on average of stormwater and recycled water to the Chino groundwater subbasin.
32	San Sevaine Basins	IEUA	Recharge in the San Sevaine Basins will be increased by recycling water through a new pump and conveyance pipeline from San Sevaine Basin No. 5, which has a low infiltration rate, to San Sevaine Basin No. 3, which has a higher infiltration rate. A new berm will also be constructed within Basin No. 5. The improvements will facilitate additional groundwater recharge from both stormwater and recycled water.
33	Lower Day Basin	IEUA	The improvements proposed as part of the Lower Day Basin project include the construction of a secondary diversion structure within the channel to more efficiently divert flows into the basin. Within the basin, capacity will be increased by removing a mid-level outlet and reconstructing an embankment. These improvements will add an estimated average of 75 acre-feet of groundwater to the Chino groundwater subbasin per year.
34	Declez Basin	IEUA	Declez Basin will be improved by reconstructing the existing embankment and spillway at a higher elevation to increase storage. Additionally, a gate will be installed on an existing outlet, improving the ability of IEUA to manage the basin as a recharge facility. The improvements will recharge an average of 241 acre-feet of stormwater to the groundwater basin annually.

Project Number	Project	Responsible Agency	Project Description
35	Victoria Basin	IEUA	The Victoria Basin project will improve the recharge and flood control capabilities of the existing basin by abandoning the mid-level outlet that allows flows to discharge to the San Sevaine Channel. The basin's recharge capacity will be increased by blocking the outlet and extending the existing lysimeter stations, allowing the basin to hold a greater volume of water.
36	Turner Basin	IEUA	The existing spillway at Turner 2 Basin was built long before upstream development in the City of Rancho Cucamonga required larger stormwater basins at the confluence of Cucamonga Channel and Deer Creek Channel, and it is one of the last remaining pieces of the Turner Basin complex that has yet to be replaced. A new spillway at a higher elevation will allow IEUA to store additional stormwater volume within the basin complex, which will produce an additional annual recharge volume of 66 acre-feet.
37	Ely Basins	IEUA	The Ely Basins improvements include excavating 470,000 cubic yards of material from within the existing footprint of the basins. IEUA estimates that the increase in the capacity of the basins would yield an average of 221 acre-feet of additional stormwater recharge per year.
38	Montclair Basins	IEUA	The proposed project at Montclair Basin will add one drop inlet structure from Basin 1 to Basin 2, and one drop inlet structure from Basin 2 to Basin 3. The project will allow for better management of groundwater recharge and the efficiencies attained will yield an average of 248 acre-feet of additional recharge per year.
39	Montclair - Arrow Highway	City of Montclair	This project will reduce the current four lane major arterial street to a two lane road, allowing for a median that will capture runoff from the street, treat it, and infiltrate it back into the ground.
40	Montclair - Fremont Avenue	City of Montclair	This project will reduce the current four lane arterial street to a two lane road, allowing for a median that will capture runoff from the street, treat it, and infiltrate it back into the ground.
41	Montclair - Sunset Park	CBWCD / Montclair	This project will develop a walking and biking environmental trail that incorporates a water feature moving dry-weather runoff on Orchard Street from the north end of the park to the south end where it will infiltrate into the ground.

Project Number	Project	Responsible Agency	Project Description
42	Urban Walkable Watersheds	CBWCD	The Urban Walkable Watersheds project will feature a community walking trail that provides connectivity near water infrastructure projects while actively capturing and infiltrating runoff through green infrastructure demonstration projects. An emphasis will be placed on increasing public education and community involvement through educational programs involving nearby public schools.
43	Multipurpose Recharge Basins	CBWCD	The Multipurpose Recharge Basins project will re-conceptualize the role of groundwater recharge basins by integrating native plant restoration and passive recreation with educational signage on perimeters of existing basins. The project will increase areas for public education and recreation without impeding groundwater recharge in the basin.
44	College Heights and Upland Percolation Basins	CBWCD	The improvements proposed to the College Heights and Upland Percolation Basins will include water quality features to improve urban runoff, flood mitigation, streetscape, passive recreation, and education.
45	Streamflow Restoration on Plunge Creek	SBVWCD	The Streamflow Restoration on Plunge Creek will continue the enhancement of the SBVWCD Plunge Creek Conservation Project by an additional half mile. In addition to providing riparian habitat, the stream enhancements will improve flood management capacity during high flow events.
46	Spreading on Woolly Star Preserve Area	SBVWCD	The Spreading on Wooly Star Preserve Area project involves spreading Santa Ana River water within the preserve area during events of high flow through the installation of new gates and pipes. Stormwater infiltration will occur in historical remnant channels to better mimic pre-development processes, which will enhance riparian habitat.
47	Mission/Zanja Basin	SBVWCD	The Mission/Zanja Groundwater Recharge Basin project will place a groundwater recharge basin in vacant lands along the Mission Zanja, reducing stormwater runoff and increasing groundwater recharge. Seven possible locations have been identified with the smallest being 65,000 square feet with a recharge rate of 10 feet per day. Up to 15 acre-feet will recharge per day at a flow rate of 7.5 cfs.

Project Number	Project	Responsible Agency	Project Description
48	Riverside Corona Feeder	WMWD	The project will connect the California State Water Project feeder to Riverside. California State Water Project water will be used to recharge Riverside County basins.
49	Confluence Regional Water Resources Project	CBWCD	The project will construct a new groundwater recharge and storage reservoir at the confluence of Chino Creek and San Antonio Creek. Pumps will send excess stormwater to upstream CBWCD-managed basins to enhance recharge opportunities. An artificial habitat and bioremediation channel will be used as an educational and wetland habitat feature.
50	Big Bear Valley Water Sustainability Project	City of Big Bear Lake	Big Bear Valley wastewater currently is treated and sent outside of the SARW to irrigate crops in Lucerne Valley. The project will upgrade the Wastewater Treatment Plant (WWTP) and reuse tertiary-treated wastewater locally to recharge local groundwater, provide critical habitat for endangered species, and stabilize BBL water levels.
51	Rathbun Creek Floodway Improvement Project	City of Big Bear Lake	The project will increase the size of three culverts on Rathbun Creek to be able to convey the 100-year discharge without flooding nearby properties. The project will also enhance the natural streambed downstream of Big Bear Boulevard and riparian habitat. A multiuse trail will be constructed along the banks to extend Rathbun Trail all the way to Big Bear Lake.
52	Treat, Recycle, Educate (TRE) Plan	City of Redlands	The TRE Plan consists of several green street improvements combined with a new 0.8-acre stormwater basin near the existing Redlands WWTP. The area will include a new educational park featuring interpretive signage describing the LID BMPs that will be included in the park and on Nevada Street. The park's vegetation will be irrigated with recycled water from the WWTP.
53	Los Serranos Park	City of Chino Hills	The Los Serranos Park project will create a new community park in the City of Chino Hills. The design will include green infrastructure and habitat enhancement and protection.
54	Restoration and Enhancement of Creeks	City of Chino Hills	This project will improve the ecosystem and protect valuable riparian habitat through a creek rehabilitation and streambed restoration project. The project will also provide public walking trails and educational opportunities.

6.2 Benefit Analysis Results

Each project was evaluated for its capacity to maximize water supply, water quality, flood management, environmental, and other community benefits within the watershed. The benefits were analyzed based on the quantitative methods approach described in **Section 5.3**. A summary of this analysis is included in **Attachment G**.

6.3 Project Prioritization

The projects listed in **Section 6.1** were assigned a ranking code according to the methodology described in **Section 5.4**. The ranking takes into account an integration of quantitative factors, including the project readiness, cost, breadth of benefits, water supply efficiency, and water quality efficiency, to assure the greatest needs are addressed. A summary of the result of this analysis are included in **Attachment H**. While each of the projects is considered a priority, this analysis helps determine which projects may be most ready and beneficial from a SWRP perspective.

6.4 Assessment of Stormwater Management Objectives

Five stormwater management goals were identified in **Section 1.5** as follows:

1. Enhance water quality
2. Maximize water supply
3. Improve flood management
4. Protect the environment
5. Provide community benefits

Eighteen stormwater management objectives were identified in accordance with these goals, as further discussed in sections above and for which the quantitative approach is included in **Section 5.3**. **Table 6-2** identifies the degree to which these stormwater management objectives will be satisfied through the construction of all projects identified in **Section 6.1**. It is unlikely that all projects will be constructed and overall implementation will span over multiple decades. Conditions will change over time and those changes are not accounted for in this analysis. The assessment included below provides a context to the magnitude of benefits proposed through this SWRP.

Table 6-2 Assessment of Stormwater Management Objectives

Goal	Objective	Predicted Cumulative Achievement
Enhance Water Quality	Pollutant Load Reduction	The projects will cumulatively provide for the removal of roughly **four quadrillion (4 x 10^{15}) MPN *E. coli* bacteria** from the waterways of the SBC SARW per year.
	Stormwater Runoff Reduction	The projects will reduce the discharge of untreated stormwater by approximately **41,000 acre-feet** per year.
Maximize Water Supply	Stormwater Recharge	The projects in the SWRP will cumulatively capture on average around **41,000 acre-feet** of stormwater per year and use the volume to recharge local aquifers.
	Recycled Water Recharge	The projects will also capture about **7,500 acre-feet** of recycled water per year for groundwater recharge.

Goal	Objective	Predicted Cumulative Achievement
Improve Flood Management	Runoff Rate Reduction	At least 32 projects will provide a benefit of reducing the peak flow rate during floods, with a maximum predicted flow rate reduction of **600 cfs** (Cactus Basin #4 and 5).
	Runoff Volume Reduction	The projects will cumulatively prevent **41,000 acre-feet** of stormwater from reaching downstream flood-prone areas.
	Flood Elevation Reduction	At least 17 projects will provide a benefit of reducing the water surface elevation during a flood event, with a maximum predicted flood elevation reduction of almost **9 feet** (Wilson Creek – 10^{th} Street to Interstate 10).
	Removal of Parcels/ Structures from the Floodplain	The projects will cumulatively remove approximately **1,900 parcels** from the risk of flooding during a 100-year storm event.
	Property Value Saved	These parcels have a combined value of over **$610 million.**
Protect the Environment	Wetlands Enhancement/ Creation	The projects will enhance or create over **148 acres** of wetlands.
	Riparian Area Enhancement	The projects in the SWRP will restore or enhance almost **178 acres** of riparian habitat.
	Streambed Restoration	The projects in the SWRP will restore at least **4,545 feet** of streambed to natural conditions, creating and preserving critical habitat for endangered species.
	Increased Urban Green Space	Cumulatively, the projects will increase the amount of urban green space within the SBC SARW by about **78 acres**.
Provide Community Benefits	Provide Employment Opportunities	Construction of the projects in the SWRP is estimated to provide roughly **6,100 job-years** of employment opportunities to the community. From the Bureau of Labor Statistics, the median tenure of an employee in a construction job in 2016 was 4 years (BLS, 2016). Therefore, it is estimated that the projects will cumulatively provide over **1,500 new jobs**.
	Increase Public Education	Public education benefits will be achieved in at least **eight projects**. These projects will have interpretive signage to increase the public's understanding of water quality protection and using stormwater as a resource.
	Increase Community Involvement	At least **five projects** in the SWRP will increase community involvement as a permanent feature of the project.
	Recreational Paths Enhancement/ Creation	The projects in the SWRP will create or enhance over **29 miles** of multi-use paths and trails for public use.
	Public Use Area Enhancement/ Creation	Over **75 acres** of new public use and recreational space will be created by the construction of the projects.

7. Implementation Strategy and Schedule

This section presents elements of the implementation strategy that will be used to implement projects and programs identified in the SBC SARW SWRP. The strategy includes implementation elements, resources, performance-measures, and an adaptive management approach. This section also discusses the use of decision support tools to support ongoing implementation and adaptation.

7.1 Implementation Approach

Figure 7-1 illustrates the overall implementation strategy. The four major components of the implementation strategy are resources, implementation, adaptive management, and performance measures. These components are further detailed in the sections below.

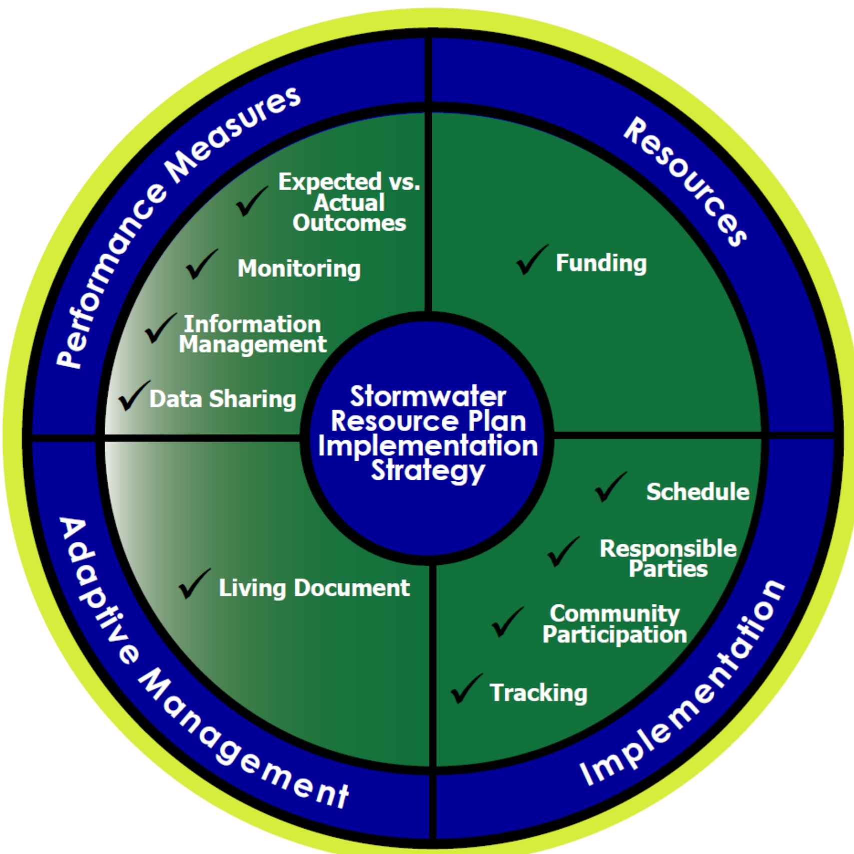


Figure 7-1 Overall Implementation Strategy

7.2 Resources

Financial resources are a significant component of SWRP implementation. A matrix of funding opportunities is included in **Attachment I**, summarizing various financing programs (grants and loans). The matrix included in the attachment identifies the funding agency, program, timeline, purpose, eligible uses, funding limits, contact information, and website link. Funding programs will change over time. The attached matrix summarizes programs that are currently relevant, which may also be relevant in the future. The cost estimates included in **Attachment H** represent the currently projected funding needs on a project by project basis (if available). The responsible agency for each project would ultimately be responsible for identifying and securing funding according to the financing program schedule and/or the implementation schedule if the implementing agency's funds are utilized.

7.3 Implementation

The general implementation strategy includes several elements, including schedule, responsible parties, community participation, and tracking, which are further detailed below. The schedule for implementation is discussed in **Section 7.3.1**. The party responsible for each project will dictate specific details regarding implementation. This information is discussed in **Section 7.3.2**. Community involvement (**Section 7.3.3**) is a key component, as the SWRP is a regional planning document that is most effective when stakeholders and the public are involved. Project/program implementation tracking (**Section 7.3.4**) will be important to measure progress from the planning phase through operation. The elements described in this section will also be considered through the adaptive management process.

7.3.1 Schedule

This section discusses the schedule associated with finalizing the SWRP along with the scheduling of the projects identified through the SWRP development process. This SWRP will be submitted to SAWPA (the local IRWM group) upon finalization, as required based on the SWRP Guidelines (SWRCB, 2015). **Table 7-1** summarizes the typical schedule related to implementation of various size projects. It is assumed that all outreach related activities would occur during the planning/design and construction phases. The schedule noted in the table below does not take into account the time needed to obtain necessary federal, state, and local permits. The obtainment of permits can vary by project and can range from a few months to several years.

Table 7-1 Typical Project Schedule

Phase	Percent Complete				
	Year 1	Year 2	Year 3	Year 4	Year 5
Green Streets (Under $1 Million for Construction)					
Agency planning and design	100%	-	-	-	-
Consultant planning and design	100%	-	-	-	-
Construction	-	100%	-	-	-
Agency construction management	-	100%	-	-	-
Consultant construction management	-	100%	-	-	-
Small/Medium Projects (Under $10 Million for Construction)					
Agency planning and design	100%	-	-	-	-
Consultant planning and design	50%	50%	-	-	-
Construction	-	25%	75%	-	-
Agency construction management	-	25%	75%	-	-
Consultant construction management	-	25%	75%	-	-
Large Projects (Over $10 Million for Construction)					
Agency planning and design	100%	-	-	-	-
Consultant planning and design	25%	50%	25%	-	-

Phase	Percent Complete				
	Year 1	Year 2	Year 3	Year 4	Year 5
Construction	-	-	25%	50%	25%
Agency construction management			25%	50%	25%
Consultant construction management			25%	50%	25%

The schedules for each individual project will vary based on the needs of the project, the funding available, and other unforeseeable circumstances, and thus it is unknown when exactly projects will begin in most cases. A rough estimate of the date when construction will start for each project is listed below. These dates are tentative and subject to change for a variety of reasons.

Year 1 = 2018

11. Cactus Basin #4 and 5 (SBCFCD)
15. Etiwanda Channel Invert Repair and Trail Project (SBCFCD)
16. West State Street Storm Drain Segment III and Brooks Basin Inlet Enhancement (SBCFCD)
18. Santa Ana River Trail Phase III (SBC Parks)
32. San Sevaine Basins (IEUA)
33. Lower Day Basin (IEUA)
49. Confluence Regional Water Resources Project (CBWCD)

Year 1 = 2019

2. West Fontana Channel – Hickory Basin to Banana Basin (SBCFCD)
12. Plunge Creek Stream Bed Restoration and Elder Creek Channel Improvement (SBCFCD)
31. Wineville Recycled Pipeline Project (IEUA)
34. Declez Basin (IEUA)
35. Victoria Basin (IEUA)
36. Turner Basin (IEUA)
37. Ely Basins (IEUA)
38. Montclair Basins (IEUA)
53. Los Serranos Park
54. Restoration and Enhancement of Creeks

Year 1 = 2020

3. Grove Basin Storm Drain (SBCFCD)
50. Big Bear Valley Water Sustainability Project (City of Big Bear Lake)
51. Rathbun Creek Floodway Improvement Project (City of Big Bear Lake)

Year 1 = 2021

1. Hawker Crawford Channel Storm Drain (SBCFCD)
17. Carbon Canyon Creek Channel – Pipeline Avenue to Peyton Drive (SBCFCD)

Year 1 = 2022

19. Santa Ana River Trail Phase IV (SBC Parks)

Year 1 = 2023 or beyond

4. Randall Basin Outlet and Colton Storm Drain Project 3-5 (SBCFCD)
5. Cable Creek Basin (Upper) (SBCFCD)
6.1 Warm Creek – Baseline Street to Sand Creek Confluence – Concept 1 (SBCFCD)
6.2 Warm Creek – Del Rosa Confluence to Sand Creek Confluence – Concept 2 (SBCFCD)
7.1 Little Sand Creek – Concept 1 (SBCFCD)
7.2 Little Sand Creek – Concept 2 (SBCFCD)
8. Mission Channel – Santa Ana River to Tennessee Street (SBCFCD)
9. Wilson Creek – 10th Street to Interstate 10 (SBCFCD)
10.1 Rialto Channel – Etiwanda to Willow – Concept 1 (SBCFCD)
10.2 Rialto Channel – Etiwanda to Willow – Concept 2 (SBCFCD)
13. Wildwood Channel – Interstate 10 to Holmes Street (SBCFCD)
14.1 Del Rosa Channel – Pacific Street to Del Rosa Avenue – Concept 1 (SBCFCD)
14.2 Del Rosa Channel – Pacific Street to Del Rosa Avenue – Concept 2 (SBCFCD)
20. Lytle Creek Basin (SBVMWD)
21. Devil Canyon Basins (SBVMWD)
22. City Creek Basin (SBVMWD)
23. Cable Creek Basin (Lower) (SBVMWD)
24. Lytle-Cajon Basins (SBVMWD)
25. Mill Creek Inlet (SBVMWD)
26. Plunge Creek Basin I (SBVMWD)
27. Plunge Creek Basin II (SBVMWD)
28. Twin Creek Spreading Grounds (SBVMWD)
29. Vulcan 2 Basin (SBVMWD)
30. Waterman Basins (SBVMWD)
39. Montclair – Arrow Highway (City of Montclair)
40. Montclair – Fremont Avenue (City of Montclair)
41. Montclair – Sunset Park (CBWCD / City of Montclair)
42. Urban Walkable Watersheds (CBWCD)
43. Multipurpose Recharge Basins (CBWCD)
44. College Heights and Upland Percolation Basins (CBWCD)
45. Streamflow Restoration on Plunge Creek (SBVWCD)
46. Spreading on Woolly Star Preserve Area (SBVWCD)
47. Mission/Zanja Basin (SBVWCD)
48. Riverside Corona Feeder (WMWD)
52. Treat, Recycle, Educate (TRE) Plan (City of Redlands)

7.3.2 Responsible Parties

A lead agency has been identified for each of the projects evaluated, as defined in **Table 6-1**. The responsible agency is the agency that submitted the project information for inclusion in the SWRP. In several cases, the lead agency will partner with other agencies. For example, the SBCFCD has identified several projects that may include trail features. Those trail features will be established through a partnership with local jurisdictions.

There are not any critical linkages between projects, such that there is not any given project that must be implemented prior to another. Several of the projects are related due to their location within the same subwatershed; therefore, implementation of one project may impact performance of another, but will not mitigate the need for the other project. The project concepts identified in the SWRP are based on full implementation. In some cases multiple alternatives have been identified and in that case only one concept will be implemented. The lead agency may determine it is best to phase the projects, which would essentially create interdependence among the phases. Due to the independence of each project, the lead agency will be responsible for the overall implementation and utilize partners as appropriate.

7.3.3 Community Participation

The stakeholders/public supported the development of the SWRP through the TAC and outreach events, described further in **Section 4 and 8**. Community participation is consistent with the SPOEEP, included in **Attachment E**. The efforts made during the SWRP development to involve stakeholders and the public will transition into a platform for stakeholder/public input during implementation. Involvement during implementation will likely focus on the direct community in which the project is being implemented. Meetings and/or workshops will be executed as necessary in an effort to inform the community of multi-benefit project implementation and seek input as appropriate.

In addition to the involvement during the design and construction process of project implementation, the stakeholders/public may be engaged following the completion of projects when educational signage is incorporated. The community will learn about the multiple benefits the project provides and stormwater quality through the signage included as part of the projects. Stakeholder/public input may also be solicited during the design process with regard to the proposed educational signage.

7.3.4 Tracking

Project implementation is the most significant SWRP element for which tracking is applicable. Preliminary information regarding project status has been collected and documented as part of the SWRP development. The project prioritization in **Attachment H** identifies whether conceptual design plans have been prepared, as well as a cost estimate, for each of the projects included in the SWRP. The status of required studies, reports, investigations, and design plans may be tracked independently by each of the parties responsible for implementation. Tracking this information is helpful, as it may assist the responsible agency and/or their partners with prioritizing implementation efforts. Centralized tracking was considered and determined not to be the best approach at this time. A centralized tracking system will be reconsidered in the future and would be incorporated into the SWRP through the adaptive management process described below if deemed appropriate at that time. Each responsible party will track the status of applicable design elements for each of their projects independently, which may include, but is not limited to:

- Conceptual plans
- Preliminary design report
- Soils investigation

- Hydrology and hydraulic study
- Topographic survey
- Flood study
- Design plans

7.4 Adaptive Management

The SBC SARW SWRP is structured as a living document and will be adaptively managed. The SWRP will be reviewed approximately every five years to determine if an update is warranted. Adaptive management will allow the SWRP to be updated with the most pertinent and relevant information, which changes over time. For example, ongoing monitoring may demonstrate water quality improvements over time. In that instance, the SWRP could be updated to re-establish the water quality priorities. The utilization of monitoring data as part of the adaptive management process is further discussed in **Section 7.5**. Ongoing adaptations to the SWRP may include, but are not limited to:

- Re-characterization of water quality priorities
- Source assessment re-evaluation
- Effectiveness assessment of watershed-based projects
- Updated metrics-based quantitative analysis
- Deleted or new projects
- Identification of completed projects

Projects may be submitted to the SBCFCD by local lead agencies on an ongoing basis. The Multi-Benefit Project Request Form originally used to collect project information from stakeholders is included in **Attachment J**. This form may be submitted to the SBCFCD at any time and the SBCFCD will incorporate projects into the SWRP as appropriate. If a project concept has changed, the responsible agency would be required to submit the updated information to the SBCFCD. Updated information would also need to be submitted if the quantified benefits are determined to be different than those presented in the SWRP due to additional data collection and/or detailed analyses. It will be noted in the SWRP when a project originally identified in the SWRP has been implemented during periodic updates.

7.5 Performance Measures

This section discusses how performance of identified projects will be measured to assess the achievement of projected benefits. The following components will be used to assess performance and are further described below:

- Evaluation of expected versus actual outcomes, which leads to the re-evaluation of project objectives, priorities, and goals
- Monitoring and information management systems used to gather performance data
- Mechanisms to adapt project operations and plan implementation based on performance data
- Approach to document and share performance data with stakeholders

7.5.1 Expected versus Actual Outcomes

The quantification of multiple benefits presented in **Attachment G** represents a preliminary evaluation of the expected outcome due to project implementation. Project concepts assessed are preliminary, and benefits will be updated as the designs are finalized by the responsible parties. Projects that receive funding through grants are typically required to measure performance over time and are designed to achieve a benefit agreed upon between the responsible party and the granting agency. Benefits have been quantified within the five benefit categories (water quality, water supply, flood management, environmental, and community) through the SWRP development.

Table 7-2 summarizes design elements and/or technical analyses that may be necessary to measure actual outcomes/multiple benefits based on the benefit category following project implementation. The elements/analyses identified will need to be tailored for each project to establish an economical approach. For example, measuring flow rates/volumes into a basin can be done easily using a flow meter on the inflow pipe, while for a channel improvement, installing flow meters at every inlet (to assess infiltration within the channel) would be extremely costly and a detailed analysis may represent a more economical approach. Additional details pertaining to the benefits are included in **Section 5.3**.

Table 7-2 Options for Measuring Actual Outcomes by Benefit Category

Benefit	Design Elements/Analysis Options to Verify Performance
Water Quality	
Pollutant load reduction	➢ Visual flow monitoring ➢ Flow meter(s)/stream gage(s) ➢ Monitoring program (pre-/post-project and/or upstream/downstream) ➢ Monitoring with lysimeters (if applicable) ➢ Hydrologic modeling with collected rainfall data ➢ Infiltration testing to support calculations
Stormwater runoff reduction	➢ Visual flow monitoring ➢ Flow meter(s)/stream gage(s) ➢ Hydrologic modeling with collected rainfall data ➢ Infiltration testing to support calculations
Water Supply	
Stormwater recharge	➢ Visual flow monitoring ➢ Flow meter(s)/stream gage(s) ➢ Hydrologic modeling with collected rainfall data ➢ Infiltration testing to support calculations
Recycled water recharge	➢ Recycled water discharge rates/quantities ▪ Flow meter, visual monitoring, and/or collect data from others ➢ Flow rate/quantity captured ▪ Flow meter and/or visual monitoring ➢ Assessment of recycled water capture versus stormwater captured (unless project exclusively captures recycled water)
Flood Management	
Runoff rate reduction	➢ Model existing and proposed conditions hydrology and hydraulics and compare results ➢ Prepare Letter of Map Revision (LOMR) (if applicable)

Benefit	Design Elements/Analysis Options to Verify Performance
Runoff volume reduction	➢ Visual flow monitoring ➢ Flow meter(s)/stream gage(s) ➢ Hydrologic modeling with collected rainfall data ➢ Infiltration testing to support calculations
Flood elevation reduction	➢ Model existing and proposed conditions hydrology and hydraulics and compare results ➢ Prepare LOMR (if applicable)
Removal of parcels/structures from the 100-year floodplain	➢ Model existing and proposed conditions hydrology and hydraulics and compare results to identify change in floodplain limits ➢ Identify structures/parcels removed ➢ Prepare LOMR (if applicable)
Property value saved	➢ Model existing and proposed conditions hydrology and hydraulics and compare results to identify properties saved ➢ Update current market prices for properties removed from the floodplain to quantify property value saved
Environmental	
Wetlands enhancement/creation	➢ Measure area based on design plans/implementation ➢ Visual monitoring/photo documentation of enhancement
Riparian area enhancement	➢ Measure area based on design plans/implementation ➢ Visual monitoring/photo documentation of enhancement
Streambed restoration	➢ Measure length based on design plans/implementation ➢ Visual monitoring/photo documentation of restored streambed
Increased urban green space	➢ Measure area based on design plans/implementation ➢ Visual monitoring/photo documentation of urban green space type and how it is utilized by the community
Community	
Provide employment opportunities	➢ Data collection from all involved partners related to employment ➢ Collection of timesheets during design, construction, and ongoing implementation (as applicable)
Increase public education	➢ Count number of interpretive signs installed ➢ Photo documentation of signage and use ➢ Public surveys
Increase community involvement	➢ Track number of community meetings held ➢ Compile and analyze data/outcomes pertaining to each meeting (number of attendees, who attended, presentation, comments, action items, etc.)
Walking paths, sidewalks, and bike trails enhancement/creation	➢ Measure feature lengths based on design plans/implementation ➢ Photo documentation of paths, sidewalks, and/or bike trails (implementation and ongoing use)
Public use areas enhancement/creation	➢ Measure public use areas based on design plans/implementation ➢ Photo documentation (implementation and ongoing use)

Project objectives, priorities, and goals may be re-evaluated once actual outcomes are quantified. At that time, the future implementation strategies may be modified, as necessary and feasible, to align with objectives, priorities, and goals, which may be adapting and changing. These re-evaluations and assessments would be part of the adaptive management process described under **Section 7.4**.

7.5.2 Monitoring

This section is broken into two separate monitoring discussions; the first one is regional monitoring that is conducted currently to assess water quality on a regional level, and the second is individual project monitoring that may be implemented following project implementation. Results from both of these monitoring programs may be used to assess performance of either a specific project or the overall program. Project specific monitoring may include information management systems, such as flow monitoring, which will also produce data that can be used to assess performance.

7.5.2.1 Regional Water Quality Monitoring

Section 3.3 details the monitoring programs implemented in the last ten years along with the results of those monitoring efforts, specifically pertaining to:

- Core Monitoring
- BBLN TMDL Monitoring:
  - BBL Watershed-Wide Nutrient Monitoring
  - BBL In-Lake Monitoring
- MSAR Bacterial Indicator TMDL/WLA Monitoring

The SBC Areawide Stormwater Monitoring Programs are implemented to fulfill the MS4 Permit requirements. Implementation is currently ongoing and the monitoring programs will be modified as required by future MS4 Permits. The data collected through these monitoring efforts was used to quantify anticipated pollutant load reductions associated with project implementation. Through the adaptive management process, further detailed in **Section 7.4**, future monitoring data will be used to verify the characterization of water quality.

In early November of each year, the SBC Areawide Stormwater Annual Report is completed for the previous fiscal year, which includes a summary of the findings from the various monitoring programs. These reports are available for stakeholders to review and are reviewed by the SARWQCB. The transparent reporting process allows for data to be reviewed and gaps to be identified if they exist. Implementation of the SBC SARW SWRP does not require additional regional monitoring to be conducted. Monitoring may be conducted on a project by project basis, as further discussed below.

The findings related to regional water quality may provide insight as to how implemented programs are influencing the quality of water reaching downstream receiving waters. This assessment may be relevant to SWRP implementation in the future, once SWRP projects have been implemented. Findings from these ongoing monitoring efforts may influence future implementation and project prioritization (through the adaptive management process).

7.5.2.2 Project Specific Monitoring

Various types of monitoring may be implemented for individual projects. Monitoring may include flow monitoring (visual versus automatic) and/or water quality monitoring. Individual project monitoring is likely to occur when grant funds are received in which monitoring is required to assess performance. The monitoring scope and frequency will likely vary on a project by project basis. Individual project monitoring data will allow the responsible party to assess project performance and compare expected and actual outcomes. This data may also be used to make projections on regional water quality improvements due to project implementation.

Monitoring data collected as part of a grant funded project will be summarized and reported to the grant manager. This data may also be shared with the public and/or stakeholders through a public input process or on the SWRP website. Sharing the monitoring data and findings with the granting agency, public, and/or stakeholders will promote a multi-faceted review process in which data gaps would be identified and an approach to fill those gaps could be developed as necessary.

7.5.3 Information Management

Information will be managed such that project operations and SWRP implementation may be adjusted based on performance data collected. How information will be stored and shared is further discussed under the following subsection, while this subsection focuses on how the information will be used to guide future operations and decisions. For instance, monitoring data (flow and/or water quality) may demonstrate that the originally projected targets are not being achieved. Some projects that involve controls (pumps, valves, etc.) may be modified to maximize the benefits achieved by a project; however, most of the projects identified in the SBC SARW SWRP cannot be easily modified once implemented. Potential project enhancements may be evaluated if critical goals are not achieved. Alternatively, if a project is exceeding the projected benefits at a high operational cost, then the project operations may be altered such that the projected benefits are achieved in a more economical way.

On a larger scale, regional monitoring data may be used to guide project/program implementation. For example, if several projects are implemented within a watershed tributary to a regional monitoring site and it is observed that water quality improves once the projects are implemented, then there may be opportunities to re-prioritize project implementation. In that case, projects within other watersheds that have water quality concerns may become a higher priority over those that would continue to improve the same watershed. Another example is that if one project helps relieve flooding in a given area, then another project to address that flooding may become a lesser priority. Projects may be re-prioritized following implementation of another project with similar benefits in the same subwatershed through the adaptive management process.

Project specific data collected through monitoring activities and/or information management systems will be managed by the responsible parties in accordance with any agreements they have in place with other involved parties (funding parties and/or project teaming partners). This data will be shared with the SBCFCD such that it may be considered when the SWRP is adaptively managed. Data collected from individual project implementation and regional monitoring will be compiled as part of the adaptive management process to determine how the program needs to be modified, likely through project re-prioritization.

The SWRP and identified projects will be submitted to and included in the latest version of the SAWPA OWOW Plan. Each project included in the SWRP and funded through an IRWM grant program will be required to provide data from approved project performance monitoring programs in formats consistent with the requirements of existing statewide databases such as the California Surface Water Ambient Monitoring Program (SWAMP), the California Environmental Data Exchange Network (CEDEN), the California Rapid Assessment Methods (CRAM) for wetland and riparian habitat conditions, and groundwater quality monitoring through the GeoTracker database, per the requirements of the OWOW

Plan. The OWOW Plan also encourages projects from the SWRP that are not funded through IRWM grant programs to upload data to the SAWPA Plan Performance Assessment Database. This database is reviewed by SAWPA staff, who will identify gaps in the data, correct erroneous data, and perform frequent backups on the database.

7.5.4 Data Sharing

Performance data collected will be made available to interested parties through various platforms. Separate reporting documents will be prepared summarizing data collection and results based on the type of monitoring/data collection. For example, annual reports (and/or other regularly scheduled reports, i.e., quarterly, seasonal, etc.) are prepared for all of the regional monitoring efforts. Additionally, an Areawide Stormwater Program Annual Report is prepared, as referenced in **Section 7.5.2.1**, that summarizes the individual regional monitoring program reports. Project specific monitoring will likely include periodic reports for internal use and/or for other involved parties. Data will be assessed and reviewed through report preparation and also by the SBCFCD through the SWRP adaptive management process. Gaps will be filled as identified and appropriate.

Through these reports, the public and interested stakeholders have access to the information collected. Stakeholders and/or the public may request regional monitoring data from the SBCFCD, while some of the monitoring reports are posted directly online on their respective websites. Specific project data will be shared as appropriate by the responsible party upon consent from all teaming partners. The SBCFCD will also evaluate opportunities to post data on the SWRP website and send email blasts to stakeholders and the public whom have been involved in outreach efforts.

The data submitted to statewide databases or through the SAWPA Plan Performance Assessment Database will be available through web tools and data requests. These data sharing tools have been developed to give stakeholders the ability to perform watershed-wide analysis and may be used to influence the goals of future plan revisions.

7.6 Decision Support Tools

The projects identified in the SWRP undergo a detailed quantitative assessment to understand the multiple benefits the given project provides. The results from the quantitative analysis and prioritization become an important tool that will be used to make decisions, such as how and when to implement the project. The approach to perform the quantitative analysis and results are included in **Section 5** and **Section 6**. Analyses performed and documentation prepared/reviewed during project implementation will also support decision making.

Decision support tools will be used in the implementation phase of the SWRP to determine progress toward meeting the goals and objectives specified in this SWRP and to determine project priorities for future iterations of the SWRP. Decision support tools will be consistent with the requirements of the SAWPA OWOW Plan, as the SBC SARW SWRP will be submitted to and approved by the local IRWM group that manages the OWOW Plan (SAWPA). The OWOW Plan calls for project proponents to collect data and submit it through database systems that have been developed for statewide efforts, such as the CEDEN and SWAMP databases, or through the SAWPA Plan Performance Assessment Database.

Updates to the watershed goals and objectives will occur whenever the OWOW Plan is updated. The OWOW Plan has been updated several times to evolve with the changing objectives of the SARW, and will be updated in the future. The OWOW Plan is a planning document with a 20-year horizon, and the needs of the watershed will require reassessment of the goals and objectives at the end of that time horizon at the very latest.

8. Education, Outreach, and Public Participation

Stakeholders, including elected and appointed officials, municipal and county staff, watershed groups, local water agencies, and NGOs, along with the public (e.g., residents, businesses, homeowners associations, etc.) are crucial to the development of the SWRP. The diverse motivation and viewpoints of each audience has shaped the development of this plan. Information regarding the goals, projects, programs, and needs identified in the SWRP was shared and the public (including stakeholders) was provided opportunities to provide feedback on the development of this plan, while the TAC provided technical guidance. The various educational outreach/education efforts for stakeholders and the public are detailed within the following subsections. Some of these approaches may also be used during community engagement executed during project design and implementation.

8.1 Education

The SBC SARW SWRP development provided an opportunity to educate local stakeholders and the public. In addition to the stakeholder and public outreach events described in **Section 4** and the sections below, education was promoted through printed materials, a SWRP webpage, and social media, each of which are further described in the subsections below. Printed materials and the SWRP webpage will be available during project design and implementation. The responsible party will incorporate these resources into future public outreach efforts.

8.1.1 Printed Materials

Printed materials were developed in an effort to educate stakeholders and the public. Printed materials included graphic posters displayed at outreach events, flyers, and informational handouts. The goals of the printed materials were to simply convey through illustrations and simplified text:

1. What is a SWRP?
2. Why is a SWRP necessary?
3. What types of solutions are included in the SBC SARW SWRP?

Multiple benefits provided through the SBC SARW SWRP implementation (water quality, water supply, flood management, environmental, and community benefits) were highlighted in printed material. The printed materials were also used to advertise stakeholder and public outreach events and solicit public review and comment of the SWRP. Printed materials were available to the public at the SBCFCD office, online, and outreach events. Some of the outreach material was printed in both English and Spanish. Copies of the printed materials available for distribution are included in **Attachment K**. Responsible parties will reference these printed materials during project design and implementation outreach efforts.

8.1.2 SWRP Webpage

The SBCFCD developed a webpage on their website providing accessible information to stakeholders and the public on the SBC SARW SWRP development. The webpage features an overview of the SWRP and included announcements regarding the outreach events and public comment period (schedule, start, end, etc.). The webpage includes links to download educational materials, as detailed in **Section 8.1.1**. During the public review period, the Draft SBC SARW SWRP was posted on this webpage with directions on how to provide comments and feedback. The webpage provides contact information, which allows interested parties to contact key personnel with any comments/questions. The webpage allows stakeholders and the public to easily find information specific to the SBC SARW SWRP development and support the outreach and education efforts described in this section. The webpage will continue to host these resources and be utilized by responsible parties to support individual project design and implementation outreach efforts.

8.1.3 Social Media

Social media was used to advertise for the public outreach event. In particular, Facebook was utilized to support education and outreach efforts. The SWRP webpage link was included in posts, encouraging the public to access and review additional information. The SBCFCD collaborated with the Areawide Program and utilized their Facebook page. The Areawide Program Facebook page has over 13,000 followers.

8.2 Stakeholder Outreach

The SBCFCD sought opportunities to partner with local stakeholders in the implementation of projects/programs that provide multiple benefits (combination of water quality, water supply, flood management, community, and environmental benefits). Potential participants were invited to the stakeholder event. Opportunities included elected and appointed officials, municipal and county staff, watershed groups, local water agencies, and NGOs, along with other stakeholders, as summarized in **Table 8-1**.

Table 8-1 Participants Invited to the Stakeholder Outreach Events

Stakeholder Category	Potential Stakeholders
Elected/appointed officials	Local officials
Local municipalities	Big Bear Lake, Chino, Chino Hills, Colton, Fontana, Grand Terrace, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Bernardino, Upland, and Yucaipa
Neighboring counties	Orange County (Department of Public Works and Flood Control District) Riverside County Flood Control and Water Conservation District
Non-governmental organizations	Council for Watershed Health Inland Empire Waterkeeper
Regulators	SARWQCB SWRCB USACE
SBC departments	Flood Control District Public Health (Mosquito and Vector Control) Public Works Regional Parks Special Districts
Water agencies and member agencies	BBMWD - BBMWC
	CBWCD and Chino Basin Watermaster

Stakeholder Category	Potential Stakeholders
Water agencies and member agencies (continued)	IEUA – Cities of Chino, Chino Hills, Ontario, and Upland, Crawford Canyon Municipal Water Company, Cucamonga Valley Water District, Fontana Water Company, Monte Vista Water District, and San Antonio Water Company
	SBVMWD – Cities of Colton, Loma Linda, Redlands, and Rialto, EVWD, Marygold Mutual Water Company, Muscoy Mutual Water Company, RHWC, SBMWD, SBVWCD, South Mesa Water Company, Terrace Water Company, WVWD, Western Heights Water Company, and YVWD
	Six Basins Watermaster
	WMWD
	Warren Valley Basin Watermaster
	Other – City of Big Bear Lake Water Department, Big Bear City Community Service District, Fallsvale Service Company, Lake Arrowhead Community Services District, Lytle Creek Springs Water Company, and Running Springs Water District
Watershed groups	MSAR TMDL Task Force SAWPA
Other agencies	Bureau of Reclamation California Department of Transportation California Department of Water Resources California State Parks School Districts United States Forest Service (Trails Unlimited)

SBCFCD contacted potential participant agencies/organizations to identify the personnel that would best serve as the stakeholder representatives. Contact information of the potential participants was obtained at other outreach events by the members of the TAC. Invitations were distributed by email. Invitations were distributed a few weeks in advance, such that a preliminary head count was determined prior to the event. A running list of agencies/organizations and personnel invited were tracked along with any input received.

The stakeholder outreach events were held in mid-August 2017. Due to the large area the SBC SARW covers, the two stakeholder outreach events were in similar formats and were hosted at two different locations, one on the east side of the SBC SARW and the other on the west to encourage stakeholders throughout the watershed to participate.

The main goals of the stakeholder events were:

- Collect information regarding challenges faced in relationship to water quality, water supply, flood management, environmental, and the community;
- Gather details pertaining to current projects and programs conceptualized, planned, and implemented;
- Solicit project/program ideas to be included in the SWRP; and
- Obtain data pertinent to quantifying project/program benefits, including, but not limited to, monitoring data, flood studies, project/program concepts, system operations, etc.

Questions, comments, and concerns were addressed at the end of the meeting. The format of the stakeholder event was facilitated as a conversation, while a presentation was used to support discussions. The event included a sign-in sheet, which was used to gather information on the participants, and send out updates on the SWRP to allow stakeholders to review the SWRP during the public review period. Hard copies of the agenda were distributed along with informational handouts. The information identified in the agenda was presented utilizing a PowerPoint presentation, while discussions were encouraged after the presentation. Comment cards were provided to attendees to leave feedback.

8.3 Public Outreach

A public outreach event was held on July 24, 2018, to advertise the release of the public draft SWRP, provide an overview of the plan, and encourage public review and comment. The public outreach event was a model for the type of public outreach that shall be conducted during the implementation phase of the plan. The public was informed of the meeting through printed advertisements, email blasts, and social media. More than two dozen stakeholders and members of the public attended the event hosted at the SBCFCD office.

The subsections below describe mechanisms, processes, and milestones that were used to facilitate public participation and communication during development and implementation of the plan, including strategies to engage particular communities in project design and implementation. Additional details pertaining to the outreach efforts are included in the SPOEEP, which is included in **Attachment E**. **Figure 8-1** below is a picture from the outreach event on July 24, 2018.

Figure 8-1 Public Outreach Event

8.3.1 Strategies to Engage Disadvantaged Communities

A DAC is defined as a census geography (place, tract, or block group) where the annual median household income is less than 80 percent of the statewide annual median household income. Approximately 800,000 people lived in a DAC within the SBC SARW as of 2013, which was nearly half the entire population of the SBC SARW. Cities predominated by DACs tend to have limited resources and technical expertise, resulting in limited community support for multi-benefit project initiatives.

Engagement with DACs is an important aspect of project identification and implementation and is essential to develop support and understanding for the multi-benefit projects identified in the SWRP.

Figure 8-2 illustrates DAC blocks/tracts in the SBC SARW and the SWRP-identified projects. There are 37 projects that will be physically located within the boundaries of a census tract or block designated as a DAC. The remaining projects not located in a DAC will still provide benefits to DACs in terms of water supply to groundwater used to service DACs, water quality improvements for downstream DACs, or recreation benefits for nearby DACs.

The public outreach event held on July 24, 2018, during the development of the SBC SARW SWRP included strategies to engage DACs. The strategies included the production of notices and handouts in multiple languages (English and Spanish). The outreach materials for the July 24, 2018, SWRP public outreach event are included in **Attachment K**. These strategies can be replicated for the outreach effort for each project in the SWRP. Additionally, the sign-in sheets used at the public outreach event collected zip code information in an effort to track engagement from DAC areas. It was found that all of the attendees live within a zip code that contains a DAC area.

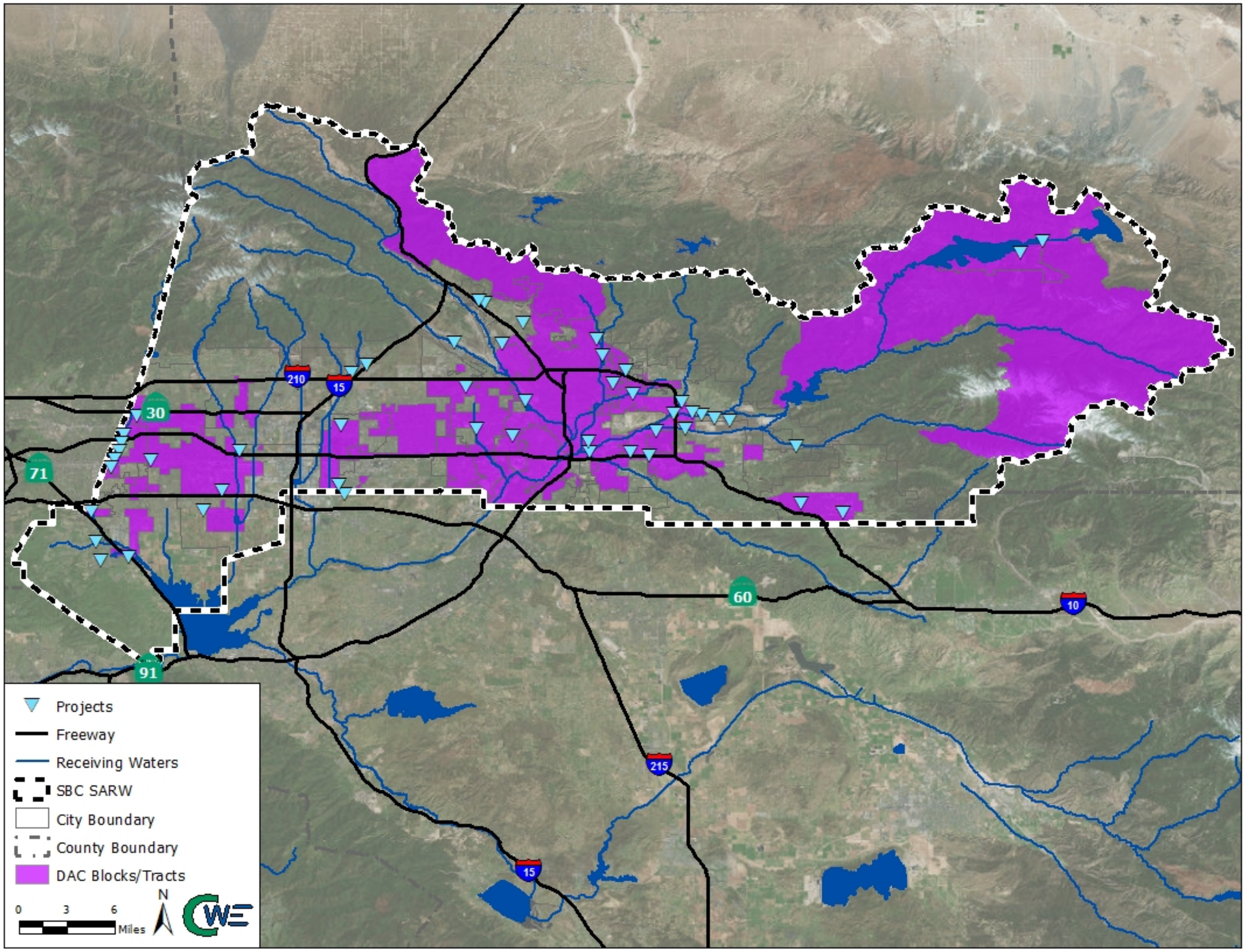


Figure 8-2 DAC Blocks/Tracts and SWRP Projects

8.3.2 Strategies to Address Environmental Injustice Needs and Issues

The USEPA defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." The goal of environmental justice will be achieved, according to the USEPA, only when everyone has the same degree of protection from environmental and health hazards, and when everyone enjoys equal access to the decision-making process.

Many of the strategies to encourage DAC participation are the same strategies to encourage equal access to the decision-making process, such as multilingual outreach efforts and dynamic approaches to community notification. Many projects in the SWRP help DACs achieve protection from environmental and health hazards. Because DACs are often located near industrial areas, DACs tend to experience stormwater or groundwater pollution more directly. Projects located within a DAC that improve water quality will help address environmental injustice caused by pollution, and there are many projects within the SWRP that achieve this goal. Additional details pertaining to the outreach approach in regards to engaging areas impacted by environmental injustice needs and issues are included in the SPOEEP (**Attachment E**).

8.3.3 Engagement during Project Design and Implementation

The public was engaged during the development of the SWRP and will also be engaged with during project design and implementation. **Section 8.1** describes how the educational components developed as part of this SWRP (printed materials, webpage, etc.) will be utilized to support outreach efforts conducted during design and implementation. Parties responsible for project implementation will also be responsible for conducting public outreach. Public outreach is typically performed by the responsible parties in the vicinity of the project being implemented. Agencies typically send informational flyers and host outreach events. Information regarding the SWRP and multiple benefits will be incorporated into these outreach efforts.

Responsible parties will evaluate opportunities to allow for public input on the project during the design process. This may include input on landscape materials, educational signage, etc. If public input is appropriate, then outreach will be conducted during the earlier phases of design, such as during preliminary design and also after 50% design is complete to share how input was incorporated. In instances where public input is not beneficial, educational outreach may be conducted as project design is being finalized and prior to construction in an effort to educate the public on the project, the multiple benefits it provides, and how it fits into the SWRP.

9. References

California Stormwater Quality Association (CASQA). 2003. Stormwater Best Management Practice Handbook: New Development and Redevelopment.

Chino Basin Watermaster (CBWM). September 2013. 2013 Amendment to the 2010 Recharge Master Plan Update. http://www.cbwm.org/docs/engdocs/2013%20Amendment%20to%20the%202010%20RMPU/2013%20Amendment%20to%20the%202010%20RMPU%20%E2%80%93%20Sections%201%20through%208.pdf

Chino Basin Watermaster (CBWM). June 2017. 2016 State of the Basin Report. Prepared by WEI for Chino Basin Watermaster.

Chino Basin Watermaster (CBWM). April 2018. Optimum Basin Maximum Benefit Annual Report 2017. Prepared by WEI for the Chino Basin Watermaster and Inland Empire Utilities Agency.

CWE. June 2017 (2017a). San Bernardino County Santa Ana River Watershed Stormwater Resource Plan: Annotated List of Data and Reports Technical Memorandum. Prepared for the SBCFCD.

CWE. June 2017 (2017b). San Bernardino County Santa Ana River Watershed Stormwater Resource Plan: Planning Area Description Technical Memorandum. Prepared for the SBCFCD.

Department of Natural Resources, State of Minnesota (DNR). 2018. Surface-Water Watersheds vs. Ground-Water Watersheds. https://www.dnr.state.mn.us/watersheds/surface_ground.html.

Department of Water Resources, State of California (DWR). 2018. Integrated Regional Water Management. https://www.water.ca.gov/Programs/Integrated-Regional-Water-Management.

Executive Office of the President – Council of Economic Advisers. 2009. Estimates of Job Creation from the American Recovery and Reinvestment Act of 2009. https://obamawhitehouse.archives.gov/sites/default/files/microsites/Estimate-of-Job-Creation.pdf.

Federal Register. 2000. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. https://www.federalregister.gov/documents/2000/05/18/00-11106/water-quality-standards-establishment-of-numeric-criteria-for-priority-toxic-pollutants-for-the.

Geosyntec Consultants. December 2008. A User's Guide for the Structural BMP Prioritization and Analysis Tool (SBPAT v1.0) Technical Appendices. Prepared for Heal the Bay, City of Los Angeles, and County of Los Angeles Department of Public Works.

Los Angeles Regional Water Quality Control Board (LARWQCB). April 2015. Attachment B to Resolution No. R15-004. Amendment to the Water Quality Control Plan for the Los Angeles Region to Revise the Los Angeles River and Tributaries Metals TMDL. http://63.199.216.6/bpa/docs/R15-004_BPA_CH_7.pdf.

Inland Empire Utilities Agency (IEUA). May 2016 (2016a). 2016 Chino Basin Storm Water Resources Plan Functional Equivalency Document. https://18x37n2ovtbb3434n48jhbs1-wpengine.netdna-ssl.com/wp-content/uploads/2016/05/Chino-Basin-SWRP-20160513.pdf.

Inland Empire Utility Agency (IEUA). 2016 (2016b). IEUA FY 2015-2016 Annual Water Use Report: Retail Agency Water Use and Five Year History. https://18x37n2ovtbb3434n48jhbs1-wpengine.netdna-ssl.com/wp-content/uploads/2017/01/16269-Annual-Water-Use-Report-15-16-20161116.pdf. Referenced April 2017.

Inland Empire Utilities Agency (IEUA). 2016 (2016c). Integrated Water Resources Plan: Water Supply & Climate Change Impacts 2015—2040. https://www.ieua.org/download/integrated-water-resources-plan-2015/.

Inland Empire Utilities Agency (IEUA) and Water Facilities Authority (WFA). June 2016. 2015 Urban Water Management Plan. https://18x37n2ovtbb3434n48jhbs1-wpengine.netdna-ssl.com/wp-content/uploads/2016/07/FINAL-IEUA-WFA-2015-UWMP-2016-07-07.pdf. Referenced April 2017. Prepared by Water System Consulting (WCS).

Mitchell, Patrick. 2006. From Crest to Coast—110 Miles Along Southern California's Largest River System (page 17). Berkeley: Wilderness Press.

Pavley, Fran. 2009. SB-790 09/04/09 – Senate Floor Analyses. C alifornia Legislative Information. http://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=200920100SB790.

San Bernardino Association of Governments (SANBAG). January 2012. Land Use Data, Existing Land Use – 2011 (Parcel Level). http://maps.sanbag.ca.gov/website/Landuse_data.htm.

San Bernardino County (SBC). 2007 (2007a). 2007 General Plan (page 169). http://www.sbcounty.gov/Uploads/lus/CommunityPlans/BearValleyCP.pdf. Prepared by URS Corporation.

San Bernardino County (SBC). 2007 (2007b). Final Program Environmental Impact Report San Bernardino County 2007 General Plan Program (page 127). http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FinalEIR2007.pdf. Prepared by URS Corporation.

San Bernardino County (SBC). 2007 (2007c). General Plan, Bear Valley Community Plan (page 51). http://www.sbcounty.gov/Uploads/lus/CommunityPlans/BearValleyCP.pdf. Prepared by URS Corporation.

San Bernardino County (SBC). 2017 (2017d). Regional Parks. http://cms.sbcounty.gov/parks/Home.aspx.

San Bernardino County Areawide Stormwater Program. August 2011. Integrated Watershed Monitoring Program. Submitted to the Santa Ana Regional Water Quality Control Board. Prepared by Larry Walker and Associates. http://www.waterboards.ca.gov/rwqcb8/water_issues/programs/stormwater/docs/sbpermit/iwmp/Revised_IWMP.pdf.

San Bernardino County Areawide Stormwater Program. May 2013 (2013a). Hydromodification Management and Monitoring Plan for the Santa Ana River Watershed Region within the County of San Bernardino. http://www.waterboards.ca.gov/rwqcb8/water_issues/programs/stormwater/docs/sbpermit/wap/Phase2/WAPAppendixH-HMP.pdf.

San Bernardino County Areawide Stormwater Program. May 2013 (2013b). Technical Guidance Document for Water Quality Management Plans. http://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/docs/sbpermit/wqmp/Final/Final_TGD_WQMP_Appendices.pdf.

San Bernardino County Areawide Stormwater Program. May 2013 (2013c). San Bernardino County Watershed Action Plan. http://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/docs/sbpermit/wap/Phase2/WAP-FINAL.pdf.

San Bernardino County Areawide Stormwater Program. August 2014. Report of Waste Discharge. Application for Renewal of the Municipal NPDES Stormwater Permit NPDES Permit No. CAS618036. http://sbcountystormwater.org/wp-content/uploads/2013/10/San-Bernardino-County-2014-ROWD-Final-8.1.14.pdf.

San Bernardino County Areawide Stormwater Program. 2014. San Bernardino County Areawide Stormwater Program – Phase I Fiscal Year June 2013- June 2014 Annual Report. Prepared by CWE.

San Bernardino County Areawide Stormwater Program. January 2015 (2015a). Municipal Stormwater Management Plan. Submitted to the Santa Ana Regional Water Quality Control Board.

San Bernardino County Areawide Stormwater Program. 2015 (2015b). Big Bear Lake Nutrient TMDL Annual Water Quality Report 2015.

San Bernardino County Areawide Stormwater Program. 2015 (2015c). San Bernardino County Areawide Stormwater Program – Phase I Fiscal Year June 2014- June 2015 Annual Report. Prepared by CWE.

San Bernardino County Areawide Stormwater Program. 2016. San Bernardino County Areawide Stormwater Program – Phase I Fiscal Year June 2015- June 2016 Annual Report. Prepared by CWE

San Bernardino County Department of Public Works (SBCDPW). Comprehensive Storm Drain Plans. http://cms.sbcounty.gov/dpw/FloodControl/Planning/MPD.aspx.

San Bernardino County Department of Public Works (SBCDPW). Master Plan of Drainage. http://cms.sbcounty.gov/dpw/FloodControl/Planning/MPD.aspx.

San Bernardino County Flood Control District (SBCFCD). June 2011. Comprehensive Bacteria Reduction Plan. Submitted to the California Regional Water Quality Control Board, Santa Ana Region. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/msar/cbrp/scb/Final_SBCo_CBRP_wAttachments.pdf.

San Bernardino County Flood Control District (SBCFCD). July 2012. Big Bear Lake Nutrient TMDL Compliance Program Watershed-Wide Monitoring Plan. Prepared by Brown and Caldwell.

San Bernardino Valley Municipal Water District (SBVMWD). January 2015. Upper Santa Ana River Watershed Integrated Regional Water Management Plan. http://www.sbvwcd.org/docman-projects/upper-santa-ana-integrated-regional-water-management-plan/3802-usarw-irwmp-2015-ch1-9-final/file.html. Referenced April 2017. Prepared by Water System Consulting (WCS).

San Bernardino Valley Municipal Water District (SBVMWD). June 2016. 2015 San Bernardino Valley Regional Urban Water Management Plan. http://www.sbvmwd.com/home/showdocument?id=4196.

Santa Ana Regional Water Quality Control Board (SARWQCB). January 2005, most recently updated February 2016 (2005a). Water Quality Control Plan for the Santa Ana River Basin (8). http://www.swrcb.ca.gov/santaana/water_issues/programs/basin_plan/index.shtml.

Santa Ana Regional Water Quality Control Board (SARWQCB). 2005 (2005b). Attachment to Resolution No. R8-2005-0097. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/bigbear/sediment/attachment_a_0705.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). 2005 (2005c). Resolution No. R8-2005-0001; Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Bacterial Indicator Total Maximum Daily Loads (TMDLs) for Middle Santa Ana River Watershed Waterbodies. http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2005/05_001.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). 2005 (2005d). Staff Report on the Sediment Total Maximum Daily Loads for Big Bear Lake and Rathbun Creek. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/bigbear/sediment/tmdl_sediment_part_1_0705.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). 2006. Resolution No. R8-2006-0023; Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate a Nutrient Total Maximum Daily Load (TMDL) for Dry Hydrological Conditions for Big Bear Lake. http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2006/06_023.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). May 2007. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Bacterial Indicator Total Maximum Daily Loads (TMDLs) for Middle Santa Ana River Watershed Waterbodies. http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2005/05_001.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). October 2008. Big Bear Lake Technical Support Document for Mercury TMDL. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/bigbear/mercury/tetra_tech_bbl_support_document_10_31_08.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). January 2010. National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for the San Bernardino County Flood Control District, the County of San Bernardino, and the Incorporated Cities of San Bernardino County Within the Santa Ana Region, Area Wide Urban Stormwater Runoff Management Program. Order No. R8-2010-0036, NPDES No. CAS618036. http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2010/10_036_SBC_MS4_Permit_01_29_10.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). January 2012 (2012a). Recreation Standards Amendments Staff Report: Executive Summary. http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/BPA_REC_Standards_Exec_Summary.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). June 2012 (2012b). Resolution No. R8-2012-0001. Resolution Approving Amendments to the Basin Plan Pertaining to Bacteria Quality Objectives and Implementation Strategies, Recreation Beneficial Uses, the Addition and Deletion of Certain Waters Listed in the Basin Plan and Designation of Appropriate Beneficial Uses, and Other Minor Modifications. http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/supplemental/R8-2012-0001-rev4-24-12.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). October 2013. Use Attainability Analysis – Cucamonga Creek Reach 1. http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/UAA/Cucamonga_UAA_10-7-13_Final.pdf.

Santa Ana Regional Water Quality Control Board (SARWQCB). April 2017. Resolution No. R8-2017-0013 Approval of Recommendations for the Federal Clean Water Act (CWA) Section 303(d) List. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/303d.shtml.

Santa Ana Watershed Project Authority (SAWPA). 2009. Big Bear Lake Nutrient TMDL Compliance Program Watershed-Wide Monitoring Plan. http://www.sawpa.org/wp-content/uploads/2012/05/Big-Bear-Lake_Monitoring-Plan-FINAL.pdf.

Santa Ana Watershed Project Authority (SAWPA). 2010 (2010a). Big Bear Lake TMDL Action Plan. http://www.sawpa.org/wp-content/uploads/2012/05/S01255.FINAL_Big-Bear-LakeTMDL-Action-Plan-8-26-2010.pdf.

Santa Ana Watershed Project Authority (SAWPA). 2010 (2010b). One Water, One Watershed Plan. http://www.sawpa.org/owow-1-0-2/.

Santa Ana Watershed Project Authority (SAWPA). February 2014. One Water, One Watershed Plan 2.0. http://www.sawpa.org/owow-2-0-plan-2/. Referenced April 2017.

Santa Ana Watershed Project Authority (SAWPA). February 2016. Santa Ana River Watershed Bacteria Monitoring Program. Prepared by CDM Smith. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/msar/Monitoring_QAPP/Final_Monitoring_Plan_February_2016.pdf.

State Water Resources Control Board (SWRCB). GeoTracker. https://geotracker.waterboards.ca.gov/.

State Water Resources Control Board (SWRCB). Safe Drinking Water Information System (SDWIS) Version 3.21, California Public Water Supply Systems Search Parameters. https://sdwis.waterboards.ca.gov/PDWW/.

State Water Resources Control Board (SWRCB). 2004. Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List. http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/ffed_303d_listingpolicy093004.pdf.

State Water Resources Control Board (SWRCB). July 2005. Big Bear Lake and Rathbun Creek Draft Sedimentation/Siltation TMDLs Technical Report. http://www.waterboards.ca.gov/rwqcb8/water_issues/programs/tmdl/docs/bigbear/sediment/tmdl_sediment_part_2_0705.pdf.

State Water Resources Control Board (SWRCB). October 2008. Big Bear Lake Technical Support Document for Mercury TMDL. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/bigbear/mercury/tetra_tech_bbl_support_document_10_31_08.pdf.

State Water Resources Control Board (SWRCB). 2012. Resolution 2015-0021. Approving the Clean Water Act Section 303(d) List Portion of the Proposed 2012 California Integrated Report. http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2012.shtml.

State Water Resources Control Board (SWRCB). 2015 (2015a). Amendment to the Water Quality Control Plan for the Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surfaces, Enclosed Bays, and Estuaries of California. http://www.waterboards.ca.gov/water_issues/programs/trash_control/docs/01_final_sed.pdf.

State Water Resources Control Board (SWRCB). 2015 (2015b). Storm Water Resource Plan Guidelines. http://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/docs/prop1/swrp_finalguidelines_dec2015.pdf.

State Water Resources Control Board (SWRCB). June 2017 (2017a). 2014 and 2016 California Integrated Report Clean Water Act Sections 303(d) and 305(b) Staff Report. June 9, 2017.

State Water Resources Control Board (SWRCB). March 2017 (2017b). San Bernardino County Flood Control District and California State Water Resources Control Board Planning Grant: Stormwater Planning: San Bernardino County Santa Ana River Watershed Group (SBC SARWG) Stormwater Resource Plan. Agreement No. D1612627.

United States Department of Agriculture (USDA). 2017 (2017a). Cucamonga Wilderness. https://www.fs.usda.gov/detail/angeles/specialplaces/?cid=stelprdb5210347.

United States Department of Agriculture (USDA). 2017 (2017b). San Gorgonio Wilderness. https://www.fs.usda.gov/detail/sbnf/specialplaces/?cid=stelprd3821641.

United States Department of Labor – Bureau of Labor Statistics (BLS). 2016. Employee Tenure in 2016. Economic News Release USDL-16-1867. https://www.bls.gov/news.release/pdf/tenure.pdf.

United States Environmental Protection Agency (USEPA). August 1999. Preliminary Data Summary of Urban Storm Water Best Management Practices. https://www3.epa.gov/npdes/pubs/usw_b.pdfhttps://www.epa.gov/sites/production/files/2015-11/documents/urban-stormwater-bmps_preliminary-study_1999.pdf.

United States Environmental Protection Agency (USEPA). 2016. CADDIS Volume 2: Sources, Stressors & Responses, pH. https://www3.epa.gov/caddis/ssr_ph_int.html. February 22, 2016.

United States Environmental Protection Agency (USEPA). 2017. Impaired Waters and TMDLS. https://www.epa.gov/tmdl/program-overview-impaired-waters-and-tmdls.

United States Environmental Protection Agency (USEPA). 2018. "Environmental Justice". https://www.epa.gov/environmentaljustice

Warrick, Jonathan A., and David M. Rubin. June 2007. Suspended-Sediment Rating Curve Response to Urbanization and Wildfire, Santa Ana River, California. Journal of Geophysical Research, Vol. 112, Issue F2. http://onlinelibrary.wiley.com/doi/10.1029/2006JF000662/abstract.

Western Municipal Water District (WMWD). May 2008. Western Municipal Water District Integrated Regional Water Management Plan 2008 Update. Prepared by Kennedy/Jenks Consultants. http://www.wmwd.com/DocumentCenter/Home/View/350.

Attachment A

Annotated List of Data and Reports Technical Memorandum

TECHNICAL MEMORANDUM

To: Arlene Chun, PE
Harold Zamora, PE

From: Katie Thomas, PE
Ilana Ton

Date: June 9, 2017

Subject: **San Bernardino County Sana Ana River Watershed Stormwater Resource Plan: Annotated List of Data and Reports**

1. Introduction

California voters passed the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) during the general election of November 4, 2014. As a precursor to the passage of Proposition 1, the California Legislature adopted Senate Bill (SB) 985 entitled the Stormwater Resource Planning Act (SB 985), requiring the development of a Stormwater Resource Plan (SWRP) to be eligible to receive grants from a bond act approved after January 1, 2014, for stormwater and dry-weather runoff capture projects. A SWRP is a stormwater management document developed on a watershed basis that identifies a prioritized list of projects to address stormwater and dry-weather runoff, while also providing multiple benefits, such as water supply, flood management, and environmental and community enhancements. The State Water Resources Control Board (SWRCB) developed Stormwater Resource Plan Guidelines (2015) to help facilitate the proper preparation of SWRPs. Proposition 1 includes numerous categories of projects to be funded, one being the Stormwater Grant Program. Planning and implementation grants were included in the Stormwater Grant Program. Planning grants are to be used for developing SWRPs and/or conducting studies prior to project implementation while the implementation grants are used to fund projects identified in a SWRP or equivalent document.

The San Bernardino County Flood Control District (SBCFCD) was awarded planning grant funds through the Stormwater Grant Program for the development of the San Bernardino County Santa Ana River Watershed (SBC SARW) SWRP (Grant Agreement No. D1612627). The SBC SARW SWRP encompasses the upper limits of the Santa Ana River (SAR) Watershed that lies within the San Bernardino County jurisdictional boundary.

A variety of Technical Memorandums (TMs) will be prepared throughout the development of the SBC SARW SWRP consistent with the final Grant Agreement. The information included in the TMs will be incorporated into the SWRP. Additional information pertaining to the SBC SARW SWRP planning area is included in the Planning Area Description TM. This TM describes references that will be reviewed, and utilized as appropriate, to support the development of the SBC SARW SWRP. References have been categorized as existing permits; planning documents; studies and reports; GeoTracker; Geographic Information Systems (GIS) data; Total Maximum Daily Loads (TMDLs); and additional data. The list of references summarized in this TM will continue to grow as the SWRP is being developed. In addition to the references identified, the SWRP Guidelines will be referenced throughout the development of the SWRP, as these guidelines serve as the basis for the SWRP being prepared. The SWRP Guidelines were developed consistent with Water Code section 1560 et seq. It is likely the Water Code will also be referenced as a guiding document to support the SWRP development.

2. National Pollutant Discharge Elimination System Permits

Section V.D of the SWRP Guidelines (2015) states that all SWRPs must be implemented in accordance with applicable National Pollutant Discharge Elimination System (NPDES) permits and waste discharge requirements. This section summarizes the Municipal Separate Storm Sewer System (MS4) Permit covering the SBC SARW area and the Report of Waste Discharge (ROWD) submitted for renewal of the MS4 Permit. In addition to these, other NPDES permit programs will be under consideration, such as the NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit), which are not as applicable to the development of the SWRP.

2.1 NPDES Municipal Separate Storm Sewer System Permit Order No R8-2010-0036

The NPDES Permit and Waste Discharge Requirements for the SBCFCD, the County of San Bernardino, and the Incorporated Cities of San Bernardino County within the Santa Ana Region, Order No. R8-2010-0036 (MS4 Permit) was adopted on January 29, 2010, and expired on January 29, 2015. The MS4 Permit was administratively extended until a new permit is issues. The MS4 Permit regulates the discharge of pollutants from anthropogenic sources from MS4s. Among many things, the MS4 Permit outlines the responsibilities of the Permittees, defines discharge prohibitions and receiving water limitations, and identifies programs that must be implemented in an effort to minimize pollutant discharges. The MS4 Permit details the granted legal authority and expectations of the Permittees which include inspections, enforcement , prohibition of waste discharge, and other actions necessary to uphold the MS4 Permit requirements. Although the expiration date has passed, the MS4 Permit must be abided by until a new MS4 Permit is adopted by the Santa Ana Regional Water Quality Control Board (RWQCB). The MS4 Permit applies to the SBC SARW area and the SWRP will be developed to be consistent with the requirements contained within it.

2.1.1 Report of Waste Discharge: Application for Renewal of the Municipal NPDES Stormwater Permit (NPDES Permit No. CAS618036)

The ROWD was prepared as part of the MS4 Permit renewal application process, which will result in the development and adoption of a fifth-term MS4 Permit by the RWQCB in the near future. The ROWD identifies the accomplishments of the Areawide Stormwater Program (Program), which implements the shared requirements set forth by the MS4 Permit, and develops priorities for the watershed area. The document presents evidence that the iterative Program Best Management Practice (BMP) approach works well in this area. The data and findings included within the ROWD will be referenced throughout the SWRP development and may be used to support approaches taken to address the SWRP Guidelines (2015).

3. Planning Documents

Various plans and programs have been developed and will be reviewed and utilized as appropriate in the development of the SWRP. Relevant documents include planning documents prepared by San Bernardino County, local agencies, groups of agencies, and regulatory entities. The following sections summarize integrated water resource plans, water quality and monitoring plans, stormwater planning documents developed for San Bernardino County, urban water management plans, and other planning documents.

3.1 Integrated Water Management Plans

3.1.1 SAWPA: One Water, One Watershed Plan 2.0

The One Water, One Watershed (OWOW) Plan is the Santa Ana River Watershed Integrated Regional Water Management (IRWM) Plan (IRWMP) prepared by the Santa Ana Watershed Project Authority (SAWPA). This plan reflects a collaborative planning process that addresses various aspects of water resources in the region (watershed). This collaborative plan crosses multiple jurisdictional boundaries and includes a public input process. The plan includes an approach for identifying and prioritizing multi-benefit projects and program, presents innovative solutions, and addresses other water resource related issues. The current version of this plan is 2.0, while an update is currently in progress. The SBC SARW SWRP will be submitted to SAWPA for incorporation into the OWOW Plan. This document will be referenced for information pertaining to the watershed and projects identified in the plan that are located within the SBC SARW may be identified and prioritized in the SWRP.

3.1.2 IEUA Integrated Water Resources Plan

The Integrated Water Resources Plan: Water Supply & Climate Change Impacts 2015 - 2040 (IRP) was prepared by the Inland Empire Utilities Agency (IEUA) in 2015. This document identifies a plan for ensuring reliable, cost-effective, and environmentally responsible water supplies for the next 25 years. The IRP goals are to integrate and update water resources planning documents in a comprehensive manner and develop an implementation strategy to improve near-term and long-term water resources management for the region. The IRP also evaluates new growth, development, and water demand patterns within the service area and assesses the water needs and supply source vulnerabilities under climate change. This document will provide information pertaining to water supply and demand within the IEUA service area, which will be included in the SWRP, as required by the Water Code. Potential projects identified within the document will also be reviewed to identify if there are opportunities to include them in the SWRP.

3.1.3 Upper Santa Ana River Watershed Integrated Regional Water Management Plan (SBVMWD)

San Bernardino Valley Municipal Water District (SBVMWD) prepared an IRWMP in 2015 to integrate planning among the agencies in the IRWM Region which begins upstream of Prado Dam and extends into the San Bernardino Mountains covering an area over 850 square miles. The IRWMP recognizes the priority of improving water supply reliability by implementing local supply projects given that imported water is increasingly viewed as a less reliable supply. The plan includes a water budget, goals and objectives, water management strategies, projects identified to help meet the region's objectives, and an implementation plan for doing so. The goals and objectives identified in this IRWMP will be reviewed and the goals and objectives of the SWRP will be made consistent with these goals, as appropriate. Potential projects identified within the document will also be reviewed to identify if there are opportunities to include them in the SWRP.

3.1.4 Updated Integrated Regional Water Management Plan (WMWD)

Western Municipal Water District (WMWD) prepared an Updated Integrated Regional Water Management Plan in 2015 covering their service area, which is located in Riverside County, adjacent to the SBC SARW area. The update addresses long range water quantity, quality, and environmental planning needs within the service area. This document identifies and evaluates water management strategies; addresses local and regional water quality, environmental, and disadvantaged community issues; discusses other regional planning efforts; and compiles an estimate of water demands by member agencies. Although WMWD's service area does not cover any portion of the SBC SARW area, a portion of the water served by WMWD is pumped from a groundwater aquifer that extends into San Bernardino County; therefore, actions taken over the groundwater aquifer may impact WMWD. This plan will be reviewed to determine if information presented within it is applicable to the SBC SARW SWRP. Projects identified in the IRWMP will be evaluated for inclusion in the SWRP.

3.2 Water Quality and Monitoring Plans

3.2.1 Basin Plan

The Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) is the basis for the RWQCB's regulatory program for controlling water quality. The Basin Plan includes a collection of water quality goals, descriptions of water quality conditions, and discussions of solutions. The Basin Plan establishes water quality standards for ground and surface waters of the region. The Basin Plan contains information on policies, beneficial uses of the waters of the Santa Ana Region, monitoring programs, and other miscellaneous topics in regards to water quality management. The SWRP will identify water bodies within the SBC SARW area, along with their beneficial uses. Water quality data will be analyzed to determine the pollutant priorities within each water body. The Basin Plan will serve as an important reference for classifying water bodies and determining priorities.

3.2.2 Big Bear Lake Watershed-Wide Nutrient Monitoring Plan

The Big Bear Lake Watershed-Wide Nutrient Monitoring Plan was submitted by the Big Bear Lake TMDL Task Force (TMDL Task Force) with the intent to: review and update the Big Bear Lake Nutrient TMDL; determine the sources of nutrients; develop TMDLs for wet and moderate years hydrologic conditions; and determine compliance with the Big Bear Lake Dry Nutrient TMDL, including Waste Load Allocations (WLAs) and Load Allocations (LAs). Similar to the Santa Ana River Watershed Bacteria Monitoring Plan described below in **Section 3.2.6**, monitoring results associated with the implementation of this monitoring program will be utilized in the SWRP to identify water quality priorities and assess the need for projects at key locations within the SBC SARW. Additionally, this monitoring program will be assessed to determine if continued implementation will support the goals and adaptive management of the SWRP.

3.2.3 Comprehensive Bacteria Reduction Plan

The Comprehensive Bacteria Reduction Plan (CBRP) was prepared in response to the MS4 Permit. The CBRP is a long-term plan designed to achieve compliance with dry-weather condition WLAs for bacterial indicators established by the Middle Santa Ana River (MSAR) Bacterial Indicator TMDL as well as a monitoring program to track progress towards compliance. The CBRP will be referenced for information regarding the MSAR Bacterial Indicator TMDL, such as requirements, and implementation actions (projects and programs).

3.2.4 Hydromodification Management and Monitoring Plan

A Hydromodification Management and Monitoring Plan for the Santa Ana River Watershed Region, within the County of San Bernardino, was developed to fulfill the requirements of Section XI.B.3.b.ii of the MS4 Permit. The Plan evaluates hydromodification impacts for drainage channels deemed most susceptible to degradation, identifies sites to be monitored (including assessment methodology and required follow-up actions based on results), and identifies monitoring sites that may be used to evaluate the effectiveness of stormwater BMPs. This document will be referenced during the project selection process. Areas susceptible to hydromodification will be identified and projects may be proposed to mitigate concerns. Additionally, this plan will be reviewed to verify projects proposed in the SWRP will not worsen impacts associated with hydromodification.

3.2.5 Integrated Watershed Monitoring Program

The Integrated Watershed Monitoring Program (IWMP) was prepared in response to the MS4 Permit. The objective of the IWMP is to provide data to support the development of an effective watershed and key environmental resources management program that focuses resources on the priority pollutants of concern. The IWMP includes the following monitoring programs: core; illegal discharge/illicit connection; hydromodification; source identification and special studies; and regional watershed. Monitoring results associated with the implementation of this monitoring program will be utilized in the SWRP to identify water quality priorities and assess the need for projects at key locations within the SBC SARW. Additionally, this monitoring program will be assessed to determine if continued implementation will support the goals and adaptive management of the SWRP.

3.2.6 Santa Ana River Watershed Bacteria Monitoring Plan

The Santa Ana River Watershed Bacteria Monitoring Plan establishes the requirements for bacteria sampling to support the following objectives: fulfill the monitoring and surveillance requirements of the 2012 adopted Basin Plan Amendment to Revise Recreation Standards for Inland Freshwaters in the Santa Ana Region; conduct sampling to support implementation of the MSAR Bacterial Indicator TMDL; and support any additional bacterial indicator monitoring that may be conducted in the watershed to support regional regulatory activities or requirements. Monitoring results associated with the implementation of this monitoring program will be utilized in the SWRP to identify water quality priorities and assess the need for projects at key locations within the SBC SARW. Additionally, this monitoring program will be assessed to determine if continued implementation will support the goals and adaptive management of the SWRP.

3.2.7 Water Quality Monitoring Data

The existing water quality monitoring data from the monitoring programs described above will be utilized to establish the current baseline water quality conditions within the SBC SARW. The monitoring data will be compiled and compared to water quality objectives (WQOs) to identify Water Body-Pollutant Combinations (WBPC). Projects and programs identified in the SWRP will aim to address the WBPCs identified.

3.3 San Bernardino County Stormwater Planning

3.3.1 San Bernardino County Watershed Action Plan

In response to the MS4 Permit, a Watershed Action Plan (WAP) was developed for San Bernardino County in two phases. A hydromodification assessment was provided within the WAP to examine the thresholds for determining whether a creek is subject to hydromodification impacts due to future development. References were made to the System-Wide Evaluation Retrofit Opportunities TM and an Evaluation of Retrofit Sites for Water Quality Improvements, which is an extension to the TM. The TM identifies opportunities to retrofit existing stormwater conveyance systems, parks, and other recreational areas with water quality protection measures and includes recommendations for specific retrofit studies that incorporate opportunities for addressing applicable TMDLs. The evaluation explores the availability and applicability of the identified projects to a specific water quality concern. The document also includes a cost-benefit analysis of each potential retrofit site in the context of the water quality improvement needs of the subwatershed and watershed. The methodology used to identify projects and quantify benefits will be reviewed and referenced as appropriate in the SWRP.

3.3.2 Technical Guidance Document for Water Quality Management Plans

The Technical Guidance Document (TGD) for Water Quality Management Plans (WQMPs) was prepared in response to the MS4 Permit and describes requirements for new development and significant redevelopment projects to incorporate Low Impact Development (LID) BMPs to the maximum extent practicable. This document provides guidance for incorporation of site design/LID, source control, and treatment control BMPs. This document also addresses Hydrologic Conditions of Concern (HCOC) mitigation measures necessary for specific new and redevelopment sites. The methodology for sizing LID BMPs along with design specifications will be referenced within the SWRP when identifying similar types of stormwater BMP projects, such that the approach and specifications are consistent with this approved and implemented guidance document.

3.3.3 Municipal Stormwater Management Plan

This Municipal Stormwater Management Plan (MSWMP) is an interim umbrella document that presents the overall MS4 Permit implementation approach as managed by the San Bernardino County Areawide Stormwater Program. The MSWMP is developed to delineate the following Areawide Programs: program management; illegal discharges; industrial/commercial sources; new development and redevelopment; public agency activities; residential program activities; public information and participation; program evaluation; and monitoring. The MSWMP will be referenced to verify the SWRP is consistent with the currently implemented stormwater program.

3.4 Urban Water Management Plans

3.4.1 IEUA and WFA Urban Water Management Plan

The 2015 Urban Water Management Plan (UWMP) is an update to the IEUA and Water Facilities Authority's (WFA) 2010 UWMP. IEUA provides services for the southwestern section of San Bernardino County in the SARW which also encompasses the WFA's service area of 135 square miles within the upper SARW. This UWMP lays out the region's plan for ensuring reliable, cost-effective, and environmentally responsible water supplies for the next 25 years. This document includes information about water demand, water supply, and supply reliability assessment in the IEUA service region. The IEUA and WFA UWMP will be referenced during the development of the SWRP for information regarding water supply and demand and potential projects that may be included in the SWRP.

3.4.2 San Bernardino Valley Regional Urban Water Management Plan

The SBVMWD prepared the San Bernardino Valley Regional Urban Water Management Plan (UWMP) in 2015 and updated it in 2016. The SBVMWD service area includes nine additional water agencies, which are served by SBVMWD. The UWMP provides a summary of the anticipated supplies and demands for the years of 2015 through 2040. This document includes 16 sections and is over 1,100 pages. The sections include, but are not limited to, regional water sources, regional water use, contingency planning, future goals, and recommended projects. The SBVMWD UWMP will be referenced during the development of the SWRP for information regarding water supply and demand. Potential projects identified within the document will also be reviewed to identify if there are opportunities to include them in the SWRP.

3.5 Other Planning Documents

3.5.1 Chino Basin Stormwater Resources Plan Functional Equivalency Document

The objective of the Chino Basin Stormwater Resources Plan Functional Equivalency Document is to demonstrate that the accumulation of existing stormwater and dry-weather flow management programs and their implementation agreements in the Chino Basin are functionally equivalent to a SWRP. The IEUA, Chino Basin Watermaster, Chino Basin Water Conservation District (CBWCD), SBCFCD, and the region's cities and water districts have worked together since 2000 to implement regional programs within the Chino Groundwater Basin to increase groundwater recharge by using stormwater and dry-weather runoff. This collaboration has resulted in the development of recharge master plans; the construction, operation, maintenance, and monitoring of new recharge project facilities; periodic reviews of these recharge projects' performance; and periodic updates to recharge master plans. This document references a variety of other documents that together satisfy the SWRP Self-Certification Checklist, making projects referenced in these documents eligible for Proposition 1 implementation grant funding. This document, and the documents referenced within it, will be reviewed throughout the development of the SWRP development. Projects identified in this plan may also be included in the SBC SARW SWRP as appropriate.

3.5.2 Recharge Master Plan Update

The Chino Basin Watermaster and IEUA prepared a Recharge Master Plan Update (RMPU) in 2010 that was amended in 2013. The RMPU was prepared in response to a court order and includes a discussion on safe yield, review of water supply plans, description of existing stormwater recharge projects, assessment of stormwater recharge opportunities, evaluation of supplemental water recharge opportunities, and identifies future recharge plans. The 2013 amendment: addresses the changes since the 2010 RMPU and impacts of the revised groundwater production and replenishment projections; maintains an inventory of existing recharge facilities and their capabilities; utilizes monitoring, reporting, and accounting practices to estimate long-term average annual net stormwater recharge; and organizes recharge improvement projects and how to evaluate, rank, and apply the projects. The RMPU and amendment will be reviewed during the development of the SWRP to identify existing initiatives (projects and programs) that may be applicable to the SWRP. Potential projects identified within the documents will also be reviewed to identify if there are opportunities to include them in the SWRP.

3.5.3 Master Plans of Drainage

Master Plans of Drainage (MPD) were created to evaluate the existing drainage systems and recommend improvements and new facilities in an area based on localized drainage issues. MPDs are often developed based on projected future land uses in an undeveloped area and identify locations where storm drain facilities will be necessary. They address the current and future drainage needs of a city or area. SBCFCD has developed area specific MPDs covering developed portions of their jurisdiction (County unincorporated areas), some of which are available online and others available at their office. Additionally, some cities within the SBC SARW area have developed an MPD inclusive of their current and planned storm drain system. MPDs will be referenced as needed to verify storm drain locations and may be used as a tool for identifying potential projects, as planned facilities (new and/or improved) may be incorporated into projects identified and prioritized in the SWRP.

3.5.4 Comprehensive Storm Drain Plans

Comprehensive Storm Drain Plans (CSDPs) are similar to MPDs, as they evaluate existing drainage systems, identify deficiencies, and recommend improvements based on localized drainage issues. The main difference between CSDPs and MPDs is that CSDPs do not plan for future facilities in undeveloped areas; rather, they may identify future facilities needed to mitigate existing developed areas. Various CSDPs were developed by the SBCFCD and are available at their office. Similar to MPDs, CSPDs will be referenced as needed to verify storm drain locations and may be used as a tool for identifying potential projects, as planned facilities (new and/or improved) may be incorporated into projects identified and prioritized in the SWRP.

4. Studies and Reports

Information and findings from various studies and reports will be reviewed and referenced in the development of the SWRP as appropriate.

4.1 Annual Water Use Reports

IEUA monitors and compiles water use data from each of its retail agencies to track overall water demands and sources of supply. Each fiscal year, this data is compiled into an Annual Water Use Report. Data includes monthly water use (by member agency and source of supply), a five-year history of water use, and retail agency water usage as a percentage of the total water used in the service area. These reports will be reviewed for information pertaining to water use within the IEUA service area, as this information is required in the SWRP based on the SWRP Guidelines.

4.2 FEMA Flood Insurance Study and Flood Insurance Rate Maps

The Federal Emergency Management Agency (FEMA) prepared a Flood Insurance Study (FIS) for San Bernardino County, California and Incorporated Areas. This study revises and updates information on the existence and severity of flood hazards in the geographic area of San Bernardino County. Flood risk data that is used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management is summarized in the FIS. The FIS includes flow rate information, cross section data, and narrative descriptions of areas that have been assessed for flooding potential. In addition to the FIS, Flood Insurance Rate Maps (FIRMs) are prepared, which illustrate the extent of modeled floodplains. These maps are available through the FEMA website as image files and GIS shapefiles. The FIS and FIRMs will be reviewed to identify areas susceptible to flooding. This information may be used to identify and prioritize projects in the SWRP.

4.3 Preliminary Data Summary of Urban Stormwater Best Management Practices

The Preliminary Data Summary of Urban Stormwater Best Management Practices was prepared by the United States Environmental Protection Agency (USEPA) and includes information on the effects of urban land use as a contributor to acidity and nutrients in stormwater. Additionally, this document makes the case for the atmospheric deposition of nutrients and metals. This report summarizes information and data regarding the effectiveness of BMPs at controlling and reducing pollutants in urban stormwater, expected costs, and environmental benefits. This report describes how urban stormwater runoff is a source of pollutants causing water quality impairments, what those pollutants are, and where they originate from. This information will be utilized throughout the development of the SWRP to identify activities generating or contributing to the contamination of stormwater runoff. BMP design standards will also be reviewed and referenced as appropriate.

4.4 Use Attainability Analysis Cucamonga Creek Reach 1

A Use Attainability Analysis for Cucamonga Creek Reach 1 was prepared in 2013 by the RWQCB. This document explores the possibility of recovering the beneficial uses of Cucamonga Creek. The Use Attainability Analysis describes Reach 1 of Cucamonga Creek in detail, provides information regarding the existing beneficial uses, summarizes the factors that impact the beneficial uses, and identify future uses and the impact of those uses. Additionally, the current characteristics of the impaired creek and potential sources of pollution are discussed along with water quality monitoring data. Information presented in the Use Attainability Analysis will be reviewed and incorporated into the SWRP as appropriate. It is anticipated that the water body characterization and discussion of pollutant sources will be important to the development of the SWRP, specifically relating to the water quality prioritization and identification of potential pollutant sources.

5. GeoTracker

“GeoTracker” is the SWRCB’s online database management system to track and archive compliance data from discharges or spills of waste or unauthorized releases of hazardous material from underground storage tanks. A map is produced with a list of sites that impact, or had/have a potential to impact, groundwater quality in California. Also, GeoTracker contains records for various unregulated projects, as well as permitted facilities such as irrigated lands, oil and gas refineries, and other related sites. Information pertaining to both open and closed cases are available through GeoTracker. GeoTracker will be utilized as part of the project evaluation and prioritization phase of the SWRP development to identify if a project that involves infiltration will negatively impact groundwater supply due to existing contamination.

6. Geographic Information System Data

GIS software is designed to capture, store, manipulate, analyze, manage, and present spatial data. There are various sources of GIS data available within the SBC SARW area that will be referenced and utilized throughout the SWRP development. GIS data gathered may be used for analysis and/or creating figures. Data from the County of San Bernardino's Geographic Information Management System will be utilized to support the development of the SWRP. Data taken from this database includes county boundary, land use, jurisdictional boundaries, and subwatershed boundaries. Data was also pulled from other governmental GIS databases. The following GIS data will be reviewed from various sources and incorporated as appropriate: floodplains, groundwater basins, impairments, soil conditions, storm drains, topography, water bodies, etc. Some examples of sources other than San Bernardino County include, but are not limited to, FEMA, Department of Water Resources (DWR), SAWPA, United States Geological Survey (USGS), and more.

7. Total Maximum Daily Load

TMDL requirements and supporting technical documents will be utilized during the development of the SWRP, including, but not limited to, Basin Plan Amendments (BPAs) and TMDL Staff Reports.

7.1 Big Bear Lake Nutrient TMDL

The BPA for the Big Bear Lake Nutrient TMDL includes background information regarding phosphorous, the principle nutrient causing the impairment, sources, and numeric targets (to be applied in all hydrologic conditions) for total phosphorus and response numeric targets for chlorophyll *a*, macrophyte coverage, and percentage of nuisance aquatic vascular plant species. The response numeric targets provide a method of tracking improvements to water quality as a result of reduced loading of phosphorus. The BPA specifies WLAs and LAs for total phosphorus for Big Bear Lake that applies to Dry Hydrologic Conditions. The BPA also specifies an implementation plan for nutrient reduction that includes compliance schedules for the numeric targets, WLAs, and LAs. The BPA outlines requirements associated with a monitoring program, which has been incorporated into the Big Bear Lake Watershed-Wide Nutrient Monitoring Program, as described in **Section 3.2.2**, which is used to track progress toward compliance. In addition to the BPA, a Staff Report is available, which provides additional details regarding the findings presented in the BPA. These documents will be referenced throughout the development of the SWRP, as the SWRP will consider objectives and schedules established by TMDLs. Additionally, projects and programs will be made consistent to TMDL documents.

7.2 Big Bear Lake and Rathbun Creek Draft Sedimentation/Siltation TMDLs Technical Staff Report

The Staff Report on the Sediment TMDL for Big Bear Lake and Rathbun Creek was prepared in 2005 to support the development of a TMDL. The Staff Report was created to assess the sources of sedimentation and siltation impairments in Big Bear Lake and Rathbun Creek. The Staff Report provides information on the land uses tributary to both Big Bear Lake and Rathbun Creek. References are made to weathering, mass-wasting, and watershed erosion processes to explain the impairments. Additionally, a link between sedimentation and nutrient impairment is made. A BPA/TMDL was never finalized and approved for Big Bear Lake and Rathbun Creek for sedimentation/siltation; however, this report will be reviewed for information regarding the source assessment conducted, as this information may be applicable to the SWRP.

7.3 Big Bear Lake Technical Support Document for Mercury TMDL

The Big Bear Lake Technical Support Document for Mercury TMDL was prepared in 2008 for the SWRCB and USEPA. This document describes the possible sources of mercury loading into Big Bear Lake and the techniques used to quantify loads from each source. Local and regional monitoring data coupled with model output for Big Bear Lake Watershed were used to estimate loading from wet and dry atmospheric deposition and watershed sources (water column and sediment bound). The Technical Report finds that the MS4 was not a significant source of mercury in the lake. This document will be reviewed and referenced as appropriate throughout the development of the SWRP, specifically in regards to the water quality evaluation and source assessment. A BPA/TMDL was never finalized and approved for Big Bear Lake for mercury; however, this report will be reviewed for information regarding the source assessment conducted, as this information may be applicable to the SWRP.

7.4 Middle Santa Ana River Watershed Bacterial Indicator TMDL

The BPA for the MSAR Bacterial Indicator TMDL includes background information regarding the fecal coliform impairment, potential sources, and numeric targets to be achieved in the MSAR. The BPA also includes the USEPA requirement of the states to evaluate and incorporate Escherichia coliform (*E. coli*) as water quality standards based on its “Ambient Water Quality Criteria for Bacteria - 1986.” The BPA specifies alternative numeric targets for *E. coli* to be achieved in the MSAR. The amendment specifies Wet and Dry Season TMDLs, WLAs for point sources, and LAs for fecal coliform and *E.coli*. Included in the amendment is an implementation plan for bacterial reduction, which was incorporated into the CBRP, as described in **Section 3.2.3**. In addition to the BPA, a Staff Report is available, which provides additional details regarding the findings presented in the BPA. These documents will be referenced throughout the development of the SWRP, as the SWRP will consider objectives and schedules established by TMDLs. Additionally, projects and programs will be made consistent to TMDL documents.

8. Additional Data

In addition to the sources identified above, the following additional sources may be referenced as applicable throughout the development of the SWRP. It is anticipated that references in addition to those identified in this TM will be identified throughout the development of the SWRP.

- Clean Water Act Section 303(d) List
- Future MS4 Permits (if made available)
- Other applicable NPDES Permits
- San Bernardino County Areawide Stormwater Program Annual Reports
- Local Implementation Plans (LIPs)
- Applicable laws and ordinances
- Planning documents prepared by local agencies and Non-Governmental Organizations (NGOs)
- Groundwater monitoring data

9. References

Chino Basin Watermaster. September 2013. 2013 Amendment to the 2010 Recharge Master Plan Update. http://www.cbwm.org/docs/engdocs/2013%20Amendment%20to%20the%202010%20RMPU/2013%20Amendment%20to%20the%202010%20RMPU%20%E2%80%93%20Sections%201%20through%208.pdf Referenced April 2017. Prepared by Wildermuth Environmental Inc.

Federal Emergency Management Agency (FEMA). Revised September 2016. Flood Insurance Study.

Federal Emergency Management Agency (FEMA). Flood Insurance Rate Maps. https://msc.fema.gov/portal#. Referenced April 2017

Inland Empire Utilities Agency (IEUA). May 2016 (2016a). 2016 Chino Basin Storm Water Resources Plan Functional Equivalency Document. https://18x37n2ovtbb3434n48jhbs1-wpengine.netdna-ssl.com/wp-content/uploads/2016/05/Chino-Basin-SWRP-20160513.pdf. Referenced April 2017.

Inland Empire Utility Agency (IEUA). 2016 (2016b). IEUA FY 2015-2016 Annual Water Use Report: Retail Agency Water Use and Five Year History. https://18x37n2ovtbb3434n48jhbs1-wpengine.netdna-ssl.com/wp-content/uploads/2017/01/16269-Annual-Water-Use-Report-15-16-20161116.pdf. Referenced April 2017.

Inland Empire Utilities Agency (IEUA). 2016 (2016c). Integrated Water Resources Plan: Water Supply & Climate Change Impacts 2015—2040. https://www.ieua.org/download/integrated-water-resources-plan-2015/. Referenced April 2017.

Inland Empire Utilities Agency (IEUA) and Water Facilities Authority (WFA). June 2016 (2016d). 2015 Urban Water Management Plan. https://18x37n2ovtbb3434n48jhbs1-wpengine.netdna-ssl.com/wp-content/uploads/2016/07/FINAL-IEUA-WFA-2015-UWMP-2016-07-07.pdf. Referenced April 2017. Prepared by Water System Consulting (WCS).

San Bernardino County Areawide Stormwater Program. August 2011. Integrated Watershed Monitoring Program. Submitted to the Santa Ana Regional Water Quality Control Board. Prepared by Larry Walker and Associates. http://www.waterboards.ca.gov/rwqcb8/water_issues/programs/stormwater/docs/sbpermit/iwmp/Revised_IWMP.pdf. Referenced April 2017.

San Bernardino County Areawide Stormwater Program. May 2013 (2013a). Hydromodification Management and Monitoring Plan for the Santa Ana River Watershed Region within the County of San Bernardino. http://www.waterboards.ca.gov/rwqcb8/water_issues/programs/stormwater/docs/sbpermit/wap/Phase2/WAPAppendixH-HMP.pdf. Referenced April 2017.

San Bernardino County Areawide Stormwater Program. May 2013 (2013b). San Bernardino County Watershed Action Plan.

http://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/docs/sbpermit/wap/Phase2/WAP-FINAL.pdf. Referenced April 2017.

San Bernardino County Areawide Stormwater Program. August 2014. Report of Waste Discharge. Application for Renewal of the Municipal NPDES Stormwater Permit NPDES Permit No. CAS618036. http://sbcountystormwater.org/wp-content/uploads/2013/10/San-Bernardino-County-2014-ROWD-Final-8.1.14.pdf. Referenced April 2017.

San Bernardino County Areawide Stormwater Program. June 2013. Technical Guidance Document for Water Quality Management Plans. Prepared by CDM Smith. http://www.swrcb.ca.gov/santaana/water_issues/programs/stormwater/docs/sbpermit/wqmp/Final/Final_TGD_WQMP.pdf. Referenced April 2017.

San Bernardino County Areawide Stormwater Program. January 2015. Municipal Stormwater Management Plan. Submitted to the Santa Ana Regional Water Quality Control Board.

San Bernardino County Department of Public Works (SBCDPW). Comprehensive Storm Drain Plans. http://cms.sbcounty.gov/dpw/FloodControl/Planning/MPD.aspx. Referenced April 2017.

San Bernardino County Department of Public Works (SBCDPW). Master Plan of Drainage. http://cms.sbcounty.gov/dpw/FloodControl/Planning/MPD.aspx. Referenced April 2017.

San Bernardino County Flood Control District (SBCFCD). June 2011. Comprehensive Bacteria Reduction Plan. Submitted to the California Regional Water Quality Control Board, Santa Ana Region. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/msar/cbrp/scb/Final_SBCo_CBRP_wAttachments.pdf. Referenced April 2017.

San Bernardino County Flood Control District (SBCFCD). July 2012. Big Bear Lake Nutrient TMDL Compliance Program Watershed-Wide Monitoring Plan. Prepared by Brown and Caldwell.

San Bernardino Valley Municipal Water District (SBVMWD). January 2015. Upper Santa Ana River Watershed Integrated Regional Water Management Plan. http://www.sbvwcd.org/docman-projects/upper-santa-ana-integrated-regional-water-management-plan/3802-usarw-irwmp-2015-ch1-9-final/file.html. Referenced April 2017. Prepared by Water System Consulting (WCS).

San Bernardino Valley Municipal Water District (SBVMWD). June 2016. San Bernardino Valley Regional Urban Water Management Plan. http://www.sbvmwd.com/home/showdocument?id=4196. Referenced April 2017.

Santa Ana Regional Water Quality Control Board (RWQCB). January 2005, most recently updated February 2016. Water Quality Control Plan for the Santa Ana River Basin (8). http://www.swrcb.ca.gov/santaana/water_issues/programs/basin_plan/index.shtml. Referenced April 2017.

Santa Ana Regional Water Quality Control Board (RWQCB). May 2007. Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate Bacterial Indicator Total Maximum Daily

Loads (TMDLs) for Middle Santa Ana River Watershed Waterbodies. http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2005/05_001.pdf. Referenced April 2017.

Santa Ana Regional Water Quality Control Board (RWQCB). January 2010. National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for the San Bernardino County Flood Control District, the County of San Bernardino, and the Incorporated Cities of the San Bernardino County within the Santa Ana Region Area-Wide Urban Stormwater Runoff Management Program. http://www.waterboards.ca.gov/santaana/board_decisions/adopted_orders/orders/2010/10_036_SBC_MS4_Permit_01_29_10.pdf. Referenced April 2017.

Santa Ana Regional Water Quality Control Board (SWRCB). October 2013. Use Attainability Analysis – Cucamonga Creek Reach 1. http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/UAA/Cucamonga_UAA_10-7-13_Final.pdf. Referenced April 2017.

Santa Ana Watershed Project Authority (SAWPA). February 2014. One Water, One Watershed Plan 2.0. http://www.sawpa.org/owow-2-0-plan-2/. Referenced April 2017.

Santa Ana Watershed Project Authority (SAWPA). February 2016. Santa Ana River Watershed Bacteria Monitoring Program. Prepared by CDM Smith. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/msar/Monitoring_QAPP/Final_Monitoring_Plan_February_2016.pdf. Referenced April 2017.

State Water Resources Control Board (SWRCB). July 2005. Big Bear Lake and Rathbun Creek Draft Sedimentation/Siltation TMDLs Technical Report. http://www.waterboards.ca.gov/rwqcb8/water_issues/programs/tmdl/docs/bigbear/sediment/tmdl_sediment_part_2_0705.pdf. Referenced April 2017.

State Water Resources Control Board (SWRCB). October 2008. Big Bear Lake Technical Support Document for Mercury TMDL. http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/docs/bigbear/mercury/tetra_tech_bbl_support_document_10_31_08.pdf. Referenced April 2017.

State Water Resources Control Board (SWRCB). 2015. Storm Water Resource Plan Guidelines. http://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/docs/prop1/swrp_finalguidelines_dec2015.pdf.

State Water Resources Control Board (SWRCB). GeoTracker. https://geotracker.waterboards.ca.gov/. Referenced April 2017.

United States Environmental Protection Agency (USEPA). Preliminary Data Summary of Urban Storm Water Best Management Practices. August 1999. https://www3.epa.gov/npdes/pubs/usw_b.pdfhttps://www.epa.gov/sites/production/files/2015-11/documents/urban-stormwater-bmps_preliminary-study_1999.pdf. Referenced April 2017.

Western Municipal Water District (WMWD). May 2008. Western Municipal Water District Integrated Regional Water Management Plan 2008 Update. Prepared by Kennedy/Jenks Consultants. http://www.wmwd.com/DocumentCenter/Home/View/350. Referenced April 2017.

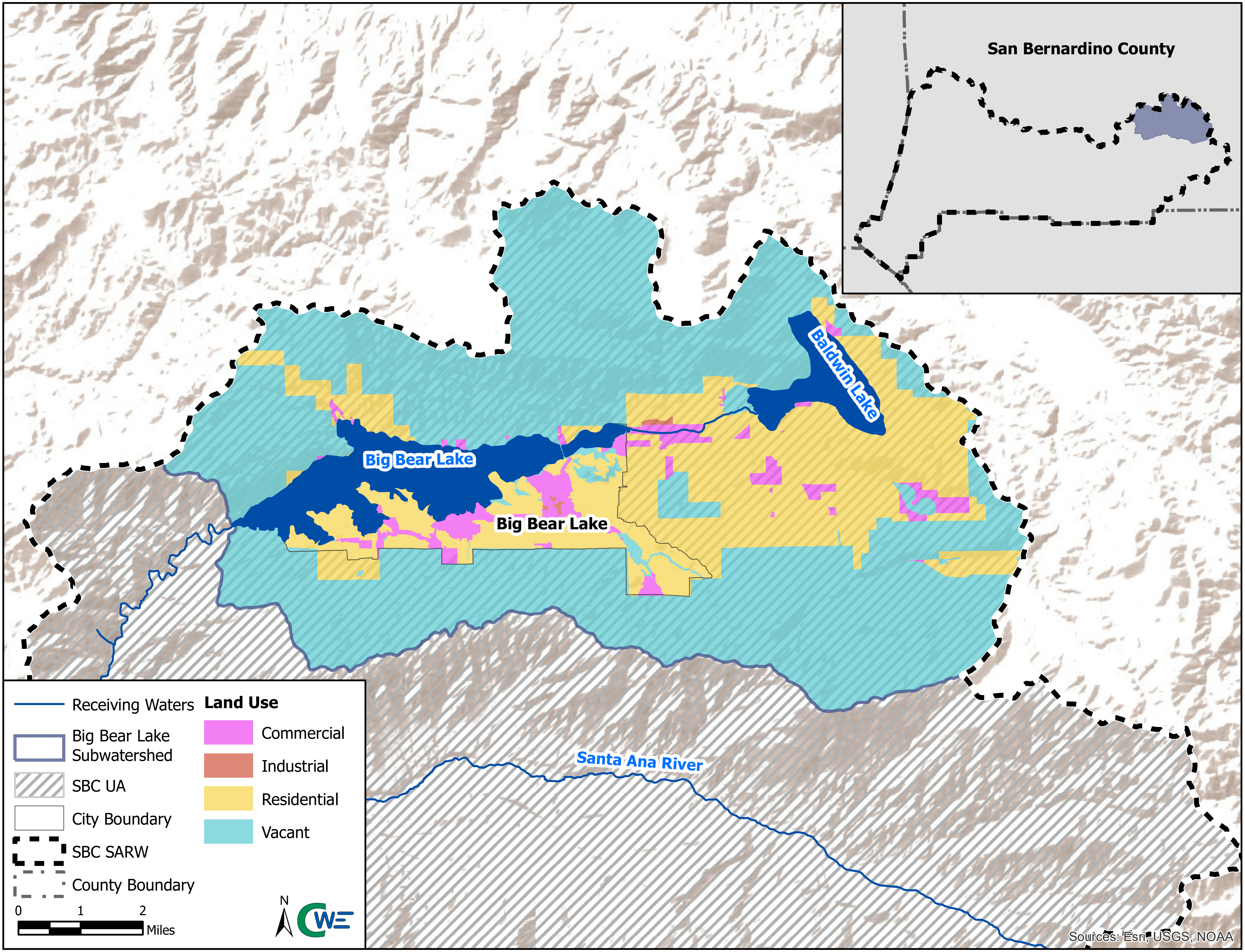
Attachment B

Land Use Categorization Table

Land Use Description	Re-Categorization
Agriculture	Agriculture
Cemetery	Vacant
College	Education
General Commercial	Commercial
General Industrial	Industrial
Golf Course	Vacant
Heavy Industrial	Industrial
Hotel/Motel	Commercial
Institutions/Government	Commercial
K-12 Schools	Education
Light Industrial	Industrial
Miscellaneous Commercial	Commercial
Miscellaneous Industrial	Industrial
Office	Commercial
Open-Non-developed	Vacant
Other Retail/Service	Commercial
Parks	Vacant
Regional Commercial	Commercial
Residential	Residential
Transportation	Transportation
Urban Mixed	Commercial
Utilities	Vacant

Attachment C

San Bernardino County Santa Ana River Subwatershed Figures


San Bernardino County
Big Bear Lake
Big Bear Lake
Baldwin Lake
Santa Ana River
Receiving Waters
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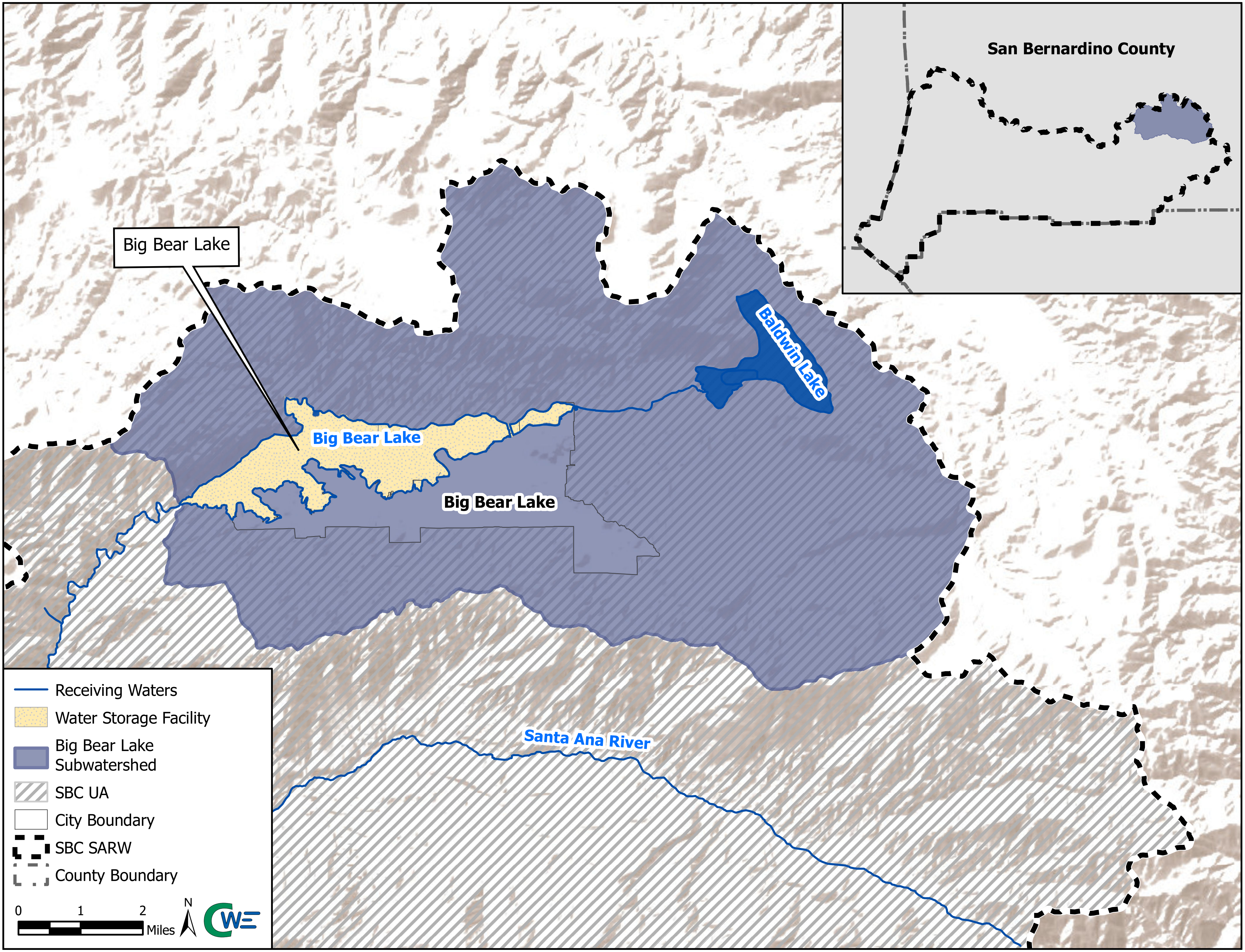
San Bernardino County
Big Bear Lake
Big Bear Lake
Baldwin Lake
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Santa Ana River
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Water Storage Facility
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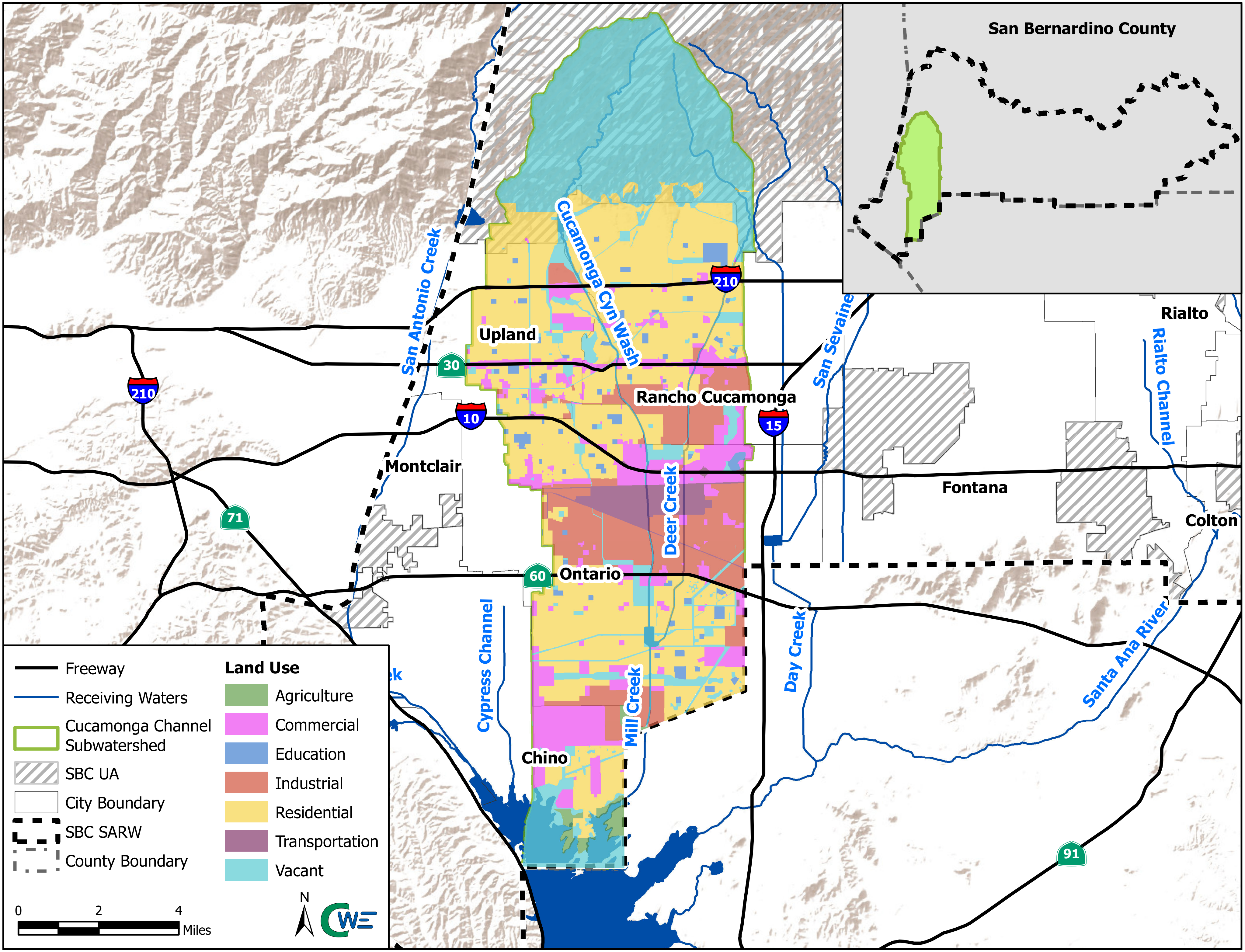

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Fontana
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Cucamonga Channel Subwatershed
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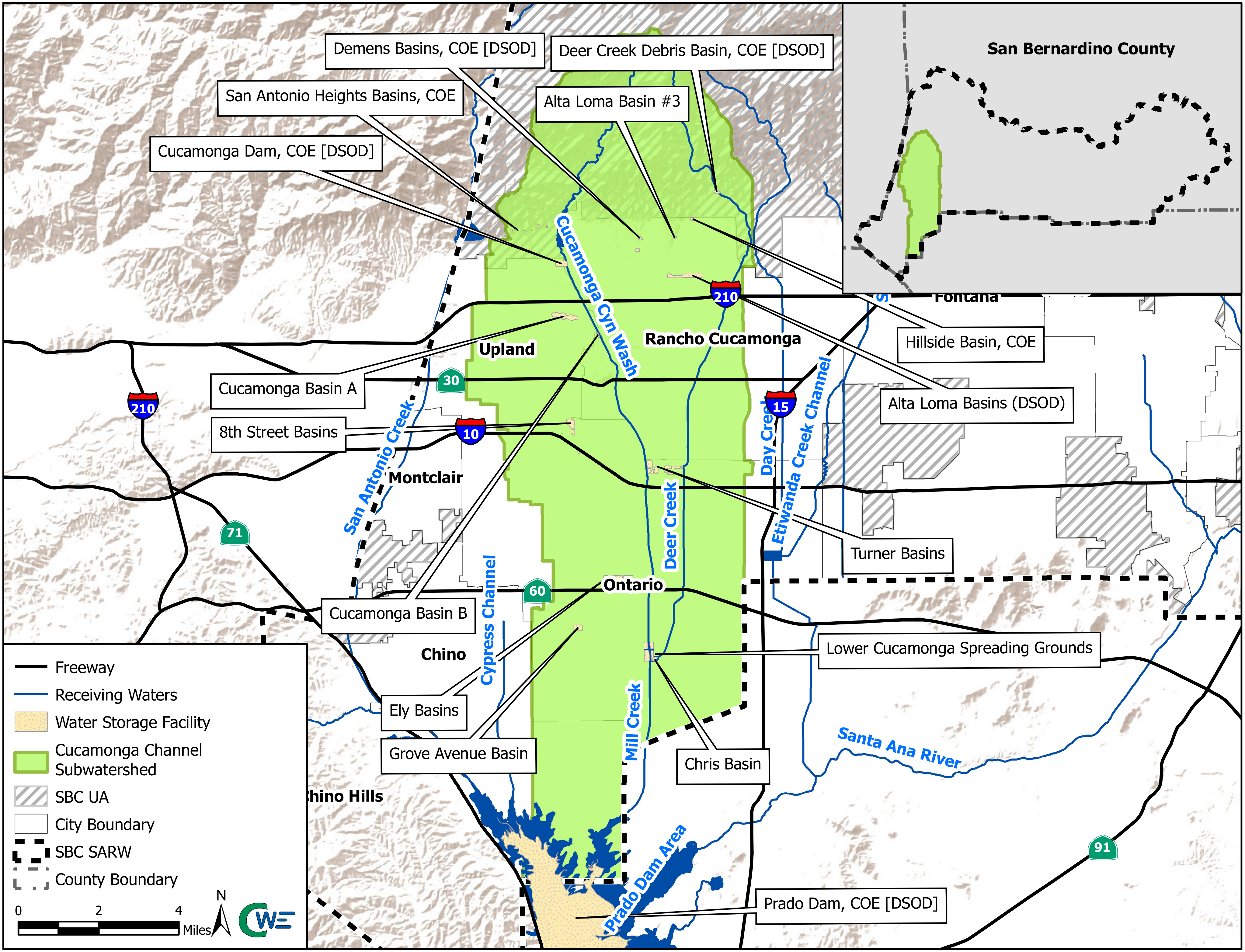

San Bernardino County
Demens Basins, COE [DSOD]
Deer Creek Debris Basin, COE [DSOD]
San Antonio Heights Basins, COE
Alta Loma Basin #3
Cucamonga Dam, COE [DSOD]
Fontana
Hillside Basin, COE
Rancho Cucamonga
Upland
Cucamonga Basin A
Alta Loma Basins (DSOD)
8th Street Basins
Montclair
Turner Basins
Ontario
Cucamonga Basin B
Chino
Lower Cucamonga Spreading Grounds
Ely Basins
Grove Avenue Basin
Chris Basin
Santa Ana River
Chino Hills
Prado Dam Area
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Cypress Channel
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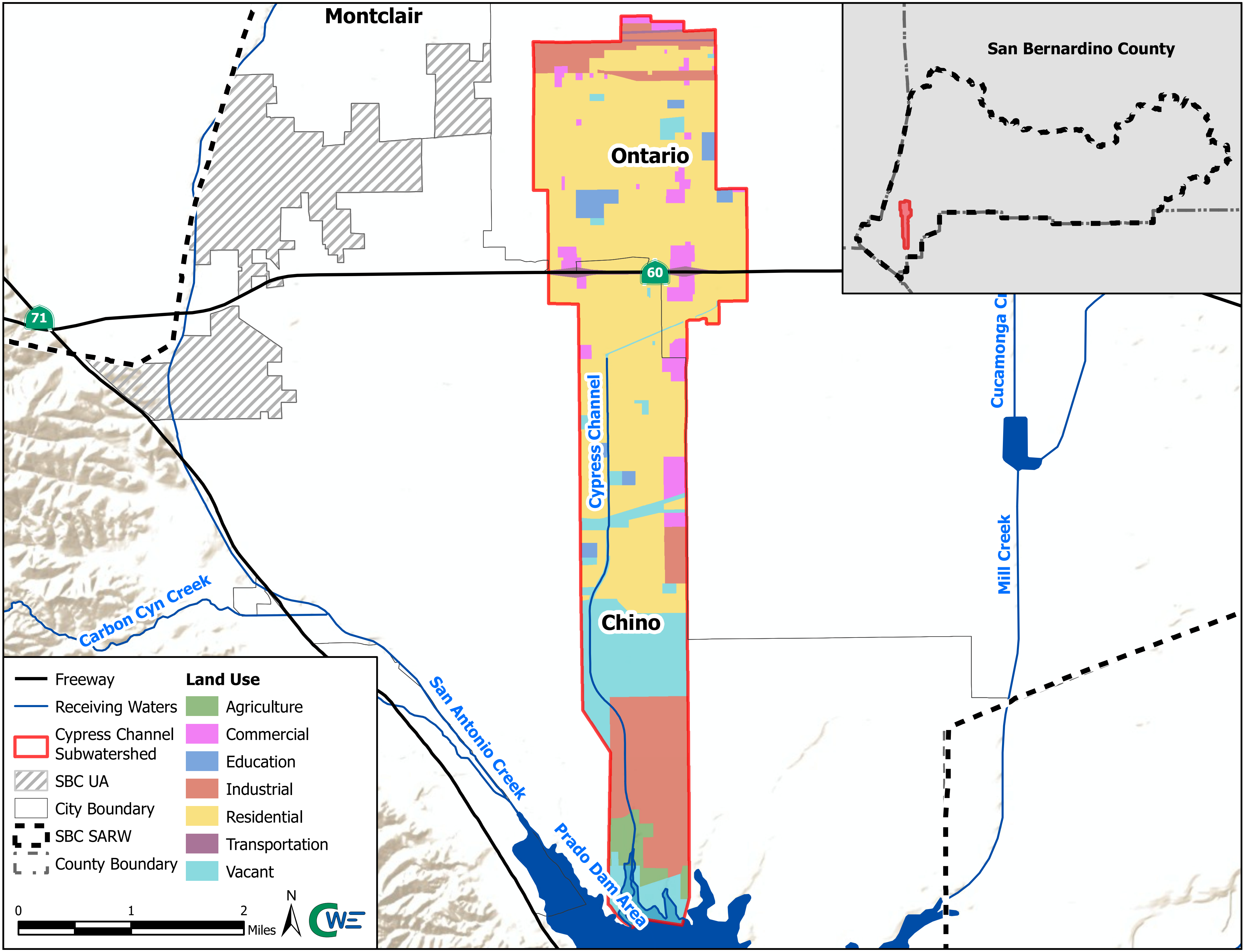

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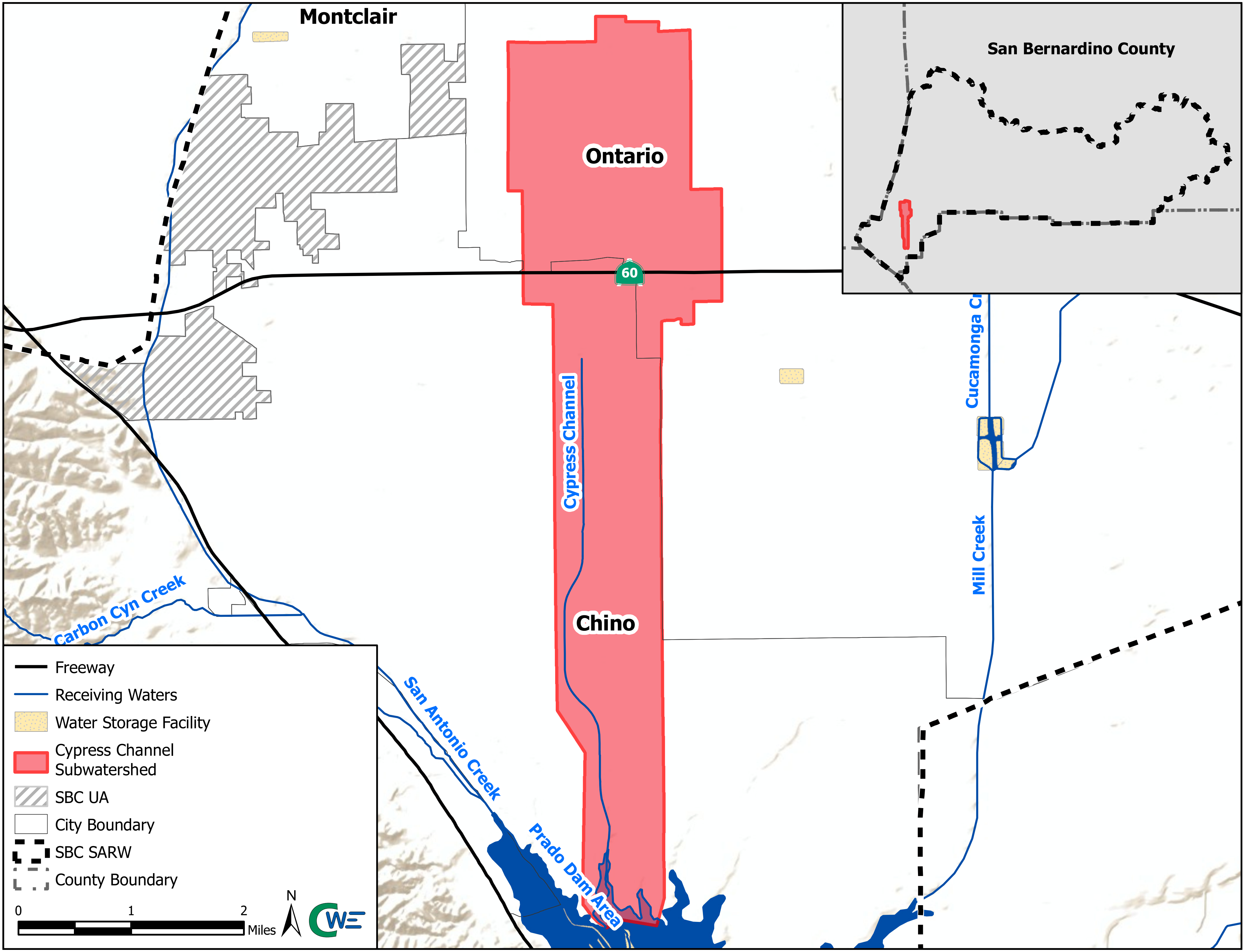

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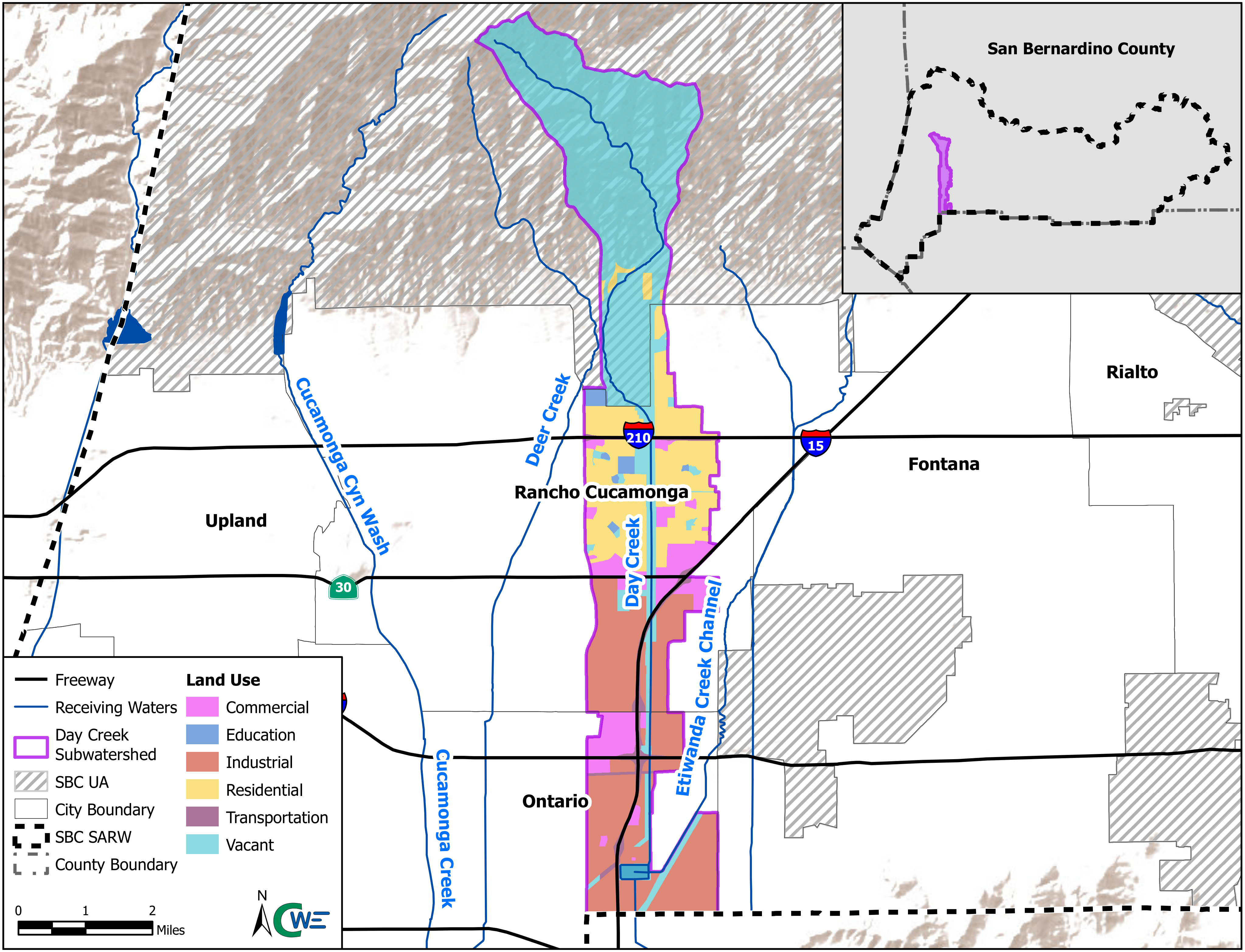
San Bernardino County
Rialto
Fontana
Upland
Rancho Cucamonga
Ontario
Cucamonga Cyn Wash
Deer Creek
Day Creek
Etiwanda Creek Channel
Cucamonga Creek
210
15
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Freeway
Receiving Waters
Day Creek Subwatershed
SBC UA
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County Boundary
Land Use
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Education
Industrial
Residential
Transportation
Vacant
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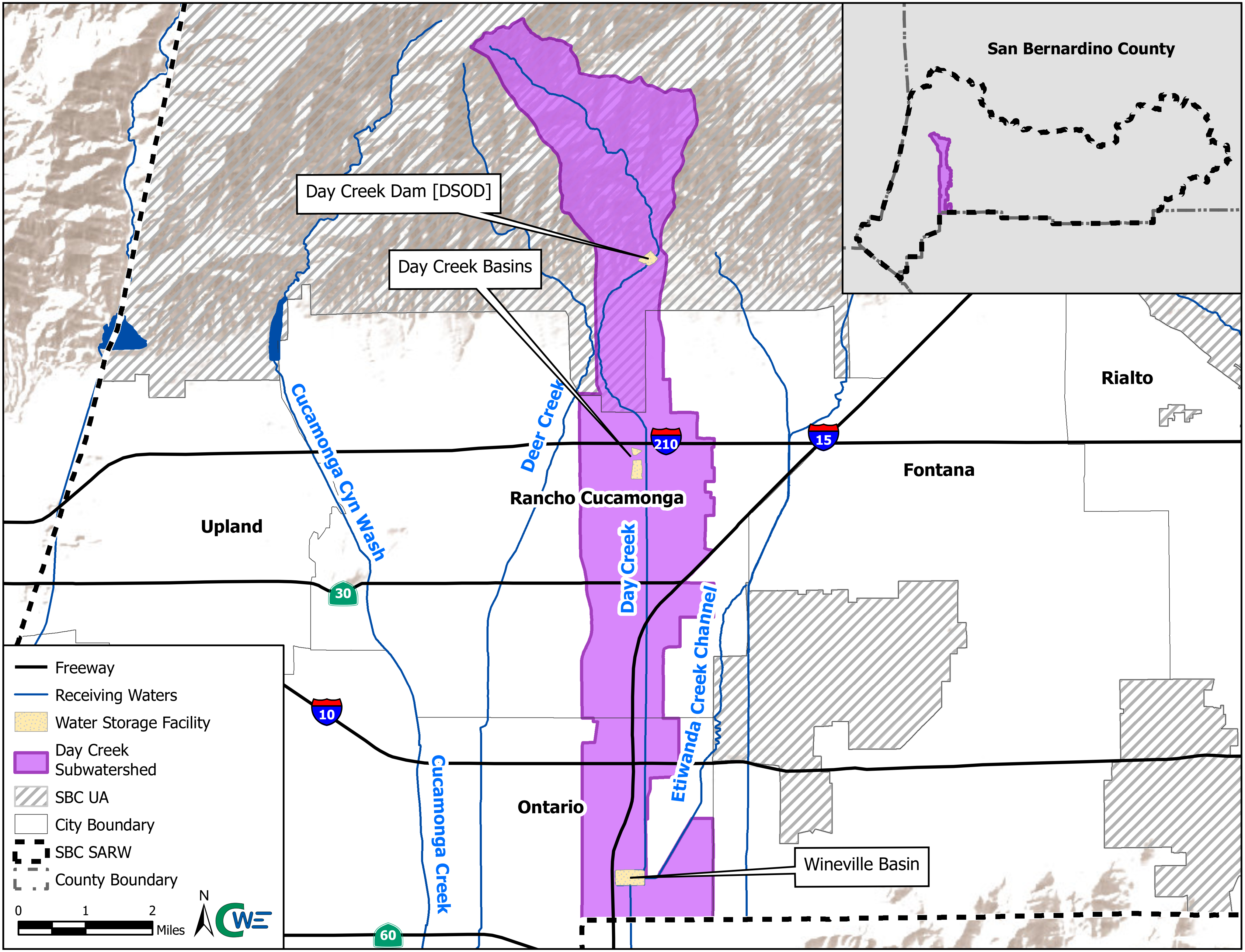

San Bernardino County
Day Creek Dam [DSOD]
Day Creek Basins
Wineville Basin
Cucamonga Cyn Wash
Deer Creek
Day Creek
Etiwanda Creek Channel
Cucamonga Creek
Rancho Cucamonga
Upland
Fontana
Rialto
Ontario
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Freeway
Receiving Waters
Water Storage Facility
Day Creek Subwatershed
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County Boundary
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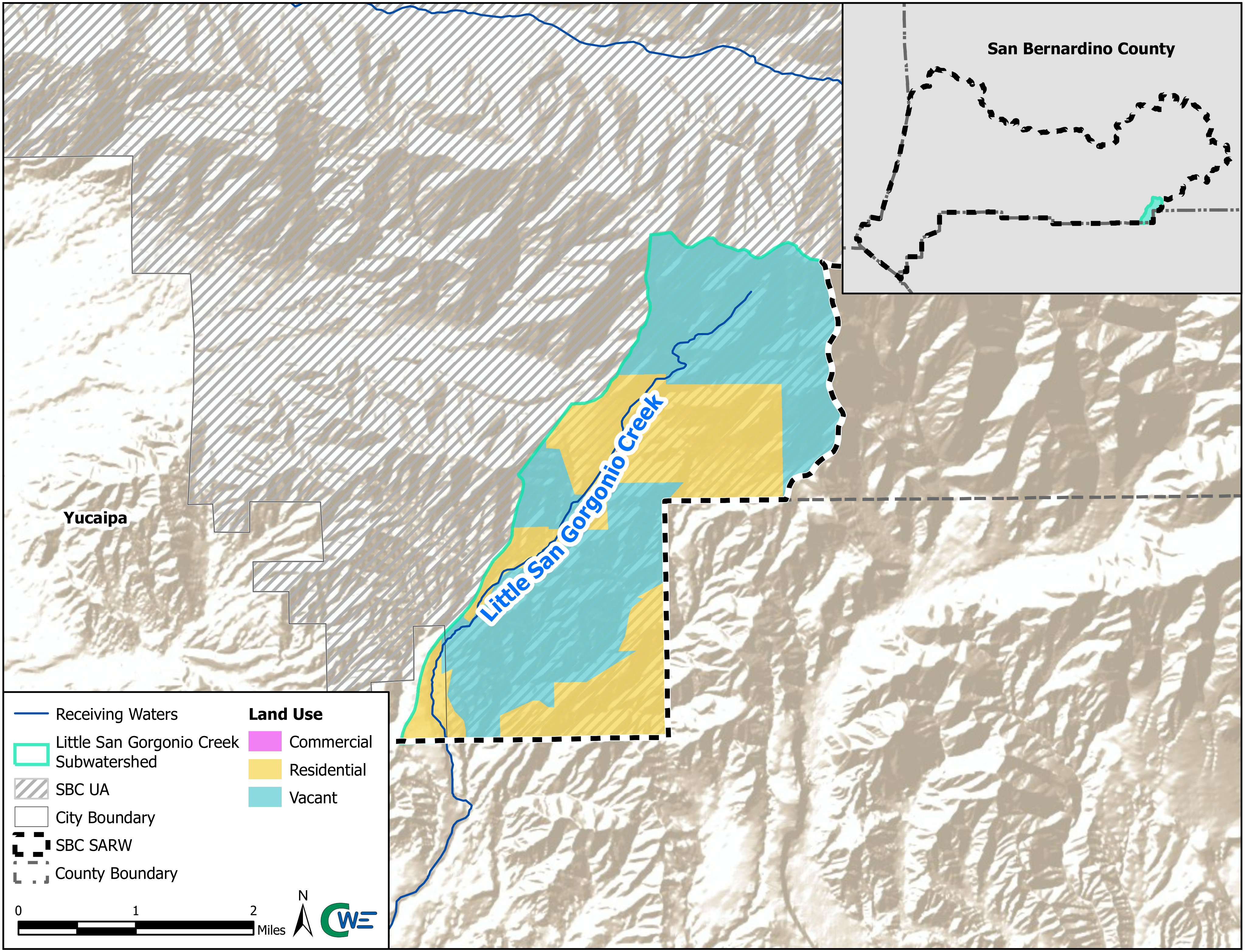

San Bernardino County
Yucaipa
Little San Gorgonio Creek
Receiving Waters
Little San Gorgonio Creek Subwatershed
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City Boundary
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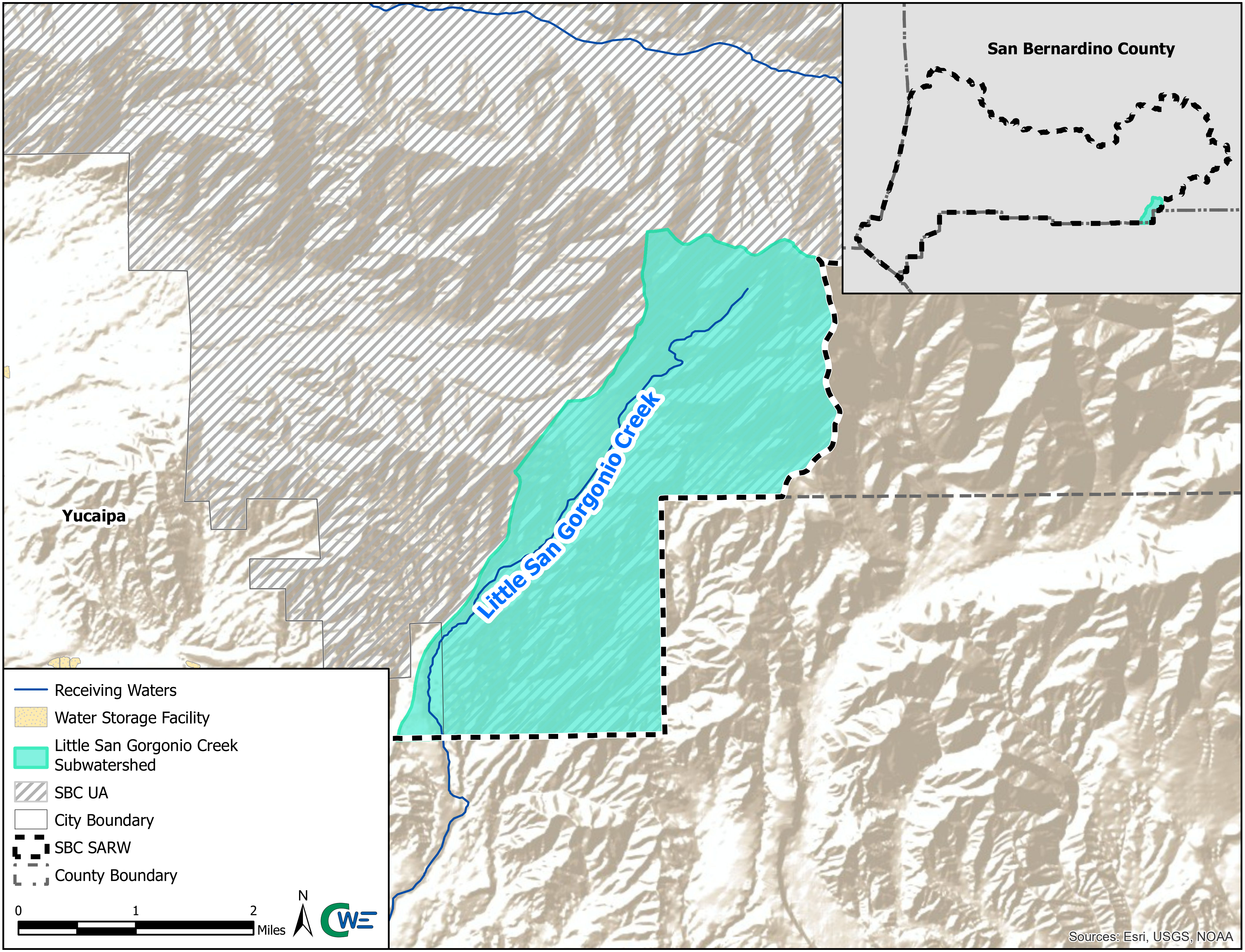
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City Boundary
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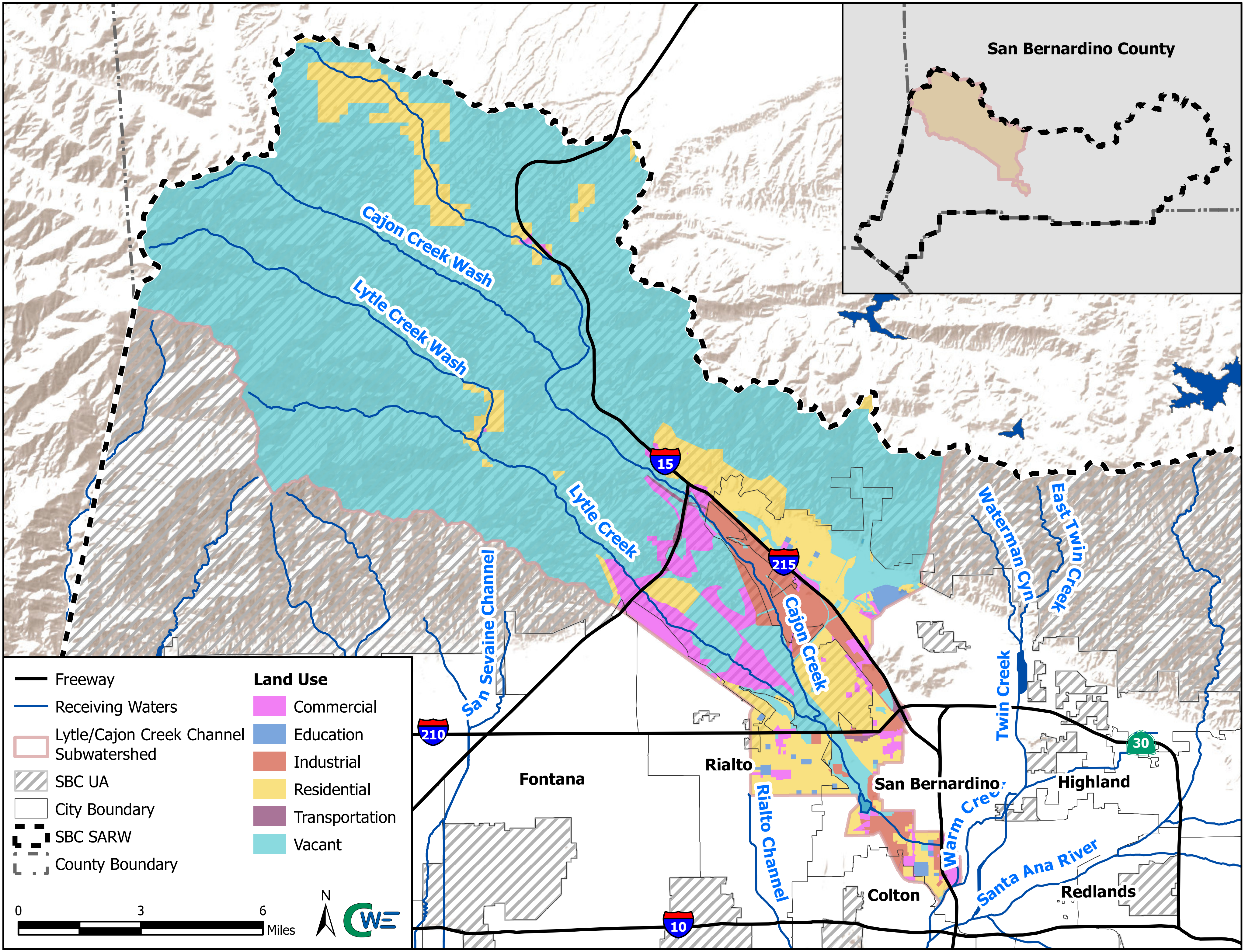
Sources: Esri, USGS, NOAA



San Bernardino County
Cajon Creek Wash
Lytle Creek Wash
Lytle Creek
Cajon Creek
San Sevaine Channel
Waterman Cyn
East Twin Creek
Twin Creek
Warm Creek
Santa Ana River
Rialto Channel
Fontana
Rialto
San Bernardino
Highland
Colton
Redlands
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Freeway
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Lytle/Cajon Creek Channel Subwatershed
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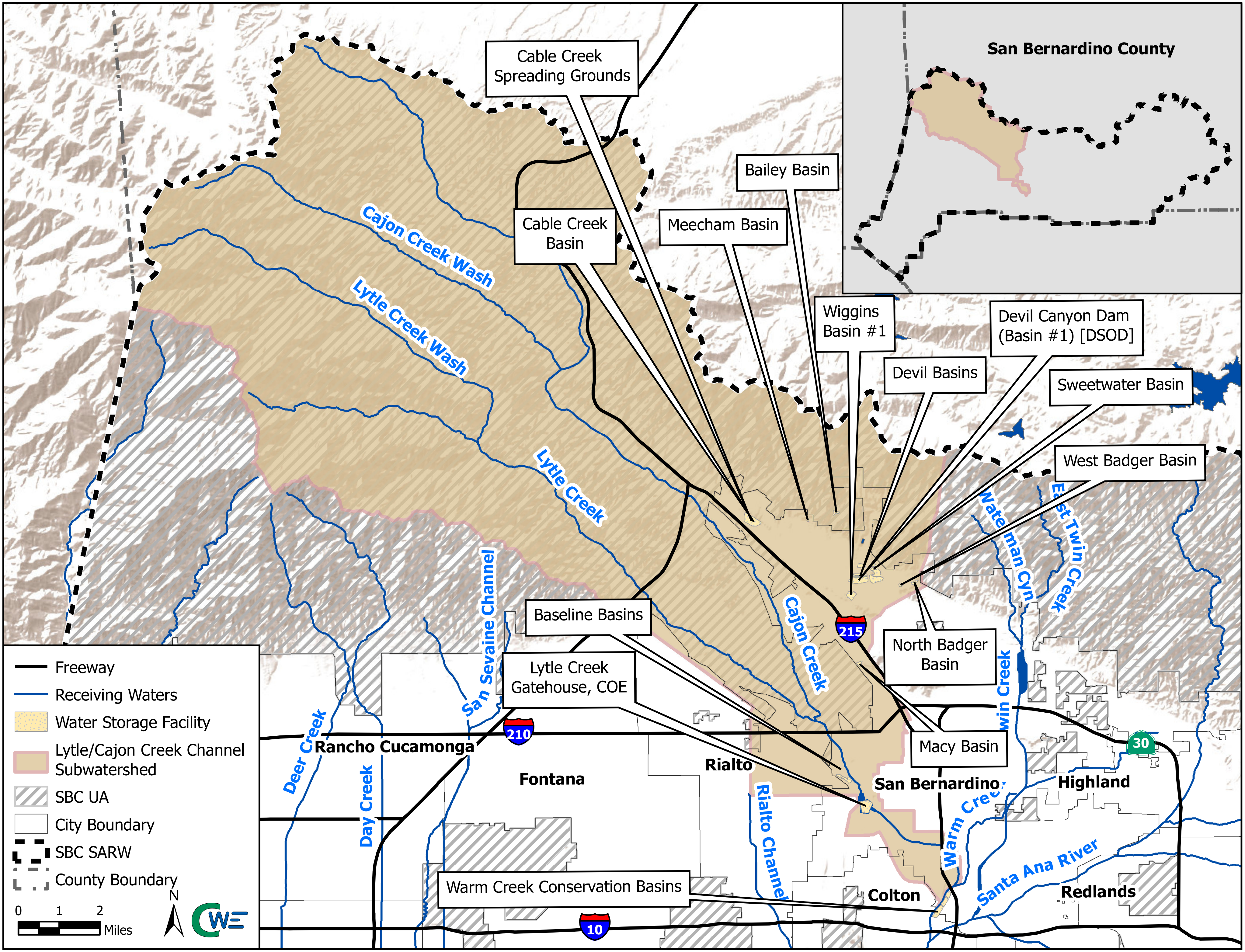
San Bernardino County
Cable Creek Spreading Grounds
Bailey Basin
Cable Creek Basin
Meecham Basin
Wiggins Basin #1
Devil Canyon Dam (Basin #1) [DSOD]
Devil Basins
Sweetwater Basin
West Badger Basin
North Badger Basin
Baseline Basins
Lytle Creek Gatehouse, COE
Macy Basin
Warm Creek Conservation Basins
Cajon Creek Wash
Lytle Creek Wash
Lytle Creek
Cajon Creek
San Sevaine Channel
Deer Creek
Day Creek
Rialto Channel
Waterman Cyn
East Twin Creek
Twin Creek
Warm Creek
Santa Ana River
Rancho Cucamonga
Fontana
Rialto
San Bernardino
Highland
Colton
Redlands
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Water Storage Facility
Lytle/Cajon Creek Channel Subwatershed
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City Boundary
SBC SARW
County Boundary
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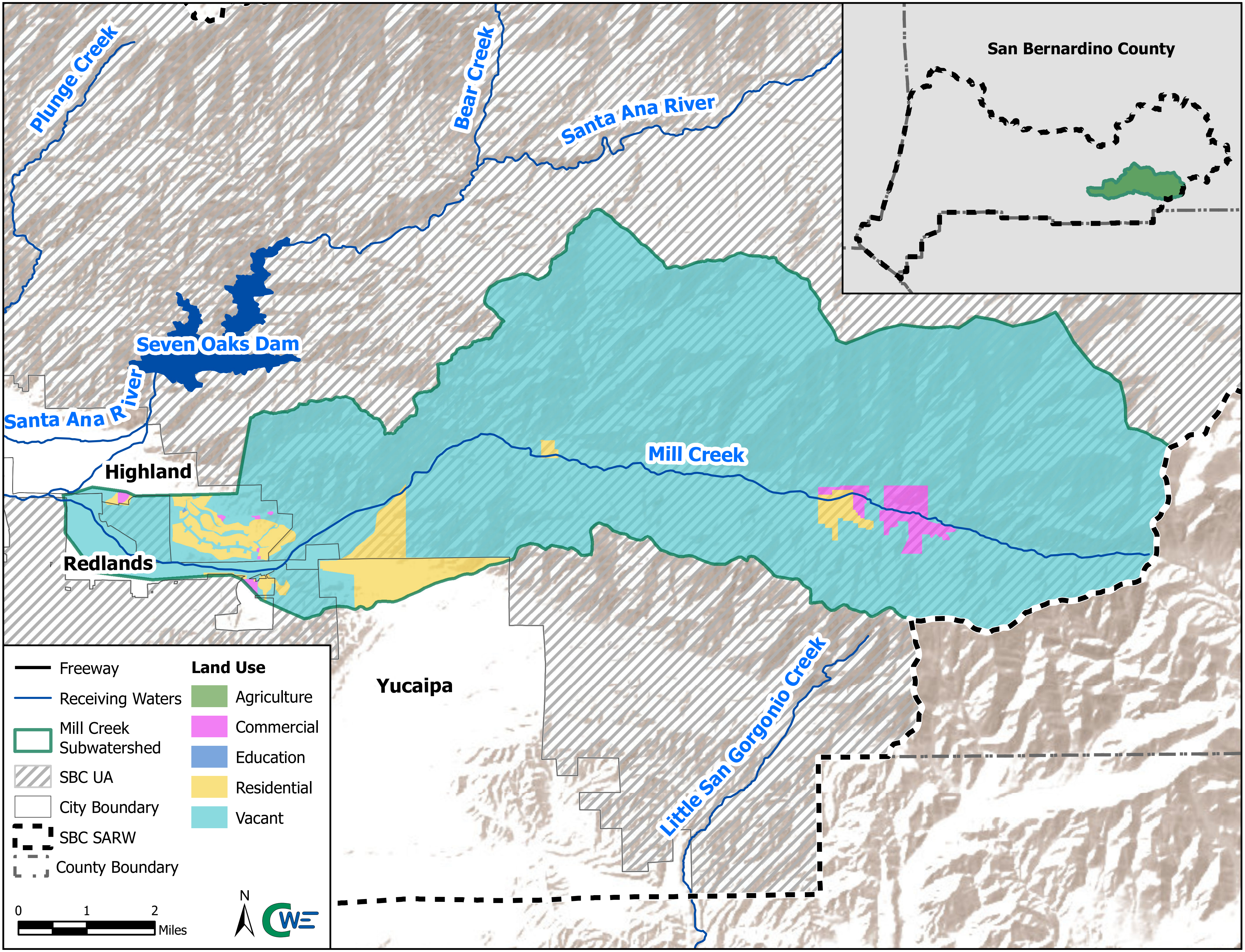

San Bernardino County
Plunge Creek
Bear Creek
Santa Ana River
Seven Oaks Dam
Santa Ana River
Highland
Mill Creek
Redlands
Yucaipa
Little San Gorgonio Creek
Freeway
Receiving Waters
Mill Creek Subwatershed
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City Boundary
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County Boundary
Land Use
Agriculture
Commercial
Education
Residential
Vacant
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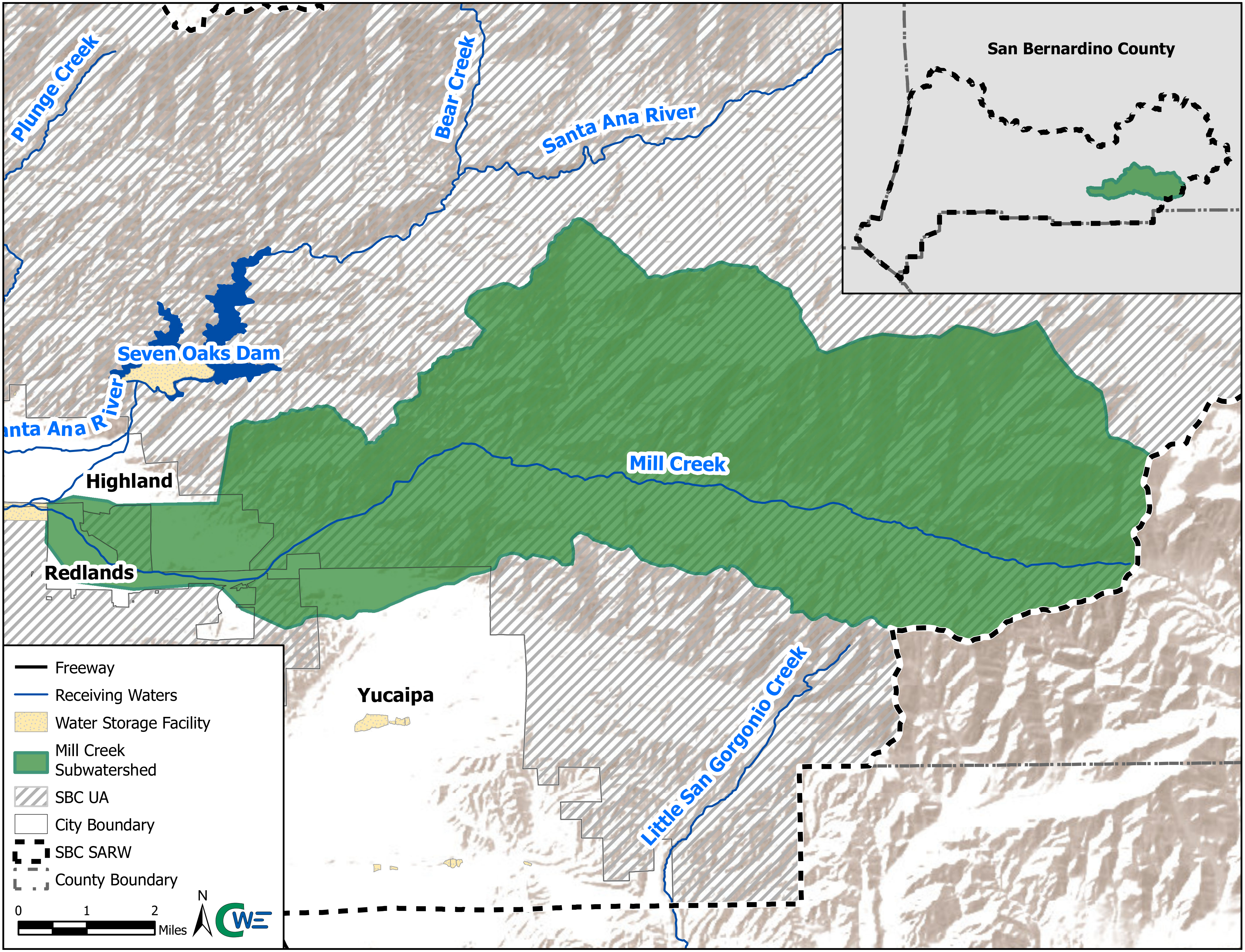
San Bernardino County
Plunge Creek
Bear Creek
Santa Ana River
Seven Oaks Dam
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Highland
Mill Creek
Redlands
Yucaipa
Little San Gorgonio Creek
Freeway
Receiving Waters
Water Storage Facility
Mill Creek Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
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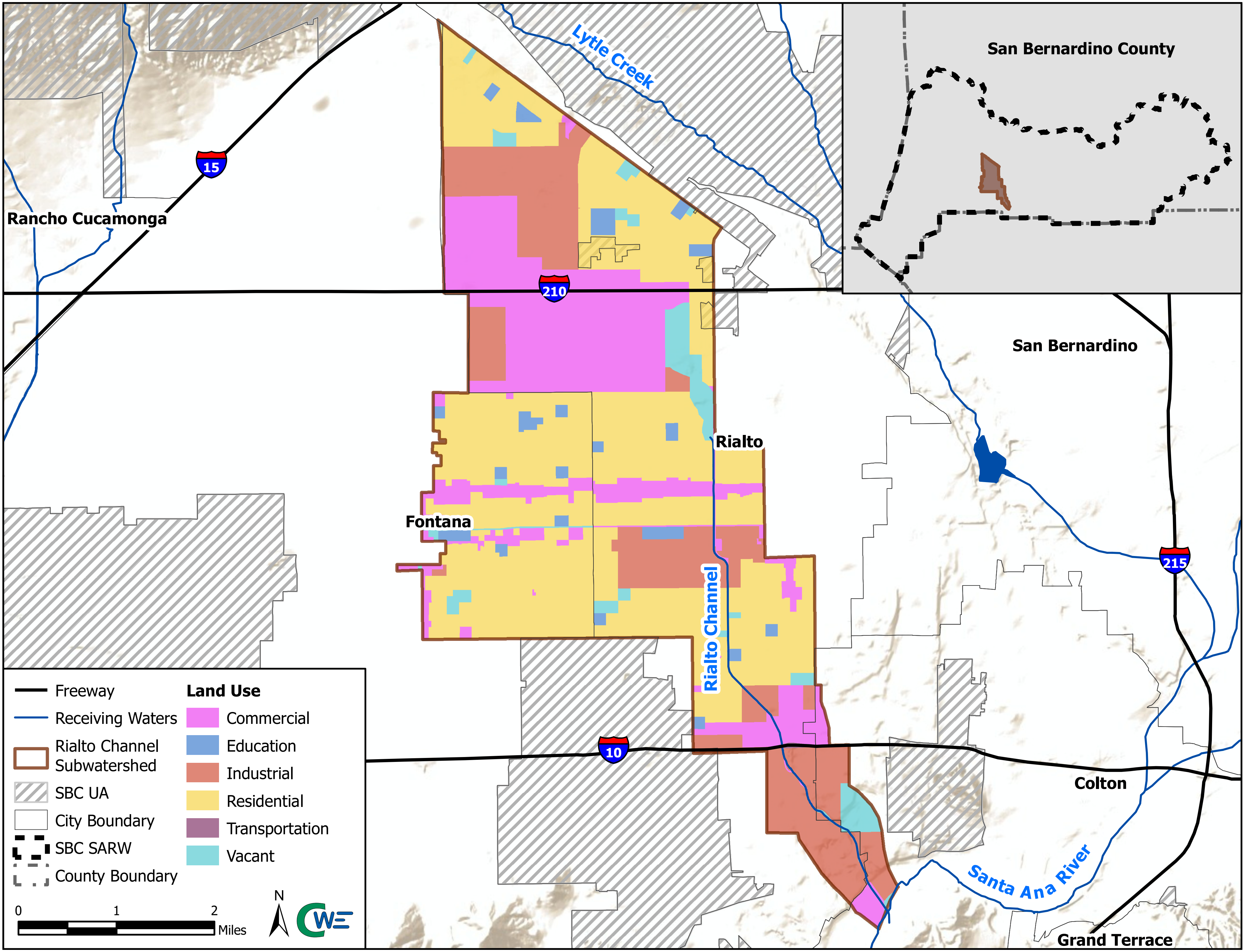

San Bernardino County
Lytle Creek
15
Rancho Cucamonga
210
San Bernardino
Rialto
Fontana
Rialto Channel
215
10
Colton
Santa Ana River
Grand Terrace
Freeway
Receiving Waters
Rialto Channel Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
Land Use
Commercial
Education
Industrial
Residential
Transportation
Vacant
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Miles
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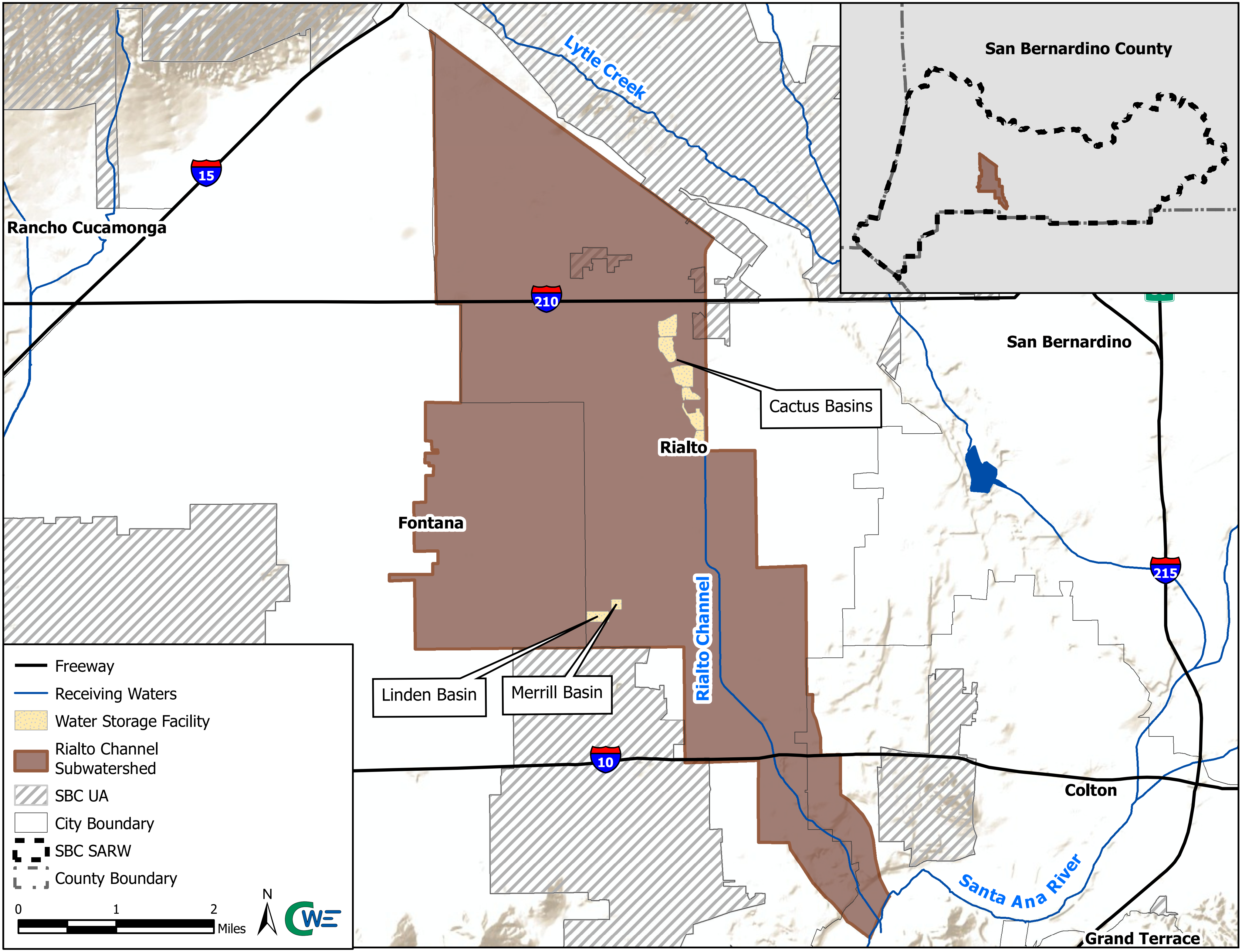
San Bernardino County
Lytle Creek
Rancho Cucamonga
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210
Cactus Basins
Rialto
San Bernardino
Fontana
215
Rialto Channel
Linden Basin
Merrill Basin
10
Colton
Santa Ana River
Grand Terrace
Freeway
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Rialto Channel Subwatershed
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City Boundary
SBC SARW
County Boundary
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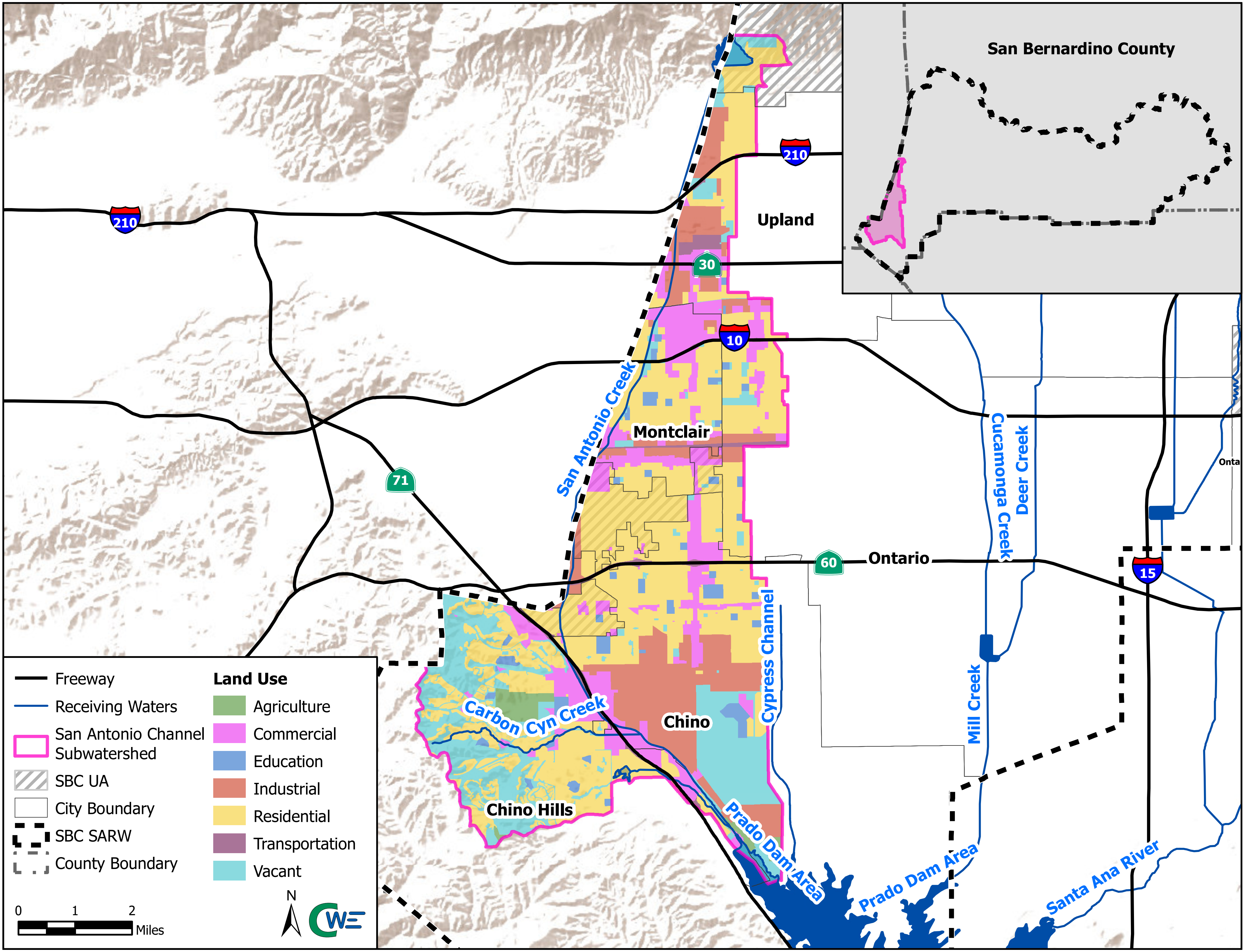
San Bernardino County
Upland
Montclair
Ontario
Chino
Chino Hills
San Antonio Creek
Cucamonga Creek
Deer Creek
Cypress Channel
Carbon Cyn Creek
Mill Creek
Prado Dam Area
Prado Dam Area
Santa Ana River
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Freeway
Receiving Waters
San Antonio Channel Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
Land Use
Agriculture
Commercial
Education
Industrial
Residential
Transportation
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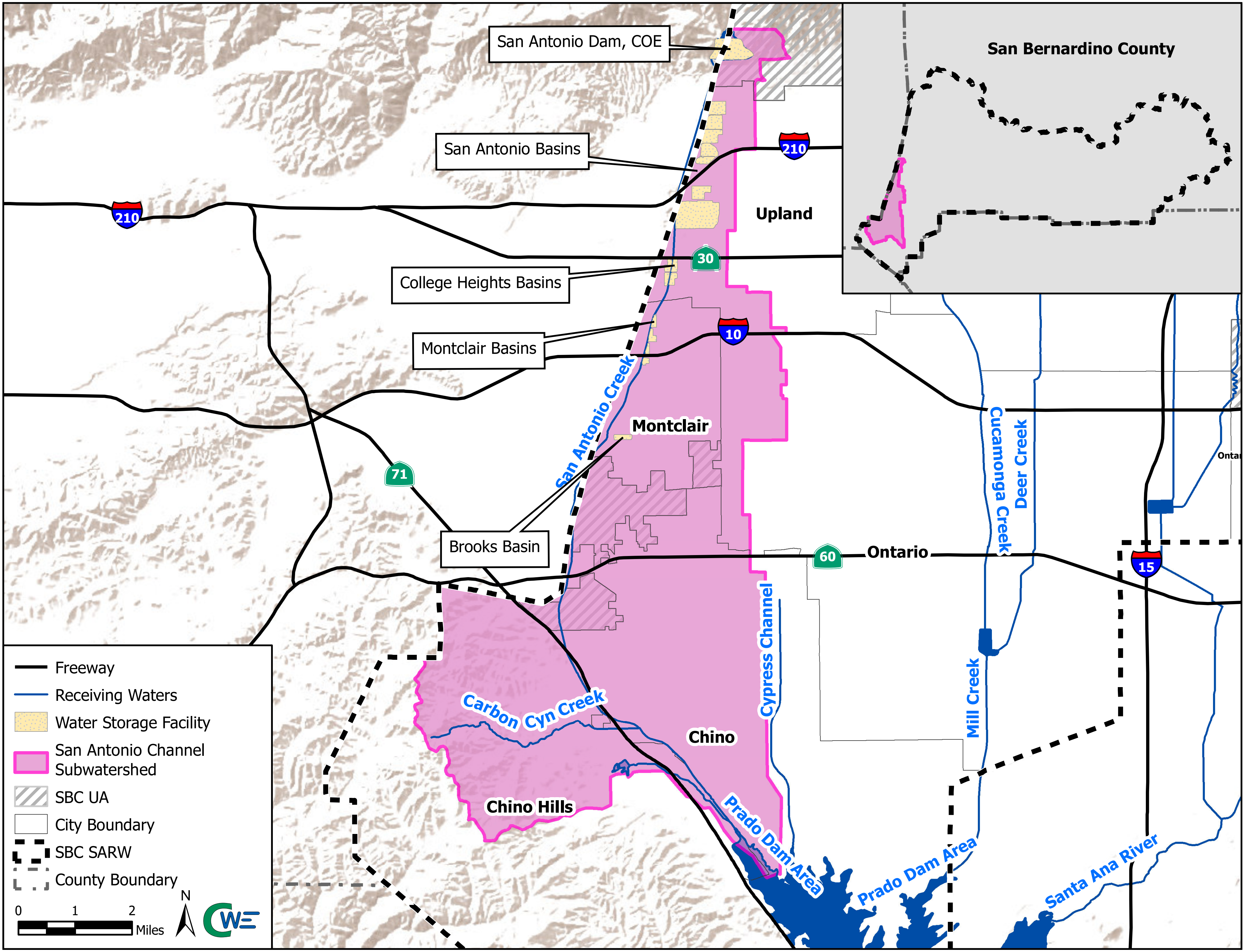

San Bernardino County
San Antonio Dam, COE
San Antonio Basins
College Heights Basins
Montclair Basins
Brooks Basin
Upland
Montclair
Ontario
Chino
Chino Hills
San Antonio Creek
Carbon Cyn Creek
Cypress Channel
Cucamonga Creek
Deer Creek
Mill Creek
Prado Dam Area
Prado Dam Area
Santa Ana River
210
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Receiving Waters
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City Boundary
SBC SARW
County Boundary
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Miles
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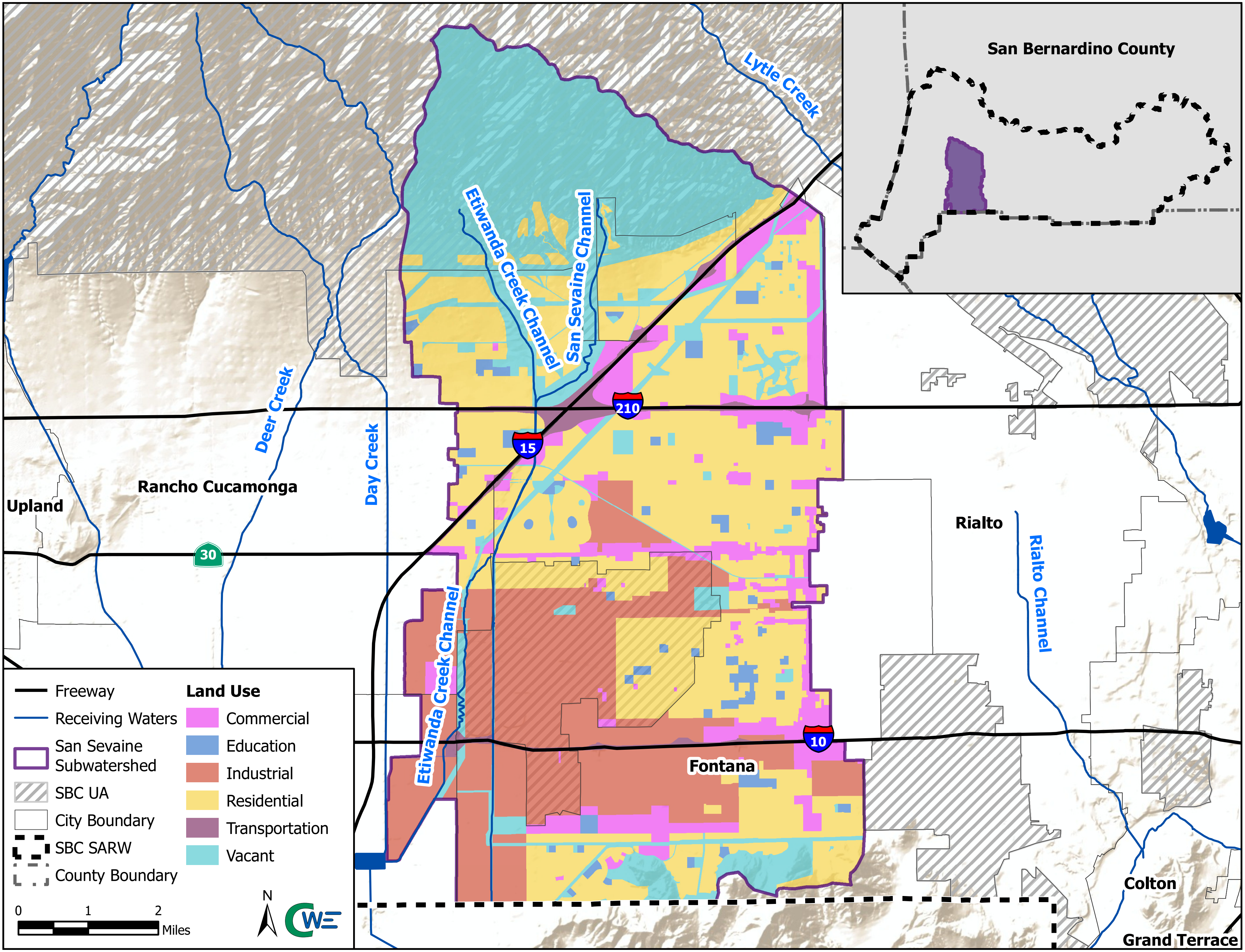

San Bernardino County
Lytle Creek
Etiwanda Creek Channel
San Sevaine Channel
Deer Creek
Day Creek
Rancho Cucamonga
Upland
Rialto
Rialto Channel
Etiwanda Creek Channel
Fontana
Colton
Grand Terrace
210
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Freeway
Receiving Waters
San Sevaine Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
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Commercial
Education
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Residential
Transportation
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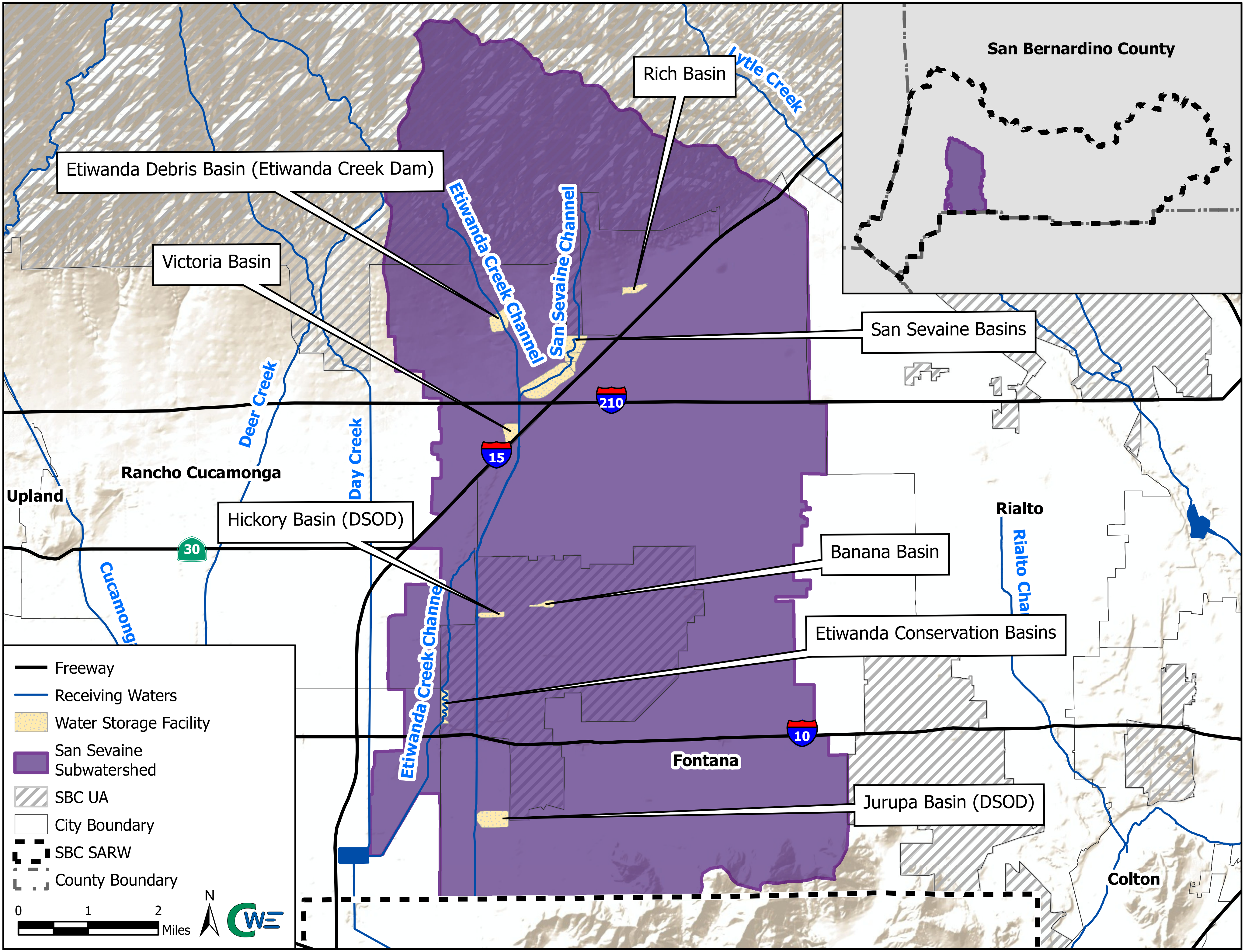

San Bernardino County
Rich Basin
Lytle Creek
Etiwanda Debris Basin (Etiwanda Creek Dam)
Etiwanda Creek Channel
San Sevaine Channel
Victoria Basin
San Sevaine Basins
210
15
Deer Creek
Day Creek
Rancho Cucamonga
Upland
Rialto
Rialto Cha
Hickory Basin (DSOD)
Banana Basin
30
Cucamong
Etiwanda Conservation Basins
Etiwanda Creek Channe
10
Fontana
Jurupa Basin (DSOD)
Colton
Freeway
Receiving Waters
Water Storage Facility
San Sevaine Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
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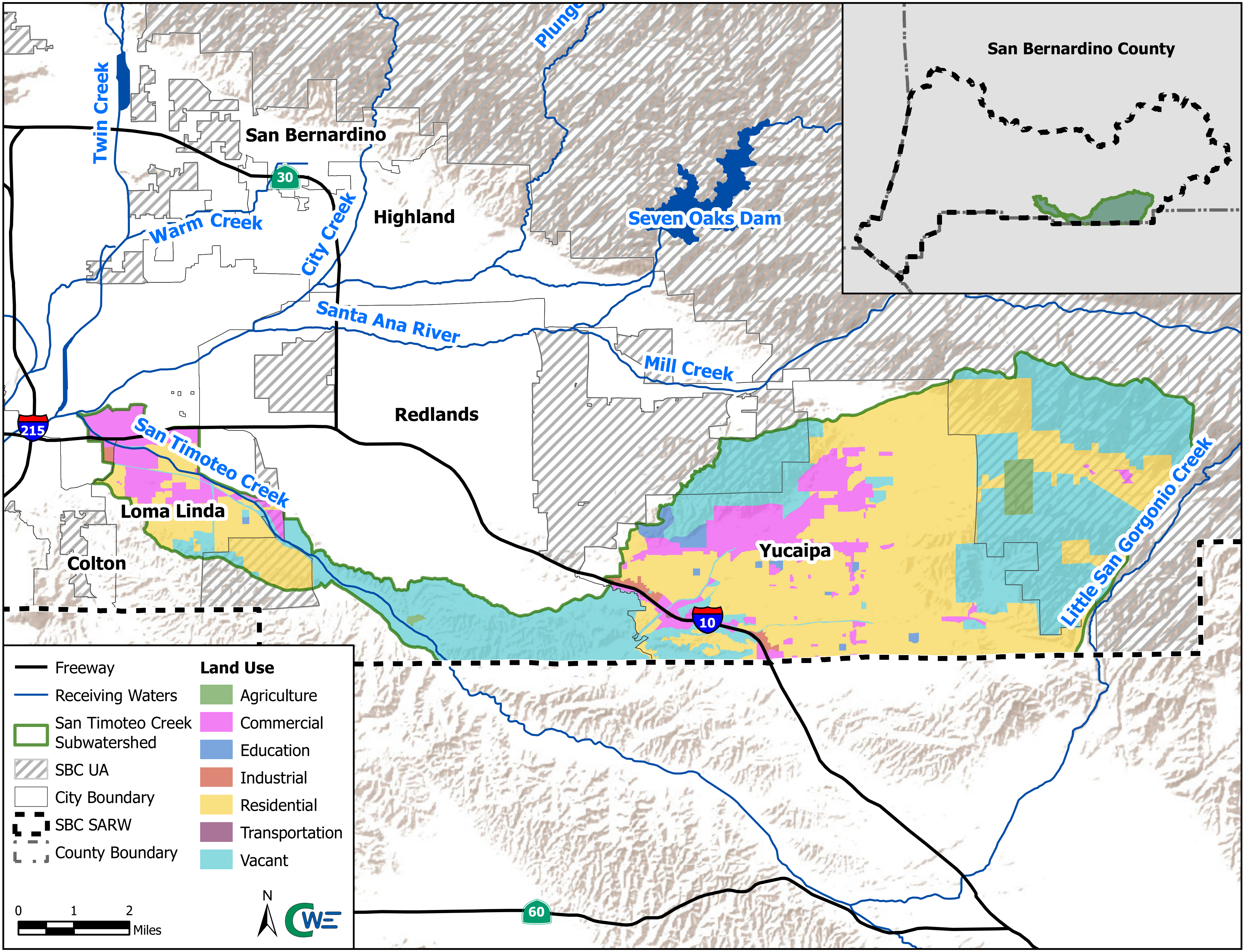
San Bernardino County
San Bernardino
Highland
Redlands
Loma Linda
Colton
Yucaipa
Twin Creek
Warm Creek
City Creek
Plunge
Seven Oaks Dam
Santa Ana River
Mill Creek
San Timoteo Creek
Little San Gorgonio Creek
215
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Freeway
Receiving Waters
San Timoteo Creek Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
Land Use
Agriculture
Commercial
Education
Industrial
Residential
Transportation
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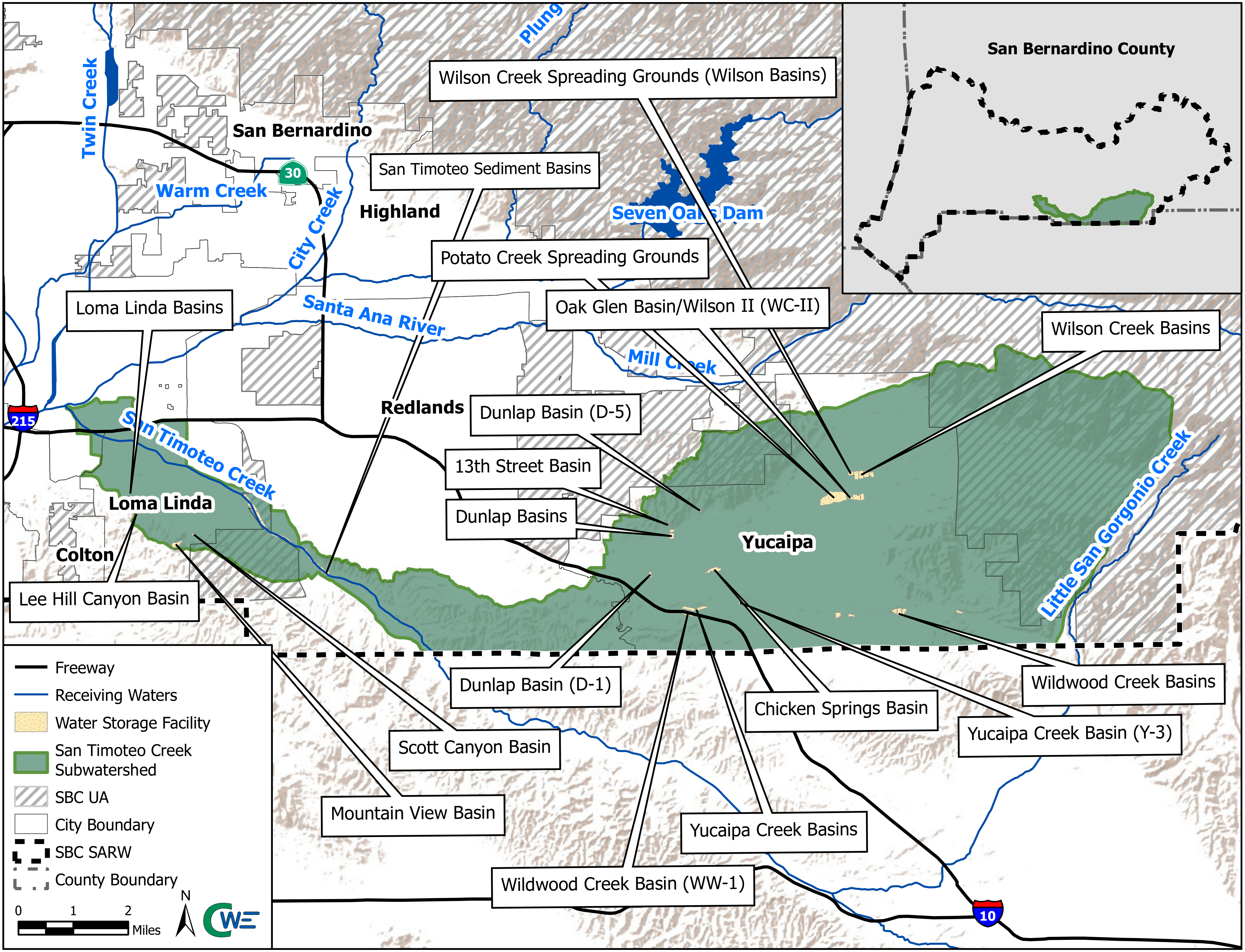

San Bernardino County
Wilson Creek Spreading Grounds (Wilson Basins)
San Timoteo Sediment Basins
Potato Creek Spreading Grounds
Oak Glen Basin/Wilson II (WC-II)
Wilson Creek Basins
Loma Linda Basins
Dunlap Basin (D-5)
13th Street Basin
Dunlap Basins
Lee Hill Canyon Basin
Dunlap Basin (D-1)
Scott Canyon Basin
Mountain View Basin
Wildwood Creek Basin (WW-1)
Yucaipa Creek Basins
Chicken Springs Basin
Yucaipa Creek Basin (Y-3)
Wildwood Creek Basins
San Bernardino
Highland
Redlands
Loma Linda
Colton
Yucaipa
Twin Creek
Warm Creek
City Creek
Santa Ana River
Mill Creek
Seven Oaks Dam
San Timoteo Creek
Little San Gorgonio Creek
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Freeway
Receiving Waters
Water Storage Facility
San Timoteo Creek Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
0 1 2 Miles
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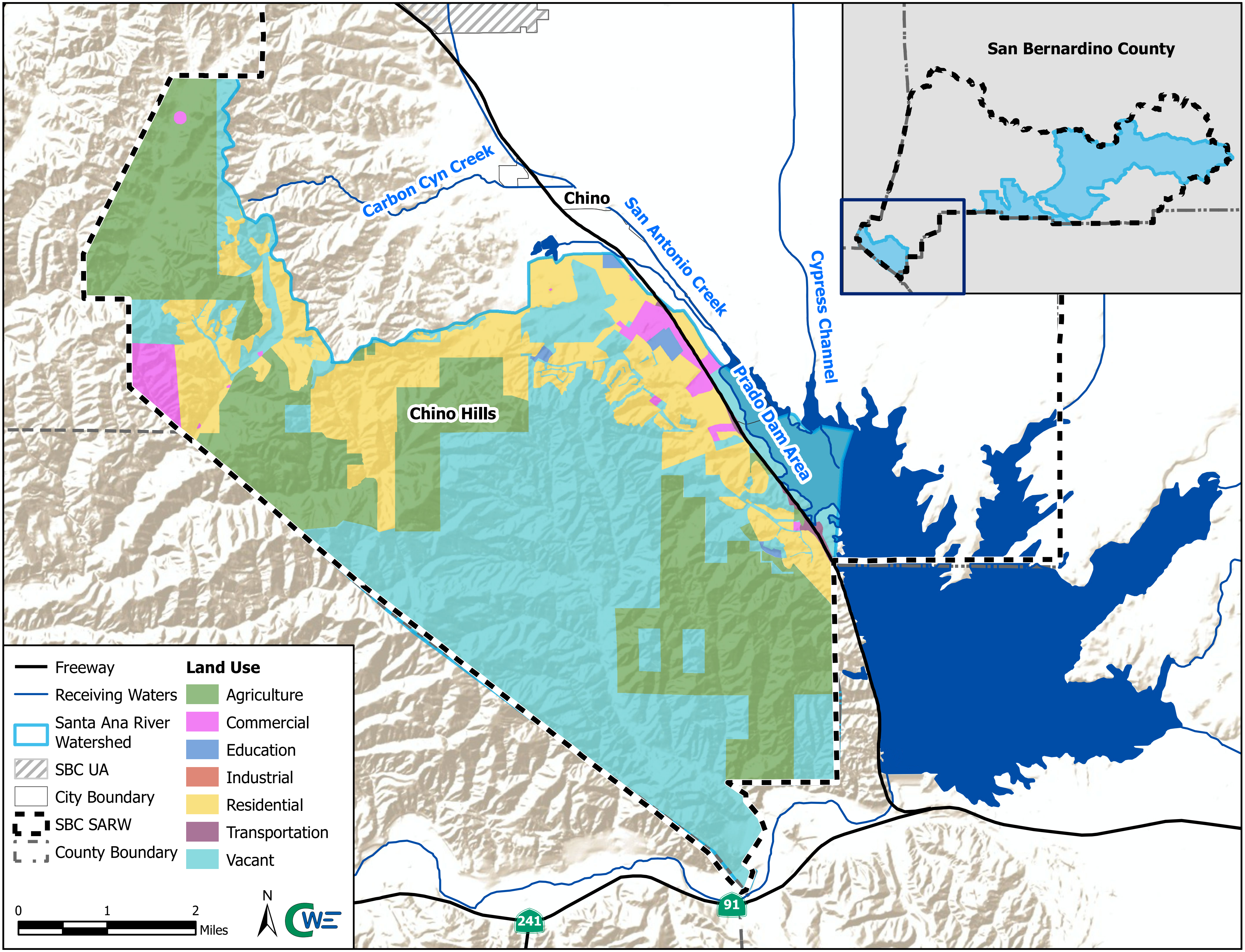

San Bernardino County
Carbon Cyn Creek
Chino
San Antonio Creek
Cypress Channel
Prado Dam Area
Chino Hills
Freeway
Receiving Waters
Santa Ana River Watershed
SBC UA
City Boundary
SBC SARW
County Boundary
Land Use
Agriculture
Commercial
Education
Industrial
Residential
Transportation
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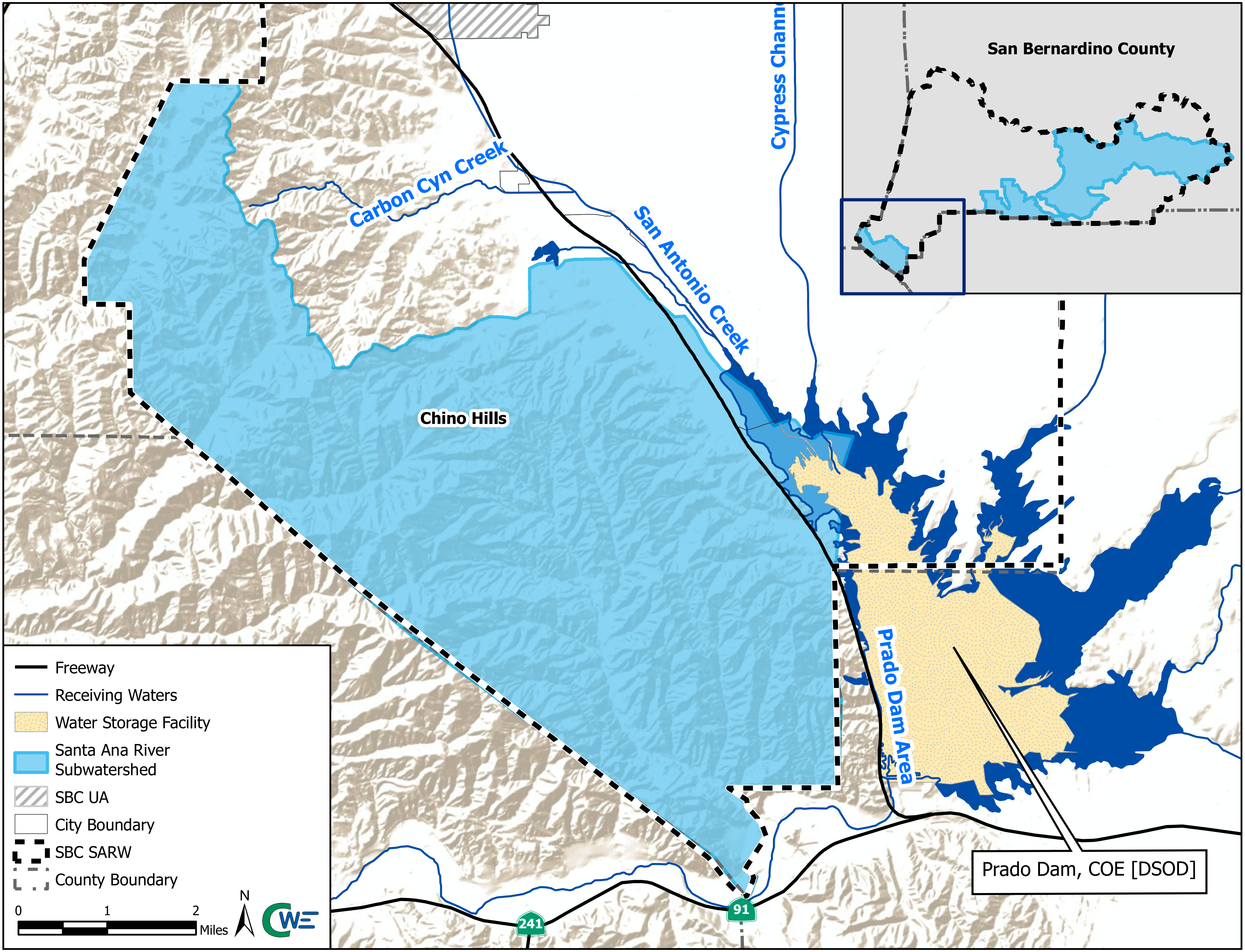

San Bernardino County
Cypress Chann
Carbon Cyn Creek
San Antonio Creek
Chino Hills
Prado Dam Area
Prado Dam, COE [DSOD]
Freeway
Receiving Waters
Water Storage Facility
Santa Ana River Subwatershed
SBC UA
City Boundary
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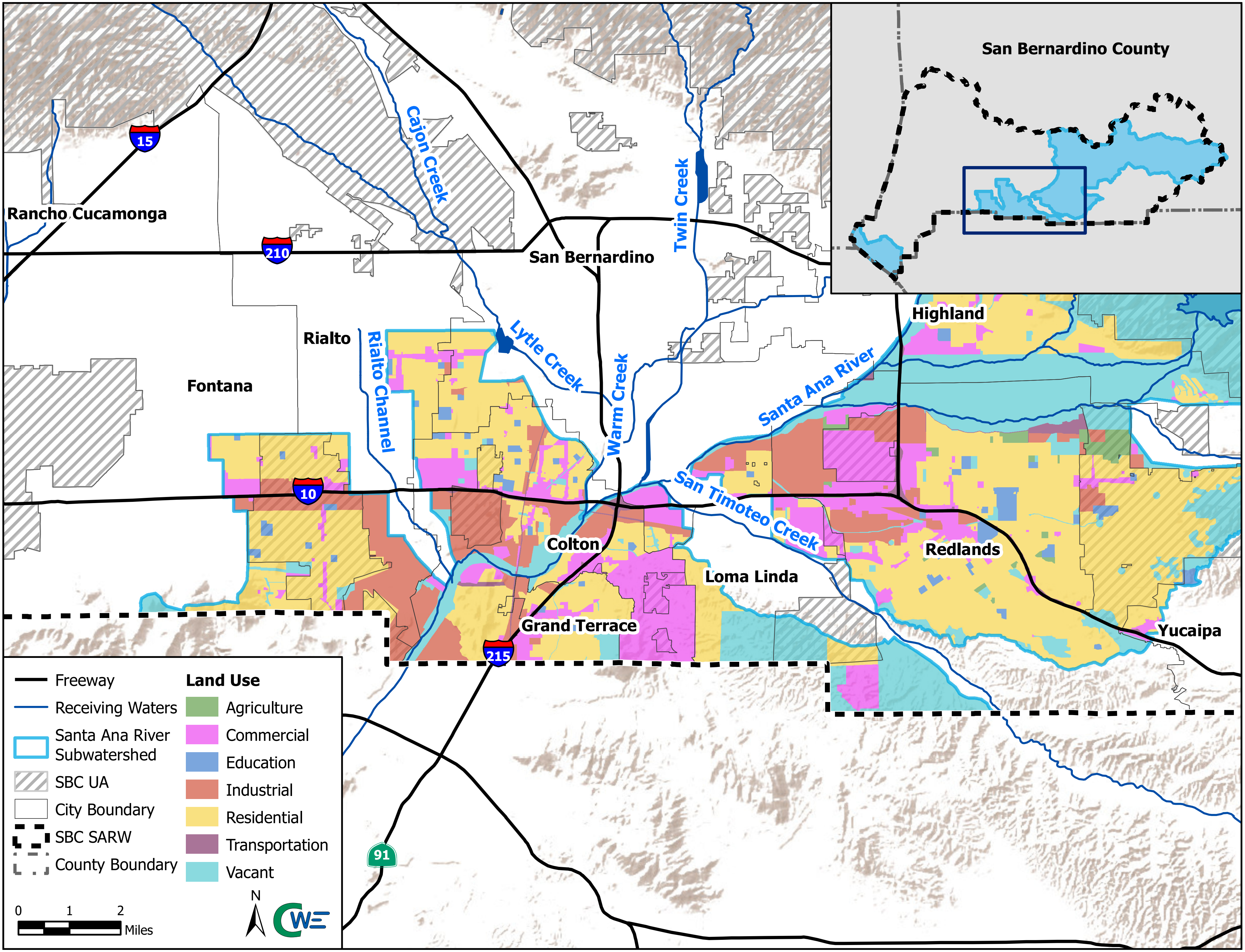

San Bernardino County
Rancho Cucamonga
San Bernardino
Rialto
Fontana
Highland
Colton
Loma Linda
Redlands
Grand Terrace
Yucaipa
Cajon Creek
Twin Creek
Lytle Creek
Rialto Channel
Warm Creek
Santa Ana River
San Timoteo Creek
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210
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215
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Freeway
Receiving Waters
Santa Ana River Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
Land Use
Agriculture
Commercial
Education
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Residential
Transportation
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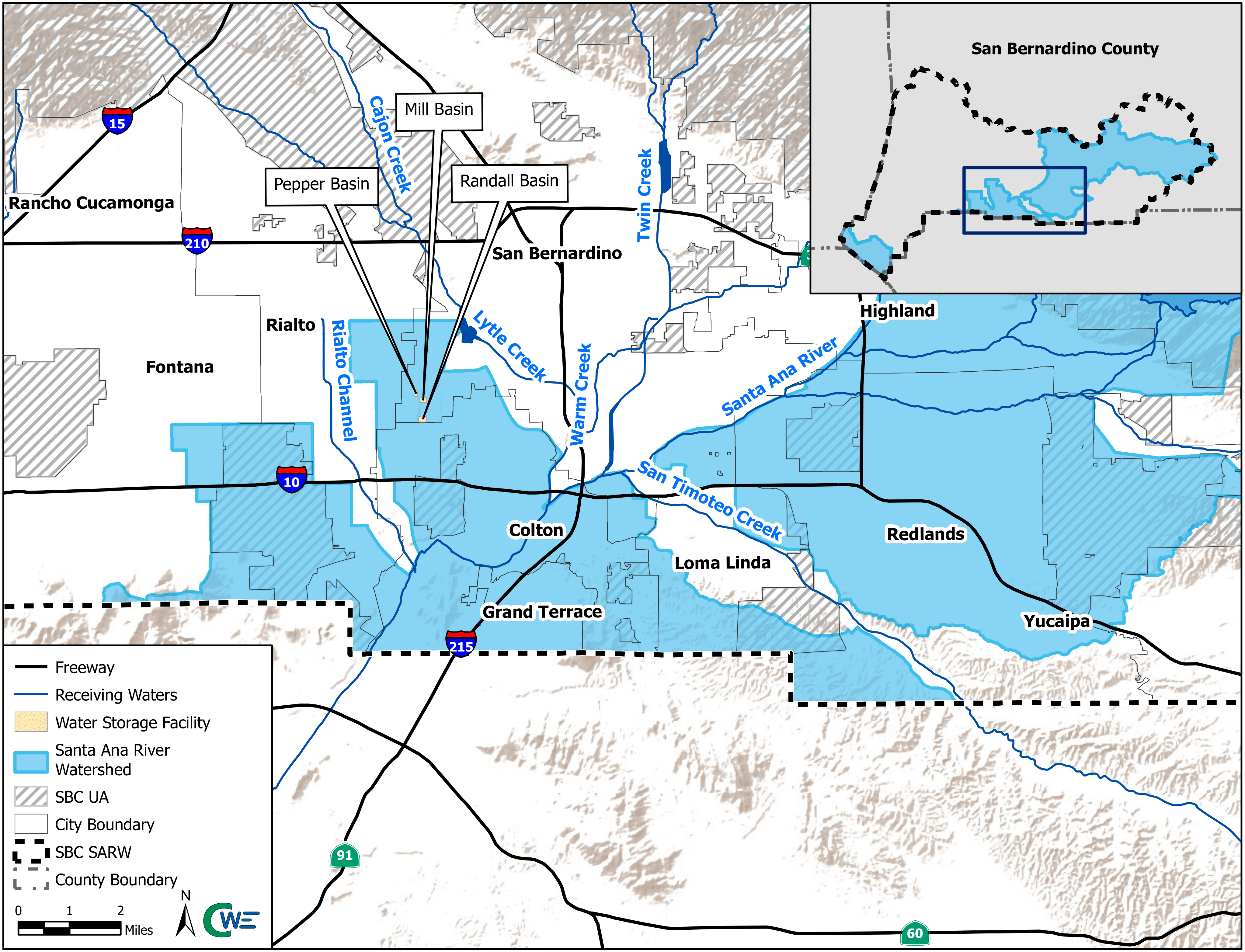

San Bernardino County
Mill Basin
Pepper Basin
Randall Basin
Cajon Creek
Twin Creek
Rancho Cucamonga
San Bernardino
Rialto
Fontana
Rialto Channel
Lytle Creek
Warm Creek
Highland
Santa Ana River
San Timoteo Creek
Colton
Loma Linda
Redlands
Grand Terrace
Yucaipa
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Freeway
Receiving Waters
Water Storage Facility
Santa Ana River Watershed
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City Boundary
SBC SARW
County Boundary
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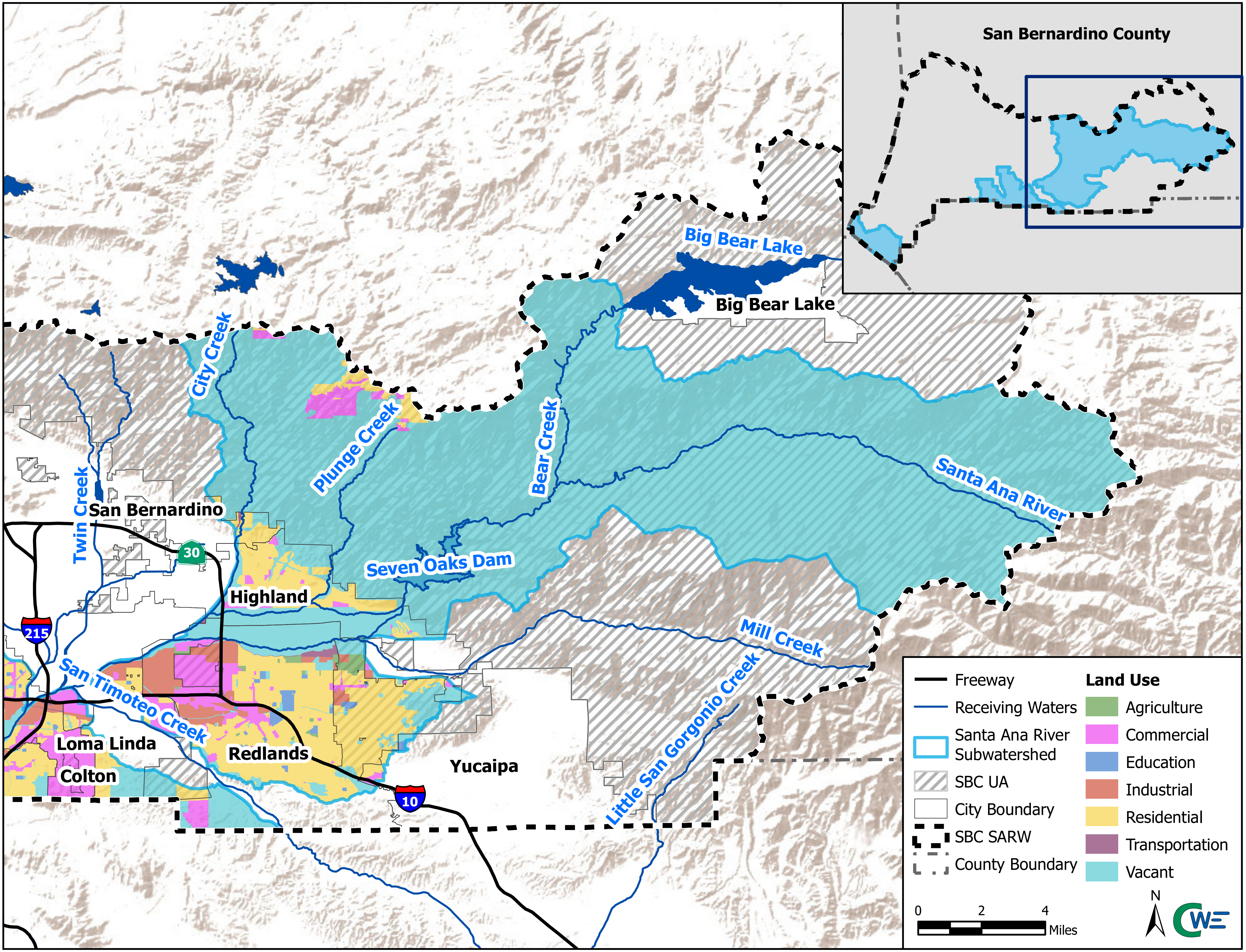

San Bernardino County
Big Bear Lake
Big Bear Lake
City Creek
Plunge Creek
Bear Creek
Santa Ana River
Twin Creek
San Bernardino
30
Seven Oaks Dam
Highland
215
Mill Creek
San Timoteo Creek
Little San Gorgonio Creek
Loma Linda
Redlands
Colton
Yucaipa
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Freeway
Receiving Waters
Santa Ana River Subwatershed
SBC UA
City Boundary
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Land Use
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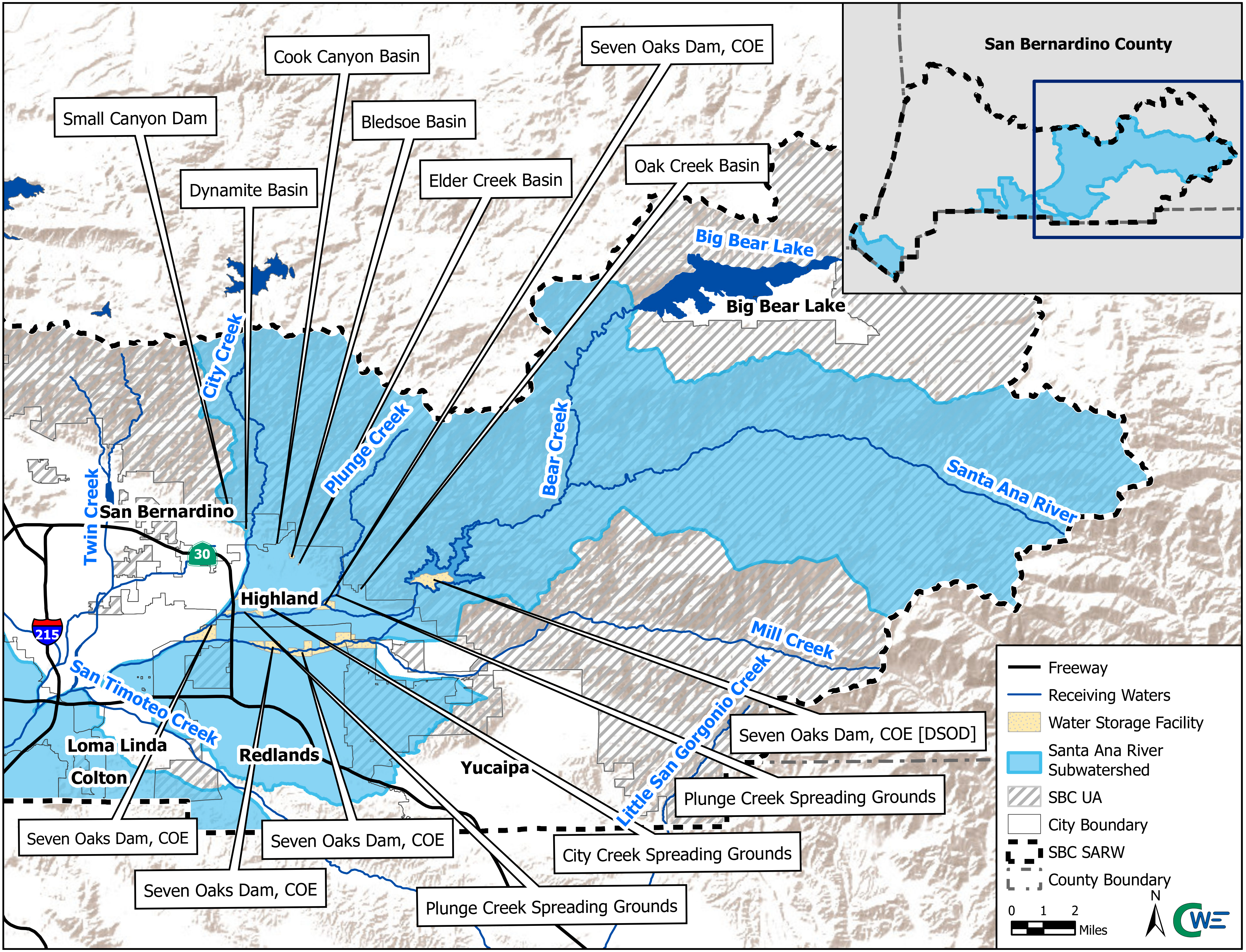

San Bernardino County
Cook Canyon Basin
Seven Oaks Dam, COE
Small Canyon Dam
Bledsoe Basin
Oak Creek Basin
Dynamite Basin
Elder Creek Basin
Big Bear Lake
Big Bear Lake
City Creek
Plunge Creek
Bear Creek
Santa Ana River
Twin Creek
San Bernardino
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Highland
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Mill Creek
San Timoteo Creek
Little San Gorgonio Creek
Loma Linda
Redlands
Yucaipa
Colton
Seven Oaks Dam, COE [DSOD]
Plunge Creek Spreading Grounds
Seven Oaks Dam, COE
Seven Oaks Dam, COE
City Creek Spreading Grounds
Seven Oaks Dam, COE
Plunge Creek Spreading Grounds
Freeway
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Water Storage Facility
Santa Ana River Subwatershed
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City Boundary
SBC SARW
County Boundary
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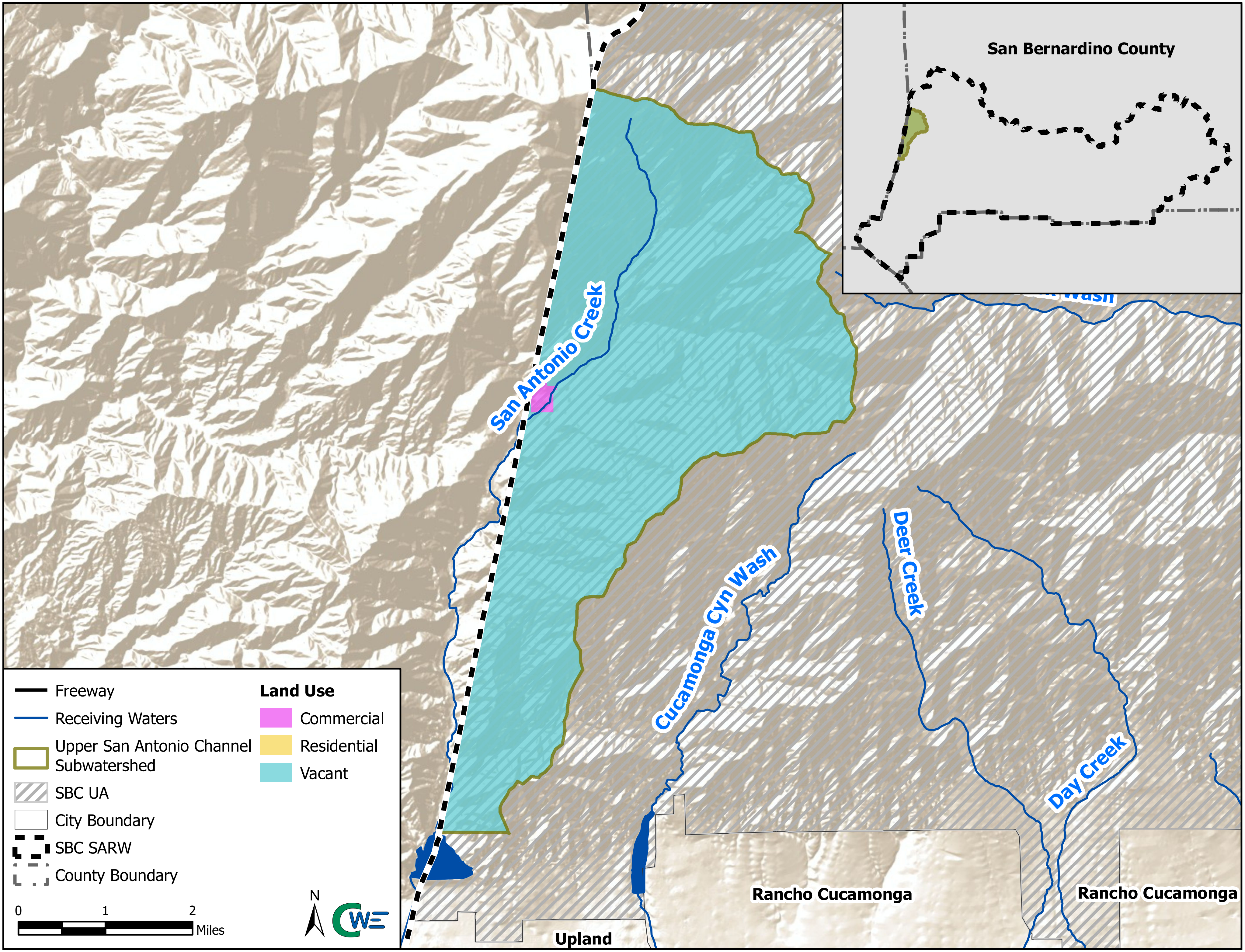
San Bernardino County
San Antonio Creek
Cucamonga Cyn Wash
Deer Creek
Day Creek
Rancho Cucamonga
Rancho Cucamonga
Upland
Freeway
Receiving Waters
Upper San Antonio Channel Subwatershed
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City Boundary
SBC SARW
County Boundary
Land Use
Commercial
Residential
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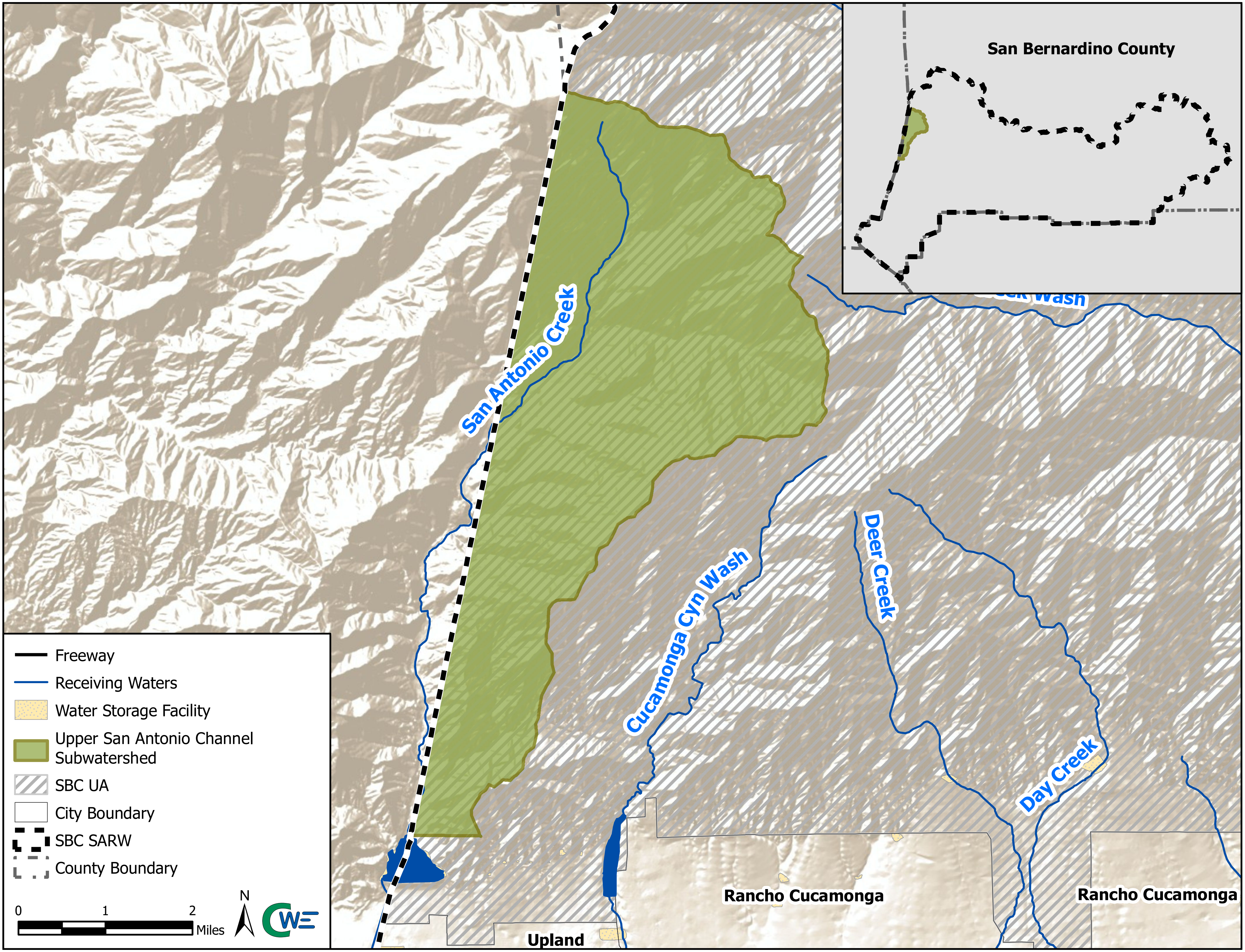
San Bernardino County
San Antonio Creek
Cucamonga Cyn Wash
Deer Creek
Day Creek
Rancho Cucamonga
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Upland
Freeway
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Water Storage Facility
Upper San Antonio Channel Subwatershed
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SBC SARW
County Boundary
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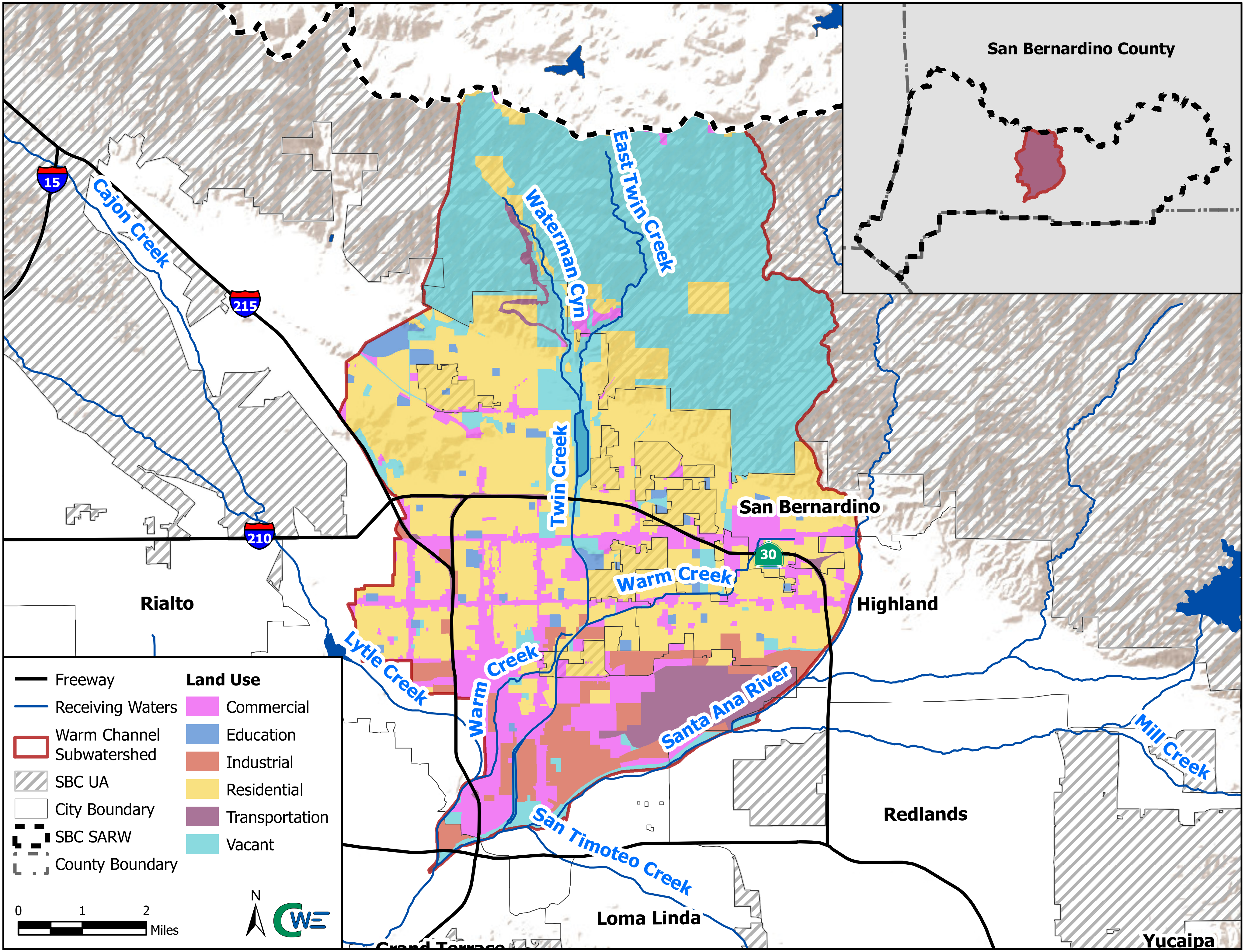

San Bernardino County
Cajon Creek
Waterman Cyn
East Twin Creek
Twin Creek
Warm Creek
Lytle Creek
Santa Ana River
San Timoteo Creek
Mill Creek
San Bernardino
Highland
Rialto
Redlands
Loma Linda
Yucaipa
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215
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Freeway
Receiving Waters
Warm Channel Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
Land Use
Commercial
Education
Industrial
Residential
Transportation
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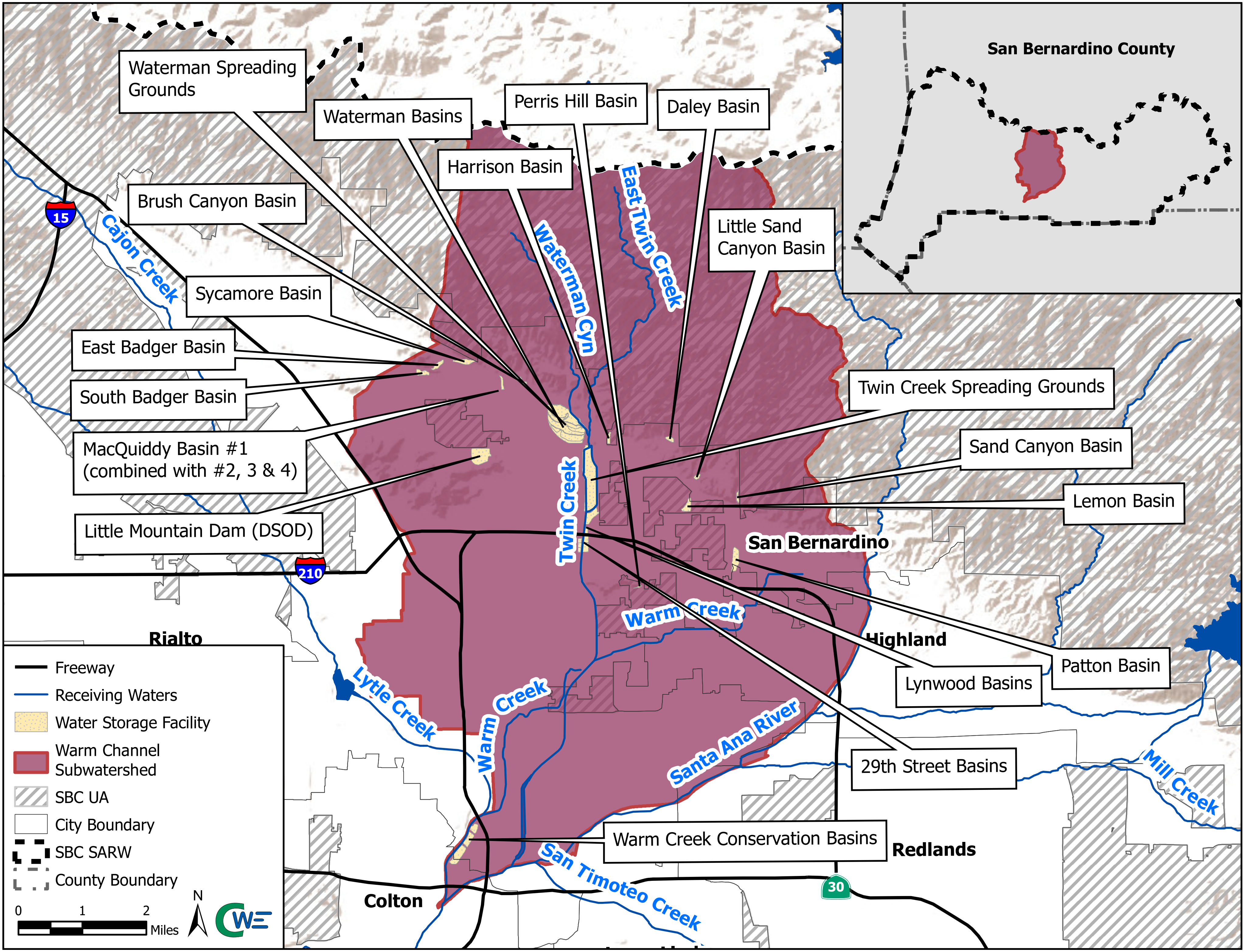

Waterman Spreading Grounds
Waterman Basins
Perris Hill Basin
Daley Basin
Harrison Basin
Brush Canyon Basin
Little Sand Canyon Basin
Sycamore Basin
East Badger Basin
South Badger Basin
MacQuiddy Basin #1 (combined with #2, 3 & 4)
Little Mountain Dam (DSOD)
Twin Creek Spreading Grounds
Sand Canyon Basin
Lemon Basin
San Bernardino
Patton Basin
Lynwood Basins
29th Street Basins
Warm Creek Conservation Basins
San Bernardino County
Cajon Creek
Waterman Cyn
East Twin Creek
Twin Creek
Warm Creek
Lytle Creek
Warm Creek
Santa Ana River
San Timoteo Creek
Mill Creek
Rialto
Highland
Redlands
Colton
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Freeway
Receiving Waters
Water Storage Facility
Warm Channel Subwatershed
SBC UA
City Boundary
SBC SARW
County Boundary
0 1 2 Miles
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Attachment D

Water Quality Data Analysis

Summary of Dry-Weather Water Quality Data Analysis

Constituent	Data Range	Number of Exceedances / Number of Samples																	
		Cucamonga Creek	Cucamonga Channel	SAR @ Pedley Reach 3	SAR @ Mt Vernon Crossing Reach 4	Deer Creek	Lower Deer Creek	Warm Creek Bypass	Rialto Channel	East Rialto Channel	San Bernardino Channel	Warm Creek Channel	Del Rosa Channel	Lytle Cajon Channel	Live Oak Canyon Creek	San Timoteo Creek	Mission Creek Channel	Zanja Creek	SAR @ Mountain View Reach 5
Field (In-Situ) Measurements																			
pH	All	5/6 H	2/4 H	0/5	--	1/2 H	2/2 H	--	--	--	--	--	--	--	--	1/1 H	--	--	--
	5-yrs	5/6 H	2/3 H	0/5	--	1/2 H	2/2 H	--	--	--	--	--	--	--	--	1/1 H	--	--	--
Cations																			
Total Hardness	All	0/10	0/8	0/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	1/1	--	--	--
	5-yrs	0/10	0/3	0/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	1/1	--	--	--
Sodium	All	0/10	0/8	7/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	1/1	--	--	--
	5-yrs	0/10	0/3	7/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	1/1	--	--	--
Anions																			
Chloride	All	0/10	0/8	1/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	1/1	--	--	--
	5-yrs	0/10	0/3	1/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	1/1	--	--	--
Sulfate	All	0/10	0/8	0/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	0/1	--	--	--
	5-yrs	0/10	0/3	0/9	--	0/4	0/4	--	--	2/2	--	--	--	--	--	0/1	--	--	--
Solids																			
TDS	All	--	0/8	0/9	0/2	--	--	0/3	--	1/2	0/3	0/3	--	--	--	1/1	--	--	--
	5-yrs	--	0/3	0/9	0/2	--	--	0/3	--	1/2	0/3	0/3	--	--	--	1/1	--	--	--
Aggregate Organic Compounds																			
COD	All	--	5/8	0/9	2/2	--	--	0/3	--	2/2	3/3	1/3	--	--	--	1/1	--	--	--
	5-yrs	--	2/3	0/9	2/2	--	--	0/3	--	2/2	3/3	1/3	--	--	--	1/1	--	--	--
General Inorganics																			
Cyanide	All	1/10	0/8	0/9	0/2	0/4	0/4	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
	5-yrs	1/10	0/3	0/9	0/2	0/4	0/4	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
Nutrients																			
Total Inorganic Nitrogen, calc	All	0/10	0/8	0/9	0/2	--	--	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
	5-yrs	0/10	0/3	0/9	0/2	--	--	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
Metals and Metalloids (Total)																			
Chromium 6+	All	0/5	0/3	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
	5-yrs	0/5	0/2	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
Mercury	All	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5-yrs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	All	0/5	0/3	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
	5-yrs	0/5	0/2	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
Metals and Metalloids (Dissolved)																			
Arsenic (CTR, 1-hr Avg, WWE)	All	0/5	0/3	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
	5-yrs	0/5	0/2	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
Cadmium	All	1/5	0/3	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
	5-yrs	1/5	0/2	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--

Constituent	Data Range	Number of Exceedances / Number of Samples																	
		Cucamonga Creek	Cucamonga Channel	SAR @ Pedley Reach 3	SAR @ Mt Vernon Crossing Reach 4	Deer Creek	Lower Deer Creek	Warm Creek Bypass	Rialto Channel	East Rialto Channel	San Bernardino Channel	Warm Creek Channel	Del Rosa Channel	Lytle Cajon Channel	Live Oak Canyon Creek	San Timoteo Creek	Mission Creek Channel	Zanja Creek	SAR @ Mountain View Reach 5
Copper	All	4/10	0/8	0/9	0/2	2/4	0/4	0/3	--	0/2	0/3	1/3	--	--	--	0/1	--	--	--
	5-yrs	4/10	0/3	0/9	0/2	2/4	0/4	0/3	--	0/2	0/3	1/3	--	--	--	0/1	--	--	--
Lead	All	1/10	0/8	0/9	0/2	0/4	0/4	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
	5-yrs	1/10	0/3	0/9	0/2	0/4	0/4	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
Nickel	All	0/5	0/3	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
	5-yrs	0/5	0/2	0/4	0/1	0/2	0/2	0/1	--	0/0	0/1	0/1	--	--	--	0/1	--	--	--
Silver	All	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5-yrs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	All	0/10	0/8	0/9	0/2	0/4	0/4	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
	5-yrs	0/10	0/3	0/9	0/2	0/4	0/4	0/3	--	0/2	0/3	0/3	--	--	--	0/1	--	--	--
Organochlorine Pesticides and PCBs[1]																			
VOCs[1]																			
Semivolatile Organic Compounds[1]																			
Organo-Phosphorus Pesticides[1]																			
Bacteria																			
E. coli	All	2/3	4/8	9/9	0/2	1/4	2/4	1/3	--	1/2	1/3	0/3	--	--	--	1/1	--	--	--
	5-yrs	2/3	2/3	9/9	0/2	1/4	2/4	1/3	--	1/2	1/3	0/3	--	--	--	1/1	--	--	--
Fecal Coliform	All	1/3	3/5	6/6	1/2	1/4	3/4	1/1	--	0/0	0/1	0/1	--	--	--	1/1	--	--	--
	5-yrs	1/3	2/3	6/6	1/2	1/4	3/4	1/1	--	0/0	0/1	0/1	--	--	--	1/1	--	--	--

[1] No target analytes detected above detection limit.

Summary of Wet-Weather Water Quality Data Analysis

Constituent	Data Range	Number of Exceedances/Number of Samples												
		Cucamonga Creek	Cucamonga Channel	SAR @ Pedley Reach 3	SAR @ Mt Vernon Crossing Reach 4	Deer Creek	Lower Deer Creek	Warm Creek Bypass	Rialto Channel	East Rialto Channel	San Bernardino Channel	Warm Creek Channel	Del Rosa Channel	Lytle Cajon Channel
Field (In-Situ) Measurements														
pH	All	1/12 L, 1/12 H	2/18 H	1/26 L	2/11 H	1/6 L	2/5 H	--	--	--	--	--	--	--
	5-yrs	1/4 L	0/4	1/13 L	2/11 H	1/6 L	2/5 H	--	--	--	--	--	--	--
Cations														
Total Hardness	All	0/49	1/21	4/40	--	0/7	0/6	--	--	0/2	--	--	0/2	--
	5-yrs	0/22	0/4	1/16	--	0/7	0/6	--	--	0/2	--	--	0/2	--
Sodium	All	0/49	0/20	0/39	--	0/7	0/6	--	--	0/2	--	--	0/2	--
	5-yrs	0/22	0/4	0/15	--	0/7	0/6	--	--	0/2	--	--	0/2	--
Anions														
Chloride	All	0/49	0/21	0/40	0/0	0/7	0/6	--	--	0/2	--	--	0/2	--
	5-yrs	0/22	0/4	0/16	0/0	0/7	0/6	--	--	0/2	--	--	0/2	--
Sulfate	All	0/49	0/21	0/40	--	0/7	0/6	--	--	0/2	--	--	0/2	--
	5-yrs	0/22	0/4	0/16	--	0/7	0/6	--	--	0/2	--	--	0/2	--
Solids														
TDS	All	--	0/21	0/40	0/12	--	--	0/2	0/2	0/2	0/2	0/2	0/2	--
	5-yrs	--	0/4	0/16	0/12	--	--	0/2	0/2	0/2	0/2	0/2	0/2	--
Aggregate Organic Compounds														
COD	All	--	18/21	33/40	10/12	--	--	2/2	2/2	2/2	2/2	2/2	2/2	--
	5-yrs	--	4/4	13/16	10/12	--	--	2/2	2/2	2/2	2/2	2/2	2/2	--
General Inorganics														
Cyanide	All	0/10	0/10	0/9	0/10	0/5	0/4	0/2	0/2	0/2	0/2	0/2	0/2	--
	5-yrs	0/10	0/2	0/9	0/10	0/5	0/4	0/2	0/2	0/2	0/2	0/2	0/2	--
Nutrients														
Total Inorganic Nitrogen, calc	All	0/49	0/21	0/40	0/12	0/7	0/6	0/2	0/2	0/2	0/2	0/2	0/2	--
	5-yrs	0/22	0/4	0/16	0/12	0/7	0/6	0/2	0/2	0/2	0/2	0/2	0/2	--
Metals and Metalloids (Total)														
Chromium 6+	All	0/6	0/5	0/4	0/5	0/3	0/2	0/1	0/1	0/1	0/1	0/1	0/1	--
	5-yrs	0/6	0/2	0/4	0/5	0/3	0/2	0/1	0/1	0/1	0/1	0/1	0/1	--
Mercury	All	--	--	--	--	--	--	--	--	--	--	--	--	--
	5-yrs	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	All	0/37	0/14	1/32	0/5	0/3	0/2	0/1	0/1	0/1	0/1	0/1	0/1	--
	5-yrs	0/12	0/2	0/9	0/5	0/3	0/2	0/1	0/1	0/1	0/1	0/1	0/1	--
Metals and Metalloids (Dissolved)														
Arsenic (CTR, 1-hr Avg, WWE)	All	0/23	0/16	0/17	0/7	0/5	0/4	0/1	0/1	0/1	0/1	0/1	0/1	--
	5-yrs	0/18	0/4	0/11	0/7	0/5	0/4	0/1	0/1	0/1	0/1	0/1	0/1	--
Cadmium	All	6/22	3/16	0/17	0/7	0/5	0/4	0/1	0/1	0/1	0/1	0/1	0/1	--
	5-yrs	2/17	0/4	0/11	0/7	0/5	0/4	0/1	0/1	0/1	0/1	0/1	0/1	--

Constituent	Data Range	Number of Exceedances / Number of Samples												
		Cucamonga Creek	Cucamonga Channel	SAR @ Pedley Reach 3	SAR @ Mt Vernon Crossing Reach 4	Deer Creek	Lower Deer Creek	Warm Creek Bypass	Rialto Channel	East Rialto Channel	San Bernardino Channel	Warm Creek Channel	Del Rosa Channel	Lytle Cajon Channel
Copper	All	16/26	6/21	0/22	0/12	3/7	4/6	2/2	1/2	2/2	0/2	1/2	1/2	--
	5-yrs	12/21	0/4	0/16	0/12	3/7	4/6	2/2	1/2	2/2	0/2	1/2	1/2	--
Lead	All	0/26	0/21	0/22	0/12	0/7	0/6	0/2	0/2	0/2	0/2	0/2	0/2	--
	5-yrs	0/21	0/4	0/16	0/12	0/7	0/6	0/2	0/2	0/2	0/2	0/2	0/2	--
Nickel	All	0/6	0/5	0/4	0/5	0/3	0/2	0/1	0/1	0/1	0/1	0/1	0/1	--
	5-yrs	0/6	0/2	0/4	0/5	0/3	0/2	0/1	0/1	0/1	0/1	0/1	0/1	--
Silver	All	12/16	6/14	0/15	0/5	2/4	6/6	0/1	0/0	0/1	0/1	0/1	0/0	--
	5-yrs	7/11	0/2	0/9	0/5	2/4	6/6	0/1	0/0	0/1	0/1	0/1	0/0	--
Zinc	All	13/26	9/21	1/22	3/12	4/6	5/6	2/2	2/2	2/2	1/2	2/2	2/2	--
	5-yrs	12/21	0/4	1/16	3/12	4/6	5/6	2/2	2/2	2/2	1/2	2/2	2/2	--
Organochlorine Pesticides and PCBs[1]														
VOCs[1]														
Semivolatile Organic Compounds[1]														
Organo-Phosphorus Pesticides[1]														
Bacteria														
E. coli	All	37/37	15/15	39/39	11/11	7/7	6/7	2/2	2/2	2/2	1/1	2/2	2/2	--
	5-yrs	15/15	4/4	16/16	11/11	7/7	6/7	2/2	2/2	2/2	1/1	2/2	2/2	--
Fecal Coliform	All	32/36	12/12	35/35	8/8	4/4	3/4	2/2	2/2	2/2	1/1	2/2	2/2	--
	5-yrs	13/13	4/4	13/13	8/8	4/4	3/4	2/2	2/2	2/2	1/1	2/2	2/2	--

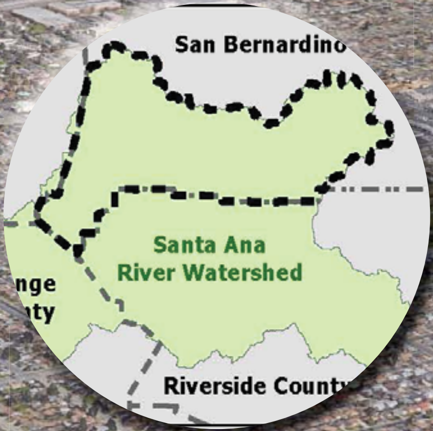
[1] No target analytes detected above detection limit.

Attachment E

Stakeholder and Public Outreach, Education, and Engagement Plan

STAKEHOLDER AND PUBLIC OUTREACH, EDUCATION, AND ENGAGEMENT PLAN

FOR THE SBC SARW SWRP



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Stakeholder and Public Outreach, Education, and Engagement Plan

for the SBC SARW SWRP

Prepared for:

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July 2017

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Acronyms

BBMWD	Big Bear Municipal Water District
DAC	Disadvantaged Community
District or SBCFCD	San Bernardino County Flood Control District
DWR	Department of Water Resources
IEUA	Inland Empire Utilities Agency
MHI	Median Household Income
NPDES	National Pollutant Discharge Elimination System
RCFCWCD	Riverside County Flood Control and Water Conservation District
RWQCB	Regional Water Quality Control Board (Santa Ana)
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SBC SARW	San Bernardino County Santa Ana River Watershed
SBVMWD	San Bernardino Valley Municipal Water District
SPOEEP	Stakeholder and Public Outreach, Education, and Engagement Plan
SWRCB	State Water Resources Control Board
SWRP	Stormwater Resource Plan
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
WMWD	Western Municipal Water District

1. Introduction

California voters passed the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) during the general election of November 4, 2014. As a precursor to the passage of Proposition 1, the California Legislature adopted Senate Bill (SB) 985 entitled the Stormwater Resource Planning Act (SB 985), requiring the development of a Stormwater Resource Plan (SWRP) to be eligible to receive grants from a bond act approved after January 1, 2014, for stormwater and dry-weather runoff capture projects. A SWRP is a stormwater management document developed on a watershed basis that identifies a prioritized list of projects to address stormwater and dry-weather runoff, while also providing multiple benefits, such as water supply, flood management, and environmental and community enhancements. The State Water Resources Control Board (SWRCB) developed Stormwater Resource Plan Guidelines (2015) to help facilitate the proper preparation of SWRPs or equivalent documents. Proposition 1 includes numerous categories of projects to be funded, one being the Stormwater Grant Program. Planning and implementation grants were included in the Stormwater Grant Program. Planning grants are to be used for developing SWRPs and/or conducting studies prior to project implementation while the implementation grants are used to fund projects identified in a SWRP or equivalent document.

The San Bernardino County Flood Control District (SBCFCD or District) was awarded planning grant funds through the Stormwater Grant Program for the development of the San Bernardino County Santa Ana River Watershed (SBC SARW) SWRP (Grant Agreement No. D1612627). The SBC SARW SWRP encompasses the upper limits of the SARW that lies within the San Bernardino County jurisdictional boundary.

This Stakeholder and Public Outreach, Education, and Engagement Plan (SPOEEP) has been developed to support the outreach efforts that will be conducted throughout the SWRP development, consistent with the SWRP Guidelines (2015), applicable Water Code (Sections 10561-10573), and the Proposition 1 Grant Agreement. The Grant Agreement identifies the following tasks (Task 5) associated with stakeholder and public outreach, education, and participation:

- Provide a stakeholder outreach, education, and engagement plan and submit to the Grant Manager for review and approval.
- Conduct a minimum of two (2) stakeholder meetings and one (1) public outreach meeting for interested stakeholders over the course of the SWRP development. At a minimum, one outreach meeting shall include a request for stakeholders to propose multi-benefit stormwater management projects.
- Submit a summary of stakeholder outreach, education and public participation and collaboration activities including meeting agenda(s) and materials, meeting summaries, sign-in sheets, and photos in the associated quarterly progress report(s).

The Grant Agreement also discusses the development of a Technical Advisory Committee (TAC) which involves stakeholders (Task 2). The SPOEEP summarizes efforts associated with the TAC, as they relate to stakeholder outreach, while the tasks identified in the bulleted list above are the main focus.

1.1 SPOEEP Goals

The SPOEEP provides the scope of work for the stakeholder and public outreach and education that will be implemented throughout the SWRP development. The SPOEEP identifies how input, ideas, and information will be solicited and collected from stakeholders and the public focusing on multi-benefit projects that provide water quality, water supply, flood management, environmental, and community benefits. The SPOEEP also describes the efforts that will be made during the SWRP development to educate stakeholders and the public. The information collected through SPOEEP implementation will be considered, and incorporated as applicable, throughout the SWRP development.

A key goal of the SPOEEP is to outline the steps that will be taken to involve interested stakeholders and the public in the development and review of the SWRP. These efforts include reaching out to a broad range of stakeholders, including elected and appointed officials, municipal and county staff, watershed groups, local water agencies, and non-governmental organizations, along with the public (e.g., residents, businesses, homeowners associations, etc.). Each of these audiences has a slightly different point of view and motivation for participating in the SBC SARW SWRP development. Understanding the different points of view will allow the SWRP to be prepared in a way that benefits the community and encourages support during SWRP development and implementation.

It is important to understand the roles the stakeholders will play versus how the public will be involved. **Section 2** defines the different groups involved in these efforts and the sections of the SPOEEP clarify how the District will interact with the public versus the stakeholders. Additional outreach efforts are required with stakeholders, as they will provide technical information to support the SWRP development. The public will be involved in the SWRP in a different capacity, which is further detailed herein. The District will use the development of the SWRP as an educational opportunity for both the stakeholders and the public. Information regarding the goals, projects, programs, and needs identified in the SWRP will be shared and the public (including stakeholders) will be given an opportunity to provide feedback on the plan itself, while not being as involved in the technical aspects. Goals associated with each specific type of outreach/education effort are detailed within their appropriate sections.

1.2 SPOEEP Structure

The development of the SBC SARW SWRP provides an opportunity to collect regional data, promote discussion between agencies, and creates a platform for transparency concerning both the SWRP and future project/program implementation. The SPOEEP structure is as follows:

- **Section 2 – Definitions**: defines key terms such as “public,” “stakeholders,” and “TAC” to clarify how outreach, education, and engagement will be tailored to each group.
- **Section 3 – Stakeholder Involvement in TAC**: summarizes goals and strategies related with the stakeholder involvement in the TAC, which is separate from general stakeholder outreach, education, and engagement efforts.
- **Section 4 – Stakeholder Outreach**: describes who, what, when, why, and how relating to the two (2) stakeholder outreach events that will be conducted during SWRP development.
- **Section 5 – Public Outreach**: describes who, what, when, why, and how relating to the one (1) public outreach event that will be held during the SWRP development.

- **Section 6 – Education**: details the efforts that will be made in educating stakeholders and the public, such as print material, webpage, and social media.
- **Section 7 – Alignment with SWRP Guidelines**: summarizes how the stakeholder and public outreach, education, and engagement efforts meet the SWRP Guidelines and corresponding sections of the Water Code.

2. Definitions

This section defines key terms that will be used throughout the SPOEEP. The terms defined below have similar definitions and understanding the differences will provide clarity regarding the outreach and education efforts that will be made during the SBC SARW SWRP development.

Public: Ordinary people in general; the community. Examples include residents, businesses, homeowners associations, etc.

Stakeholders: A person, group, or organization that has interest or concern in an organization and/or project (such as the SBC SARW SWRP). Stakeholders can affect or be affected by the organization's and/or project's actions, objectives, and policies. Examples include, and are not limited to, elected and appointed officials, municipal and county staff, watershed groups, local water agencies, and non-governmental organizations.

TAC Stakeholders: Key stakeholders (see definition above) that have service areas that overlaps (at least in part) with the SBC SARW. These stakeholders work closely with the District and partnerships have been/are in place for projects/programs that have been and continue to be implemented.

3. Stakeholder Involvement in TAC

The SBC SARW SWRP TAC was formed to solicit expert advice and technical support throughout the SWRP development. In addition to the requirements identified in the Grant Agreement for stakeholder and public outreach (refer to **Section 1**), the Grant Agreement requires that the District:

1. Establish a TAC for the SWRP development that includes the SWRCB, Regional Water Quality Control Board (RWQCB), and other interested parties, such as municipalities, water suppliers, local agencies, non-governmental organizations, public utilities, and regulatory agencies. A list of TAC members, their roles and responsibilities, and affiliations must be submitted to the Grant Manager.
2. Convene a kickoff meeting to develop the SWRP water management goals and objectives, formalize roles, and develop a schedule for future meetings. A summary of SWRP objectives, meeting schedule, and updates to the TAC participant list must be submitted to the Grant Manager.
3. Conduct a minimum of three (3) additional meetings and submit the agendas, meeting notes, sign-in sheets, and a list of current action items for each meeting to the Grant Manager.

Information pertaining to the TAC is presented in this SPOEEP to clarify how the effort being made to involve stakeholders in the TAC is separate from other stakeholder outreach efforts (detailed in **Section 4**). TAC member roles and responsibilities and the TAC schedule are presented in subsections below. Additional information required based on the Grant Agreement is submitted separately to the Grant Manager.

3.1 Roles and Responsibilities

Key stakeholders were invited to serve on the TAC based on proximity to the SBC SARW, involvement in similar efforts (watershed planning, multi-benefit projects, etc.), and existing relationships/partnerships. It is important that the TAC is able to provide region-specific input and understands the current challenges faced in the SBC SARW. The District has agreements in place with the TAC stakeholders and anticipates future partnership opportunities will come out of the SWRP development. **Table 3-1** summarizes the key stakeholders invited to participate in the TAC and their role/responsibility.

Table 3-1 TAC Roles and Responsibilities

Agency	Status	Role/Responsibility
Bureau of Reclamation	Unable to Participate	Not applicable
Chino Basin Water Conservation District	Active	Guidance on water accounting and project selection
Inland Empire Utilities Agency (IEUA)	Active	Guidance on water supply, waste water, recycled water and joint use project selection
Riverside County Flood Control and Water Conservation District (RCFCWCD)	Invited, No Response	Not applicable
RWQCB	Active	Guidance on permit requirements and project selection

Agency	Status	Role/Responsibility
Santa Ana Watershed Project Authority (SAWPA)	Active	Guidance on regional water and project selection
San Bernardino County Department of Public Works, National Pollutant Discharge Elimination System (NPDES)	Active	TAC lead
San Bernardino County Flood Control District, Flood Planning	Active	Guidance on flood control and project selection
San Bernardino Valley Municipal Water District (SBVMWD)	Active	Guidance on water supply, groundwater recharge and project selection
Western Municipal Water District (WMWD)	Pending	Guidance on groundwater recharge in service area and project selection

3.2 Tentative Schedule

Table 3-2 summarizes the TAC meeting schedule and meeting purpose, which includes the kickoff meeting and three additional meetings. At the time this SPOEEP was prepared, the kickoff meeting and one additional meeting had been held. The schedule and scope for the last two meetings are tentative and may change.

Table 3-2 Tentative TAC Meeting Schedule and Purpose

TAC Meeting	Schedule	Purpose
Kickoff Meeting	April 12, 2017	➢ Present background/overview of SBC SARW SWRP ➢ Define roles and responsibilities ➢ Discuss water management goals and objectives ➢ Outline TAC involvement and schedule
Meeting #2	July 6, 2017	➢ Examine quantifiable benefit goals and targets to be included in the SWRP ➢ Review multi-benefit projects identified in other planning documents that may be included in the SBC SARW SWRP ➢ Identify data needed for projects to quantify benefits
Meeting #3	Late August 2017	➢ Present/discuss results associated with benefit quantification for example projects ➢ Collaborate on project concepts ➢ Evaluate opportunities to enhance projects to provide additional benefits
Meeting #4	December 2017	➢ Walk through the Draft SBC SARW SWRP ➢ Discuss structure and key sections ➢ Solicit feedback, comments, questions, and suggestions

4. Stakeholder Outreach

Two (2) stakeholder outreach events will be held during the development of the SBC SARW SWRP, consistent with the Grant Agreement requirements. The goals of the stakeholder outreach event are:

1. Collect information regarding challenges faced in relationship to water quality, water supply, flood management, environmental, and the community;
2. Gather details pertaining to current projects and programs conceptualized, planned, and implemented;
3. Solicit project/program ideas to be included in the SWRP; and
4. Obtain data pertinent to quantifying project/program benefits, including, but not limited to, monitoring data, flood studies, project/program concepts, system operations, etc.

The District will utilize the stakeholder events to solicit technical information and identify projects/programs that include partnerships with the District and/or are mutually beneficial. The stakeholder events will also promote education, as the District will share details pertaining to the SBC SARW SWRP, which will increase awareness and encourage support. It is important to include local stakeholders in the region throughout the SWRP development, as partnerships may be formed and local support will lead to a successful plan and projects/programs implementation.

4.1 Potential Participants

Potential participants in the stakeholder event will include the stakeholders participating in the TAC along with additional local stakeholders. Opportunities to include elected and appointed officials, municipal and county staff, watershed groups, local water agencies, and non-governmental organizations, along with other stakeholders, have been and will continue to be evaluated. The TAC will work together to compile lists of stakeholders that have participated in outreach efforts of similar scope/magnitude. **Table 4-1** identifies potential participants. This list will be further refined prior to the stakeholder outreach event.

Table 4-1 Potential Participants for the Stakeholder Outreach Events

Stakeholder Category	Potential Stakeholders
Elected/appointed officials	To be determined
Local municipalities	Big Bear Lake, Chino, Chino Hills, Colton, Fontana, Grand Terrace, Highland, Loma Linda, Montclair, Ontario, Rancho Cucamonga, Redlands, Rialto, San Bernardino, Upland, and Yucaipa
Neighboring counties	Orange County (Department of Public Works and Flood Control District) Riverside County (RCFCWCD)
Non-governmental organizations	Council for Watershed Health Inland Empire Waterkeeper
Regulators	RWQCB (Santa Ana) SWRCB United States Army Corps of Engineers

Stakeholder Category	Potential Stakeholders
SBC departments	Flood Control District Public Health (Mosquito and Vector Control) Public Works Regional Parks Special Districts
Water agencies and member agencies	Big Bear Municipal Water District (BBMWD) – Big Bear Municipal Water Company
	Chino Basin Water Conservation District/Watermaster
	IEUA – Cities of Chino, Chino Hills, Ontario, and Upland, Crawford Canyon Municipal Water Company, Cucamonga Valley Water District, Fontana Water Company, Monte Vista Water District, and San Antonio Water Company
	SBVMWD – Cities of Colton, Loma Linda, Redlands, and Rialto, East Valley Water District, Marygold Mutual Water Company, Muscoy Mutual Water Company, Riverside Highland Water Company, San Bernardino Municipal Water District, San Bernardino Valley Conservation District, South Mesa Water Company, Terrace Water Company, West Valley Water District, Western Heights Water Company, and Yucaipa Valley Water District
	Six Basins Watermaster
	WMWD
	Warren Valley Basin Watermaster
	Other – City of Big Bear Lake Water Department, Big Bear City Community Service District, Fallsvale Service Company, Lake Arrowhead Community Services District, Lytle Creek Springs Water Company, and Running Springs Water District
Watershed groups	Middle Santa Ana River Total Maximum Daily Load (TMDL) Task Force SAWPA
Other agencies	Bureau of Reclamation California Department of Transportation California State Parks Department of Water Resources (DWR) School Districts United States Forest Service (Trails Unlimited)

The District will contact potential participant agencies/organizations in an effort to identify the personnel that would best serve as the stakeholder representative. If these potential participant agencies have been involved in outreach efforts implemented by members of the TAC, then contact information obtained at those events will be utilized if possible. Invitations will be distributed by email, when possible, and mail. The District will evaluate opportunities to utilize Doodle Poll or a similar web application to collect information on availability. A running list of agencies/organizations and personnel invited will be tracked along with their responses.

4.2 Event Format

The main purpose of the stakeholder events will be to identify projects/programs for inclusion in the SWRP. The District will seek opportunities to partner with local stakeholders in the implementation of projects/programs that provide multiple benefits (combination of water quality, water supply, flood management, community, and environmental benefits). It is anticipated that the stakeholder outreach events will be no longer than 1.5 hours. The tentative agenda is provided below. Ample time will be set aside to answer questions and listen to comments and concerns. In contrast to the format of the public outreach event described in **Section 5.2**, the stakeholder event will be structured more like a conversation rather than a presentation, while a presentation will be used to support discussions.

1. Project background (Proposition 1)
2. Goals of stakeholder outreach
3. Goals of the SBC SARW SWRP
4. SWRP overview
5. Quantifiable benefits
    a. Water quality
    b. Water supply
    c. Flood management
    d. Environmental
    e. Community
6. Potential projects
    a. Project types
    b. Partnerships
    c. Data needs
7. Next steps
8. Questions and answers

Only one agenda is identified in this section, as the District will conduct two stakeholder events that focus on the same topic, as further detailed in **Section 4.3**. A sign-in sheet will be used to gather information on the participants, which will be used to send out updates on the SWRP, as it would be beneficial if the stakeholders reviewed the SWRP during the public review period. Hard copies of the agenda will be distributed along with informational handouts as determined to be helpful. The information identified in the agenda will be presented utilizing a PowerPoint presentation, while discussions will be encouraged. Comment cards will be available to encourage attendees to leave feedback.

4.3 Tentative Schedule

The stakeholder outreach events will be held in mid-August. Due to the large area the SBC SARW covers, the two stakeholder outreach events will be of a similar format and hosted at two different locations, one on the east side of the SBC SARW and the other on the west. This will encourage stakeholders throughout the watershed to participate. It is anticipated that these events will be held during business hours and the locations will be further evaluated. The District will evaluate opportunities to utilize Doodle Poll or a similar web application to collect information on availability, which will provide useful information regarding the schedule of the stakeholder events. Invitations will be distributed a few weeks in advance, such that a preliminary head count can be determined prior to the event.

5. Public Outreach

One (1) public outreach event will be held during the SBC SARW SWRP development, as required in the Grant Agreement. The goals of the public outreach event are:

1. Educate the public (additional education information in **Section 6**);
2. Rally community support for the SBC SARW SWRP; and
3. Encourage the public to review the document and provide input.

It is important that the public is aware of the effort being made by the District to develop the SWRP and are in support of the development and implementation. The SWRP will be posted for public review and the public outreach event will serve as an advertisement and introduction. The public is more likely to review the SWRP and provide meaningful comments if they have a base understanding of the efforts made, SWRP development process, and contents. This section details how potential participants will be invited, event format, and schedule.

5.1 Potential Participants

The general public will be solicited for involvement in the public outreach event rather than specific audiences. Alternatively, the goal will be to advertise as much as possible for the outreach event in an effort to identify participants. Existing platforms will be used when possible, as mentioned below. Invitations for the public outreach event will be posted online on the District's website, distributed via email, and will be available in printed format at the District office.

The San Bernardino County Areawide Stormwater Program (Areawide Program) consists of the District, San Bernardino County, and 16 municipalities within the County, all of which are located within the SBC SARW SWRP. The Areawide Program has been implementing an outreach program for several years that pertains mostly to stormwater quality. Over the past few years, the Areawide Program has focused on collecting email addresses, which are used to share information related to the Arewide Program and associated events. The District will work with the Areawide Program to distribute invitations to the SWRP public outreach event to the community currently involved in outreach efforts implemented by the Areawide Program. This is a good audience to focus on, as they have some knowledge of stormwater quality and shown interest in the stormwater program.

The SBC SARW SWRP TAC will be solicited for similar types of mailing groups. Agencies involved in the TAC implementation projects and programs that include community outreach. The District will look for opportunities to leverage those existing relationships in an effort to encourage participation in the SBC SARW SWRP public outreach event. These email lists will be utilized, if available, to distribute the invitation.

In addition to email invites, invitations will be posted on Facebook. The District will post invitations on the San Bernardino County and San Bernardino County Department of Public Works Facebook pages. The District will also coordinate with the Areawide Program to post on their Facebook page. The SBC SARW SWRP TAC members will be consulted to determine if their agencies can post on their Facebook pages and/or they will be tagged in the original post in an effort to reach a larger audience. Opportunities to utilize other social media platforms, such as Twitter, will also be explored.

Print invitations will also be utilized. The invitation will be posted in local newspapers and printed versions will be available at the District office near other print materials. A website will be created that will allow potential participants to RSVP, such as Eventbrite or a similar platform. This will allow the District to have a general idea as to how many participants will attend the event. The sign-in sheet at the public outreach event will ask how each participant heard of the event. This will provide useful data that may be referenced for future public outreach events, such as those that may be conducted during the SWRP implementation.

5.2 Event Format

As described in the goals above, the event will be structured in a way that will educate attendees by providing general background information and details specific to the SBC SARW SWRP. It is anticipated that the public outreach event will be no longer than 1.5 hours. The tentative agenda is provided below. Ample time will be set aside to answer questions and listen to public comments and concerns.

1. Project background (Proposition 1)
2. Goals of public outreach
3. Goals of the SBC SARW SWRP
4. SWRP overview (aligns with SWRP structure)
    a. Watershed identification
    b. Water quality compliance
    c. Organizations, coordination, and collaboration
    d. Quantitative methods
    e. Identification and prioritization of projects
    f. Implementation strategy and schedule
    g. Education, outreach, and public participation
5. SWRP public review
6. Next steps
7. Questions and answers

A sign-in sheet will be used to gather information on the participants, which will be used to send out reminders regarding the public review of the SWRP. Hard copies of the agenda will be distributed along with informational handouts as determined to be helpful throughout the SWRP development. The information identified in the agenda will be presented utilizing a PowerPoint presentation. Comment cards will be available to encourage attendees to leave feedback.

5.3 Tentative Schedule

The SWRP public outreach event will be held near the date the draft SWRP is posted for public review (before or just after it is posted). The draft SWRP will tentatively be posted for public review in early February 2018. This event will be used to encourage the public to review the SWRP and provide feedback. It will also be used to rally public support of the SWRP, which is important, as support will encourage long-term success. The District will evaluate opportunities to hold the outreach event during the day or in the evening. Different locations will also be evaluated, as the SBC SARW covers a large area and it will be important to find a central location.

6. Education

The District sees the SBC SARW SWRP development as an opportunity to educate local stakeholders and the public. In addition to the stakeholder and public outreach events described in **Section 4** and **Section 5**, education will be promoted through printed materials, a SWRP webpage, and social media, each of which are further described in the subsections below.

6.1 Printed Materials

Printed materials will be developed in an effort to educate stakeholders and the public. As the SBC SARW SWRP development progresses, the contents of the printed materials will be further defined. Printed materials may include graphic posters, postcards, and/or brochures. The goals of the printed materials are to simply convey through illustrations and minimal text:

1. What is a SWRP?
2. Why is a SWRP necessary?
3. What types of solutions are included in the SBC SARW SWRP?

Printed material will highlight the multiple benefits that will be provided through the SBC SARW SWRP implementation (water quality, water supply, flood management, environmental, and community benefits). Printed materials will also be used to advertise the stakeholder and public outreach events and solicit public review and comment of the SWRP. Printed material will be available at the District's office and outreach events. The District will evaluate opportunities to provide educational material to educational institutes, which may be dependent on their involvement in the outreach events. In addition to printed material, the contents of these materials will be posted on the SWRP webpage and social media accounts, as described in **Section 6.2** and **Section 6.3**, respectively. The District will evaluate opportunities to prepare materials in both English and Spanish.

6.2 SWRP Webpage

The District will develop a webpage on their website that provides information on the SBC SARW SWRP development, consistent with the SWRP Guidelines, which state that SWRP information must be accessible to the stakeholders and public. The webpage will provide an overview of what the SWRP is and will include announcements as necessary. For example, announcements will be posted regarding the outreach events and public comment period (schedule, start, end, etc.). The webpage will include links to download educational materials, as detailed in **Section 6.1**. During the public review period, the Draft SBC SARW SWRP will be posted on this webpage and the ability to provide comments and feedback will be enabled. The webpage will provide contact information, which will allow interested parties to contact key personnel. The webpage will allow stakeholder and the public to easily find information specific to the SBC SARW SWRP development and support the outreach and education efforts described in this SPOEEP.

6.3 Social Media

Opportunities to utilize social media will be evaluated throughout the SBC SARW SWRP development. It is anticipated that, at a minimum, Facebook will be utilized to support education and outreach efforts. Facebook would be used to post educational materials, as detailed in **Section 6.1**, encourage local engagement and support, and advertise events (outreach and public review). The District will work with the Areawide Program to utilize their Facebook page, either through a direct post or by sharing a post made on the San Bernardino County Department of Public Works Facebook page. Working with the Areawide Program would be beneficial, as there is a large following currently and the followers are aware of stormwater issues and programs, thus represent a target audience.

The District will also encourage the TAC agencies/organizations to share posts related to the SBC SARW SWRP, or these agencies/organizations may be tagged in the posts. This will allow the posted materials to reach a larger audience. **Table 6-1** summarizes the current number of followers for the San Bernardino County Department of Public Works, Areawide Program, and TAC agencies/organizations (as of July 2017). The District will also evaluate opportunities to utilize other social media platforms, such as Twitter.

Table 6-1 Summary of Facebook Pages and Number of Followers

Facebook Page	Number of Followers
San Bernardino County Department of Public Works	608
Areawide Program	13,103
TAC Agencies/Organizations	
Chino Basin Water Conservation District	1,222
IEUA	404
RWQCB (Santa Ana)	-
SAWPA	153
SBVMWD	-
WMWD	643

7. Alignment with SWRP Guidelines

Section VI.F of the SWRP Guidelines identifies guidance related to education, outreach, and public participation based on the Water Code. This section clearly explains how the stakeholder and public outreach, education, and engagement implemented throughout the SBC SARW SWRP development are in alignment with the SWRP Guidelines. The SWRP Guidelines identify the following goals for stakeholder and public outreach, education, and engagement. Subsections below address each item in order.

i. Public education and public participation opportunities to engage the public when considering major technical and policy issues related to the development and implementation of the plan;

ii. Mechanisms, processes, and milestones that have been or will be used to facilitate public participation and communication during development and implementation of the plan;

iii. Mechanisms to engage members of affected communities in project design and implementation;

iv. Identification and inclusion of specific audiences including local ratepayers, developers, locally regulated commercial and industrial stakeholders, non-governmental organizations, non-profit organizations, and the general public;

v. Strategies to engage disadvantaged and climate vulnerable communities within the SWRP boundaries and ongoing facilitation and tracking of their involvement in the planning process;

vi. Efforts to identify and address specific, runoff-related environmental injustice issues within the watershed; and

vii. A schedule for initial public engagement and education.

7.1 Consideration of Policy Issues

Stakeholders and the public will be consulted regarding technical and policy issues related to the development and implementation of the SWRP. Stakeholders through the TAC (**Section 3**) and at the stakeholder outreach events (**Section 4**) will be consulted on technical issues in different ways. The TAC is being consulted for guidance on the direction taken in the SWRP to quantify benefits, identify, and prioritize projects/programs from a technical standpoint. The public will also be engaged regarding technical and policy issues through the SWRP public review process. Guidance identified in this SPOEEP demonstrates that the District will work to engage stakeholder and the public in participating through printed materials, webpage, and social media (**Section 6**).

7.2 Mechanisms, Processes, and Milestones

Section 3, **Section 4**, and **Section 5** describe the mechanisms, processes, and milestones used to facilitate stakeholder and public participation and communication. The "Tentative Schedule" subsections in the sections referenced above describe the milestones utilized to schedule stakeholder and public outreach efforts. **Section 6** additionally details communication efforts through printed materials, webpage, and social media.

7.3 Engagement of Affected Communities

Section 6 describes the mechanisms used to engage the public and stakeholders, which will be used during the development of the SBC SARW SWRP and likely during implementation. These efforts may become more targeted during SWRP implementation within the affected communities, including both stakeholders and the public. Stakeholder and public outreach, education, and engagement efforts during the implementation of projects/programs identified in the SBC SARW SWRP will vary by project/program. The District will follow internal standard operating procedures, while projects/programs implemented by stakeholder partners will follow the lead implementing agency's procedures. Outreach efforts by either the District and/or partners will also follow guidelines identified by funding partners as applicable.

7.4 Identification and Inclusion of Specific Audiences

This SPOEEP identifies a variety of specific audiences to be included in both the stakeholder and public outreach, education, and engagement efforts, as identified in **Section 3**, **Section 4**, and **Section 5**. Audiences identified in the SWRP Guidelines, local ratepayers, developers, locally regulated commercial and industrial stakeholders, non-governmental organizations, non-profit organizations, and the general public, fall within the potential participants identified in the sections referenced above.

7.5 Strategies to Engage Disadvantaged Communities

Disadvantaged Communities (DACs) are defined as areas where the Median Household Income (MHI) is less than 80 percent of the statewide annual MHI. In addition, severely DACs are those areas where the MHI is less than 60 percent of the statewide annual MHI. DACs were mapped by DWR to better define geographies that meet DAC definitions based on census designated places (city/community boundaries), tracts (development areas), and blocks (smaller pockets of the community). As suggested in the definition, places are larger than tracts, which are larger than blocks. Based on the mapping published by DWR, illustrated in the figures below, 27 percent of the SBC SARW is considered a DAC tract and/or block. **Figure 7-1** illustrates the DAC tracts within the SBC SARW, while **Figure 7-2** illustrates the DAC blocks, and **Figure 7-3** illustrates the area covered by either a DAC tract and/or block.

The District will follow the approach described herein to communicate with stakeholders and the public in an effort to encourage outreach, education, and engagement with respect to the SBC SARW SWRP, which will include DACs. The District will ask for participants address and/or zip code in an effort to understand whether or not DACs were effectively reached and willing to participate. The District will evaluate opportunities to prepare printed material and webpage in both English and Spanish, which may better cater to existing DAC communities. Item iv described above also mentions climate vulnerable communities, which are not applicable in this region.

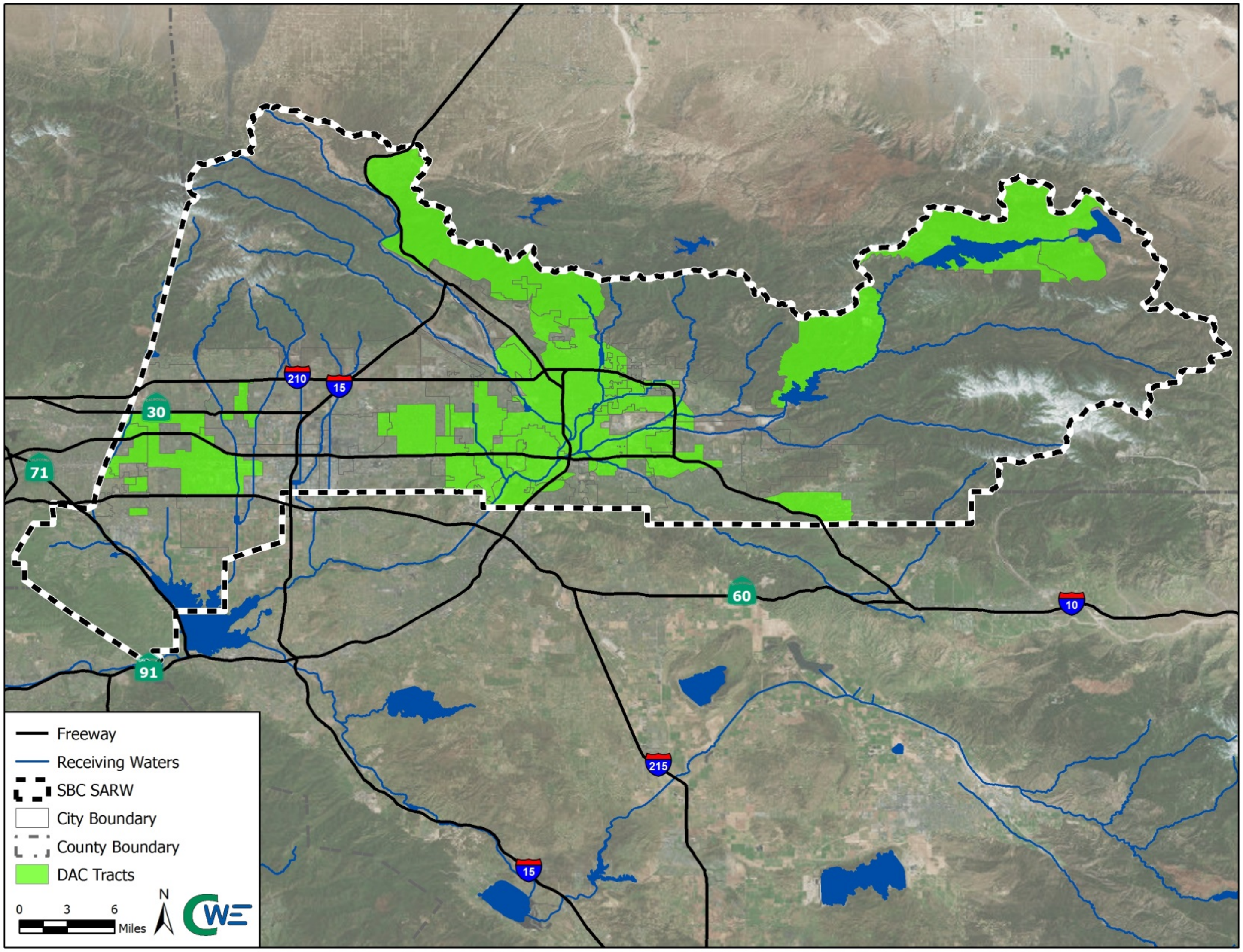


Figure 7-1 DAC Tracts within the SBC SARW

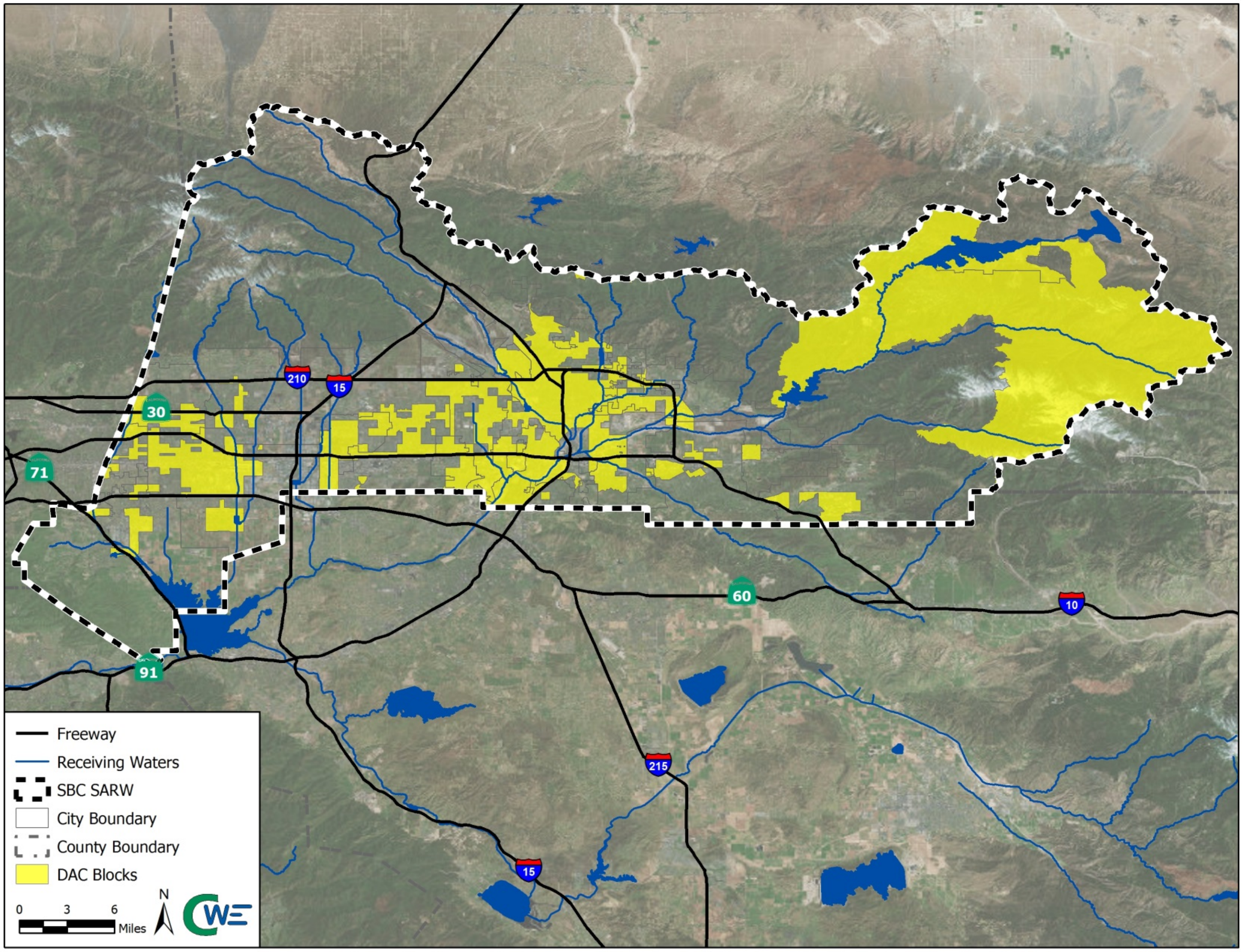


Figure 7-2 DAC Blocks within the SBC SARW

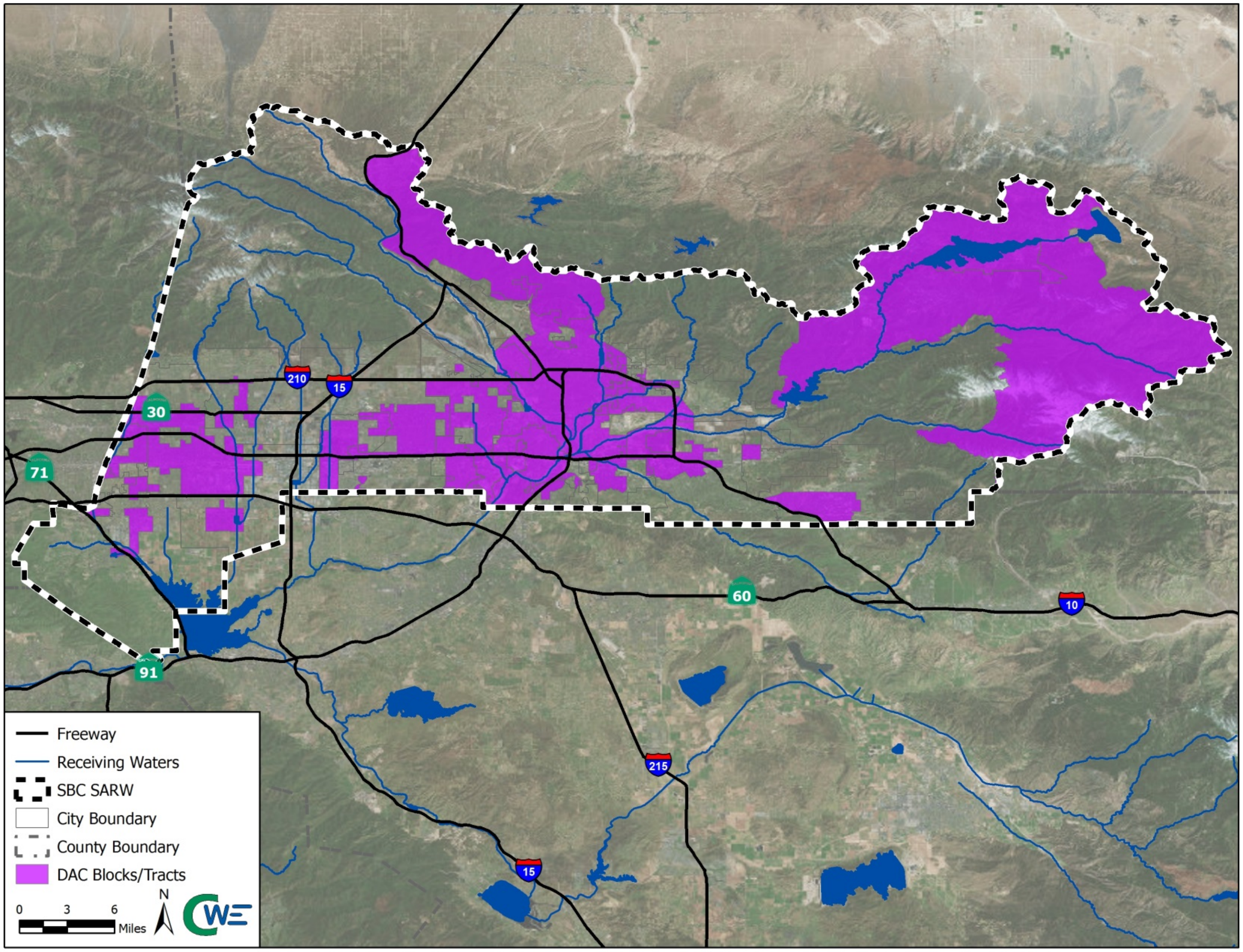


Figure 7-3 DAC Blocks and Tracts within the SBC SARW

7.6 Environmental Injustice Issues

When environmental injustice issues exist, it is common that they have a more significant impact on DACs. Including DACs in the stakeholder and public outreach, education, and engagement, as described in **Section 7.5**, may also address runoff-related environmental injustice issues, which may be of greater concern within DACs. Projects/programs will be identified in the SBC SARW SWRP which will address DACs and may in turn address and/or minimize runoff-related environmental injustice issues if they exist. Through the stakeholder and public outreach events, participants will be asked to share their concerns, such that solutions may be provided. These concerns may include runoff-related environmental injustice issues; therefore, by hosting these outreach events, these issues may be identified and addressed.

7.7 Schedule

The tentative schedule associated with stakeholder involvement in the TAC, stakeholder outreach, and public outreach is presented in **Section 3**, **Section 4**, and **Section 5**, respectively. The schedule for educational materials will be further evaluated during the SWRP development; however, it is anticipated the schedule for the release of material will closely follow the schedule for both the stakeholder and public outreach events. In summary, the schedule associated with stakeholder meetings through the TAC, stakeholder outreach events, and the public outreach event are summarized in **Table 7-1**.

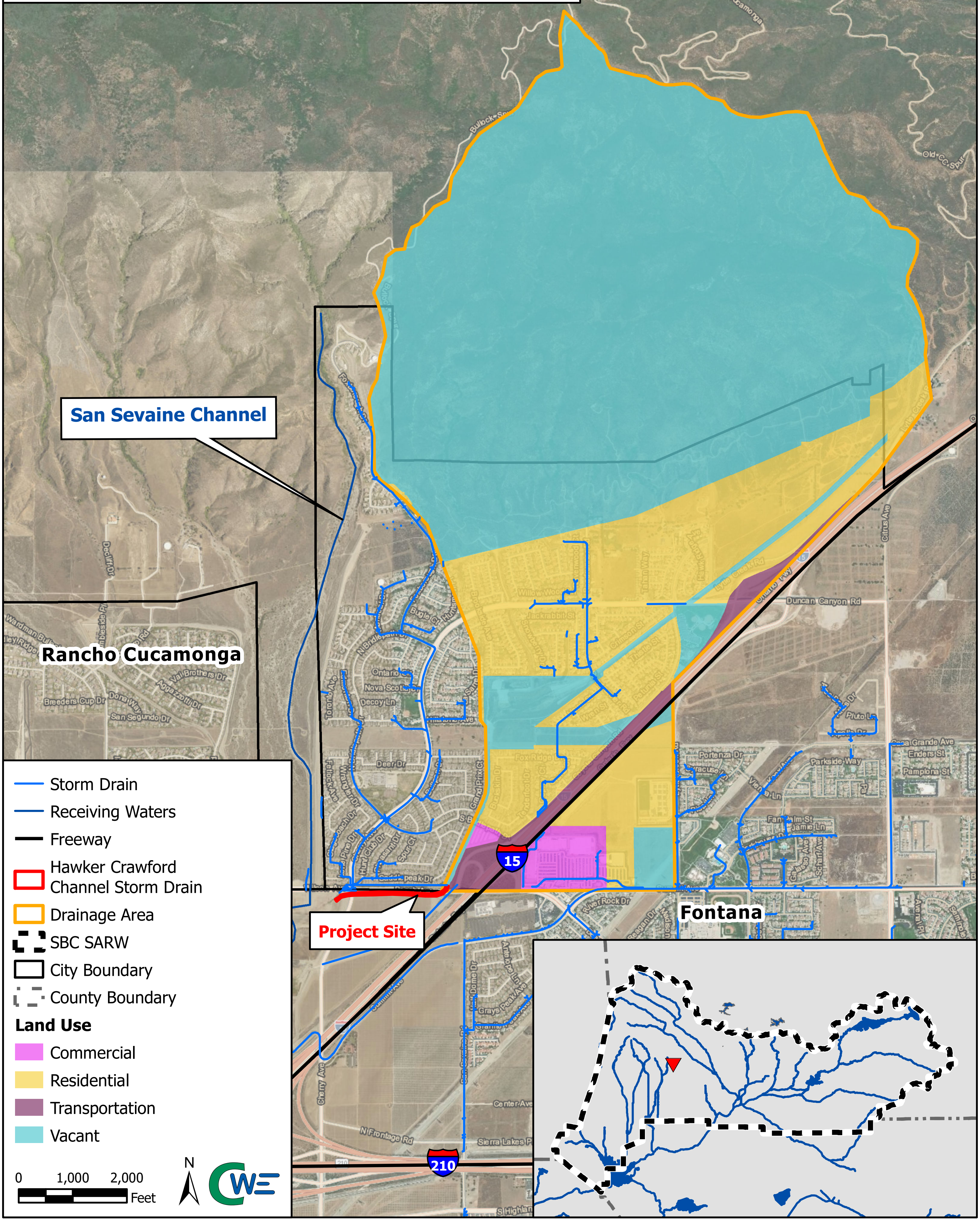
Table 7-1 Tentative Schedule

Audience	Event	Tentative Schedule
Stakeholder Meetings through the TAC	Kickoff Meeting	April 12, 2017
	Meeting #1	July 6, 2017
	Meeting #2	Late August 2017
	Meeting #3	December 2017
Stakeholder Outreach	Event #1	Mid-August 2017
	Event #2	
Public Outreach	Event #1	February 2018

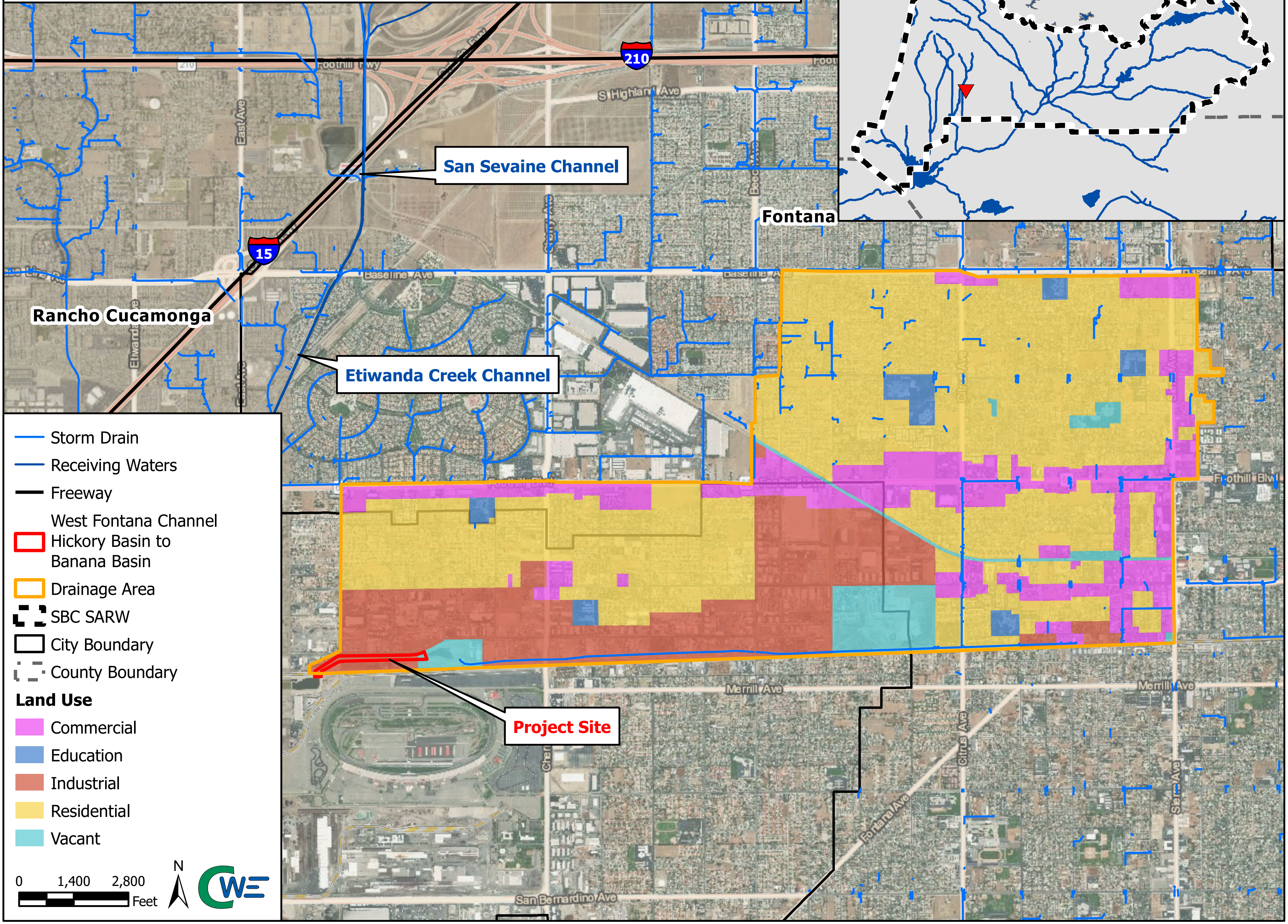
Attachment F

Project Figures

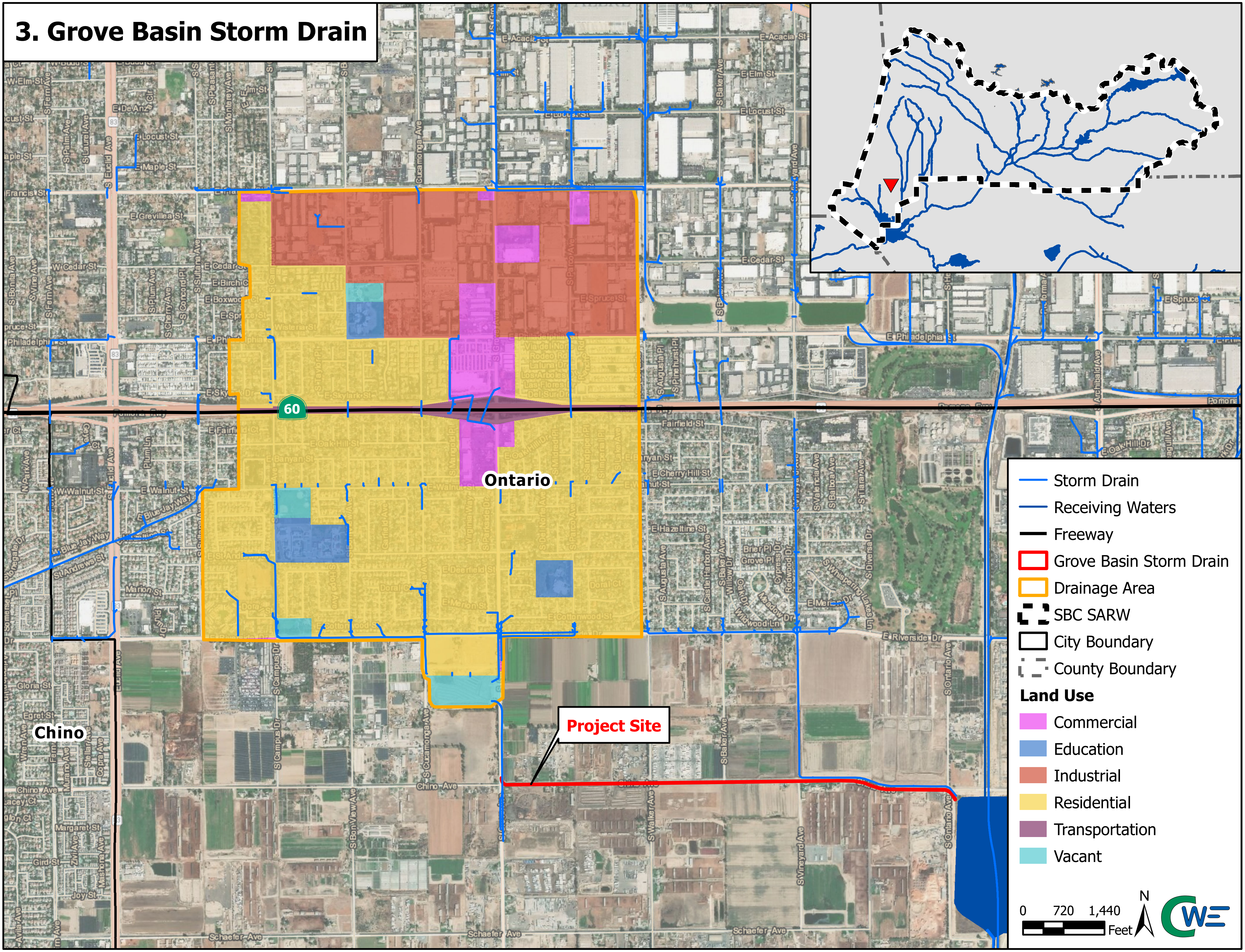
1. Hawker Crawford Channel Storm Drain



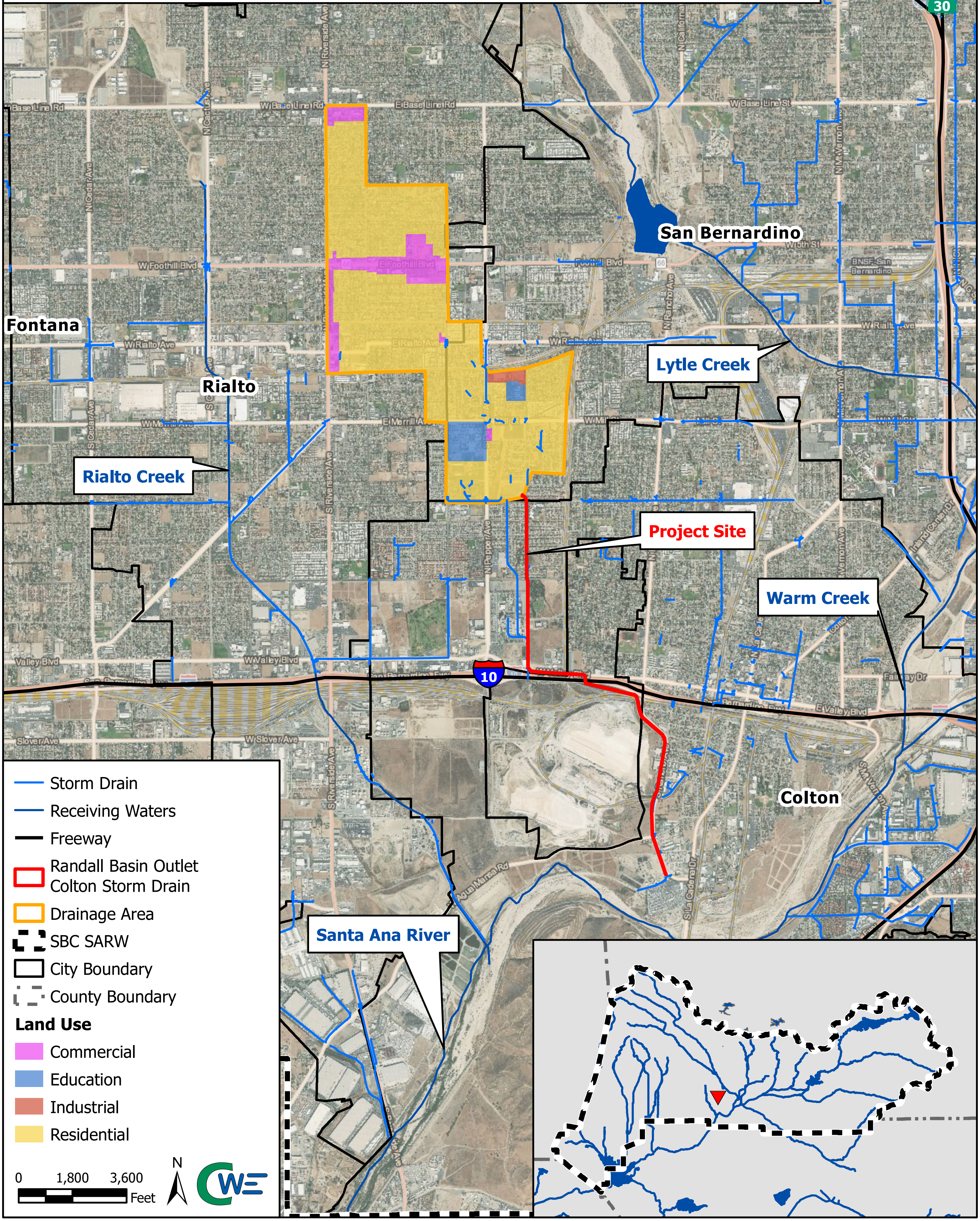
2. West Fontana Channel - Hickory Basin to Banana Basin



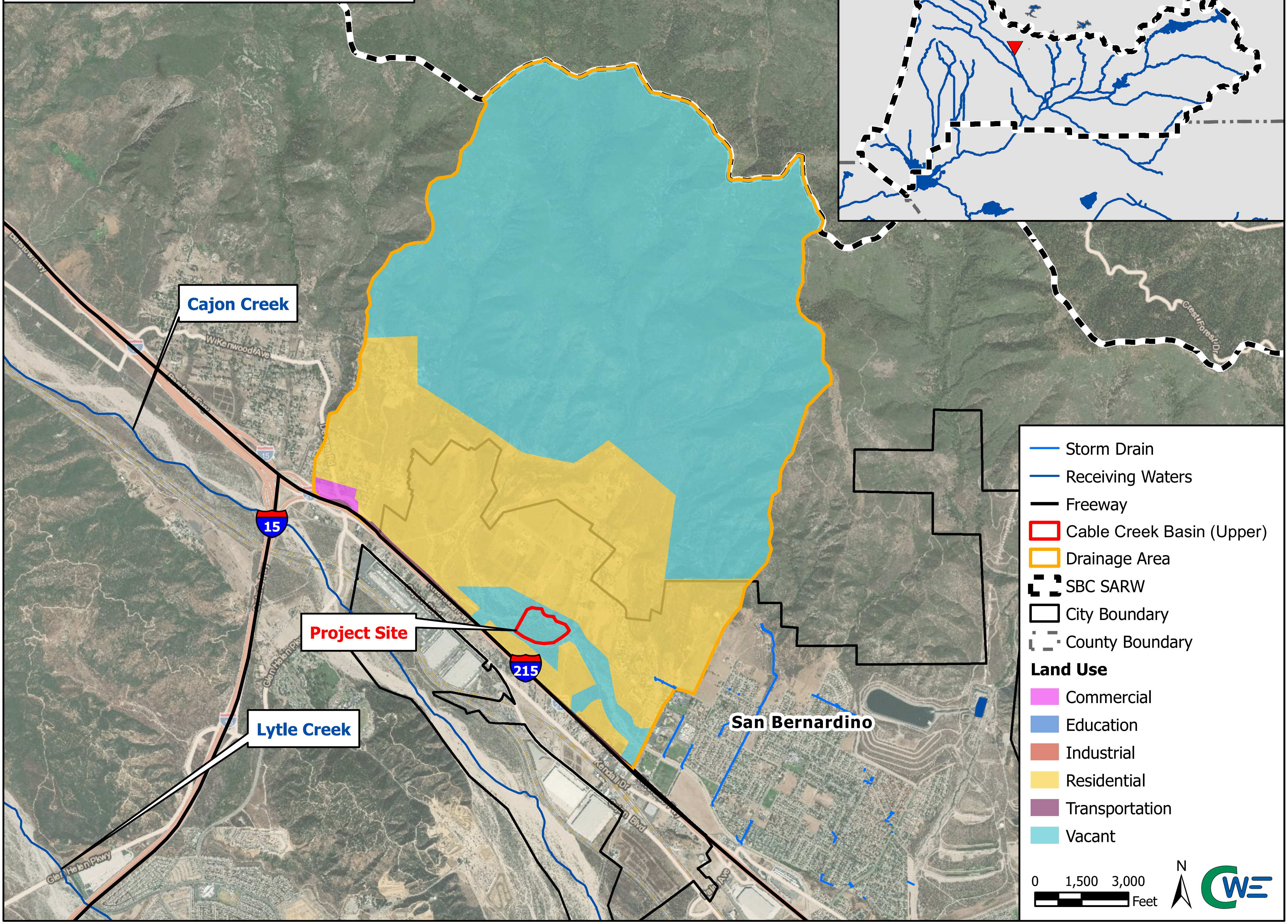
3. Grove Basin Storm Drain

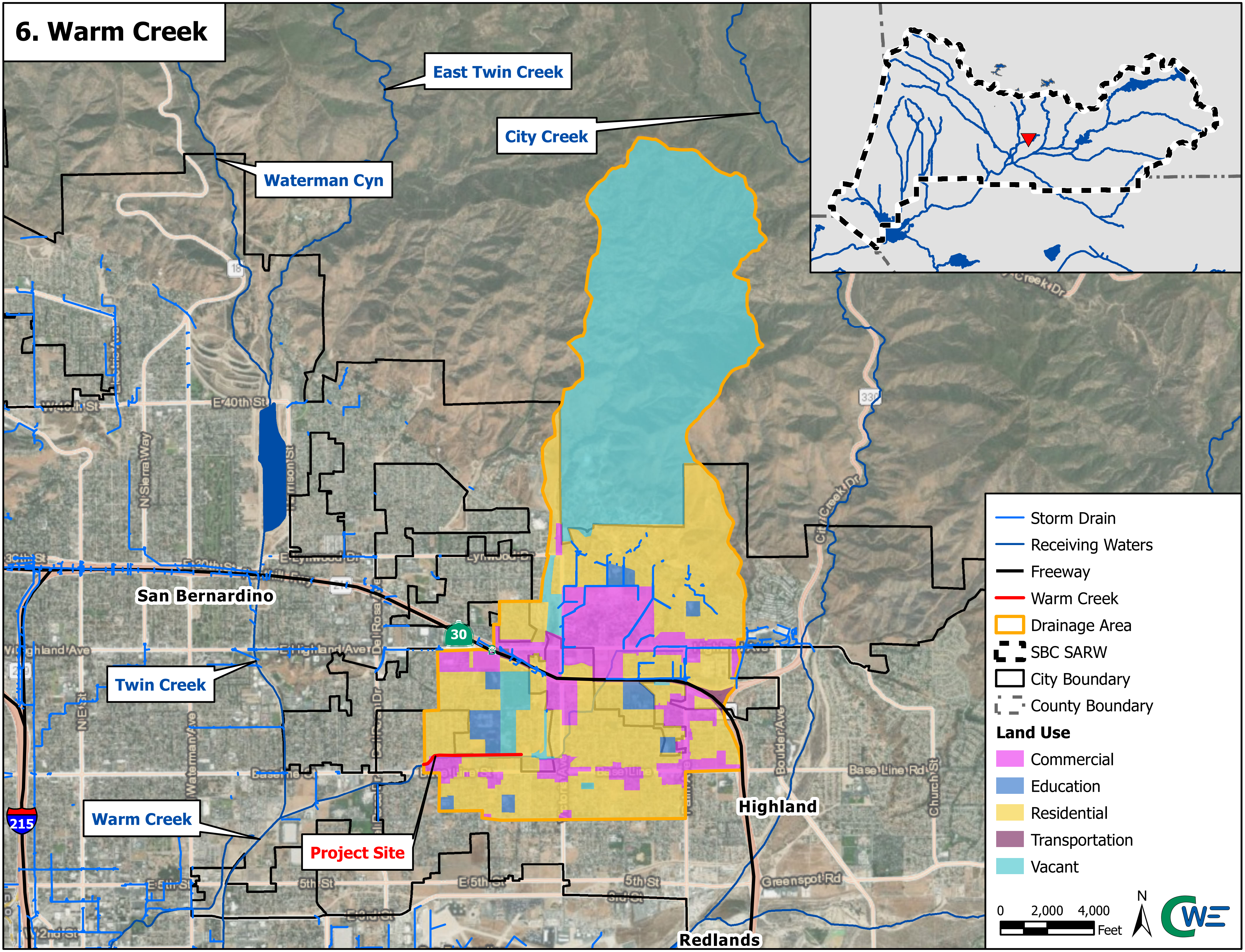


4. Randall Basin Outlet and Colton Storm Drain Project 3-5



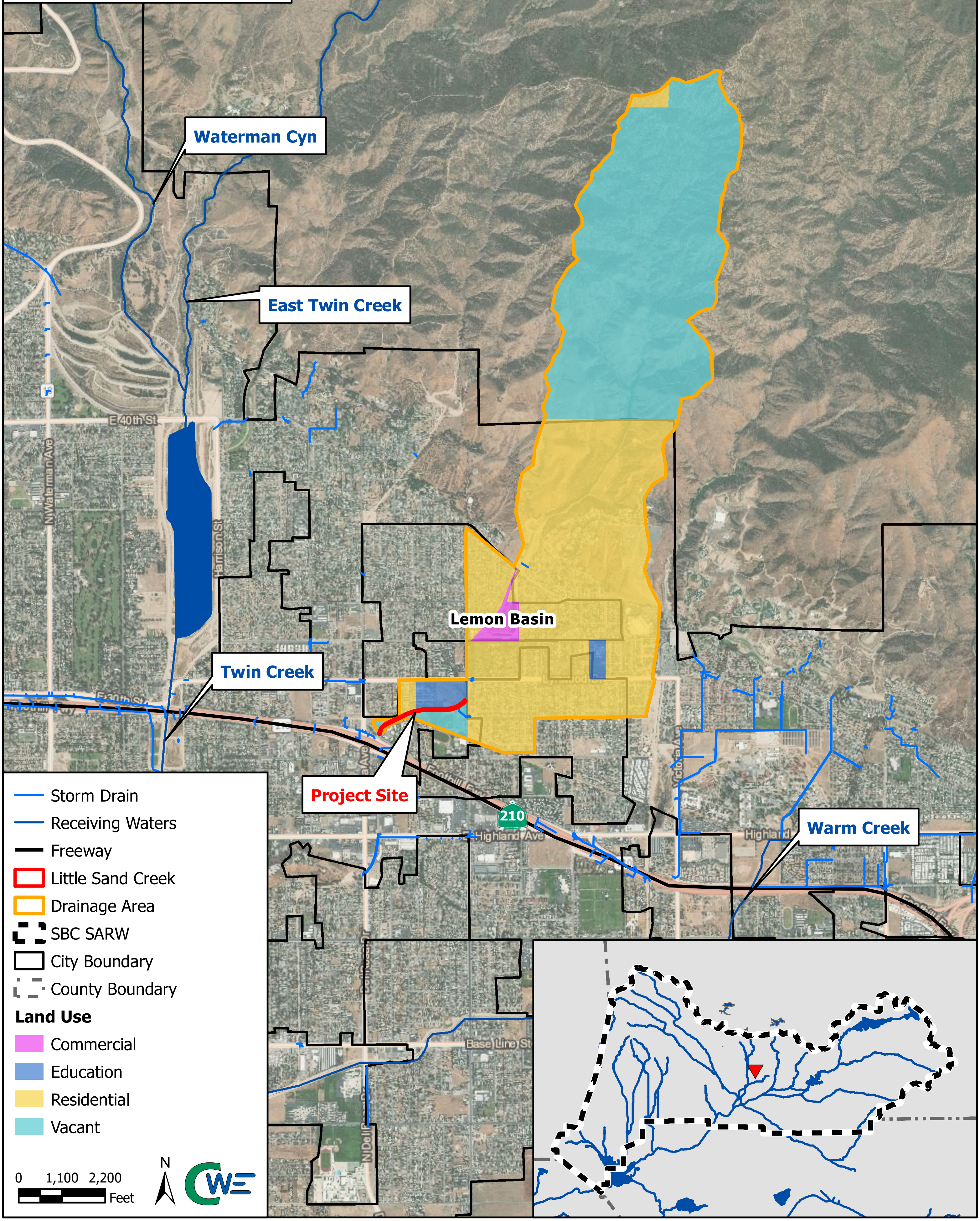
5. Cable Creek Basin (Upper)



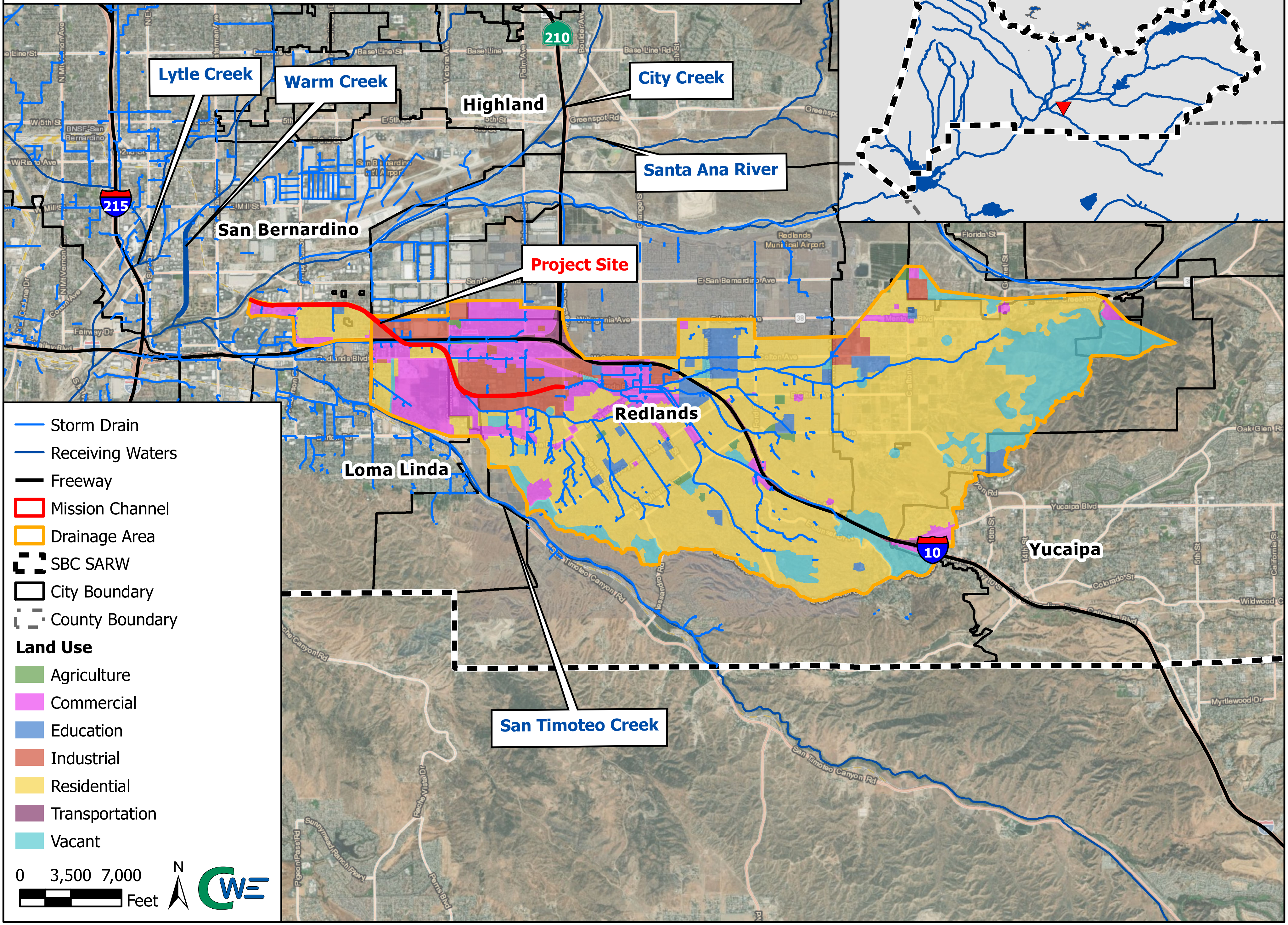


6. Warm Creek
East Twin Creek
City Creek
Waterman Cyn
San Bernardino
Twin Creek
Warm Creek
Project Site
Highland
Redlands
Storm Drain
Receiving Waters
Freeway
Warm Creek
Drainage Area
SBC SARW
City Boundary
County Boundary
Land Use
Commercial
Education
Residential
Transportation
Vacant
0 2,000 4,000
Feet
N

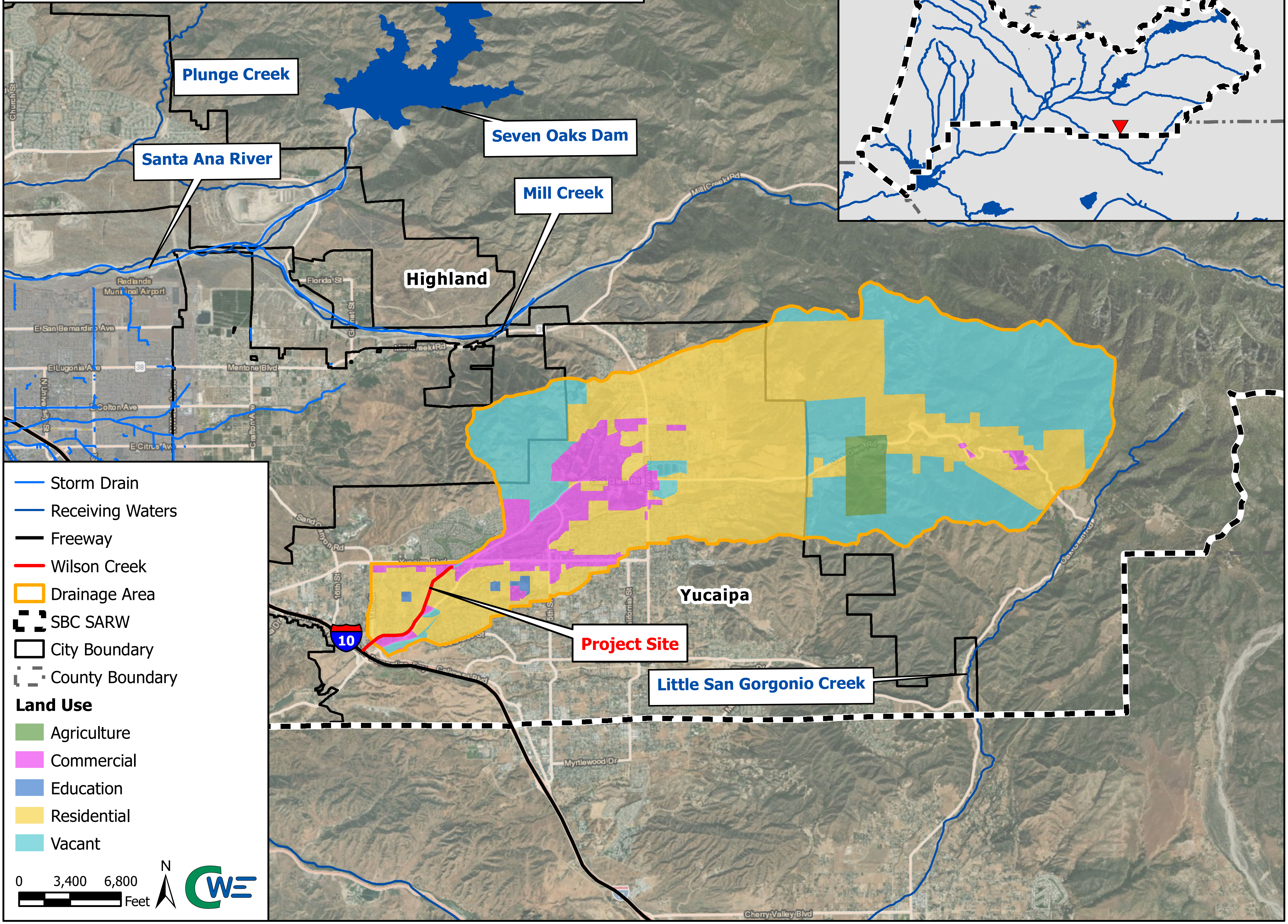
7. Little Sand Creek



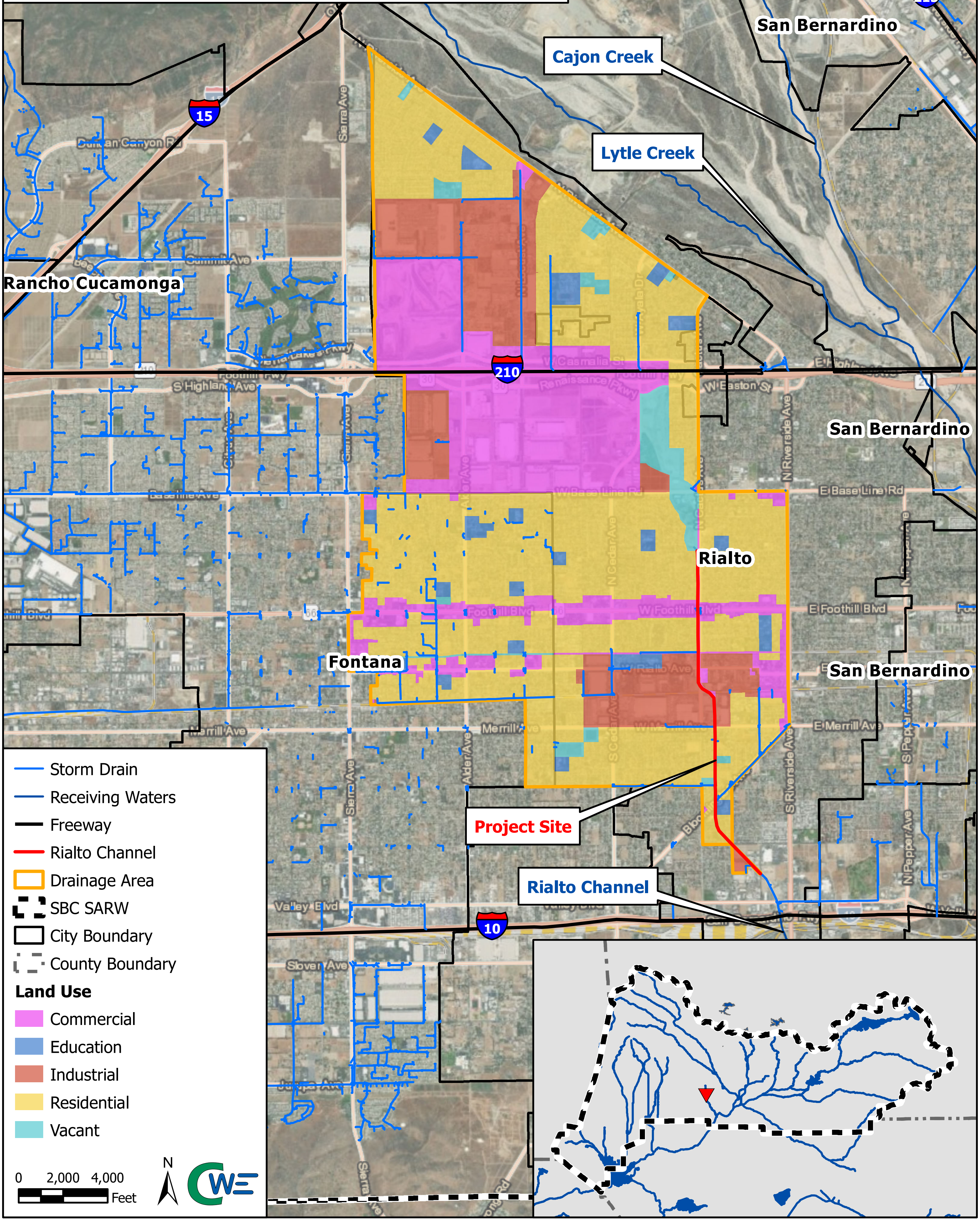
8. Mission Channel - Santa Ana River to Tennessee Street



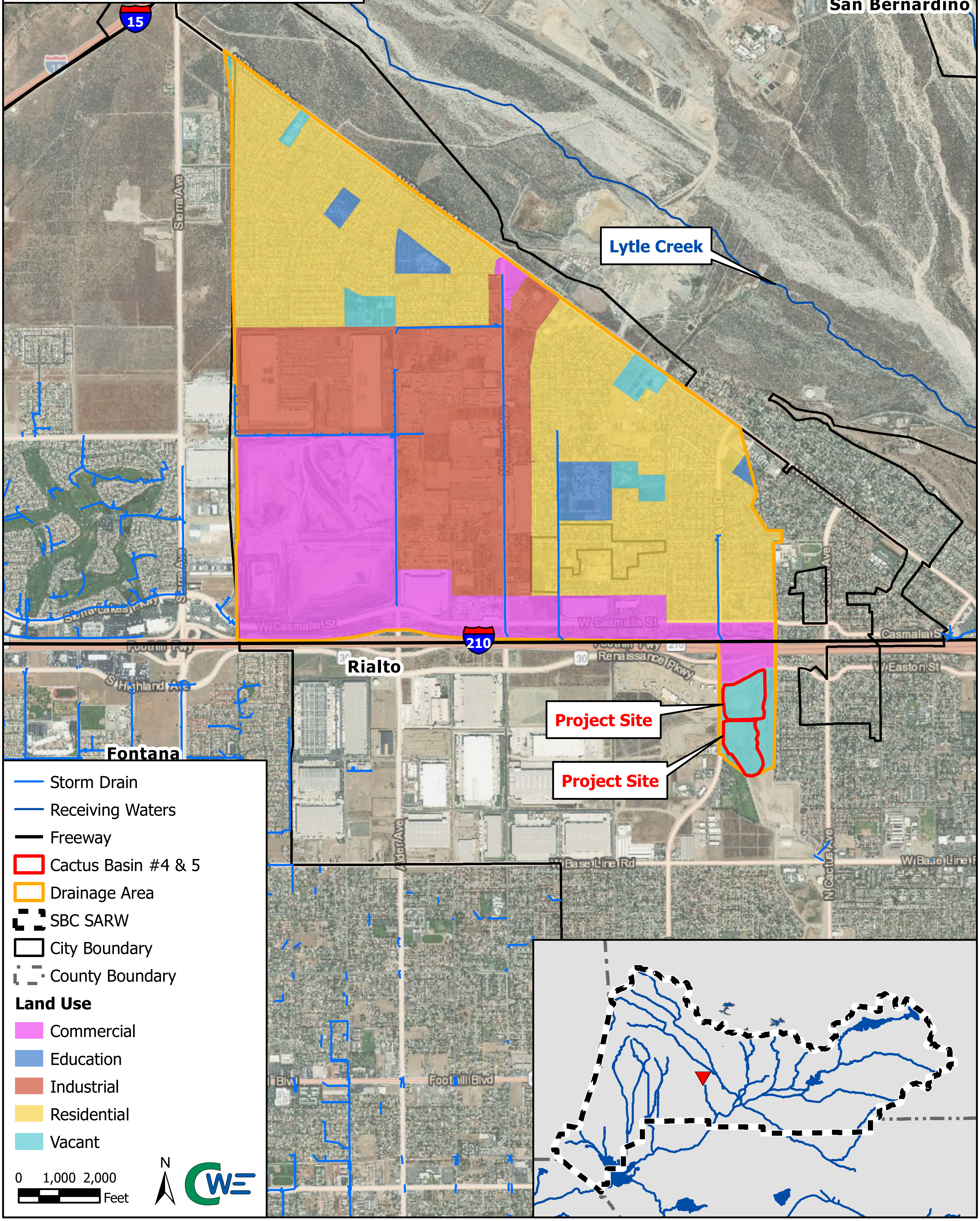
9. Wilson Creek - 10th Street to Interstate 10



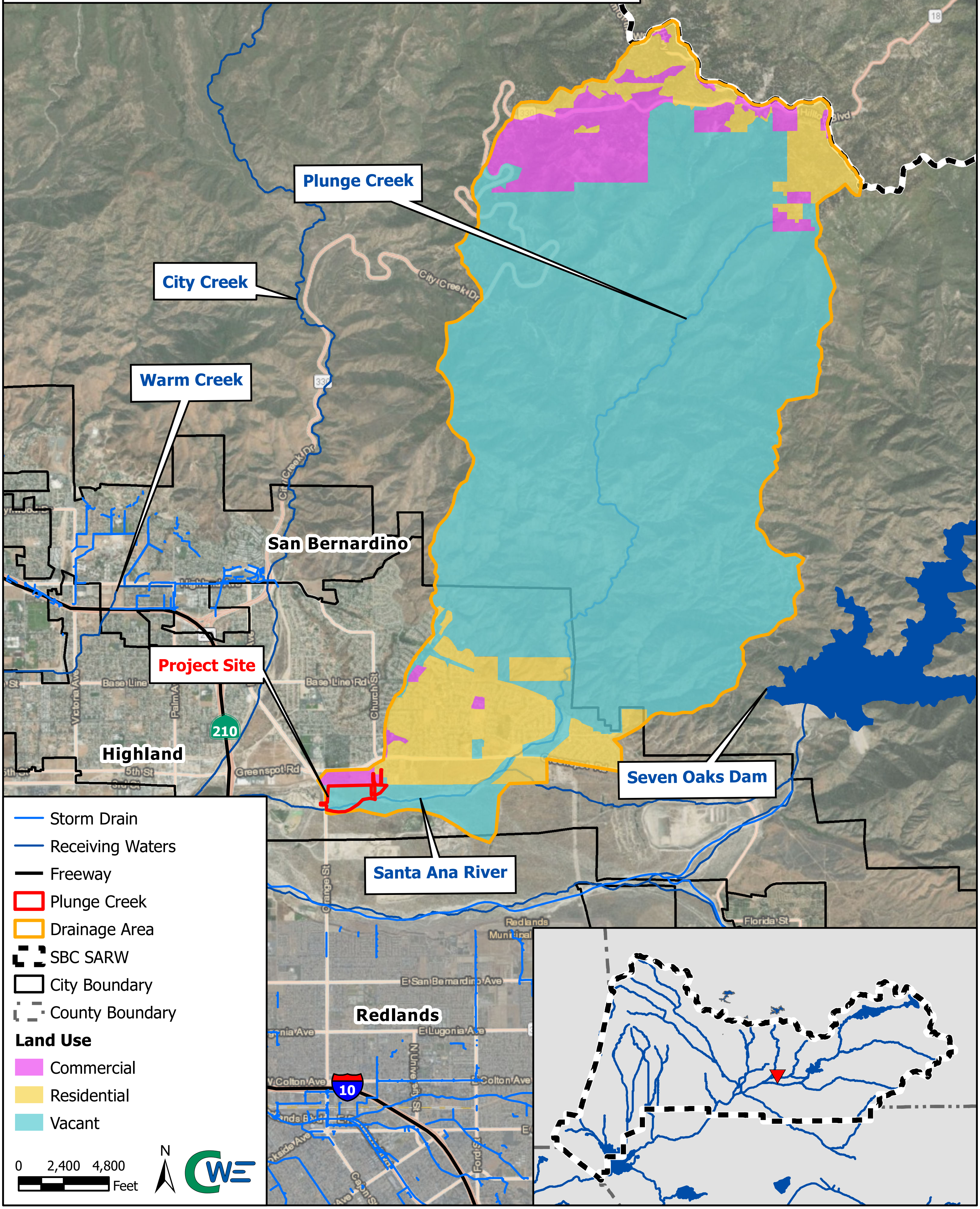
10. Rialto Channel - Etiwanda to Willow



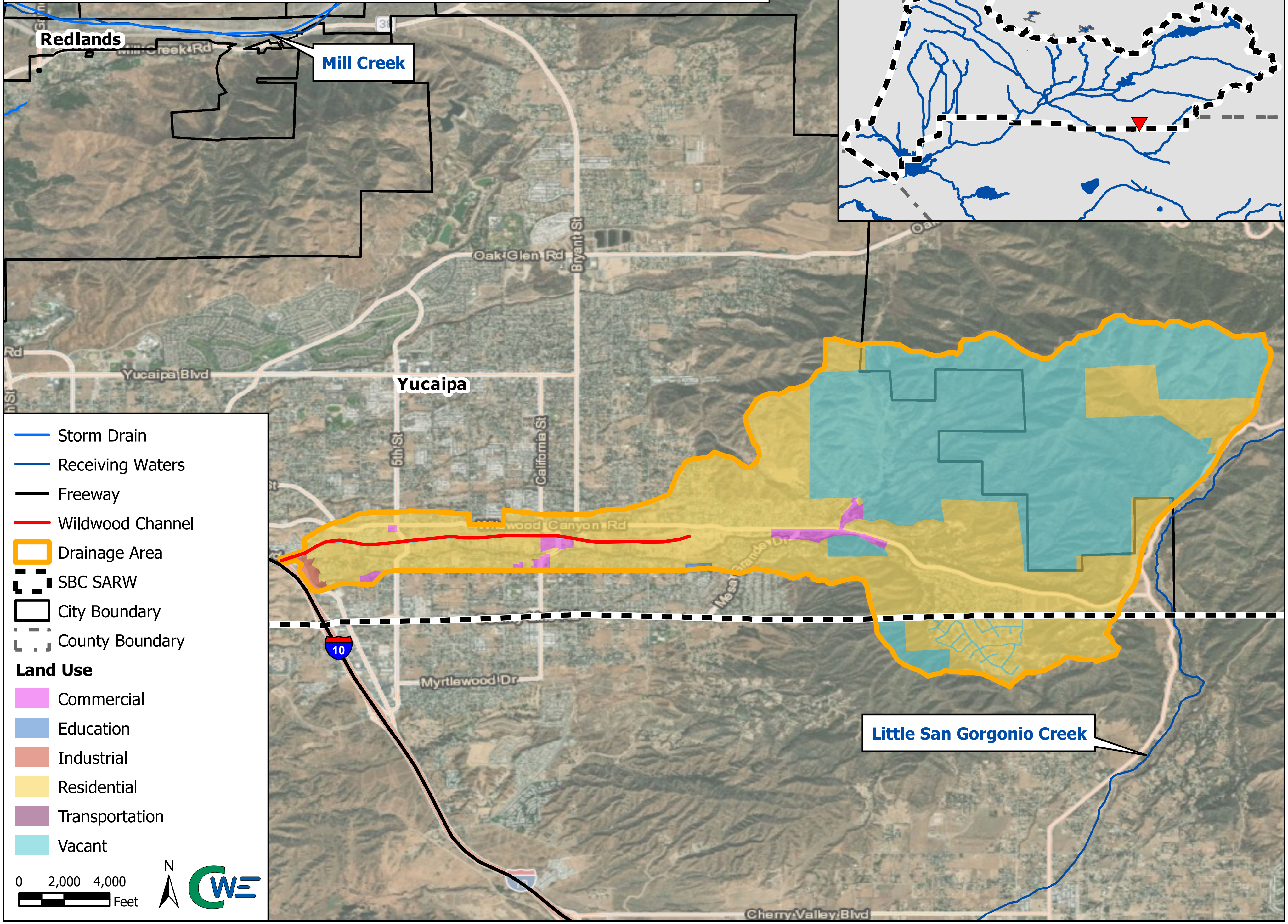
11. Cactus Basins #4 & 5



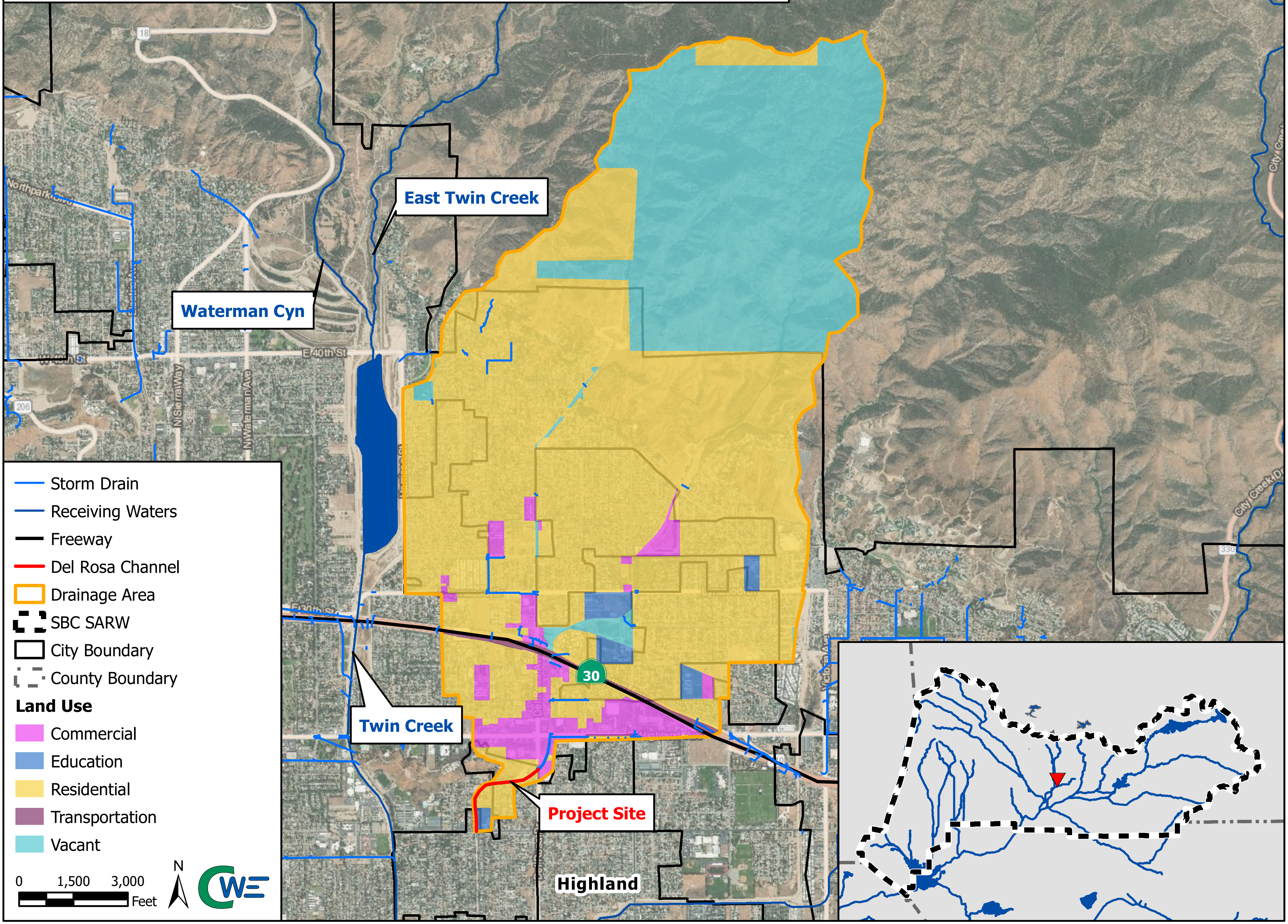
12. Plunge Creek Stream Bed Restoration and Elder Creek Channel Improvement



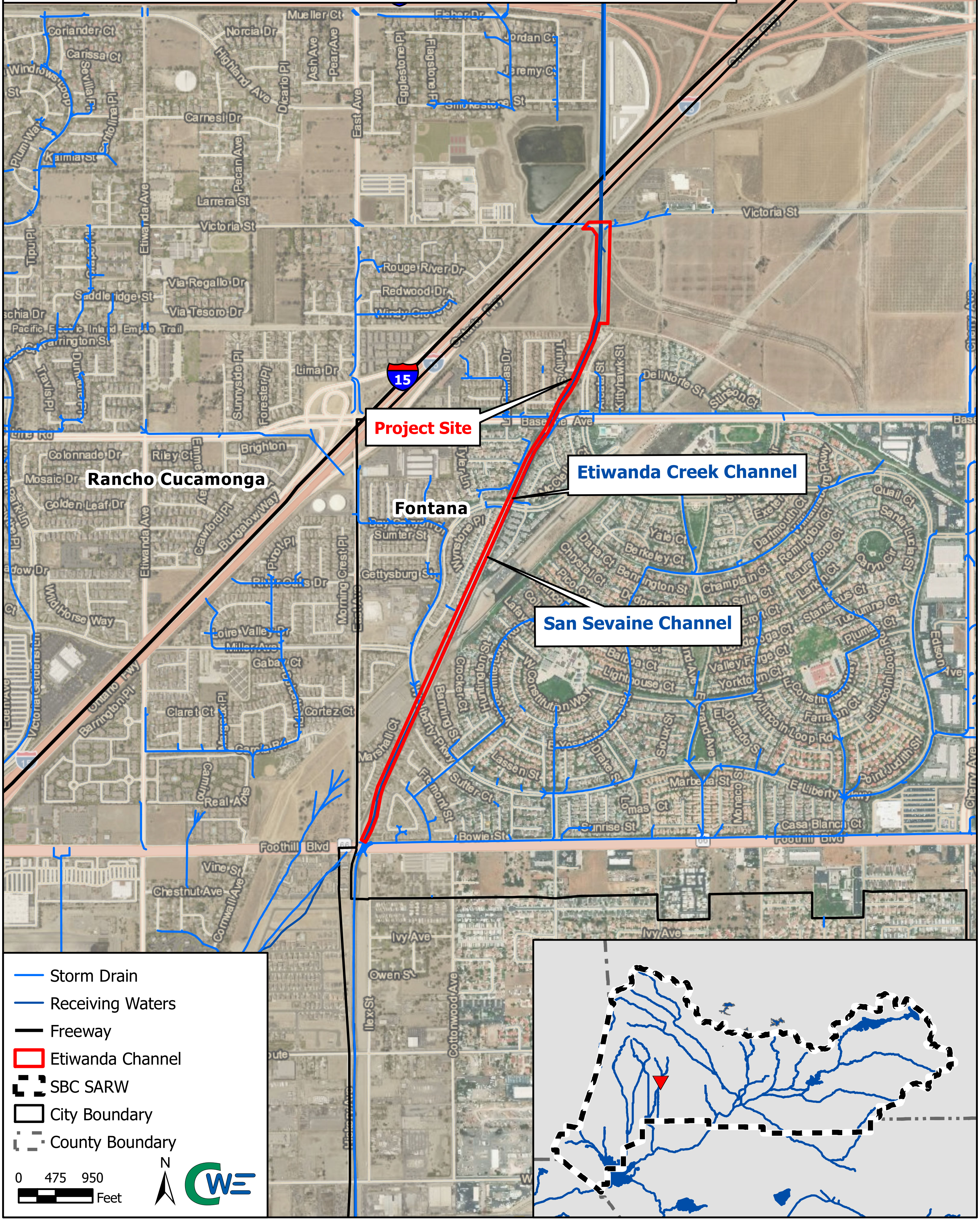
13. Wildwood Channel - Interstate 10 to Holmes Street



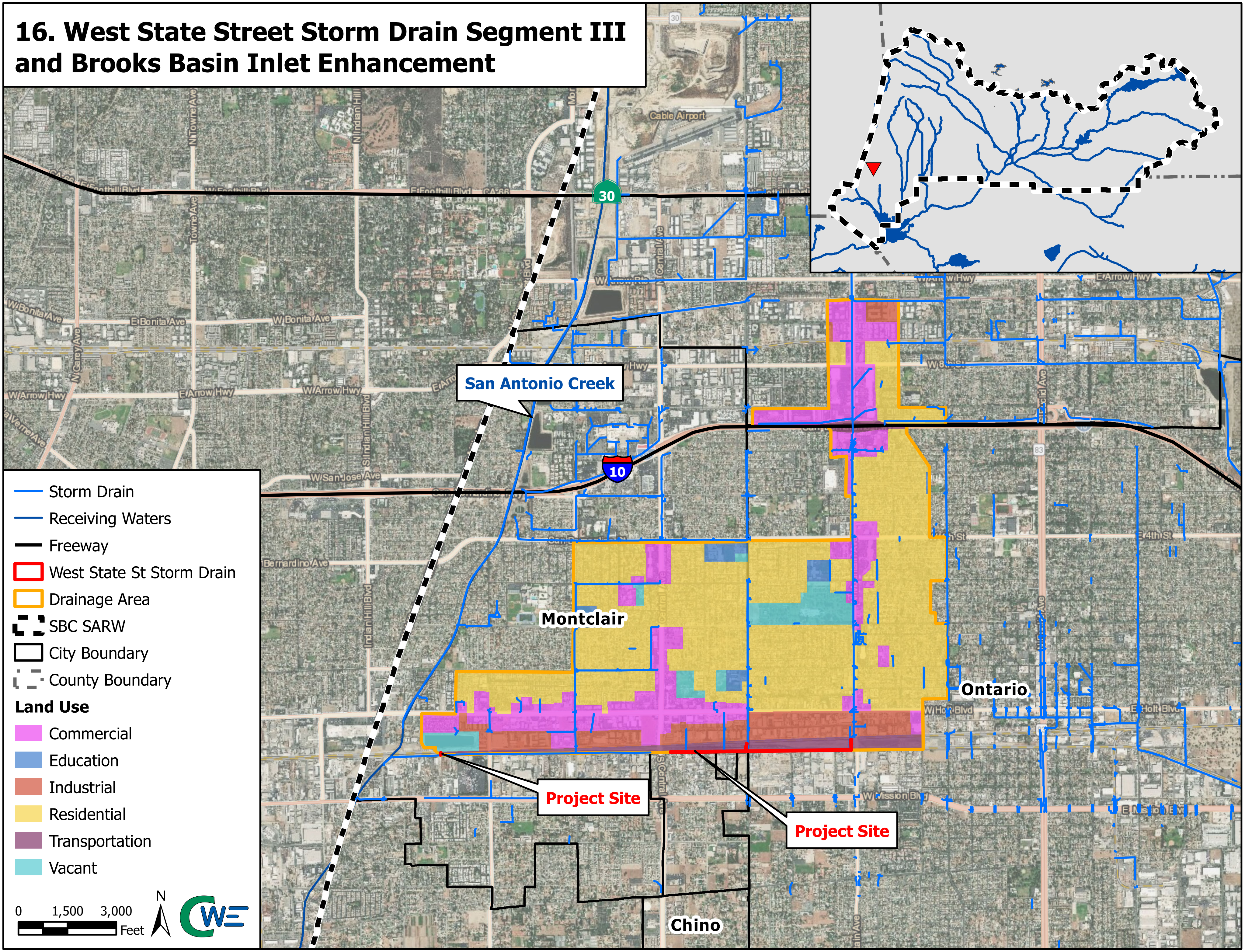
14. Del Rosa Channel - Pacific Street to Del Rosa Avenue



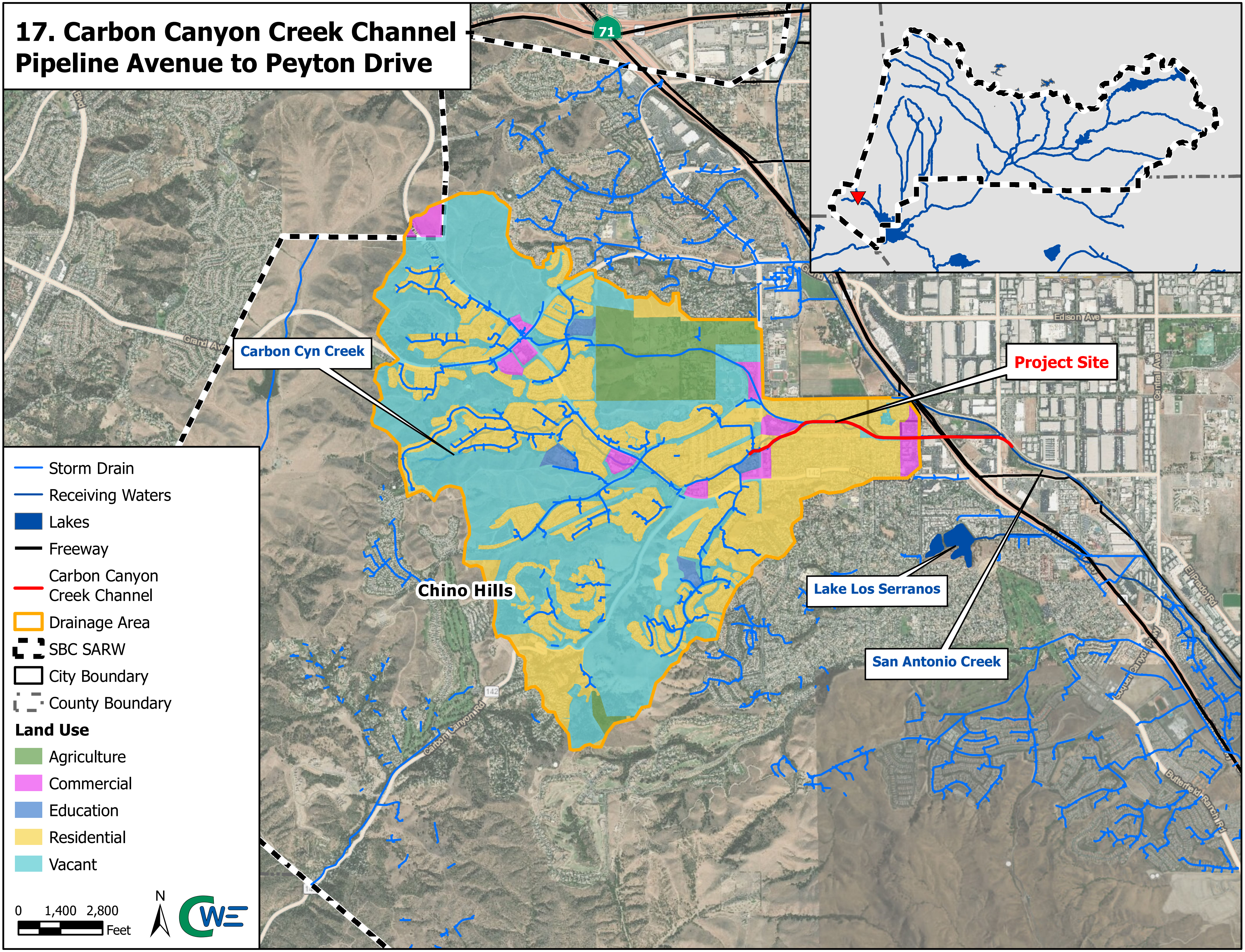
15. Etiwanda Channel Invert Repair and Trail Project



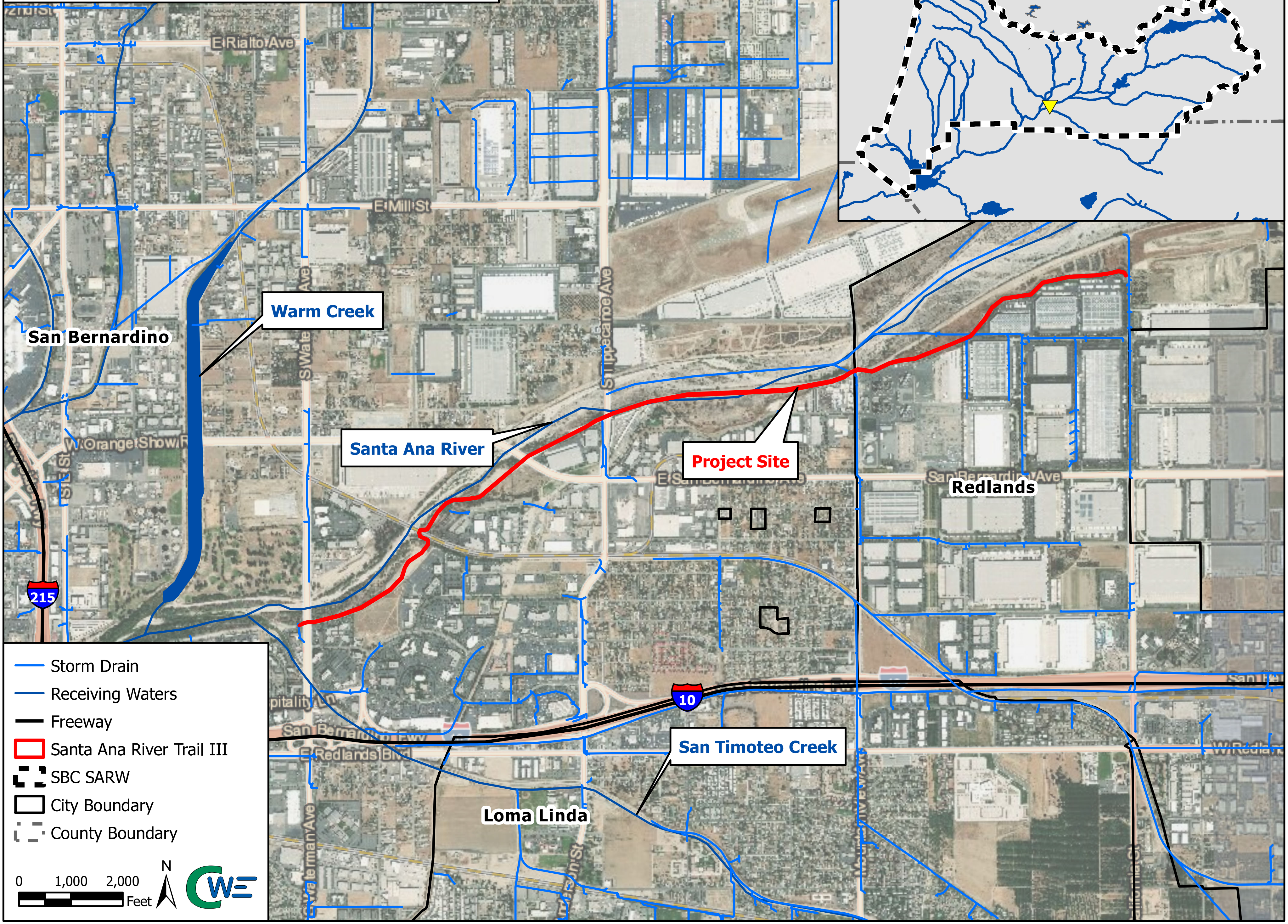
16. West State Street Storm Drain Segment III and Brooks Basin Inlet Enhancement



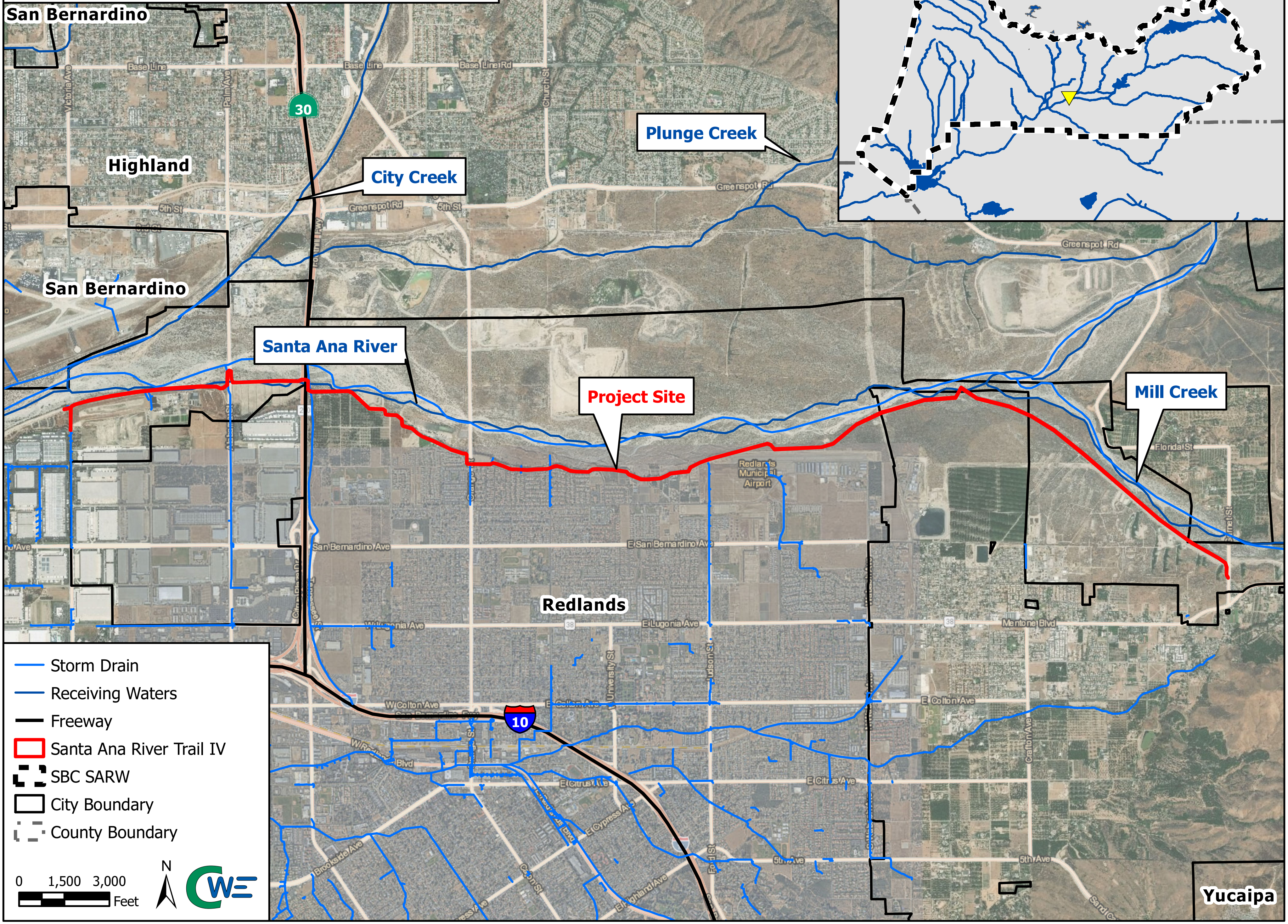
17. Carbon Canyon Creek Channel Pipeline Avenue to Peyton Drive



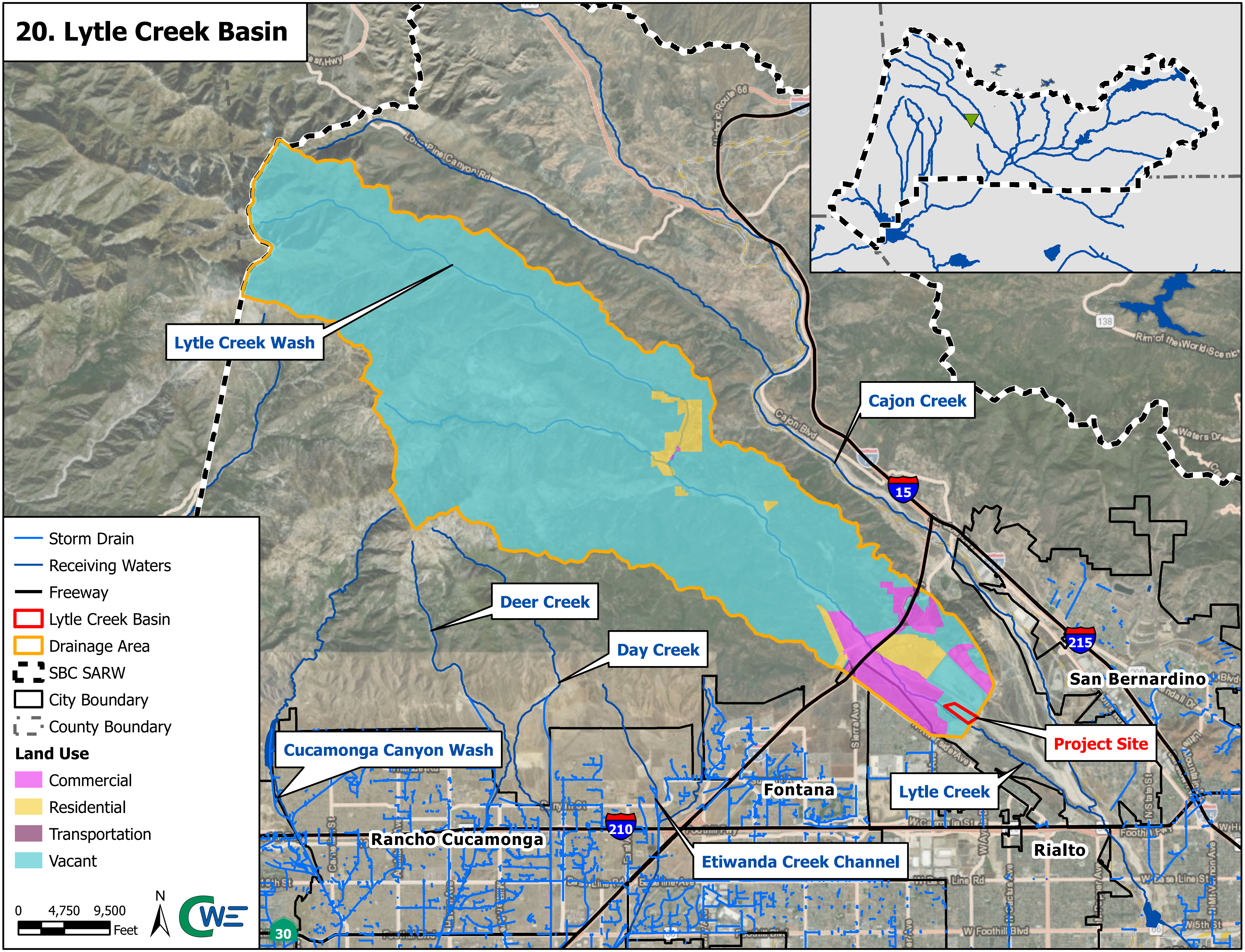
18. Santa Ana River Trail Phase III



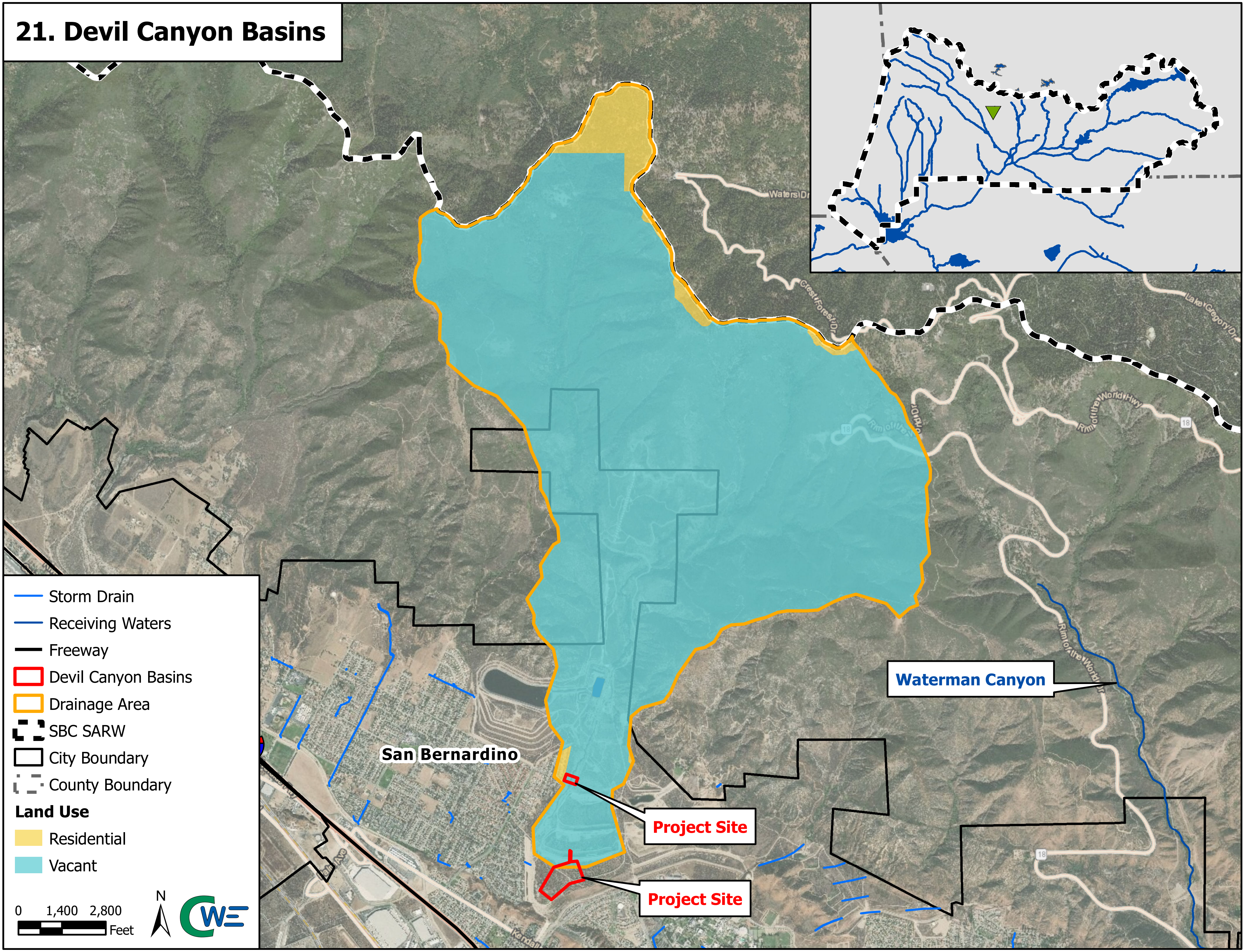
19. Santa Ana River Trail Phase IV



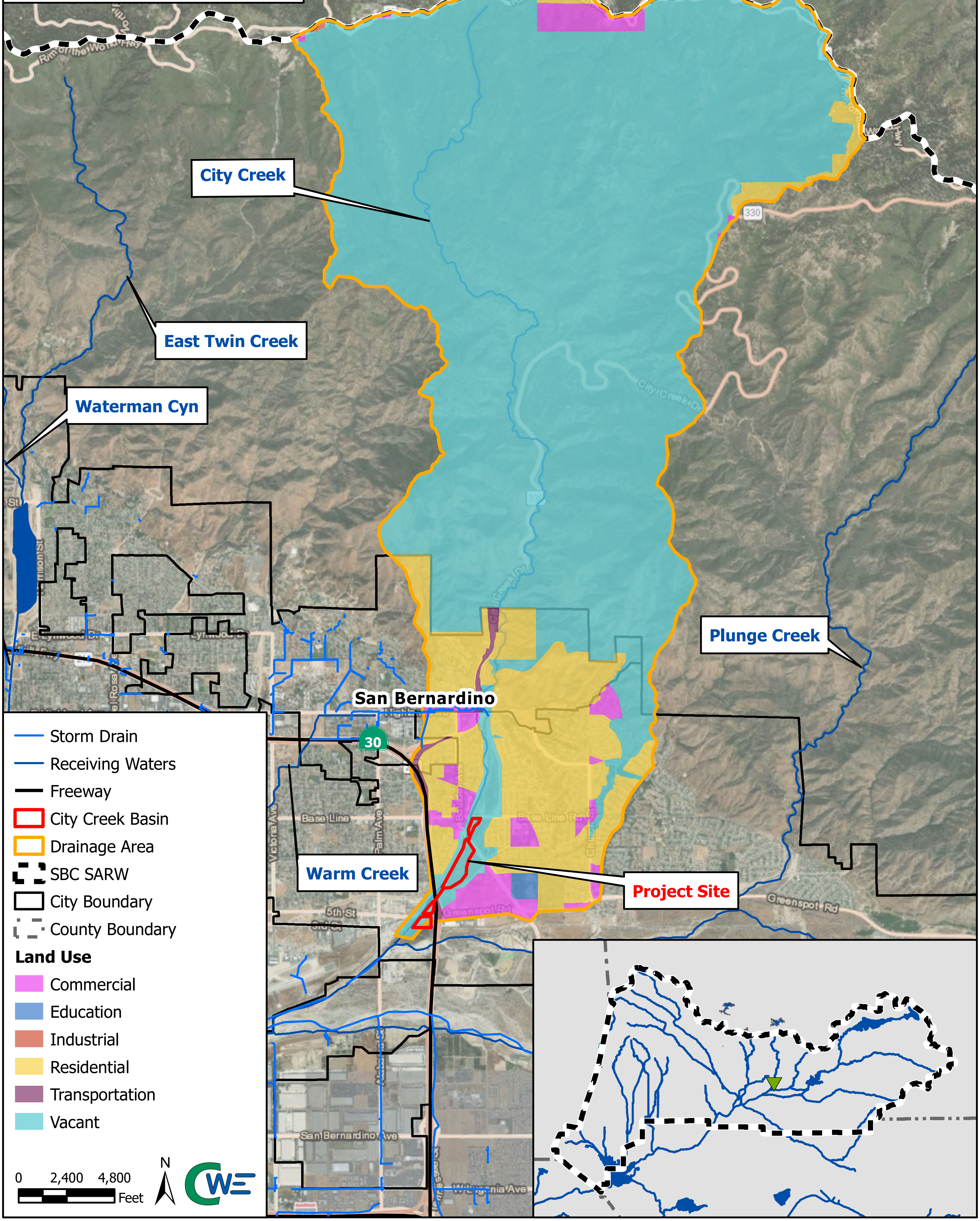
20. Lytle Creek Basin



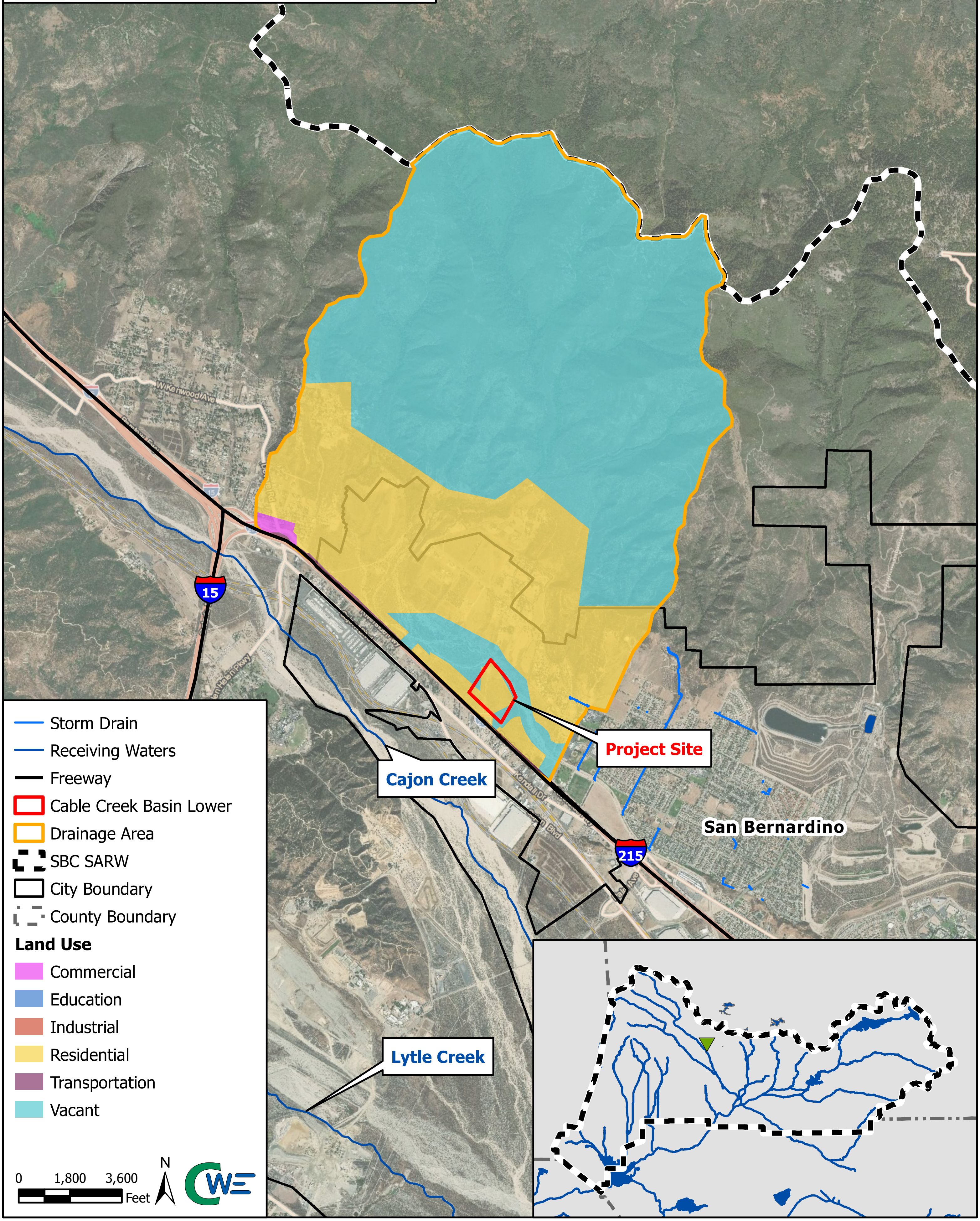
21. Devil Canyon Basins



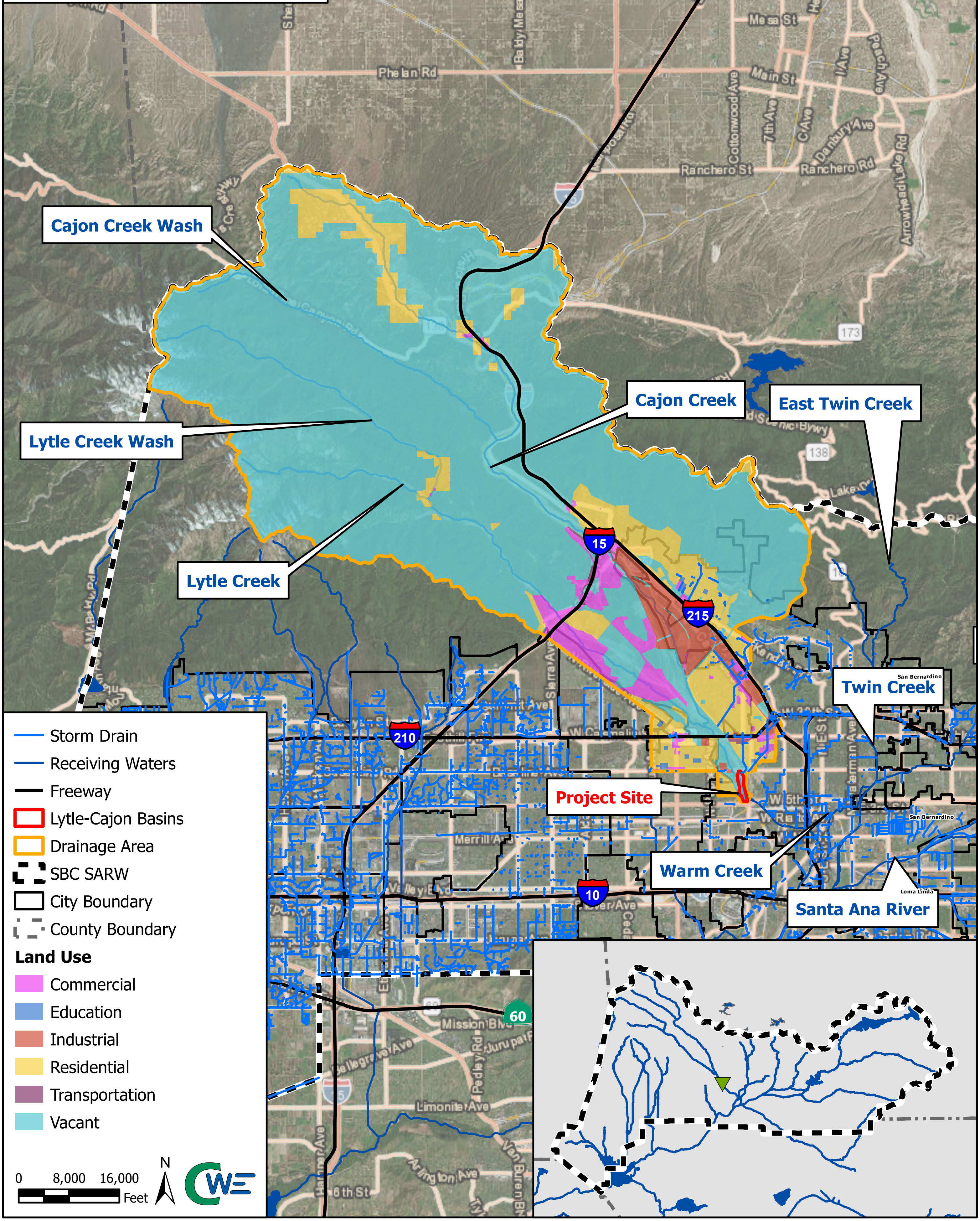
22. City Creek Basin



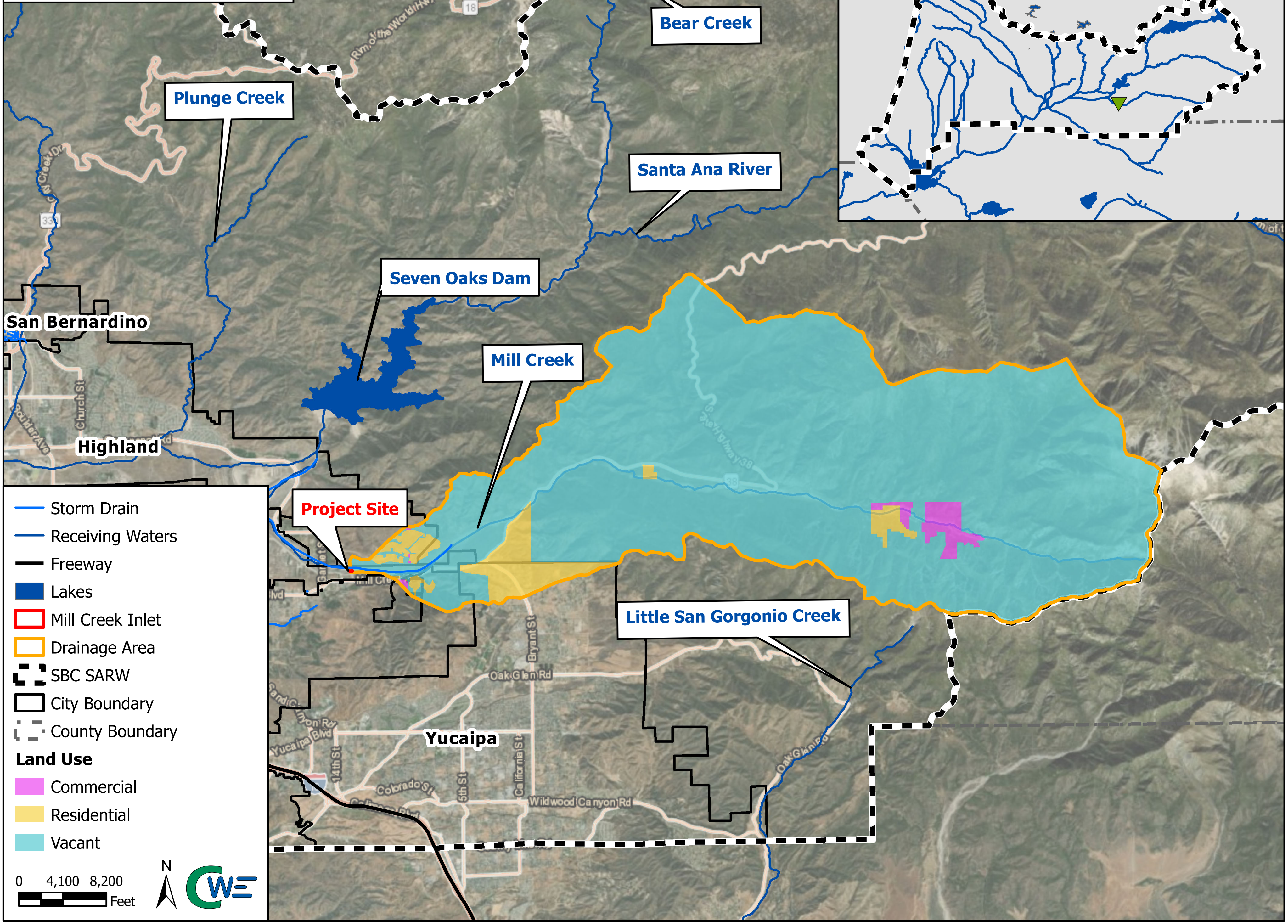
23. Cable Creek Basin (Lower)



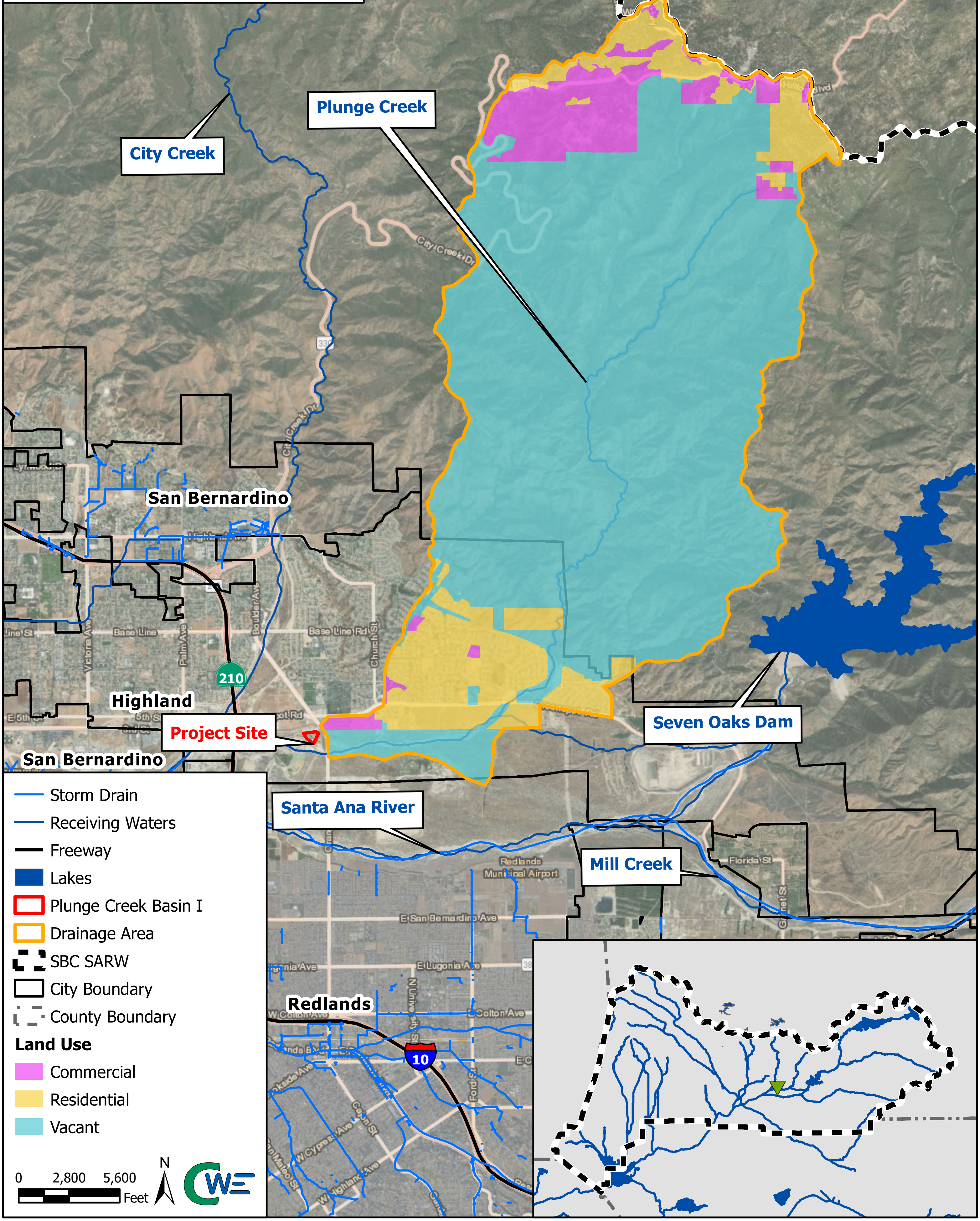
24. Lytle-Cajon Basins



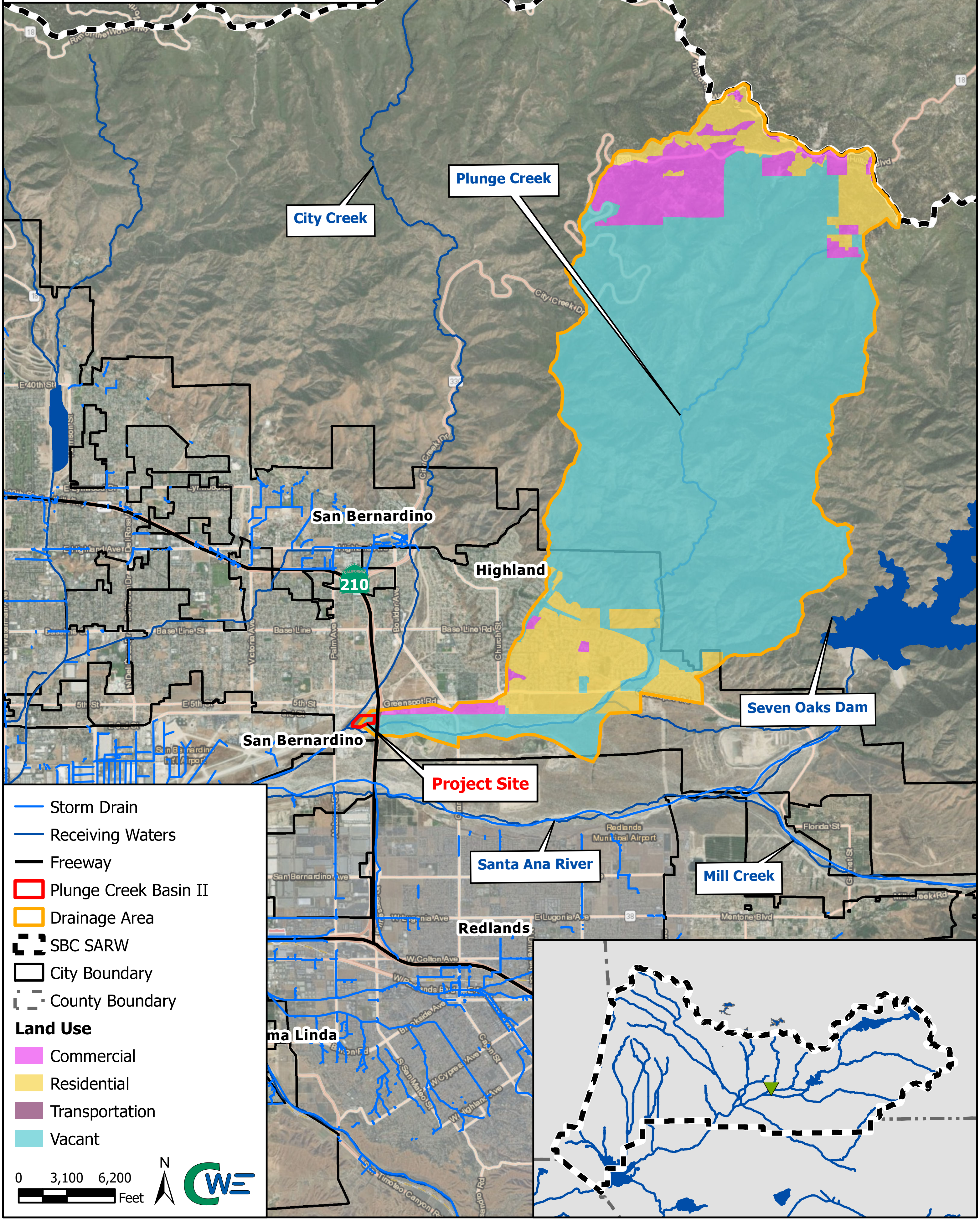
25. Mill Creek Inlet



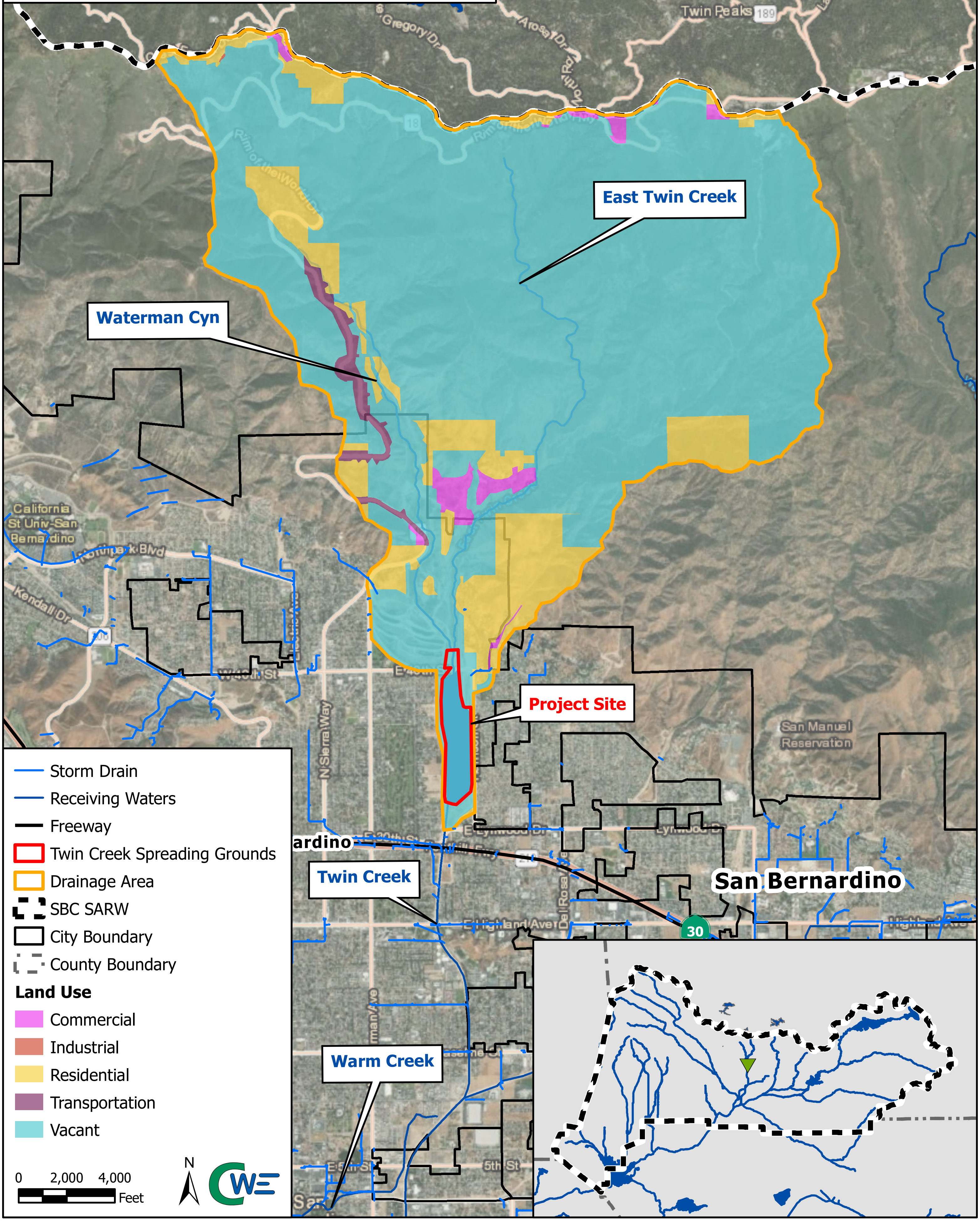
26. Plunge Creek Basin I



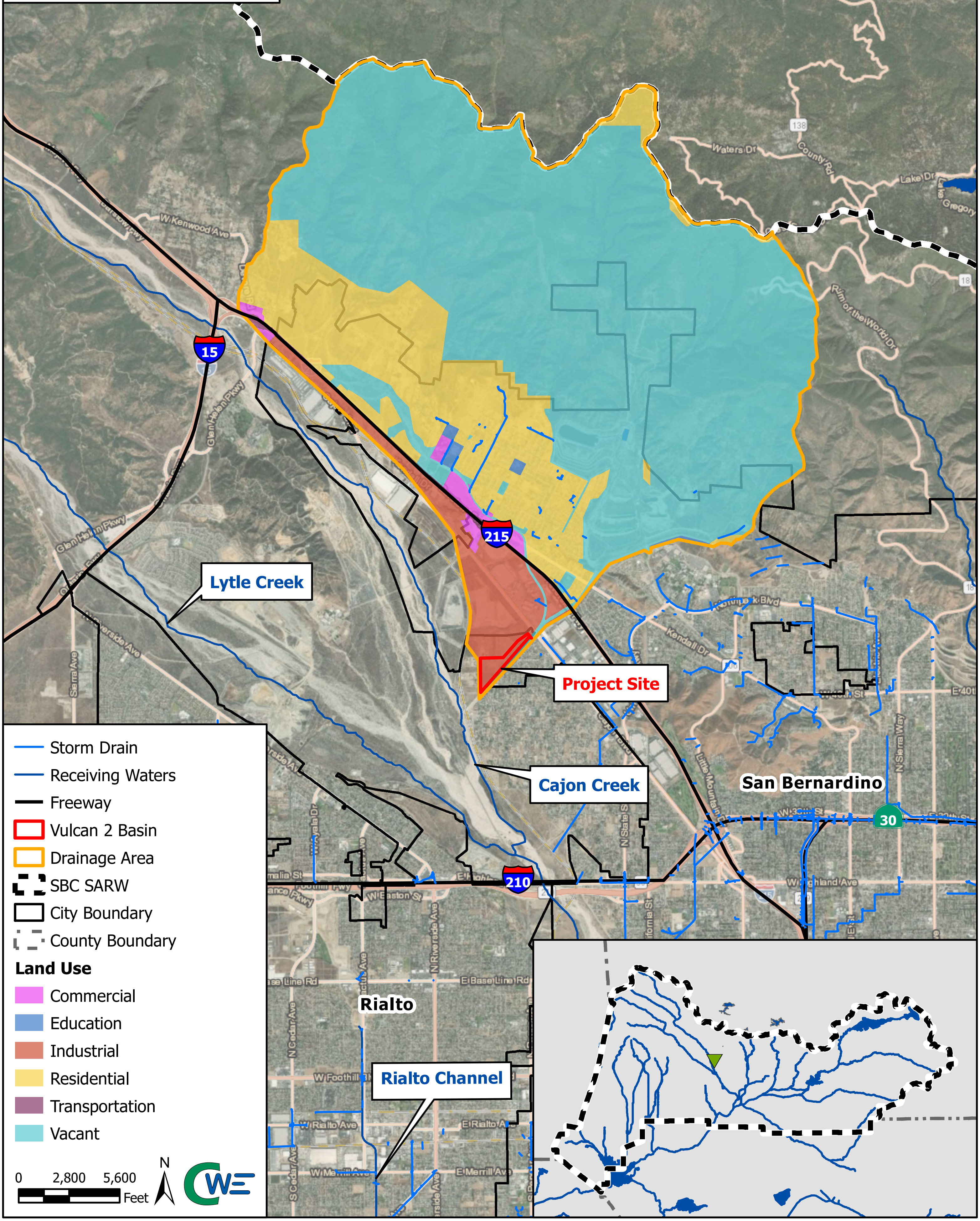
27. Plunge Creek Basin II



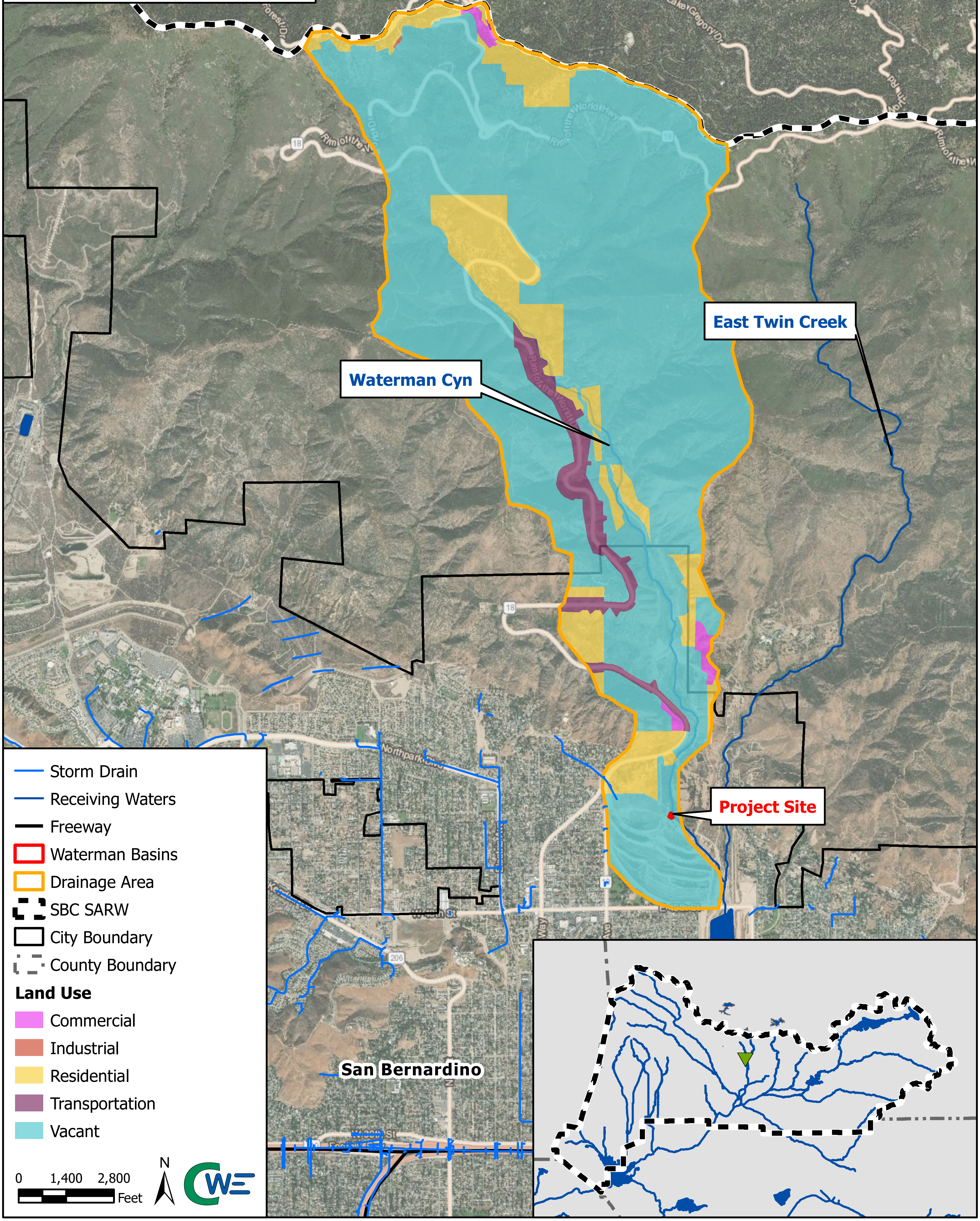
28. Twin Creek Spreading Grounds



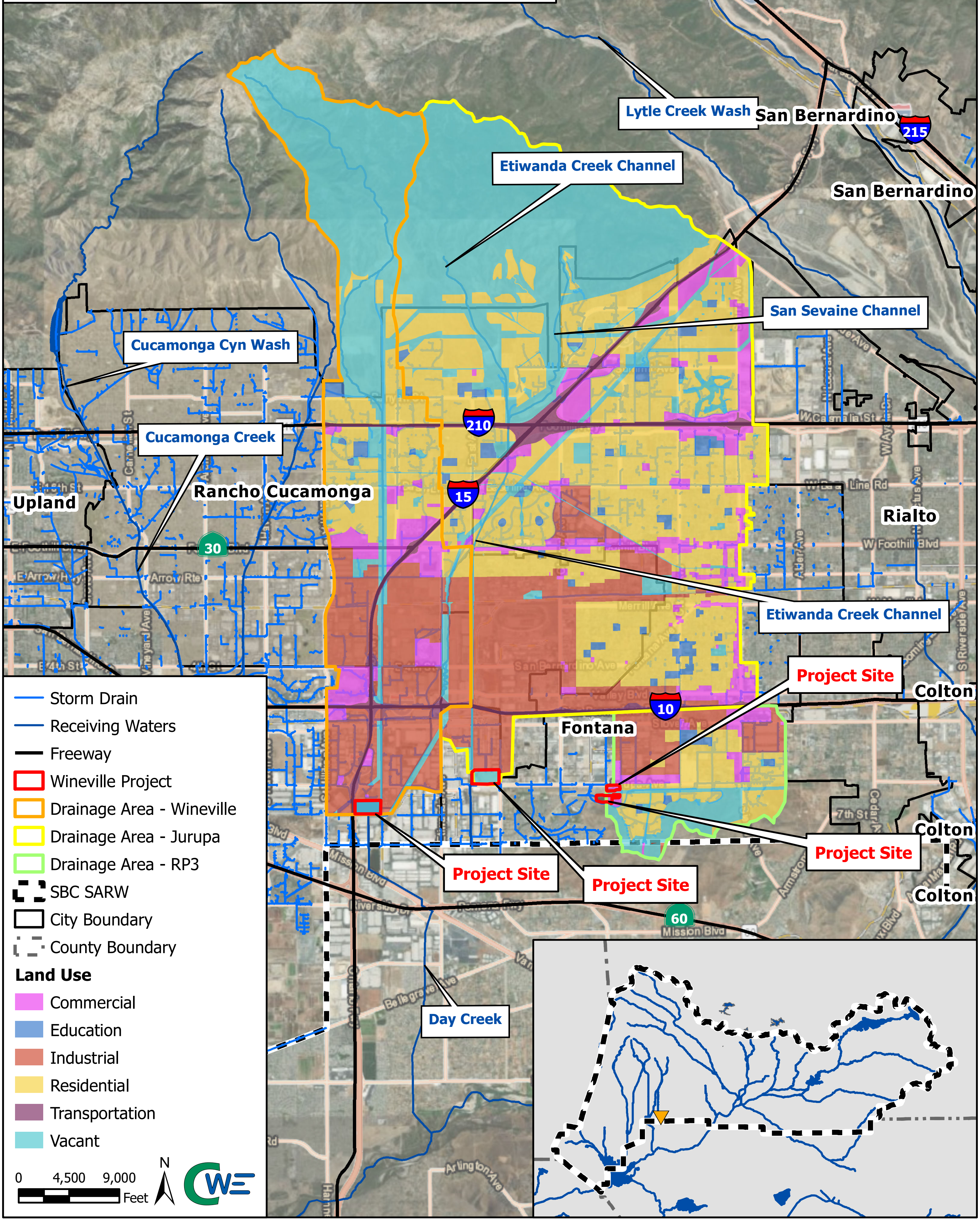
29. Vulcan 2 Basin



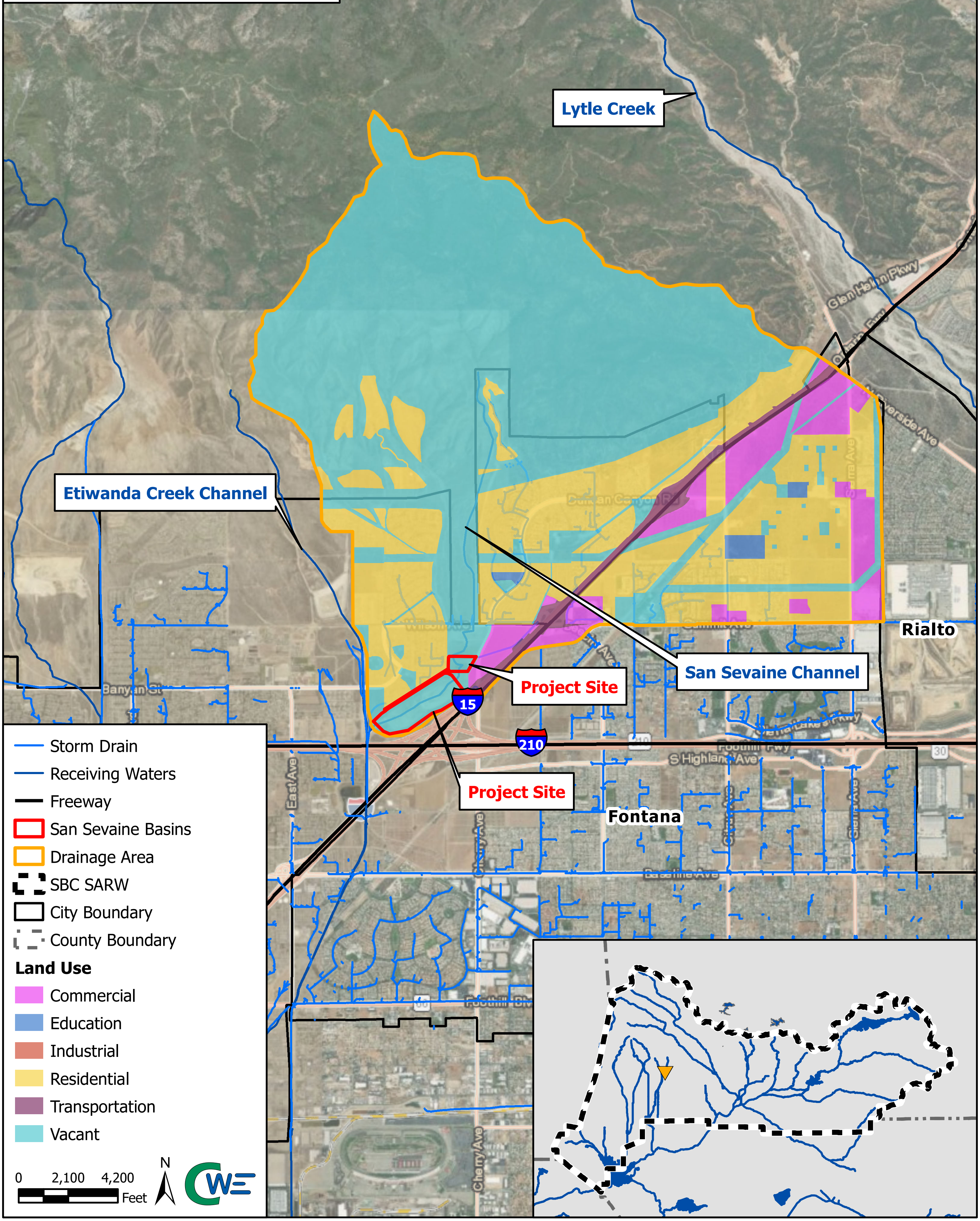
30. Waterman Basins



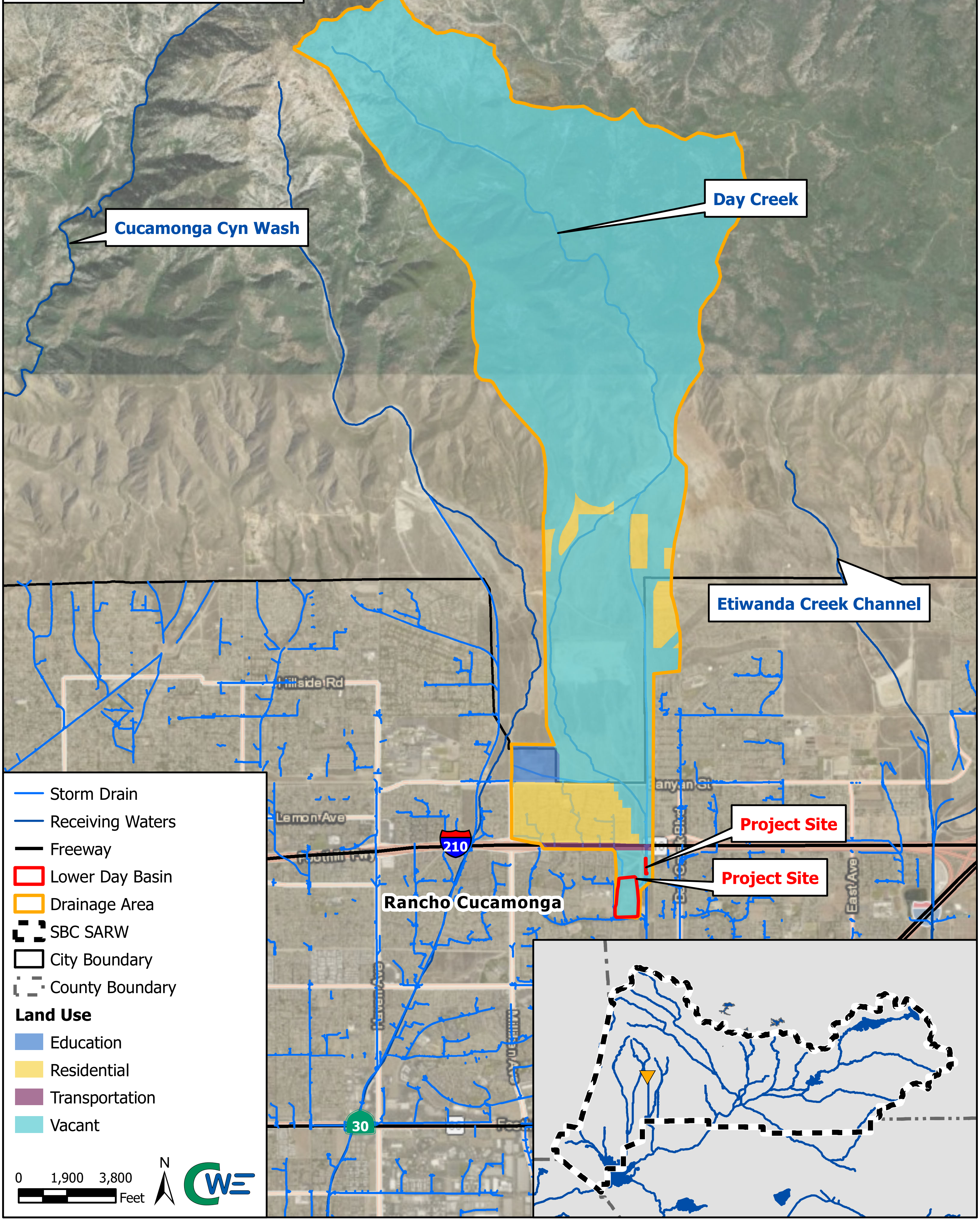
31. Wineville Recycled Pipeline Project



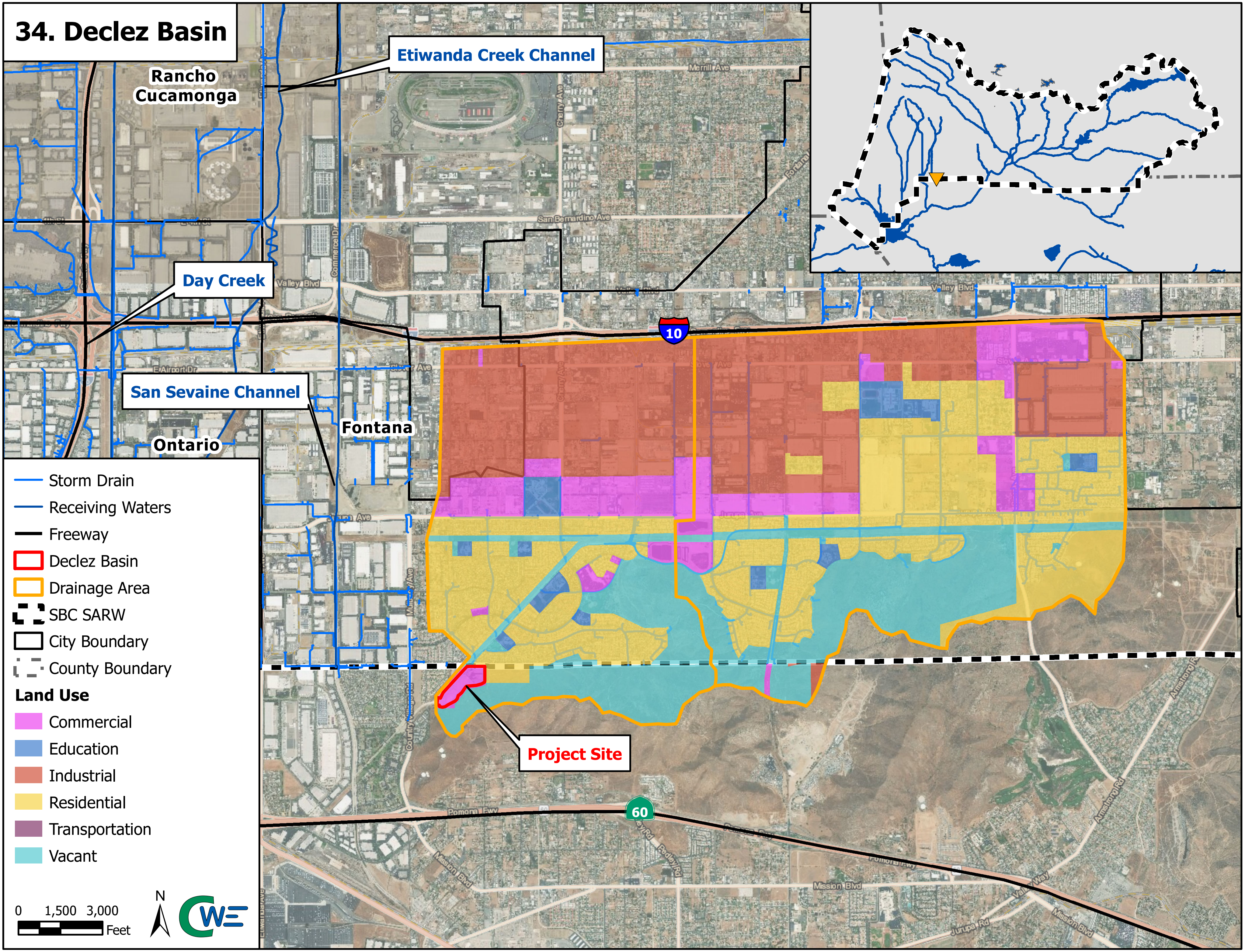
32. San Sevaine Basins



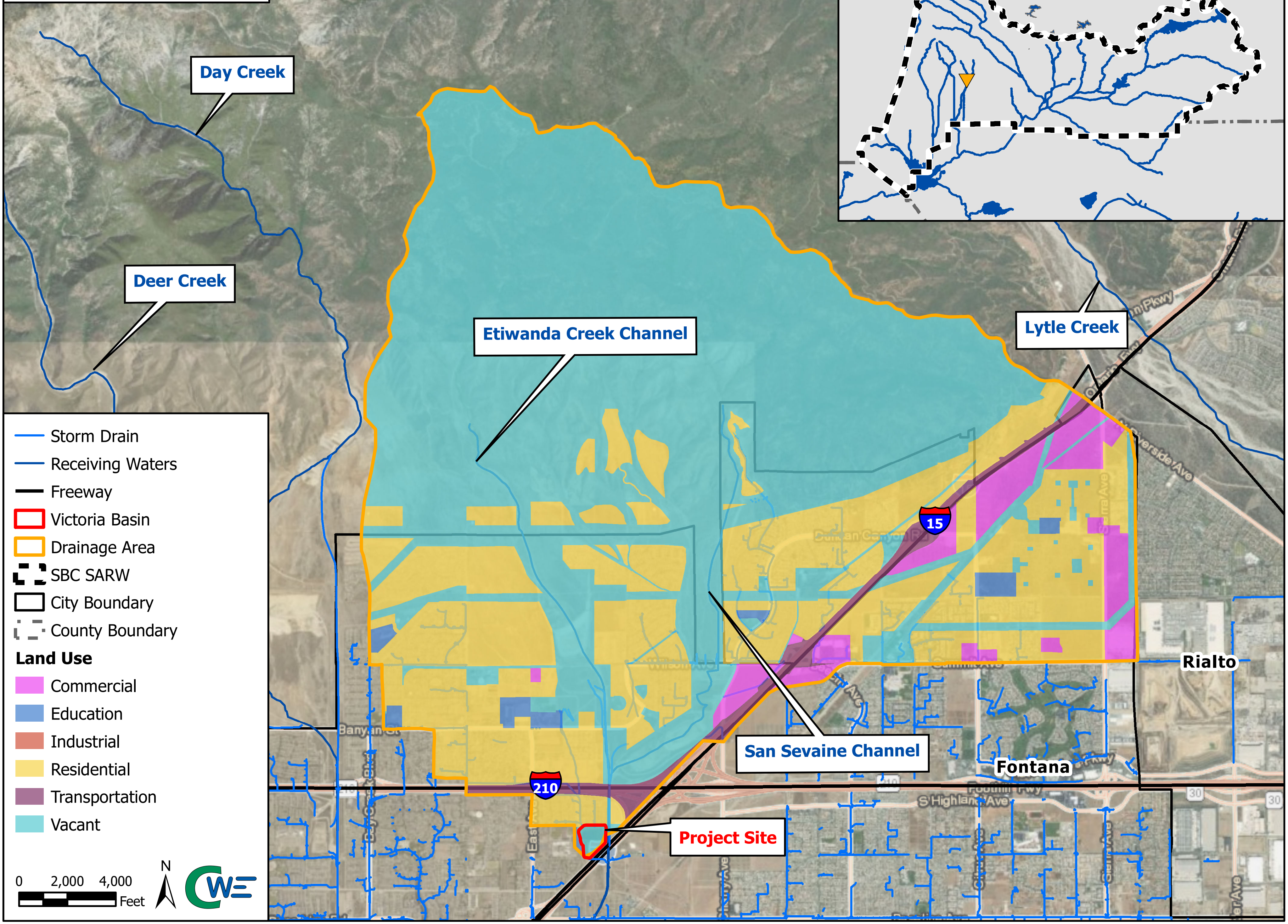
33. Lower Day Basin



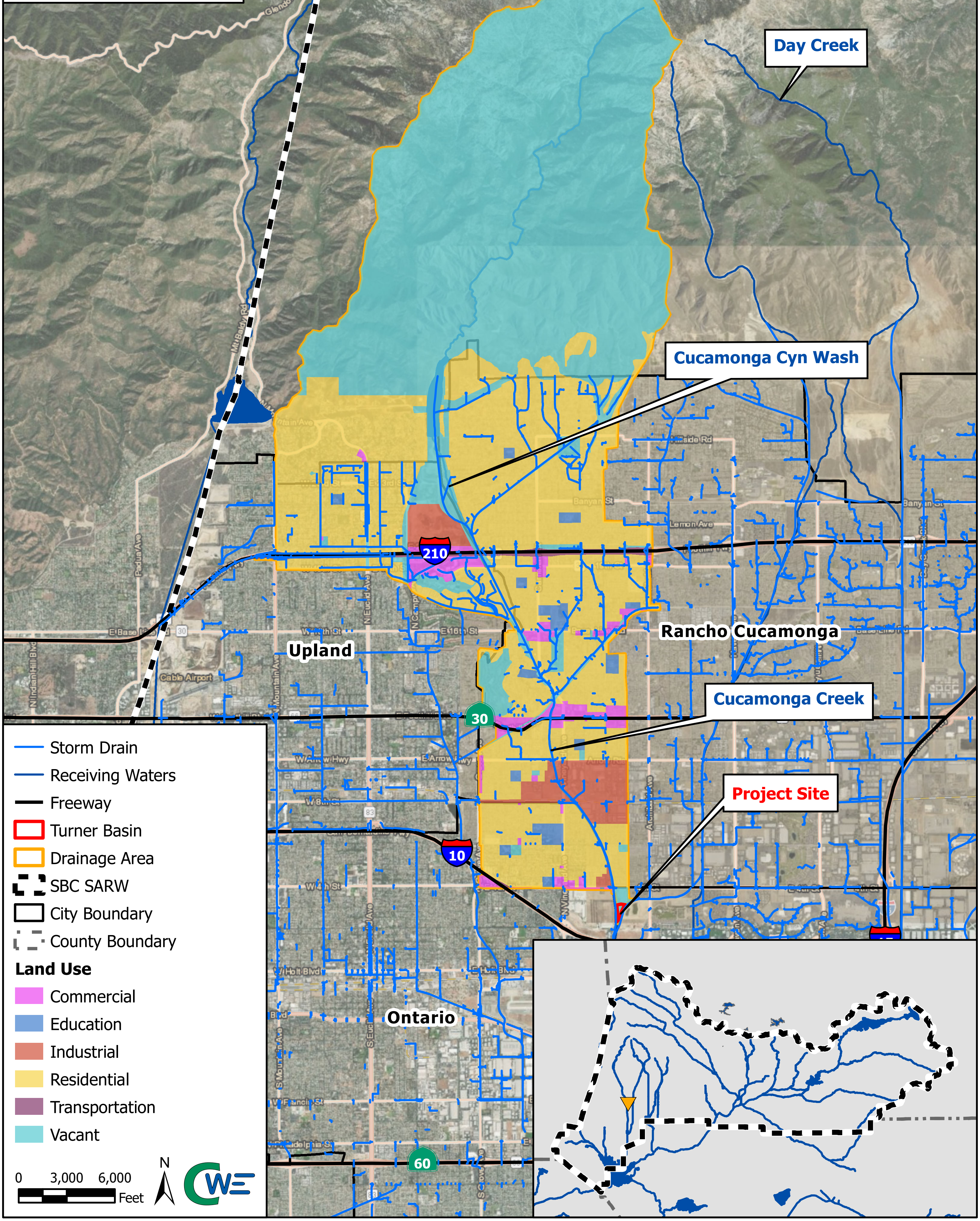
34. Declez Basin



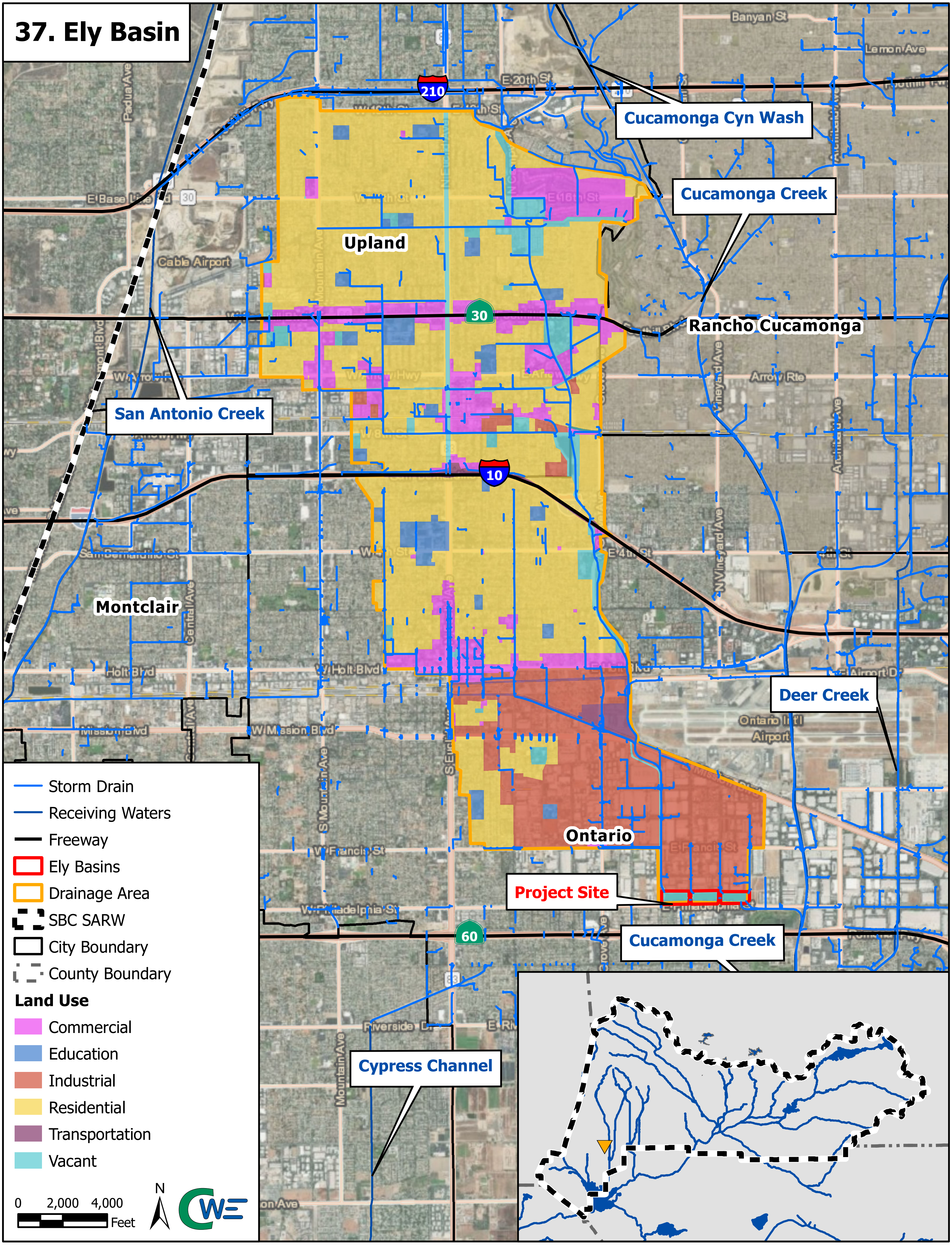
35. Victoria Basin



36. Turner Basin



37. Ely Basin


Upland
Rancho Cucamonga
Montclair
Ontario
Cucamonga Cyn Wash
Cucamonga Creek
San Antonio Creek
Deer Creek
Project Site
Cucamonga Creek
Cypress Channel
Cable Airport
Ontario Int'l Airport
Banyan St
Lemon Ave
E 20th St
E Base Line Rd
E 16th St
W 16th St
Arrow Rte
W Arrow Hwy
E Arrow Hwy
W 8th St
W 4th St
E 4th St
San Bernardino St
Holt Blvd
W Holt Blvd
Mission Blvd
W Mission Blvd
W Francis St
E Francis St
W Philadelphia St
E Philadelphia
Riverside Dr
Airport Dr
Padua Ave
Central Ave
Mountain Ave
S Mountain Ave
S Euclid Ave
N Vineyard Ave
Vineyard Ave
Archibald Ave
210
30
10
60
83
Storm Drain
Receiving Waters
Freeway
Ely Basins
Drainage Area
SBC SARW
City Boundary
County Boundary
Land Use
Commercial
Education
Industrial
Residential
Transportation
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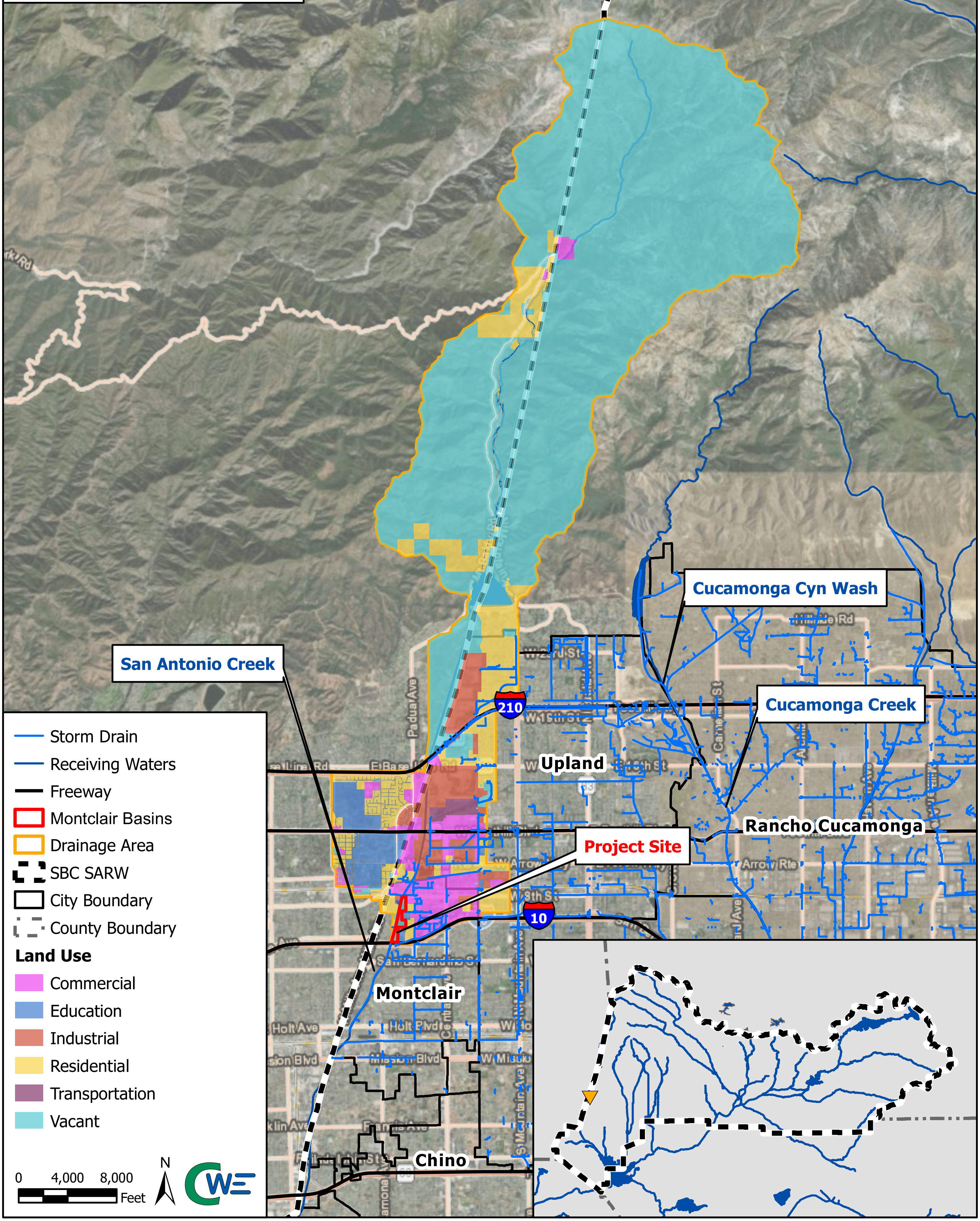
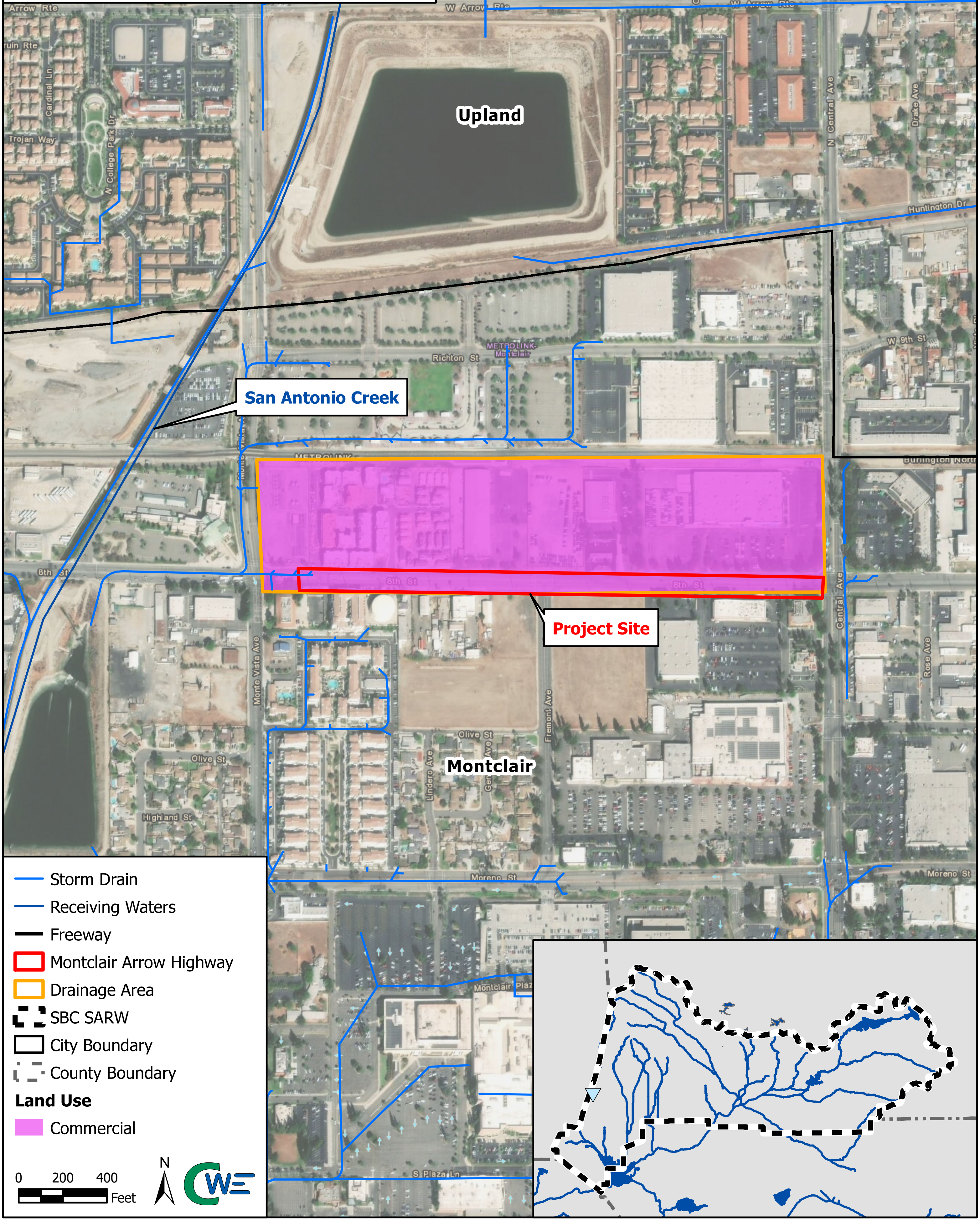
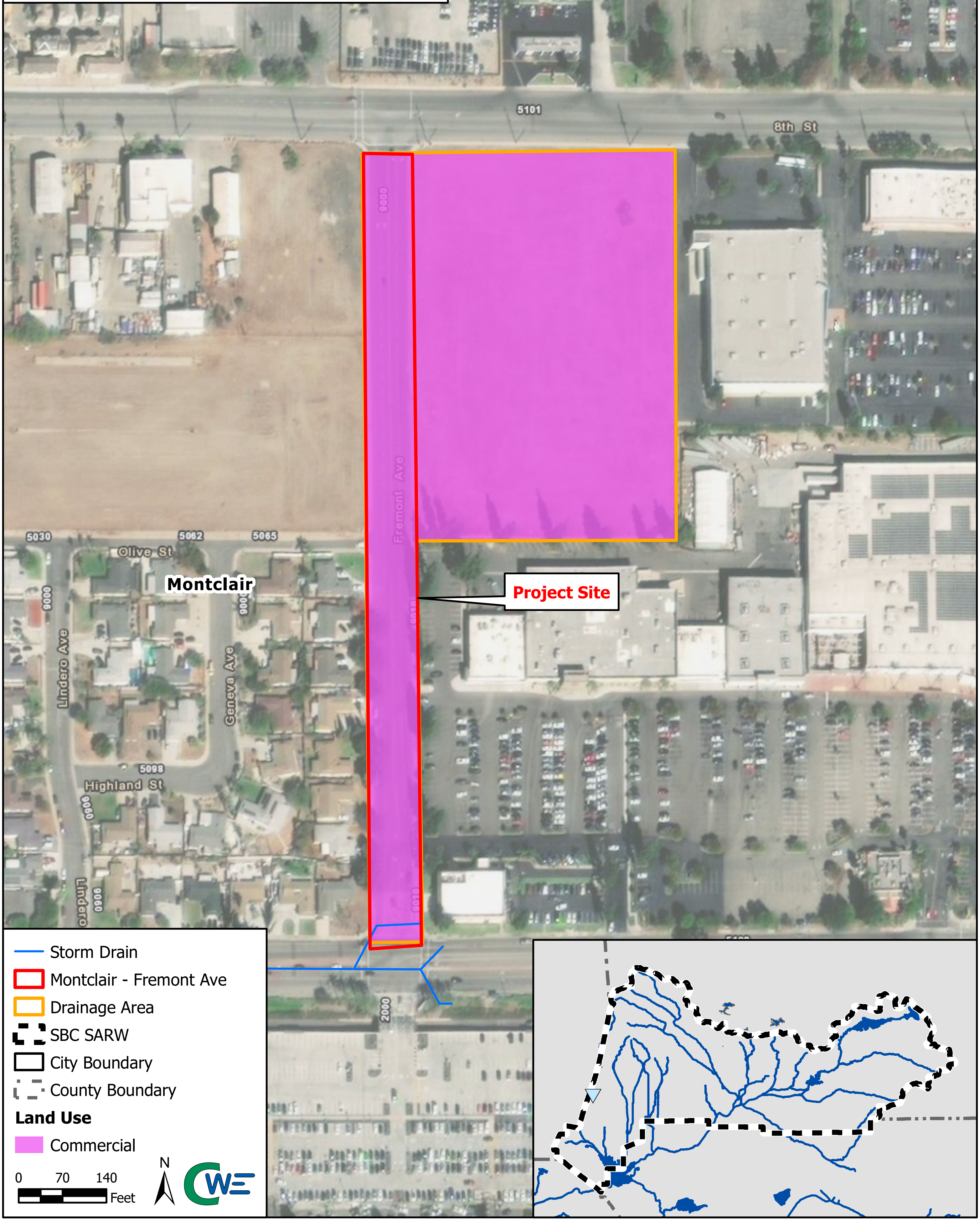
38. Montclair Basins



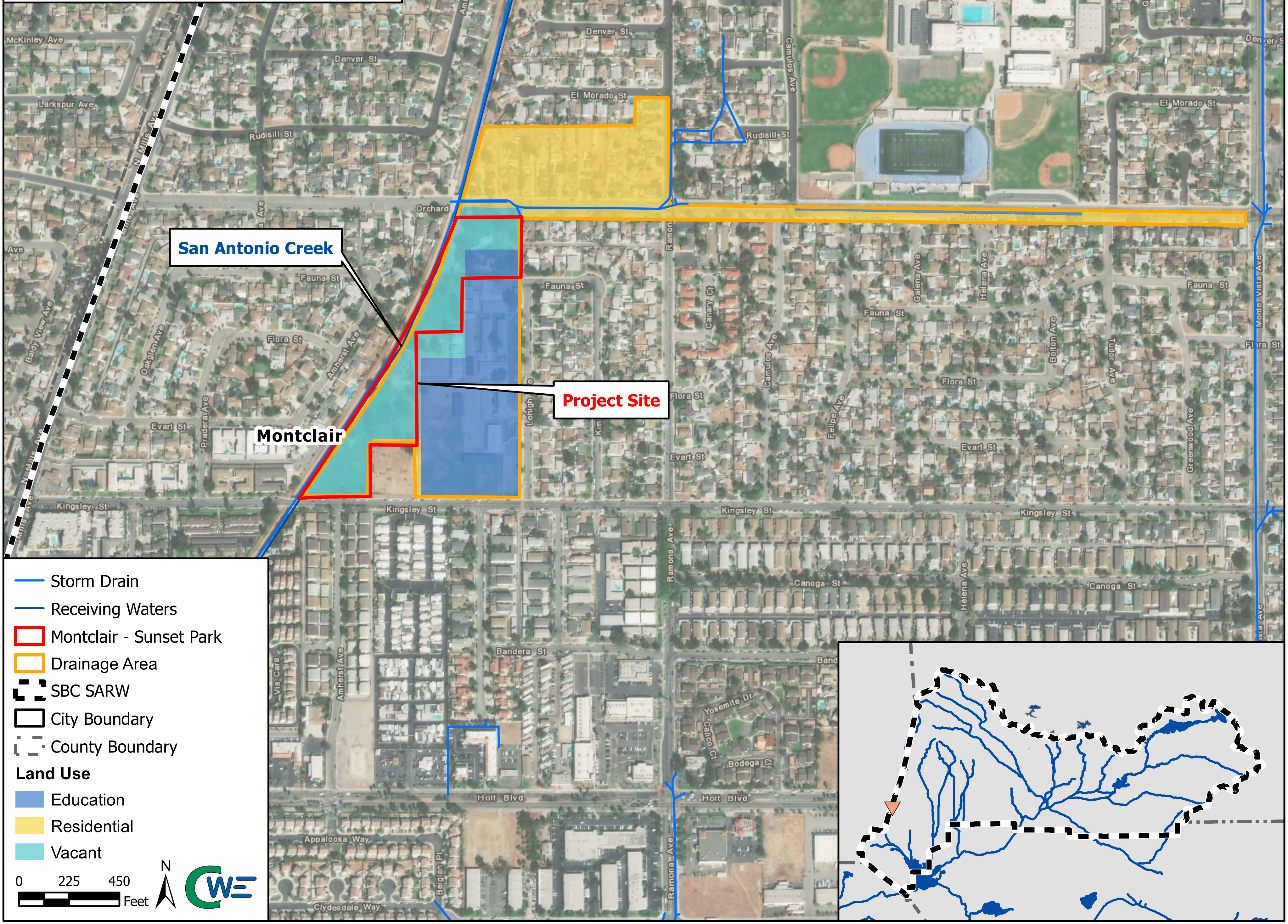
39. Montclair - Arrow Highway



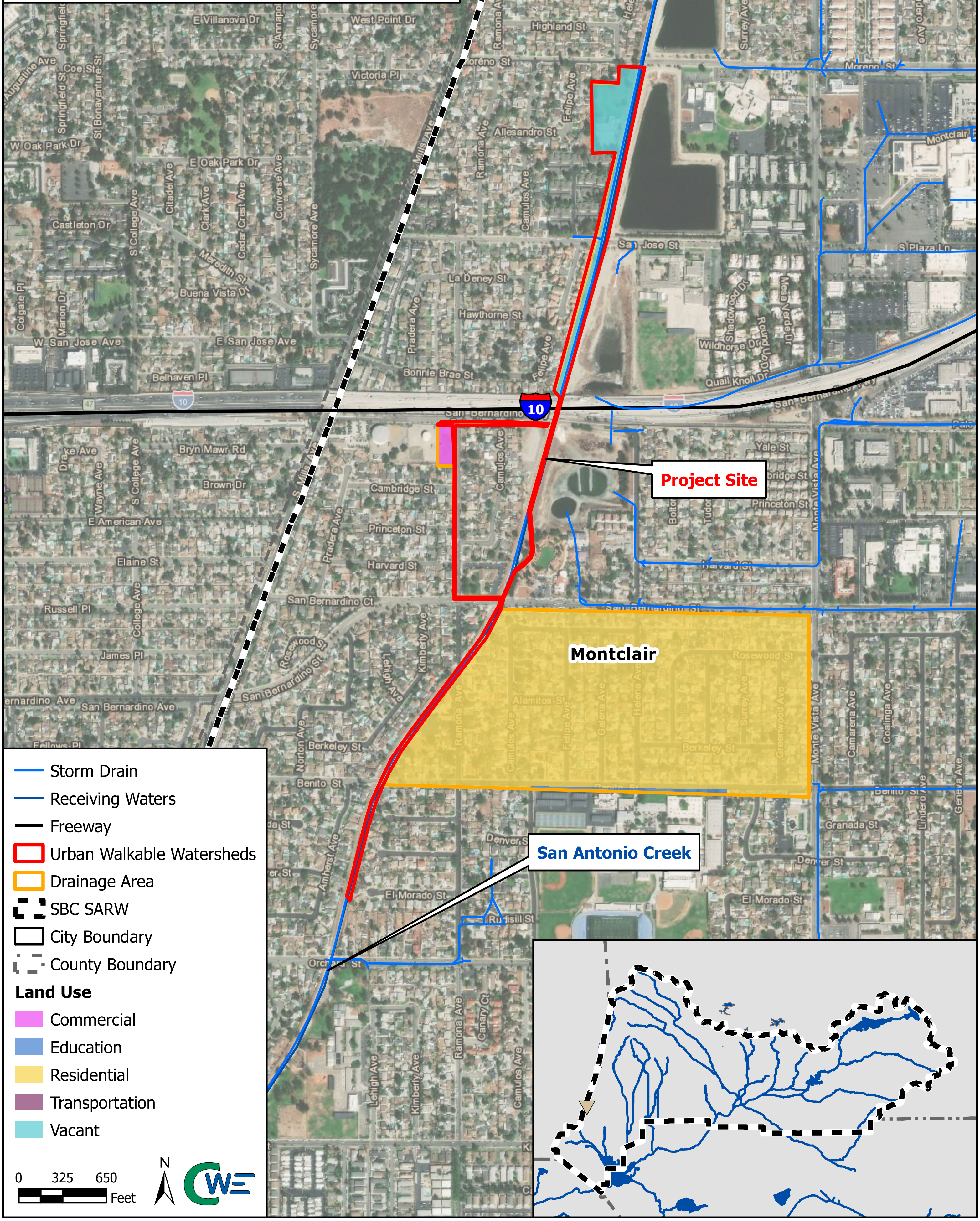
40. Montclair - Fremont Avenue



41. Montclair - Sunset Park

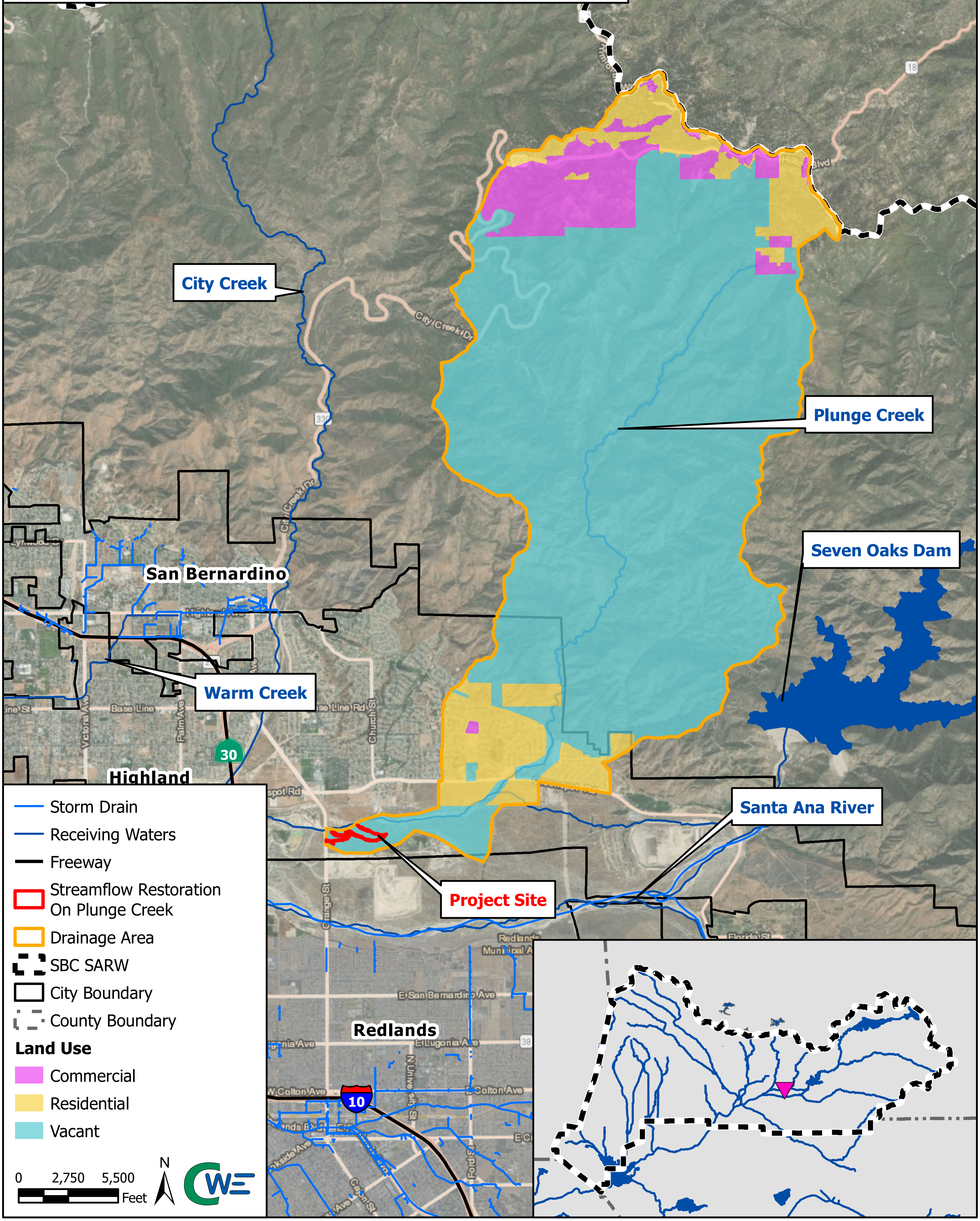


42. Urban Walkalbe Watersheds

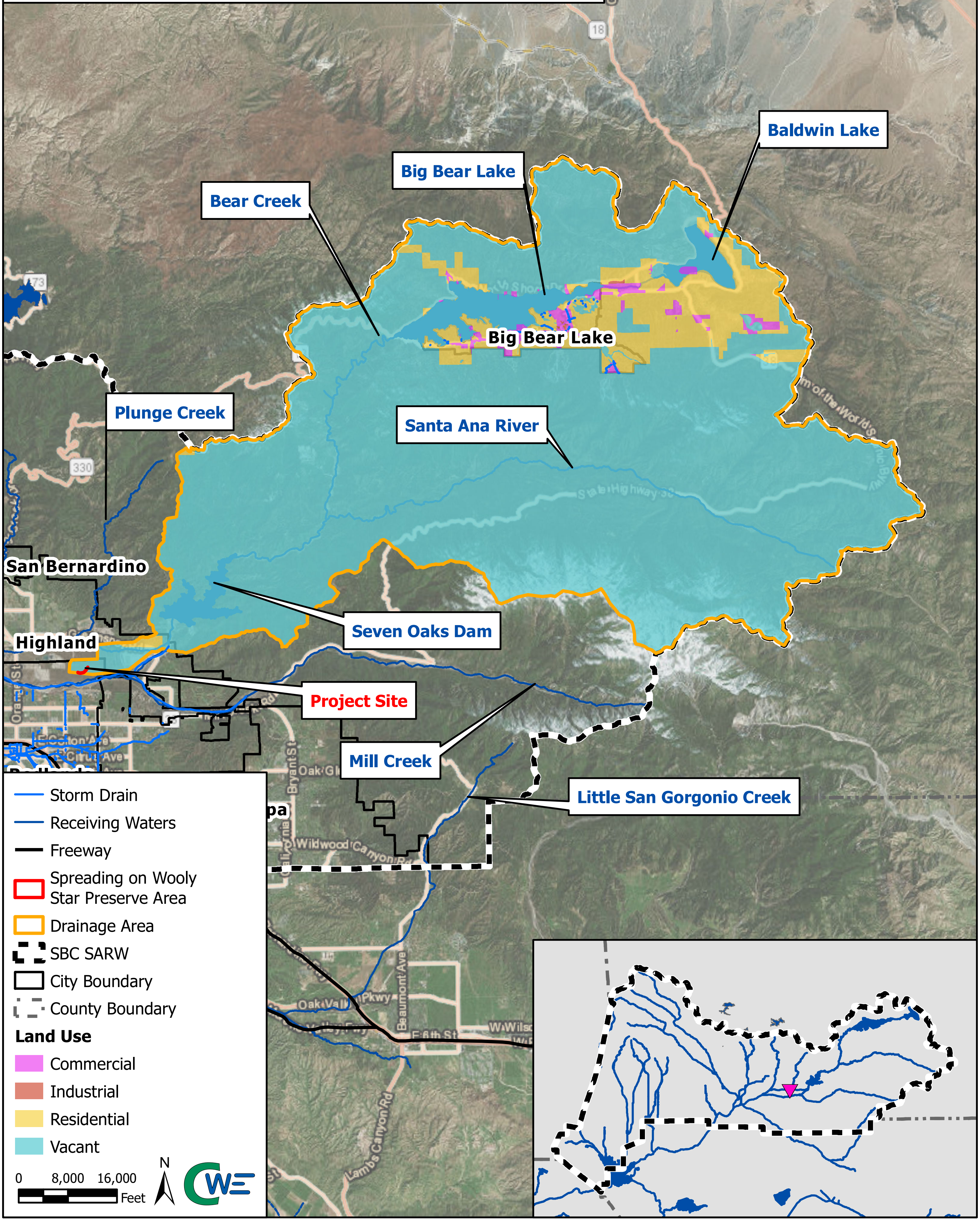


44. College Heights and Upland Percolation Basins

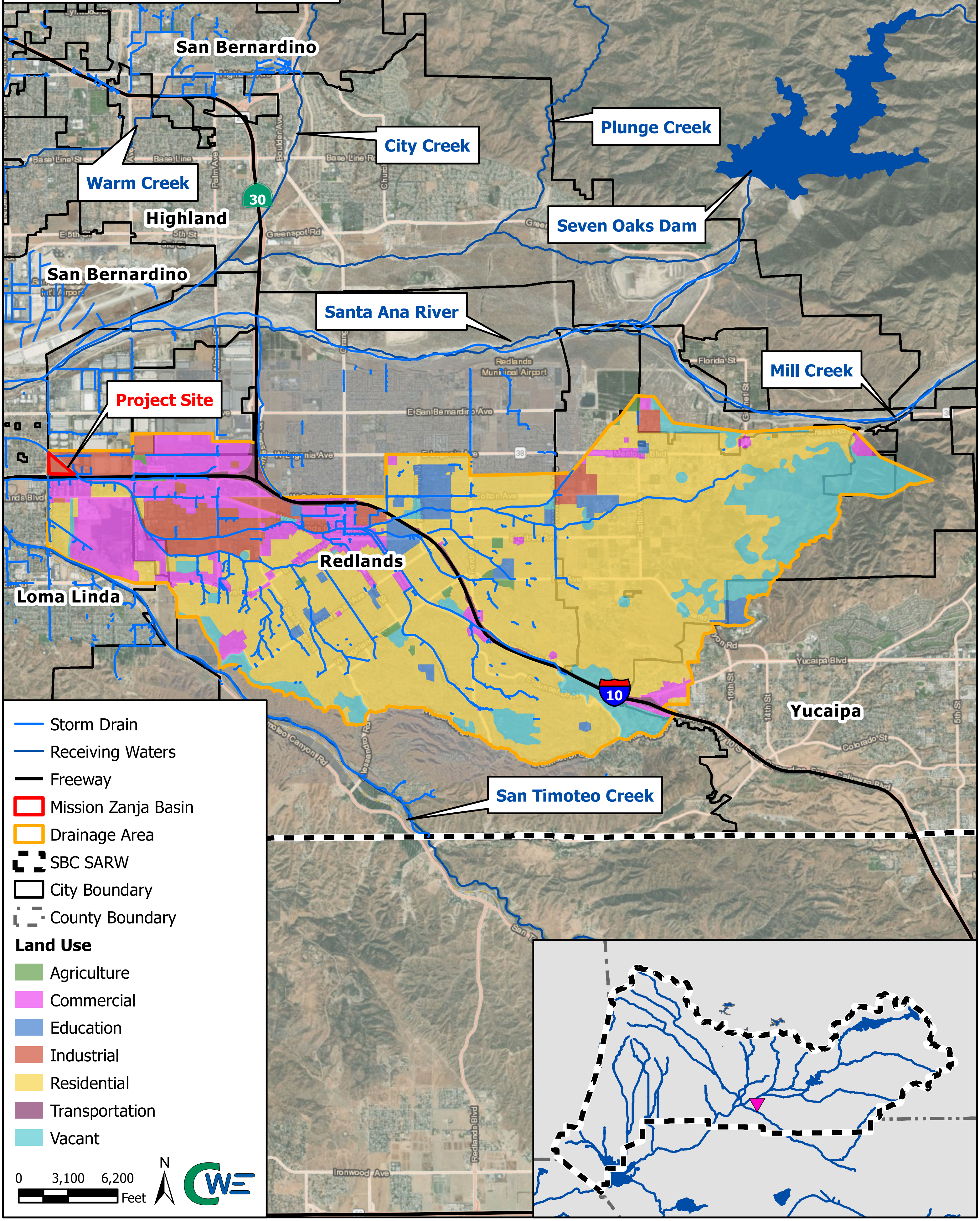
45. Streamflow Restoration on Plunge Creek



46. Spreading on Wooly Star Preserve Area

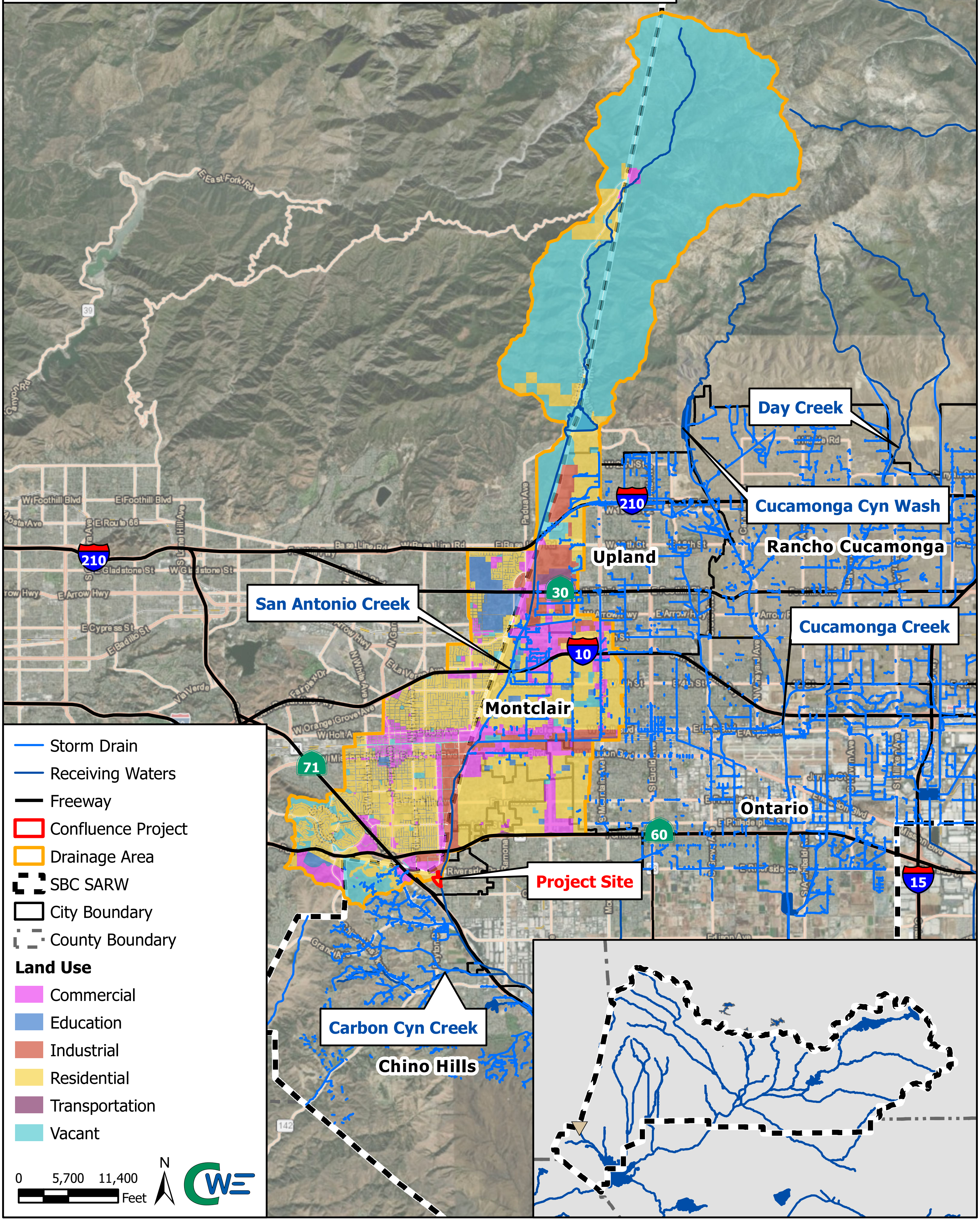


47. Mission Zanja Basin

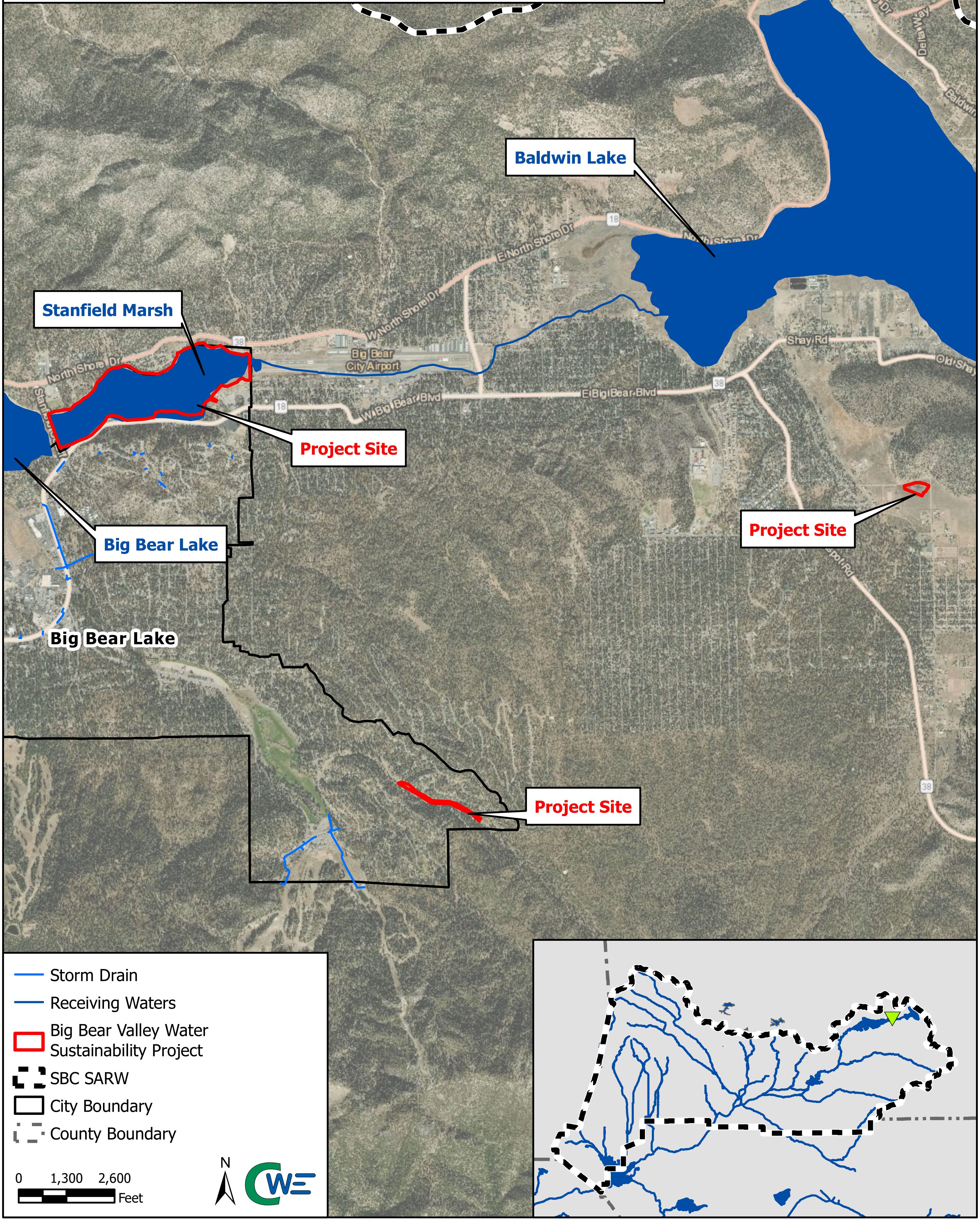


48. Riverside Corona Feeder

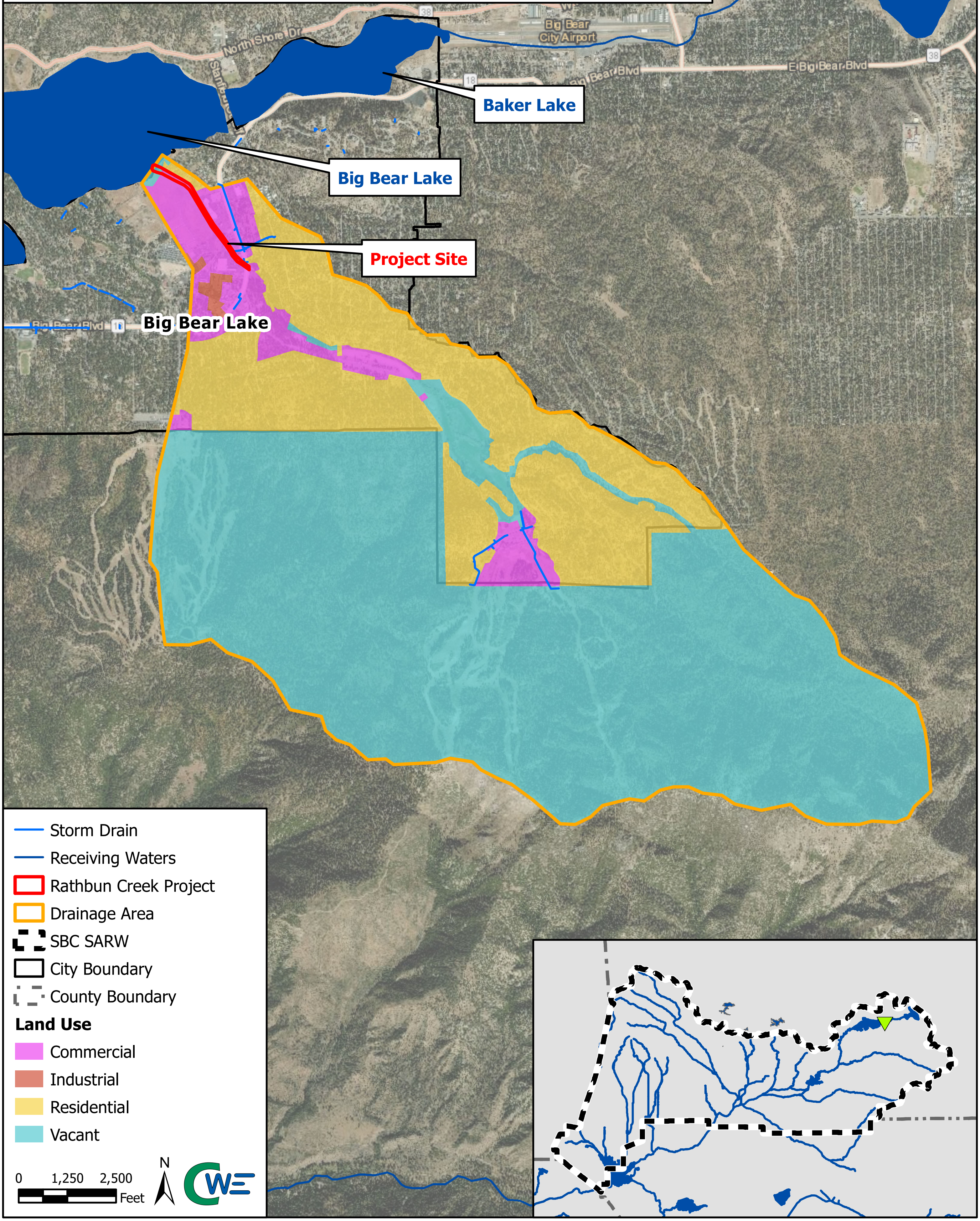
49. Confluence Regional Water Resource Project



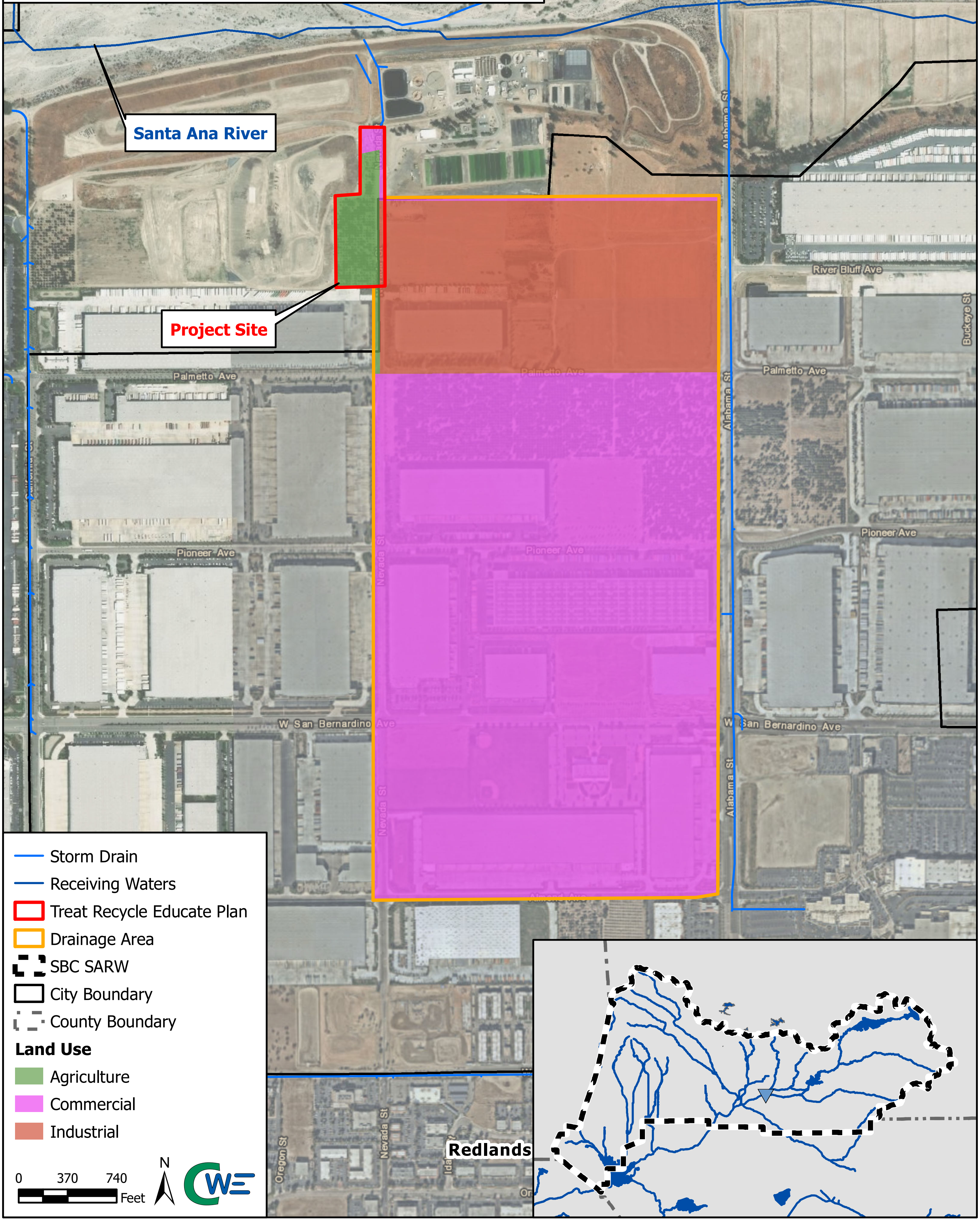
50. Big Bear Valley Water Sustainability Project



51. Rathbun Creek Floodway Improvement Project



52. Treat, Recycle, Educate (TRE) Plan



Attachment G

Project Selection and Metrics-Based Analysis

San Bernardino County
Santa Ana River Watershed
Storm Water Resource Plan

Project Selection and Metrics-Based Analysis

Project Number	Project	Lead Agency	Project Description	Water Quality Benefits	Pollutant Load Reduction	Stormwater Runoff Reduction	Water Supply Benefits	Stormwater Recharge	Recycled Water Recharge	Flood Management Benefits	Runoff Rate Reduction	Runoff Volume Reduction	Flood Elevation Reduction	Removal of Parcels/Structures from the 100-Year Floodplain	Property Value Saved	Environmental Benefits	Wetlands Enhancement/Creation	Riparian Area Enhancement	Streambed Restoration	Increased Urban Green Space	Community Benefits	Provide Employment Opportunities	Increase Public Education	Increase Community Involvement	Trails Enhancement/Creation	Public Use Areas Enhancement/Creation	Full Project Cost Estimate	SBCFCD has approved concept?
1	Hawker Crawford Channel Storm Drain	SBCFCD	Existing undersized trapezoidal channel cuts through a field and discharges into San Sevaine Basin No. 3, which has an infiltration rate of 0.5 feet per day. Proposed project will take flow into a box culvert sized to carry the 100-year flow rate (Q) and discharge into San Sevaine Basin No. 1, which has a higher infiltration rate (2.5 ft/day).	X	2.4E+12 MPN *E. coli*	12 afy	X	12 afy		X		12 afy		3 parcels	$1.8 million						X	67 job-years					$6,231,000	Y
2	West Fontana Channel - Hickory Basin to Banana Basin	SBCFCD	Existing undersized riprap-lined trapezoidal channel floods surrounding parcels during high return interval events. Proposed project will enlarge the channel to contain the 100-year storm event and add a bioswale to the north side that treats stormwater runoff from areas north of the channel.	X	1.3E+12 MPN *E. coli*	7.4 afy				X		7.4 afy	up to 4.76 ft	6 parcels	$0.2 million	X		0.75 ac		0.75 ac	X	108 job-years					$10,000,000	Y
3	Grove Basin Storm Drain	SBCFCD	Grove Basin has a gated outlet structure which is connected to a 66-inch Reinforced Concrete Pipe (RCP). This 66-inch RCP currently discharges onto Grove Avenue causing street flooding and the polluted discharge eventually reaches Prado Park Lake. Proposed project will reroute the flows to a 108-inch RCP going eastward along Chino Avenue and discharge to Lower Cucamonga Spreading Grounds.	X	3.8E+12 MPN *E. coli*	61 afy	X	61 afy		X	X	61 afy									X	108 job-years					$10,000,000	Y
4	Randall Basin Outlet and Colton Storm Drain Project 3-5	SBCFCD	Randall Basin is a flood control basin that currently can only discharge excess flows overland in an uncontrolled emergency spillway to Randall Avenue. Proposed project will allow Randall Basin to be managed as a recharge facility. Project will include control structure at basin outlet and a new storm drain to the Santa Ana River.	X	3.5E+12 MPN *E. coli*	57 afy	X	57 afy		X		180 afy									X	108 job-years					$10,000,000	Y
5	Cable Creek Basin (Upper)	SBCFCD	Currently uncontrolled and unregulated flows from Cable Creek discharge to the Cajon Wash. Proposed project will create a new basin on Cable Creek upstream of Little League Drive in north San Bernardino. The basin will capture sediment and polluted runoff. The project will also provide a water supply benefit to the Bunker Hill groundwater basin through groundwater recharge.	X	1.7E+14 MPN *E. coli*	859 afy	X	859 afy		X	X	859 afy									X	217 job-years					$20,000,000	Y
6.1	Warm Creek - Baseline Street to Sand Creek Confluence - Concept 1	SBCFCD	Warm Creek is an undersized earth-lined trapezoidal channel between Baseline Street and the improved confluence with Sand Creek. Warm Creek Concept 1 will increase the width of the channel, which will increase infiltration. The channel will be lined with riprap and velocity will be controlled by grouted riprap grade breaks. A trail is also proposed along a portion of the site, to be maintained by the Cities of San Bernardino and Highland.	X	1.4E+13 MPN *E. coli*	13.5 afy	X	13.5 afy		X		13.5 afy	up to 0.32 ft			X				2.42 ac	X	69 job-years			5,280 ft	2.42 ac.	$6,350,000	N
6.2	Warm Creek - Del Rosa Confluence to Sand Creek Confluence - Concept 2	SBCFCD	Warm Creek Concept 2 will improve water quality by adding a bioswale on each side of the channel at locations where it is feasible to capture runoff from intersecting storm drains. Walls will separate the bioretention facilities from the flood control channel, and the channel will be deep enough to contain the entire 100-year flood flow. The project will incorporate a trail to be maintained by the Cities of San Bernardino and Highland.	X	3.7E+13 MPN *E. coli*	44 afy				X			up to 2.00 ft	119 parcels	$36.6 million	X		2.08 ac		6.02 ac	X	284 job-years			8,580 ft	6.02 ac	$26,126,325	N
7.1	Little Sand Creek - Concept 1	SBCFCD	Little Sand Creek is a channel with a riprap bottom and rail-and-wire revetment with sheet metal backing on the sides. Concept 1 will improve water quality and flood control with the incorporation of a bioswale to capture and treat stormwater flows entering from the north side of the channel. The bioswale will be separated from the improved flood control channel by a concrete wall.	X	1.5E+12 MPN *E. coli*	9 afy				X			up to 3.08 ft			X		1.06 ac		1.06 ac	X	74 job-years					$6,825,600	N
7.2	Little Sand Creek - Concept 2	SBCFCD	Little Sand Creek Concept 2 will take advantage of publicly owned lands on the north side of the channel to improve water supply and water quality. A small basin will be constructed that will take diverted dry-weather runoff from Little Sand Creek for infiltration/groundwater recharge.	X	5.4E+13 MPN *E. coli*	116 afy	X	116 afy		X	0.7 cfs	116 afy									X	35 job-years					$3,216,957	N
8	Mission Channel - Santa Ana River to Tennessee Street	SBCFCD	Mission Channel is an undersized earth and riprap trapezoidal channel that bisects a disadvantaged community in eastern San Bernardino and western Redlands. Proposed project will benefit the community by adding a trail connecting the Santa Ana River Trail and the Orange Blossom Trail, while upgrading the channel to be capable of carrying the 100-year storm event. The channel will continue to be an earthen channel, and the increased width will increase the volume of infiltration.	X	1.3E+13 MPN *E. coli*	51 afy	X	51 afy		X	1.3 cfs	51 afy	X	X	X	X				3.08 ac	X	89 job-years			8,900 ft	3.08 ac	$8,190,000	N
9	Wilson Creek - 10th Street to Interstate 10	SBCFCD	Wilson Creek flows through west Yucaipa as a 60-foot wide channel with rail and wire revetment on the side slopes. The efficiency of infiltration from the earth-lined channel is less than optimal, as the channel is prone to scour and deposition, which alters the stream bed and constricts the spread of flows. The proposed project will improve infiltration efficiency, reduce scour, enchance the flood capacity, and improve the trail system along the channel.	X	8.8+12 MPN *E. coli*	19 afy	X	19 afy		X	0.4 cfs	19 afy	up to 8.80 ft	131 parcels	$30.8 million	X				3.47 ac	X	120 job-years			7,550 ft	3.47 ac	$11,000,000	N
10.1	Rialto Channel - Etiwanda to Willow - Concept 1	SBCFCD	Rialto Channel conveys urban runoff from the Cactus Basin complex in an undersized earth and rock-lined trapezoidal channel. The proposed project concept will widen the channel to allow for more infiltration while deepening the channel to provide additional flood capacity. The project will also provide community benefits to severely disadvantaged communities within the City of Rialto through the creation of a multi-use trail to connect with the popular Pacific Electric Trail.	X	2.5E+13 MPN *E.coli*	114 afy	X	114 afy		X	2.3 cfs	114 afy	X	X	X	X				7.16 ac	X	223 job-years			15,600 ft	7.16 ac	$20,580,000	N
10.2	Rialto Channel - Etiwanda to Willow - Concept 2	SBCFCD	Rialto Channel Concept 2 will widen and deepen Rialto Channel to provide flood protection for surrounding residents and businesses. The concept will increase infiltration in the upper portion through Armorflex blocks, while the lower portion will convey flood flows through a concrete lined rectangular channel. The project will include a multi-use trail, as described under Concept 1 above.	X	7.1E+12 MPN *E.coli*	33 afy	X	33 afy		X	0.6 cfs	33 afy	X	X	X	X				7.16 ac	X	142 job-years			15,600 ft	7.16 ac	$13,098,000	N
11	Cactus Basin #4 & 5	SBCFCD	Cactus Basin #4 and 5 will provide multiple benefits to disadvantaged communities in the City of Rialto and the Inland Empire. The project will provide a large increase in the volume of stormwater that can be captured for groundwater recharge. The project will enhance water quality by preventing bacteria from reaching downstream water bodies. The project will also protect thousands of structures from flooding.	X	3.7E+13 MPN *E. coli*	170 afy	X	170 afy		X	600 cfs	170 afy	up to 3.44 ft	1,504 parcels	$451 million						X	304 job-years					$28,000,000	Y
12	Plunge Creek Stream Bed Restoration and Elder Creek Channel Improvement	SBCFCD	The project, a continuation of San Bernardino Valley Water Conservation District's Plunge Creek restoration project, will rehabilitate the ecological function of the wash. The project will spread stormwater through braided channels to restore natural watershed processes, enhance groundwater recharge, and improve downstream water quality. The project will also improve Elder Gulch upstream of the confluence in a way that reduces sedimentation and protects surrounding areas from flooding.	X	1.6E+13 MPN *E.coli*	80 afy	X	80 afy		X	3.6 cfs	80 afy	X	X	X	X		25 ac	1,700 ft		X	81 job-years					$7,477,000	Y

Project Number	Project	Lead Agency	Project Description	Water Quality Benefits	Pollutant Load Reduction	Stormwater Runoff Reduction	Water Supply Benefits	Stormwater Recharge	Recycled Water Recharge	Flood Management Benefits	Runoff Rate Reduction	Runoff Volume Reduction	Flood Elevation Reduction	Removal of Parcels/Structures from the 100-Year Floodplain	Property Value Saved	Environmental Benefits	Wetlands Enhancement/Creation	Riparian Area Enhancement	Streambed Restoration	Increased Urban Green Space	Community Benefits	Provide Employment Opportunities	Increase Public Education	Increase Community Involvement	Trails Enhancement/Creation	Public Use Areas Enhancement/Creation	Full Project Cost Estimate	SBCFCD has approved concept?
13	Wildwood Channel - Interstate 10 to Holmes Street	SBCFCD	Wildwood Channel conveys flow in an undersized channel lined with sand and gravel. The proposed project will widen the channel to increase infiltration capacity and flood protection, while providing grade breaks that reduce velocities. The project will also enhance the existing multi-use trails in this disadvantaged community.	X	1.8E+12 MPN *E. coli*	38 afy	X	38 afy		X	0.8 cfs	38 afy	X	X	X	X				6.49 ac	X	181 job-years			14,140 ft	6.49 ac	$16,670,920	N
14.1	Del Rosa Channel - Pacific Street to Del Rosa Avenue - Concept 1	SBCFCD	Del Rosa Channel is an undersized rectangular channel with a riprap-lined bottom and rail-and-wire revetment on the sides. The limited amount of public right-of-way reduces the opportunities for additional enhancements. Concept 1 will widen the channel from 20 feet to 30 feet and deepen it to handle flood flows. The composition of the channel bottom will remain porous for infiltration. A new culvert will be required across Pacific Avenue.	X	2.6E+12 MPN *E. coli*	12 afy	X	12 afy		X		12 afy	up to 5.43 ft	97 parcels	$26.7 million						X	86 job-years					$7,878,445	N
14.2	Del Rosa Channel - Pacific Street to Del Rosa Avenue - Concept 2	SBCFCD	Del Rosa Channel Concept 2 will only widen the channel without deepening it. The slopes will be protected with stairstepped rock gabion walls, eliminating the need for permanent concrete structures within the channel right-of-way. Flooding will be reduced, but the channel will not be capable of carrying the 100-year flood. The existing culvert at Pacific Avenue will remain in place.	X	1.1E+12 MPN *E. coli*	5 afy	X	5 afy		X		5 afy	up to 1.86 ft								X	32 job-years					$2,930,297	N
15	Etiwanda Channel Invert Repair and Trail Project	SBCFCD	Etiwanda Channel and San Sevaine Channel are two rectangular concrete channels laterally contiguous to one another separated by a channel wall. The channels are subject to scour issues. The proposed project will remove the wall between the channels, adress the scouring issues, and provide a trail improvement, benefiting the community as part of the San Sevaine Trail Phase I Segment 2 in the City of Fontana.							X			X			X				X	X	16 job-years	X		X	X	$1,500,000	N
16	West State Street Storm Drain Segment III and Brooks Basin Inlet Enhancement	SBCFCD	West State Street Storm Drain is an open channel that runs between West State Street and the Union Pacific Railroad in the Cities of Montclair and Ontario. The storm drain conveys runoff westward to San Antonio Creek Channel, while upstream of the Channel there is an inlet that diverts low flows into Brooks Basin. The project will enlarge the inlet and enhance the channel to provide flood protection and to capture, convey, and divert more stormwater to Brooks Basin for infiltration (groundwater recharge).	X	5.4E+12 MPN *E. coli*	117 afy	X	117 afy		X	10 cfs	117 afy	X	X	X						X	126 job-years					$11,660,000	Y
17	Carbon Canyon Creek Channel - Pipeline Avenue to Peyton Drive	SBCFCD	Carbon Canyon Creek Channel is a riprap lined undersized trapezoidal channel between Pipeline Avenue and Peyton Drive. The proposed project will widen the channel but maintain a soft bottom. This design will increase flood protection and provide additional opportunity for stormwater flows to infiltrate and recharge groundwater supplies.	X	3.2E+12 MPN *E. coli*	15 afy	X	15 afy		X	0.3 cfs	15 afy	X	X	X						X	228 job-years					$21,000,000	N
18	Santa Ana River Trail Phase III	SBC Parks	Santa Ana River Trail Phase III will extend the popular public use trail from its current endpoint at Waterman Avenue in San Bernardino to California Street in the City of Redlands. Stormwater improvements along the trail will be sized for the 100-year flood flow from future development conditions. The trail will provide public use areas and green space for disadvantaged communities.													X				9.18 ac	X	41 job-years			19,992 ft	9.18 ac	$3,786,000	Y
19	Santa Ana River Trail Phase IV	SBC Parks	Santa Ana River Trail Phase IV will complete the trail to Garnet Street in Mentone. The project will provide public use areas and enhance green space. The project will also feature interpretive signage as a public education component.													X				24.27 ac	X	109 job-years	7 signs		52,865 ft	24.27 ac	$10,000,000	Y
20	Lytle Creek Basin	SBVMWD	The proposed Lytle Creek Basin will be located in the City of Rialto east of Interstate 15, upstream of an existing CEMEX plant. The 60 acre site will have a wetted area of 48 acres and a storage volume of 460 acre-feet.	X	5.5E+14 MPN *E. coli*	4,023 afy	X	4,023 afy		X	X	4,023 afy									X	159 job-years					$14,685,038	N
21	Devil Canyon Basins	SBVMWD	The existing Devil Canyon Spreading Grounds diverts flow from Devil Creek during very high flow events. The proposed project would increase the capacity of the diversion through the construction of an inflatable armored dam across Devil Creek. Two new recharge cells will be constructed below the existing Basin No. 1, and the transfer structures between the existing basins would be improved. The site will have a wetted area of 35.9 acres and a total storage volume of 242 acre-feet.	X	3.7E+14 MPN *E. coli*	3,631 afy	X	3,631 afy		X	X	3,631 afy									X	258 job-years					$23,768,911	N
22	City Creek Basin	SBVMWD	The series of nine proposed basins that will be constructed for the City Creek Basin project will be located along over a mile of City Creek on both sides of the 210 Freeway in the City of Highland. The site will have a wetted area of 37.7 acres and a storage volume of 254 acre-feet, and it will be connected at the downstream end to the proposed Plunge Basin II project.	X	7.5E+14 MPN *E. coli*	5,247 afy	X	5,247 afy		X	X	5,247 afy									X	356 job-years					$32,823,285	N
23	Cable Creek Basin (Lower)	SBVMWD	This Cable Creek Basin project will be located just downstream of the proposed SBCFCD Cable Creek Basin project. Unlike the SBCFCD project, flow will be diverted into the lower Cable Creek Basin project from the main channel via an inflatable rubber dam. The 37.9 acres of wetted area will have a storage volume of 281 acre-feet over three separate basin cells.	X	4.1E+14 MPN *E. coli*	2,978 afy	X	2,978 afy		X	X	2,978 afy									X	266 job-years					$24,520,683	N
24	Lytle-Cajon Basins	SBVMWD	The Lytle-Cajon Basin project will be located just upstream of the Lytle-Cajon Radial Gate and spillway. The proposed project would result in the construction of eight in-channel recharge basins. In total the project would have a total wetted are of 43 acres and a storage volume of 244 acre-feet.	X	X	3,408 afy	X	3,408 afy		X	X	3,408 afy									X	115 job-years					$10,668,323	N
25	Mill Creek Inlet	SBVMWD	The Mill Creek Inlet project will improve the transfer of flow from Mill Creek into the existing series of percolation basins in the Mill Creek wash area. The capacity of the existing inlet will be increase from 110 cubic feet per second (cfs) to 210 cfs and will involve replacement of culverts underneath the existing flood control levee.	X	1.8E+14 MPN *E. coli*	887 afy	X	887 afy		X	100 cfs	887 afy									X	28 job-years					$2,595,052	N
26	Plunge Creek Basin I	SBVMWD	The Plunge Creek Basin I project will place a basin downstream of the SBVWCD and SBCFCD Plunge Creek Restoration Projects. The single cell basin will capture water from an inflatable rubber dam diversion across Plunge Creek. The project will have a total wetted area of 6 acres and a storage volume of 40 acre-feet.	X	3.5E+14 MPN *E. coli*	2,481 afy	X	2,481 afy		X	X	2,481 afy									X	118 job-years					$10,900,345	N

Project Number	Project	Lead Agency	Project Description	Water Quality Benefits	Pollutant Load Reduction	Stormwater Runoff Reduction	Water Supply Benefits	Stormwater Recharge	Recycled Water Recharge	Flood Management Benefits	Runoff Rate Reduction	Runoff Volume Reduction	Flood Elevation Reduction	Removal of Parcels/Structures from the 100-Year Floodplain	Property Value Saved	Environmental Benefits	Wetlands Enhancement/Creation	Riparian Area Enhancement	Streambed Restoration	Increased Urban Green Space	Community Benefits	Provide Employment Opportunities	Increase Public Education	Increase Community Involvement	Trails Enhancement/Creation	Public Use Areas Enhancement/Creation	Full Project Cost Estimate	SBCFCD has approved concept?
27	Plunge Creek Basin II	SBVMWD	The Plunge Creek Basin II project will be located just upstream of the confluence of Plunge Creek and City Creek. The basin will receive flows from an inflatable dam placed across Plunge Creek. The project will have a total wetted area of 10.7 acres and a storage volume of 66 acre-feet.	X	X	1,050 afy	X	1,050 afy		X	X	1,050 afy									X	139 job-years					$12,808,867	N
28	Twin Creek Spreading Grounds	SBVMWD	The existing Twin Creek Spreading Grounds are flow-through basins located within Twin Creek north of Lynwood Drive in the City of San Bernardino. Exising basins within the spreading grounds were originally built to attenuate flows, but over the years the basin walls have been eroded or purposely breached, so flows currently pass through unobstructed. The proposed project will reconstruct and armor the basin walls, constructing one new cell, and providing new transfer structures between the basin cells.	X	5.9E+14 MPN *E. coli*	4,087 afy	X	4,087 afy		X	X	4,087 afy									X	181 job-years					$16,677,990	N
29	Vulcan 2 Basin	SBVMWD	The Vulcan 2 Basin project will improve groundwater recharge in a new basin located near the severely disadvantaged community of Muscoy. The basin will divert flow from the Devil Creek Diversion Channel through an inflatable dam. The total wetted area will be 35.2 acres and the storage volume will be 383 acre-feet.	X	X	3,441 afy	X	3,441 afy		X	X	3,441 afy									X	339 job-years					$31,221,404	N
30	Waterman Basins	SBVMWD	The Waterman Basins project will improve the existing diversion structure at the Waterman Basins northeast of Waterman Avenue and 40th Street in the City of San Bernardino. The improvements will refurbish two existing radial gate systems and provide two new gates for a maximum diversion capacity of 1,000 cfs. Upon completion, Waterman Basins will attain a total wetted area of 31.5 acres and a storage volume of 180 acre-feet.	X	X	1,675 afy	X	1,675 afy		X	X	1,675 afy									X	110 job-years					$10,207,218	N
31	Wineville Recycled Pipeline Project	IEUA	The Wineville Recycled Pipeline Project will make changes to three basins. The project will include upgrading Wineville Basin to be capable of infiltration by adding a gate to the outlet and improving the dam. Detained stormwater will be pumped to Jurupa Basin via a new pump and conveyance pipeline. Stormwater will then be pumped from Jurupa Basin through existing lines to the RP3 Basins, which will be enlarged and improved to accept more stormwater and recycled water.	X	1.4E+14 MPN *E. coli*	3,166 afy	X	3,166 afy	3,535 afy	X	X	3,166 afy									X	231 job-years					$21,300,000	N
32	San Sevaine Basins	IEUA	Recharge in San Sevaine Basin will be increased by recycling water through a new pump and conveyance pipeline from the Basin No. 5, which has a low infiltration rate, to Basin No. 3, which has a higher infiltration rate. A new berm will also be constructed within Basin No. 5.	X	9.1E+13 MPN *E. coli*	642 afy	X	642 afy	1,911 afy	X		642 afy									X	38 job-years					$3,550,000	N
33	Lower Day Basin	IEUA	The improvements proposed as part of the Lower Day Basin project include the construction of a secondary diversion structure within the channel to more efficiently divert flows into the basin. Within the basin, capacity will be increased by removing a mid-level outlet and reconstructing an embankment.	X	1.0E+13 MPN *E. coli*	75 afy	X	75 afy		X		75 afy									X	26 job-years					$2,480,000	N
34	Declez Basin	IEUA	Declez Basin will be improved by reconstructing the existing embankment and spillway at a higher elevation to increase storage. Additionally, a gate will be installed on an existing outlet, improving the ability of IEUA to manage the basin as a recharge facility. The improvements will recharge an average of 241 acre-feet of stormwater to the groundwater basin annually.	X	1.1E+13 MPN *E. coli*	241 afy	X	241 afy		X		241 afy									X	44 job-years					$4,070,000	N
35	Victoria Basin	IEUA	The proposed Victoria Basin project will improve the recharge and flood control capabilities of the existing Victoria Basin by abandoning the mid-level outlet that allows flows to the San Sevaine Channel. By blocking the outlet and extending the existing lysimeter stations, the capacity of the basin for recharge will be increased, as the basin will be able to hold a greater volume of water.	X	6.1E+12 MPN *E. coli*	43 afy	X	43 afy	120 afy	X		43 afy									X	1 job-years					$150,000	N
36	Turner Basin	IEUA	The existing spillway at Turner 2 Basin was built long before upstream development in the City of Rancho Cucamonga required larger stormwater basins at the confluence of Cucamonga Channel and Deer Creek Channel, and it is one of the last remaining pieces of the Turner Basin complex that has yet to be replaced. A new spillway at a higher elevation will allow IEUA to store additional stormwater volume within the basin complex, which will produce an additional annual recharge volume of 66 acre-feet.	X	2.2E+13 MPN *E. coli*	66 afy	X	66 afy		X		66 afy									X	9 job-years					$890,000	N
37	Ely Basins	IEUA	The Ely Basin improvements include excavating 470,000 cubic yards of material from within the existing footprint of the basins. IEUA estimated that the increase in the capacity of the basin would yield an average of 221 acre-feet of additional stormwater recharge per year.	X	4.8E+13 MPN *E. coli*	221 afy	X	221 afy		X		221 afy									X	34 job-years					$3,200,000	N
38	Montclair Basins	IEUA	The proposed project at Montclair Basin will add one drop inlet structure from Basin 1 to Basin 2, and one drop inlet structure from Basin 2 to Basin 3. The project will allow for better management of groundwater recharge in the basins, and the efficiencies attained will yield an average of 248 acre-feet of additional recharge per year.	X	3.5E+13 MPN *E. coli*	248 afy	X	248 afy		X		248 afy									X	15 job-years					$1,440,000	N
39	Montclair - Arrow Highway	City of Montclair	This project will reduce the current four lane major arterial street to a two lane road, allowing for a median that will capture runoff from the street, treat it, and infiltrate it back into the ground.	X	X	X	X	X		X	X	X									X	X					X	N
40	Montclair - Fremont Avenue	City of Montclair	This project will reduce the current four lane arterial street to a two lane road, allowing for a median that will capture runoff from the street, treat it, and infiltrate it back into the ground.	X	X	X	X	X		X	X	X									X	X					X	N
41	Montclair - Sunset Park	CBWCD / Montclair	This project will develop a walking and biking enviromental trail that incorporates a water feature moving nusance water from Orchard Street from the north end to the south end where it will infiltrate into the ground.	X	X	X	X	X		X	X	X				X				X	X	X	X		X	X	X	N

Project Number	Project	Lead Agency	Project Description	Water Quality Benefits	Pollutant Load Reduction	Stormwater Runoff Reduction	Water Supply Benefits	Stormwater Recharge	Recycled Water Recharge	Flood Management Benefits	Runoff Rate Reduction	Runoff Volume Reduction	Flood Elevation Reduction	Removal of Parcels/Structures from the 100-Year Floodplain	Property Value Saved	Environmental Benefits	Wetlands Enhancement/Creation	Riparian Area Enhancement	Streambed Restoration	Increased Urban Green Space	Community Benefits	Provide Employment Opportunities	Increase Public Education	Increase Community Involvement	Trails Enhancement/Creation	Public Use Areas Enhancement/Creation	Full Project Cost Estimate	SBCFCD has approved concept?
42	Urban Walkable Watersheds	CBWCD	The Urban Walkable Watersheds project will feature a community walking trail that provides connectivity by water infrastructure projects while actively capturing and infiltrating runoff through green infrastructure demonstration projects. An emphasis will be placed on increasing public education and community involvement through educational programs involving nearby public schools.	X	X	X	X	X		X	X	X				X				X	X	X	X	X	X	X	X	N
43	Multipurpose Recharge Basins	CBWCD	The Multipurpose Recharge Basins project proposed by CBWCD will reconceptualize the role of urban recharge basin by integrating native plant restoration and passive recreation with interpretation on perimeters of existing basins. The project will increase areas for public education and recreation while continuing basin recharge.													X		X		X	X	X				X	X	N
44	College Heights and Upland Percolation Basins	CBWCD	The improvements proposed to the College Heights and Upland Percolation Basins will include water quality features to improve urban runoff, flood mitigation, streetscape, passive recreation, and education.													X				X	X	X				X	X	N
45	Streamflow Restoration on Plunge Creek	SBVWCD	The Steamflow Restoration on Plunge Creek project will continue the enhancement of the SBVWCD Plunge Creek Conservation Project by an additional half mile. The additional stream enhancements will converge water onto Plunge Creek or onto Orange Street lessening chances of backflow during high flow events.	X	X	X	X	X		X	X	X				X		X	X		X	X					X	N
46	Spreading on Woolly Star Preserve Area	SBVWCD	The Spreading on Wooly Star Preserve Area (WSPA) will spread Santa Ana River water on the WSPA during events of high flow through the installation of new gates and pipes. Stormwater infiltration will occur in historical remnant channels to better mimic pre-development processes, and this will enhance riparian habitat.	X	X	X	X	X		X	X	X				X		X	X		X	X					X	N
47	Mission/Zanja Basin	SBVWCD	The Mission/Zanja Groundwater Recharge Basin project will place a groundwater rechange basin in vacant lands along the Mission Zanja, reducing stormwater runoff and increase groundwater recharge. Seven possible locations have been identified with the smallest being 65,000 square feet with a recharge rate of 10 feet per day. 15 acre-feet per day could recharge at a flow rate of 7.5 cfs.	X	X	X	X	X		X	7.5 cfs	X									X	X					X	N
48	Riverside Corona Feeder	WMWD	Connect SWP feeder to Riverside; recharge Riverside County basins																		X	X					X	N
49	Confluence Regional Water Resources Project	CBWCD	The Confluence Regional Water Resources Project will construct a new groundwater recharge and storage reservoir at the confluence of Chino Creek and San Antonio Creek. Pumps will send excess stormwater to upstream CBWCD-managed basins to enhance recharge opportunities. The project will also include an artificial habitat and bioremediation channel as an educational and wetland habitat feature.	X	3.1E+13 MPN *E. coli*	1,830 afy	X	1,830 afy		X		1,830 afy				X	2.03 ac	2.03 ac	627 ft	2.03 ac	X	217 job-years	X	X		2.03 ac	$20,000,000	Y
50	Big Bear Valley Water Sustainability Project	City of Big Bear Lake	Big Bear Valley wastewater currently is treated and sent outside of the SARW to irrigate crops in Lucerne Valley. The Big Bear Valley Water Sustainability Project will upgrade the WWTP and reuse tertiary treated wastewater locally to recharge local groundwater, provide critical habitat for endangered species, and stabilize the water level at Big Bear Lake.	X	X		X		1,950 afy							X	145 ac	145 ac			X	478 job-years		X			$44,000,000	N
51	Rathbun Creek Floodway Improvement Project	City of Big Bear Lake	The Rathbun Creek Floodway Improvement Project will increase the size of three culverts to be able to convey the 100-year discharge without flooding nearby properties. The project will also enhance the natural streambed downstream of Big Bear Boulevard and enhance riparian habitat. A multiuse trail facility will also be constructed along the banks to extend Rathbun Trail all the way to Big Bear Lake.							X			up to 3.44 ft	1,504 parcels	$451 million	X	1.50 ac	2.04 ac	2,218 ft	3.54 ac	X	65 job-years	1 sign	X	3,500 ft	3.54 ac	$6,000,000	N
52	Treat, Recycle, Educate (TRE) Plan	City of Redlands	The TRE Plan consists of several green street improvements combined with a new 0.8-acre stormwater basin near the existing WWTP in the City of Redlands. The area will include a new educational park featuring interpretive signage describing the LID BMPs that will be included in the park and on Nevada Street. The park's vegetation will recycled water from the WWTP.	X	X	X	X	X	X	X	X	X				X				1.20 ac	X	22 job-years	6 signs	X	1,920 ft	0.40 ac	$2,000,000	N
53	Los Serranos Park	City of Chino Hills	The Los Serranos Park project will create a new community park in the City of Chino Hills. The design will include green infrastructure and habitat enhancement and protection.	X	X	X										X		X		X	X	43 job-years			X	X	$4,000,000	N
54	Restoration and Enhancement of Creeks	City of Chino Hills	This project will improve the ecosystem and protect valuable riparian habitat through a creek rehabilitation and streambed restoration project. The project will also provide public walking trails and educational opportunities.	X	X	X										X		X	X	X	X	8 job-years	X		X	X	$750,000	N

Units:
ac = acre
afy = acre-feet per year
cfs = cubic feet per second
ft = feet
MPN = Most Probable Number

Notes:
CBWCD = Chino Basin Water Conservation District
IEUA = Inland Empire Utilities Agency
SBC = San Bernardino County
SBCFCD = San Bernardino County Flood Control District
SBVMWD = San Bernardino Valley Municipal Water District
WMWD = Western Municipal Water District

Attachment H

Project Prioritization Results

San Bernardino County
Santa Ana River Watershed
Storm Water Resource Plan

Results of Project Prioritization

Project Number	Project	Lead Agency	Concept Approved, or Project Ready?	Code: Project Readiness	Full Project Cost	Code: Cost Estimate	Have Benefits Been Quantified?	Code: Quantification	Number of Benefit Categories	Code: Benefit Categories	Water Supply Unit Cost ($/afy)	Code: Water Supply Cost	Water Quality Unit Cost ($/billion MPN)	Code: Water Quality Cost	Ranking Code	Ranked Order
49	Confluence Regional Water Resources Project	CBWCD	Y	1	$20,000,000	1	Y	1	5	1	$10,929	3	$643	4	111134	1
12	Plunge Creek Stream Bed Restoration and Elder Creek Channel Improvement	SBCFCD	Y	1	$7,477,000	1	Y	1	5	1	$93,463	4	$467	3	111143	2
5	Cable Creek Basin (Upper)	SBCFCD	Y	1	$20,000,000	1	Y	1	4	2	$23,283	3	$118	3	111233	3
16	West State Street Storm Drain Segment III and Brooks Basin Inlet Enhancement	SBCFCD	Y	1	$11,660,000	1	Y	1	4	2	$99,658	4	$2,159	6	111246	4
11	Cactus Basin #4 & 5	SBCFCD	Y	1	$28,000,000	1	Y	1	4	2	$164,706	5	$757	4	111254	5
3	Grove Basin Storm Drain	SBCFCD	Y	1	$10,000,000	1	Y	1	4	2	$163,934	5	$2,632	6	111256	6
4	Randall Basin Outlet and Colton Storm Drain Project 3-5	SBCFCD	Y	1	$10,000,000	1	Y	1	4	2	$175,439	5	$2,857	6	111256	6
1	Hawker Crawford Channel Storm Drain	SBCFCD	Y	1	$6,231,000	1	Y	1	4	2	$519,250	7	$2,596	6	111276	8
2	West Fontana Channel - Hickory Basin to Banana Basin	SBCFCD	Y	1	$10,000,000	1	Y	1	4	2		9	$7,692	7	111297	9
19	Santa Ana River Trail Phase IV	SBC Parks	Y	1	$10,000,000	1	Y	1	2	4		9		9	111499	10
18	Santa Ana River Trail Phase III	SBC Parks	Y	1	$3,786,000	1	Y	1	2	4		9		9	111499	10
10.1	Rialto Channel - Etiwanda to Willow - Concept 1	SBCFCD	N	2	$20,580,000	1	Y	1	5	1	$180,526	5	$823	4	211154	12
8	Mission Channel - Santa Ana River to Tennessee Street	SBCFCD	N	2	$8,190,000	1	Y	1	5	1	$160,588	5	$630	4	211154	12
6.1	Warm Creek - Baseline Street to Sand Creek Confluence - Concept 1	SBCFCD	N	2	$6,350,000	1	Y	1	5	1	$470,370	6	$454	3	211163	14
10.2	Rialto Channel - Etiwanda to Willow - Concept 2	SBCFCD	N	2	$13,098,000	1	Y	1	5	1	$396,909	6	$1,845	5	211165	15
13	Wildwood Channel - Interstate 10 to Holmes Street	SBCFCD	N	2	$16,670,920	1	Y	1	5	1	$438,708	6	$9,262	7	211167	16
9	Wilson Creek - 10th Street to Interstate 10	SBCFCD	N	2	$11,000,000	1	Y	1	5	1	$578,947	7	$1,250	5	211175	17
52	Treat, Recycle, Educate (TRE) Plan	City of Redlands	N	2	$2,000,000	1	Y	1	5	1		9		9	211199	18
28	Twin Creek Spreading Grounds	SBVMWD	N	2	$16,677,990	1	Y	1	4	2	$4,081	1	$28	1	211211	19

Results of Project Prioritization

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20	Lytle Creek Basin	SBVMWD	N	2	$14,685,038	1	Y	1	4	2	$3,650	1	$27	1	211211	19
26	Plunge Creek Basin I	SBVMWD	N	2	$10,900,345	1	Y	1	4	2	$4,394	1	$31	1	211211	19
32	San Sevaine Basins	IEUA	N	2	$3,550,000	1	Y	1	4	2	$1,391	1	$39	1	211211	19
25	Mill Creek Inlet	SBVMWD	N	2	$2,595,052	1	Y	1	4	2	$2,926	1	$14	1	211211	19
35	Victoria Basin	IEUA	N	2	$150,000	1	Y	1	4	2	$920	1	$25	1	211211	19
31	Wineville Recycled Pipeline Project	IEUA	N	2	$21,300,000	1	Y	1	4	2	$3,179	1	$152	3	211213	25
24	Lytle-Cajon Basins	SBVMWD	N	2	$10,668,323	1	Y	1	4	2	$3,130	1		9	211219	26
22	City Creek Basin	SBVMWD	N	2	$32,823,285	1	Y	1	4	2	$6,256	2	$44	1	211221	27
38	Montclair Basins	IEUA	N	2	$1,440,000	1	Y	1	4	2	$5,806	2	$41	1	211221	27
23	Cable Creek Basin (Lower)	SBVMWD	N	2	$24,520,683	1	Y	1	4	2	$8,234	2	$60	2	211222	29
21	Devil Canyon Basins	SBVMWD	N	2	$23,768,911	1	Y	1	4	2	$6,546	2	$64	2	211222	29
29	Vulcan 2 Basin	SBVMWD	N	2	$31,221,404	1	Y	1	4	2	$9,073	2		9	211229	31
30	Waterman Basins	SBVMWD	N	2	$10,207,218	1	Y	1	4	2	$6,094	2		9	211229	31
36	Turner Basin	IEUA	N	2	$890,000	1	Y	1	4	2	$13,485	3	$40	1	211231	33
7.2	Little Sand Creek - Concept 2	SBCFCD	N	2	$3,216,957	1	Y	1	4	2	$27,732	3	$60	2	211232	34
37	Ely Basins	IEUA	N	2	$3,200,000	1	Y	1	4	2	$14,480	3	$67	2	211232	34
34	Declez Basin	IEUA	N	2	$4,070,000	1	Y	1	4	2	$16,888	3	$370	3	211233	36
33	Lower Day Basin	IEUA	N	2	$2,480,000	1	Y	1	4	2	$33,067	3	$248	3	211233	36
50	Big Bear Valley Water Sustainability Project	City of Big Bear Lake	N	2	$44,000,000	1	Y	1	4	2	$22,564	3		9	211239	38

Results of Project Prioritization

Project Number	Project	Lead Agency	Concept Approved, or Project Ready?	Code: Project Readiness	Full Project Cost	Code: Cost Estimate	Have Benefits Been Quantified?	Code: Quantification	Number of Benefit Categories	Code: Benefit Categories	Water Supply Unit Cost ($/afy)	Code: Water Supply Cost	Water Quality Unit Cost ($/billion MPN)	Code: Water Quality Cost	Ranking Code	Ranked Order
27	Plunge Creek Basin II	SBVMWD	N	2	$12,808,867	1	Y	1	4	2	$12,199	3		9	211239	38
14.1	Del Rosa Channel - Pacific Street to Del Rosa Avenue - Concept 1	SBCFCD	N	2	$7,878,445	1	Y	1	4	2	$656,537	7	$3,030	6	211276	40
14.2	Del Rosa Channel - Pacific Street to Del Rosa Avenue - Concept 2	SBCFCD	N	2	$2,930,297	1	Y	1	4	2	$586,059	7	$2,664	6	211276	40
17	Carbon Canyon Creek Channel - Pipeline Avenue to Peyton Drive	SBCFCD	N	2	$21,000,000	1	Y	1	4	2	$1,400,000	8	$6,563	7	211287	42
6.2	Warm Creek - Del Rosa Confluence to Sand Creek Confluence - Concept 2	SBCFCD	N	2	$26,126,325	1	Y	1	4	2		9	$706	4	211294	43
7.1	Little Sand Creek - Concept 1	SBCFCD	N	2	$6,825,600	1	Y	1	4	2		9	$4,550	6	211296	44
51	Rathbun Creek Floodway Improvement Project	City of Big Bear Lake	N	2	$6,000,000	1	Y	1	3	3		9		9	211399	45
53	Los Serranos Park	City of Chino Hills	N	2	$4,000,000	1	N	2	3	3		9		9	212399	46
15	Etiwanda Channel Invert Repair and Trail Project	SBCFCD	N	2	$1,500,000	1	N	2	3	3		9		9	212399	46
54	Restoration and Enhancement of Creeks	City of Chino Hills	N	2	$750,000	1	N	2	3	3		9		9	212399	46
41	Montclair - Sunset Park	CBWCD / Montclair	N	2	X	2	N	2	5	1		9		9	222199	49
42	Urban Walkable Watersheds	CBWCD	N	2	X	2	N	2	5	1		9		9	222199	49
45	Streamflow Restoration on Plunge Creek	SBVWCD	N	2	X	2	N	2	5	1		9		9	222199	49
46	Spreading on Woolly Star Preserve Area	SBVWCD	N	2	X	2	N	2	5	1		9		9	222199	49
39	Montclair - Arrow Highway	City of Montclair	N	2	X	2	N	2	4	2		9		9	222299	53
40	Montclair - Fremont Avenue	City of Montclair	N	2	X	2	N	2	4	2		9		9	222299	53
47	Mission/Zanja Basin	SBVWCD	N	2	X	2	N	2	4	2		9		9	222299	53
43	Multipurpose Recharge Basins	CBWCD	N	2	X	2	N	2	2	4		9		9	222499	56
44	College Heights and Upland Percolation Basins	CBWCD	N	2	X	2	N	2	2	4		9		9	222499	56

San Bernardino County
Santa Ana River Watershed
Storm Water Resource Plan

Results of Project Prioritization

Project Number	Project	Lead Agency	Concept Approved, or Project Ready?	Code: Project Readiness	Full Project Cost	Code: Cost Estimate	Have Benefits Been Quantified?	Code: Quantification	Number of Benefit Categories	Code: Benefit Categories	Water Supply Unit Cost ($/afy)	Code: Water Supply Cost	Water Quality Unit Cost ($/billion MPN)	Code: Water Quality Cost	Ranking Code	Ranked Order
48	Riverside Corona Feeder	WMWD	N	**2**	X	**2**	N	**2**	1	**5**		**9**		**9**	222599	**58**

Units:
ac = acre
afy = acre-feet per year
cfs = cubic feet per second
ft = feet
MPN = Most Probable Number

Notes:
CBWCD = Chino Basin Water Conservation District
IEUA = Inland Empire Utilities Agency
SBC = San Bernardino County
SBCFCD = San Bernardino County Flood Control District
SBVMWD = San Bernardino Valley Municipal Water District
WMWD = Western Municipal Water District

Codes:

Project readiness ----------------------
1 = approved or ready
2 = not approved or ready

Cost Estimate --------------------------
1 = cost estimate provided
2 = no cost estimate provided

Quantification ---------------------------
1 = benefits have been quantified
2 = benefits have not been quantified

Benefit Categories ---------------------
1 = project provides benefits across 5 categories
2 = project provides benefits across 4 categories
3 = project provides benefits across 3 categories
4 = project provides benefits across 2 categories
5 = project provides benefits in one category

Water Supply Cost ---------------------
1 = unit cost of groundwater recharge is less than $5,000 per acre-foot per year
2 = unit cost of groundwater recharge is between $5,000 and $10,000 per acre-foot per year
3 = unit cost of groundwater recharge is between $10,000 and $50,000 per acre-foot per year
4 = unit cost of groundwater recharge is between $50,000 and $100,000 per acre-foot per year
5 = unit cost of groundwater recharge is between $100,000 and $200,000 per acre-foot per year
6 = unit cost of groundwater recharge is between $200,000 and $500,000 per acre-foot per year
7 = unit cost of groundwater recharge is between $500,000 and $1,000,000 per acre-foot per year
8 = unit cost of groundwater recharge is greater than $1,000,000 per acre-foot per year
9 = project provides no benefit to groundwater recharge, or benefits are unquantified

Water Quality Cost ---------------------
1 = unit cost of water quality improvement is less than $50 per billion *E. coli* bacteria removed
2 = unit cost of water quality improvement is between $50 and $100 per billion *E. coli* bacteria removed
3 = unit cost of water quality improvement is between $100 and $500 per billion *E. coli* bacteria removed
4 = unit cost of water quality improvement is between $500 and $1,000 per billion *E. coli* bacteria removed
5 = unit cost of water quality improvement is between $1,000 and $2,000 per billion *E. coli* bacteria removed
6 = unit cost of water quality improvement is between $2,000 and $5,000 per billion *E. coli* bacteria removed
7 = unit cost of water quality improvement is between $5,000 and $10,000 per billion *E. coli* bacteria removed
8 = unit cost of water quality improvement is greater than $10,000 per billion *E. coli* bacteria removed
9 = project provides no water quality benefit, or benefits are unquantified

Attachment I

Funding Matrix

Summary of Potential Funding Sources for SWRP Projects

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
Grants							
California Climate Investments	Urban Greening Program	Round 2 Solicitation now closed. Schedule for future solicitations unknown	Funding of projects that reduce greenhouse gases by sequestering carbon, decreasing energy consumption and reducing vehicle miles traveled, while also transforming the built environment into places that are more sustainable, enjoyable, and effective in creating healthy and vibrant communities	➢ Establishment, enhancement, and expansion of neighborhood parks and community spaces ➢ Greening of public lands and structures, which may include incorporation of riparian habitat for water capture ➢ Green streets and alleyways ➢ Non-motorizes urban trails ➢ Urban heat island mitigation	None	California Natural Resources Agency (916) 653-2812 urbangreening@resources.ca.gov	UGP
California Department of Parks and Recreation	Habitat Conservation Fund	Continuous; application must be submitted by first work day of October	Protecting, restoring, and enhancing wildlife habitat and fisheries	➢ Enhancement or restoration of wetlands ➢ Enhancement or restoration of riparian habitat	No minimum or maximum amounts (2,000,000 total available each year) Requires 50% match	Barbara Baker Habitat Conservation Fund Program (916) 6511-7743 Barbara.Baker@parks.ca.gov	HCF
California Department of Parks and Recreation	Land and Water Conservation Fund (LWCF)	Continuous Next cycle in 2020	To provide for the health, inspiration, and education of the people of California by helping to preserve the State's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation	➢ Acquisition and development projects to create outdoor recreational resources	$3,000,000 maximum	Luan Aubin (916) 651-8573 Luan.Aubin@parks.ca.gov Richard Rendon (916) 651-7600 richard.rendon@parks.ca.gov	LWCF
California Department of Parks and Recreation	Outdoor Environmental Educational Facilities	Schedule for future solicitations unknown	To provide for the health, inspiration, and education of the people of California by helping to preserve the state's extraordinary biological diversity, protecting its most valued natural and cultural resources, and creating opportunities for high-quality outdoor recreation	➢ Development of public outdoor structures and exhibits that facilitate focused learning ➢ Focused learning must take place in a natural outdoor setting, with native vegetation ➢ Learning must encompass the natural environment, and inspire environmental stewardship and an appreciation of the natural world ➢ Learning must include an understanding of how humans interact with, and are dependent on, natural ecosystems ➢ Structures and exhibits may provide outdoor education on their own (such as signs, kiosks, nature trails), or facilitate providing outdoor education (such as campfire centers, amphitheaters, group campgrounds)	Up to $500,000; Match funds optional (5/100 possible points with applicant paying all non-construction costs	Luan Aubin (916) 651-8573 Luan.Aubin@parks.ca.gov	OEEF

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
California Department of Parks and Recreation	Recreational Trails Program	Schedule for future solicitations are unknown at this time (anticipated 2019)	Provides funds annually for recreational trails and trails-related projects	➢ Provides funds annually for recreational trails and trails-related projects	12% minimum match requirement	Luan Aubin San Bernardino Project Officer Office of Grants and Local Services State of California Department of Parks and Recreation Luan.Aubin@parks.ca.gov (916) 651-8573	RTP
California Department of Parks and Recreation	Statewide Park Program (Proposition 68)	Final application guide to be published by January 2019; applications due Summer 2019	Creates new parks and new recreation opportunities in critically underserved communities across California	➢ Development of a new park ➢ Expansion of an existing park ➢ Renovation of an existing park ➢ Acquisition of land to develop a park ➢ Each project must create or renovate at least one recreation feature (dog parks, athletic fields, trails, etc.)	$200,000 to $8,500,000; no match requirement	Luan Aubin San Bernardino Project Officer Office of Grants and Local Services State of California Department of Parks and Recreation Luan.Aubin@parks.ca.gov (916) 651-8573	SPP
California Department of Water Resources	Local Levee Assistance Program	Continuous (Last cycle: 2014-2016)	Provide financial assistance to local public agencies responsible for flood management outside the Sacramento-San Joaquin Delta	➢ Fund repair of local flood control facilities critically damaged by erosion, levees with unstable slopes, and other unstable facilities ➢ Geotechnical exploration of existing local levees and evaluation of the data for stability, seepage, and underseepage deficiencies	Not stated	Patrick Luzuriaga Chief, Local Assistance Section A Division of Flood Management (916) 574-0932 Patrick.Luzuriaga@waterboard.ca.gov	LLAP
California Department of Water Resources	Flood Control Subventions Program	Schedule for future solicitations are unknown at this time	Provide financial assistance to local agencies cooperating in the construction of federally authorized flood control projects	➢ Funds major flood control projects ➢ Funds small flood control projects ➢ Watershed protection projects	Cost share ranging between 50% and 70%	Patrick Luzuriaga Chief, Local Assistance Section A Division of Flood Management (916) 574-0932 Patrick.Luzuriaga@waterboard.ca.gov	FCSP
California Department of Water Resources	Flood Corridor Program	Schedule for future solicitations are unknown at this time	Provide funding for primarily nonstructural flood management solutions	➢ Wildlife habitat enhancement ➢ Agricultural land preservation	No funding left in program at this time	Patrick Luzuriaga Chief, Local Assistance Section A Division of Flood Management (916) 574-0932 Patrick.Luzuriaga@waterboard.ca.gov	FCP
California Department of Water Resources	Integrated Regional Water Management (IRWM) Grant (Proposition 1)	Applicant must have been involved in IRWM planning process (collaboration may be required); Round 1 Grant Applications Due to DWR anticipated April 2019	To encourage integrated regional strategies for management of water resources and to provide funding for implementation projects that support integrated water management	➢ Water supply reliability, water conservation, and water use efficiency ➢ Stormwater capture, storage, clean-up, treatment, and management ➢ Non-point source pollution reduction, management, and monitoring ➢ Groundwater recharge and management projects ➢ Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users	Minimum 50% cost share	Zaffar Eusuff (916) 651-9266 Muzaffar.eusuff@water.ca.gov Ted Daum (916) 651-9264 Theodore.Daum@water.ca.gov	IRWM

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
California Department of Water Resources	Urban Streams Restoration Program	Continuous, Draft guidelines anticipated in Spring 2019	To reduce flooding and erosion and associated property damage; restore, enhance or protect the natural ecological values of streams; and promote community involvement, education and stewardship	➢ Projects that restore environmental and recreational benefits to streams previously channelized for flood control are eligible ➢ Projects that include removing the concrete and re-establishing the natural stream meander and floodplain topography ➢ Flood management, erosion control, or environmental restoration are the main objective, but may include some trail work	$1000-$1,000,000; no match requirement	Stefan Lorenzato Program Manager (916) 651-9617 Stefan.Lorenzato@water.ca.gov Marc Commandatore (916) 651-9630	USRP USRP Grants
California Department of Water Resources	Water-Energy Grant Program	Continuous, schedule for solicitation unknown at this time	To implement water efficiency programs or projects that reduce greenhouse gas emissions, and reduce water and energy use	➢ Commercial or institutional water-energy efficiency programs or projects ➢ Residential water-energy efficiency programs or projects benefiting Disadvantaged Communities (DACs) ➢ Proposal must demonstrate that it will directly reduce GHG emissions and also reduce water and energy use	$3,000,000	(916) 651-9613 DWR_IRWM@water.ca.gov Matt Botill (Branch Chief, CA Climate Investments) (916) 324-0934 Matthew.Botill@arb.ca.gov	WEGP
California Natural Resources Agency	Environmental Enhancement and Mitigation Program	Next solicitation in April 2019	Funding projects to mitigate, either directly or indirectly, the environmental impacts of the modification of an existing transportation facility or the environmental impacts of the construction of a new transportation facility	➢ Urban forestry to offset vehicular emissions of carbon dioxide ➢ Resource lands for acquisition or enhancement of resource lands ➢ Mitigation Projects Beyond the Scope of the Lead Agency	Maximum $1,000,000 for acquisitions, $500,000 for development projects	California Natural Resources Agency (916) 653-2812 eemcoordinator@resources.ca.gov Carol Carter carol.carter@resources.ca.gov	EEMP
California Natural Resources Agency	California River Parkways Grant Program (Proposition 68)	Continuous; Concept Proposals August 15, 2018 – September 27, 2018	To protect and manage the State's natural, historical, and cultural resources	➢ Funding for projects that involve natural creeks, streams, and/or rivers. Projects must meet at least two of the following five statutory objectives: ▪ Recreation- provide compatible recreational opportunities, including trails for strolling, hiking, bicycling, and equestrian uses along rivers and streams ▪ Habitat- protect, improve, or restore riverine or riparian habitat, including benefits to wildlife habitat and water quality ▪ Flood management- maintain or restore the open space character of lands along rivers and streams so that they are compatible with periodic flooding as part of a flood management plan or project ▪ Conversion to river parkways- convert existing developed riverfront land into uses consistent with river parkways ▪ Conservation and interpretive enhancement- provide facilities to support or interpret river or stream restoration or other conservation activities	No minimum or maximum grant amounts	(916) 653-2812 urban.rivers@resources.ca.gov	CURGP CURGP

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
California State Coastal Conservancy	Proposition 1	Continuous; RFP in Winter 2018-2019 Applications due Spring 2019	To work proactively with local communities to implement multi-benefit projects that protect and enhance coastal resources	➢ Implement watershed adaptation projects in order to reduce the impacts of climate change on communities and ecosystems ➢ Restore river parkways throughout the state, including but not limited to projects pursuant to the California River Parkways Act of 2004 and urban river greenways ➢ Protect and restore rural and urban watershed health to improve watershed storage capacity, forest health, protection of life and property, storm water resource management, and greenhouse gas reduction ➢ Protect and restore coastal watersheds including but not limited to, bays, marine estuaries, and near shore ecosystems ➢ Reduce pollution or contamination of rivers, lakes, streams, or coastal waters, prevent and remediate mercury contamination from legacy mines, and protect or restore natural system functions that contribute to water supply, water quality, or flood management ➢ Assist in the recovery of endangered, threatened, or migratory species by improving watershed health, instream flows, fish passage, coastal or inland wetland restoration, or other means, such as natural community conservation plan and habitat conservation plan implementation	No minimum or maximum amount	Mary Small mary.small@scc.ca.gov (510) 285-4181	CSCC Prop 1
California State Water Resources Control Board (SWRCB)	Cleanup and Abatement Account (CAA)	Continuous; schedule for solicitation unknown at this time	To provide public agencies with grants for the cleanup or abatement of a condition of pollution when there are no viable responsible parties available to undertake the work	➢ Emergency Cleanup Projects – Public Safety ➢ Projects that address Disadvantaged Communities Environmental Justice infrastructure needs ➢ Cleanup and/or abatement of 2006-listed water bodies that will help to implement a Total Maximum Daily Load (TMDL) ➢ Cleanup and/or abatement of non-point source legacy pollutants (i.e. stormwater) when the source(s) of the pollution have been mitigated ➢ Cleanup and/or abatement of pollution in high-use groundwater basins ➢ Cleanup and/or abatement of contaminated sites when the viable responsible party has not been identified ➢ Projects that promote habitat restoration through non-profit organizations that collaborate with the Regional Water Boards and encourage public outreach and education ➢ Completion of a study/plan and/or monitoring addressing significant Statewide water quality problems	Division of Financial Assistance allows requests for up to $250,000 Projects more than $250,000 will require approval from the SWRCB.	Kim Hanagan Senior WRCE (916) 323-0624	CAA
California State Water Resources Control Board (SWRCB)	Orphan Site Cleanup Fund (OSCF)	Continuous	Provides financial assistance to eligible applicants for the cleanup of sites contaminated by leaking petroleum underground storage tanks (USTs) where there is no financially responsible party, and the applicant is not an eligible claimant to the UST Cleanup Fund	➢ Assessment: preliminary site assessment and soil and water investigation and the preparation of a corrective action plan in accordance with California Code of Regulations, Title 23, Chapter 16, Article 11 ➢ Cleanup: Provide funding for response actions that carry out cleanup activities and include implementing a corrective action plan and verification monitoring, in accordance with California Code of Regulations, Title 23, Chapter 16, Article 11	Maximum $1,000,000	Lola Barba Manager (916) 341-5009 lola.barba@waterboards.ca.gov	OSCF

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
California State Water Resources Control Board (SWRCB)	Multi-benefit Stormwater Management Projects	Solicitation of Round 2 grants for implementation begins mid 2019	Improve regional water self-reliance, security and adapt to the effects on water supply arising from climate change	➢ Multi-benefit storm water management projects which may include, but shall not be limited to, green infrastructure, rainwater and storm water capture projects and storm water treatment facilities	$250,000 to $10,000,000 from Prop 1 Grants Requiring 50% match	Daman Badyal Damanvir.Badyal@waterboards.ca.gov (916) 319-9436	SWGP
California State Water Resources Control Board (SWRCB)	Site Cleanup Subaccount Program (SCAP)	Continuous Pre-Application process – no deadlines	To issue grants for projects that remediate the harm or threat of harm to human health, safety, or the environment caused by existing or threatened surface water or groundwater contamination	➢ Remediate the harm or threat of harm to human health, safety, and the environment from surface water or groundwater contamination ➢ Human-made contaminants ➢ A regulatory agency has issued a directive (unless this is infeasible) ➢ Responsible party lacks financial resources ➢ Projects may include site characterization, source identification, or implementation of cleanup	No limits or match requirements	gwquality.funding@waterboards.ca.gov Subject Line: SCAP Phone: (800) 813-FUND (3863) Diane Barclay diane.barclay@waterboards.ca.gov (916) 341-5797	SCAP
California State Water Resources Control Board (SWRCB)	Small Community Wastewater Program - Small Community Grant Fund	Continuous; Project must be submitted to project list for CWSRF (Clean Water State Revolving Fund) financing	To preserve, enhance, and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses, and to ensure proper water resource allocation and efficient use, for the benefit of present and future generations	➢ Planning, design, construction, of publicly-owned wastewater conveyance, treatment, and disposal facilities ➢ Wastewater planning: feasibility/engineering studies, environmental studies, rate studies	Up to $8,000,000, 75% share	Jennifer Toney Senior Water Resource Control Engineer Division of Financial Assistance Small Community Wastewater Unit (916) 319-8246 Wennilyn Fua wennilyn.fua@waterboards.ca.gov (916) 322-1026	SCWP
California State Water Resources Control Board (SWRCB)	Sustainable Groundwater Planning (SGWP) Grant Program - Prop 1	Schedule for future solicitations are unknown at this time	To encourage sustainable management of groundwater resources that support the Sustainable Groundwater Management Act (SGMA); This PSP is making a total of approximately $86.3 million available, with at least $10 million made available to projects that serve Severely Disadvantaged Communities (SDACs)	➢ Category 1 projects serve Severely Disadvantaged Communities (SDACs) and Category 2 projects are related to the development of Groundwater Sustainability Plans (GSPs) for critically over drafted basins and high/medium priority basins ➢ Category 1 and Category 2 projects must address a DWR Bulletin 118 (2016) basin or a non-adjudicated portion of a basin that are designated by DWR as high or medium priority basins ➢ Category 2 projects located in basins determined to be probationary under SGMA by SWRCB or projects identified in an Alternative Plan are not eligible	Up to $1,000,000; 50% share	Zaffar Eusuff Muzaffar.Eusuff@water.ca.gov (916) 651-9266	SGWP

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
California State Water Resources Control Board (SWRCB)	Urban Storage Tank Cleanup Fund (USTCF)	Continuous; schedule for solicitation unknown at this time	To contribute to the protection of California's public health, and water quality through (1) establishing an alternative mechanism to meet Financial Responsibility requirements for owners and operators of petroleum USTs, and (2) reimbursing eligible corrective action costs incurred in the cleanup of contamination resulting from the unauthorized release of petroleum from USTs	➢ Projects that abate emergency situations or cleanup abandoned sites that pose a threat to human health, safety, and the environment, as a result of a UST petroleum release	Up to $14,000,000 (small business)	State Water Resources Control Board Division of Financial Assistance Underground Storage Tank Cleanup Fund P.O. Box 944212 Sacramento, CA 94244-2120 (800) 813-FUND	USTCF
California State Water Resources Control Board (SWRCB)	Water Recycling Fund Program	Continuous	To assist agencies or regions with completing planning studies for water recycling projects using treated municipal wastewater and/or treated groundwater from sources contaminated by human activities	➢ Groundwater Recharge Facilities (when associated with protection of groundwater quality) that demonstrate multiple benefits by using recycled water to improve groundwater quality and supply, and/or provide public health benefits from improved water quality and supply	Planning: Maximum $75,000, 50% share Construction: Maximum $15,000,000, 35% share	Michael Downey Senior Water Resources Control Engineer (916) 324-8404 Michael.Downey@waterboards.ca.gov	WRFP
California Transportation Commission (CTC)	Active Transportation Program	Continuous; Cycle 4 applications were due July 31, 2018	To encourage increased use of active modes of transportation, such as biking and walking	➢ Infrastructure Projects: Capital improvements that will further the goals of this program. This typically includes the environmental, design, right-of-way, and construction phases of a capital (facilities) project ➢ Plans: The development of a community wide bicycle, pedestrian, safe routes to school, or active transportation plan in a disadvantaged community ➢ Non-infrastructure (NI) Projects: Education, encouragement, and enforcement activities that further the goals of the ATP	No limits; match requirements vary by source of ATP funding, whether from federal or state sources. See guidelines for details.	Laurie Waters Laurie.Waters@dot.ca.gov (916) 651-6145	ATP ATP Guide

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
Federal Emergency Management Agency	Flood Mitigation Assistance (FMA) Program	Application cycle October 1, 2018 to January 31, 2019	Reducing or eliminating claims under the National Flood Insurance Program (NFIP). Funds provided for projects and planning to reduce or eliminate long-term risk of flood damage to structures insured under the NFIP.	➢ Floodwater storage and diversion ➢ Stormwater management ➢ Wetland restoration/creation ➢ Localized flood control to protect critical facility ➢ Floodplain and stream restoration	Up to $100,000 for community flood mitigation advance assistance Up to $10,000,000 for community flood mitigation projects $100,000 per Applicant for mitigation planning with a maximum of $50,000 for state plans and $25,000 for local plans	FEMA Department of Homeland Security 500 C Street, S.W. Washington, DC 20472	FMA
Federal Emergency Management Agency	Hazard Mitigation Grant Program (HMGP)	Continuous; schedule for solicitation unknown at this time	To help communities implement hazard mitigation measures following a Presidential Major Disaster Declaration in the areas of the state, tribe, or territory requested by the Governor or Tribal Executive.	➢ Mitigating flood and drought conditions – aquifer storage and recovery ➢ Floodplain and stream restoration ➢ Flood diversion and storage ➢ Green infrastructure methods	Up to 75% of project	FEMA Department of Homeland Security 500 C Street, S.W. Washington, DC 20472 Jennifer L. Hogan California Governor's Office of Emergency Services 3650 Shriever Avenue Mather, CA 95655 (916) 845-8205 jennifer.hogan@caloes.ca.gov	HMGP HMGP
Federal Emergency Management Agency	Pre-Disaster Mitigation (PDM) Grant Program	Continuous; application cycle October 1, 2018 to January 31, 2019	To reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters.	➢ CRMA and pre- or post-wildfire mitigation activities or any mitigation action that utilizes green infrastructure approaches ➢ Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geotextiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring ➢ FEMA encourages mitigation projects that fall into the Miscellaneous/Other category to address climate change adaptation and resiliency ➢ Mitigation projects must adapt to new challenges posed by more powerful storms, frequent heavy precipitation, heat waves, prolonged droughts, extreme flooding, higher sea levels, and other weather events	Up to 75% of project, 90% if small, impoverished community or tribe	FEMA Department of Homeland Security 500 C Street, S.W. Washington, DC 20472	PDM PDM
Federal Transit Administration (FTA)	Enhanced Mobility of Seniors and Individuals with Disabilities	Continuous; schedule for solicitation unknown at this time	To improve mobility for seniors and individuals with disabilities by removing barriers to transportation service and expanding transportation mobility options	➢ Building an accessible path to a bus stop, including curb-cuts, sidewalks, accessible pedestrian signals or other accessible features ➢ Mobility management programs	Administration/ planning: 100% Capital costs: 80% Operating assistance costs: 50%	Office of Program Management Federal Transit Administration 1200 New Jersey Avenue, S.E. Washington, DC 20590 (202) 366-2053	EMSID EMSID

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
Federal Transit Administration (FTA)	Flexible Funding Program: Congestion Mitigation & Air Quality Program (CMAQ)	Continuous	To provide a flexible funding source to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas)	➢ Funds may be used for a transportation project or program that is likely to contribute to the attainment or maintenance of a national ambient air quality standard, with a high level of effectiveness in reducing air pollution, and that is included in the metropolitan planning organization's (MPO's) current transportation plan and transportation improvement program (TIP) or the current state transportation improvement program (STIP) in areas without an MPO ➢ Project must: must be a transportation project, must generate an emissions reduction and must be located in or benefit a nonattainment or maintenance area	80% Federal share, 100% for special projects	Mark Glaze mark.glaze@dot.gov	CMAQ
Federal Transit Administration (FTA)	Flexible Funding Program: Surface Transportation Block Grant (STBG)	Continuous	To preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals	➢ Recreational trails projects, pedestrian and bicycle projects ➢ Environmental restoration and pollution abatement to minimize or mitigate impacts of any transportation project funded under this title (including retrofitting and construction of stormwater treatment systems to meet Federal and State requirements under sections 401 and 402 of the Federal Water Pollution Control Act ➢ Establishment of plants selected by State and local transportation authorities to perform one or more of the following functions: abatement of stormwater runoff, stabilization of soil, and aesthetic enhancement	Up to 80% Federal share,	David Bartz Office of Program Administration (512) 536-5906 david.bartz@dot.gov	STBG FHWA STBG FTA
Federal Transit Administration (FTA)	Pilot Program for Transit-Oriented Development Planning	Continuous; last cycle 2016	To improve economic development and ridership, foster multimodal connectivity and accessibility, improve transit access for pedestrian and bicycle traffic, engage the private sector, identify infrastructure needs, and enable mixed-use development near transit stations	➢ Enhance economic development and ridership ➢ Facilitate multimodal connectivity and accessibility ➢ Increase non-motorized access to transit hubs ➢ Enable mixed-use development ➢ Identify infrastructure needs associated with the transit project ➢ Include private sector participation	$250,000 - $2,000,000, Maximum Federal share 80%	Ben Owen FTA Office of Planning and Environment (202) 366-5602 benjamin.owen@dot.gov	PPTODP

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
Federal Transit Administration (FTA)	Urbanized Area Formula Grant	Continuous	FTA apportions Urbanized Area Formula Program funds to urbanized areas (UZAs) and to states for public transportation capital projects, operating assistance, job access and reverse commute projects, and for transportation-related planning	➢ Planning, engineering, design and evaluation of transit projects and other technical transportation-related studies ➢ Capital investments in bus and bus-related activities such as replacement of buses, overhaul of buses, rebuilding of buses, crime prevention and security equipment and construction of maintenance and passenger facilities ➢ Capital investments in new and existing fixed guideway systems including rolling stock, overhaul and rebuilding of vehicles, track, signals, communications, and computer hardware and software ➢ Provide access for bicycles to public transportation facilities ➢ Provide shelters and parking facilities for bicycles in or around public transportation facilities	80% Federal share, 90% if project involves vehicle-related equipment costs attributable to compliance with the Americans with Disabilities Act (ADA) and Clean Air Act 50% for Operating Assistance costs Funds are available the year appropriated plus five years	Office of Program Management Federal Transit Administration 1200 New Jersey Avenue, S.E. Washington, DC 20590 United States (202) 366-2053	UAFG
National Endowment for the Arts	Our Town Grant	Schedule for future solicitations are unknown at this time	To support creative place making projects that help to transform communities into lively, beautiful, and resilient places with the arts at their core	➢ Design projects that demonstrate artistic excellence while supporting the development of places where creative activities occur, or where the identity of place is created or reinforced ➢ Design of public spaces, e.g., parks, plazas, landscapes, neighborhoods, districts, infrastructure, bridges, and artist-produced elements of streetscapes ➢ Design of cultural facilities – new or adaptive reuse	$25,000-$200,000 in matching grants for Arts Engagement, Cultural Planning, and Design Projects $25,000-$100,000 in Matching Grants for Projects that Build Knowledge About Creative Placemaking	NEA Staff OT@arts.gov	NEA
National Fish and Wildlife Foundation	Environmental Solutions for Communities Grant Program	Applicant must be a nonprofit organization (collaboration required); schedule for future solicitations are unknown at this time	To promote sustainable communities by supporting projects that link economic development and community well-being to the stewardship and health of the environment	➢ Demonstration projects that showcase innovative, cost-effective and environmentally-friendly approaches to improve environmental conditions within urban communities by 'greening' traditional infrastructure and public projects such as stormwater management and flood control and renovations to public facilities ➢ Projects that provide measurable and meaningful conservation/environmental outcomes	$25,000-$100,000	Sarah McIntosh Coordinator sarah.mcintosh@nfwf.org (202) 595-2434 Carrie Clingan Program Director, Community Stewardship and Youth (202) 595-2471 carrie.clingan@nfwf.org	NFWF

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
National Fish and Wildlife Foundation	Five Star & Urban Waters Restoration Grant Program	Annual; 2019 proposals due January 31, 2019	To develop community capacity to sustain local natural resources for future generations by providing modest financial assistance to diverse local partnerships focused on improving water quality, watersheds and the species and habitats they support.	➢ Restore and/or create wetlands, coastal or riparian areas ➢ Integrate meaningful outreach, education and/or training into the proposed on-the-ground activities that advance local watershed and conservation goals ➢ Involve five or more partners (public and private entities) including the applicant ➢ Result in specific, measurable ecological, educational and community benefits ➢ Include a plan for maintenance and care of the project beyond the grant period	$20,000 to $50,000 is a typical range: minimum 1:1 non-federal match	Danny Bowater (All Geographies) Coordinator, Community-Based Conservation (202) 595-2434 Daniel.Bowater@nfwf.org Easy Grants Helpdesk Easygrants@nfwf.org Voicemail: (202) 595-2497 Hours: M-F 9am-5pm ET Include: Name, Proposal ID#, email, phone number, program applied and issue	FSUWR
Ocean Protection Council	Proposition 1	Solicitation anticipated in July 2019	To preserve, protect, and restore the resources of the California coast	➢ Reduce pollution and contaminants, including nutrients, toxics, and contaminants of emerging concern from sources including stormwater, non-point discharges, agricultural runoff, etc. ➢ Prevent land-based litter from reaching the ocean and becoming marine debris ➢ Remove micro-plastics and microfibers from agricultural runoff and stormwater	Minimum $250,000	Marina Cazorla, Program Manager OPC_Prop1grants@resources.ca.gov	OPC Prop 1 OPC Prop 1
People For Bikes	Community Grant Program	1-2 cycles per year, Fall 2018 grant cycle closed to new applications October 2019 for 2019 grant schedule	To provide funding for important and influential projects that leverage federal funding and build momentum for bicycling in communities across the U.S	➢ Bike paths, lanes, trails, and bridges ➢ Mountain bike facilities ➢ Bike parks and pump tracks ➢ BMX facilities ➢ End-of-trip facilities such as bike racks, bike parking, bike repair stations and bike storage ➢ Programs that transform city streets, such as Ciclovías or Open Streets Days ➢ Campaigns to increase the investment in bicycle infrastructure	Maximum $10,000, 50% share	Zoe Kircos Director of Grants and Partnerships (303) 449-4893 x106 zoe@peopleforbikes.org	CGP CGP
Rails to Trails Conservancy	Doppelt Family Trail Development Fund	Annual, applications due each January	To support organizations and local governments that are implementing projects to build and improve multi-use trails	➢ New trail construction, trail facility/infrastructure (e.g., trailheads, bathrooms) ➢ Land acquisition ➢ Trail signage ➢ Improvements to existing trails and significant maintenance tasks ➢ Promoting a local trail project in the local media ➢ Conducting feasibility studies ➢ Adding personnel or volunteer coordination capacity	$5,000-$50,000	grants@railstotrails.org	DFTDF
San Bernardino County Transportation Authority	Measure I	Continuous	Measure I is the half-cent sales tax collected throughout San Bernardino County for transportation improvements	➢ Major Street Projects - defined as congestion relief and safety improvements to major streets that connect communities, serve major destinations, and provide freeway access ➢ Local Street Projects - defined as local street and road construction, repair, maintenance and other eligible local transportation priorities	Not Stated Limits depend on tax revenue and region within county	Andrea Zureick Director Fund Administration and Programming azureick@gosbcta.com (909) 884-8276	SBCTA

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
State of California Wildlife Conservation Board	Habitat Restoration Grant	Continuous	Awards grants for projects to restore and enhance wildlife habitats	➢ Riparian habitat conservation ➢ Inland wetlands conservation ➢ Ecosystem restoration on agricultural lands ➢ Habitat enhancement and restoration	Not Stated	John P. Donnelly, Executive Director, Wildlife Conservation Board 1416 9th Street, Room 1266 Sacramento, CA, 95814	HRG
Surdna Foundation	Surdna Foundation Grant	Applicant must be a nonprofit organization (collaboration required); letters of inquiry are accepted on a rolling basis	To foster sustainable communities in the United States, communities guided by principles of social justice and distinguished by healthy environments, strong local economies, and thriving cultures	➢ Clean, affordable, equitable, high-quality and efficient transportation and land use development that better connects critical services, jobs, schools, housing and other regional destinations ➢ Efforts to help people make homes, businesses and other buildings more energy efficient ➢ Efforts to capture stormwater and slowly release it into the existing network of drains, or reuse it where it falls to cultivate natural green spaces	Indirect costs for program grants up to 15% of project expenses allowed for grants of $25,000 or more	Grants Manager, Surdna Foundation 330 Madison Ave., 30th Floor New York, NY 10010 grants@surdna.org	Surdna
United States Army Corp of Engineers	Small Flood Damage Reduction Projects	Continuous	To study, design, and construct small flood control projects in partnership with non-Federal government agencies, such as cities, counties, special authorities, or units of state government	➢ Projects may be structural (i.e., levees, flood walls, diversion channels, pumping plants and bridge modifications) or non-structural (i.e., flood proofing, relocation of structures and flood warning systems)	Feasibility Study: 100% up to $100,000 - 50/50 cost-share above that Design/ Construction: 65%	Chris Hatfield of the Special Studies Section (978) 318-8520	SFDRP
United States Army Corp of Engineers	Emergency Watershed Protection	Continuous	To help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences	➢ Remove debris from stream channels, road culverts, and bridges ➢ Reshape and protect eroded and unstable banks ➢ Correct damaged drainage facilities ➢ Establish cover on critically eroding lands ➢ Repair levees and structures ➢ Repair conservation practices	Up to 75% of construction costs, 90% in limited resource areas	Shawn Anderson National Emergency Watershed Protection Program Coordinator (202) 720-5795	EWP EWP
United States Department of the Interior (DOI) - Bureau of Reclamation	Drought Response Program: Drought Resiliency Projects	Future cycles unknown at this time	To help communities prepare for and respond to drought	➢ Groundwater recharge and benefits for fish and wildlife Implement projects that support proactive approach to drought control Improving Water Management Update comprehensive drought plans with resiliency projects	Applicants must provide a 50 percent non-Federal cost-share. Award Ceiling: $750,000	Darion Mayhorn Reclamation Drought Coordinator dmayhorn@usbr.gov (303) 445-3121	DRP
U.S. Department of the Interior (DOI) - Bureau of Reclamation	Cooperative Watershed Management Program: Phase II	Continuous	Provides financial assistance to locally led watershed groups to encourage diverse stakeholders to form local solutions to water management needs	➢ Implementation of on-the-ground watershed management projects that address critical water supply needs, water quality, and ecological resilience of the watershed	For Phase II Reclamation will award up to $100,000 per project over a two-year period. Applicants must contribute at least 50% of the total project costs	Avra Morgan aomorgan@usbr.gov (303) 445-2906	CWMP

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
United States Department of the Interior (DOI) -National Park Service	Land & Water Conservation Fund	Continuous; next competitive cycle 2020 at the earliest	To stimulate a nationwide action program to assist in preserving, developing, and assuring to all citizens of the United States of present and future generations such quality and quantity of outdoor recreation resources as may be available and are necessary and desirable for individual active participation	➢ Development of picnic areas, sports and playfields, trails, swimming facilities, boating facilities, fishing/hunting facilities, winter sport facilities, camping facilities, exhibit facilities, spectator facilities, community gardens, etc. ➢ Protects and preserves older national parks, forests, wildlife refuges, and recreation areas	50% matching grants Funding range: $15,000 - $2,000,000,	lwcf.grants@nps.gov Director CA Department of Parks and Recreation P.O. Box 942896 Sacramento, CA 94296 (916) 653-8380	LWCF LWCF
United States Department of Transportation (DOT)	Better Utilizing Investments to Leverage Development (BUILD) program	Annually	DOT investment in road, rail, transit and port projects that promise to achieve national objectives	➢ Road or bridge projects eligible under title 23, United States Code ➢ Public transportation projects eligible under chapter 53 of title 49, United States Code; ➢ Passenger and freight rail transportation projects; ➢ Port infrastructure investments (including inland port infrastructure and land ports of entry); ➢ Intermodal projects	Urban: minimum $6,250,000 for match Rural: minimum $1,000,000 All projects: Maximum $25,000,000 Urban: up to 80% Rural: up to 100%	Office of Infrastructure Finance and Innovation Office of the Secretary of Transportation BUILDgrants@dot.gov (202) 366-0301	BUILD
United States Department of Transportation Federal Highway Association (FHWA)	Recreational Trails Program	Continuous	To develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses	➢ Maintenance and restoration of existing recreational trails ➢ Development and rehabilitation of trailside and trailhead facilities and trail linkages for recreational trails ➢ Purchase and lease of recreational trail construction and maintenance equipment ➢ Construction of new recreational trails (with restrictions for new trails on Federal lands) ➢ Acquisition of easements and property for recreational trails or recreational trail corridors ➢ Assessment of trail conditions for accessibility and maintenance ➢ Development and dissemination of publications and operation of educational programs to promote safety and environmental protection related to the use of recreational trails, including supporting non-law enforcement trail safety and trail use monitoring patrol programs, and providing trail-related training ➢ State costs incurred in administering the program	Varies by state, Federal limit up to 80% share	Richard Rendón, State Trail Administrator Office of Grants and Local Services California State Parks (916) 651-7600 richard.rendon@parks.ca.gov	RTP
United States Economic Development Administration (EDA)	Public Works & Development Facilities Programs	Proposals accepted on a rolling basis	To provide economically distressed communities and regions with comprehensive and flexible resources to address a wide variety of economic needs, and are designed to lead to the creation and retention of jobs and increased private investment	➢ Increase economic resiliency, including resilience to the effects of natural disasters and climate change ➢ Assist with natural disaster mitigation and recovery ➢ Aimed at restoring or improving urban waters and the communities that surround them ➢ Promote job creation and economic prosperity through enhancing environmental quality and developing and implementing green products, processes, places, and buildings as part of the green economy	$100,000 - $3,000,000 Typically 50% Federal share	Wilfred Marshall Wmarshall@eda.gov (310) 348-5386	PWDFP

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
United States Environmental Protection Agency (USEPA)	Urban Waters Small Grant	Last cycle 2016; Schedule for future solicitations are unknown at this time	To help local residents and their organizations, particularly those in underserved communities, restore their urban waters in ways that also benefit community and economic revitalization	➢ Activities that engage communities in learning about, planning and developing green infrastructure/LID approaches, programs and practices that enhance the sustainability of their communities and more effectively manage urban runoff/stormwater pollution	$40,000-$60,000 (2016)	Ruth Chemerys urbanwaters@epa.gov	USEPA
United States Environmental Protection Agency (USEPA)	Pollution Prevention (P2) Grant	Future funding unknown at this time	To support projects that use pollution prevention techniques to reduce and/or eliminate pollution from air, water and/or land prior to performing recycling, reuse, or clean up	➢ Offering pollution prevention workshops ➢ Offering technical advice to state agency staff who in turn use this information to train businesses on best management practices	Approximately $40,000-$500,000 50% match	Jessica Counts-Arnold 75 Hawthorne Street San Francisco, CA 94105 (415) 972-3288 counts-arnold.jessica@epa.gov PPP: (202) 566-0799 ppic@epa.gov	EPA P2 EPA P2 EPA P2
United States Environmental Protection Agency (USEPA)	Section 319 Nonpoint Source Grant Program	Schedule for solicitation unknown at this time	Reduction of nonpoint source pollution with emphasis on green infrastructure	➢ Streambed and habitat restoration ➢ Implementation of upstream LID practices to manage impervious surface runoff	$250,000 - $800,000 Minimum 25% match	Jeanie Mascia State Water Resources Control Board Nonpoint Source Pollution Unit (916) 323-2871 jeanie.mascia@waterboards.ca.gov	NPSGP NPSGP
United States Housing and Urban Development (HUD)	Community Development Block Grant (CDBG)	2017 Funding Cycle specific for Indian Tribes and Alaska Native Villages Schedule for future solicitations are unknown at this time	Creation of decent housing, suitable living environments, and economic opportunities primarily for persons with low and moderate incomes	➢ Eligible to fund stormwater and green infrastructure as projects create jobs, increase economic activity, and increase property value	Not Stated	Ray Brewer Field Office Director (Santa Ana) (714) 796-5577 CA_Webmanager@hud.gov	CDBG
Wildlife Conservation Board	California Stream Flow Enhancement Program (Prop 1)	Schedule for future solicitations unknown	Implement three broad objectives of the California Water Action Plan: more reliable water supplies; the restoration of important species and habitats; and a more resilient, sustainably managed water infrastructure that can better withstand inevitable and unforeseen pressures in the coming decades	➢ Groundwater storage and conjunctive use ➢ Changes in water management ➢ Habitat restoration and wildlife benefit ➢ Water Infrastructure improvements ➢ Reconnecting flood flows with restored flood plains ➢ Reservoir operations both at existing and new storage sites ➢ Reliability, restoration, and resilience	No minimum or maximum	Elizabeth Hubert elizabeth.hubert@wildlife.ca.gov (916) 445-1093 wcbstreamflow@wildlife.ca.gov	CSFEP
Loans							
California State Water Resources Control Board (SWRCB)	Clean Water State Revolving Fund	Applications are accepted on a rolling basis	To provide financial assistance through loans (with below market rates) for a wide range of water infrastructure projects, under 33 U.S. Code §1383	➢ Assistance for measures to manage, reduce, treat, or capture stormwater or subsurface drainage water ➢ Projects that reduce the demand for publicly owned treatment works capacity through water conservation, efficiency, or reuse ➢ Implement state nonpoint source pollution management program, established under CWA section 319	No limits, historically $1,000,000-$350,000,000	Bob Pontureri robert.pontureri@waterboards.ca.gov (916) 341-5828 (916) 327-9978 CleanWaterSRF@waterboards.ca.gov	CWSRF

Summary of Potential Funding Sources for SWRP Projects

Funding Agency	Program	Timeline	Purpose	Eligible Uses	Funding Limits	Contact Information	Link
California State Water Resources Control Board (SWRCB)	Loan Forgiveness - Clean Water State Revolving Fund	Applications are accepted on a rolling basis	To provide financial assistance through loans (with below market rates) for a wide range of water infrastructure projects, under 33 U.S. Code §1383	➢ Green Project Reserve (GPR) projects (Green Infrastructure, Water Efficiency, Energy Efficiency, and Environmentally Innovative Activities) ➢ Must address water or energy efficiency, mitigate stormwater runoff, or encourage sustainable project planning, design, and construction ➢ Must be a CWSRF eligible project; whether standalone or part of a larger project	50% of actual GPR costs; 75% planning costs; $4,000,000 Maximum loan forgiveness per project (Water recycling projects eligible for $2,500,000 max loan forgiveness)	(916) 327-9978 CleanWaterSRF@waterboards.ca.gov	SWRCB
California Infrastructure and Economic Development Bank	Infrastructure State Revolving Fund (ISRF)	Applications are accepted on a rolling basis	To serve a variety of public purposes including providing an accessible low-cost financing option to eligible borrowers for a wide range of infrastructure projects	➢ Project can consist of design, acquisition, planning, permitting, entitling, construction, improving, extending, restoring, financing, and generally developing facilities that include real personal property, structures, conveyances, equipment, thoroughfares, buildings, and supporting components thereof ➢ Infrastructure projects related to city streets, drainage/water supply/flood control, environmental mitigation measures, parks and recreational facilities, public transportation, water treatment and distribution, and more	$50,000-$25,000,000 with loan terms for the useful life of the project up to a max of 30 years; No match required	Tom Dear, Loan Origination Manager 1325 J Street, 18th Floor Sacramento, CA 95812 (916) 341-6600 LoanProgram@ibank.ca.gov	ISRF ISRF
The Conservation Fund	Conservation Loans	Applications are accepted on a rolling basis	To protect land, water, and wildlife, generate jobs, and balance human demand with the need to use natural resources responsibly	➢ Trail and park acquisitions and construction ➢ Habitat restoration and ecosystem services ➢ Initiatives to connect people to nature	Up to $500,000	Reggie Hall Conservation Loans (703) 908-5825 rhall@conservationfund.org (703) 525-6300 loans@conservationfund.org	CL

Attachment J

Multi-Benefit Project Request Form

The Flood Control District is seeking partners

Multi-Benefit Project Request Form

We want to know about your projects for inclusion in the Stormwater Resource Plan. If your project involves a partnership with the District and provides at least two benefits, then complete the form below. We will perform a metrics-based analysis of project benefits. Potential project benefits are listed below.

Water Quality
- Pollutant load reduction
- Stormwater runoff reduction

Flood Management
- Runoff rates and runoff volume reductions
- Flood elevation reduction
- Parcel/structure removal from floodplain
- Property value saved

Water Supply
- Groundwater recharge
  - Stormwater
  - Recycled water

Community
- Employment opportunities
- Public education
- Community involvement
- Enhancement/creation of
  - public spaces
  - walking paths
  - bike trails
  - sidewalks

Environmental
- Wetlands enhancement/ creation
- Riparian area enhancement
- Streambed restoration
- Increased urban green space

Tell us about your project

Project Name: ______________________________

Submitting Agency: ______________________ Lead Agency: ______________________

Project Partners: ______________________________

Contact: ______________ Email: ______________ Phone: ______________

List main project components ______________________________

____

____

How far along is the project?

☐ Just an idea

☐ Concept developed

☐ Preliminary design report

☐ Soils investigation

☐ Hydrology study

☐ Topographic survey

☐ Hydraulic study

☐ Flood study

☐ Design plans in progress

☐ Design plans completed

Attachment K

Printed Educational and Outreach Material

SAN BERNARDINO
COUNTY
PUBLIC WORKS

You are invited!

The San Bernardino County Flood Control District is leading the development of a **Stormwater Resource Plan** for the San Bernardino County portion of the Santa Ana River Watershed and needs your **valuable insight**.

Be a part of this exciting process!

For more information please email swrp@cwecorp.com

Join the District in one of two outreach events!

Learn about:

- Proposition 1 Grant Funding
- The Stormwater Resource Plan (SWRP)
- How your agency can get involved

The District is seeking partners on future multi-benefit projects. Come share your ideas.

Stakeholder Outreach Events

Event #1

August 30, 2017 from 1:30 - 3:00 pm
Inland Empire Utilities Agency Board Room
6075 Kimball Avenue, Chino

Event #2

August 31, 2017 from 1:30 - 3:00 pm
Department of Public Works Hearing Room
825 E. Third Street, San Bernardino

We look forward to ongoing collaboration!

SAN BERNARDINO COUNTY PUBLIC WORKS

You are invited!

The San Bernardino County Flood Control District is leading the development of a **Stormwater Resource Plan** for the San Bernardino County portion of the Santa Ana River Watershed. We need your help planning for the future of our **valuable water resources**.

Be a part of this exciting process!

For more information and to provide comments please email swrp@cwecorp.com

Join the District at this public outreach event!

Learn about:
- Our water resources
- The Stormwater Resource Plan (SWRP)
- Multi-benefit projects
- How you can get involved

Provide feedback on the Draft SWRP

Come share your ideas.

Public Outreach Event

July 24, 2018 from 5:00 - 7:00 pm
Department of Public Works Hearing Room
825 E. Third Street, San Bernardino

Refreshments will be provided

Review the draft SWRP at http://bit.do/SWRP and provide comments by August 7, 2018.

We look forward to seeing you there!

SAN BERNARDINO
COUNTY
PUBLIC WORKS

¡Esta invitado!

El Distrito de Control de Inundaciones del Condado de San Bernandino esta liderando el desarrollo de un **Plan de Recursos de Aguas Pluviales (SWRP)** para la porción del Condado de San Bernandino localizado en la Cuenca del Rió Santa Ana. Necesitamos su ayuda para planear el futuro de nuestros **valiosos recursos hídricos**.

¡Sea parte de este proceso facinante!

Para más información y para ofrecer su comentario, envié un correo electrónico a swrp@cwecorp.com

¡Acompañe el Distrito en nuestro evento para el publico!

Aprende sobre:

- Nuestros recursos hídricos
- El Plan de Recursos de Aguas Pluviales (SWRP)
- Proyectos de beneficios múltiples
- Como puede participar

Ofrece su opinión sobre el borrador del SWRP

Vengan a compartir sus ideas.

Junta de información para el publico

24 de julio de 2018, 5:00 - 7:00 pm
Department of Public Works Hearing Room
825 E. Third Street, San Bernardino

Refrescos serán proporcionados

Revise el borrador del SWRP que se encuentra en http://bit.do/SWRP y proporcione su comentario por el 7 de agosto de 2018.

¡Esperamos verlos en la junta!

Frequently Asked Questions

1. What is a SWRP?

A Stormwater Resource Plan (SWRP) is a watershed based planning document that includes an evaluation of existing water resources and an identification of projects, programs, and activities that will enhance the beneficial uses of stormwater and dry-weather runoff. A metrics-based approach is used to quantify project/program benefits and prioritize future implementation. Projects/programs that provide multiple benefits, such as water quality, water supply, flood management, environmental, and community benefits, are identified in SWRPs. SWRPs are developed in coordination with multiple stakeholders and the public. The development of a SWRP provides opportunities for agencies and organizations to collaborate to find ways to capture, clean, infiltrate, and/or use runoff that otherwise would leave the watershed. SWRPs are adaptively managed overtime to address ongoing changes in regulatory policies and needs.

2. Who needs a SWRP and what are the benefits?

Any public agency, nonprofit organization, public utility, federally recognized Indian tribes, State Indian tribes, and mutual water companies may develop a SWRP. Developing a SWRP provides opportunities to receive funding through the Proposition 1 Stormwater Grant Program, administered through the State Water Resources Control Board (State Board). With limited exceptions for certain small disadvantaged communities, Water Code Section 10563(c)(1) requires stormwater and dry-weather runoff capture projects be included in a SWRP to receive stormwater grants from bond measures passed by the State of California after January 1, 2014. One such bond measure is Proposition 1, passed by voters in November 2014, which authorized $200 million in funding for multi-benefit stormwater management projects. Additionally, the development of a SWRP encourages agencies/organizations to evaluate the health of the watershed and plan projects and programs that will provide multiple benefits and address existing concerns.

3. What are the goals of a SWRP?

The development of SWRPs is a collaborative process that involves both stakeholders and the public. Goals pertaining to specific SWRPs are established through those collaborative efforts. In general, SWRPs have the following goals:

- Improve water quality by reducing runoff volumes and pollutants entering receiving waters to support beneficial uses
- Capture and use stormwater as a water supply resource
- Protect life and property through better management of flooding risks
- Use stormwater projects to enhance environmental and community benefits
- Identify multi-benefit projects that accomplish more than one of the goals identified above

4. What are the goals of the SBC SARW SWRP?

The San Bernardino County Santa Ana River Watershed (SBC SARW) SWRP will meet the general goals identified above in addition to some region specific goals. The main goal of the SBC SARW SWRP is to quantify the various benefits that result from implementation of projects and programs included in the plan. This allows the San Bernardino County Flood Control District (District) and partnering agencies to easily apply for funding opportunities available not only through the State Board and the Stormwater Grant Program, but also other water related funding opportunities. The quantification of benefits is required within the SWRP; however, the SBC SARW SWRP goes above and beyond those expectations to make applying for and obtaining funds easier.

5. What information is included in a SWRP?

Each SWRP will be different, but all will be prepared considering guidance set forth in the SWRP Guidelines developed by the State Board. At a minimum, the following information will be included in SWRPs, consistent with the guidelines:

- Description of watershed and sub-watersheds covered in the plan, including water quality priorities, identification of surface water and groundwater resources, account of local water supplies and suppliers, and a summary of existing natural habitat and open space within the watershed
- Identification of existing regional water management groups, public agencies, governments, non-profit organizations, utilities, and other stakeholders and the development of a process by which organizers of the SWRP consult, cooperate, and collaborate with each other
- Quantitative methods for identification and prioritization of stormwater and dry-weather runoff capture projects, including an integrated metrics based analysis of multi-benefit projects
- Identification and prioritization of stormwater projects based on how each project would improve water supply, water quality, flood management, environmental, and community benefits
- Identification of resources for plan implementation and project scheduling, including strategies for maintaining and amending the SWRP for future projects through an adaptive management process
- Provisions for community participation in plan development and implementation

6. How can we get a project included in the SBC SARW SWRP?

If your agency would like partner with the District on a multi-benefit project located within the SBC SARW area, and that project aligns with the goals of the SWRP, we would like to hear from you. Please send an email to SWRP@cwecorp.com and include the information requested in the project request flyer, such as contact person, partnering agencies, project name/components, and the status of the project. The more well-planned and well-quantified your project is, the likelier it will be to get matching funds from the State. The multiple benefits provided by projects included in the SBC SARW SWRP will be quantified and the results of this analysis will not only support future Proposition 1 grant applications, but other related funding opportunities that may exist in the future.

7. What is the difference between a SWRP and IRWMP?

An Integrated Regional Water Management Plan (IRWMP), such as the One Water One Watershed (OWOW) Plan prepared by the Santa Ana Water Project Authority (SAWPA), is different than a SWRP and an IRWMP does not automatically become a SWRP Equivalent document. According to the California Department of Water Resources, an IRMWP is a comprehensive planning document to encourage development of voluntary regional strategies for management of water resources. Projects identified in an IRWMP must address at least one water-related concern, but are not required to provide multiple benefits, as is required in a SWRP. Additionally, IRWMPs were developed in response to Proposition 50 and SWRPs are being developed in response to Proposition 1. IRWMPs are prepared by larger watershed areas, while individual SWRPs covering a much smaller area may be prepared.

Preguntas Más Frecuentas

1. ¿Qué es un SWRP?

Un Plan de Recursos de Aguas Pluviales (SWRP; por sus siglas en inglés) es un documento de planificación basado en cuencas que incluye una evaluación de los recursos hídricos existentes y una identificación de proyectos, programas y actividades que mejorarán los usos beneficiosos de las aguas pluviales y la escorrentía en clima seco. Se utiliza un enfoque basado en criterios para cuantificar los beneficios del proyecto/programa y priorizar la implementación futura. Los proyectos/programas que brindan múltiples beneficios, como la calidad del agua, el suministro de agua, el manejo de inundaciones, el medio ambiente y los beneficios para la comunidad, se identifican en un SWRP. Cada SWRP se desarrolla en coordinación con múltiples partes interesadas y el público. El desarrollo de un SWRP ofrece oportunidades para que las administraciones públicas y organizaciones colaboren para encontrar formas para capturar, limpiar, infiltrar y/o utilizar la escorrentía que de otro modo dejaría la cuenca. Cada SWRP se maneja de forma adaptativa a lo largo del tiempo para abordar los cambios en curso en las políticas y necesidades normativas.

2. ¿Quién necesita un SWRP y cuáles son los beneficios?

Cualquier administración pública, organización sin fines de lucro, utilidad pública, tribus indígenas reconocidas a nivel federal, tribus indígenas del estado y compañías de agua mutuales pueden desarrollar un SWRP. Desarrollar un SWRP brinda oportunidades para recibir fondos a través del Programa de Subvención de Aguas Pluviales de la Proposición 1, administrado a través de la Junta Estatal de Control de Recursos Hídricos (State Board). Con excepciones limitadas para ciertas comunidades pequeñas desfavorecidas, la Sección 10563 (c) (1) del Código de Agua exige que las aguas pluviales y los proyectos de captura de escorrentía se incluyan en un SWRP para recibir concesiones de aguas pluviales de medidas de bonos aprobadas por el Estado de California después del 1 de enero. 2014. Una de esas medidas de bonos es la Proposición 1, aprobada por los votantes en noviembre de 2014, que autorizó $ 200 millones en fondos para proyectos de administración de aguas pluviales de múltiples beneficios. Además, el desarrollo de un SWRP promueve a las agencias/organizaciones a evaluar el estado de la cuenca y planificar proyectos y programas que proporcionarán múltiples beneficios y abordarán las preocupaciones existentes.

3. ¿Cuáles son los objetivos de un SWRP?

El desarrollo de SWRP es un proceso de colaboración que involucra tanto a los interesados como al público. Las metas relacionadas con un SWRP específicos se establecen a través de esos esfuerzos de colaboración. En general, cada SWRP tiene los siguientes objetivos:

- Mejorar la calidad del agua al reducir los volúmenes de escorrentía y los contaminantes que ingresan a las aguas receptoras para apoyar usos beneficiosos
- Capturar y usar aguas pluviales como un recurso de suministro de agua
- Proteger la vida y la propiedad a través de un mejor manejo de los riesgos de inundación
- Utilizar proyectos de aguas pluviales para mejorar los beneficios ambientales y comunitarios
- Identificar proyectos de múltiples beneficios que logren más de uno de los objetivos identificados anteriormente

4. ¿Cuáles son los objetivos del SBC SARW SWRP?

El SWRP de la Cuenca del Río Santa Ana del Condado de San Bernardino (SBC SARW) cumplirá con los objetivos generales identificados anteriormente, además de algunos objetivos específicos de la región. El objetivo principal del SBC SARW SWRP es cuantificar los diversos beneficios que resulten debido a la implementación de proyectos y programas incluidos en el plan. Esto permite que el Distrito de Control de Inundaciones (Distrito) y las agencias asociadas del Condado de San Bernardino soliciten fácilmente las oportunidades de financiamientos disponibles no solo a través del State Board y el Programa de Subvenciones de Tormentas, sino también de otras oportunidades de financiamiento relacionadas con el agua. La cuantificación de los beneficios se requiere dentro del SWRP; sin embargo, el SBC SARW SWRP va más allá de esas expectativas para facilitar la solicitud y obtención de fondos.

5. ¿Qué información está incluida en un SWRP?

Cada SWRP será diferente, pero todos serán preparados teniendo en cuenta la pauta establecida en el documento SWRP Guidelines desarrolladas por el State Board. Como mínimo, la siguiente información se incluirá en los SWRP, en conformidad con las directrices:

- Descripción de cuencas y subcuencas cubiertas en el plan, incluidas las prioridades de calidad del agua, identificación de aguas superficiales y recursos de aguas subterráneas, cuenta de suministros de agua locales y proveedores, y un resumen del hábitat natural existente y el espacio abierto dentro de la cuenca
- Identificación de grupos regionales de administración del agua, agencias públicas, gobiernos, organizaciones sin fines de lucro, servicios públicos y otras partes interesadas y el desarrollo de un proceso mediante el cual los organizadores del SWRP consultan, cooperan y colaboran entre sí
- Métodos cuantitativos para la identificación y priorización de proyectos de captura de escorrentía en aguas pluviales y clima seco, incluyendo un análisis basado en métricas integradas de proyectos de múltiples beneficios
- Identificación y priorización de proyectos de aguas pluviales en función de cómo cada proyecto mejoraría el suministro de agua, la calidad del agua, el manejo de las inundaciones, el medio ambiente y los beneficios para la comunidad
- Identificación de recursos para la implementación del plan y la programación del proyecto, incluyendo estrategias para mantener y modificar el SWRP para proyectos futuros a través de un proceso de manejo adaptativa
- Disposiciones para la participación de la comunidad en el desarrollo e implementación del plan

6. ¿Cómo podemos incluir un proyecto en el SBC SARW SWRP?

Si su agencia quisiera asociarse con el Distrito en un proyecto de beneficios múltiples ubicado dentro del área de SBC SARW, y ese proyecto se alinea con los objetivos del SWRP, nos gustaría saber de usted. Envíe un correo electrónico a SWRP@cwecorp.com e incluya la información solicitada en el folleto de solicitud del proyecto, incluyendo nombre de la persona de contacto, agencias asociadas, nombre/componentes del proyecto y las condiciones del proyecto. Cuanto mejor planeado y mejor cuantificado sea su proyecto, más probable será obtener fondos del Estado. Los beneficios múltiples provistos por los proyectos incluidos en SBC SARW SWRP se cuantificarán y los resultados de este análisis no solo respaldarán las futuras solicitudes de subvenciones de la Proposición 1, sino también otras oportunidades de financiamiento relacionadas que puedan existir en el futuro.

7. ¿Cuál es la diferencia entre un SWRP y un IRWMP?

Un Plan Regional Integrado de Administración del Agua (IRWMP), como el Plan One Water One Watershed (OWOW) preparado por la Autoridad del Proyecto Acuático de Santa Ana (SAWPA), es diferente de un SWRP y un IRWMP no se convierte automáticamente en un documento equivalente a un SWRP (SWRP Equivalent). De acuerdo con el Departamento de Recursos Hídricos de California, un IRMWP es un documento de planificación integral para alentar el desarrollo de estrategias regionales voluntarias para el manejo de los recursos hídricos. Los proyectos identificados en un IRWMP deben abordar al menos un problema relacionado con el agua, pero no están obligados a proporcionar beneficios múltiples, como se requiere en un SWRP. Además, el desarrollo del IRWMP fue en respuesta a la Proposición 50, mientras el desarrollo del SWRP fue en respuesta a la Proposición 1. Otra diferencia es que los IRWMP se preparan en general por áreas de cuencas hidrográficas grandes, mientras un SWRP se puede preparar para una área mucho más pequeña.

SAN BERNARDINO COUNTY PUBLIC WORKS

The Flood Control District is seeking partners

Multi-Benefit Project Request Form

We want to know about your projects for inclusion in the Stormwater Resource Plan. If your project involves a partnership with the District and provides at least two benefits, then complete the form below. We will perform a metrics-based analysis of project benefits. Potential project benefits are listed below.

Water Quality

- Pollutant load reduction
- Stormwater runoff reduction

Flood Management

- Runoff rates and runoff volume reductions
- Flood elevation reduction
- Parcel/structure removal from floodplain
- Property value saved

Water Supply

- Groundwater recharge
  - Stormwater
  - Recycled water

Community

- Employment opportunities
- Public education
- Community involvement
- Enhancement/creation of
  - public spaces
  - walking paths
  - bike trails
  - sidewalks

Environmental

- Wetlands enhancement/ creation
- Riparian area enhancement
- Streambed restoration
- Increased urban green space

Tell us about your project

Project Name: ______________________________

Submitting Agency: ____________________ Lead Agency: ____________________

Project Partners: ______________________________

Contact: ______________ Email: ______________ Phone: ______________

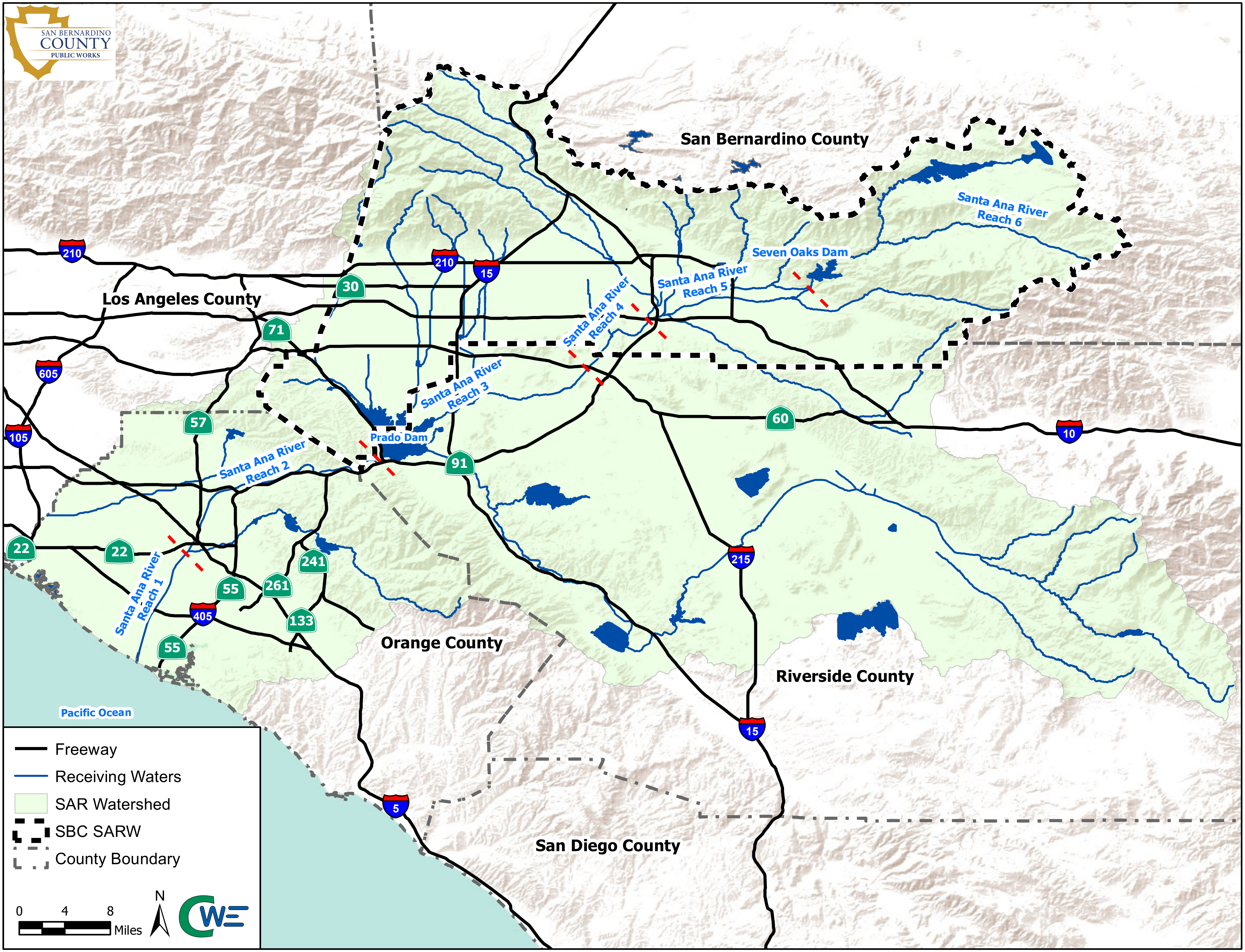
List main project components ______________________________

____

____

How far along is the project?

- ☐ Just an idea
- ☐ Concept developed
- ☐ Preliminary design report
- ☐ Soils investigation
- ☐ Hydrology study
- ☐ Topographic survey
- ☐ Hydraulic study
- ☐ Flood study
- ☐ Design plans in progress
- ☐ Design plans completed



SAN BERNARDINO COUNTY PUBLIC WORKS
San Bernardino County
Los Angeles County
Orange County
Riverside County
San Diego County
Pacific Ocean
Santa Ana River Reach 1
Santa Ana River Reach 2
Santa Ana River Reach 3
Santa Ana River Reach 4
Santa Ana River Reach 5
Santa Ana River Reach 6
Seven Oaks Dam
Prado Dam
210
15
30
71
605
105
57
60
10
91
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55
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261
241
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Freeway
Receiving Waters
SAR Watershed
SBC SARW
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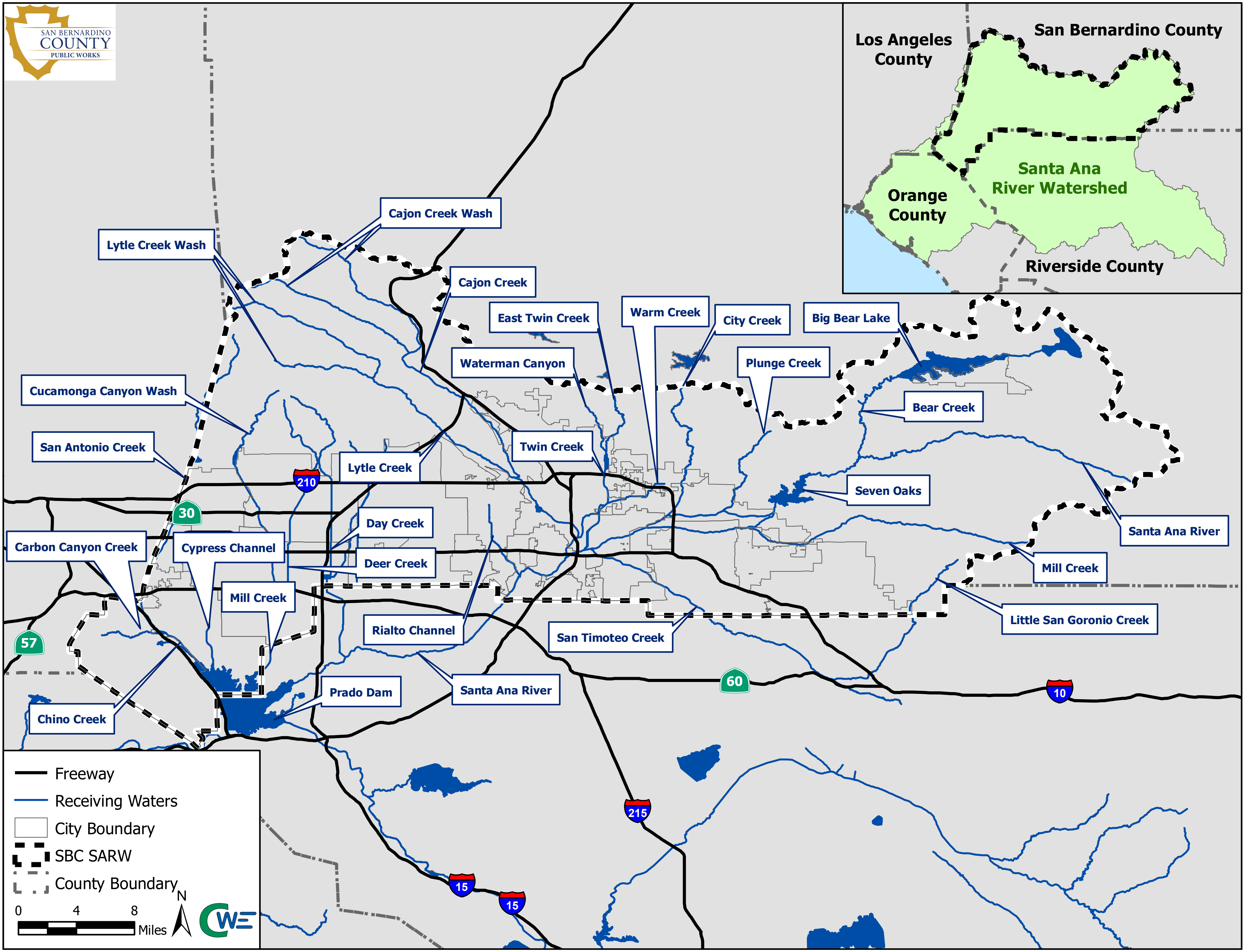

SAN BERNARDINO COUNTY PUBLIC WORKS
Los Angeles County
San Bernardino County
Santa Ana River Watershed
Orange County
Riverside County
Cajon Creek Wash
Lytle Creek Wash
Cajon Creek
East Twin Creek
Warm Creek
City Creek
Big Bear Lake
Waterman Canyon
Plunge Creek
Cucamonga Canyon Wash
Bear Creek
San Antonio Creek
Twin Creek
Lytle Creek
Seven Oaks
Day Creek
Santa Ana River
Carbon Canyon Creek
Cypress Channel
Deer Creek
Mill Creek
Mill Creek
Little San Goronio Creek
Rialto Channel
San Timoteo Creek
Prado Dam
Santa Ana River
Chino Creek
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Freeway
Receiving Waters
City Boundary
SBC SARW
County Boundary
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Miles
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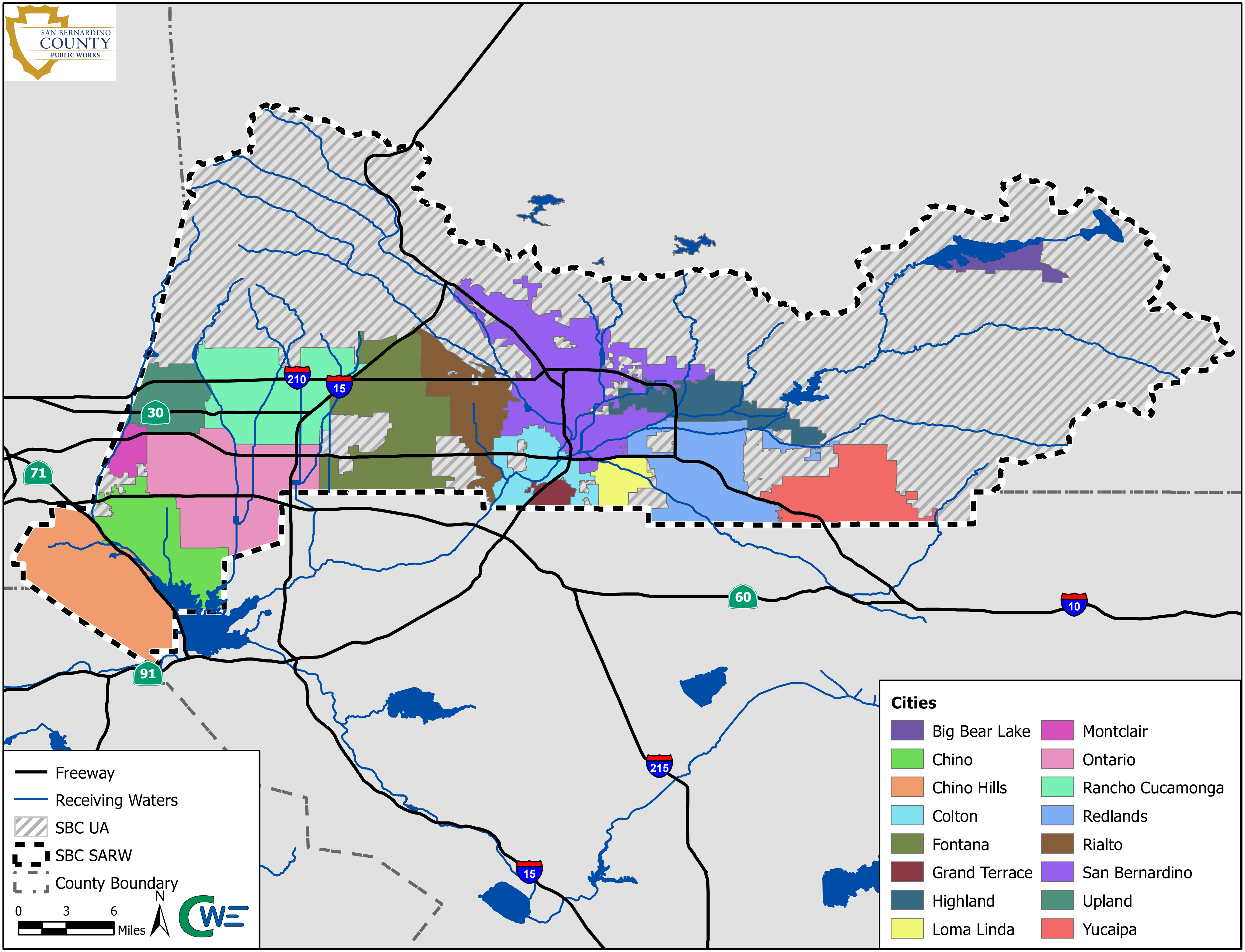

SAN BERNARDINO COUNTY PUBLIC WORKS
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Cities
Big Bear Lake
Chino
Chino Hills
Colton
Fontana
Grand Terrace
Highland
Loma Linda
Montclair
Ontario
Rancho Cucamonga
Redlands
Rialto
San Bernardino
Upland
Yucaipa
Freeway
Receiving Waters
SBC UA
SBC SARW
County Boundary
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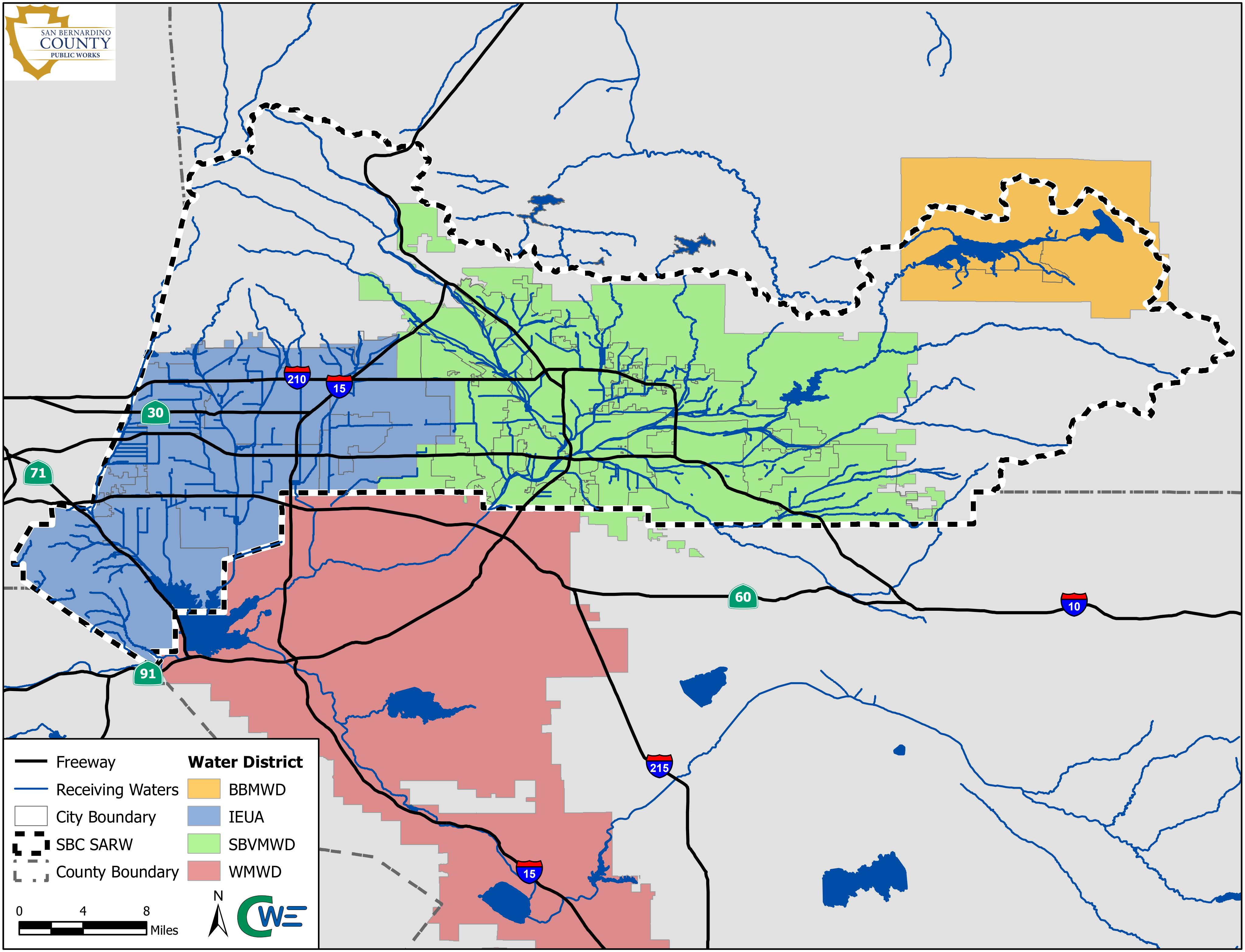

SAN BERNARDINO COUNTY PUBLIC WORKS
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Freeway
Receiving Waters
City Boundary
SBC SARW
County Boundary
Water District
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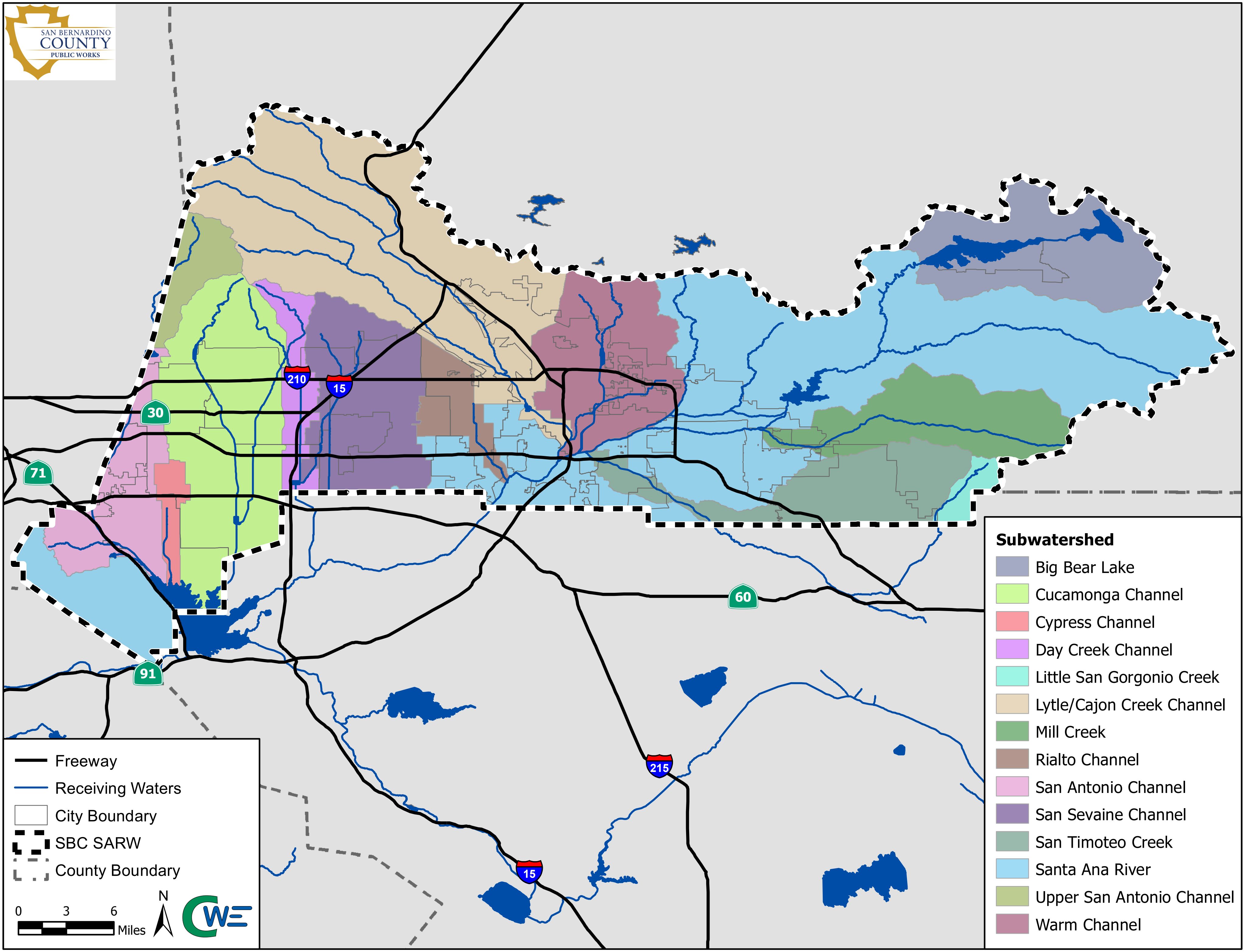
SAN BERNARDINO COUNTY PUBLIC WORKS
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Receiving Waters
City Boundary
SBC SARW
County Boundary
0 3 6 Miles
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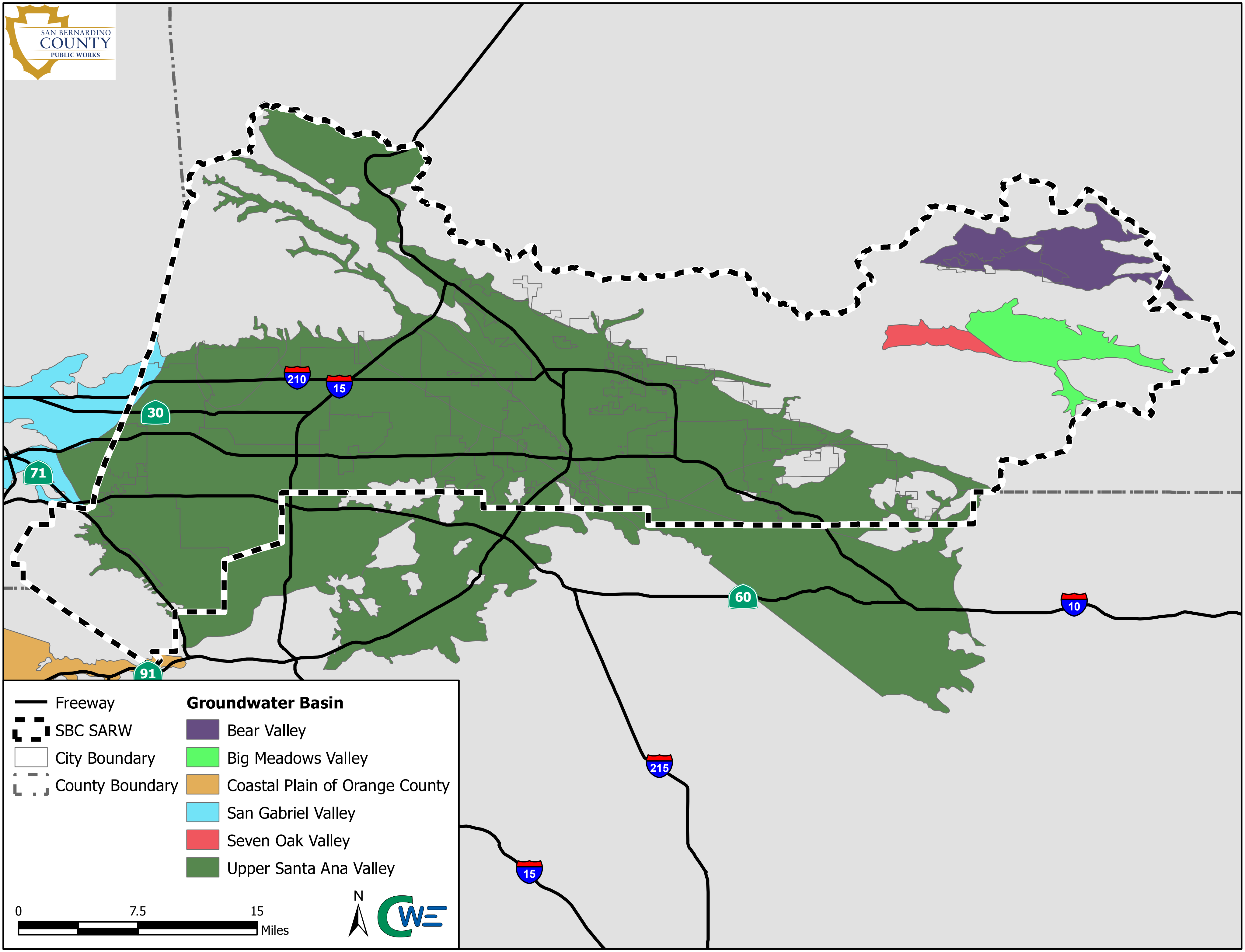
Subwatershed
Big Bear Lake
Cucamonga Channel
Cypress Channel
Day Creek Channel
Little San Gorgonio Creek
Lytle/Cajon Creek Channel
Mill Creek
Rialto Channel
San Antonio Channel
San Sevaine Channel
San Timoteo Creek
Santa Ana River
Upper San Antonio Channel
Warm Channel



SAN BERNARDINO COUNTY PUBLIC WORKS
210
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Freeway
SBC SARW
City Boundary
County Boundary
Groundwater Basin
Bear Valley
Big Meadows Valley
Coastal Plain of Orange County
San Gabriel Valley
Seven Oak Valley
Upper Santa Ana Valley
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Miles
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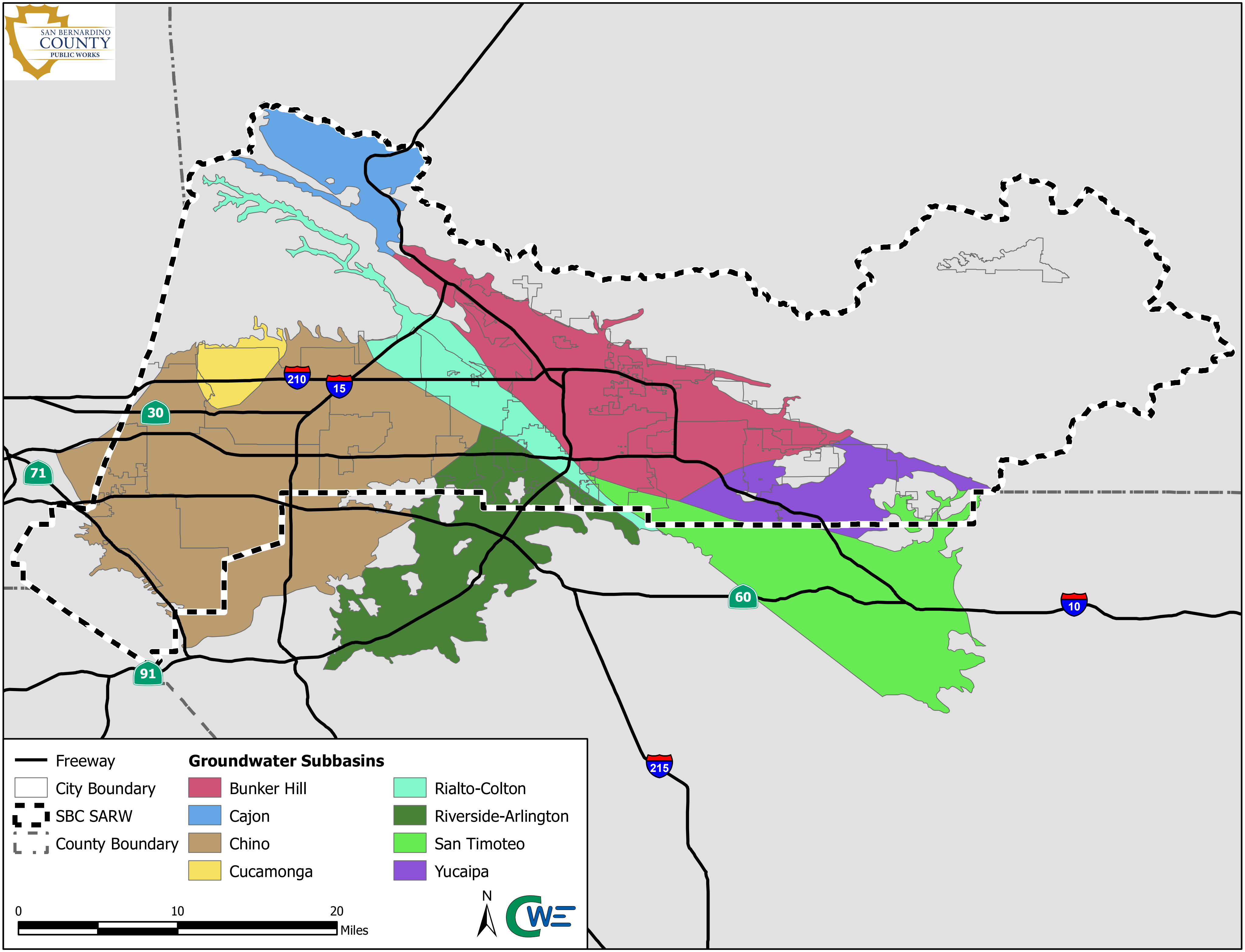
CWE


SAN BERNARDINO COUNTY PUBLIC WORKS
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215
Freeway
City Boundary
SBC SARW
County Boundary
Groundwater Subbasins
Bunker Hill
Cajon
Chino
Cucamonga
Rialto-Colton
Riverside-Arlington
San Timoteo
Yucaipa
0
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Miles
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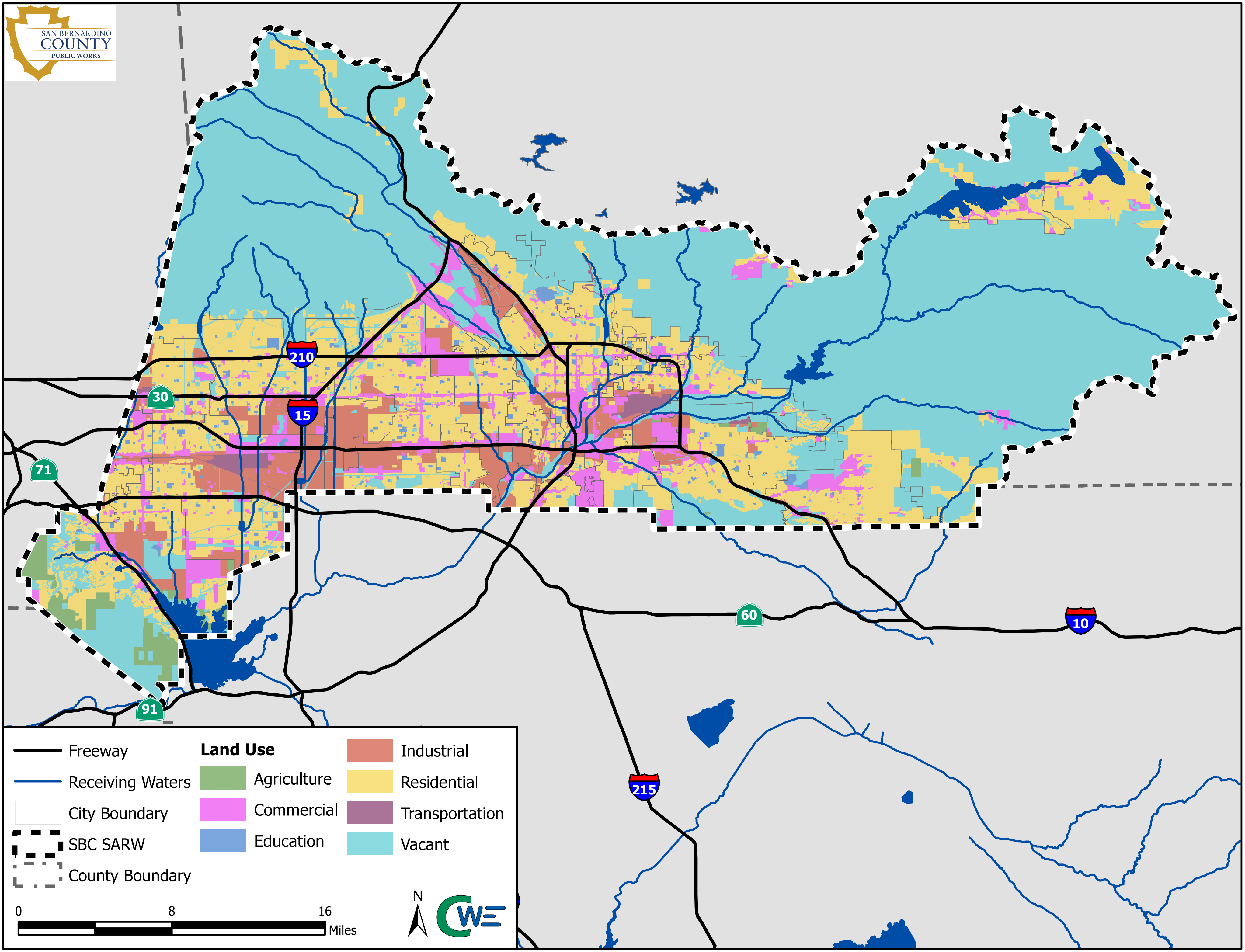
CWE


SAN BERNARDINO COUNTY PUBLIC WORKS
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215
Freeway
Receiving Waters
City Boundary
SBC SARW
County Boundary
Land Use
Agriculture
Commercial
Education
Industrial
Residential
Transportation
Vacant
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8
16
Miles
N
CWE

What is a SWRP?

A SWRP is a watershed based, public/stakeholder-driven, and adaptively managed plan that evaluates existing water resources and identifies projects, programs, and activities that will enhance the beneficial uses of stormwater and dry-weather runoff.

Adaptive Management

New Data

(water quality, studies, objectives, etc.)

Public and Stakeholder Input

SWRP Development

Apply Assessment Tools

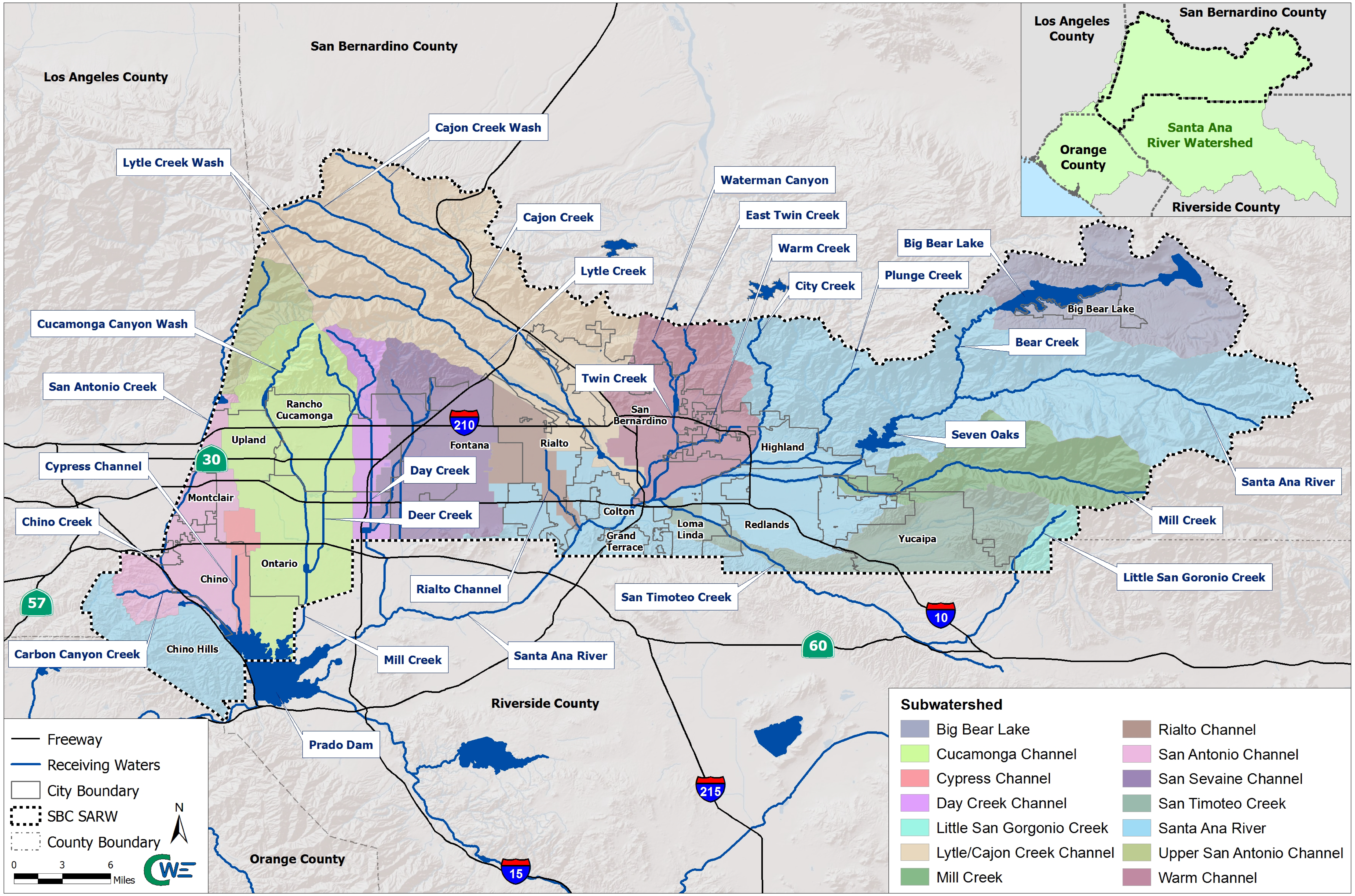
Evaluate Multiple Benefits

Determine Implementation Approach

Benefit Categories

- Water Quality
- Flood Management
- Water Supply
- Community
- Environmental

SWRP Area Map



San Bernardino County

Santa Ana River Watershed Stormwater Resource Plan

SAN BERNARDINO COUNTY PUBLIC WORKS

What types of projects are included?

Groundwater Recharge

Habitat Restoration

Channel Improvements

Water Quality Enhancements

Passive Recreation

Recycled Water

What are the multiple benefits?

Projects, programs, and activities identified in the SWRP will provide the multiple benefits described below.

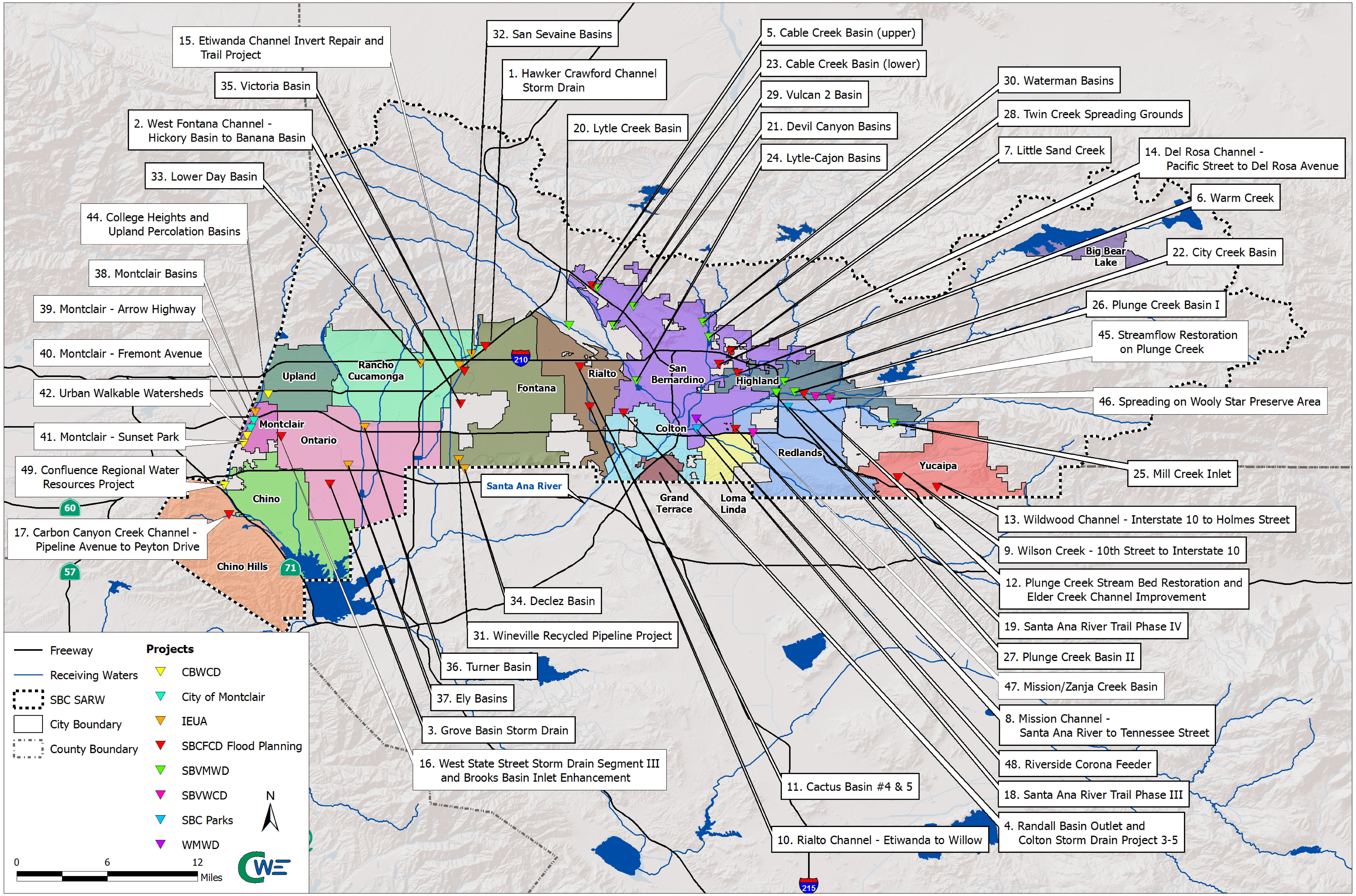
GOALS	OBJECTIVES
Enhance Water Quality	Pollutant Load Reduction Stormwater Runoff Reduction
Maximize Water Supply	Stormwater Recharge Recycled Water Recharge
Improve Flood Management	Runoff Rate & Volume Reduction Flood Elevation Reduction Floodplain Parcels/Structures Removal Saved Property Value
Protect the Environment	Wetlands Enhancement/Creation Riparian Area Enhancement Streambed Restoration Increased Urban Green Space
Provide Community Benefits	Employment Opportunities Public Education and Community Involvement Recreational Paths Enhancement/Creation Public Use Area Enhancement/Creation

OUTCOMES

- Removal of roughly **four quadrillion (4×10^{15}) MPN E. coli bacteria** per year.
- Reduce the discharge of untreated stormwater by approx. **41,500 acre-feet** per year.
- Cumulatively capture on average around **41,500 acre-feet** of stormwater per year and use the volume to recharge local aquifers.
- Capture about **5,600 acre-feet** of recycled water per year for groundwater recharge.
- Provide a benefit of reducing the peak flow rate during floods, with a maximum predicted flow rate reduction of **600 cfs**.
- Cumulatively prevent **41,500 acre-feet** of stormwater from reaching flood-prone areas.
- Reduce the water surface elevation during a flood event, with a maximum predicted flood elevation reduction of almost **9 feet**.
- Remove over **1,700 parcels** from the risk of flooding during a 100-year storm event. These parcels have a combined value of over **$510 million**.
- Enhance or create **2 acres** of wetlands.
- Restore or enhance almost **31 acres** of riparian habitat.
- Restore at least **2,300 feet** of streambed to natural conditions, creating and preserving critical habitat for endangered species.
- Increase the amount of urban green space by about **66 acres**.
- Construction is estimated to provide roughly **4,400 job-years** of employment opportunities to the community. Estimated at cumulatively providing over **1,100 new jobs**.
- Public education in at least **five projects**, including interpretive signage to increase the public's understanding of water quality protection and using stormwater as a resource.
- Increased permanent community involvement in at least **three projects**.
- Create or enhance over **24 miles** of multi-use paths and trails for public use.
- Over **64 acres** of new public use and recreational space will be created by the construction of the projects.

SAN BERNARDINO COUNTY PUBLIC WORKS

SWRP Projects



San Bernardino County

Santa Ana River Watershed Stormwater Resource Plan

SAN BERNARDINO COUNTY PUBLIC WORKS

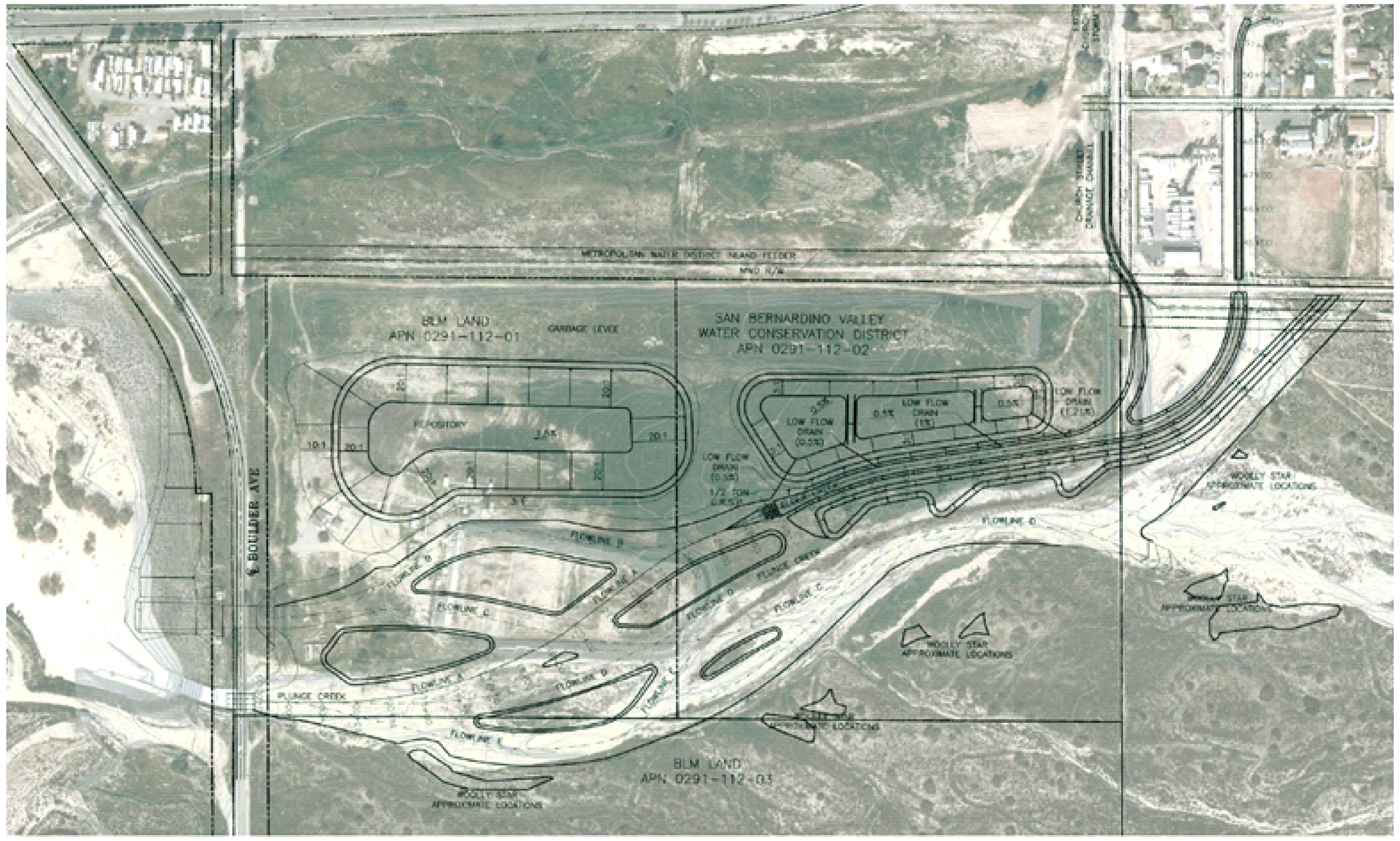
SWRP Example Projects

Cactus Basin No. 4 and 5

This project will provide beneficial uses in Disadvantaged Communities in Rialto and the Inland Empire by increasing the volume of stormwater captured to rechage groundwater, while enhancing water quality and protecting thousands of structures from flooding.

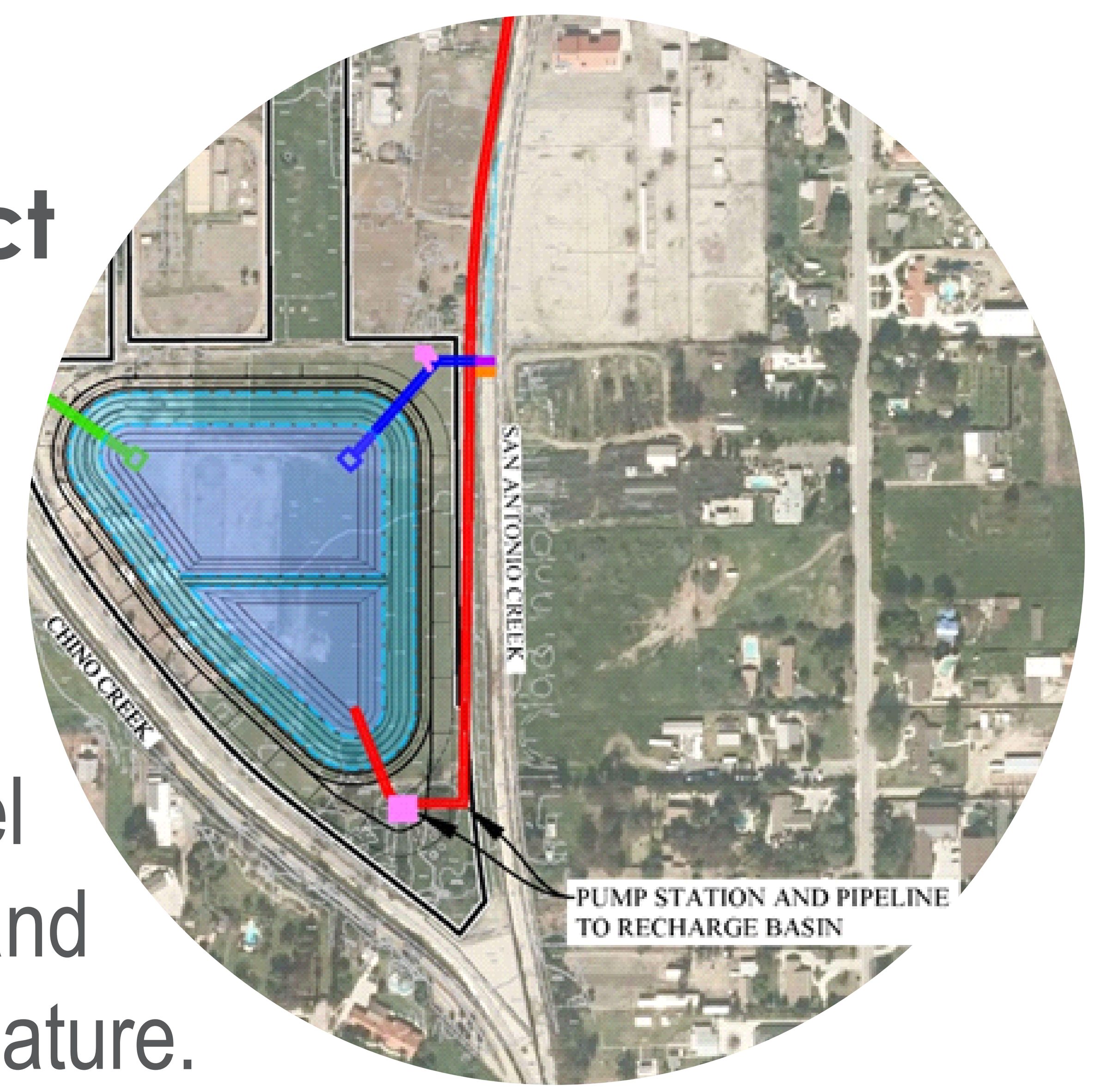
Elder Creek

The Elder Creek/Plunge Creek confluence project, a continuation of SBVWCD's Plunge Creek restoration project, will rehabilitate the ecological function of the Santa Ana River Wash area. The project will spread stormwater through braided channels to restore natural watershed processes, enhance groundwater recharge, and improve downstream water quality. The project will also improve Elder Gulch upstream of the confluence to reduce sedimentation and protect surrounding areas from flooding.



Confluence Basin Project

This project will construct a new groundwater recharge and storage reservoir where Chino and San Antonio Creeks meet. A habitat and bioremediation channel will be used as an educational and wetland habitat feature.



Next Steps

June 29, 2018	Public SWRP Draft posted online
August 7, 2018	Public Comments due
August 31, 2018	Comments addressed in Final Draft SWRP
October 31, 2018	Final SWRP
Late 2018	Present SWRP to SAWPA
Late 2018/Early 2019	Proposition 1 Funding Application Released
2019	Apply for Funding
2020 - Onward	Implement Projects

Email:
swrp@cwecorp.com
for additional information

SAN BERNARDINO COUNTY PUBLIC WORKS