

5.7 Land Use and Water Planning



The Shops at Dos Lagos
Corona, CA

Introduction

The Land Use and Water Planning Pillar for One Water One Watershed 2.0 (OWOW) was re-formed in early 2012 and was co-chaired by Jerry Blum, City of Ontario Planning Director and Susan Lien-Longville, Santa Ana Regional Water Quality Control Board (RWQCB) Board Member (formerly Water Resources Institute: CSU, San Bernardino). The Pillar conducted ten meetings at the Santa Ana Watershed Project Authority (SAWPA) between July 2012 and August 2013, which were regularly attended by staff from water and utility agencies, Caltrans, the development community, resource conservation groups, and interested consultants.

Land use decisions are arguably the primary underlying cause of, and potential solution for, the existing water supply, water quality, and natural resource challenges in the Santa Ana River (SAR) Watershed. Similarly, relative energy use and greenhouse gas emission levels result from the level of efficiency produced by land use patterns. Land use designations and development through time have resulted in areas of economic vitality and comfortable living, while leaving other areas in blighted conditions, with inequitable exposure to environmental hazards and poorly maintained infrastructure. To improve conditions and create a sustainable watershed, land use decisions must provide net watershed benefits. We must avoid land use decisions that allow net degradation of watershed conditions.

The Land Use and Water Planning Pillar reviewed the guidance of the Department of Water Resources (DWR) Integrated Regional Water Management (IRWM) Guidelines, Relation to Land Use Planning Standard to assist the development of this chapter and actions to support their efforts. This section encouraged an exchange of knowledge and expertise between land use and water resource managers;

examining how Regional Watershed Management Groups (RWMG) and land use planning agencies currently communicate; and identifying how to improve planning efforts between the RWMGs and land use planning agencies.

This Chapter: 1) describes the history of development and watershed planning efforts in the Santa Ana River Watershed; 2) identifies key watershed sustainability needs; 3) evaluates how watershed priorities can be addressed by improved collaboration between water and land use agencies; and 4) recommends the strategies and implementation actions expected to be effective to ensure watershed sustainability priorities are a primary consideration in the land use decision process. Finally, this OWOW 2.0 Plan (Plan) updates and revises the OWOW 1.0 Plan.

Chapter 1.2 of the OWOW 1.0 Plan, Moving Towards Sustainability, summarized the history of land use patterns and practices in the Santa Ana River Watershed and some of the impacts of land use decisions on water resources and lessons learned. An objective analysis of the strengths, threats and weaknesses of land use patterns and practices is followed by strategies that address land use and water management producing mutually beneficial and cost effective results. The chapter closes with suggestions of collaborative partnerships between regional water management agencies and local governments, and private sector developers and environmental organizations to address the sustainability of prior and future land use decisions. The authors of this chapter are confident that solutions to the challenges we face in the watershed are limited only by our determination to solve complex land use and watershed sustainability problems by working together.

The way in which we manage water resources is inextricably linked to our land use patterns. Our current land use planning and practices have damaged and threaten to further damage our water-supply reliability, and are costly in many other ways, including loss of historic watershed functionality, habitat deterioration and high energy consumption for transport. This problem can be stopped and even reversed if local governments and their planning and water agencies, real estate developers, and the environmental community work together to fully incorporate water in the development process. No one agency can be successful working alone.

Working together, the watershed can increase the understanding that unavoidable impacts do result from previous long-standing standard building practices. Embracing a sustainable development ethic steers the Watershed in a direction to meet human needs, while preserving the environment so that these needs can be met now, as well as in the indefinite future. Furthermore, ignoring the opportunities to curb the impacts of land use will result in only greater impacts tomorrow.

Implementation Principles¹

1. Water supply agencies should be consulted early in the land use decision-making process regarding technology, demographics and growth projections
2. City and county officials, the watershed stakeholders, Local Agency Formation Commission (LAFCO), special districts and other stakeholders sharing watersheds should collaborate to take advantage of the benefits and synergies of water resource planning at a watershed level
3. The best, multi-benefit and integrated strategies and projects should be identified and implemented before less integrated proposals, unless urgency demands otherwise
4. From start to finish, projects and programs should involve the public, build relationships, and increase the sharing of and access to information. The participatory process should focus on ensuring that all residents have access to clean, reliable and affordable water for drinking and recreation
5. Plans, programs, projects and policies should be monitored and evaluated to determine if the expected results are achieved and to improve future practices
6. Limited, accessible, low-cost, outdoor recreational opportunities

Current Priorities and Approaches for Watershed Sustainability— OWOW 2.0

Main objectives for the Land Use and Water Planning Pillar:

- Identify implementation actions to conduct collaboration between water and land use communities
- Prepare (as appropriate): updates to conditions of land use and resource management; implementation measures to support water savings through land use practices including low impact development; implementation of Ahwahnee Water Principles for Resource Efficient Land Use, new green building programs and onsite and offsite conservation land use practices
- Determine new opportunities to improve collaboration between water managers and land use decision makers and interaction with the land use community
- Determine what forums, policies and projects could be instituted to improve water management efforts with the land use community
- Describe how improved interaction between water managers and land use planners could advance the Plan implementation and the planning process

Despite over a decade of Integrated Regional Watershed Management planning within the SAR Watershed and numerous similar plans designed to address watershed challenges from the watershed perspective, the core challenges of population growth and expanding urbanization remain. Innovative ideas and projects have been implemented and water quality and water supplies are better managed as a result. However, key challenges remain—the integration of watershed stakeholders and an

¹ Local Government Commission, 2005. Ahwahnee Water Principles.
http://www.lgc.org/ahwahnee/h2o_principles.html

overwhelming need to develop unbiased cooperative watershed implementation processes. Competing individual agency priorities can limit the level of cooperation and the resulting assemblage of feasible projects. Watershed sustainability priorities should be given greater weighting in the project conceptualization and implementation process.

Relationship to other OWOW Pillars

Land Use Links All Pillars

Water use is dictated by land use. Likewise, water supply is a function of location, and groundwater recharge is impacted by land uses—agriculture uses water and adds nutrients, urbanization demands water for residents and businesses, and historically reduces groundwater recharge by the use of impervious cover. Wastewater treatment is designed to accommodate the needs of the watershed, which are largely a function of population and resulting development. Water quality is also directly impacted by land uses. Natural hazard risks are exacerbated by development in fault zones, flood plains, and fire-prone areas—these scenarios are made better or worse by land use decisions. Natural resources and habitat are exploited, managed, or preserved based on the allowed development, which is controlled by land use decisions. Energy use is a function of land use characteristics and the infrastructure required to support the developed areas—suburban sprawl leads to more land used for roadways and imported water requires transport systems. These choices lead to relative levels of energy use, limit energy efficiency for the watershed, and determine greenhouse gas emissions from the watershed that drive climate change. Finally, government oversight tries to reduce undue environmental degradation and minimize health risks, but works within a context of existing land uses and ongoing land use demands. Economically disadvantaged communities are a consequence of ongoing land use decisions and policies.

Current Land Development Planning, Design, and Approval Processes

Historical and Current Conditions of Land Use

Historical documents describe years of sustainable land use practices in the SAR Watershed by native tribes, followed by the California missions that established the first significant rangelands and the first agricultural production in the region. A steady wave of migration from other regions of the country and abroad continued, and accelerated during the construction of the railroads in the years between 1861 and 1900, following the path of available water supplies needed to operate the steam engines. From the top to the bottom of the watershed, the history of small towns that became respectably sized cities is linked to the arrival of thousands of permanent railroad jobs. Readily available water supplies then fueled the development of a vibrant agricultural community, including a large citrus industry, dependent on irrigation.

Growth throughout the watershed stagnated during the Great Depression, but World War II caused military installations and industrial war suppliers to move further inland, along with a major wave of migration. Residential and commercial development were greatly expanded in the watershed by the soldiers returning from the Pacific Theater of World War II—they relocated throughout the nation including Southern California where they had trained or been stationed at military bases.

Demographic patterns clearly reflect an internal migration pattern from west to east in the Watershed that began when coastal property became too expensive for many prospective buyers, driving population further inland in search of affordable homes and land. The construction of the freeway system was enthusiastically welcomed in Riverside and San Bernardino Counties where the new link to robust job markets on the coast and in Los Angeles triggered the growth of suburbs that primarily served as bedroom communities for commuters.

Land use patterns show the expansion from locations with direct access to surface water to places that could be served by gravity-fed irrigation ditches and canals. Land use intensified in areas where drilling a private well was affordable until the critical mass of urban and agriculture water users prompted the establishment of private water companies, irrigation districts, and municipal water districts that could tap the groundwater and build systems to deliver the water directly to customers.

Concerns over reliable water supplies to sustain future land uses led to decades of water rights disputes in the courts between downstream and upstream water agencies in the watershed. By the time the State and Federal environmental protection regulations were established in the 1970's, consumptive land use patterns in the Watershed had dramatically decreased the quality and quantity of open space, and surface waters and groundwater had been severely impaired by practices of the time.

Management of Land Resource

The sole authority of cities and counties to regulate land use in their own jurisdiction is deeply anchored in California history and cherished by local communities. Local governments have focused on sustaining a robust economy through land use decisions that contribute to construction of infrastructure, and generating local government revenues that cover the costs of city and county services that protect the lives and property of their constituents.

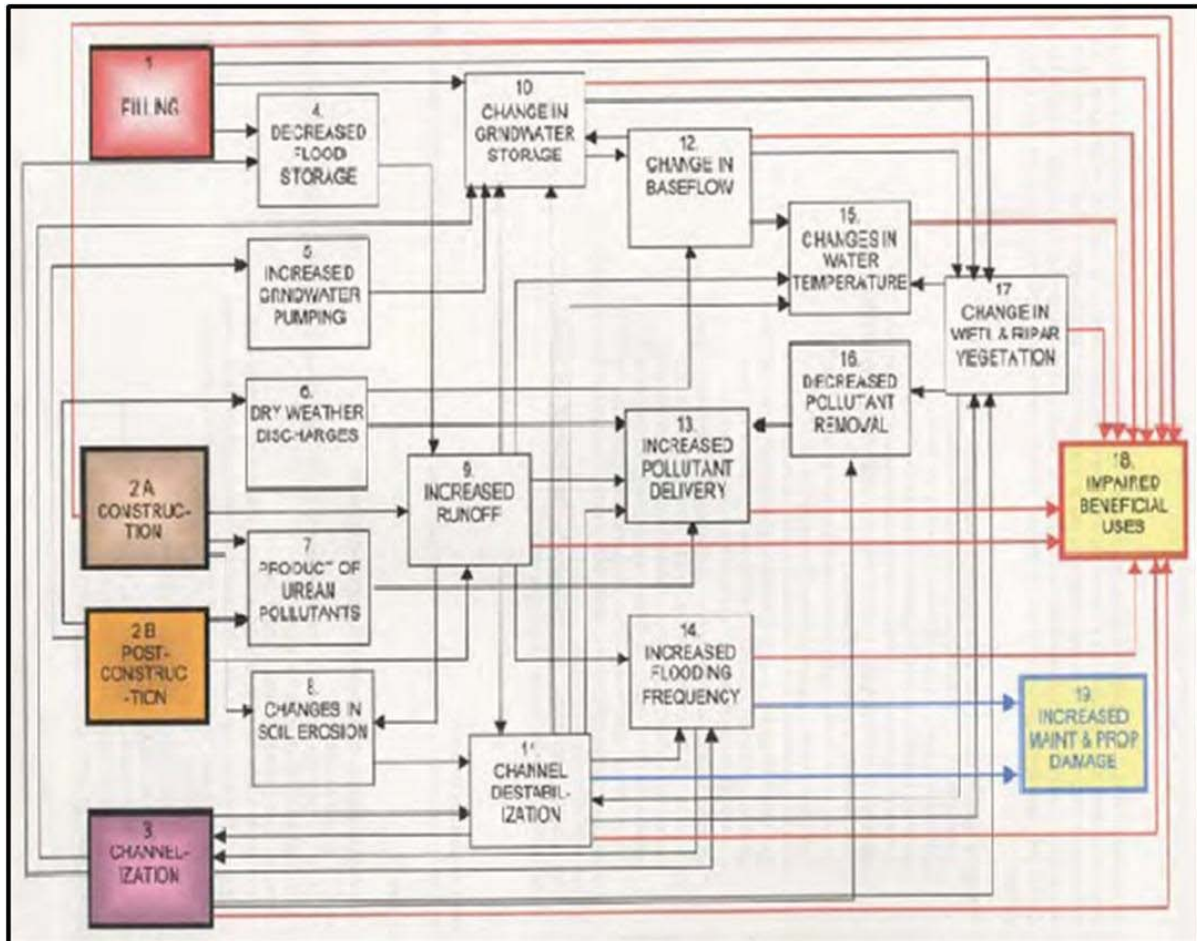
Regional Strengths, Threats, and Weaknesses of Land Use

The increase in hard surfacing and flood control over decades of land use practices in the watershed has changed stormwater runoff patterns resulting in a threat to the sustainability of regional groundwater basins losing historical recharge capacity. For example, the Chino Basin Watermaster estimates that over 40,000 acre-feet/year (AFY) of groundwater recharge have been lost on average since land use practices began increasing impervious surfaces.

Various studies have demonstrated a strong correlation between the impervious cover in a watershed and reductions in water supply sustainability. When impervious cover exceeds 10% of total watershed area, there is typically a decrease in groundwater recharge and an increase in 1-2 year frequency flood events, decreased baseflow, and increased pollutant discharges into surface waters.

Figure 5.7-1, developed by the State Water Resources Control Board (SWRCB), illustrates the potential effects of development on the beneficial uses of water from a science-based perspective. All of these effects are present in varying degrees throughout the developed watershed.

Figure 5.7-1 Potential Effects of Development of Beneficial Uses
(Source: State Water Resources Control Board)



Drawing on the most recent land use maps available from the Southern California Association of Governments (SCAG), **Figure 5.7-2** reflects the collective outcome of land use planning and decisions in the Watershed that, over time, has shrunk the footprint of agriculture, open space and recreation, while the areas consumed by new residential, commercial, and industrial developments have expanded. **Figure 5.7-3** projects specific areas of population increase from 2008 to 2035 and pinpoints locations where future land use decisions will need to address a robust economy with new jobs and housing for residents, as well as a sustainable water supply over a long-term planning horizon.

Figure 5.7-2 Land Uses in the Santa Ana River

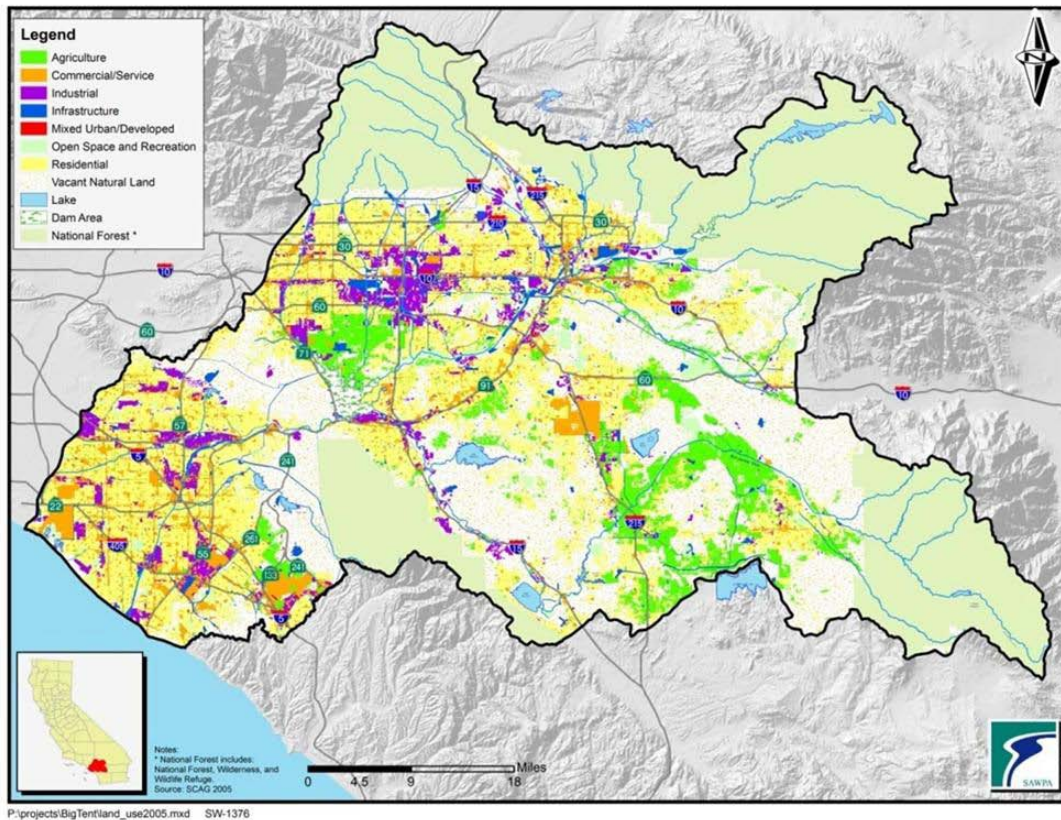
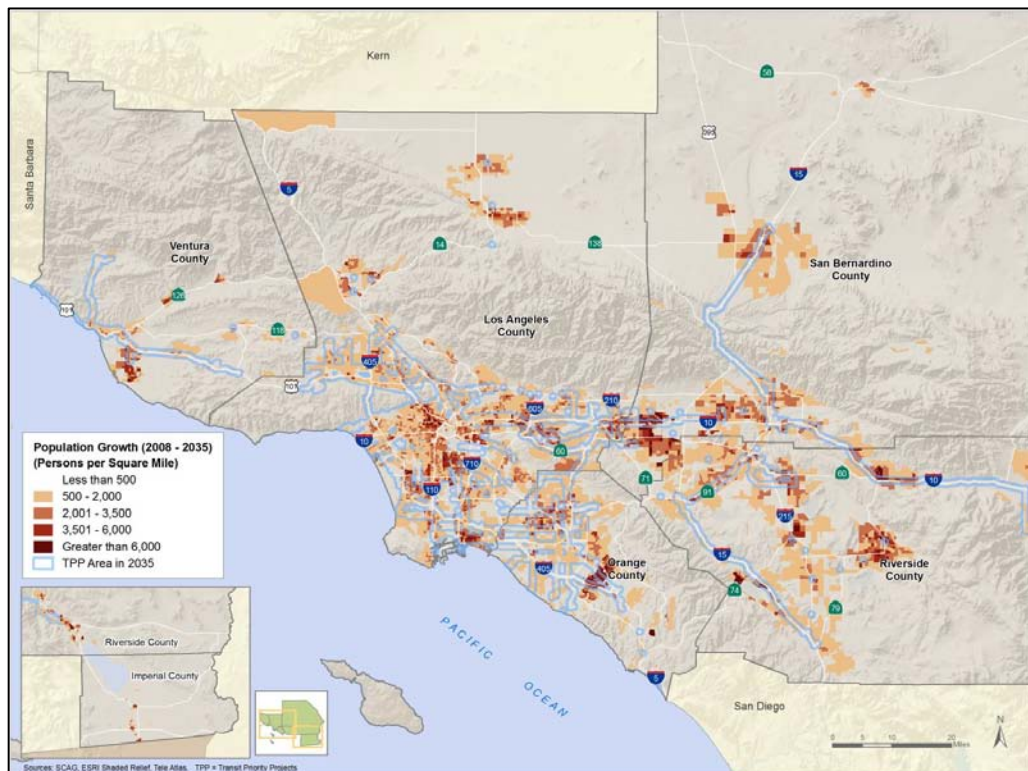


Figure 5.7-3 Projected Population Growth 2008-2035 (SCAG RTP 2012)



Regional Planning and Implementation of Land Use Strategies

Compass Blueprint

The Compass Blueprint was developed by SCAG in companionship with the 2003 Regional Transportation Plan (RTP) and it continued as a companion to the 2008 RTP. The 2008 RTP recognized “The centrifugal force of growth that continues to push the development footprint of the urbanized area outward. At the same time, pushing back on dispersed development are natural barriers, financial constraints to pay for outward expansion, and public resistance to unsustainable ‘leap frog’ growth into green fields and sensitive habitat areas. Nearly all natural locations for urban development have been consumed, leaving us with hard choices about how we are to grow and change to meet the demands of the future.”

The Compass Blueprint recommended implementation of integrated land use and transportation planning in the local communities of the Southern California region to accommodate the growth forecasted over the next 25 years in an environmentally sustainable manner.

Working with stakeholders in each county, the regional planning agencies that serve as Council of Governments for Orange, Riverside, and San Bernardino Counties developed the Compass Blueprint. The Compass Blueprint 2% strategy envisions the direction of future development in strategic opportunity areas (SACs) that do not exceed 2% of the region’s land resources. The Compass effort also educated stakeholders regarding alternative development that is more compact and more sustainable. A series of maps identified SACs in each county (**Figure 5.7-4A** to **Figure 5.7-4C**). The Opportunity Areas are shown as colored areas within a blue perimeter line. Substantial future development is anticipated to happen around transit hubs, railway stations, major bus stations, and along transit corridors. The maps point to modest changes in current land use and transportation trends on only 2% of the land area of the region. Efforts already are underway to reduce the quantity of low-density development in a number of the Opportunity Areas.

Figure 5.7-4a SCAG Compass Blueprint Strategic Opportunity Areas – SANBAG

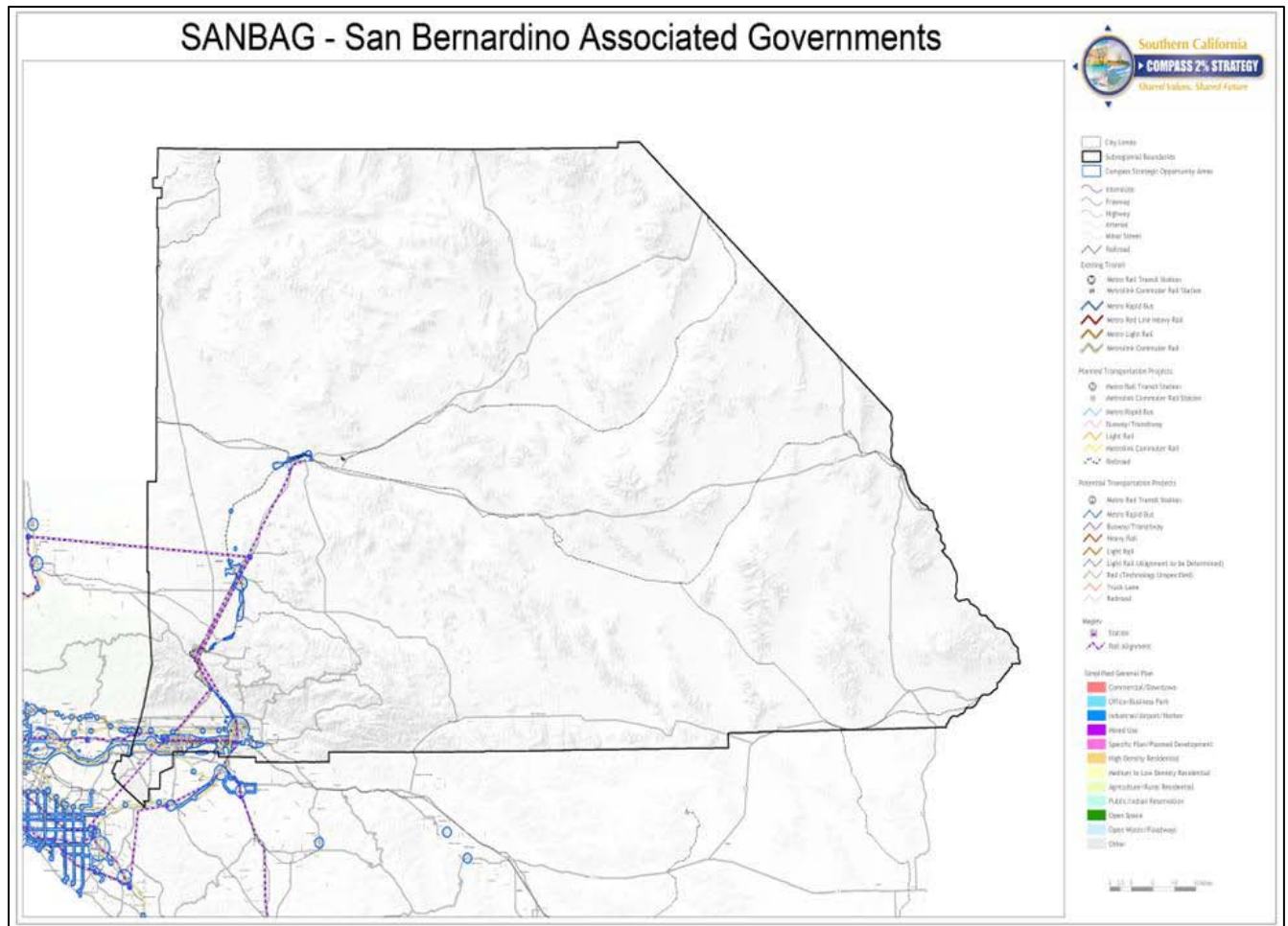


Figure 5.7-4b SCAG Compass Blueprint Strategic Opportunity Areas - OCCOG

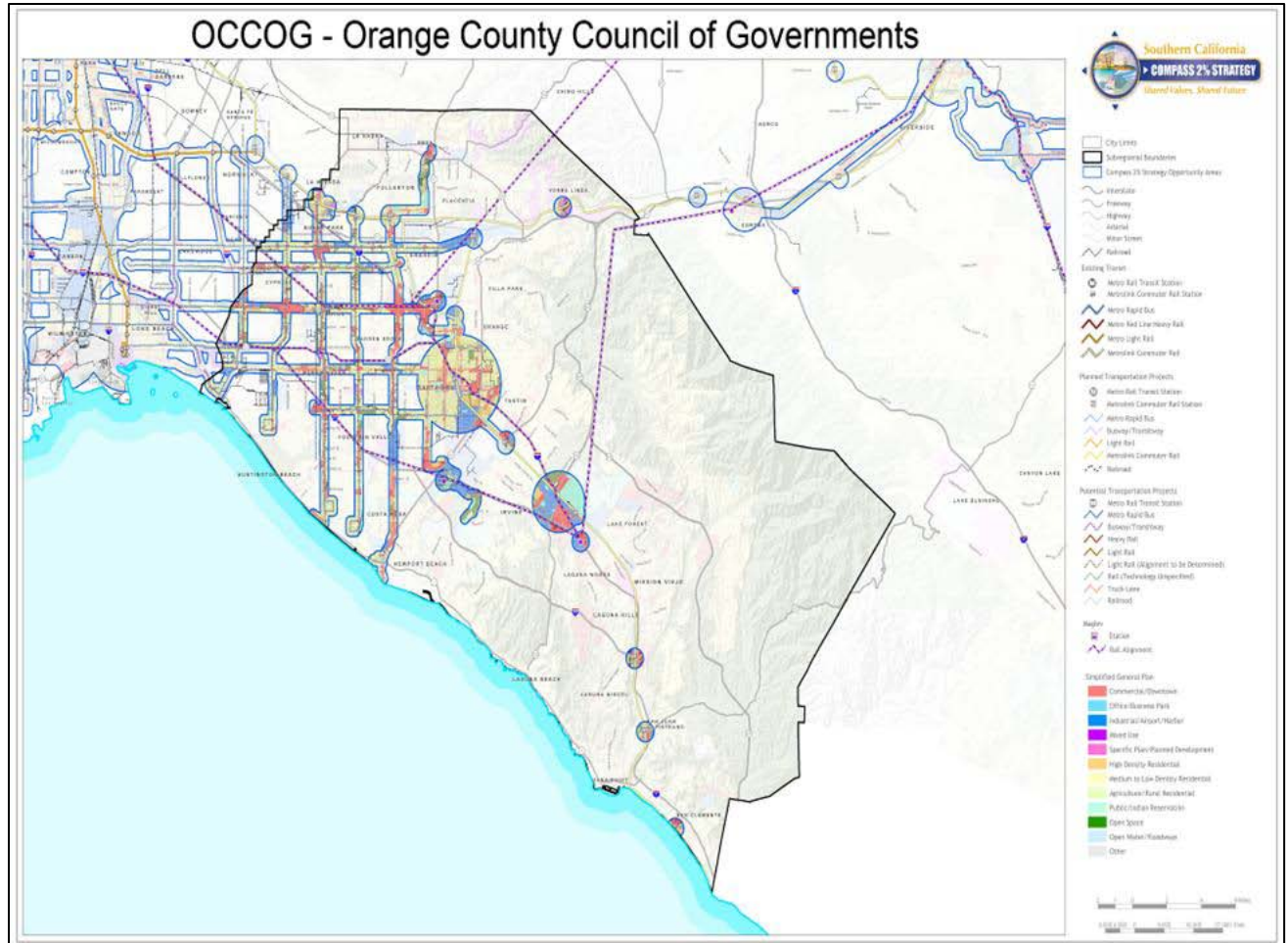
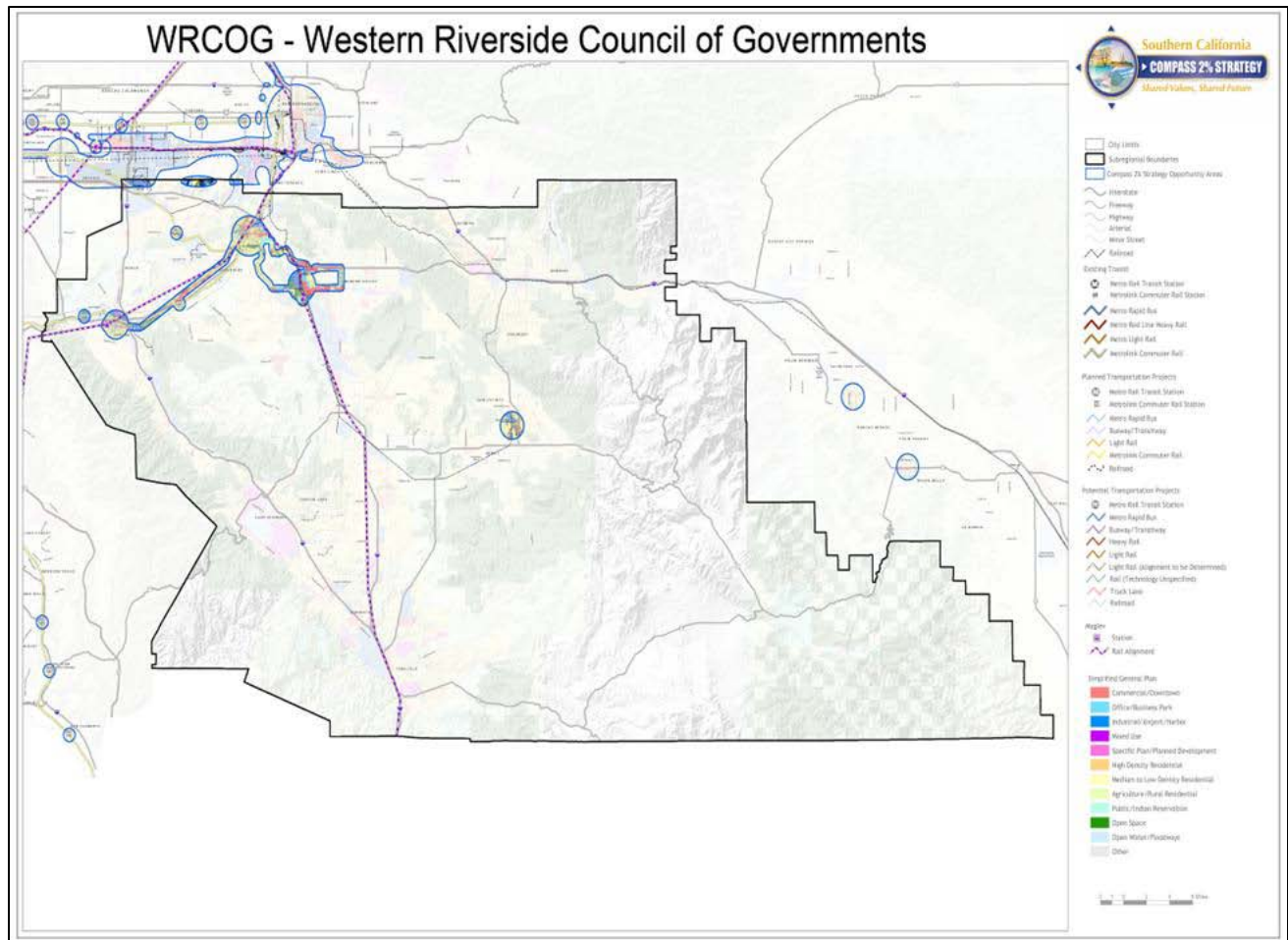


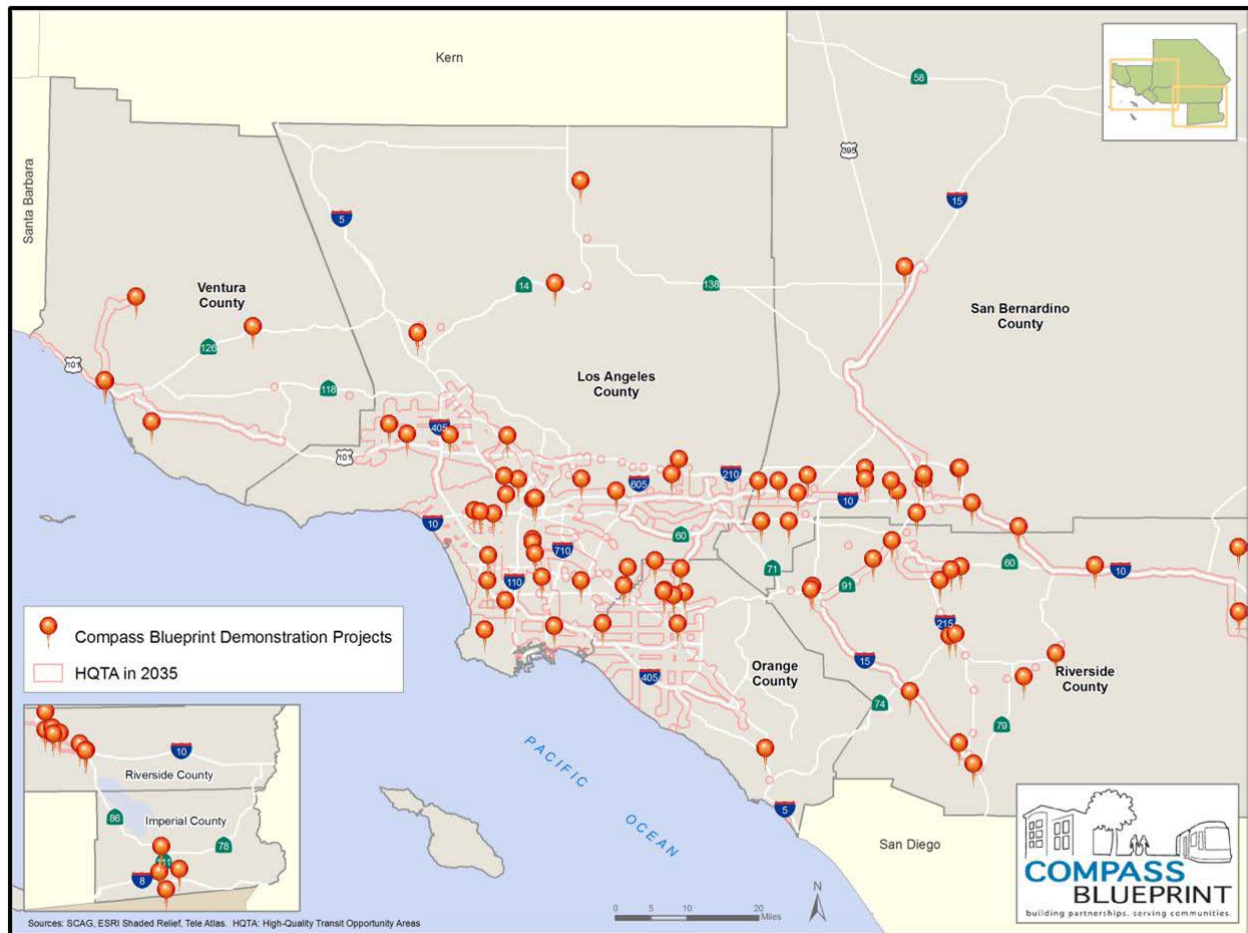
Figure 5.7-4c SCAG Compass Blueprint Strategic Opportunity Areas – WRCOG



Higher density development that is compact, mixed use, walkable, and transit-oriented not only preserves open lands that absorb water to the maximum extent possible, but minimizes automobile generated urban runoff pollutants that degrade both surface and ground water quality.

The Compass Blueprint used four (4) guiding principles: “Mobility, Livability, Prosperity and Sustainability.” Since 2004, Compass Blueprint has supported integrated land use and transportation planning through incentive funding of over \$10.5 million for 132 demonstration projects in the SCAG Region. These are voluntary SCAG/local government partnerships that use innovative approaches to work with local plans and implement regional priorities. Projects include transit-oriented development plans, downtown revitalization efforts, low-income community visioning, and other projects that support local and regional goals. **Figure 5.7-5** shows all completed Compass Blueprint Demonstration Projects, including thirty projects located within the SAR Watershed. (See 2012 SCAG RTP, Appendix: SCS Background Documentation for project list. Also see interactive project map at: <http://maps.scag.ca.gov/cbp/>

Figure 5.7-5 SCAG Compass Blueprint Demonstration Projects and HQTA Projected for 2035



Future Demonstration Projects throughout the region will encourage implementation of sustainability principles by focusing on regionally-significant local plans that directly implement the Sustainable Communities Strategy (SCS) and its goal of translating policy to on-the-ground land use changes and multi-modal transportation improvements. Concurrently, Compass Blueprint will further incentivize local implementation of the SCS through the Compass Blueprint Awards Program, and through the “Toolbox Tuesdays” program offering free, monthly, professional training events for local planners.

Local Sustainability Planning Tool

The SCAG 2012 RTP was developed with support from the Local Sustainability Planning Tool (LSPT), a GIS tool that allows users to evaluate various development scenarios and potential impacts (**Figure 5.7-6A and 6B**). The LSPT is a sketch planning tool that can be used by local jurisdictions and members of the public to analyze the impact of different land use scenarios on vehicle ownership, vehicle miles traveled, mode-use, and their associated effects on GHG emissions. (See <http://rtpscs.scag.ca.gov/Pages/Local-Sustainability-Planning-Tool.aspx> for more information or to access the LSPT.)

Figure 5.7-6a SCAG RTP Workshop Scenario Elements

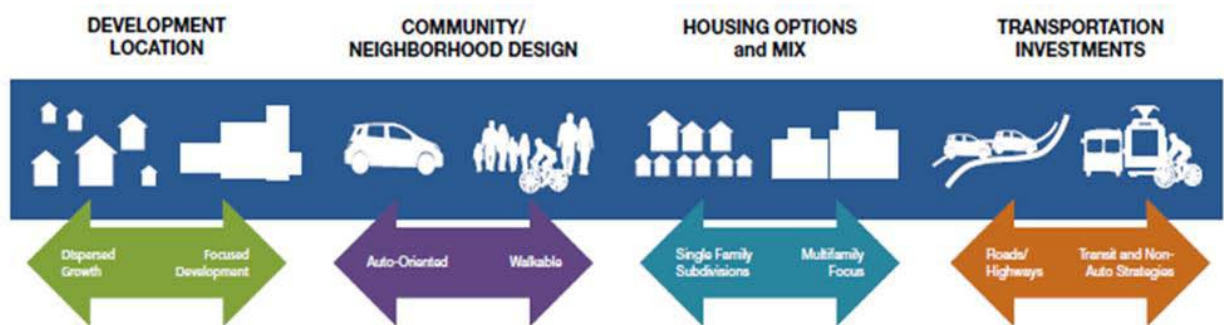
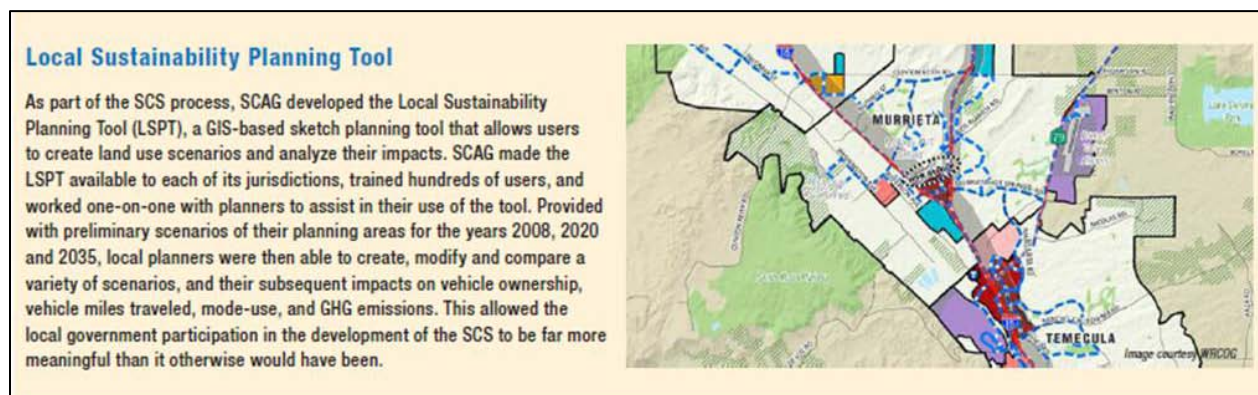


Figure 5.7-6b SCAG Local Sustainability Planning Tool (SCAG 21012 RTP)



The implementation of land planning relies on three primary tools authorized in California Government Code (CA Code): the General Plan (Section 65300 et seq.) and Specific Plans; the zoning ordinance (Section 65850 et seq.); and the Subdivision Map Act (Section 66410 et seq.)².

General Plans

General Plans include development goals and policies and lay the foundation for land use decisions made by planning commissions, city councils, or board of supervisors. General Plans must contain text sections and maps or diagrams illustrating the general distribution of land uses, circulation systems,

² Fulton, William, 1999. Guide to California Planning, Second Edition. Point Arena, California, Solano Press Books.

open space, environmental hazard areas, and other policy statements that can be illustrated. General Plans must contain seven mandatory elements: circulation, conservation, housing, land use, noise, open-space, and safety. Cities and counties could adopt an optional water element in their general plans, but few have done so. Instead, water has typically been addressed in the mandatory conservation element or in optional natural resources or public facilities elements. Commonly, water is addressed only in terms of water supply and/or water conservation.³ CA Code (65302.2) requires General Plans adopted or revised after January 1, 1996, to consider any applicable Urban Water Management Plans.

General Plans can be amended four times per year, and multiple individual changes can comprise each amendment. Although not required, guidance is available for preparing a Water Element⁴. Few jurisdictions in California have prepared Water Elements for their general plan (see Merced County for one example).⁵ Also, “The Department of Water Resources or the Central Valley Flood Protection Board, as appropriate, and the Department of Fish and Game may develop site design and planning policies to assist local agencies which request help in implementing the general plan guidelines for meeting flood control objectives and other land management needs.” (CA Code 65303.4)

Discussions with the Land Use and Water Planning Pillar noted that there are contrary attitudes about the effectiveness of General Plans among the watershed stakeholders. Local governments, who approve the plans, tend to view them favorably as dynamic tools for planning land use because city councils or board of supervisors have the capacity to approve General Plan Amendments as deemed appropriate. On the other hand, local residents and environmental organizations voice frustration with General Plans that in practice are not routinely “implemented over time for the physical development of the communities”, but rather serve as convenient placeholder planning documents for processing routine General Plan Amendments that expand land use.

Specific Plans⁶

Specific plans are flexible and scalable by design and can be used in different ways to implement LID and watershed protection priorities. If adopted by resolution, a specific plan is a policy document. If adopted by ordinance, a specific plan can be a regulatory document. An overlay specific plan could be adopted either by resolution or ordinance to address only the watershed protection issues. Alternatively, a specific plan could be adopted to address the comprehensive development or redevelopment of a defined area and include watershed protection requirements among the standards

³ Low Impact Development Manual for Southern California, 2010. Low Impact Development Center; <https://www.casqa.org/LinkClick.aspx?fileticket=zA3DaxiwHtE%3d&tabid=242>

⁴ State of California General Plan Guidelines 2003. http://opr.ca.gov/docs/General_Plan_Guidelines_2003.pdf

⁵ Merced County Water Element draft: June 2011: http://www.co.merced.ca.us/pdfs/planning/generalplan/2030sections/mcgpu_2030gp_part_ii_12_water_pcrd_2011_06_14.pdf

⁶ Appendix B: California Planning and Regulatory Framework for LID. Low Impact Development Manual for Southern California, 2010. Low Impact Development Center; <https://www.casqa.org/LinkClick.aspx?fileticket=zA3DaxiwHtE%3d&tabid=242>

and implementation measures applicable to the area. The Land Use and Water Planning Pillar stakeholders support the expanded use of Specific Plans as Watershed Planning Tools.

Zoning Ordinances

CA Code Section 65850 authorizes zoning as a regulatory mechanism to implement general plans. Zoning is adopted by ordinances and must be consistent with general plans. Zoning requires compliance on a lot-by-lot basis with specific enforceable standards. Zoning ordinances specify categories of land use and associated standards such as minimum lot size, maximum building heights, and minimum building setbacks. Zoning ordinances can include overlay zones that provide additional standards for specified areas such as historic districts, wetlands, and other areas deemed to require extra protection.² AB 1881 required California cities to adopt landscaping ordinances to improve water conservation through drought-tolerant landscaping and effective irrigation control systems.

Subdivision Map Act

Any subdivision of land for sale or financing requires local government approval through adopted subdivision regulations required by state law. Subdivision approvals can be granted by local Planning Commissions or may also require approval by local government councils or boards. Such approvals offer an opportunity for local government to require conditions of approval for land development, including water supply, water quality, habitat conservation, or other watershed-based requirements.

CEQA

The California Environmental Quality Act (CEQA), is not a planning law as such, but has significantly influenced land use since it was passed in 1970. "By law CEQA has four functions:

1. To inform decision-makers about significant environmental impacts;
2. To identify ways environmental damage can be avoided;
3. To prevent avoidable environmental damage;
4. To disclose to the public why a project is approved even if it leads to environmental damage."⁷

The ideal timeframe for CEQA implementation is as early in the planning process as possible to "enable environmental considerations to influence project program and design and yet late enough to provide meaningful information for environmental assessment" [CA Code §15004(b)]. Since the earliest planning stage is the development of the applicable General Plan, Water and Land Use considerations should be incorporated into general plans in California. Any subsequent municipal planning must be consistent with a municipality's general plan. Therefore, incorporation of water and land use issues into general plans would provide support at the foundational level of development planning, and would serve to link LID with CEQA Guidelines.² The requirements of the National Environmental Policy Act (NEPA) were patterned after CEQA, and only apply to projects with federal involvement. Therefore, compliance with CEQA is typically sufficient in substance to comply with NEPA, although NEPA compliance may require a longer timeline.

⁷ Fulton, William, 1999. Guide to California Planning, Second Edition. Point Arena, California, Solano Press Books. Chapter 9.

CEQA Incentive⁸

SB 375 provides incentives in the form of CEQA streamlining to encourage community design that supports reduction in per capita GHG emissions. Generally, two types of projects are eligible for streamlined CEQA review once a compliant RTP/SCS has been adopted: (1) residential/mixed use projects (consistent with the SCS) or (2) a Transit Priority Project (TPP). See Appendix: SCS Background Documentation for more information on CEQA streamlining incentives through SB 375.

Development codes

Development codes typically combine zoning ordinances, subdivision regulations, design review guidelines, and related planning requirements.¹ Recently developed CalGreen building codes are now required.

As of January 1, 2011, “California requires new buildings to reduce water consumption, employ building commissioning to increase building system efficiencies, divert construction waste from landfills, and install low pollutant emitting finish materials. CALGreen’s mandatory measures establish a minimum for green construction practices, and incorporate environmentally responsible buildings into California cities without significantly driving up construction costs in a slow economy.

CALGreen has approximately 52 nonresidential mandatory measures and an additional 130 provisions that have been placed in the appendix for optional use. Some key mandatory measures for commercial occupancies include specified parking for clean air vehicles, a 20% reduction of potable water use within buildings, a 50% construction waste diversion from landfills, use of building finish materials that emit low levels of volatile organic compounds, and commissioning for new, nonresidential buildings over 10,000 square feet.”⁹

OWOW and Land Use Planning Interaction

There are a variety of innovative collaborations that already exist between water supply agencies and other public agencies that are producing mutually-beneficial and cost-effective results, as demonstrated in the Plan. However, opportunities remain for water agencies to develop more effective partnerships with local governments, developers and environmental organizations that will leverage funds, resources and expertise.

As previously described, the OWOW Plan was developed in an open, multi-jurisdictional and multidisciplinary process in which the interests of all stakeholders in the watershed were considered. The Steering Committee and the Pillars included representatives not only from water agencies, but from cities and counties, the development community, and a host of non-governmental organizations. The resulting Plan: (1) links the need for sufficient and clean water with land use, environmental protection, and the need for economic development; (2) and increases understanding of the link between water resources and land use for both land use planning and water agencies. More comprehensive

⁸ SCAG 2012. Regional Transportation Plan 2012-2035: Sustainable Communities Strategy. <http://www.scagrtpl.net/>

⁹ The 2010 California Green Building Standards Code. <http://www.bsc.ca.gov/Home/CALGreen.aspx>

understanding creates a perspective of land use planning that includes new development, open space for parks, recreation and environmental services, such as habitat and water filtration and natural treatment. Furthermore, the OWOW process strengthens interactions between water agencies and land use planning entities into the future.

Incorporating water use considerations into land use planning will be required to meet the requirements on Senate Bill (SB) 7, which requires urban water agencies to reduce per capita consumption 20% by 2020. Considering that outdoor use (i.e. landscaping) accounts for at least half of typical water use, land use decisions will have tremendous impact on future water conservation efforts.

The following sections describe ongoing efforts in the region to simultaneously address land use and water planning:

Working with Residential, Commercial and Industrial Developers

Water supply agencies, including the Metropolitan Water District of Southern California (MWDSC), have been investing in landscape water use efficiency projects with homebuilders for several years.

As of January 2010, Assembly Bill (AB) 1881 required local governments to adopt the State's Model Water Efficient Landscape Ordinance or equivalent ordinance, and required public and private development projects to submit water efficient landscape plans for areas equal or greater than 2,500 square feet. AB1881 institutionalizes the incorporation of water efficient landscaping into new development at the State level. Stakeholders in the Chino Basin developed an AB1881-equivalent landscape ordinance prior to the 2010 deadline as a locally-tailored alternative.

In addition to the accomplishments to be provided by AB1881, residential, commercial, and industrial developers have been working to support critical aspects of integrated regional water management, such as:

- Supporting LID site designs that reverse the conventional concept of stormwater runoff as a waste needed to be conveyed offsite as rapidly as possible, to recognizing stormwater as an essential resource to be captured for groundwater recharge or other use. Implementation of LID techniques also reduces pollutants in stormwater, including metals, nutrients, pesticides, total dissolved solids, petroleum hydrocarbons, and bacterial contaminants.
- Reducing the proportion of impervious surfaces in new developments by installing green roofs or rainfall-capturing roofs, and pervious pavement for parking lots, sidewalks, plazas and other similar uses.

Working with Local Governments

Water supply agencies, such as MWDSC, continue to expand investment of resources in water-efficient, highly visible public landscaping projects in cooperation with local governments in the watershed. Unfortunately, investments to date have yet to create the critical mass of water-use efficient landscapes necessary to prompt the public toward a dramatic paradigm shift. Considerable additional investment is

necessary to reduce unreasonable water waste and meet SB 7 requirement of 20% reduction in per capita water use by 2020.

Obsolete land use practices present in visible public places that employ wasteful water use practices should be prioritized for investment to be retrofitted and transformed into examples of water use efficiency and livability.

The outcome of investing resources in this manner offers the benefits of:

- Increasing the conservation of potable water supplies that are currently dedicated to irrigating public landscapes that lack water use efficiencies
- Reducing the portfolio of negative images of public agencies wasting water
- Educating the public using visible public places with signage that explains the smart controllers and irrigation systems that are supporting attractive water-use-efficient landscape designs that the public would find desirable in their own homes and businesses
- Replacing impervious surfaces in public projects where flashy urban runoff is a chronic problem with attractive permeable paving illustrated with signage for the public
- Natural resources, such as wetlands, floodplains, recharge zones, riparian area preservation and restoration, open space, and native habitats, should be identified, preserved and restored as valued assets for flood protection, water quality improvement, groundwater recharge, habitat, and overall long-term water resource sustainability
- Reducing development in high risk areas prone to wildfires and post-fire debris flows that reduce the efficiency of water supply programs when foreseeable disasters do occur
- Sewering disadvantaged communities with failing septic systems that are proximate to available sewer lines where residents lack financial resources and political will

Working with Environmental Organizations

Agencies and stakeholders in the Watershed have partnered with the environmental community in restoring over 3,000 acres of riparian habitat. These projects have increased surface water flow, replacing water hungry invasive species with native plants, and increased habitat suitability for endangered riparian species. However, water supply agencies have insufficiently invested resources working with environmental organizations in low-income communities that disproportionately lack sufficient land surfaces for the capture of stormwater from urban runoff that also can serve as open space for recreation.

The outcome of investing resources in this manner reduces stormwater pollutant loads, and serves the needs of Disadvantaged Communities.

Regional and Watershed Examples

University of California, Irvine Cooperative Extension LID Test Site¹⁰

The University of California, Irvine Cooperative Extension (UCCE) Low Impact Development (LID) Test Facility (UCCE Facility), located in Irvine, California, consists of three model residential landscapes each with a mock residence, and a fourth, undisturbed landscape (**Figure 5.7-7**). The residential landscapes were constructed with various levels of LID BMP implementation. The volume and pollutant concentration of discharges, and the percentage of runoff from various BMPs and LID systems have been monitored, and the soil type reviewed.

Figure 5.7-7 UCCE LID Site



The mock residences are used for equipment storage and occasionally as meeting rooms or classrooms during demonstrations of the facility. Pesticides and fertilizers were applied according to package directions, and irrigation was applied as needed to maintain the residential landscapes. The plots are each 90 feet by 45 feet, totaling 4,050 square feet. The mock residences have footprints of 576 square feet. The LID features at the four sites are described below.

¹⁰ San Bernardino County Flood Control District Lid Guidance Manual and Training Program Monitoring Technical Memorandum Revised July 2011. Prepared by Mactec Engineering, Inc.

- Landscape A: Typical Landscape – The typical landscape was designed to represent a single-family residence in a modern development with no LID techniques implemented. This landscape was developed with a concrete driveway, landscaped grass and flowers, concrete walkways, standard roof drains, and landscape drains running to the street. Landscape A is approximately 37 percent impervious.
- Landscape B: Retrofit Landscape – The retrofit landscape consists of LID techniques that a homeowner could install on an existing residential development such as Landscape A. The driveway and walkway were constructed with pervious stone pavers, and a positive sub-drain/infiltration system was installed under the driveway. A dry-well infiltration pit, rain gutter cisterns, and minor landscaping modifications including native plant materials are additional features of the retrofit landscape. Landscape B is approximately 14-percent impervious and 23-percent semi-pervious (stone pavers).
- Landscape C: Full Implementation or Sustainable Landscape – The full implementation landscape consists of LID features such as interlocking pavers for the driveway and walkways, landscape infiltration trenches, and landscaping with low water use and native plants. Roof drains are directly connected to dry wells. This landscape was designed with the goal of minimizing runoff from irrigation and storms. Landscape C is approximately 14-percent impervious and 23-percent semipervious (stone pavers).
- Landscape D: Undisturbed Landscape – The graded lot consists of an empty, undeveloped landscape adjacent to the three residential landscape sites. This area is surrounded by a berm and is absent a driveway, walkways, a housing structure, landscape vegetation, and any LID features of the residential sites. This site was established in March 2009 and is used to represent the characteristics of pre-development land.

Drainage for the four landscapes has been designed to direct all runoff into concrete collection boxes located at the west corner of each lot. Each of the collection boxes has a sump pump connected to a flow meter. A data logger inside each mock residence records the volume of all discharges. Grab samples have been collected from the three residential landscapes and analyzed for pesticides during both dry weather and wet weather events between early 2007, late 2008, and in early 2010 for a separate perimeter study.

Multi-Objective Stormwater Management Projects in the Chino Creek Watershed¹¹ *Chino Creek Wetlands and Educational Park*

This project, conceptually modeled after the Sepulveda Basin in Los Angeles, where a public park is a part of the flood control system, had two main objectives. The first objective was to detain, infiltrate and treat stormwater from the upper, off-site watershed and tributary areas; and the second was to be a demonstration site for different types of constructed wetlands so that developers in the area would understand the most cost-effective wetland type for their projects. Developers were very interested to learn whether there was a wetland type that had a small footprint, reasonable capital and O&M cost,

¹¹ SCWC, 2012. Stormwater Capture: Opportunities to Increase Water Supplies in Southern California. http://socalwater.org/images/SCWC_Stormwater_White_Paper_Case_Studies.Smaller.pdf

and was reliable over time so that regulations were met consistently. Different types of wetlands operating in parallel provided comparable treatment data.

The 22-acre wetlands and educational park serves as a demonstration area and has incorporated educational features for improving water supply, stormwater treatment and water efficiency. Educational tours are provided through a partnership between IEUA and the Santa Ana Watershed Association (SAWA) (see: <http://www.ieua.org/education/docs/ChinoCreekParkBrochure.pdf>) (**Figure 5.7-8**).

Figure 5.7-8 Chino Creek Wetlands



The park was designed to capture and infiltrate flows generated from up to a 25-year frequency design storm as well as to attenuate flows from the 100-year storm event (395 cubic feet per second (cfs)) from the upper tributary area of 700 acres.

Stormwater flow from the upper tributary area enters the Park from two reinforced concrete boxes on the north and northwest of the site. Currently, a 3 ft. x 10 ft. box culvert transports this flow under Kimball Avenue in the north location into an unlined channel and then a detention pond before entering the park for treatment.

The detention basin was designed to divide the flow into three types of wetlands:

- Subsurface flow
- Surface emergent marsh/pond habitat
- Cottonwood/Native Willow riparian channel

The park design also included small surface bioswales, in order to provide further water quality improvement and create habitat for native flora and fauna.

Both the subsurface flow and surface type of wetlands were expected to provide water quality improvement and to retain storm flows on-site. The subsurface wetlands were designed based on a pilot project that was completed at a local dairy previous to the design of the park. The Cottonwood/Native Willow riparian channel was designed to mimic natural wetlands typically found in Southern California and in this region.

The wetland basins were all designed so that grab sampling could occur and to provide electrical outlets for automatic sampling if desired. Key operations and maintenance personnel were involved in the design to promote ease of maintenance. While the site looks very organic, the entire site allows easy re-routing of flow from one basin and/or wetland to another, to facilitate maintenance.

The upland park areas have trails, habitat and open space, and were designed for detention and sheet flow of stormwater. Open areas were planted with native vegetation and mulched with compost. After traversing through the wetlands and the habitat, flow is discharged under El Prado Road and discharges as surface flow in an existing flow pattern to Chino Creek.

Inland Empire Utilities Agency (IEUA) Headquarters

The IEUA Headquarters (HQ), a Leadership Energy & Environmental Design (LEED) Platinum facility, was designed to meet all LEED requirements for both site and water, including stormwater, and became a demonstration of on-site BMPs. This site is aesthetically pleasing, with outdoor opportunities for staff, including picnicking. It has provided extensive opportunities for education and public outreach, including numerous tours and demonstration visits.

The four main goals of the HQ site were determined by IEUA and by LEED Platinum certification criteria, and included:

- Maximize open space, native plants, and habitat
- Reduce stormwater
- Treat stormwater
- Use of recycled water

Maximizing open space involved conserving existing natural areas, restoring damaged areas (dairy farm activities), providing habitat and promoting biodiversity within the vicinity. The Agency reduced the

development of its footprint (site area, building footprint, future building expansion, parking lot, water feature and pavement) to exceed the local zoning open space requirement for the site by 25%. Reducing stormwater flow involved eliminating runoff and contamination and increasing on-site infiltration by limiting the disruption of natural water flows. The site was graded in such a way as to create an on-site retention basin with a capacity of 75.9 acre-feet. This was in addition to the infiltration capacity of the site itself and the parking lot. Reuse of stormwater was not done at the site, as it was seen as not cost-effective and potentially maintenance intensive.

The treatment of stormwater was accomplished by focusing on both suspended solids and phosphorus by limiting disruption of natural water flows by eliminating stormwater runoff, increasing on-site infiltration and using vegetation and the natural biota in soil to treat stormwater contaminants.

Infiltration and retention basins were used to estimate the removal of pollutants (Total Suspended Solids [TSS] and Total Phosphorus [TP]) from on-site storm runoff produced from an 85th percentile 24-hour storm event (“first flush” storm runoff). Bio-filters and bio-swales are included as pre-treatment for the infiltration/retention basins. The large wet pond is also used as a BMP facility. The majority of the parking areas have permeable surfaces which provide additional stormwater treatment, thus improving water quality.

Recycled water from the adjacent Regional Wastewater Treatment Plant No. 5 (RP-5) was considered to be a critical component for reducing water consumption and demonstrating water conservation practices. Recycled water is an important product of the Agency. Demonstrating the use of this water on grass lawns and native and California adaptive plants is still seen today as important in overcoming barriers to its use.

Cucamonga Creek Watershed Regional Water Quality Project¹²

This is a unique multi-jurisdictional project to create and restore the region’s native ecosystems while enhancing recreational and educational uses as part of a regional watershed management plan. Spearheaded by the City of Ontario and supported by the City of Chino, the County of San Bernardino, the Inland Empire Utilities Agencies (IEUA), the Orange County Water District (OCWD), and the United States Army Corps of Engineers (USACE), the project transforms a fallow and underutilized area within the Prado Basin to provide regional environmental and recreational benefits. The project’s unique regional approach is also supported by the State Water Resources Control Board through grant funding and is an integral part of the Santa Ana Watershed Project Authority’s (SAWPA) Integrated Regional Water Management Plan, “One Water, One Watershed” (OWOW).

Prado Dam was originally constructed as a flood protection project and was completed in 1941 (see Chapter 5.8, Pages 10-11 for more complete description). Although there are many benefits associated with having the dam in place and valuable habitat being developed behind the dam, it is a physical

¹² Text from City of Ontario 2013.

barrier in the Santa Ana River Channel. As such, the dam creates habitat blockage for a variety of species that rely, now or historically, on the Santa Ana River as a migratory corridor¹³.

Water Quality Benefits

The Prado Basin contains some of the best and largest riparian habitat in all of Southern California. Included are threatened and endangered species such as the least Bell's vireo, arroyo chub, and Santa Ana sucker. In addition, groundwater pumped from the basin is the primary source of drinking water consumed and used in Orange County. The Santa Ana Regional Water Quality Control Board (RWQCB) has designated Cucamonga Creek/Mill Creek as impaired pursuant to Section 303(d) of the Clean Water Act. The project provides a regional approach to enhancing water quality in Prado Basin, protecting the viability of native habitat while improving groundwater quality for downstream water users.

The Cucamonga Creek Watershed encompasses approximately 77 square miles, comprised of portions of the cities of Ontario, Chino, Rancho Cucamonga, and Upland. Pollutants such as pathogens, nutrients, salinity/total dissolved solids/chlorides, and suspended solids are known to occur in these water bodies. Active and former agricultural uses and urban runoff from developed areas represent the primary contributors to the pollutants found in the watershed.

The project, proposed for completion in 2014, diverts flows from Cucamonga Creek into a series of natural water quality treatment ponds that include areas of open water and wetland vegetation. The system is designed to first remove trash and debris as water flows through a de-silting basin, then remove pollutants through natural settlement, ultraviolet light treatment, and biological activity as it travels through native wetland vegetation. The system is designed to be entirely gravity fed, requiring no manmade energy sources, thus promoting progressive water quality alternatives that advance the use of renewable, sustainable, and environmentally sensitive designs, materials and practices (**Figure 5.7-9**).

¹³ Source: Comments from Anthony Spina, National Marine Fisheries Service, West Coast Region.

Figure 5.7-9 Cucamonga Creek Wetlands

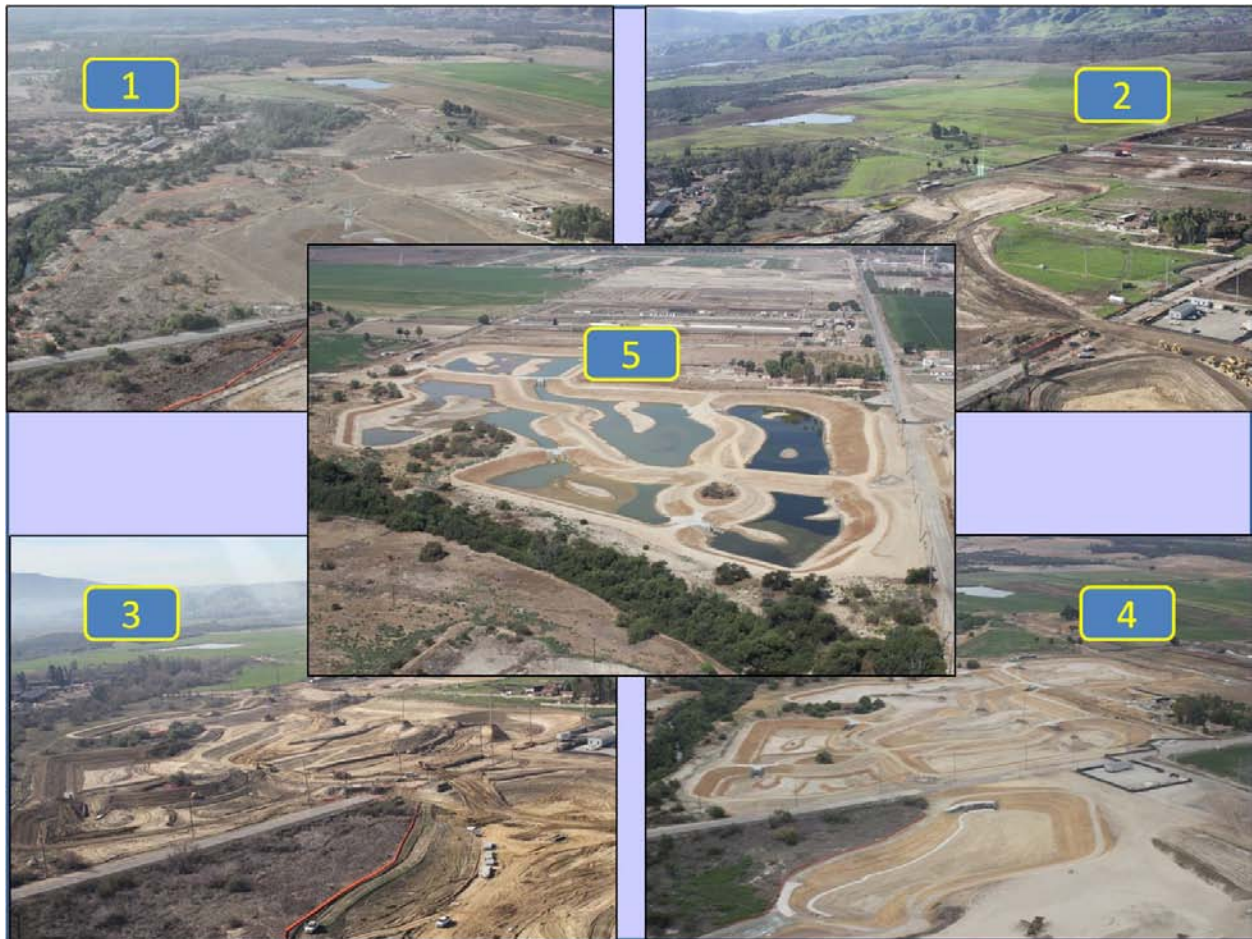


The project is a regional natural treatment facility designed to hold and treat 160 acre-feet of water. This volume translates into treatment of 10 – 18% of all wet-weather runoff in the Cucamonga Channel watershed. In contrast, a single-function water quality project of the same size in an upstream tributary could effectively capture approximately 6% of the total wet-weather runoff from the watershed. Thus, the project is an effective means of leveraging water quality benefits for the region.

Recreational Benefits

The project's recreational plan provides for additional passive recreation opportunities in the Prado Basin by incorporating approximately 3.5 miles of hiking and equestrian trails, forming a looped trail system around vegetated and open water ponds (**Figure 5.7-10**). The proposed trail system includes benches in locations that offer vistas of the wetland ponds and the surrounding environment, providing wildlife viewing opportunities with interpretative signage. Planting will be coordinated around the benches to provide shade and increase the aesthetic character of the views. The surrounding native plantings and open water wetlands will attract numerous wildlife species, offering excellent wildlife viewing opportunities.

Figure 5.7-10 Cucamonga Creek Time Series



Interpretive signage is proposed at the trailheads as well as throughout the trail system to provide park users with a better understanding of the history of the area; local wildlife that might be viewed; information on native vegetation, including plant communities and individual species; and an explanation on water quality and natural treatment systems.

Consistent with the needs identified by the USACE Prado Basin Master Plan and the San Bernardino County Parks Department, the trail system will provide future trail connections for the inter-county trail system as well as the Coast to Crest Trail System intended to connect the Santa Ana River Trail from its outfall in Orange County to the mountains in San Bernardino. The new trail system will also connect to the City of Chino Urban Buffer linear park/open space (The Preserve Specific Plan, City of Chino – March 2003, Amended – January 2008).

Native Habitat Creation and Restoration Benefits

The Prado Basin currently protects 4,400 acres of native habitat. The Prado Basin also contains some of the best and largest riparian habitat in all of Southern California with more than 300 species of plants, 13 species of reptiles, 47 species of breeding birds, 11 raptor species, and 23 mammal species. Included

are threatened and endangered species such as the least Bell's vireo, arroyo chub, and Santa Ana sucker.

The Project will create 32 acres of native habitat through the use of native planting in the wetland ponds and slopes in addition to replacing non-native vegetation, agricultural lands, and disturbed areas with high quality native vegetation. The Native Habitat Plan creates several habitat types that will benefit local wildlife, including endangered species, by utilizing species that promote nesting, breeding and foraging. The Native Habitat Plan also supports the Recreation Plan by providing shade, wildlife viewing opportunities, and aesthetics.

Low Impact Development Guidance and Training for Southern California

This project, funded under Proposition 40 and cooperatively conducted with local governments and regulatory agencies from six counties (Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura; and RWQCBs from Los Angeles, Santa Ana, and San Diego regions), began in 2006. It was led by the San Bernardino County Flood Control District with guidance from the Southern California Stormwater Monitoring Coalition (SMC), and a stakeholder-comprised Technical Advisory Committee (TAC). The project developed the Low Impact Development Manual for Southern California, which facilitates the implementation of LID techniques for projects in Southern California. It also provides guidance for municipalities, land developers, consultants and other design professionals who prepare stormwater engineering plans and specifications in Regional Water Quality Control Board Districts 4, 8 and 9 of Southern California.

The LID GTPSC also conducted several training workshops in 2007 and 2008, and transferred the final LID Manual to the California Stormwater Quality Association (CASQA) for statewide access via the World Wide Web and to steward updates and revisions to the manual over time. CASQA now hosts an LID web portal and will be developing this portal under a 2012 Proposition 84 Stormwater Grant.

Finally, the project included a monitoring element designed to evaluate the effectiveness of LID BMPs in reducing stormwater impacts. Monitoring has been underway at selected sites, although precipitation has generally been less than average, so few events have been captured. The monitoring program is currently under review by the SMC, and is expected to be refined and continued. The objective is to adaptively update the LID Manual based on actual performance of LID in the field.

Riverside County Flood Control & Water Conservation District LID Retrofit Project

The RCFCWCD retrofitted their 15-acre headquarters near downtown Riverside with LID BMPs from their LID BMP Design Manual to showcase, learn, and gather local, real-world data of constructible LID BMPs. The Project was supported through a partnership with SAWPA and funded in part by Proposition 13 Water Bond funding administered by the SWRCB. The Project entailed construction and installation of selected LID BMPs, including porous pavers, porous concrete pavement, porous asphalt pavement, biofiltration basins, and a vegetated infiltration swale. The Project also replaced turfed landscaped areas with drought tolerant and California-friendly landscaping (**Figure 5.7-11**). The total construction cost of the Project was \$ 2,557,634.36.

Figure 5.7-11 Riverside County FC and WCD LID Testing and Demonstration Facility



A dedicated website was developed during the project to educate the public about LID practices. The website also served as an avenue to show construction progression of the different LID BMPs. Since construction completion in 2012, the facility has welcomed and educated visitors through signs, markers, and a walking guide. The facility has also garnered several awards, including the ASCE's (Region 9, Los Angeles Section) 2012 Civil Engineering Project Improvement Award, ASCE Region 9 2012 Outstanding Stormwater Management Project, and the Southern California APWA 2012 Project of the Year in Stormwater Quality.

The project also constructed and installed a monitoring center which will allow future water quality monitoring of LID BMP influent and effluent that aims to enumerate LID BMP performance in the semi-arid Southern California climate.

San Bernardino County Vision Water Element^{14, 15}

This project is an effort to “improve countywide efforts to plan and manage water resources in San Bernardino County.” The Vision: “Develop a Countywide strategy that encourages collaboration among business, residents, and water agencies that will:

- Address multiple watersheds and water agencies
- Build institutional and organizational capacity for future countywide networking efforts
- Create mutually beneficial investment opportunities to ensure adequate water supplies and quality for the future”

“Leaders from public and private water agencies, regulators, planners, education and business formed the Countywide Vision Water Element group in January 2012 and have been meeting regularly to discuss the challenges faced by the county community as it strives to meet the water needs of an ever-growing region.”

“The Water Element Group recognized the need for a high-level, comprehensive look at countywide water management. With participation from water agencies throughout the County, the Water Element Group prepared an inventory of current and planned water needs and available water resources. The inventory found that more than ***enough water will exist to meet the needs of San Bernardino County residents and businesses through 2035 only if water users step-up conservation efforts and the public and local government leaders are willing to invest in projects that will store and protect additional water supplies.***”

“The County Vision Water Element group will use the information contained in the inventory to promote partnerships among water agencies and other stakeholders within the county, improve water management and efficiency, protect and conserve water resources, and identify the most important next steps the group should take to further these goals.”

City of Ontario New Model Colony General Plan¹⁶

Since 1998, the City of Ontario has been developing a bold vision for its future growth, including the adoption of its general plan and adding 3,303 acres of former agricultural land into its sphere of influence. The City’s recent plans call for 13,000 new housing units across a broad range of housing types and a mix of business spaces oriented towards three mixed-use centers that are served by pedestrian-friendly roadways and a large central park. Emphasizing connections to corridors and transit, the City is creating a major regional center for Southern California.

¹⁴ San Bernardino County Countywide Water Inventory Executive Summary September 5, 2012
http://www.sbcounty.gov/Uploads/CAO/Vision/Water_Inventory_Executive_Summary_9_6_2012_v01.pdf

¹⁵ <http://www.sbcounty.gov/Uploads/CAO/Vision/FINAL-Water-Conference-Presentation.pdf>

¹⁶ SCAG 2012. Regional Transportation Plan 2012-2035: Sustainable Communities Strategy, Page 149.
<http://www.scagrtp.net/>

Existing Forums to Address Watershed Planning

SCAG is the Regional Transportation Planning Authority. As such, SCAG has been evaluating regional growth problems and developing guidance and approaches to implement community sustainability principles in collaboration with local governments and County Transportation Commissions (CTCs). Water quality and water supply are key sustainability considerations and are given high priority in the SCAG efforts. The Water Chapter of SCAG's 2008 Regional Comprehensive Plan (RCP)¹⁷ (Pages 48-63) evaluates water priorities and climate change, and provides comprehensive recommendations for addressing these issues in the immediate future as related to regional growth needs.

The SCAG recommendations are entirely consistent with the OWOW Mission to develop a sustainable and adaptable watershed. For example the 2008 RCP provides the following Water Goals:

- “Develop sufficient water supplies through environmentally sustainable imports, local conservation and conjunctive use, reclamation and reuse to meet the water demands created by continuing regional growth
- Achieve water quality improvements through implementation of land use and transportation policies and programs that promote water stewardship and eliminate water impairments and waste in the region
- Foster comprehensive and collaborative watershed planning within the region that produces waterwise programs and projects with multiple benefits and ecosystem protections, integrating local government planning efforts with those of special districts, environmental advocate and other watershed stakeholders”

Transportation Planning¹⁸

Since 2000, SCAG has worked with Southern California stakeholders to create a dynamic regional growth vision. “Charged by federal law with preparing a Regional Transportation Plan every four years, SCAG has traditionally focused most on the mobility aspects of the region's growth. Under state law, SCAG is also charged with working with its member local governments on planning for an adequate regional housing supply.”

The 2012 RTP land use mitigation program includes the following types of measures:

- Encourage cities and counties to update their general plans and provide the most recent plans to SCAG
- Work with member cities to ensure that transportation projects are consistent with the RTP and general plans
- Work with cities and counties to ensure general plans reflect RTP policies

Water Resources in the RTP

¹⁷ SCAG 2008. Regional Comprehensive Plan. http://www.scag.ca.gov/rcp/pdf/finalrcp/f2008RCP_Water.pdf

¹⁸ SCAG 2012. Regional Transportation Plan 2012-2035: Sustainable Communities Strategy. <http://www.scagrtp.net/>

Cumulative impacts to water resources from the growth projected in the 2012 RTP include potential water quality impairment from increased impervious surfaces; increased development in alluvial fan floodplains; and increased water demand and associated impacts. Increased greenhouse gas emissions from the transportation system impact the security and reliability of the imported water supply. The water resources mitigation program from the 2012 RTP includes the following types of measures:

- Utilizing advanced water capture and filtration techniques, showing a preference for naturalized systems and designs, to control stormwater at the source
- Avoiding any new construction of impervious surfaces in non-urbanized areas, such as wetlands, habitat areas, parks, and near river systems
- Avoiding any new construction that provides access to flood-prone areas, such as in alluvial fans and slide zones
- Protection and preservation of existing natural flood control systems, such as wetlands and riparian buffers, and expansion of such systems in areas where they do not currently exist
- Constructing projects according to Best Management Practices for water quality protection and water conservation, including low-impact development and green building standards
- Coordinating project development and construction efforts across jurisdictional, agency, and departmental boundaries, to increase project benefits

Orange County Sustainable Communities Strategy (SCS)¹⁹

The Orange County Council of Governments (OCCOG) developed their own SCS and entered into a *Memorandum of Understanding with SCAG specifying submission* schedules and standards for each component of the subregional SCS. While OCCOG conducted their own research and outreach to develop their SCS, they worked closely with SCAG through workshop preparation (**Figure 5.7-6a**), data and information sharing, and regular meetings. SCAG's Local Sustainability Planning Tool was also made available along with trainings and one-on-one working sessions to assist in the review and revision of the preliminary scenarios.

Riverside County and City Arroyo-Watershed Project

The Riverside Arroyo/Watershed Policy Study, completed in November 2006, was a joint effort between the City of Riverside and the County of Riverside to establish a broad plan for the protection of the arroyos and other watercourses that traverse the boundary between the City and County. The study also made recommendations intended to facilitate the protection of water quality, and the augmentation of water supply for the City-County area. The study applies to a large portion of the Santa Ana Watershed area, offers a comprehensive program of water protective policies and land use/riparian and water interface design concepts, and involves two closely coordinated neighboring jurisdictions, and thus can provide a model for other jurisdictions within the OWOW Plan area, both in terms of policies and design concepts, as well as inter-jurisdictional cooperation in implementing them. The study was prepared by the County-City Arroyo/Watershed Committee (CCAC), an interdisciplinary group whose members were appointed by the Riverside City Council and the Riverside County Board of Supervisors.

¹⁹ Orange County Sustainable Communities Strategy, June 2011. <http://www.occog.com/pdf/OCSCS20110614.PDF>

Many organizations contributed to the work of the CCAC, especially SAWPA, the California Department of Fish and Game, the Riverside-Corona Resource Conservation District, the Riverside County Flood Control and Water Conservation District, SAWA, Riverside Land Conservancy, UCR (logistical research), and Mt. San Jacinto College.

The recommendations of the CCAC in the Riverside Arroyo/Watershed Policy Study were intended to result in implementing amendments to both the City's and County's General Plans, their zoning ordinances, grading ordinances, and other ordinances and policies under the charge of the those jurisdictions' Planning, Transportation, Flood Control, Health, Agricultural Commissioner, and Parks offices/departments. Study recommendations have been incorporated into the City's General Plan and ordinances, and are in the process of being similarly adopted by the County as part of a major, comprehensive General Plan update.

The Study's policies address a wide variety of land use and watershed issues, including (but not limited to): building/graded area setbacks from arroyos; illegal grading policies; a GIS tool for mapping watercourse features requiring protection; golf course setbacks from arroyos; a model policy associating slope, setbacks from arroyos, and lot size; requirements for septic tanks; policies for bridging, rather than grading road (with culverts) arroyo crossings; water quality protection policies that emphasize multiple, compatible uses, using storm water management and runoff as design elements; requirements for domestic and farm animals and livestock grazing in and near arroyos; restrictions on nurseries in and near arroyos; and restrictions on the location of utility facilities in and near arroyos. The CCAC GIS Watercourse Layer Map of arroyos and watercourses in the project area was accompanied by 19 specific recommendations for proactive and sensitive development that occurs near watercourses and arroyos²⁰.

The Study identifies several "next" steps to carry forth the benefits of its approach, including:

- Ensure the incorporation of the study's concepts on a long-term basis into local general plans and zoning ordinances
- Thorough, adequate assessments of at-risk land use conversions in and near arroyos;
- The establishment of various levels of governance and coordination on a watershed-wide basis; and public education about the study and the public's role in assisting in its implementation
- Conduct an objective evaluation of the effectiveness of existing protection measures and their implementation

²⁰ Riverside Arroyo Watershed Policy Study: Recommendations, 2006. Prepared by the County/City Arroyo-Watershed Committee. <http://www.rctlma.org/planning/content/geninfo/ccacpolicystudy.pdf>

Benefits to implementing the recommended actions included:

1. **Create dynamic scenarios** for protecting watercourses and other watershed values described in General Plan vision statements by applying policy recommendations in combination with the new GIS Watercourse Protection Map
2. **Reduce the occurrence of code violations** due to consistent and clear rules across boundaries for developers, land owners, staff, and land use decision-makers
3. **Lessen potential for citizen complaints, litigation, and development delays** over code violations due to consistent and clear rules across boundaries and an approach that is integrative in nature
4. **Enhance public safety** through incorporation of BMPs that reduce downstream flooding, landslides and erosion, and water quality impacts from new and existing development
5. **Lower flood management and water quality management costs** through controlling runoff and water quality at the source while providing multiple benefits that include habitat protection, recreation enhancement, aesthetic improvements, and high quality development
6. **Improve neighborhood and community quality of life** through increased opportunities for recreation, significant protection and enhancement of the aesthetic quality of Riverside, and high quality development
7. **Enhance funding opportunities** for acquiring State and Federal funds, including the recently passed Proposition 84 water bond funds, to make flood management and water quality protection improvements that are consistent with the CCAC policy recommendations and design guidelines

Newport Bay Conservancy

The Newport Bay Conservancy is developing a Concept Book for the Newport Bay Watershed that is intended to inform land use planning in the region and inform how it could be used to support water resource restoration goals. The project will first identify the ecological and water resource infrastructure goals that enable cross-agency buy in. It will then look for land use design opportunities throughout the watershed for implementing those goals in their entirety. The idea is to paint a picture for what complete resource integration and restoration would look like in the urban landscape and demonstrate how it could be integrated into other urban planning objectives such as transportation planning, community beautification and economic development. In this way, water resource restoration can become a part of the bigger picture of creating and enhancing community identity while also achieving technical environmental goals.

OWOW Influence on Planning Commissions

The OWOW Plan can influence local Planning Commissions indirectly, through project consideration and selection for funding and outreach from OWOW Pillar participants. Projects identified and recommended by the Plan could be communicated to local Planning agencies for consideration through brochures or other outreach. The SAWPA Commission and OWOW Steering Committee include local decision makers and elevate the level of awareness of watershed priorities.

General Plan Water Element

Current CA Code does not require General Plans to include a “water element.” A water element has been strongly recommended as a fundamental approach to incorporate water issues into the planning process. Therefore, the 2003 General Plan Guidelines from the California Office of Planning Research the included guidelines for an optional water element (Page 128) and a flood management element (Page 116) (OPR General Plan Guideline are currently in the process of being updated. See: http://opr.ca.gov/docs/GPG_2013_One_Pager.pdf).

Model Ordinance Governing Planning for Watershed Sustainability

Local government ordinances and implementing codes are more directly implemented than higher-level planning documents. Many local governments have adopted ordinances to address specific environmental concerns, including water supply and conservation, water quality, and sustainable development practices. MS4 Permits in the watershed require all Permittees to “maintain adequate legal authority to control the discharge of pollutants to their MS4s through ordinance... and enforce these authorities.” MS4 Permittees in the watershed have complied by adopting ordinances based on regionally developed model stormwater ordinances. All watershed cities were required by AB1881 to adopt a landscape ordinance by January 2010—most cities complied through the use of the DWR model ordinance or regional model ordinances.

Los Angeles County Ordinance Example²¹

“The County of Los Angeles added a chapter to the Title 12 Environmental Protection of the Los Angeles County Code. This chapter is entitled Low Impact Development Standards; its stated purpose is to require the use of LID principles in development projects. The chapter states, *“LID builds on conventional design strategies by utilizing every softscape and hardscape surface in the development to perform a beneficial hydrologic function by retaining, detaining, storing, changing the timing of, or filtering stormwater and urban runoff.”* The ordinance requires comprehensive LID plans that demonstrate compliance with an LID Standards Manual to be submitted for review and approval by the Department of Public Works. It also specifies that urban and stormwater runoff quantity and quality control standards will be established in the LID Standards Manual that is to be updated and maintained by the Department of Public Works. For subdivisions, the LID plans must be approved prior to tentative map approval. For all other development, an LID plan must be approved prior to issuance of a grading permit or, where a grading permit is not required, prior to issuance of a building permit.

The Subdivision and Planning Zoning Titles of the Los Angeles County Code were amended to add reference to the Low Impact Development Title. In addition, the County adopted ordinances for green building and drought-tolerant landscaping. All three ordinances apply to all administrative and all discretionary projects.”

²¹ Low Impact Development Manual for Southern California, 2010. Low Impact Development Center, Appendix B, Page 203.; <https://www.casqa.org/LinkClick.aspx?fileticket=zA3DaxiwHtE%3d&tabid=242>

Therefore, the Land Use and Water Pillar recommends the development of a model ordinance that would facilitate the consistent implementation of Watershed Sustainability Planning Procedures. Such a model ordinance could be readily adapted from existing ordinance examples, such as the “Model Ordinance Governing Planning and Development on Alluvial Fans” that was recommended by stakeholders appointed to DWR's Alluvial Fan Task Force (AFTF). (See: http://aftf.csusb.edu/documents/DRAFT_MODEL_ORDINANCE.pdf).

The AFTF Model Ordinance was designed to provide a platform for pre-project level discussion and evaluation of sustainability issues related to individual development projects being proposed in alluvial fan areas. The sole purpose of the Model Ordinance was to facilitate better informed land use decisions. The Model Ordinance procedures are intended provide project proponents with as much information about sustainability issues before any project planning expenditures take place.

It is important that OWOW 2.0 stakeholders also note that AFTF Model Ordinance (MO), crafted by attorneys and vetted by legal stakeholders, **was designed specifically not expand or conflict with any existing land use regulatory processes in any way**. To that end, the MO merely sets forth procedures to be followed, and substantive factors to be considered, for these particular types local land use decisions. The ultimate goal is for local communities to utilize the best available scientific information to ensure that land use planning and development adequately consider watershed sustainability issues.

OWOW Governance and OWOW Project Selection

The OWOW 2.0 Plan will guide the selection of projects to be awarded California Proposition 84 funds and other future water resource implementation funding in the SAR Watershed. However, to maximize project benefits and ultimately optimize watershed sustainability, project concepts and designs need to be influenced before project selection process begins. Projects created to serve single or very limited entity interests may not have considered the cumulative watershed impact and demand close scrutiny. Comprehensive watershed planning should include project conceptualization that maximizes benefits from the holistic watershed perspective.

To further more holistic project concepts, the plan binds watershed stakeholders through trust and relationship building. The plan will be most effective if successfully communicated to the local and regional agency decision-makers.

Relevant policies

- General Plans have conservation elements that can serve watershed sustainability requirements
- Local Ordinances—such as AB 1881 Landscape Ordinance
- Master Drainage Plans
- MS4 Permit Requirements for development, redevelopment, and roads
- MS4 Permits require Permittees to review the watershed protection principles and policies, specifically addressing urban and stormwater runoff, in its planning procedures, including CEQA preparation, review and approval processes; General Plan and related documents

including, but not limited to its Development Standards, Zoning Codes, Conditions of Approval, Development Project Guidance; and WQMP development and approval processes²²

Drivers for Land Use and Water Planning Collaboration

Implementation of land development provisions of MS4 Permits

The U.S. Environmental Protection Agency (EPA) requires Municipal Separate Storm Sewer Systems (MS4) permits to address new development and significant redevelopment projects through implementation of post-construction controls to reduce pollutants in stormwater discharges, and ensure long-term operation and maintenance of these controls.²³

Hydrologic modifications from urbanization increase the quantity of stormwater discharges, and cause excessive erosion and stream channel degradation. Frequently the volume, duration, and velocity of stormwater discharges cause degradation to aquatic systems. Protecting and restoring the physical, chemical and biological integrity of receiving waters must be a central issue in stormwater permits. The National Research Council²⁴ recommends that the NPDES stormwater program examine the impacts of stormwater flow, treat flow as a surrogate for other pollutants, and includes recommended control requirements in stormwater permits. The report recommends that the volume retention practices of infiltration, evapotranspiration and rainwater harvesting be used as primary stormwater management mechanisms. For this reason, EPA recommends use of a permit condition that is based on maintaining or restoring predevelopment hydrology although other forms of this permit condition maybe appropriate as well.

MS4 Tasks (WQMPs, LID, General Plan, Codes, CEQA, hydromodification, habitat)

As part of the development program, the MS4 Permits include several requirements aimed at linking water quality and watershed protection with land use planning processes. These requirements include the “consideration of watershed protection principles in...CEQA and planning processes” (San Bernardino County MS4 Permit, Section XI.B.3.b.4; Page 77). These principles include specific consideration of the impacts of stormwater runoff, discharge of pollutants, and physical impacts which could affect downstream receiving waters and beneficial uses. The permittees must also coordinate with the Santa Ana RWQCB when projects require a Clean Water Act Section 401 Water Quality Certification. The MS4 Permit also specifies development of “common principles and policies necessary for watershed protection,” which must include seven specific considerations (SB County MS4; Section XI.C.3.a – g; Page 78). These required considerations are very similar to the Ahwahnee Water Principles. The three

²² CRWQCB, Santa Ana Region, January 29, 2010. Waste Discharge Requirements for the County of San Bernardino and the Incorporated Cities of San Bernardino County, Order No. R8-2010-0036, NPDES No. Cas618036, Areawide Urban Storm Water Runoff.

²³ USEPA, 2010. MS4 Permit Improvement Guide. **EPA 833-R-10-001**

²⁴ *Urban Stormwater Management in the United States*, National Academies Press, 2008
www.epa.gov/npdes/pubs/nrc_stormwaterreport.pdf

county MS4 Programs are each developing watershed geodatabases intended to integrate watershed data and facilitate better planning. These are being developed within Watershed Action Plans (WAPs) (San Bernardino and Riverside County MS4s) and Watershed Infiltration and Hydromodification Master Plans (WIHMPs) (in Orange County). These are described in more detail in the **Chapter 5.8 Stormwater: Resource and Risk Management** “MS4 Permits as a driver for Plan implementation,” and table 5.8-1.

Water Quality Management Plans (WQMPs) contain the requirements for implementation of post-construction BMPs for development projects subject to approval by the Permittees. The most recent WQMPs require the implementation of LID principles at all sites, with infiltration BMPs preferred wherever feasible. WQMPs are required for most projects that disturb 5,000 square feet or more, all auto repair facility projects, and projects 2,500 square feet or more that discharging environmentally sensitive areas (SB County MS4 Permit, Section XI.D.4; Page 79).

The WQMPs include specific requirements for projects that have a downstream Hydrologic Condition of Concern (HCOC). HCOCs are locations where water quality or habitat will be adversely affected by increased flow volumes, velocities, or by changes in the timing or duration of stormwater runoff. Protection of areas with HCOCs is a developing science and the MS4 Permits encourage watershed and stream-specific evaluations and require monitoring to ensure appropriate protection is devised and implemented.

The MS4 Permits require the development and/or revision of Local Implementation Plans (LIPs) for each Permittee. The LIPs describe each individual Permittee’s detailed processes and identifies departments responsible for implementing all MS4 Permit requirements as specified in the Drainage Area Management Plans (DAMPs) and Municipal Storm Water Management Plans (MSWMPs). LIPs are an enforceable extension of the MS4 Permit. Individual LIPs are reviewable by the Regional Board and lack of implementation of LID provisions constitutes non-compliance with the MS4 Permit.

The MS4 Permits also require the implementation of LID or “greenstreet” techniques for applicable road construction projects. These requirements have been incorporated into the WQMPs and Technical Guidance Documents (TGDs).

Alternative compliance approaches

Alternative approaches for compliance with the MS4 Permit development requirements are described in **Chapter 5.8 Stormwater: Resource and Risk Management** in this plan. However, additional description and project applications are included below from the land use perspective.

Alternative land development compliance under MS4 Permits

Urban Runoff Fund, Water Quality Credit System, Regional Treatment BMPs

(These are described in more detail in the **Chapter 5.8 Stormwater: Resource and Risk Management** “MS4 Permits as a driver for Plan implementation,” pages 26-27 and Table 5.8-1) Alternative stormwater compliance elements for development projects in the Santa Ana Region MS4 Permits.)

The MS4 Permits allow the development and significant redevelopment requirements of the WQMPs to be met through the use of: regional treatment BMPs, and urban runoff fund, or a water quality credit system. Regional treatment BMPs include sediment basins, infiltration basins or water quality wetlands that would receive storm runoff from upstream project sites. Potentially, regional facilities could be funded in part by contributing development projects, and be maintained by a public agency. Properly implemented regional BMPs could protect water quality and provide groundwater recharge, while providing a cost-effective means for MS4 WQMP compliance.

An urban runoff fund (URF) would be established to develop water quality projects using contributions from development projects where LID and infiltration are not feasible, or where greater benefits could be derived from off-site project implementation. Challenges to use of the URF include administration of the fund, assessing the value of projects and appropriate fund contributions, and scheduling constraints written into the MS4 Permits.

A water quality credit system would be established to allow projects to trade water quality or LID/infiltration credits. Projects unable to provide adequate runoff BMPs onsite could purchase credits for BMPs implemented elsewhere. Sites that are able to provide water quality or infiltration BMPs that exceed the required design standards would be allowed to sell credits for the net additional treatment capacity.

Design and approval of development project occurs within a complicated process involving regulations, permits, water supply determinations, and guidance. Regulatory agencies technically do not have land use authority, but influence land use through permit requirements. **Figure 5.7-12** shows schematically the linkages between regulations, permits, local government authority, water agency responsibilities, and where watershed protection priorities are incorporated. State and federal authorities are imposed by state and federal agencies on projects through permits. MS4 Permits specifically require incorporation of watershed protection “principles and policies” into local government General Plans, CEQA documents and the overall development process. Stream channel dredge and fill (USACE Section 404 Permits) RWQCB and SWRCB 401 Water Quality Certifications, and stream alteration permits (CDFW Section 1600 Permits) are typically issued directly to individual projects. Local jurisdictions must verify and facilitate these permits before approving project plans. Water suppliers are responsible to provide water supply assurance before projects can be approved by the local government (**See Figure 5.7-13**). Finally, OWOW Plan priorities inform the permitting process and are indirectly incorporated into local development approval processes and into individual projects.

Figure 5.7-12 Local Land Use Authority, Regulatory Authority and Permitting Requirements

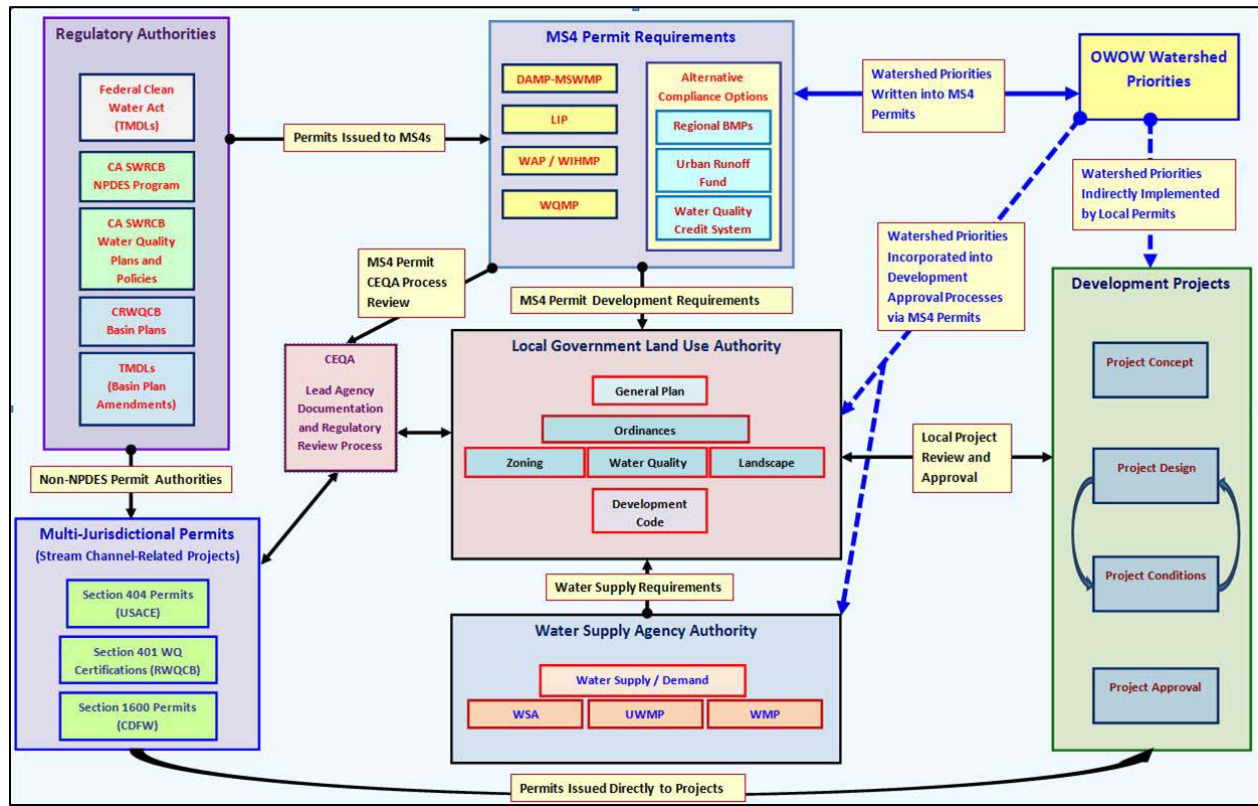
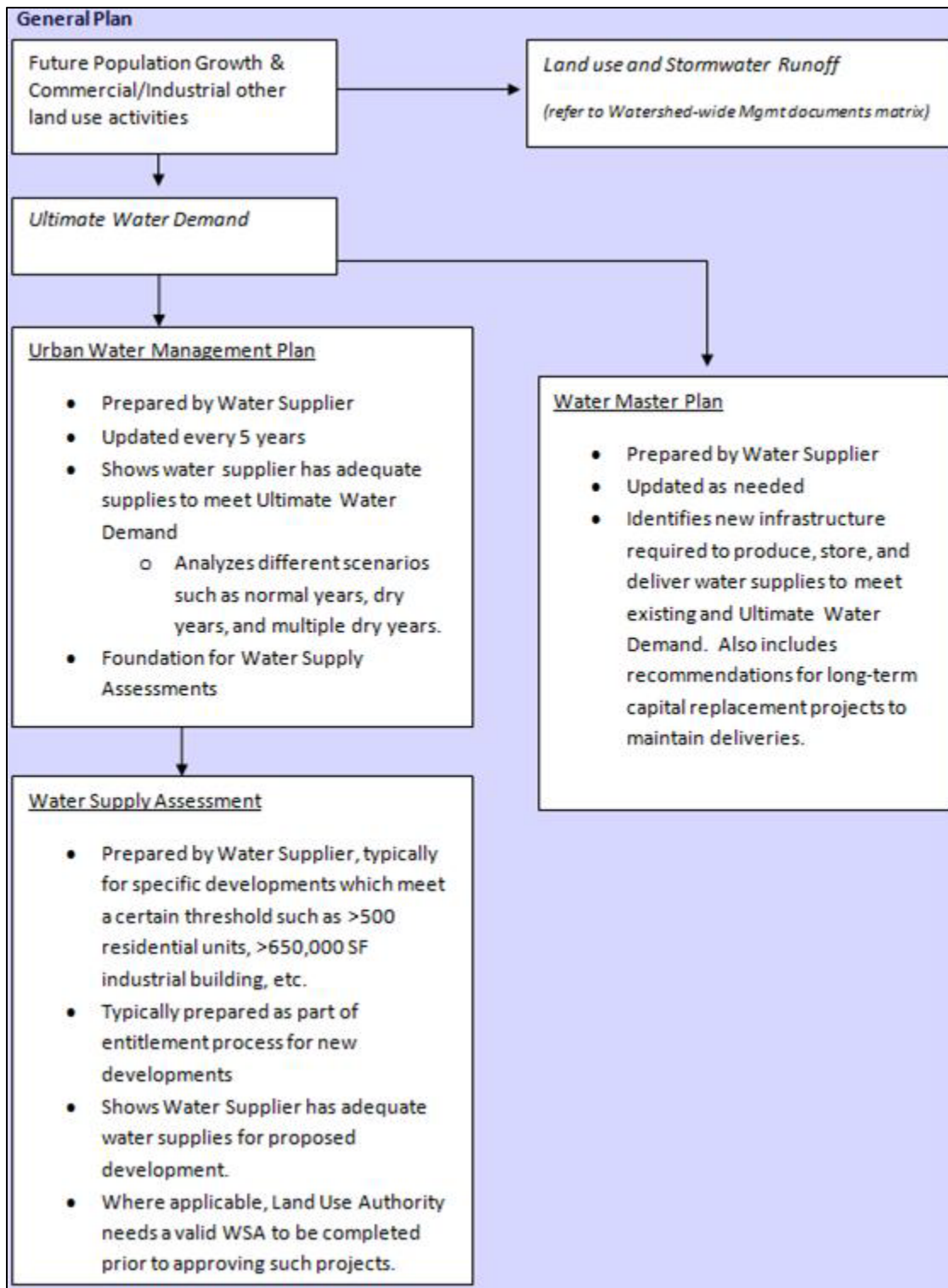


Figure 5.7-13 General Plan-Water Supply Requirements



Incentives for OWOW stakeholders to partner on MS4 Development projects

Ground water yield increase from LID implementation

A primary goal of LID implementation is to maintain or restore natural hydrologic conditions at project sites. A key aspect of hydrology is enhancing infiltration to compensate for installation of impervious surfaces. LID implementation can incrementally increase the recharge of groundwater basins, whether at individual, distributed sites in the watershed, or at larger scale catchment or regional infiltration sites. This increases the local groundwater supply and improves watershed sustainability.

Quantification (estimates) of groundwater recharge from site-based or regional LID—value of water supply

As stated by the Southern California Water Committee (SCWC): “Not all development will occur in areas where on-site capture and infiltration results in augmentation of groundwater basins used as drinking water supplies...”²⁵ Although LID techniques will increase groundwater recharge, it is difficult to determine the actual quantity of new available supply due to variable soil and subsurface characteristics. Larger scale infiltration facilities are more quantifiable and more likely to be maintained and monitored. Valuation of increased recharge and new supply is needed to understand cost benefit factors and to incentivize such projects to encourage broader project support. The Chino Basin Water Master has evaluated the volume of recharged and potentially accessible water from LID implementation in the Chino Basin. The challenge is to demonstrate cost-benefits for the stakeholders under various implementation scenarios, especially distributed, individual site based infiltration BMPs v. larger scale catchment or subwatershed regional infiltration basins. Larger scale basins would most likely be maintained by water agencies and their effectiveness would be monitored and maximized, whereas individual privately maintained BMPs will have less scrutiny and less effective maintenance on average. Water agencies will need demonstrated long-term supply increases to justify cost sharing on such projects, while MS4 partners need to show pollutant reduction and mitigation of hydromodification.

Development community perspective and partnering

The development community in the SAR Watershed has demonstrated a willingness to adapt projects to meet watershed needs and to lead innovative projects (See examples in the **Chapter 5.8 Stormwater: Resource and Risk Management**, “Stormwater as an Essential Resource for the SAR Watershed” and “Regional and Watershed Examples” described earlier in this chapter) Building Industry Association and the Construction Industry Coalition on Water Quality have partnered in research and implementation projects to advance understanding of costs and benefits of LID and sustainable community designs. Developers will design and build the projects that serve watershed priorities as a result of ongoing collaboration.

Legislated Water Supply or Conservation Goals

Water Supply Legislation

In 1983, the State legislature enacted the Urban Water Management Planning Act which requires urban water suppliers that provide water to 3,000 or more customers, or that provides over 3,000 acre-feet of

²⁵ SCWC, 2012. Stormwater Capture: Opportunities to Increase Water Supplies in Southern California.

water annually, to prepare an Urban Water Management Plan (UWMP) and update it every 5 years. The UWMP describes the supplier's efforts to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its customers during normal, single dry, and multiple dry years. UWMPs and General Plans are linked and interdependent as the assumptions for land use, population growth, etc., must be consistent. UWMPs are a critical source document for cities and counties as they update General Plans. Similarly, General Plans are a source document as water suppliers update their UWMPs. Continuing land use changes and population growth have resulted in additional water demand on water systems. In 2002, the State legislature enacted Senate Bills 610 and 221 as companion measures, to further promote more collaborative planning between local water suppliers and land use authorities and to ensure the increased demands are adequately addressed, and a firm source of water supply is available prior to approval of certain developments. *Water Supply Assessments* pursuant to SB 610 and *Written Verifications of Water Supply* pursuant to SB 221 are prepared by the water supplier for applicable projects and typically rely on UWMPs as a foundational document.

SB 610 (Water Supply Assessment) requires an urban water supplier to include a description of all water supply projects and programs that may be undertaken to meet total projected water use over the next 20 years. SB 221 (Written Verification of Water Supply) prohibits approval of a tentative map, or a parcel map for which a tentative map was not required, or a development agreement for a subdivision of property of more than 500 dwelling units, including the design of the subdivision or the type of improvement, unless the legislative body of a city or county provides written verification from the applicable water supplier that sufficient water supplies are, or will be available prior to completion of the project.

In 2009, the State legislature enacted Senate Bill 7x-7 (20x2020 Plan) to set forth a statewide road map to maximize urban water use efficiency and conservation and establish a requirement to reduce per capita water consumption by 20% by 2020. To ensure progress in meeting the goal, water suppliers were mandated to develop water use targets and document such compliance in their UWMPs.

Water supply, needed for population growth, is a significant limiting factor for development projects. UWMPs and Water Supply Assessments link water resource constraints with local project planning, design and approval process. Water supply is a critical sustainability factor and should be recognized as a high priority feasibility factor in project concept development. Projects that enhance water supply, such as LID capture and use BMPs and infiltration BMPs on various scales (that recharge supply aquifers) should merit stronger acceptance with the regulatory programs.

Sustainable Communities Legislation²⁶

The purpose of SB 375 (Sustainable Communities and Climate Protection Act of 2008) is to implement the state's greenhouse gas emissions (GHG) reduction goals in the sector of cars and light trucks. This mandate requires the California Air Resources Board to determine per-capita GHG emission reduction

²⁶ SCAG 2012. Regional Transportation Plan 2012-2035: Sustainable Communities Strategy.
<http://www.scagrtpl.net/>

targets for each Metropolitan Planning Organization (MPO) in the state for years 2020 and 2035. SCAG and California's 17 other MPOs must address GHG reduction in a "Sustainable Communities Strategy" that is part of the respective MPO's Regional Transportation Plan. In accordance with Govt. Code section 65080(b)(2)(B)(vii), the 2012 Regional Transportation Plan (RTP) and incorporated SCS are expected to achieve GHG emission reductions of 8 percent per capita in 2020 and 16 percent per capita in 2035.

Transportation strategies contained in the RTP—managing transportation demand and making key transportation system improvements – are major components of the SCS. However, the SCS also focuses on the general land use growth pattern for the region, because geographical relationships between land uses—including density and intensity—help determine the need for travel in the first place. Therefore, SCAG's SCS includes not only projections about the transportation network but also about land use. Under SB 375, a SCS must, in summary:

- Identify existing and future land use patterns
- Consider statutory housing goals and objectives
- Identify areas to accommodate long-term housing need
- Identify areas to accommodate 8-year housing need
- Consider resource areas and farmland
- Identify transportation needs and the planned transportation network
- Set forth a future land use pattern to meet GHG emission reduction targets
- Comply with federal law for developing an RTP

The SCS does not create a mandate for land use policies at the local level. In fact, SB 375 specifically states that the SCS cannot dictate local General Plan policies (see, Government Code Section 65080(b)(2)(J)). However, the SCS is intended to provide a regional policy foundation for local governments to build upon and includes quantitative growth projections from each city and county in the region. In addition, some projects consistent with the SCS are eligible for streamlined environmental review.

One aspect of SB 375 unique to the SCAG region is that subregions within SCAG have the option of creating their own subregional SCS. Of SCAG's 15 subregions, two accepted this option: the Gateway Cities Council of Governments (Gateway COG) and the Orange County Council of Governments (OCCOG). These subregional SCS documents are incorporated into the regional SCS.

Optimize Watershed Supply and Quality

The Ahwahnee Water Principles for Resource Efficient Land Use describe values that a community should consider to maximize the sustainability of a watershed or region. These are grouped into nine basic principles that link community development with sustainable approaches for land use, water supply, water quality protection, flooding, and natural resource conservation.

The plan describes opportunities and constraints in the SAR Watershed that must be managed to ensure increased sustainability while accommodating population growth. The goal is to achieve optimal resource use and to adapt to changing conditions over time.

Constraints that limit Land Use & Water Planning Collaboration

Collaboration pros and cons:

Pros:

- Collaboration can pool or leverage resources of multiple agencies
- Provides a more multi-disciplinary, multi-agency perspective, and increased experience and expertise
- Avoids unnecessary duplication of efforts
- Helps ensure all related priorities and projects are considered
- Collaborative projects can be more competitive for grant funding

Cons:

- Differing multi-jurisdictional priorities may be difficult to address adequately
- Collaborative projects may be slower to develop and implement
- Multi-jurisdictional permitting requires more effort

Process and regulatory constraints

- Existing plans and codes may preclude LID designs (e.g. curb requirements)
- Right-of-way, safety and design requirements may limit adaptability of road retrofit or improvement projects
- Regional BMPs are generally favored by stakeholders, including regulators. However, regulations and permits contain potentially conflicting limitations such as the transport of waste in waters of the US and habitat protection requirements that limit BMP maintenance opportunities
- MS4 Permit WQMPs require BMP selection and implementation based on a strict hierarchy that limits the possible configurations that can be approved

Relevant constraints identified by other Pillars

- Watershed locations with non-infiltrating soils and geology
- Areas with groundwater contaminant plumes
- Concern regarding infiltration of stormwater from industrial land uses, or from BMPs that are poorly designed, installed, and/or maintained
- Project site may not be the most effective location to recharge a water-supply aquifer
- Watershed priorities are not part of the WQMP site feasibility analysis

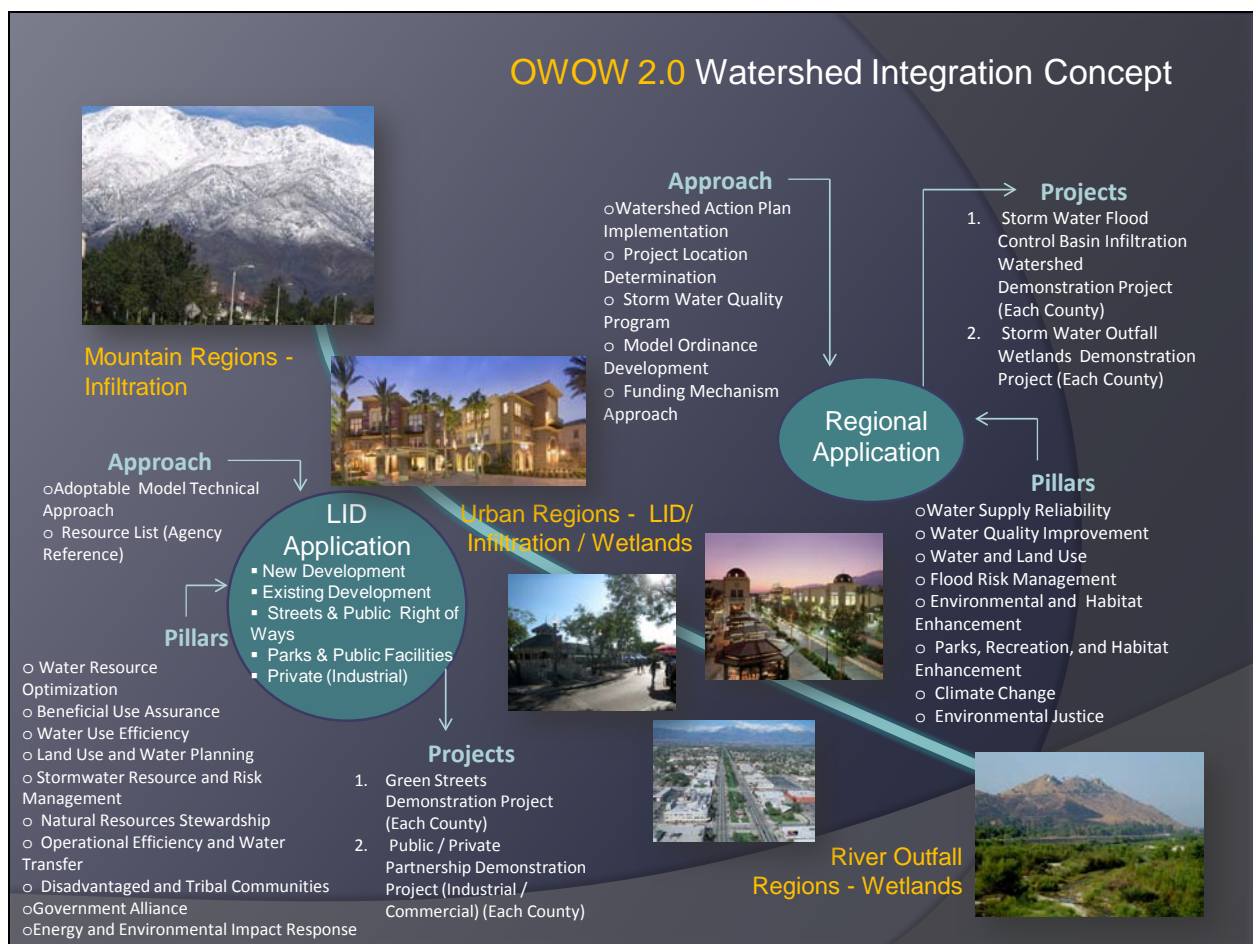
Funding options to support collaboration

- OWOW supports collaborative projects
- An URF or Water Quality Credit System could become a funding source based on cooperation
- Seek state/federal funding to develop regional funding mechanisms for collaborative projects
- Partner with SCAG or Councils of Government for incentive funding for demonstration projects
- USDA Grants to partner with agricultural stakeholders

Strategies for Improved Interaction Between Water Managers and Land Use Planners

The OWOW Plan and process has significantly expanded the breadth and level of stakeholder involvement in understanding watershed problems and in developing strategies to address these problems and improve the watershed over previous IRWMP efforts. However, to effectively integrate watershed sustainability into the land use planning and development concept, design, and approval process, additional stakeholders and higher management and executive level staff within stakeholder organizations must become fully participating members of the OWOW effort. Watershed sustainability priorities must be integrated into decisions driven by the priorities of economic development. An alternative is to have OWOW integrated into economic development processes. A diagram of the OWOW land use and water planning process is shown in **Figure 5.7-14** below.

Figure 5.7-14 OWOW 2.0 Watershed Integration Concept



OWOW Outreach Committee

The OWOW Pillars held several Pillar Integration meetings during the development of the Plan. These meetings provided a unique forum to develop and evaluate potential watershed priorities and projects to address watershed sustainability. We recommend a continued series of periodic meetings to further the ideas and continue to develop new ideas. Outreach efforts should also be periodically held to update other stakeholder forums, such as Regional Board meetings, Boards of Supervisors, and other watershed groups.

OWOW /FCD Partnership Development or Enhancement

Stakeholders in the Chino Basin have successfully completed several multi-stakeholder projects that address stormwater, water supply and habitat. One of the most significant is the Chino Basin Facility Improvement Project. This project is a partnership between the Chino Basin Watermaster, the Inland Empire Utilities Agency, The San Bernardino County Flood Control District and the Chino Basin Water Conservation District. This project has retrofitted approximately two-dozen offline flood control basins with remotely operable control valves to allow capture and recharge of stormwater and dry weather flows. The project is supported by a four-party Agreement and received funding support from Proposition 13 Water Bond through SAWPA. Although this project has increased the capture and recharge of stormwater in the basin, it has not been coordinated with the MS4 Program and does not provide any MS4 compliance benefits.

Revisions to the Land Planning Process to Address Constraints

Basic land planning tools can be revised or amended to incorporate watershed sustainability priorities. General Plans can incorporate a specific water element, or can include watershed requirements in the conservation element. Specific Plans can also be used to implement watershed and/or sustainability considerations. Different local governments will have specific preferences and concerns regarding general plan revisions.

Model sustainability ordinances (LID implementation, alluvial fans, water conservation, or sustainable communities) can be used to implement watershed priorities. Model ordinances have been developed for such purposes, such as the Model Ordinance Governing Planning and Development on Alluvial Fans²⁷, and the LID, Green Streets, and Drought-Tolerant Landscaping Ordinance adopted by the County of Los Angeles.

Early Consideration of Project Concepts and Designs

Planning processes should encourage the earliest possible consideration of watershed priorities. Project concepts should serve watershed needs and be designed and implemented to optimize watershed sustainability. Once a project has been conceived, it is subject only to process-based modifications. Fundamental choices regarding allowable projects should be informed by the plan.

²⁷ Alluvial Fan Task Force: Findings and Recommendations Report, July 2010. Appendix D: Model Ordinance Governing Planning and Development on Alluvial Fans.

http://aftf.csusb.edu/documents/FINDINGS_Final_Oct2010_10-29-10_web.pdf

General Plan, Specific Plan, and Ordinance Changes

General Plans and Specific Plans could be revised to require projects to demonstrate early consideration of Plan priorities and recommendations. Ordinances can specify the process to implement early project planning practices.

Training Needs—Various Target Audiences

Implementation of the cooperative and multi-benefit project concepts will be supported by education. Training and outreach have been a part of the OWOW process, and should be enhanced for OWOW 2.0. It is especially important to provide education for the high-level decision makers, including elected officials, the RWQCB, and other local and regional stakeholders. Outreach can build trust and acceptance of new approaches.

Consider How Water Agency “Will Serve” Letters May Be Used to Support Land Use Planning

Current requirements for water supply assessments limit their applicability to relatively large-scale projects. Requiring water supply assurances for all projects could help ensure implementation of water conservation measures (landscaping, water recycling, stormwater capture and use) for a wider range of projects. A watershed scale supply assessment could provide an incentive for water agencies to collaborate—and develop guidelines for water supply requirements.

Incorporate Recommendations of Alluvial Fan Task Force in Land Use Planning²⁸

Alluvial fans are gently sloping fan-shaped landforms commonly seen at the base of semi-arid mountain ranges in the SAR Watershed and serve as natural buffers between fire-prone mountain ranges and flooding. Paths of flooding and debris flows on alluvial fans may be uncertain, making development challenging.

The Integrated Approach (IA) for development on alluvial fans consists of a suite of local planning tools for preproject screening designed to assist local communities that need to plan for and evaluate future development proposals on alluvial fans (**Figure 5.7-15**)²⁹.


²⁸ Alluvial Fan Task Force Fact Sheet 2010.

[http://aftf.csusb.edu/documents/AFTF_FACTS_Final_Oct2010_web\[1\].pdf](http://aftf.csusb.edu/documents/AFTF_FACTS_Final_Oct2010_web[1].pdf)

²⁹ AFTF, 2010. Integrated Approach for Sustainable Development On Alluvial Fans.

http://aftf.csusb.edu/documents/IA_Final_Oct2010_web.pdf

Figure 5.7-15 Local Planning Tools and FEMA

| LOCAL PLANNING TOOLS FOR ALLUVIAL FAN PRE-PROJECT SCREENING HTTP://CGISR-AFTF.WIN.CSUPOMONA.EDU/PORTAL | | | | | |
|---|--|--|--|--|--|
| Step 1 Identify whether proposed site is on regulated floodplain with adequate hazard protection | Step 2 Consider relative flood hazard potential | Step 3 Consider other hazards present on proposed site | Step 4 Consider beneficial resources on proposed site | Step 5 Consider capacity to address multiple objectives consistent with FloodSAFE | Step 6 Consider problem-solving economic strategies |
| Flood-Zone (FZ) Tools FZ1 - FEMA Special Flood Hazard Area (SFHA) FZ2 - Existing flood control structure certified to provide adequate protection from hazards | Alluvial Fan (AF) Tools AF1 - Is the proposed site underlain by Quaternary Sediments that include Alluvial fans? AF2 - Map the relative potential for alluvial fan flooding | Multiple Hazard (MH) Tools MH1 - Active faults MH2 - Seismic shaking MH3 - Rockfall and landslides MH4 - Minerals and unstable geological units MH5 - Wildlife hazards MH6 - Other local hazards | Multiple Benefit (MB) Tools MB1 - Capacity for recharge MB2 - Ecological value MB3 - Mineral resources MB4 - Cultural resources MB5 - Current and future land uses | Sustainability Analysis (SA) Tools SA1 - Examine capability of site for proposed use SA2 - Examine suitability of site for proposed use | Economic (ECON) Tools ECON1 - Multiple benefit IRWM projects ECON2 - Cost and benefit analysis ECON3 - Resources for operation and management ECON4 - Transfers and purchases of development rights ECON5 - Other funds ECON6 - Disaster clean-up ECON7 - Asset management |
| FEMA Guidelines for Determining Flood Hazards on Alluvial Fans FEMA Appendix G: Guidance for Alluvial Fan Flooding Analyses and Mapping | | | | | |
|  | | Flood Management (FM) Tools FM1 - Identify the presence of an alluvial fan FM2 - Identify existing hazards on alluvial fan area FM3 - Define active and inactive fan areas FM4 - Establish the appropriate level of hazard protection FM5 - Identify studies necessary to demonstrate development is protected from design flood FM6 - Incorporate multiple objectives in the mitigation measures (Other pertinent local, state and federal regulations may also apply) | | | |

The tools provide a method for planners to evaluate hazards, resources, and site-specific issues in alluvial fan areas that are proposed for development. This evaluation helps determine, in the pre-project phase, whether new development can be designed to promote flood management sustainability, by avoiding the most hazardous areas and conserving the most valuable resources. Flood management tools are included that are consistent with FEMA guidelines to analyze alluvial fan flood hazards and to formulate flood hazard protection.

As directed by Assembly Bill 2141, the findings and recommendations of the Task Force will be submitted to DWR and the State legislature for possible future action.

Implementation Recommendations to Support Water and Land Use Planning Collaboration

Watershed Integration: Watershed Identity Development and Implementation Project

This comprehensive project includes an assemblage of component projects designed to overcome existing limitations on watershed-based planning and project development to accelerate progress toward a sustainable watershed. SAWPA OWOW would lead and steer this project assemblage, including:

Local land use authority process enhancement

This element will provide education, guidance, and ready-to-use tools for local jurisdictions to align all aspects of their land planning and approval processes to reinvent communities over time, based on watershed sustainability priorities. This effort can benefit from coordination with the ongoing San Bernardino County Vision Water Element, and should incorporate innovative methods and findings. The approach should start with efforts to engage the Councils of Government in the watershed, and work to influence and integrate the elected officials, Boards, and other high-level decision makers. This project would provide workshops, training materials, case examples, and focused outreach and training.

Products of this project would include:

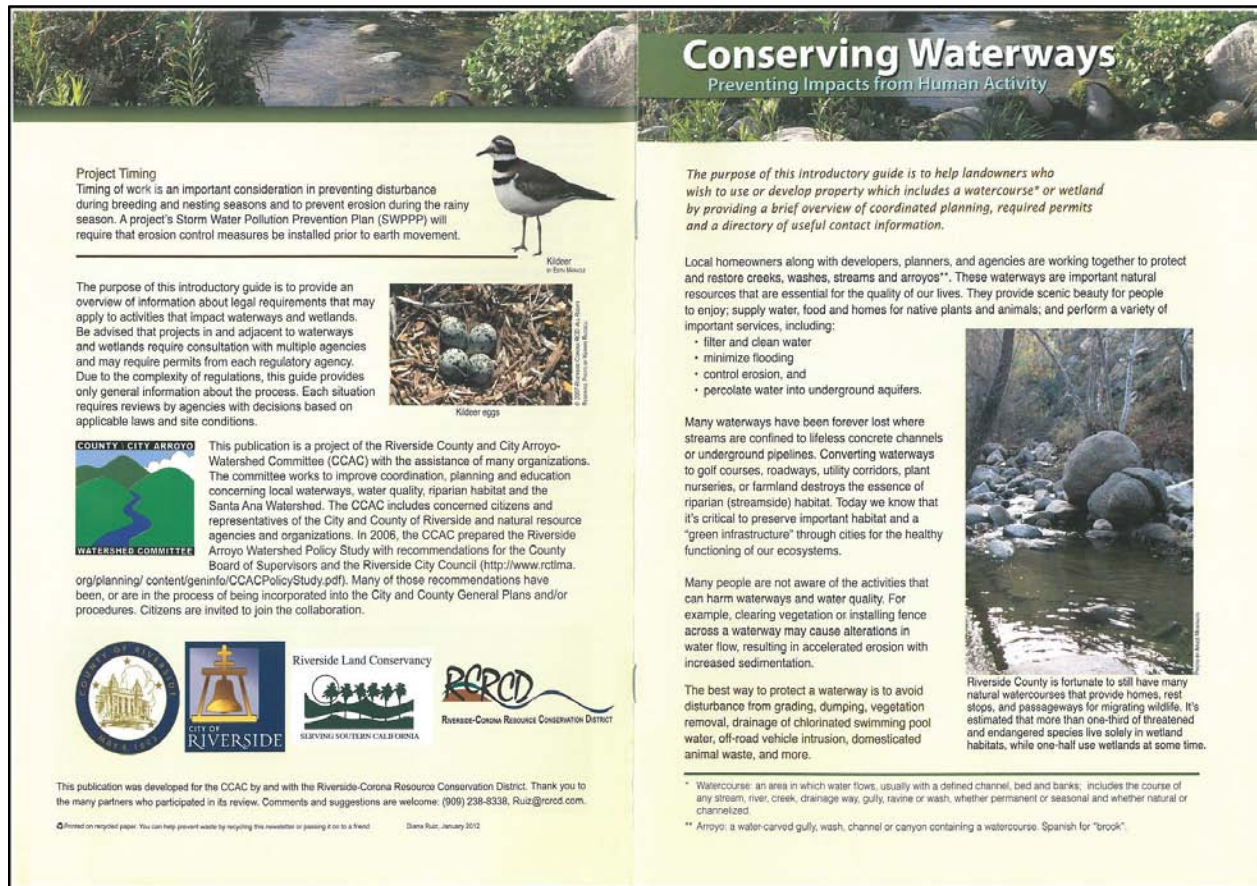
- Watershed-wide land use planning guidelines manual(s)
- Model ordinance governing planning for watershed sustainability
- Model general plan water element for the SAR Watershed
- Watershed coordination forums and training workshops
- Planning Commission education and outreach

Three pilot programs can implement these enhancements:

The Riverside City/County Arroyo-Watershed Program

This program provides the initial concepts and tools, and has experience working through local jurisdictions and building cooperation. The Riverside City-County Arroyo/Watershed Policy study and subsequent coordination efforts developed a methodology to achieve local government implementation of General Plan, ordinance, and policy amendments that address watershed protection priorities. This methodology can be implemented throughout the SAR Watershed to align local government plans and procedures with OWOW Plan priorities. The original project focused on preserving stream and arroyo areas and habitat, and needs to more fully incorporate water supply and overall sustainability principles. These can be readily incorporated into the method.

Figure 5.7-16 Riverside City/County Arroyo-Watershed Program



The Newport Bay Conservancy Concept Book

The Newport Bay Conservancy Concept Book for the Newport Bay Watershed is intended to inform land use planning in the region and inform how it could be used to support water resource restoration goals. This project can pilot the local government enhancement approach within the Newport Bay Watershed and influence adjacent jurisdictions.

City of Ontario – New Model Colony

The City of Ontario has implemented innovative land use planning approaches and can provide a pilot project area for local government enhancement in urbanized San Bernardino County. The City's recent plans call for 13,000 new housing units across a broad range of housing types and a mix of business spaces oriented towards three mixed-use centers that are served by pedestrian-friendly roadways and a large central park. Emphasizing connections to corridors and transit, the City is creating a major regional center for Southern California.

Coordinate and integrate with other regional planning efforts to build-in key watershed sustainability priorities into plans that apply to the SAR Watershed.

This element would engage the regional transportation planning agencies (SCAG, SANBAG, WRCOG, RCTC, and OCCOG) and other planning agencies as partners in OWOW. This would coordinate closely with (1) above.

Regional transportation planning efforts have successfully reached local, regional, and state decision-makers, and enlisted significant stakeholder participation and support. The OWOW Plan should integrate, or be integrated into the transportation planning world. Transportation planning should incorporate the OWOW watershed sustainability priorities as co-equal with the other RTP elements. Although sustainability is a key consideration, mandated by legislation, water quality and water supply are inadequately weighted in the RTPs. Reinvent these elements into a comprehensive sustainability effort, including all stakeholders and decision-makers and a plan for the watershed. Partner with the SCWC, ASCE, Urban Land Institute, and other groups for technical support.

SCAG has funded transportation demonstration projects in the Region and at least 30 projects in the SAR Watershed. Conduct an evaluation of these projects and their linkages to water and sustainability.

Coordinate and host a symposium to describe the ecology, hydrology, and natural history of the SAR Watershed. This is needed to inform stakeholders regarding how the watershed is naturally integrated, and how urbanization has disrupted the integration and how to reintegrate to maximize functions and sustainability.

Watershed-wide geodatabase alignment and connection, access portal, and planning and evaluation tool development.

County-based geodatabases have been recently prepared by San Bernardino and Riverside County Watershed Action Plans, and Orange County hydromodification mapping and Watershed Master Plans. This includes evaluation of existing watershed planning tools and a search for other existing applicable tools.

- Develop GIS layer of “community improvement areas” based on local government economic development needs—street rebuilding, drainage improvements, utility rehabilitation in conjunction with streets
- Workshop with planners
 - Layer of transportation opportunity areas
 - overlay with WQ project sites
 - Economic development areas
 - Failed street areas
 - DAC layer
- Identify project types—example
- DAC Greenstreets
- FCD Recharge Basins

- Transportation Agency Data (Rail/Caltrans)
 - Locate joint project areas (Trans/Water)
 - Locate joint Ag/water project areas
- Integrate Land Use Decision Support Tools Developed Elsewhere
- Coordinate geodatabase development with the development of applicable tools that include areas outside the SAR Watershed to enhance functionality. Several relevant tools and mapping efforts are of particular interest.
 - EcoAtlas
 - The San Francisco Estuary Institute developed a statewide geodatabase designed to track riparian and wetland resources under the State Wetland and Riparian Monitoring Program. The EcoAtlas includes interactive base layers, including streams, wetlands, riparian areas, and special habitats, and provides maps and other spatial information. This tool was developed by the Wetland and Riparian Monitoring Workgroup and provides detailed statewide information on wetland and riparian restoration projects. This is an active online tool and is viewable at <http://www.ecoatlas.org/>. The project team continues to maintain and improve the EcoAtlas.
 - DWR Integrated Water and Land Smart Planning Tool
 - DWR, in partnership with Sonoma State University Center for Sustainable Communities, is developing a decision support tool that integrates land use with water supply, water quality, energy and water/energy use and impacts including GHGs, and project cost factors. The tool was “designed for local decision makers who are considering land use and project design decisions, based on economic development needs and consistency with general and specific plans.”³⁰ This tool can be customized with local condition inputs and will soon be tested by local governments in California. The tool will quantify costs associated with different development and design scenarios, and is intended to:
 - “Create an open, locally-modifiable and user-friendly tool to help guide land use and land cover decisions
 - Quantify relationships between land use alternatives and key water supply benefits, including water supply reliability, flood management, water quality, habitat value, Climate Action Mitigation
 - Quantify the monetary costs of implementing LID and traditional development strategies, including long term costs
 - Compare and contrast different development styles exemplified in four case study sites.”
- USBR online climate change model for the SAR Watershed.
- Water/Energy use and impact data and resources (see **Chapter 5.13 Energy and Environmental Impact Response**, “Water-Energy Projects” and the Energy Network)

³⁰ Draft Report, April 2013: Integrating Land and Water Management: A Suburban Case Study and User-Friendly, Locally Adaptable Tool. California Department of Water Resources and Sonoma State University. (http://www.waterplan.water.ca.gov/docs/meeting_materials/caucus/2013.05.09/DRAFT_DWR-Report_4_30_13.pdf)

Regulatory assessment and integration to support watershed sustainability project concepts and implementation.

Regulatory Boards and staff support the OWOW Plan. However, varying interpretations of regulations and permit requirements may impede the development of concepts and projects that provide overall cumulative and long-term watershed sustainability improvements. This project element would engage the regulators (RWQCB and SWRCB, DWR, CDFW, USACE, etc.) and proactive stakeholders (including NGOs) to develop approaches to implement projects and ensure compliance with relevant regulations and permits.

Demonstration project site identification, project design, coordinated planning, construction and maintenance.

These are multi-benefit, multi-jurisdictional projects that address watershed sustainability priorities. Projects should identify project partners and costs/benefits, and develop incentives to encourage continued implementation. The project should consider developing model implementation tools such as a model MOU or Agreement for multi-agency projects or watershed-wide projects.

Two proposed project categories:

Green street/parking lot projects

Retrofits or new projects that create new functions of stormwater treatment and capture, groundwater recharge if feasible, flood risk reduction, enhanced aesthetics and/or walkable/recreation spaces, and incrementally improve water quality and maximize water use efficiency. Projects can integrate with other projects or include elements such as public parks.

This project would coordinate the three SAR Watershed county Public Works Departments, interested cities, water agencies, and other stakeholders to identify locations and designs for multi-use green street or parking lot related projects that address stormwater runoff and improve existing developed areas. The project would also develop funding strategies for maintenance and additional projects, will include water quality credit and regulatory compliance evaluation, and recommend provisions for permit compliance credit. Completed projects will serve as models to increase understanding and acceptance of similar projects in the watershed.

Specific considerations should include:

- Commercial and “clean” industrial areas for parking lot retrofit
- Street use safety and design constraints
- Existing design manuals (e.g. San Mateo Street Design Manual)
- Needs to link economic development, Planning, and Public Works departments of local government
 - Locate and prioritize streets already in need of upgrade or replacement
 - Such as “failed” streets in City of LA

- coordinate with utility infrastructure replacement—in street corridors
- sell as a community redevelopment project

Example Projects:

- Monte Vista Avenue Grade Separation
(http://www.cityofmontclair.org/depts/pw/engineering/projects/upcoming_projects.asp)

A railroad grade separation project in the City of Montclair on Monte Vista Avenue at the Union Pacific Railroad tracks is planned over the next few years. Rail traffic has been increasing on this stretch of busy rail line known as the Alameda Corridor East. The traffic is expected to increase significantly as trade traffic continues to grow at the ports of Los Angeles and Long Beach. Montclair has begun acquiring a right-of-way for the project. Funding for this project is coming from a variety of sources. The 30 million dollar project is expected to begin construction in 2014.

- City of Riverside “parklets” policy projects and small street retrofits by private entities
- Elmer Ave Neighborhood Retrofit – Council for Watershed Health

<http://www.watershedhealth.org/programsandprojects/was.aspx?search=elmer>

Figure 5.7 -17 Elmer Avenue Neighborhood Retrofit



Regional treatment for surface and stormwater runoff

Sites to be selected, optimally one per county, that can accept and treat/infiltrate stormwater, nuisance runoff, and other surface flows. Projects will be multi-benefit and multi-agency collaborations. These sites can be identified based on previous evaluations of opportunities within the county flood control systems and the geodatabases, combined with evaluation and recommendations from other watershed stakeholders, especially the water and regulatory agencies. Water supply, habitat conservation, creation or mitigation, and long-term maintenance must be addressed. These sites would develop mechanisms to account for water quality benefits and provide MS4 Permit compliance capacity. This project element would collaborate with the regulatory assessment effort (No. 4, above) to develop a model regional treatment/retention BMP implementation guidance document.

Potential project locations:

- The City and County of Riverside are partnering to develop increased groundwater recharge in the Kansas, Marlborough, and Columbia basins
- Geodatabases provide initial list of project sites, collaborate with Water Agencies to prioritize sites
- Evaluate existing multi-use projects to determine their effectiveness in achieving stated benefits (e.g. Big League Dreams—Cucamonga-Mill Creek Wetlands)

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