# Chapter 5.5 Land Use

## Introduction

A compelling case for why water management agencies must work with local governments and other stakeholders to tackle the complex issues related to local land use was made in an editorial by DWR Director Lester Snow in April 2008. "The decisions we are making now…how efficiently we use water and where we build our new communities, will dictate how much flexibility we will have in the future and what the quality of life will be for the next generation of Californians." Moreover, Director Snow acknowledged that "Most land-use and water-use decisions in California are made at the local and regional levels, though rarely is such decision-making integrated." The result, Director Snow points out, is "Land-use planning that encourages low-density development greatly increases per-capita water demand. Such development patterns also inevitably lead to more dependence on automobiles, which are the largest source of climate-changing greenhouse gas emissions in California. The resulting climate changes will make it more difficult to maintain reliable water supplies. Low-density development imposes other costs as well, as it is generally more costly and difficult to provide flood protection for sprawling suburbs, and this growth reduces the availability of agricultural land. In all, such land uses threaten our water-supply reliability and are costly in many other ways. Land use and water planning must be better integrated to ensure that we make informed resource management decisions."

This chapter briefly examines the history of land use patterns and practices in the Santa Ana River Watershed (Watershed) and some of the lessons learned about the effect of land use decisions on water resources. 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 resistance to solving complex problems working together.

## Description of Historical and Current Conditions of Land Use

Historical documents about years of sustainable land use practices in the Watershed by native tribes are followed by an enormous body of knowledge about the settlement of the California missions that established the first significant rangelands in the region and also ventured into the first agricultural production. A steady wave of migration from other regions of the country as well as abroad continued until a tidal wave of migration during the construction of the railroads in the years between 1861 and 1900 that followed the path of available water supplies needed to operate the steam engines. The history of small towns that became respectably sized cities from the top to the bottom of the Watershed 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.

The Great Depression resulted in stagnant growth throughout the Watershed, but the next major tidal wave of migration was prompted by the bombing of Pearl Harbor that drove military installations and industrial war suppliers further inland. Residential and commercial development became robust from the top to the bottom of the Watershed when legions of soldiers returning from the Pacific of World War II 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 become 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.

Patterns also can be derived from a water supply perspective with land uses expanding from locations with 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. By the time the State and Federal environmental protection regulations were established in the 1970's, consumptive land use patterns in the Watershed had decreased dramatically in 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. The regional strength of local governments has been their focus 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

Governor Davis signed the first legislation affecting the ability of local governments to make land use decisions related to water supply in 2003. SB 610/221 requires that water suppliers demonstrate in their Urban Water Management Plans (UWMPs) that sufficient water supply is available to meet project and cumulative demand over a 20-year horizon in normal or single-multiple dry years for projects of 500 units or equivalent water demand. More importantly, the legislation anchored the connection that does exist between land use and water supply planning that is fundamental to long-term sustainability as population continues to grow throughout the State.

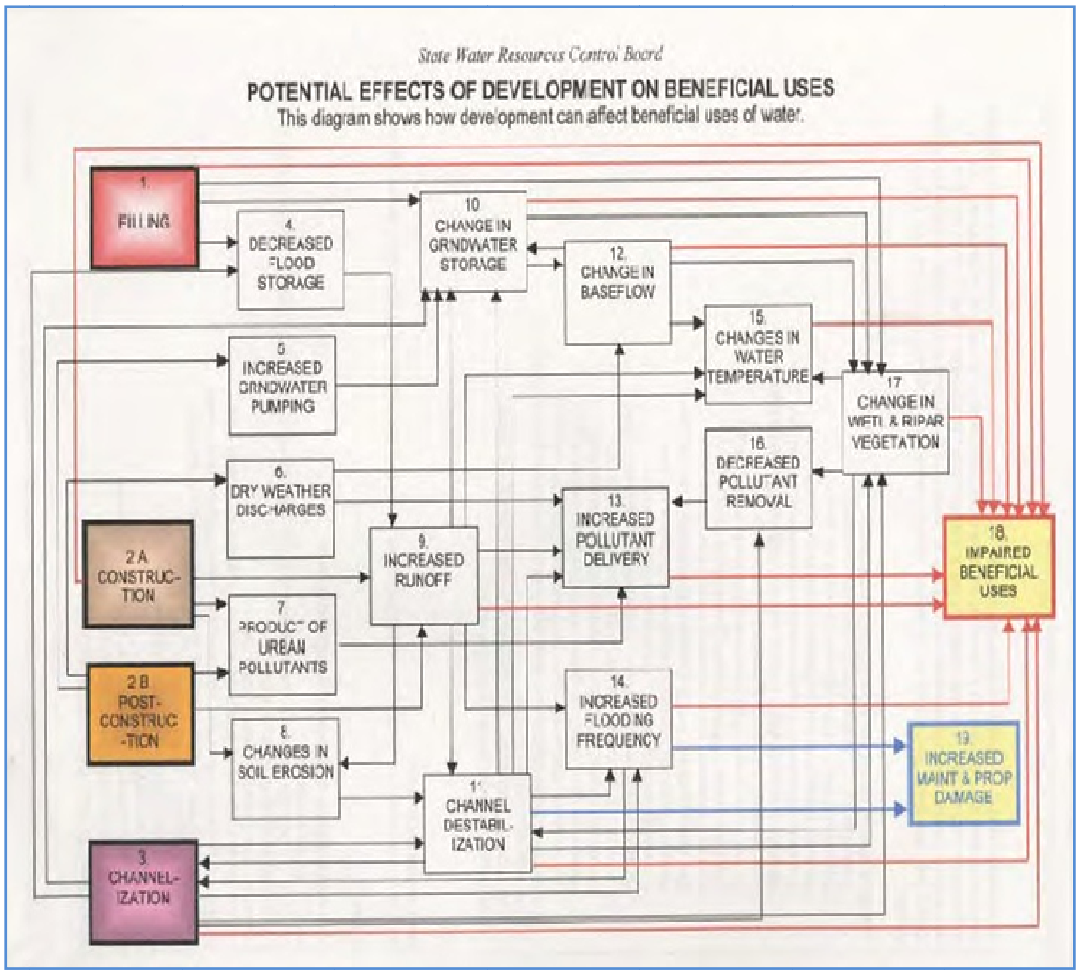
The increase in hard surfacing and flood control over decades of land use practices in the Watershed has changed stormwater runoff patterns resulting in a threat to the sustainability of regional groundwater basins losing historical recharge capacity. For example, the Chino Basin estimates that

over 40,000 acre-feet per year (AFY) of groundwater recharge have been lost on average since land use practices began increasing impervious surfaces.

Resource materials published by the California Land and Water Use Partnership have identified a sound correlation between impervious covers (IC) and threats to regional water supply sustainability. When IC exceeds 10% as it does in many of urban areas in the Watershed, the common signs are not only a reduced level of groundwater recharge, but also an increased size and frequency of one to two-year floods, decreased movement of groundwater to surface water, and increased contaminant run-off into surface water.

**Figure 5.5-1,** developed by the SWRCB, is included here to illustrate the potential effects of development on the beneficial uses of water from a science-based perspective. It is not difficult to find all of these effects in varying degrees throughout the developed Watershed.

**Figure 5.5-1 Potential Effects of Development on Beneficial Uses**



Drawing on the most recent land use maps available from the Southern California Association of Governments (SCAG), **Figure 5.5-2** 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 5.5-3** projects a population increase from 2000 to 2030 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 5.5-2 Santa Ana River Watershed 2005 Landuse**

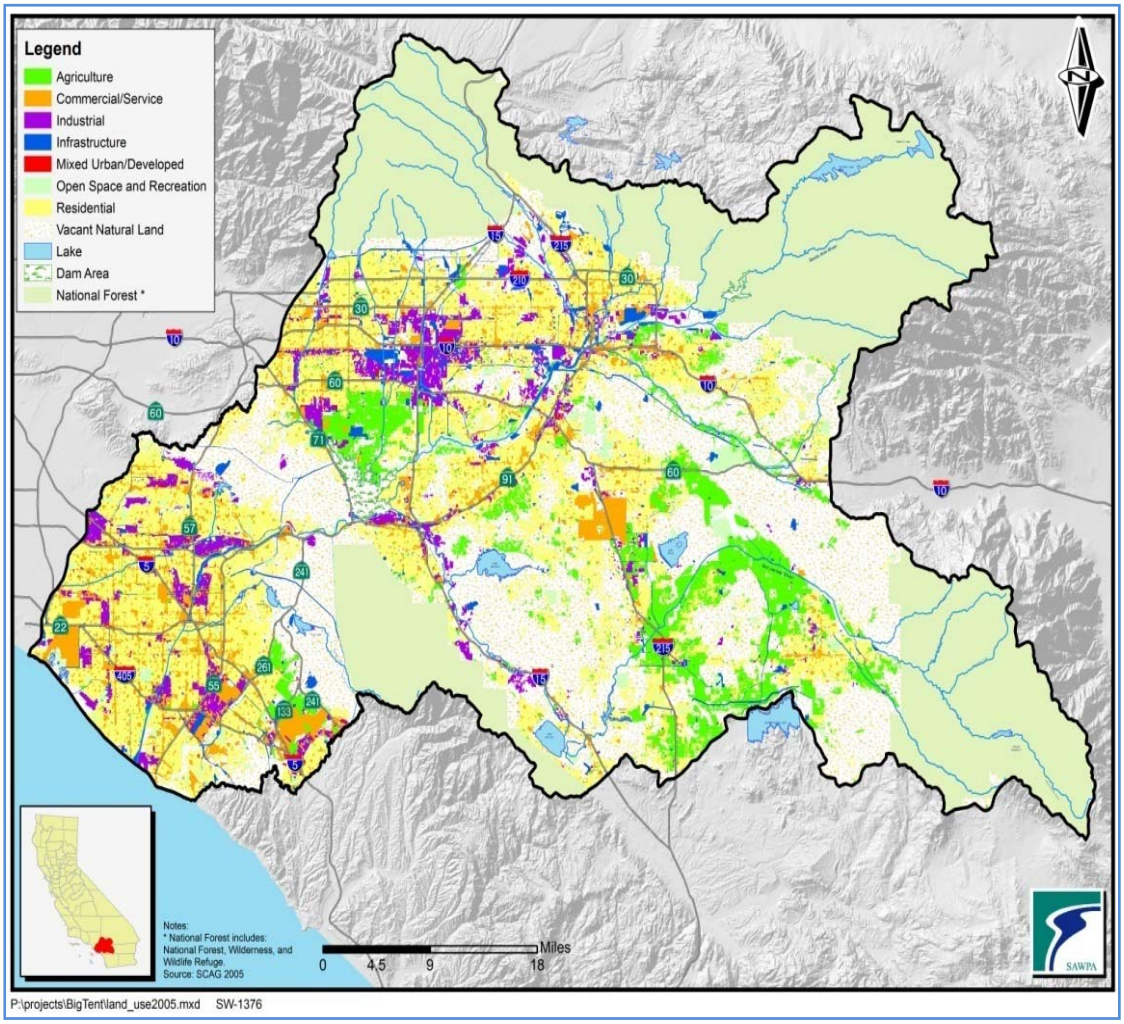
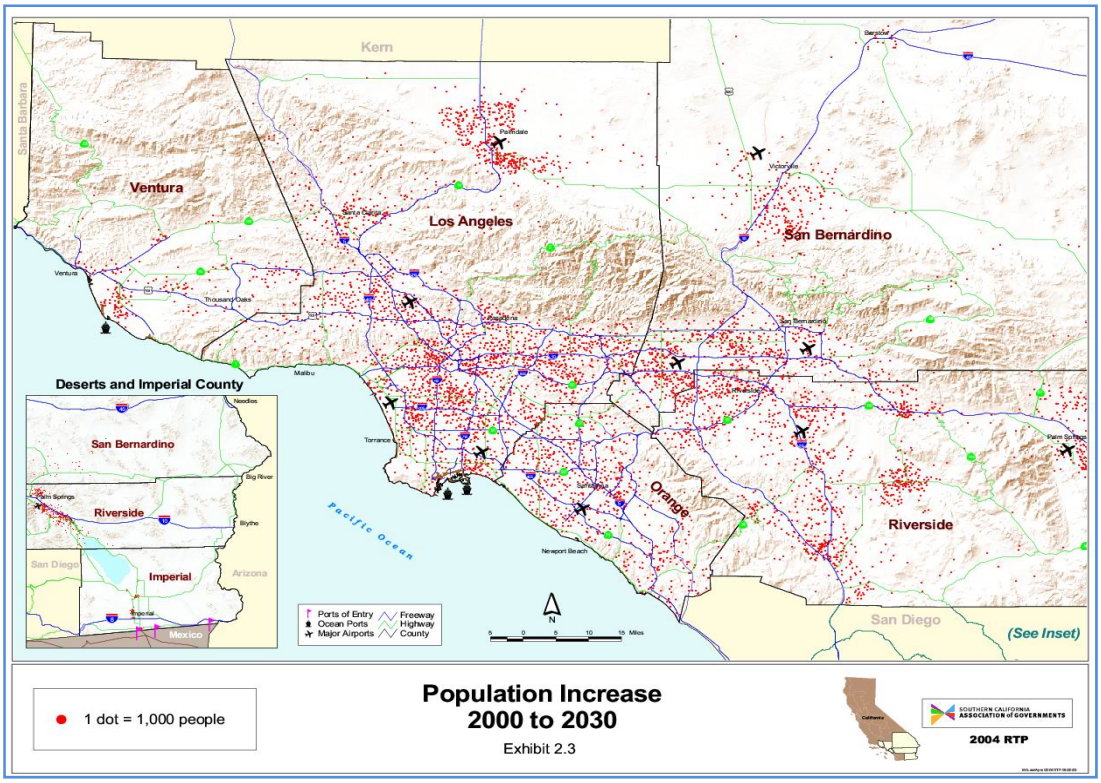


**Figure 5.5-3 Projected Population Increase from 2000 to 2030**




# Identification and Implementation of Land Use Strategies

## Regional Land Use Planning Reducing Low Density Development Patterns

The Compass Blueprint was developed by SCAG in companionship with the 2003 Regional Transportation Plan (RTP), and it continues as a companion to the proposed Final 2008 RTP. The RTP recognizes "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 attempts to foster 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. By encouraging local communities to focus on accommodating as much new growth as possible in existing and emerging centers along major transportation corridors, creating areas of mixed-use development and walkable communities around existing and planned mass transportation systems, the Compass Blueprint is aimed at reducing the quantity of low-density development that was presumed evitable for the inland areas of the Watershed.

By working with stakeholders in each county, the Compass Blueprint developed a series of maps (**Figure 5.5-4** to **Figure 5.5-6**) identifying 2% Strategy Opportunity Areas in each county. The maps point to modest changes in current land use and transportation trends on only 2% of the land area of the region. The Opportunity Areas are shown as colored areas within a blue perimeter line.

**Figure 5.5-4 Opportunity Areas in San Bernardino County**

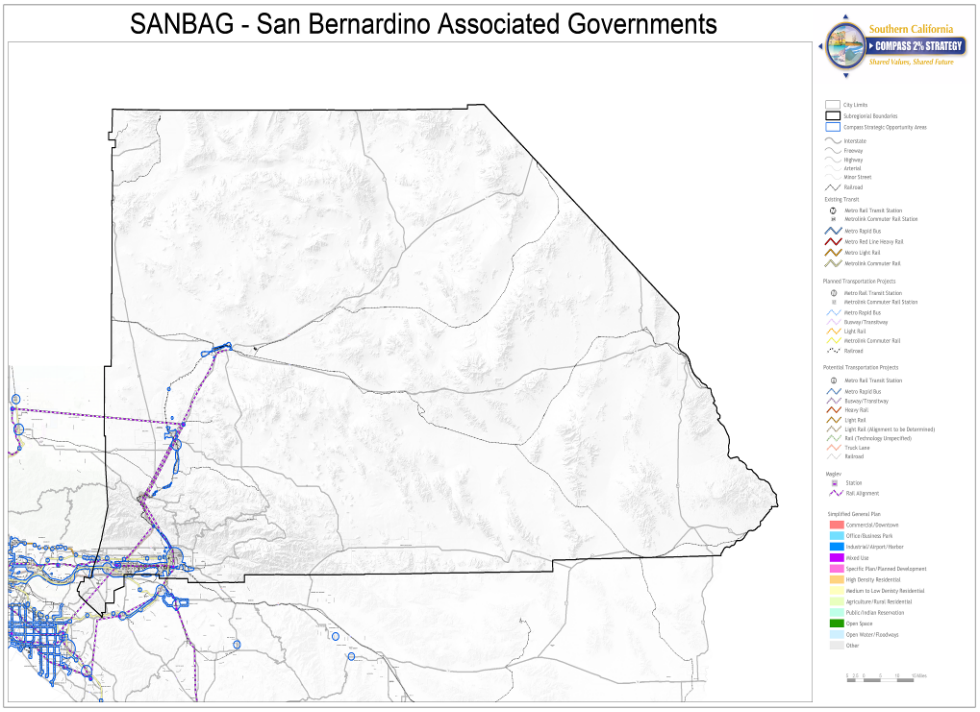
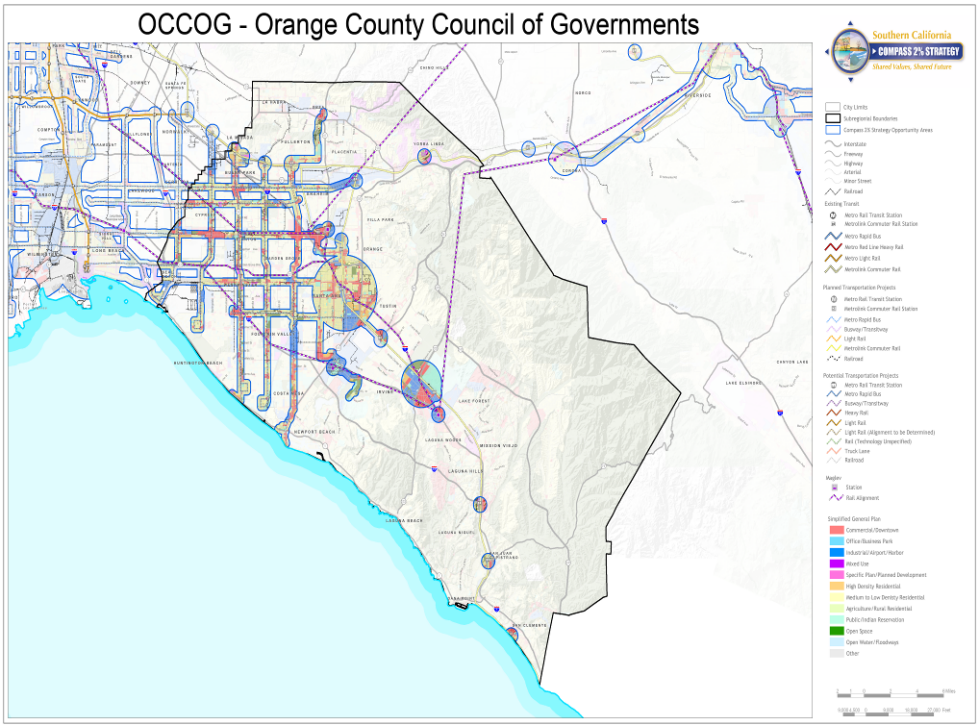


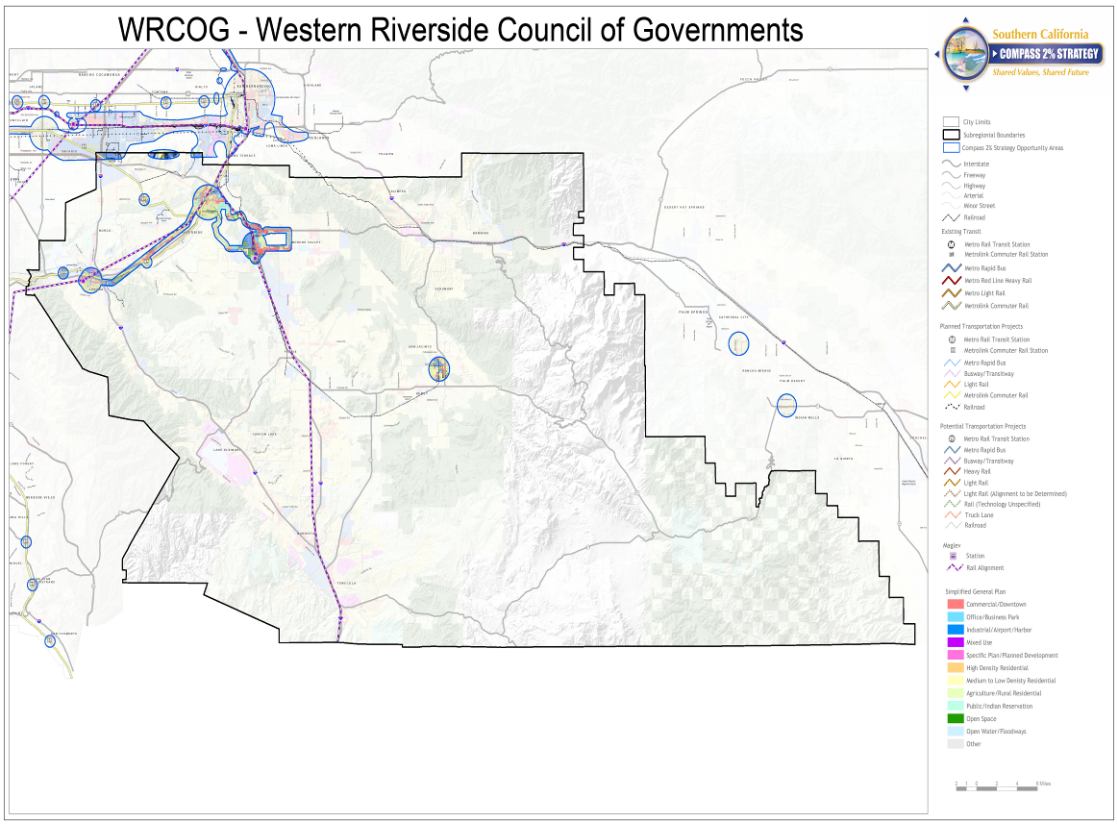

**Figure 5.5-5 Opportunity Areas in Orange County**



These maps were developed by the regional planning agencies that serve as Council of Governments for Orange, Riverside, and San Bernardino Counties with extensive public input. Efforts already are underway to reduce the quantity of low-density development in a number of the Opportunity Areas.

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.

**Figure 5.5-6 Opportunity Areas in Riverside County**




## Ahwahnee Water Principles for Resource Efficient Land Use

The SWRCB supported the Local Government Commission working in concert with elected officials and water leaders from throughout the State to develop the **Ahwahnee Water Principles for Resource Efficient Land Use** (Water Principles)**.** These complement the Ahwahnee Principles for Resource-Efficient Communities that were developed in 1991. The premise for the Water Principles is that "Cities and counties are facing major challenges with water contamination, stormwater runoff, flood damage liability, and concerns about whether or not there will be enough water for current residents, as well as for new development. These issues affect city and county budgets and their taxpayers. However, there are a number of actions that some cities and counties are taking that reduce costs and improve the stewardship of their water resources."

**Figure 5.5-7** shows nine distinctly different water principles that cities and counties can implement through their authority to regulate land use. Five implementation principles provide steps for city and county officials to collaborate on to take advantage of the benefits and synergies of land use and water resource planning at a watershed level.

**Figure 5.5-5 Ahwahnee Water Principles for Resource Efficient Land Use**


### *Principle 1: Compact Community Design*

- **Community design should be compact, mixed use, walkable and transit-oriented** so that automobile-generated urban runoff pollutants are minimized and the open lands that absorb water are preserved to the maximum extent possible.

### *Principle 2: Natural Infrastructure*

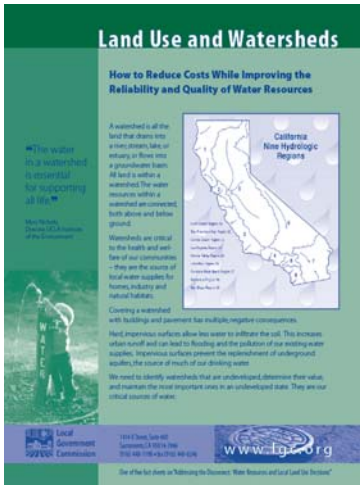
- Natural resources such as **wetlands, flood plains, recharge zones, riparian areas, open space, and native habitats should be identified, preserved and restored as valued assets** for flood protection, water quality improvement, groundwater recharge, habitat, and overall long-term water resource sustainability.

### *Principles 3-5: Sustainable Site Design*

- **Incorporate water holding areas such as creek beds, recessed athletic fields, ponds, cisterns, and other features in the urban landscape** that serve to recharge groundwater, reduce runoff, improve water quality and decrease flooding.
- **Design all aspects of landscaping from the selection of plants to soil preparation and the installation of irrigation systems to reduce water demand**, retain runoff, decrease flooding, and recharge groundwater.
- **Permeable surfaces should be used for hardscape**. Impervious surfaces such as driveways, streets, and parking lots should be minimized so that land is available to absorb storm water, reduce polluted urban runoff, recharge groundwater and reduce flooding.
- **Dual plumbing that allows graywater from showers sinks and washers to be reused for landscape irrigation** should be included in the infrastructure of new development.

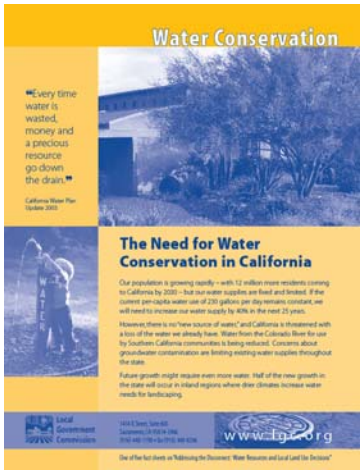
### *Principles 7-9: Efficient Water Use*

- Community design **should maximize the use of recycled water** for appropriate applications including outdoor irrigation, toilet flushing, and commercial and industrial processes. Purple pipe should be installed in all new construction and remodeled buildings in anticipation of the future availability of recycled water.
- Urban water **conservation technologies such as low-flow toilets, efficient clothes washers, and more efficient water-using industrial equipment** should be incorporated in all new construction and retrofitted in remodeled buildings.
- **Ground water treatment and brackish water desalination** should be pursued when necessary to maximize locally available, drought-proof water supplies.




### *Implementation Principles*

- Water supply agencies should be consulted early in the land use decision-making process regarding technology, demographics and growth projections.
- City and county officials, the watershed council, 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.
- The best, multi-benefit and integrated strategies and projects should be identified and implemented before less integrated proposals, unless urgency demands otherwise.
- From start to finish, projects and programs should involve the public, build relationships, and increase the sharing of and access to information.
- Plans, programs, projects and policies should be monitored and evaluated to determine if the expected results are achieved and to improve future practices.

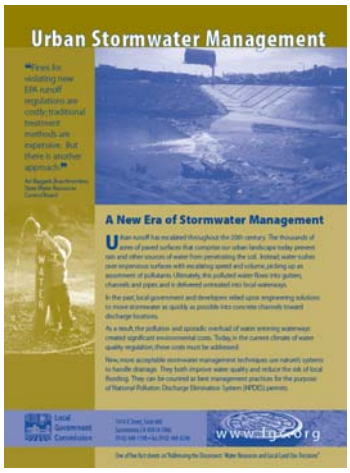




A series of Fact Sheets was developed to help local government officials understand that the concerns they face about having enough water for current residents, as well as for new development, are best addressed through actions by cities and counties to improve the stewardship and reliability of local water supplies. Copies of the Ahwahnee Water Principles and the Fact Sheets were distributed to every County Supervisor, Mayor and City Council Member in California. Regional Workshops were held throughout the State for elected officials, municipal staff, planning commissioners, and other stakeholders.

## Low Impact Development

The **Low Impact Development (LID) Guidance and Training Program** is collaboration between the Southern California Stormwater Monitoring Coalition—a group comprised of San Bernardino,

Riverside, Orange, Ventura, Los Angeles and San Diego Counties, the Cities of Long Beach and Los Angeles, the three respective Regional Water Quality Control Boards, the U.S. EPA, Caltrans, and the California Stormwater Quality Association.

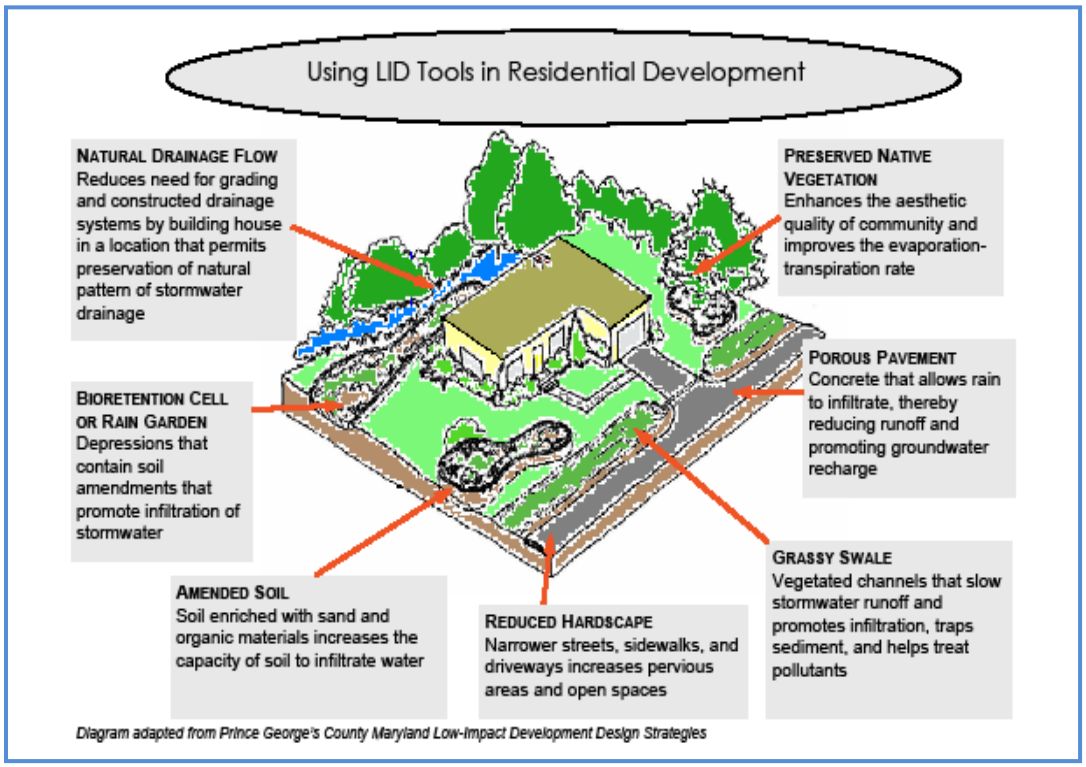



The potential of LID goes well beyond reducing the volume of polluted stormwater runoff. Stormwater runoff also can be understood as a lost resource in the semi-arid environment of southern California, where increasing demand for fresh water requires costly importation of water supplies to sustain ever-growing communities. The goal of LID is to mimic a site's pre-development hydrology, including runoff rates and volumes, by using design techniques that infiltrate, filter, store, evaporate, capture, and reuse runoff close to the source of rainfall (SWRCB). Through LID practices, both stormwater runoff rates and volume impacts can be managed more successfully than with conventional management practices.


LID also benefits water quality. Within the Watershed, the net increase in surface runoff for developed impervious area ranges from 9 inches to 18 inches during an average year, depending upon rainfall. Because stormwater runoff, both volume and rate, also is a major source of pollutant transport to coastal waters and other receiving water bodies, reducing runoff rate and volume reduces pollutant transport. Pollutants associated with stormwater include heavy metals, nutrients, pesticides, petroleum hydrocarbons, and others.

A LID Manual is being developed as a technical reference guide and describes the structural and non-structural Best Management Practices (BMPs) in sufficient detail to reduce the environmental impacts of land development or re-development at the project level. The Southern California LID Manual is designed to be incorporated as a component of the Stormwater BMP Manual(s) that have been developed and are maintained by the California Stormwater Quality Association (CASQA). **Figure 5.5-8** illustrates how LID Tools can be used in residential development.

**Figure 5.5-8 Using LID Tools in Residential Development**




## Green Building Programs Linking Land Use and Water

The Leadership in Energy and Environmental Design (LEED®) is a Green Building Rating System™ that encourages sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. Water agencies and local governments in the Watershed have completed public buildings earning LEED certification to demonstrate sustainable practices. More are anticipated.

There are over 60 local chapters of the U.S. Green Building Council (USGBC), including chapters in Orange County and the Inland Empire. The USGBC is committed to supporting Federal, State and local governments in their pursuit and development of green building programs and initiatives. The 2008 USGBC annual Greenbuild Conference welcomed nearly 30,000 attendees this past year for three days of outstanding educational sessions, renowned speakers, green building tours, seminars, and networking events.

An increasing number of California homebuilders are participating in the California Green Builder (CGB) program launched by the California Building Industry Association in 2005 with more than 1,800 homes completed and another 3,600 under construction or in the planning stage. Each one of these new homes save at least 20,000 gallons of water a year compared to typical homes.

## Offsetting New Water Demand with Onsite and Offsite Conservation

The concept for offsetting impacts with onsite and offsite mitigation, also known as zero footprint, has been applied to air-quality and traffic-impact mitigation. As a water management strategy, it could be utilized in the Watershed to address the impact of water demand generated by new development

mitigated with conservation measures onsite and saving an equivalent amount of water within the existing water service area offsite.

The East Bay Municipal Water District formed a partnership with the developers of a new residential community of 1,400 homes to create a zero water footprint development in northern California. The onsite measures include high-efficiency toilets, washing machines, dishwashers, low-water-use landscaping with irrigation controllers, and water recycling. An agreement was reached for offsite conservation funded for the developers that will pay $6,000 per new home for new conservation projects within the existing service area. The offsite mitigation on a 2:1 rate provides a cushion in the event that water savings from specific measures are less than expected or not permanent.

## Relation of Plan to Local Land Use and Water Planning

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. However, opportunities remain for water agencies to support programs that develop 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 multi-disciplinary process in which the interests of all groups in the watershed were taken into consideration. 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 result is a plan that: (1) links the need for sufficient and clean water with land use, environmental protection, and the need for economic development; (2) as well as a plan that increases the level of understanding about the link between water resources and land use for both land use planning and water agencies. This understanding allows 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, it is anticipated that the OWOW process will strengthen the 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, passed in November 2009, 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, the way in which land is being used 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 have been investing resources to support landscape water use efficiency projects with homebuilders for some time. This is a strategy that has been employed successfully by Metropolitan Water District of Southern California (MWDSC) for a number of years.

In January 2010, Assembly bill AB1881 took effect, requiring local governments to adopt the State's Model Water Efficient Landscape Ordinance or equivalent, and requiring public and private development projects to submit water efficient landscape plans for areas equal or greater than 2,500 square feet. AB1881 will institutionalize at the State level the incorporation of water efficiency measures into new development.

In addition to the accomplishments to be provided by AB1881, it is time to invest with residential, commercial, and industrial developers to support other measures of critical importance from an integrated regional water management perspective, such as:

- Supporting LID site designs that move from a conventional concept of runoff as a waste needed to be disposed of as rapidly as possible, to viewing stormwater as a valuable resource to be captured for passive irrigation and groundwater recharge. Implementations of non-structural and structural LID techniques also reduce pollutant loads associated with stormwater, including heavy metals, nutrients, pesticides, TDS, petroleum hydrocarbons, and others.
- Reducing the quantity of impervious surfaces in new developments by installing green roofs and pervious pavement that is well suited for parking lots, sidewalks, plazas and other similar uses.

## Working with Local Governments

Water supply agencies investing resources in water-efficient visible public landscaping projects with local governments is not new to the region. It has been employed by the MWDSC for a number of years and it continues to be expanded.

Unfortunately, these investments are far from sufficient to create the critical mass of water-use-efficient landscapes necessary to prompt the public toward a dramatic paradigm shift. Considerable investment is necessary to reduce unreasonable water waste and meet SB 7 requirement of 20% reduction in per capita water use by 2020.

Other detrimental land use practices present in visible public places also should be considered worthy of investment.

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.
- Preserving natural resources such as wetlands, flood plains, recharge zones, riparian areas, 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.
- Replacing the aging septic systems in disadvantaged communities that are in close proximity to available sewer lines where residents have lacked the financial resources and political will.

### Working with Environmental Organizations

Agencies 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 species living along river corridors. 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 offers the benefit of:

- Reducing the pollutant load associated with stormwater including heavy metals, nutrients, pesticides, TDS, petroleum hydrocarbons, and others.
- Serving the needs of Disadvantaged Communities

## Conclusion

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 habitat deterioration and high energy consumption for transport. This problem can be stopped and even reverted 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 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.

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