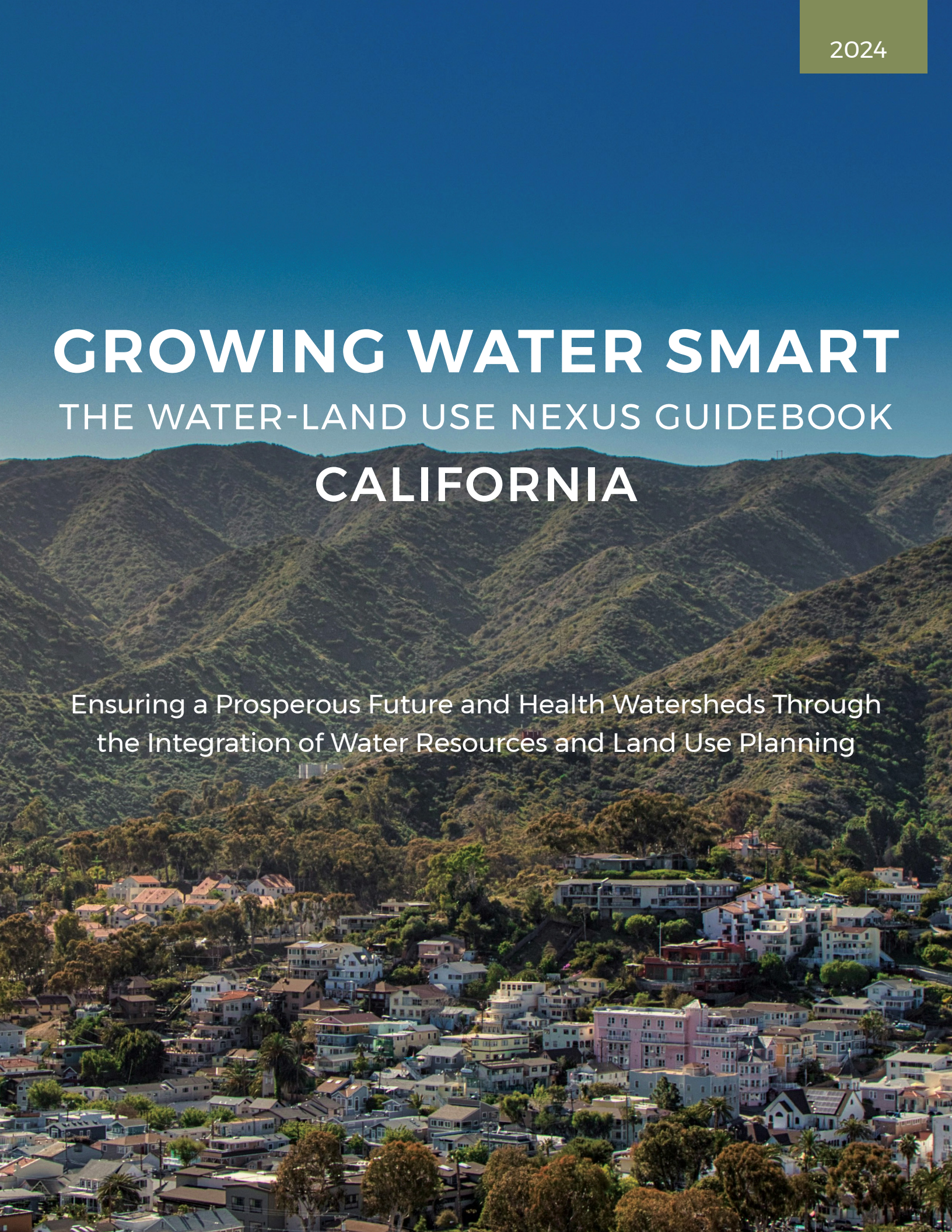
2024

GROWING WATER SMART

THE WATER-LAND USE NEXUS GUIDEBOOK

CALIFORNIA

Ensuring a Prosperous Future and Health Watersheds Through the Integration of Water Resources and Land Use Planning



ACKNOWLEDGEMENTS

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ABOUT GROWING WATER SMART

Growing Water Smart, a program of the Sonoran Institute and the Babbitt Center for Land and Water Policy, a center of the Lincoln Institute of Land Policy, introduces communities to the full range of communications, public engagement, planning, and policy implementation tools to realize their watershed health and community resiliency goals. The Growing Water Smart workshop empowers local government leaders to adopt land use plans and policies that support water resilience. Interested individuals can learn more at www.growingwatersmart.org.

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ABOUT SONORAN INSTITUTE

The Sonoran Institute's mission is to connect people and communities with the natural resources that nourish and sustain them. We envision a Colorado River Basin where rivers flow, landscapes are healthy, and all communities thrive.

ABOUT THE BABBITT CENTER FOR LAND AND WATER POLICY

The Babbitt Center for Land and Water Policy, a center of the Lincoln Institute of Land Policy, seeks to advance the integration of land and water management to meet the current and future water needs of Colorado River Basin communities, economies, and the environment. The Babbitt Center develops tools and best practices to guide decisions through research, training, and partnerships for sustainable management of land and water resources in the Basin and beyond.

CivicWell and Water Education for Latino Leaders provided research and insight into the 2023 update to the California Water Smart Water-land Use Nexus Guidebook.

ABOUT CIVICWELL

CivicWell is a 501(c)3 nonprofit organization supporting sustainable solutions and the community leaders who implement them. It inspires, equips, connects, and cultivates leadership for local innovation and community change, especially for leaders responding to the climate crisis and its impacts on their communities.

ABOUT WATER EDUCATION FOR LATINO LEADERS (WELL)

WELL educates and trains local Latino elected officials about California water policy to promote timely and equitable actions that serve to develop a robust economy, healthy communities, and a resilient environment for all Californians.

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INTRODUCTION

This guidebook serves as a compendium to the Growing Water Smart training and assistance program. It provides resources related to water resource management and land use planning that accelerates, or goes beyond, the State of California statutes and policies. For local officials in California seeking to effectively integrate land use and water planning, this guidebook provides strategies that help further the principles of making water conservation a California way of life, furthering water quality and watershed health, practicing integrated water resource management, and prioritizing water equity.

MAKING WATER CONSERVATION A CALIFORNIA WAY OF LIFE

By 2050, California's population is predicted to grow to 50 million. This puts pressure on the state's limited water resources that are being strained by decreasing precipitation and snowpack from a hotter and drier climate. California's growth challenges are compounded by a residential housing shortage estimated at 4 million units, which will require aggressive development over several years to address the deficit. Historically, water resource managers and water providers have turned to supply-side management to meet the growing demand by investing in water acquisition, treatment, storage, and distribution projects – which all have significant price tags and are time and resource intensive. Over the past twenty years, demand-side management has been integrated into management of urban water supplies by increasing conservation and efficiency, water reuse and recycling, and investing in green infrastructure.

Following a period of back-to-back extreme droughts from 2012 through 2016 that required emergency water conservation orders to protect water supplies, the State of California responded with legislation to "make water conservation a California way of life." The bills, Senate Bill (SB) 606 and Assembly Bill (AB) 1668, were signed into law by Governor Brown in May 2018, marking a shift from a water resource management paradigm that relied on temporary water conservation measures to one that achieves permanent water savings through increased efficiency. The bills established a framework for long-term improvements

in water conservation and drought planning that are helping the state adapt to climate change and longer, more intense droughts. A key component of the framework includes a requirement for urban retail water suppliers to meet established urban indoor and outdoor water budgets through locally determined tools and mechanisms to make existing customers more efficient. The tools and mechanisms include, but are not limited to, education and outreach, leak detection, rate reform, incentives for "climate ready" landscapes, and rebates to replace old and inefficient fixtures and appliances.

In 2023, the State of California released the California Water Plan Update that builds upon the existing water policies, laws, and regulations. The California Water Plan's recommendations are organized around seven objectives that provide a roadmap to resilience:

1. Support Watershed Resilience Planning and Implementation.
2. Improve Resiliency of "Backbone" State, Federal, and Regional Built Water Infrastructure.
3. Improve Resiliency of Natural "Backbone" Infrastructure.
4. Advance Equitable Outcomes in Water Management.
5. Support and Learn from Tribal Water and Resource Management Practices.
6. Support and Increase Flexibility of Regulatory Systems.
7. Provide Guidance and Support Continued Resources for Implementation of Actions toward Water Resilience.

The California Water Plan Update integrates the Newsom administration's Water Resilience Portfolio and the supporting Water Supply Strategy that identify goals for new resilient water supplies that will close the projected water supply-demand gap resulting from a decline in current water supplies due to climate change. New supplies are anticipated to come from both supply-side and demand-side actions that include the expansion of water storage capacity; maximizing alternative water sources including stormwater capture, water reuse and recycling, and desalination; and additional water savings from conservation and efficiency.

Essential to the successful implementation of the California State Water Plan is local and regional water entities and local governments working together to identify, evaluate, and implement individual and collaborative projects and strategies to improve regional and inter-regional resilience.

HOW TO USE THE LAND USE–WATER NEXUS RESOURCE GUIDE

At the community level, local government planning and regulatory mechanisms offer the greatest opportunity to ensure new development is water smart and reduces pressure on limited water supplies. This guidebook is intended to help your community identify the most appropriate land use and water resource management strategies that will achieve greater community resilience. The guidebook is not intended to be read cover to cover, but rather to serve as a resource for exploring specific topics, helping educate decision-makers, and inform strategic discussion.

The guidebook is divided into five sections. Each section includes:

- **A Case Statement** justifying each approach.
- **Toolboxes and Tools** describing the specific policy or management actions for achieving water conservation and efficiency outcomes.
- **Approaches** for implementing the tools.
- **Case Studies** demonstrating how other communities have implemented one or more of the tools to integrate their water and land use planning efforts.

Within each section, the toolboxes offer the tools and mechanisms that are required by state policy or are best practices for aligning water and land use. These are summarized in Table 1 on the next page to help you navigate the guidebook and identify opportunities for strategy development and refinement.

SECTION 1:

WATER-SMART PLANNING

Summarizes the opportunities provided by integrating water and land use during planning processes.

SECTION 2:

SUFFICIENT AND SUSTAINABLE WATER SUPPLY STANDARDS

Provides a review of the State of California's requirement for new developments to have a sufficient water supply.

SECTION 3:

WATER-SMART LAND USE POLICIES & PROCESSES

Provides planning principles to make a community's development pattern more water-smart.

SECTION 4:

HEALTHY AND RESILIENT WATERSHEDS

Describes approaches for protecting water quality and maximizing the many forms of water that can support a resilient community.

SECTION 5:

EFFICIENT WATER DEMAND PROGRAMS

Summarizes how a utility can manager the water demanded by households through market-based incentives and pricing mechanisms.

TABLE 1: OPPORTUNITIES TO INTEGRATE WATER AND LAND USE PLANNING

GUIDEBOOK SECTION	TOOLS & MECHANISMS	PURPOSE
WATER-SMART PLANNING	• Visioning with equity lenses • Information sharing and alignment • Public engagement (including underserved groups) and education • Regional partnerships • General Plans • Urban Water Management Plans • Local and regional water quality plans • Capital Improvement Plans • Hazard Mitigation Plans • Drought Resilience Plans • "One Water" and Integrated Regional Water Management IRWM Plans • Climate Action Plans • Groundwater Sustainability Plans • State and federal water infrastructure improvement programs that prioritize underserved communities	Evaluates local water supplies, current and future demands, and related community and economic values. Establishes goals and objectives for managing the intersection of natural resources and the built environment toward a future that increases water security for everyone.
SUFFICIENT AND SUSTAINABLE WATER SUPPLY STANDARDS	• California water supply rules • Water budgeting • Water allocation policies • Water demand offset programs • Annexation policies • Alternative water supplies	Links new development to water supply planning. Determines the requirements applied to new development for water resource management, conservation, and efficiency.
WATER-SMART LAND USE POLICIES AND PROCESSES	• Compact development • Water-efficient landscapes • Water-smart buildings • Development review processes	Direct how land is developed and the amount of water the developments will require.
HEALTHY AND RESILIENT WATERSHEDS	• Watershed protection • Green infrastructure • Low impact development	Protects the regional water quality and pairs the right water supply with the appropriate use.
EFFICIENT WATER DEMAND PROGRAMS	• Conservation rate structures • Conservation rebate programs • Water metering and audits • Consumer education messaging	Empowers and incentivizes landowners and renters to reduce water consumption. Links community-wide programs to water supply planning.

SECTION 1

WATER-SMART PLANNING

For a sustainable future, communities must possess guiding plans that align land use planning with forecasted water availability and further water resiliency goals.

CASE STATEMENT

While many local planning officials and water supply managers are working diligently to achieve water conservation and efficiency, water reuse, and water quality goals, the alignment and integration of community plans ensure that new and existing development, infrastructure, and other long-term investments are made in line with water management needs.

General Plans must be aligned with plans for water supply, infrastructure, water quality, and watershed health, and all must account for the impacts of climate change and natural hazards such as drought, wildfire, and flooding. To integrate planning processes, the silos between departments and agencies traditionally responsible for these topics must be broken down. Land use planners typically focus on how much and what type of growth may take place in their communities, while water resource managers focus on ensuring adequate water supply to meet demand. Integrating General Planning, water planning, capital improvement planning, and climate resilience planning will require holistic thinking and cross-departmental collaboration.

Done successfully, this integrated approach can ensure that:

Development occurs in a way that increases equity and protects the watershed, including ecological functions and the quality and quantity of water resources.

The community's vision and goals for equity, sustainability, and resilience are expressed and aligned across plans for water resources management, community health, capital improvement, and economic development.

A community's vision for the future considers the interrelated impacts of water, development, and climate change.

Groundwater is sustainably managed in accordance with land use change.

TOOLBOX: KEY LAND USE AND WATER PLANS

General Plans

General Plans offer a critical window to evaluate the interrelationship between land use patterns, community priorities, and available water resources in an era of increasing water scarcity. General Planning provides one of the few opportunities for a community-wide dialogue about the future and to help communities understand:

- Projections for future population and drivers of growth.
- The type of development occurring in the community and where that development will occur.
- The source, capacity, and conditions of a community's water supply and water-related infrastructure.
- Adequacy, sustainability, and vulnerability of the water supplies.
- Stormwater and floodplain management for multiple benefits.
- Health conditions of the watershed.
- Current programs, projects, and opportunities for better collaboration.
- Value trade-offs faced in order to achieve the community's goals.

By state statute, every municipality or county in California is required to create a General Plan.[1] The State's General Plan requirements for municipalities and counties allow for, but do not require, a distinct water element.[2] However, throughout the required elements, particularly in Land Use, Circulation, and Conservation, there are often requirements related to the sustainable management of water resources. The Office of Planning and Research (OPR) General Plan Guidelines provide recommendations for integrating water resource management.[3] A few of these requirements and recommendations are shared below.

SB 1000 requires General Plans of regions that include underserved communities to incorporate an environmental justice element, which may also address water-related equity concerns.[4]

For example, the General Plan could:

- Address concerns about the sustainability of the aquifer/surface water as part of the discussion of water supplies needed to serve new development.
- Evaluate water conservation as a planning factor in its demand modeling.
- Identify goals and approaches for coordinating and consulting among departments and with local community groups and environmental justice and water advocacy entities to secure and preserve community water supplies.

[1] Cal. Gov. Code § 65300

[2] To review content of the California optional element visit http://opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf

[3] Office of Planning and Research Guidelines 2017, 110

[4] Cal. Gov. Code §65302(h)

TABLE 2: INTEGRATING WATER INTO THE GENERAL PLAN

ELEMENT	DESCRIPTION	RECOMMENDATION
LAND USE	Requires municipalities to identify areas subject to flooding.	Further considerations should be included to address the water supply and water quality issues created by new development. This element should address considerations of density and where new development is placed with regard to existing water infrastructure and environmentally sensitive areas. For example, this element should: • Account for rivers, creeks, streams, flood corridors and floodplains, riparian habitats, and land that may accommodate floodwater for purposes of groundwater recharge and stormwater management identified in the conservation element. • Identify areas important to water supply or water quality to ensure protection. • Analyze the water, water supply, wastewater, stormwater drainage, and structural fire protection needs or deficiencies for each legacy or disadvantaged unincorporated community. • Be consistent with the conservation and open space elements regarding discouraging the premature and unnecessary conversion of open space land to urban uses.
CIRCULATION	Requires a description of existing and proposed local public utilities and facilities coordinated with the land use map (including proposed water infrastructure and wastewater treatment and disposal infrastructure).	This element should identify the location and necessity of public utilities including water, sewers, and stormwater systems that are both "right-sized" to serve only the growth planned for in the land use element and also placed in areas that maximize efficiency and minimize impacts to the community.
CONSERVATION	Addresses "the conservation, development, and utilization of natural resources," including coordination between jurisdiction and water agency for new development.	The coordination of countywide water agencies with district and city water agencies, as well as groundwater sustainability agencies (if within a SGMA groundwater basin) is required. It should include thorough analyses of projected future water needs for domestic, agricultural, ecological and industrial uses, and should provide for the conservation of water supplies and protection of aquatic ecosystems as a beneficial use. This element should identify priority areas to conserve that offer the most effective conservation of water resources.

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TABLE 2: INTEGRATING WATER INTO THE GENERAL PLAN

ELEMENT	DESCRIPTION	RECOMMENDATION
OPEN SPACE	Builds detailed policies that connect to the land use element.	Also in this element, the Office of Planning and Research recommends identifying areas important to water supply or water quality (infiltration areas, areas above groundwater supplies, wetlands, natural filtration basins, and priority recharge zones).
SAFETY	Requires hazardous zone mapping (flooding, dam failure, fires, etc.) and emergency management planning.	Floodplain mapping identifies higher risk areas where development should not occur.
HOUSING	Required to be revised and submitted periodically on a four, five, or eight year cycle, depending on various factors (Gov. Code §65588), and is subject to oversight from the state Department of Housing and Community Development to ensure adequate housing stock statewide to meet projected population growth.	This element should identify policies to invest in infrastructure and public facilities to ensure that adequate water, sewer, roads, parks, and other needed services are in place to serve existing and future resident communities in an equitable manner. Additionally, water and sewer providers should be consulted during the development and update of the housing element, and the local government must deliver the adopted housing element to their water and sewer providers, including a summary/ quantification of their regional housing need allocation and any other relevant information.[5]
WATER	While optional,[6] a water element (or water sections in all other relevant elements) can strengthen integrated water resource management and preparedness for hydroclimatic events such as droughts, floods, and fires.	There is a long-standing debate in California as to whether "water" should be a required element or if "water implications" should be woven into every element of a General Plan. In the absence of a requirement or statewide recommendation, local governments are strongly encouraged to consider a "both, and" approach: opting to develop the recommended yet still optional water element and incorporating water implications into all required elements of their General Plan. At minimum, local governments should do one or the other.

[5] Gov. Code §65589.7 Water and Sewer Priority.
See the HCD Memo at www.hcd.ca.gov/community-development/housing-element/housing-element-memos/docs/memo_sb1087.pdf
[6] Section 65303 of the California Government Code.

General Plans, CEQA, and Water Resources Analysis

General Plans also have a role in understanding future water supply and new development. Under California Environmental Quality Act (CEQA), General Plans are considered projects and must prepare an Initial Study of environmental impacts including water quality and hydrology. If there is a finding of significant impact, an Environmental Impact Report (EIR) must be prepared. In the draft EIR, CEQA guidelines include a review the General Plan, in particular the Land Use element, of whether:

- There will be a significant depletion in groundwater and a lowering of the groundwater table from future development would infringe upon the water supply of wells already permitted.
- The required supply of future development would be insufficient under current conditions and require the development of new water projects and supplies.
- The project will impact runoff and drainage and substantially impact surface and/or groundwater water quality.

When there is a finding of impact or insufficiency, the EIR must present how the impact will be mitigated or resolved. As new water supplies become scarcer and both new supplies and conservation and efficiency strategies more expensive, the EIR should serve as an important analysis for local governments in understanding the impacts of their projected future land use patterns. Given the General Plan EIR serves as a basis for future project evidence and decisions under both SB 221 and SB 610, local governments should carefully and thoughtfully engage in their development to ensure the assumptions are as well prepared as possible.

Urban Water Management Plans

Per California Water Code, §10610-10656 and §10608, urban water suppliers that supply over 3,000 acre-feet annually or serve more than 3,000 connections must prepare an Urban Water Management Plan (UWMP) every five years. The UWMP includes multiple interrelated elements that assess the reliability of a provider's water supplies over a minimum 20-year horizon, including:

- A long-term Water Supply and Demand Assessment that inventories water supply and infrastructure in an evaluation of a system's ability to meet its customers' needs. The state requires that the reliability of a provider's supply reliability be assessed under normal, dry, and multiple-dry years hydrologic conditions and a Drought Risk Assessment be conducted for the next five years.
- Beginning in 2022, a standalone Annual Water Supply and Demand Assessment must be submitted to the state, forecasting the upcoming year, any anticipated shortages, and possible actions.
- A standalone Water Shortage Contingency Plan (WSCP) that identifies a supplier's response to managing and mitigating an actual water shortage condition as a result of drought or other impacts to water supplies.
- A summary description of water conservation goals and targets that complies with the Water Conservation Act of 2009 (also known as SBX7-7), baseline, targets, and 2020 Compliance, and the demand management strategies to promote conservation and reduce water demand.

[7] Department of Water Resources, Drought Planning for Small Water Suppliers and Rural Communities at www.water.ca.gov/Programs/Water-Use-And-Efficiency/SB-552

Small water suppliers—defined as those with fewer than 3,000 connections and serve fewer than 3,000 acre-feet—must develop an abridged water shortage contingency plan, annually report their water supply conditions and use by month, and upgrade their infrastructure to drought resilient standards if needed.[7]

Integrated Regional Water Management and "One Water" Plans

In 2002, California State lawmakers passed the Integrated Regional Water Management (IRWM) Planning Act[8] to encourage local entities and water interest groups to improve water quality and water supply reliability at a regional level to meet the state's overall agricultural, domestic, industrial, and environmental water needs.[9] It is a voluntary, collaborative effort to plan and implement water management solutions on a regional scale, though it does not include local land use in the water management considerations. Across the state there are regional collaborative coordinating committees that work to support and address communities' local water needs in service of protecting the overall watershed health.

An example of this is the Integrated Regional Water Management Plan for the Upper Santa Ana River (IRWMP), which includes a regional context as well as Urban Water Management Plans for each local agency.[10]

"One Water" plans promote the holistic management of water in all its forms—drinking water, stormwater, wastewater, and source water for a city or county. These plans offer innovative, cross-departmental solutions at the local level to traditional water management practices to maximize the strategic use of all forms of water.

An example of such an effort in California is the City of Los Angeles' One Water LA 2040 Plan. The One Water LA 2040 Plan serves as a roadmap that connects various local plans, ideas, and people so that the community will arrive at better and fiscally responsible water planning solutions. The plan identifies projects, programs and policies that will yield sustainable, long-term water supplies for Los Angeles to increase the community's resilience to drought conditions and climate change.[11]

One Water approaches can be integrated into planned development or sub-area plans to promote a holistic approach to water in site and building plans. Collaboration is a key component of the planning process so that the various responsibilities of local municipal departments and community groups' needs are considered and addressed when developing a One Water plan.

[8] California Department of Water Resources, Integrated Regional Water Management, www.water.ca.gov/Programs/Integrated-Regional-Water-Management

[9] Association of California Water Agencies, Integrated Regional Water Management Policy Principles, www.acwa.com/resources/integrated-regional-water-management-policy-principles

[10] Integrated Regional Water Management Plan for the Upper Santa Ana River (IRWMP). (2020). www.sbvwcd.org/our-projects/upper-santa-ana-integrated-regional-water-management-plan

[11] LA Sanitation and Environment, One Water LA, www.lacitysan.org/san/faces/home/portal/s-lsh-es/s-lsh-es-owla?_adf.ctrl-state=3p6j1lxdr_5&_afrLoop=1776138090786204#!

Groundwater Sustainability Plans

The Sustainable Groundwater Management Act (SGMA), passed in 2014, requires local Groundwater Sustainability Agencies (GSAs) in designated high- and medium-priority basins to develop and implement Groundwater Sustainability Plans (GSPs) or to develop Alternatives to GSPs. GSPs provide a roadmap for how groundwater basins will reach long-term sustainability. Although local public agencies in basins designated as low and very-low priority are not required to do so, DWR encourages them to form GSAs and develop GSPs, update existing groundwater management plans, or coordinate with others to develop a new groundwater management plan in accordance with Water Code Section 10750 *et seq.*

To integrate water and land use planning within the Groundwater Sustainability Plan, the Department of Water Resources Sustainable Groundwater Management Program's Groundwater Sustainability Plan Guidance documents recommends the following Land Use Elements or Topic Categories of Applicable General Plans (Reg. § 354.8 f) be included in the GSP:

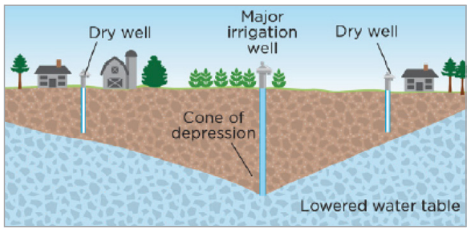
- Summary of General Plans and other land use plans.
- Additional information could include crop types and acreages, urban land designation, and identification of open spaces.
- Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects.
- Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans.
- Summary of the process for permitting new or replacement wells in the basin.
- Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.[12]

If groundwater is identified as a primary source of water, the Urban Water Management Plan must include the GSP's priorities as well as a description of coordination efforts with the GSA. In response, the GSA must provide the land use agency with a current version of its GSP along with other water management documents and a report of the anticipated effect of a proposed General Plan action on the GSP's implementation.

Photo by Vasile Stefirta

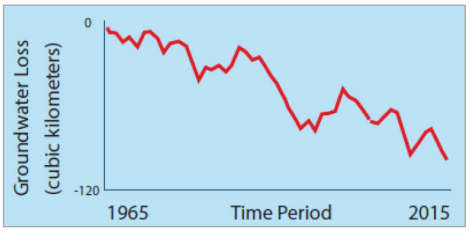
[12] California Department of Water Resources. Groundwater Sustainability Plan Annotated Outline.

SIX UNDESIRABLE RESULTS AVOIDED WITH A GSP



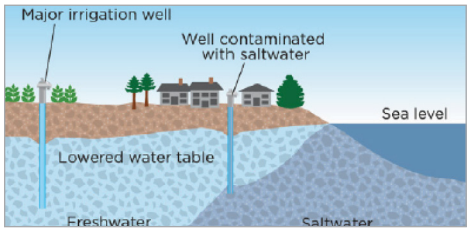
Chronic lowering of groundwater

Risk of shallow wells going dry, increasing reliance on bottled water. Also negatively impacts wetlands and streams that rely on shallow groundwater.



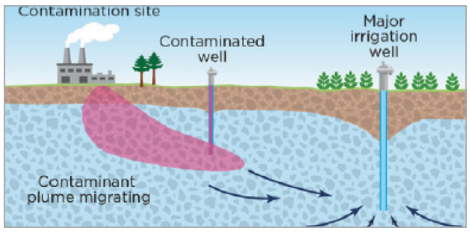
Groundwater storage reduction

Less groundwater stored in the water "savings account" reduces the ability to be prepared for droughts and restricts future land use development.



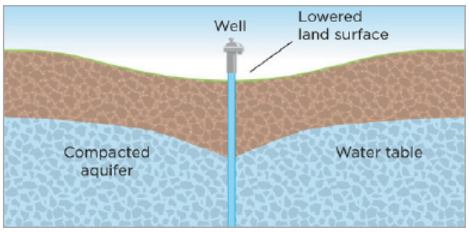
Seawater intrusion

Increased salt levels from seawater intrusion impacts drinking water and irrigation supply, and harms aquatic life.



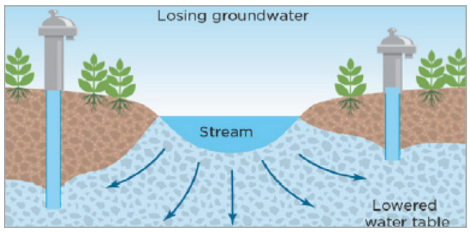
Degraded water quality

Violation of California's human right to water and community access to water used for drinking, cooking, and sanitation.



Land Subsidence ('sinking' due to over-pumping)

Damage to buildings and infrastructure, increased flood risk in low-lying areas, and lasting damage to groundwater aquifers.



Depletions of interconnected surface water

Overpumping may pull from surface waters (e.g. streams), impacting surface water users such as fisheries, marinas, and/ or consumers who rely on surface water for drinking.

Drought Resiliency Plans

The 2018 Water Conservation and Drought Planning (SB 606 and Assembly Bill 1668) legislation provided a new framework for efficient water use and added requirements to strengthen local drought resilience for urban areas, vulnerable small water suppliers, and rural communities. The legislation listed recommendations for drought planning, which enabled the passage of Senate Bill 552 in 2022 that requires counties to prepare a Drought Resiliency Plan either as a standalone document, or as part of other local plans.[13]

A Drought Resiliency Plan is an evaluation of strategies to improve water conservation and water storage during wet years, and to reduce water demand in response to drought conditions. It should include specific demand-reduction measures and an adaptive management process after dry years to adjust for further improvements. This plan can be a standalone document or can be embedded or included in another local planning document.

[13] California Department of Water Resources. County Drought Resilience Plan Guidebook. water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/County/CountyGuidebook_DWR_20230307_ADA_508.pdf

Local and Regional Water Quality Plans

Local and regional entities have several existing water planning authorities related to water quality control planning. Local plans and regulations around water quality are driven by federal Clean Water Act requirements related to reducing pollutant discharge. Stormwater Management Plans provide another opportunity for local entities to link water-related goals and policies across planning efforts and departments.

Local water quality control plans are connected through regional-level planning. Clean Water Act section 208 requires states to prepare area-wide waste treatment management plans (208 Plans). Pursuant to the Porter-Cologne Water Quality Control Act of 1969, California has nine regional Water Quality Control Boards that develop and update an area-wide Water Quality Control Plans.

Tying regional Water Quality Control Plans to local stormwater management plans and General Plans (and vice versa) provides an opportunity to integrate goals, policies, and programs for stormwater infrastructure (including green infrastructure and low-impact development stormwater management options), sewer construction, and wastewater treatment facilities across local and regional planning efforts. It could also provide significant justifications for local decisions made on creating, updating, and implementing capital plans.

Capital Improvement Plans

Planning departments, parks, public works, and water and wastewater utilities often rely on grants and bonds to invest in green and gray infrastructure improvements or new construction. Capital Improvement Plans (CIPs), which forecast and match projected revenues and capital needs over a multi-year period, provide the greatest opportunity to create a long-term investment strategy for the infrastructure improvements identified in a General Plan or Urban Water Management Plan.

Capital Improvement Plans can direct investment in infrastructure not only for treatment facilities and pipes, but also in projects that are multifunctional and employ nature-based solutions to stormwater.

Local Hazard Mitigation Plans

Local Hazard Mitigation Plans identify specific hazards likely to impact a community, including shocks such as drought, wildfire, extreme heat, or flooding. A community must have a Local Hazard Mitigation Plan (LHMP) approved by the Federal Emergency Management Agency (FEMA) in order to receive grants from the Pre-Disaster Mitigation or Post-Disaster Hazard Mitigation Grant Program. Local communities, including cities, counties, and special districts, must prepare LHMPs and update them at least every five years in accordance with the federal Disaster Mitigation Act of 2000 to remain eligible for FEMA mitigation project grants. These plans identify pre-disaster risk reduction as well as post-disaster response activities, and how hazards can impact water infrastructure and plans for reducing vulnerability and risks.[14]

To integrate and streamline planning efforts, AB 2140 allows California counties and cities to adopt their current, FEMA-approved local hazard mitigation plans (LHMPs) into the Safety Element of their General Plans.

[14] Links to Local Hazard Mitigation Plans can be found on the California Office of Emergency Services website at www.caloes.ca.gov/office-of-the-director/operations/recovery-directorate/hazard-mitigation/state-hazard-mitigation-planning

Approaches for Aligning Water and Land Use in Long Range Plans:

- Achieve consistent data and forecasting methodology by comparing anticipated demand from new development described in General Plans with water supply and water infrastructure capacity to resolve inconsistencies.
- As the primary community plan governing the built environment and development, focus closely on addressing a broad range of water constraints and opportunities throughout the General Plan, including in a water resources element, if applicable. Involve water resource managers in the plan development. Link water supply and demand, conservation, and recharge priorities and policies across all related plans to address water concerns through a variety of approaches and authorities.
- Evaluate plans and policies to determine if the expected results were achieved and to improve future planning.[15]

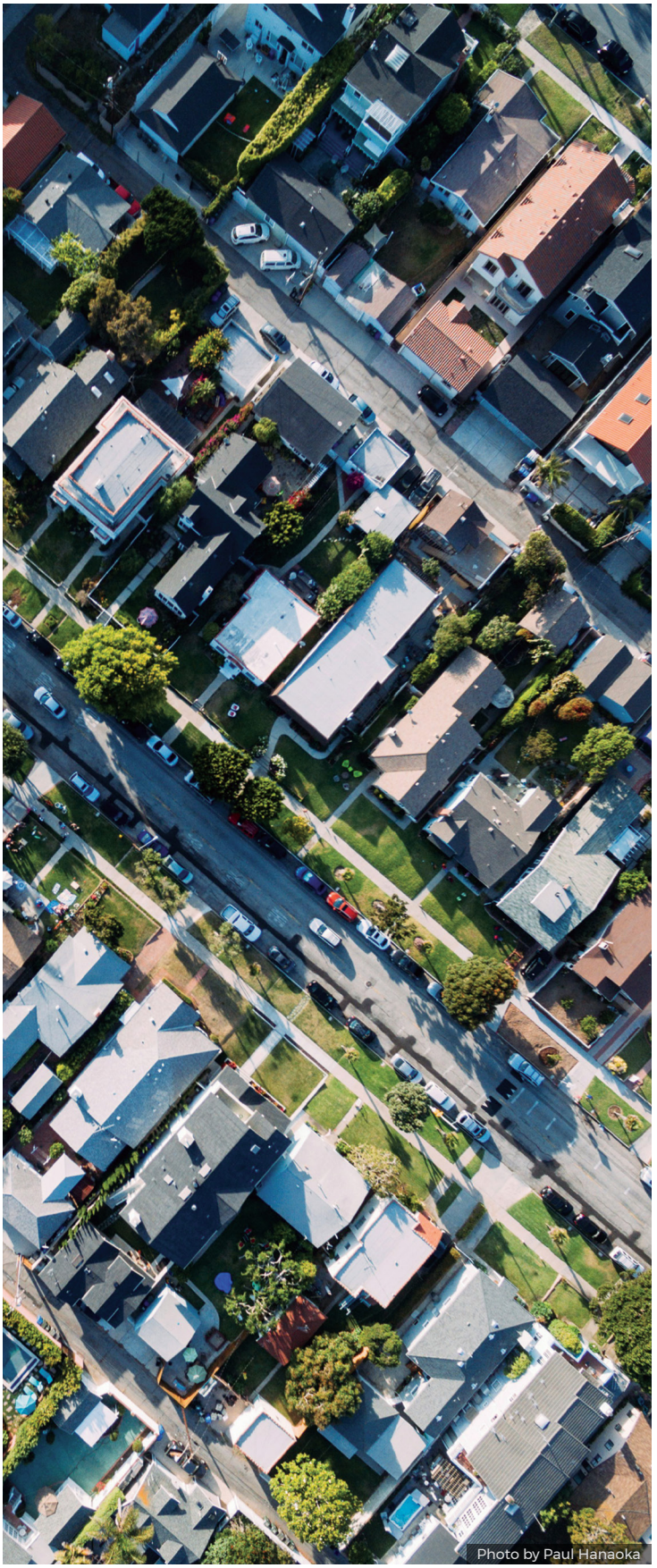


Photo by Paul Hanaoka

[15] Ahwahnee Water Principals, https://civicwell.org/civic-resources/ahwahnee-water-principles/

Photo by Steven Kelly

CASE STUDY

WATER-SMART SUPPLY — CITY OF FRESNO

Until recently, the City of Fresno has been dependent on groundwater for about 88% of its water supply. Groundwater withdrawals have outpaced the rate of groundwater recharge. Over the past 100 years, the city has seen groundwater levels drop 100 feet. The City has an agreement to use Fresno Irrigation District canals to distribute water to Fresno Metropolitan Flood Control District (FMFCD) basins throughout Fresno for groundwater recharge during dry months. The City has budgeted more than $850,000 to construct the connections and make necessary improvements, such as flow monitoring, to allow for efficient recharge. The City has ongoing projects with the neighboring city of Clovis, the Fresno Irrigation District, and the FMFCD for groundwater recharge. This partnership delivers an average of 60,000 acre-feet of water to underground storage every year. Fresno has addressed these challenges in a coordinated way through their long range water and land use plans.

According to their 2020 Urban Water Management Plan, an increasing volume of rainwater can no longer soak through the soil to the groundwater aquifer as urbanization covers once open land with pavement, roads, and buildings. There is not enough storage capacity in the aquifer to serve the city's needs, and natural recharge is not able to keep up with pumping. They identified that more active recharge facilities—such as Managed Aquifer Recharge—are needed to replace the loss of natural recharge capacity.

The City's General Plan (2014) supports the use of a natural-drainage system in new development to capture and infiltrate water on-site. For the first time, the General Plan and development code limits the expansion of growth in undeveloped areas and redirects it to existing areas. This is accomplished through policies that support infill development and establish minimum rather than maximum densities. These policies are projected to slow urbanization and protect lands currently available for natural recharge for an additional 25 years.

SECTION 2

SUFFICIENT AND SUSTAINABLE WATER SUPPLY STANDARDS

Water supply should be demonstrated as adequate and sustainable before any development is approved.

CASE STATEMENT

Local governments are often able to set their own standards that: (1) establish water supply requirements based on specific parcels or uses or (2) require additional review and approval. Water adequacy rules link supply-side management to demand-side management.

States across the West have adopted state statutes intended to protect communities from the threat of insufficient water supplies for new development, recognizing that:

New development creates new water demand, which can be met through water conservation efforts (e.g., more efficient appliances, changing to less intensive water landscaping), local water capture projects (e.g., recharge basins, rainwater harvest), and the use of recycled water.

Government has a role to play in ensuring sustainable and sufficient water supplies for new and existing property owners.

Growth pressure on water supplies requires a stronger connection between land use approval and water planning at the state, regional, and local levels.

Collaboration between local governments and water providers is essential to ensuring supply reliability.

Criteria for Sufficient Water Supply for Development

Water supply for municipal and county development is regulated at the state and local levels. The State of California State Water Board and Department of Public Health are each responsible for the implementation of state policy that guides how water supplies are assessed for sufficiency and reliability during land development applications, ensuring that the development of new public water systems meets water supply and water quality requirements, and ensuring that individual wells are constructed to protect public safety. Local governments play a key role in implementing state requirements and are often able to set their own standards that complement and/or exceed minimum state standards for development review.

This section offers a high-level overview of key policies guiding how water supply and the land use approval process for new development applications and building permits are interrelated. As the statutory decision makers, a local government should make explicit the information it will use to make a determination of the sufficiency of a future water supply. The list below summarizes the types of criteria and/or development standards a local government should consider during approval of a development application. Each toolbox offers more explicit details of guiding policy and implementation of best practices.

1. **Defined Sufficient and Sustainable Supply:** SB 210 defines sufficient water supply as the total water supplies available during a normal, single dry, and multiple dry years period within 20-year projections that will meet the water demands of the proposed subdivision, including agricultural and industrial uses.
2. **Approved Water Source(s):** Clearly defined and identified allowable water sources, whether from a water provider, individual wells, shared wells, and/or alternative water sources. Pursuant to California Water Code Section 160.4, hauled water is not a permitted source of water for urban development.
3. **A Water Rights Inventory:** Legal demonstration of future water source(s), either by the acquisition or dedication of surface water rights or the approval for wells.

TABLE 3: AGENCY OVERSIGHT FOR APPROVAL OF NEW WATER SUPPLY FOR MUNICIPAL USE

DEPARTMENT OF WATER RESOURCES & STATE WATER BOARD	DEPARTMENT OF PUBLIC HEALTH	LOCAL GOVERNMENT
Establishes the minimum standards for well drilling and construction.	Approves permits for public water supply systems.	Adopts and administers ordinance for individual wells permits. Administers compliance for sustainable water supply under SB 610 and SB 221.

4. **Demonstrated Water Availability:** For development reviewed through California Environmental Quality Act (CEQA), SB 210, and SB 610, water availability is demonstrated by the expected availability of water supply under multiple conditions (dry and drier/ single year/multi-year), consideration of climate change impacts and water supply timeframes (at minimum 20 years), and legal requirements or limitations for acquiring water from each source (consideration of pumping and recharge rates, water supply plans, or surface water allocations). For individual well permits, well yield tests demonstrate reliability of the water supply and aquifer.
5. **Development Water Demand Projections:** A water demand projection is the amount that a proposed development will require at full buildout. Projects subject to the CEQA and Water Code §10910(a) and 10912(a)(3), thus requiring a Water Supply Assessment, are required to establish a water use budget to provide the basis for the water demand. Water budgets should include indoor and outdoor water uses, including:
    - demand from indoor plumbing fixtures and account for occupancy counts, frequency of use, and duration time per occupant;
    - water demands for heating and cooling, accounting for climate conditions and days of operation;
    - demand from process water;
    - other indoor demand;
    - outdoor irrigation demand;
    - demand from other outdoor uses.

    Evaluation of an individual or public water system well permit is determined by estimated daily use in gallons per day, maximum daily demand, and peak hour demand.
6. **Water Efficiency, Conservation, and Demand Management Practices:** The local government pre-development requirements and/or incentives for developments to reduce projected water demand through water efficiency and conservation practices.
7. **Underserved Water Users:** Historically underserved water users should be identified and engaged to reduce local inequities in developed areas as new developments are integrated.
8. **Compliance with Other Regulatory Requirements:** Development regulations can identify specific areas or zones where water resources are particularly scarce (e.g., recharge zones, different water provider service areas, specific hydrological zones, groundwater recharge areas, groundwater management areas, etc.); where water quality concerns require additional review or assessment; or when there are other specific requirements (e.g. zoning density, mitigation standards, water conservation and efficiency requirements, and/or a water allocation policy).
9. **Maps:** Maps of geographic locations where different requirements or review processes apply. Building these in GIS can aid awareness and data management.
10. **Defined Review Processes and Criteria:** Specificity and guidance on what is required for the review (such as whether it is a Water Supply Assessment and/or

Written Verification), when in the process it occurs in the development application (site development application or building permit), and who conducts the reviews.

11. **Engineering Standards for Wells and the Water Supply and Distribution System:** The engineering requirements for a well, water system connection, and water distribution system should be clearly articulated in development regulations or state guidelines should be referenced.
12. **Requirements for Augmentation (where necessary):** Proof of augmentation prior to final plat. New, uniform surface water augmentation criteria were adopted in 2018 by the State Water Resources Control Board, including making it easier to augment supply with potable reuse.

Photo by Will Langenberg

TOOLBOX: SUFFICIENT WATER SUPPLY RULES FOR NEW DEVELOPMENT

Two pieces of legislation known as the "Show Me the Water" laws, SB 610 and SB 221, went into effect in 2002 and govern the development review process for an adequate water supply for new development that meets the minimum threshold criteria.

SB 610

SB 610 requires a Water Supply Assessment (WSA) for qualifying projects including residential developments with over 500 units; certain commercial and industrial projects; mixed used development that include any of the previous elements; any development where the proposed demand is equal to or greater than 500 residential units; or for any water provider with less than 5,000 connections, any proposed residential development that would account for an increase of 10 percent or more in the number of the water system's existing service connections.

As an evidentiary document for an Environmental Impact Report (EIR) pursuant to CEQA, the WSA must provide substantial evidence showing that sufficient water will be available to meet water demands for the project. The sufficiency analysis must consider the following and is most often based on the provider Urban Water Management Plan proposed to serve the new development:

- Meets the definition of a project.
- Quantification of a project's total water demand including types of uses, indoor and outdoor water demand, acreage of land uses, etc. as well as water demand projections for each land use type over a 20-year period in 5-year increments.
- The source(s) of proposed supply, proof of legal rights, proof of intent to acquire (e.g., contracts), and quantification of the identified source of the past five years.
- If the source is surface water, the historical record of water provider availability for at least 20 years over during normal, single dry and multiple dry years.
- If the source is groundwater, an analysis of the basin's capacity to meet the project's projected demand.

California Water Code section 10911(c) designates local government decision makers, not the water provider, as responsible for the final determination of water sufficiency. However, the California Water Code does not define "sufficiency" for purposes of preparing a WSA leaving it to the local government to ensure the water provider conducts a thorough analysis of whether there will be enough water supply (down to the acre-foot) to satisfy demands for a project for 20-years in any of the normal, single-dry or multiple-dry year scenarios. The smaller the margin between water supply available and demand projected, the more a local government ought to scrutinize the development application and consider alternative supplies and demand offset requirements as a condition of approval.

If a project relies on future water supplies that are projected to be available at a later date, there is a higher level of review that requires evidence of a future water supply, the costs to make that supply available, permitting and approval for infrastructure to deliver the water. Even though a project may not

have sufficient water at the time of approval, if it is based on a future supply that is not reason enough to deny a project if the evidence shows the water will be available at the time of construction. However, legal precedent requires that the future supplies be certain, and not speculative. A water provider and/or projects projected supply should be carefully reviewed for costs, sources, permits, timing, and environmental impacts.

SB 221

SB 221 requires municipalities and counties to review for water supply adequacy for large projects that include a "subdivision" defined by statute as either a proposed residential development of more than 500 dwelling units or any proposed residential development that would account for an increase of 10 percent or more in the number of the public water system's existing service connections. Public water systems with fewer than 5,000 service connections are exempt. Proof of water availability is demonstrated by a Written Verification prepared by the water provider at tentative map and prior to final map approval. The verification must include specific "substantial evidence" which under SB 221 is most often based on the Urban Water Management Plan, a Water Supply Assessment prepared under SB 610, or the Groundwater Sustainability Plan although other planning documents as long as it can provide evidence. The analysis must also demonstrate that the conditions have not changed since plan adoption.

A "sufficient water supply" is defined by SB 221 as the total water supplies available during a normal, single dry, and multiple dry years within 20-year projections that will meet the water demands of the proposed subdivision, including agricultural and industrial uses. The factors analyzed include:

- The source(s) of supply.
- The historical record of water availability for at least 20 years demonstrating the water provider's capacity to consistently meet supply.
- The water agency's Urban Water Shortage Contingency Analysis includes actions to be undertaken by the water provider in response to water supply shortages up to 50% reduction in supplies. A development may still be able to have a sufficient water supply as long as the water agency has estimated and planned for the proposed development during the drought as part of the shortage contingency and the demand measures apply to residential development.
- Compliance with any water demand measures adopted by resolution, ordinance, or contract reducing the water supply allocated to a specific water use sector as long as it does not conflict with Section 354 of the Water Code.
- Amount of water the water provider may "reasonably" receive from another source including conjunctive use, reclaimed water, water conservation, and water transfer, and/or federal, state, and local water initiatives such as CALFED and Colorado River agreements.
- Water availability impacts on agricultural and industrial water users from the proposed subdivision with the service area.
- Where a subdivision relies on groundwater, proof of rights to extract water based on:
    - In an adjudicated basin, the order or decree for pumping rights.
    - In a high or medium priority basin, the most recently adopted groundwater sustainability plan/plan alternative or where no plan, DWR's information regarding present management conditions and projected overdraft.
    - In a low or very low priority basin, DWR's information regarding present

management conditions and projected overdraft.

- Demonstration of the water providers ability to still meet the obligation for local share of affordable housing required by statute.

If the project's verification relies on future water supplies that are projected to be available at a later date, the law requires a higher level of review and proof of evidence of the future water supply including written contracts or proof of valid legal water rights, the costs to make that supply available and copies of capital outlay plans, likelihood of permitting and approval for infrastructure to deliver the water, and any other regulatory approvals needed. While a project may not have sufficient water at the time of approval, the sufficiency determination is based on the evidence that shows whether the water will be available at the time of construction.

Exemptions, Lower Threshold Projects, and CEQA

SB 610 and SB 221 only apply to certain projects which means that most California developments with less than the 500-unit threshold and/or affordable housing projects targeting low to very low incomes are exempt from these requirements. SB 221 also exempts any residential project in any already urbanized area previously developed for urban uses. For development projects that do not meet the higher threshold of SB 221 and SB 610, a project's water supply must satisfy the Environmental Impact Assessment (EIR) under CEQA impacts to hydrology and water quality resources.

Given that the General Plan EIR serves as a basis for future project evidence and decisions under both SB 221 and SB 610, local governments should carefully and thoughtfully engage in the development of the General Plan and the General Plan EIR to ensure the water supply assumptions are as well prepared as possible.

TABLE 4: "SHOW ME THE WATER" REQUIREMENTS SUMMARY

BILL NUMBER	SB 610	SB 221
REQUIREMENT	Water Supply Assessments	Written Verifications
WHEN REQUIRED	Water Supply Assessments are required at the beginning of the development process for residential projects of more than 500 units or specified commercial and industrial projects.	Written Verifications are required as a final check on water availability for residential projects of more than 500 units prior to final subdivision map approval.
PREPARED BY	Prepared by the public water system, as identified by the city as the lead agency.	Prepared by the agency providing water service to the project.
APPROVAL PROCESS	Adopted by the governing body of the water supply agency and included in the EIR being prepared for the proposed project under CEQA.	May be completed and approved before, as part of, or after the CEQA process.

TOOLBOX: LOCAL WELL AND WATER SYSTEM PERMITS

According to the California Department of Water Resources (DWR), groundwater supplies approximately 40 percent of California's total water supply in average water years, and in some regions of the state, up to 60 percent in dry years. Individual households and public water systems that rely on groundwater are managed at both the state and local level. While the majority of the state receives water provided by 400 large, urban water utilities, 2,500 smaller utilities serve rural communities and tens of thousands of rural homes get their water from domestic wells. DWR estimates 7,000-15,000 new wells are constructed annually in California with the majority in Southern California. A complex set of state and local rules govern how wells are permitted for domestic use.

Public Water Systems

California's Code of Regulations Title 22 Chapter 16 California Waterworks Standards guides the permitting process for public water systems. A public water system is defined as a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year and includes the following:

1. Any collection, treatment, storage, and distribution facilities under control of the operator of the system that are used primarily in connection with the system.
2. Any collection or pretreatment storage facilities not under the control of the operator that are used primarily in connection with the system.
3. Any water system that treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.

The process requires any applicant seeking to establish a public water system to obtain a domestic water supply permit from the State Water Resources Control Board, Division of Drinking Water.

Individual Domestic Wells

The State of California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB) have established minimum well construction standards to protect groundwater quality and quantity. These standards are locally administered through a permit system for individual wells from a local enforcing agency, or LEA. The LEA is either a city, county, or water provider who has adopted a local well ordinance which enables enforcement and regulatory authority over well construction, modifications, and decommissioning. The local ordinances ensure wells and water systems are properly constructed and provide safe and reliable potable water supply. Local ordinances can regulate:

- Permit process and requirements
- Well design and construction
- Well drilling methods
- Licensed drilling professionals
- Well spacing (up to a 1/4 of a mile)
- Water supply and well production
- Evaluation of water supply capacity (well yield tests)
- Evaluation of water quality

- Well abandonment
- Other standards such as a limit on the number of permits issued in a given time period and additional requirements during declared drought emergencies.

The requirement for a well yield test as part of the well permit provides local governments with an effective method to evaluate proof of sufficient and sustainable water supply for individual lots that have already been subdivided. Local governments have adopted clear standards to ensure a well meets the minimum production threshold and interfere with aquifer recharge.

Non-Exempt Wells

In support of the Sustainable Groundwater Management Act, the Newsom administration issued new Executive Orders (N-7-22 and N-3-23) which establish new well permitting requirements for LEAs to prepare for and lessen the effects of several years of intense drought conditions. While these new regulations exempt individual domestic wells and public water supply systems, they require additional analysis for new or altered groundwater wells are intended to lessen the effects of unregulated overdraft including:

- All non-exempt wells be accompanied by a report prepared by a licensed professional geologist concluding that drilling a new well will not result in well interference and/or subsidence.
- In addition, wells in specific groundwater basins or those classified as medium or high priority as identified by DWR cannot be issued a permit without first obtaining verification from the relevant Groundwater Sustainability Agency.

Photo by David Becker

TOOLBOX: WATER BUDGETS

Water providers and local governments use water budgets, also known as water allowances, as a tool to manage water supplies. The term water budget is applied to multiple practices, and they are often confused. In general, water budgets can be thought of in the context of:

- During development review to assess water adequacy.
- As part of a development or service agreement assigning a specific quantity of water to a development application.
- As part of a strategy to reduce or limit indoor or outdoor water demand.
- A conservation rate structuring strategy to incentivize water savings in individual households or businesses.

Photo by Carree Michel

These different purposes are summarized below.

Development Review Tool

When used in the development approval process, it helps assess water availability and adequacy. A water budget summarizes the total water demand estimated for new development. It should include all uses of water (indoor, outdoor), reuse and/or recharge, and land use type (residential/commercial/industrial/agriculture). Local governments and water providers use a wide variety of methodologies to determine a development's water budget and they can vary in accuracy. The most common methodologies include:

- Per capita per unit.
- Per standardized unit for a household or business (like equivalency units).
- Per historical use.
- Per individual indoor and outdoor calculations.
- Per acre/square foot

The water demand calculation is evaluated against existing supplies to determine if sufficient water is available to serve the development. While the water budget may be used solely for the development review process and extension of service, it can also be used to establish the "water allowance" for a development where the water provider then monitors the development for compliance with the approved water allowance.

Outdoor Water Conservation Tool

An outdoor water budget is a water management tool used to more accurately estimate and/or allocate the amount of water a landscape will require. California's MWELO includes an option to include a water budget

considering evapotranspiration data, plant type(s), purpose and functionality of the landscape, irrigated landscape area, irrigation efficiency, and climate data.

Indoor Water Conservation Tool

An indoor water budget establishes how much water a new building may require. An indoor water budget is calculated based on the flow rates of the fixtures and the appliances that will be provided by the builder (e.g., toilets, faucets, shower heads, dishwashers). There are many off-the-shelf calculators available to estimate individual projects or household indoor water demand.

Conservation Water Rate Structure Tool

For utilities, a water budget is the amount of water a customer is allotted annually and per billing cycle based on the size and use of the structure, quantity of outdoor landscaping, and historical water demand. Water budgets help promote water conservation by incentivizing water customers to stay within their water budget or pay more for exceeding their budget. Water budgets are often in tiered blocks with customer rates increasing for each tier they exceed.

Water budgets are an increasingly effective way for water providers and utilities to manage water demand and incentivize conservation and efficiency. Water providers across California are already using water budgets to ensure compliance with their WELO and are now looking to indoor water budgets to create compliance with the State's indoor water target.

Photo by Jason Jarrach

TOOLBOX: WATER ALLOCATION POLICIES

As communities across the West find themselves with water supply and demand gaps, communities are wanting to be more deliberate with how they allocate their remaining supplies to grow their community. A water allocation policy offers water providers and local governments a decision-making structure to dedicate their water resources in accordance with their community's needs and vision. An allocation policy is tailored to suit the strategic goals and priorities of a community by allocating its water supply to categories of development in a General Plan such as specific land use types, economic development, affordable housing, water efficient development, or community infill or revitalization.

Photo by Josh Hild

Without a water allocation policy, supply agreements are often made on a "first come, first serve" basis according to the California water rights code, which can unintentionally lead to resource-intensive development without compensatory benefit to the supporting community. In other scenarios, a development project with a high benefit to the community may remain on a waitlist without means to prioritize it when sufficient water becomes available.

California's Water Code establishes two requirements for water providers to prioritize water allocation:

1. In Section 354 under water shortages, a water provider and local government may, "after allocating and setting aside the amount of water which in the opinion of the governing body will be necessary to supply water needed for domestic use, sanitation, and fire protection, the regulations" establish priorities in the use of water for other purposes as long as it does not discrimination between consumers using water for the same purpose(s).
2. In Section 106.31.7, a water provider is required to develop a water allocation policy for single and multi-family residential housing for lower income households to comply with the legislative policy granting priority to affordable housing development.

These tools can be further developed to ensure water allocation is thoughtfully achieving community sustainability and quality of life.

TOOLBOX: WATER DEMAND OFFSET PROGRAMS

Water demand offset programs can address water supply shortages by requiring new development to offset its projected water demand either through water conservation in existing development or a direct transfer of water rights. The goal is that all new development, through partnerships between communities and developers, can be "water neutral" in the water supply system. Some communities provide an in-lieu fee alternative. This concept can also apply to offsetting energy, wastewater, air quality, historic preservation, or watershed health impacts. The Alliance for Water Efficiency's Net Blue Model Ordinance, user guide, offset methodology and example ordinances can support communities that are considering the establishment of a water demand offset program. Primary considerations for establishing a WDO Program include:

- Capacity to establish a water bank or authority to monitor and administer the program.
- Determining the appropriate offset ratio. A ratio of 1:1 will maintain the current water supply-demand balance, and a 2:1 mitigation ratio will reduce the ratio of demand relative to supply. Wastewater reclamation projects are more reliable and are given a 1:1 offset value, and supplies created through demand management are considered temporary and are given a 2:1 ratio.
- If fee-based, ensuring the charge reflects the costs of implementing the offset as well as administrative costs.
- The verification procedure for demonstrating the offset needs to include quantification methodologies and project documentation and verification by local program administrators.

The timing of when the offset fee is paid to allow enough time to procure supplies with those fees by the time the new demand is created by the development.


Photo by Eric Brehm

Photo by Connor Misset

CASE STUDY

TWO TYPES OF DEMAND OFFSET PROGRAMS

Santa Monica, CA

The City of Santa Monica is using "Water Neutrality" to achieve their goal of Water Self-Sufficiency by 2023 as part of their Climate Adaptation Plan. Water self-sufficiency means that the city will significantly reduce their reliance on imported water, focusing solely on conservation and diversifying its own local supplies to meet current and future water demand. All proposed development must offset any water use greater than the 5-year historical average for the site. Developers can achieve this by:

1. Performing on-site or offsite plumbing fixture retrofits, or
2. Choosing to pay an in-lieu fee.

In-lieu fees fund the city's Water Neutrality Direct Install Program, which provides free installation or replacement of plumbing fixtures.

Project sites without historical water use only need to offset new water demands above the baseline, which is determined based on average annual water usage for customers in the same class with the same size meter. If the entire development project is classified as "affordable housing," the offset must only be 50% of the baseline, as compared to 100% for other offsets. Since its inception in 2017, the city has modified the program to streamline efficiencies and address potential inequities.

Santa Rosa, CA

In 2022, the Santa Rosa City Council adopted a Water Demand Offset (WDO) Policy to create a way for the city to ensure new developments do not exceed the city's available water supply, and avoid having to stop new housing developments. The demand offset goal has been in the city's Urban Water Management Plan since 2015, and with the adoption of the WDO, the city will be able to collect a fee in the case of insufficient water supply at the time of final inspection.

The policy applies only to new developments and has not impacted proposed and newly approved affordable housing developments, which was a major concern. The WDO revenue will go to the Water Conservation Team to do water allocation projects like large scale water efficiency conversions (high-efficiency toilets and faucets) and landscape conversions. The city water department worked closely with the city land use planning department to ensure coordination and understanding of the purpose and goal of the WDO, and to communicate information about the WDO to potential applicants.

TOOLBOX: ALTERNATIVE WATER SUPPLIES

The use of alternative water supplies can ease peak pressure demands on a water treatment system during warmer months when irrigation demand increases. Alternative water supplies can also help diversify a water portfolio, allowing existing water supplies to be stretched further.

There are options available to water providers and communities for alternative water supplies:

1. Raw surface water
2. Rainwater harvesting
3. Recycled water
4. Greywater use
5. Stormwater harvesting (see the green infrastructure section)
6. Desalination (considered as a last resource given its cost and environmental impacts)

Raw Surface Water

Communities may require outdoor irrigation, with appropriate water rights, to be supplied by untreated or "raw" surface water from ponds, lakes, ditches, and rivers. While these water sources take pressure off the treated water system, they should not be considered an unlimited water supply. Non-potable water should not be incentivized as a lower-cost option. All water should be considered a valuable resource and used as efficiently as potable water. Therefore, conservation and efficiency requirements for raw water should be similar to other water sources.

Rainwater Harvesting

Rainwater harvesting is collecting runoff from roofs into storage systems. This reduces demand on freshwater supplies and the potable water system. California allows for rainwater to be harvested in rain barrels or cistern systems that funnel rooftop runoff to water collection tanks to be used with minimal to no treatment for landscape irrigation, dust control, and/or stock water supply.

Rainwater harvesting can provide water for landscaping and potable use. Though often done on residential properties, local governments can also provide standards for district-scale or commercial rainwater harvesting.

Local jurisdictions and water providers can require or incentivize rainwater harvesting in water conservation ordinances. Rainwater harvesting standards may involve specifications for technical equipment, installation, and maintenance for capturing, storing, and using rainwater at residences or commercial buildings.

Recycled Water

Water recycling is the collection of wastewater for treatment and reapplication for beneficial uses. Recycled water is a reliable supply that is "drought-proof" and locally controlled.

Recycled water treated to non-potable or non-drinkable standards is often used for irrigation and some industrial uses. However, there are limits to non-potable reuse applications, and the costs of treatment, planning and operating a dual infrastructural system, and developing a means of storage must be considered. Therefore, as treatment technology has improved, some communities have opted instead to use an advanced purification process to treat their water further to reach potable or drinkable standards.

Potable water reuse systems can be direct or indirect. Direct reuse systems integrate the ultrapure treated

water directly into the drinking water system or into the raw water supplying the system. While a growing handful of communities in the United States practice direct reuse, indirect reuse systems are far more common. In the latter, recycled water is treated to similarly high standards and is then released into another body of water, called an "environmental buffer," for storage. Environmental buffers can be groundwater—reached through either natural infiltration or injection wells—or surface water such as reservoirs, wetlands, or riverbeds. The blended water is eventually retrieved, treated again, and ultimately distributed into the drinking water system.

Greywater

Unlike recycled water, greywater is collected from non-sewage water (bathtubs, sinks, laundry) and used on-site for irrigation, with little treatment. By law, greywater is defined in California as "untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated or unhealthy bodily wastes and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. Greywater includes but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers." Local governments can develop green building incentives or development standards to better promote and incorporate water reuse.

Photo by Inge Maria

Photo by Camille Puche

CASE STUDY

SANTA MONICA SUSTAINABLE WATER INFRASTRUCTURE PROJECT

The City of Santa Monica has built two rainwater tanks to capture, treat, and recycle stormwater. The project, known as the Sustainable Water Infrastructure Project (SWIP), is designed to reduce the city's reliance on imported water. The recycled water can be used for irrigation, toilet flushing in buildings that have dual plumbing systems, and to recharge groundwater aquifers.

The city currently derives almost 60-70% of its water from local groundwater naturally recharged from rain that falls into the Santa Monica mountains. It supplements the rest with imported water from Northern California and the Colorado River. Rain that falls on the city flows into the Santa Monica Bay through the Pico-Kenter storm drain. Now the system captures stormwater in a 1.6-million-gallon tank under the Santa Monica Pier parking lot and recycles it through the SWIP. The system is the first in the state of California to treat stormwater and inject it directly into the groundwater basin to recharge local supplies. The city estimates an average diversion of over 40 million gallons of stormwater away from the Santa Monica Bay each year into the SWIP. First envisioned in the 2018 Santa Monica Sustainable Water Master Plan, SWIP came online in the fall of 2022, and proceeded to meet expectations for rainwater capture during the wettest winters on record.

SECTION 3

WATER-SMART LAND USE POLICIES & PROCESSES

Policies, programs, and processes that govern where and how development occurs can greatly impact the management of water resources.

CASE STATEMENT

Municipal water demand is a function of household size, income, and lifestyle habits for residential development, as well as how communities are planned, designed, and maintained. To use less water, the best policy is to make water-smart development – using the development patterns, building standards, and design practices listed below – the most common type of development.

Efficiencies can be achieved through greater density and more compact development patterns, water-efficient building standards, sustainable site and systems design, and especially landscaping design and maintenance.

We know that, generally speaking:

Compact and infill development consume less water than other development patterns.

Newer appliances and plumbing fixtures are more efficient than older ones.

Water-efficient plumbing and building standards reduce water consumption.

Incorporating low impact development and green infrastructure at the site scale improves water quality, recharges groundwater, and reduces treatment costs.

Landscapes with climate-appropriate low water plants and efficient irrigation systems consume less water.

Households that use less water save money for themselves and the water provider while preserving water for other people and nature.

Multifamily housing uses less water per unit than single-family development due to a smaller lot size per unit, reducing the per-capita amount of water used for outdoor landscaping.

TOOLBOX: COMPACT DEVELOPMENT

While water conservation and efficiency efforts related to land use have primarily focused on outdoor watering and indoor plumbing fixtures, considerable benefits can be realized by encouraging more compact development patterns that emphasize transit and walkability, mixed and diverse uses, and environmental and social impacts.

Water usage studies consistently demonstrate that the greatest residential water consumption in urban areas is from large, single-family lots. A large percentage of water used in these homes is applied outdoors during spring and summer. Currently, between one-half and three-quarters of the developable land in much of California is zoned for single-family housing.[16] In addition to landscaping efficiency and conservation, increasing density and promoting infill development can dramatically decrease water consumption per capita.[17] Promoting compact and infill-focused development provides many additional benefits beyond saving water. It can support more efficient use of existing infrastructure, protect natural resources, promote walkability, and enhance community vibrancy. CivicWell's Ahwahnee Water Principles for Resource-Efficient Land Use include compact development as an approach for minimizing polluted urban water runoff and preserving open lands for water absorption.[18] As wildfire threat intensifies, low-density development continues to occur at the wildland-urban interface despite the difficulty of supplying resources—such as fire protection and water supply—to this type of development. "Smart growth" approaches including compact development, preservation of critical environmental areas, and directing development toward infill sites can minimize vulnerability to flooding, wildfire, and drought.

Approaches That Promote Compact Development:

- Develop future land use plans that establish designated future growth areas where adequate infrastructure exists for accommodating growth at higher densities.
- Ensure zoning regulations permit smaller lot sizes and higher densities by right in designated districts.
- Make rezoning, annexation, and Planned Unit Development applications conditional on meeting water efficiency standards.
- Reduce or remove barriers to compact development such as minimum parking requirements, lot sizes, and lot setbacks.
- Ensure zoning regulations permit multiple types of residential development (e.g. multiplex, townhomes, apartments, accessory dwelling units) and mixed-use development by right in designated growth areas to provide a diversity of housing options and business uses.
- Ensure that subdivision regulations permit and incentivize cluster development.
- Provide incentives for increased densities using development or tap fee reductions and density bonuses.

[16] Mawhorter and Reid. Terner California Residential Land Use Survey. (2018) https://ternercenter.berkeley.edu/california-land-use/

[17] Stoker, P., Chang, H., Wentz, E., Crow-Miller, B., Jehle, G., & Bonnette, M. (2019). Building Water-Efficient Cities: A Comparative Analysis of How the Built Environment Influences Water Use in Four Western US Cities. Journal of the American Planning Association, 85(4), 511-524

[18] CivicWell. Ahwahnee Water Principles. civicwell.org/civic-resources/ahwahnee-water-principles. The Ahwahnee Water Principles for Resource-Efficient Land Use can be adopted using the Model Water Resolution Template.

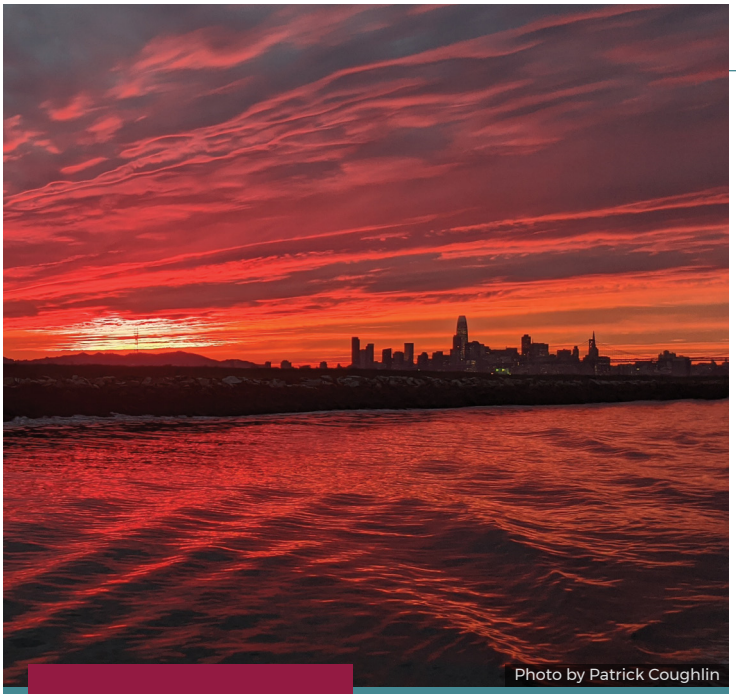


Photo by Patrick Coughlin

CASE STUDY

SAN FRANCISCO BAY AREA

The San Francisco Bay area is poised to add 2 million new jobs by 2070, which would be filled by up to 6.8 million new residents who would need at least 2.2 million new housing units by 2070. A 2021 SPUR Regional Strategy Climate Report entitled *Water for a Growing Bay Area: How the Region Can Grow Without Increasing Water Demand*[19] identifies key opportunities to reduce water demand so that the city can continue to grow while living within its constrained water resources.

The Bay Area uses about 90% of its water to supply homes and businesses and their associated landscaping. Indoor residential use accounts for 39% of that water use, followed by 37% for businesses and institutions, and 24% for residential outdoor irrigation. The region has been successful in using conservation and efficiency strategies to cut its water use by one third over 30 years, even while its population grew by about one third.

However, opportunities exist to further that trend. The report asks two fundamental questions around water and development: 1) What would water demand for the Bay Area be in 2070 with more dense and compact growth and increased water efficiency? 2) Can the Bay Area build the housing it needs to house its growing populations given the limits on the region's water supply? Scenario planning around development patterns examined three versions of two main scenarios:

- **2070 New Civic Vision Scenario** in which development patterns shift toward more infill housing in already-developed areas, avoiding altogether existing open space and the areas at greatest risk of natural disaster. A greater share of new housing is in multifamily buildings. Future job growth occurs along transit corridors and in other areas of increasing density.
- **2070 Business as Usual Scenario** which assumes development patterns similar to the status quo, leading to sprawl into existing open space, as well as more single-family homes. This scenario includes the same number of jobs as the New Civic Vision Scenario, but because the amount of housing growth in the nine-county Bay Area is smaller (by 800,000 units), more people are forced to commute from outside the region.

Outcomes of the modeling show the following findings:

- The Bay Area could add 2.1 million jobs, 6.8 million people and 2.2 million homes by 2070 and still offset all water use from this growth through modest improvements in water use efficiency and more compact land use.
- The region could grow and use even less water than today if it took some more ambitious but still achievable steps toward greater water efficiency.

[19] https://www.spur.org/sites/default/files/2021-10/SPUR_PI_Water_for_a_Growing_Bay_Area.pdf

CASE STUDY, *CONT.*

- Compared to sprawl growth, compact growth doesn't decrease total water use, but it decreases per capita consumption dramatically. In the compact growth scenarios, the region is able to fully address housing demand and yet use about the same amount of water as in the sprawl scenarios.
- In some areas, growth will outstrip the potential to offset demand with local conservation and efficiency. Meeting the demand for every part of the Bay Area will require transferring water within the region or identifying alternative supplies.

Six Scenarios for Bay Area Water Use in 2070

We crossed two growth projections and three water use alternatives to arrive at six possible scenarios for water use in the Bay Area in 2070.

WATER USE:	INEFFICIENT	EFFICIENT	HIGHLY EFFICIENT
2070 New Civic Vision Growth: Dense infill housing, high share of multifamily buildings	**Scenario 1:** Compact & Inefficient	**Scenario 3:** Compact & Efficient	**Scenario 5:** Compact & Highly Efficient
2070 Business as Usual Growth: Sprawling greenfield development, high share of single-family homes	**Scenario 2:** Sprawl & Inefficient	**Scenario 4:** Sprawl & Efficient	**Scenario 6:** Sprawl & Highly Efficient

TOOLBOX: WATER-EFFICIENT LANDSCAPES

In California, outdoor watering for urban landscapes can account for 50 percent or more of water providers' total annual water demand.[20] Communities on the urban fringe and in rural areas use more outdoor water, as they tend to have larger properties.[21] This presents a major opportunity to reduce urban water use, particularly for high water landscapes that are "nonfunctional," or not serving human or ecosystem benefits.

Model Water Efficient Landscape Ordinance

Water efficiency standards for new development and retrofitted landscapes are governed by 23 CCR 490 Model Water Efficient Landscape Ordinance (MWELO).[20,23] All local agencies must adopt, implement, and enforce the MWELO or a local Water Efficient Landscape Ordinance (WELO) that is at least as effective as the MWELO.

The MWELO applies to the following landscape projects:[24]

- New construction projects with an aggregate landscape area equal to or greater than 500 square feet requiring a building or landscape permit, plan check or design review;
- Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;
- Existing landscapes limited to Sections 493, 493.1 and 493.2; and
- Cemeteries. Recognizing the special landscape management needs of cemeteries, new and rehabilitated cemeteries are limited to Sections 492.4, 492.11, and 492. 12; and existing cemeteries are limited to Sections 493, 493.1, and 493.2.

Photo by Carree Michel

[20] Hodel, D. and D.R. Pittenger. 2015. 9%: Perspective on the California drought and landscape water use, University of California Cooperative Extension. ucanr.edu/sites/UrbanHort/Water_Use_of_Turfgrass_and_Landscape_Plant_Materials/Drought_and_Landscape_Water_Use_-_Some_Persspective/.

[21] Public Policy Institute of California Water Policy Center. Water for Cities www.ppic.org/content/pubs/report/R_1016EH3R.pdf

[22] The purpose of water-efficient landscape ordinances is to not only increase water efficiency but to improve environmental conditions in the built environment. Landscaping can replace habitat lost to development and provide other related benefits such as improvements to public health and quality of life, climate change mitigation, energy and materials conservation, and increased property values. water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Model-Water-Efficient-Landscape-Ordinance

[23] The MWELO is also referenced by Title 24, Part 11, Chapters 4 and 5 of the CALGreen Building Code.

[24] California Model Water Efficient Landscape Code govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations

Projects must submit a landscape documentation package that includes at minimum: project information; a water efficient landscape worksheet with hydrozone information and water budget calculations (maximum applied water allowance and estimated total water use); a soil management report; and landscape, irrigation, and grading design plans.

Successful implementation of MWELO has been low, with some estimates placing compliance at between 26-35%. Challenges include the complexity of the law, unenforceable provisions, lack of awareness among property owners, that building permit applicants are not versed in MWELO requirements and that building permit staff lack appropriate expertise to review the substance of the documents.[25] In March 2024, the Department of Water Resources published proposed amendments to the MWELO that may address some of the challenges to local administration.[26]

Nonpotable Water Only for Nonfunctional Turf

In October 2023, Governor Newsom signed AB 1572, which amends the California Water Code to restrict the use of potable water for irrigation of "nonfunctional turf." Nonfunctional turf is defined as grass that is purely decorative, and includes grass located within street right of ways and parking lots. This restriction applies to commercial, industrial, municipal, and institutional properties and to common areas of residential HOAs, and exempts community spaces including parks, sports fields, recreational areas and areas irrigated with recycled water. The use of potable water is permitted when necessary to ensure the health of trees or other perennial non-turf plants. The bill phases out the use of potable water for nonfunctional turf between January 1, 2027 and January 1, 2031. The legislation also prioritizes equitable application of resources to support implementation:

- By 2030, Integrated regional water management plans are required to include identification and consideration of the water needs of owners and occupants of affordable housing, including the removal and replacement of nonfunctional turf.
- When using appropriated funds for turf replacement, financial assistance for nonfunctional turf replacement shall be prioritized to public water systems serving disadvantaged communities and to owners of affordable housing.
- The Governor's Office of Business and Economic Development shall support small and minority owned businesses that provide services that advance compliance with these provisions.

Approaches for Achieving Water-Saving Landscapes:

Projects and landscapes should follow these best practices for reducing outdoor water use:

- Follow or exceed baseline levels of water efficiency as described in the MWELO.
- Incorporate other beneficial outcomes into landscape ordinances, such as low impact development (LID) practices that capture and repurpose rain and green infrastructure projects that capture and utilize stormwater, pollinator habitat, and carbon sequestration.

[25] SPUR and Pacific Institute. Water for a Growing Bay Area: How the region can grow without increasing water demand, page 39. www.spur.org/sites/default/files/2021-10/SPUR_PI_Water_for_a_Growing_Bay_Area.pdf

[26] Regulation Rulemaking on the Model Water Efficiency Landscape Ordinance (MWELO). March 18, 2024. water.ca.gov/News/Public-Notices/2024/Mar-24/Regulation-Rulemaking-on-the-Model-Water-Efficient-Landscape-Ordinance-MWELO

- Utilize plants best suited to the local climate, irrigated by hydrozone and selected from plant lists such as the Water Use Classification of Landscape Species (WUCOLS IV).[27]
- Limit or prohibit the type and area of turf grass allowed by square footage or a percentage of total landscaped area.
- Maximize irrigation efficiency through technology such as low flow and efficient irrigation heads (i.e., drip, bubblers, or low flow sprinklers); rain sensors with a shut-off device to reduce watering during natural rainfall events; smart sprinkler controllers and wireless flow meters to respond to weather data and allow scheduling differentiated by hydrozone; and Evapotranspiration (ET) sensors to adapt irrigation to changing weather and soil conditions.
- Utilize soil enhancements and mulch.
- Establish time of day and day of week irrigation schedules to limit evapotranspiration and over-watering.
- Utilize landscape design manuals that provide specific guidance to individuals and developers on water-saving tree and plant types and sizes, planting seasons, soil enhancement, mulching, and watering times appropriate for the local climate.[28]
- Utilize landscape design manuals that provide specific guidance to individuals and developers on water-saving tree and plant types and sizes, planting seasons, soil enhancement, mulching, and watering times appropriate for the local climate.[29]
- Establish code enforcement and fines for violations of standards.
- Conduct training for landscape professionals on water-saving landscaping, such as Qualified Water Efficient Landscaping (QWEL).[30]
- Establish water-efficient model maintenance standards and agreements—for HOAs and others—to use in contracting for landscape services.
- Promote and/or incentivize the use of individual household rainwater harvesting for outdoor irrigation. Since the 2012 passage of the Rainwater Capture Act, residents can use rain barrels and underground filtration systems for their outdoor landscape water needs.[31]
- Incentivize the removal of water-intensive landscapes through rebates or direct install programs.
- Provide incentives for developers to go beyond existing landscape standards via discounts on taps or connection fees.
- Offer education programs for residents, HOA managers, and landscape companies around water-efficient landscapes, irrigation systems, and watering practices.

[27] University of California Davis California Center for Urban Horticulture. Water Use Classification of Landscape Species ccuh.ucdavis.edu/wucols

[28] Costello, L.R. and K.S. Jones. 2014. WUCOLS IV: Water Use Classification of Landscape Species. California Center for Urban Horticulture, University of California, Davis.

[29] Costello, L.R. and K.S. Jones. 2014. WUCOLS IV: Water Use Classification of Landscape Species. California Center for Urban Horticulture, University of California, Davis.

[30] Qualified Water Efficient Landscapes. www.qwel.net

[31] Cal. Water Code §10573

Photo by Carree Michel

CASE STUDY

WATER EFFICIENT LANDSCAPE DESIGN TEMPLATES — SANTA ROSA, CA

Santa Rosa adopted a local Water Efficient Landscape Ordinance that is at least as effective as the State's Model Water Efficient Landscape Ordinance.[32] The Santa Rosa WELO enacted the "Maximum Applied Water Allowance Requirement," which is a property's water budget that sets the upper limit of annual applied water for the established landscape. The ordinance requires a soil analysis report that identifies soil texture, infiltration rate, pH, total soluble salts, sodium, and percent organic matter. Based on the soil analysis report, the project applicant may have to incorporate soil amendments. Post-construction, the applicant must hire a professional to perform an irrigation audit to determine the water efficiency of the landscape design and irrigation equipment.

In 2017 and 2019, Sonoma County experienced devastating wildfires. As residents looked to rebuild, the Sonoma-Marin Saving Water Partnership took the opportunity to further promote water-saving landscaping approaches. Property owners with front yard landscaped areas of less than 2,500 square feet may utilize the free landscape design templates prepared by the Sonoma-Marin Saving Water Partnership.[33] The drawings may be modified to incorporate optional features such as rain gardens and adjusted to address the specific size of the landscaped area and the placement of the structure. Plants may also be substituted to address the owner's plant preference, and the plant totals shown on the templates may be reduced by 50% if the densities shown are not desired. The reduction does not apply to trees. The template plans meet all WELO requirements and no additional submittals are required.

[32] City of Santa Rosa Landscape Standards. www.srcity.org/2428/Landscape-Standards

[33] City of Santa Rosa Residential Landscaping Requirements. www.srcity.org/3528/Residential-Landscaping-Requirements

TOOLBOX: WATER-SMART BUILDINGS

The 2014 emergency drought declaration ultimately led to Governor Brown's 2016 Executive Order B-37-16, which codified the temporary statewide emergency water restrictions to "make conservation a California way of life." The Executive Order set the stage for Senate Bill 606 and Assembly Bill 1668 (both of which passed in 2018) to ensure longer-term conservation and efficiency efforts to increase drought resilience. These bills required coordination between the State Water Resources Control Board and the Department of Water Resources to establish long-term urban water use efficiency standards in 2022 for indoor residential use, outdoor residential use, water loss, and other uses. The legislation also requires water suppliers to set annual water budgets and prepare for droughts locally in their Urban Water Management Plans.

Reducing indoor water use in residences and businesses can be achieved through water-efficiency standards for indoor plumbing fixtures. California's Green Building Standards Code (CALGreen Code)—the first statewide green building code in the nation—was passed in 2007 in response to greenhouse gas reduction goals established by Assembly Bill 32.[34]

The CALGreen Code was first published in 2010 and was most recently revised in 2022 (effective January 1, 2023). This version includes mandatory measures for water efficiency and conservation in residential and mixed use commercial buildings, including:

- Water-conserving plumbing fixtures and fittings;
- Submeters for multifamily buildings and dwelling units in mixed-use residential/commercial buildings;
- Standards for plumbing fixtures and fittings (see California Plumbing Code);
- Efficient water use in landscape areas (see local water efficient landscape ordinance).

CALGreen offers voluntary tiers of additional measures to further reduce water use. These tiers, or other local amendments to CALGreen that are more stringent than the baseline, become mandatory if adopted by the local jurisdiction. The adopted local ordinance and supporting findings must be filed with the Building Standards Council.[35]

[34] Cal. Code. Regs Title 24, Part 11.

[35] 2022 Guide to the 2022 California Green Building Standards Code (CALGreen) Residential. codes.iccsafe.org/content/CAGCGBSCR2022/guide-to-the-2022-california-green-building-standards-code-calgreen-residential. Health and Safety Code Sections 17958.5 and 18941.5 were amended by Assembly Bill 210 (Hayashi, Chapter 89, Statutes of 2009) to clarify this issue. The sections provide for cities and counties to make changes or modifications to building standards, including green building standards, due to local climatic, geological, or topographical conditions, and that Building Standards Law cannot limit local establishment of more restrictive building standards reasonably necessary due to the above-mentioned conditions.

TABLE 5: VOLUNTARY MEASURES FOR RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

RESIDENTIAL VOLUNTARY MEASURES	NON-RESIDENTIAL VOLUNTARY MEASURES
A4.103.1 Infill, greyfield, or brownfield site is selected.	**A5.103.2** Infill, greyfield, or brownfield site is selected.
A4.106.2.2 Soil is protected by evaluating natural drainage patterns and implementing erosion controls and minimizing the amount of cut and fill needed for roads and driveways.	**A5.104.1** Reduce development footprint and optimize open space.
A4.106.3 Landscape design restores areas consistent with native vegetation species and patterns or utilizes at least 75% native CA or drought tolerant plants.	**A5.106.2-3** Projects mitigate stormwater runoff by employing at least two of the following LID methods: bioretention/ filtration planters, precipitation capture, green roofs, roof leader disconnection, permeable paving, vegetative swales, tree preservation, soil quality, stream buffer, and volume retention.
A4.106.6 Vegetated roofs installed for at least 50% of the roof area.	**A5.106.3.2** Manage 40% of the average annual rainfall on the site's impervious surfaces through infiltration, reuse, or evapotranspiration.
A4.303.1 Maximum flow rate of kitchen faucets shall not exceed 1.5 GPM at 60psi.	**A5.303.2.3.1-4** Tier 1 - Provide a schedule of plumbing fixtures and fixture fittings that reduce the overall use of potable water by 12% (Tier 1), 20% (Tier 2), or 25% (Tier 3). Nonpotable water systems can be used in these calculations to demonstrate water savings.
A4.303.2 Alternative nonpotable water sources are used for indoor potable water reduction.	**A5.303.3** Appliances and fixtures for commercial application should meet several conditions, including reduced maximum water factor, ENERGY STAR dishwashers, air cooled ice makers, water-efficient food steamers, ovens, and other appliances.

TABLE 5: VOLUNTARY MEASURES FOR RESIDENTIAL AND NON-RESIDENTIAL BUILDINGS

RESIDENTIAL VOLUNTARY MEASURES	NON-RESIDENTIAL VOLUNTARY MEASURES
A4.303.3 Install at least one qualified ENERGY STAR dishwasher or clothes washer.	**A5.303.4** Non-water urinals are installed.
A4.303.4 Install non-water urinals and waterless toilets.	**A5.304.2** Separate meters or submeters installed for indoor and outdoor potable water use for landscaped areas of at least 500 square feet but no more than 1,000 square feet.
A4.303.5 Install hot water recirculation systems.	**A5.304.6-7** Restore all landscaped areas disturbed during construction with local adaptive/noninvasive vegetation or restore at least 50% of the site area on previously developed or graded sites.
A4.304.1 Rainwater catchment systems that use rainwater generated by at least 65% of the available roof area.	**A5.304.8** Install a graywater collection system for irrigation.
A4.304.2 Eliminate the use of potable water for landscape irrigation.	**A5.305.2** Irrigation systems use recycled water.
A4.304.3 Landscaped irrigated areas of less than 5,000 sq ft provided with separate submeters for outdoor potable water use.	
A4.305.1 Plumbing piping installed to permit discharge of graywater from clothes washer or other fixtures to be used for landscape irrigation.	

Photo by Liz Vo

CASE STUDY

CITY OF NAPA, CA

The City of Napa has adopted the 2022 CALGreen high performance building regulations for new development. In some cases, the regulations adopted by the City are more stringent than the baseline. For Residential projects, Water Efficiency and Conservation measures that are more stringent than CALGreen include kitchen faucet flow rate and Energy Star dishwasher/clothes washer requirements. On the Non-Residential side, Napa mandates an additional 12% indoor savings (Tier 1 Voluntary Measure) beyond the standard 2022 CALGreen fixture flow rates. Non-Residential projects must meet additional measures for specialized appliances including commercial clothes washers, dishwashers, ice makers, and food steamers. To minimize leaks, projects of all types are subject to a maximum static service pressure of 60 psi.[36]

[36] City of Napa. High Performance Building Regulations. www.cityofnapa.org/579/High-Performance-Building-Regulations

SECTION 4

HEALTHY WATERSHEDS

The effects of increasing development, climate change, and natural hazards can all degrade the quality of the watershed, impacting both water yield and water quality.

CASE STATEMENT

The management of California's lands, whether in headwaters regions or in urban settings, directly influences water quality and quantity and the overall functioning of natural water cycles. Local governments can develop policies that direct development away from sensitive areas such as streams, floodplains, drainageways, and prime groundwater recharge areas, as well as require green infrastructure and low impact development stormwater management techniques to slow the flow of water, allowing rainwater to infiltrate into the ground where it falls.

Changing landscapes resulting from both human and natural forces have a significant impact on natural ecosystems and water resource availability. Safeguarding available water resources through watershed protection and nature-based stormwater capture standards and policies is an important strategy in many communities.

By applying the principles and tools in this section, communities can reduce or reverse the impacts of:

- Pollution from urban water runoff.
- Erosion and sedimentation due to soil disturbance and vegetation loss from new development.
- Degradation of riparian areas due to development and climate change-induced shifts in hydrology.
- Increased stormwater runoff and decrease in water infiltration due to a rise in impervious surfaces.
- Impacts to water supply and water quality caused by drought, floods, and wildfires.

TOOLBOX: PROTECTING SENSITIVE AREAS

Watershed planning and the protection and restoration of sensitive areas, particularly the headwaters, have historically been carried out by grant-funded collaborative efforts led by non-profit organizations—sometimes working alongside local governments to restore ecological processes and functions. A more impactful approach is watershed-sensitive planning that drills down from the regional to the municipal scale, focused on minimizing the negative impacts of new development. Watershed protection goals should be included in community planning efforts such as General Plans, Emergency Management Plans, Urban Water Management Plans and Groundwater Sustainability Plans. Codifying these goals into policies and development codes is essential for preventing watershed degradation and enhancing community resilience.

At the municipal level, this involves restricting development on land that contributes to a healthy watershed. This includes areas that promote stormwater infiltration and groundwater recharge, mitigate flooding, preserve native plants and wildlife habitat, are historic drainageways or steep slopes, and provide recreational benefits to residents. Several land use tools such as overlay zones, stream buffers and setbacks, zoning, cluster subdivisions, and conservation easements restrict development in priority areas.

Approaches for Protecting Priority Areas of the Watershed:

- Preserve and protect natural areas that promote flood protection, water filtration, groundwater recharge, aquatic habitat, and overall long-term water resource sustainability to the maximum extent practicable prior to considering mitigative techniques.[37]
- Prohibit development in sensitive areas and incentivize infill development.
- Adopt development standards for stream buffers and setbacks, which may be referred to as streamside management areas, streamside conservation areas, creek protection permits, natural bank buffers, or riparian setbacks.[38]
- Participate in collaborative watershed restoration efforts to restore watershed functions through your Integrated Regional Water Management group.

[37] Ahwahnee Water Principals, Community Principle 2. civicwell.org/civic-resources/ahwahnee-water-principles

[38] Molly Munz, California Water Resources Control Board. 2009. Stream Setback Ordinance Survey. www.waterboards.ca.gov/water_issues/programs/stormwater/docs/hydromodification/meetings/021110/survey_streamsetback.pdf

TOOLBOX: RAIN AND STORMWATER CAPTURE

Stormwater capture and use is defined by the State Water Resources Control Board as "the intentional collection of urban runoff to augment surface water supplies, to recharge groundwater, or to support ecosystems."[39] Stormwater capture is a major priority for the State, as it can provide a sizeable source of water supply. In some parts of the state, stormwater runoff currently constitutes 10% or more of urban supplies.[40] In California's Water Supply Strategy (2022), action 2.5 "Support[s] local stormwater capture projects in cities and towns with the goal to increase annual supply capacity by at least 250,000 acre-feet by 2030 and 500,000 acre-feet by 2040."[41] In 2023, Governor Newsom signed Executive Order N-3-23, which helped expand the state's capacity to capture storm runoff in wet years by facilitating groundwater recharge projects.[42]

In 2023, SB 122 facilitated groundwater recharge projects by directing state agencies to continue to collaborate on expediting permitting or recharge projects and by designating aquifers as "natural infrastructure," thereby making groundwater recharge projects, including stormwater capture, eligible for a greater set of funding sources.

Stormwater capture achieves multiple benefits beyond serving as a water supply. The California Stormwater Quality Association (CASQA) conducted a socioeconomic analysis of urban stormwater capture, which included the following benefits (in order of priority based on CASQA membership polling):

- Improved water quality
- Reduced flooding damage to property
- Increased public safety/reduced loss of life
- Creation or enhancement of public space
- Restoration or protection of wetlands
- Enhanced recreational opportunity
- Improved community health
- Job creation
- Increased property values
- Increased agricultural yields

Stormwater capture methods designed to work with natural systems, such as green infrastructure and low impact development, are preferred. Green Infrastructure (GI) refers to "the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters."[43] GI typically addresses stormwater flows at the neighborhood or district scale. Low Impact Development (LID) minimizes changes in site hydrology or mimics pre-development hydrology by promoting the reduction of impervious areas and slowing the flow of water so that it infiltrates into the ground before leaving the site.

[39] State Water Resources Control Board. Enhancing Urban Runoff Capture and Use. 2018. www.waterboards.ca.gov/water_issues/programs/stormwater/storms/docs/STORMS-capture-use.pdf

[40] *Ibid*, page 8.

[41] California's Water Supply Strategy. resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Water-Resilience/CA-Water-Supply-Strategy.pdf

[42] Executive Order N-3-23. www.gov.ca.gov/wp-content/uploads/2023/02/Feb-13-2023-Executive-Order.pdf

[43] Water Infrastructure Improvement Act. 2019. www.congress.gov/115/plaws/publ436/PLAW-115publ436.pdf

EXAMPLES OF GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT

Creek Daylighting

Constructed Wetlands

Vegetated Roof

Bioretention Planter

Rainwater Harvesting

Permeable Paving

Many of these strategies are required to be implemented as part of the state's municipal separate storm sewer systems (MS4) permit program. Required under section 402 of the Clean Water Act, the California State Water Board's Municipal Stormwater Program manages the MS4 program Phase I permits for municipalities of over 100,000 and Phase II permits for municipalities of under 100,000 across its nine regions. Municipalities use LID techniques and emphasize landscape-based site design features and porous pavement treatment systems to achieve permit compliance. Each of the state's regional permits is unique, with different LID requirements to support the watershed health and function priorities of each region. All new projects are required to implement the LID standards in order to reduce runoff and improve stormwater quality.[44] The Phase I MS4 permits for each region are filed with the California Regional Water Resources Control Board.[45]

The California Department of Conservation recently created the Multi-benefit Land Repurposing Program to fund groundwater sustainability projects that reduce groundwater use, repurpose irrigated agricultural land, and provide wildlife habitat. This program is an avenue to pursue groundwater recharge projects, as groundwater recharge is a goal of the land repurposing program.

[44] California Water Boards. Municipal Stormwater Program. www.waterboards.ca.gov/water_issues/programs/stormwater

[45] California State Water Resources Control Board. Phase I MS4 Permits. www.waterboards.ca.gov/water_issues/programs/stormwater/phase_i_municipal.html

TABLE 6: COMMON GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT TECHNIQUES	
APPLICATION	DESCRIPTION
BIORETENTION BASINS, STORMWATER HARVESTING BASINS, AND RAIN GARDENS	Small- to large-scale planning areas containing shrubs, trees, and grasses designed to capture stormwater.
BIOSWALES	Shallow and uncovered channels that induce meandering and are placed deep within a drainage channel.
CURB OPENINGS AND CURB EXTENSIONS	Drainage inlets that divert stormwater into bioretention basins. Basins can be extended into the shoulder to expand the harvesting capacity with added traffic-calming effects.
DETENTION PONDS	Basins that provide flow control by collecting stormwater runoff.
PERMEABLE PAVEMENT, GRAVEL, OR PAVERS	Methods of paving that allow infiltration and can be used in low-to-moderately trafficked areas like sidewalks and parking lots.
GREEN ROOFS	Roofs are covered with growing media and vegetation that enable rainfall infiltration and evapotranspiration of stored water.
URBAN TREE CANOPY	Trees absorb stormwater in their leaves and branches and reduce urban heat.

Approaches to Stormwater Capture:

- Design stormwater capture projects to employ GI and LID approaches to work with natural systems to the greatest extent possible.
- Harness captured stormwater by recharging groundwater or reusing it.
- Conduct a gap analysis of your codes and ordinances to identify impediments to or opportunity to improve stormwater capture.[46]
- Adopt stormwater management and site design standards that use best practices for low-impact development to reduce stormwater runoff, reduce erosion, and increase water infiltration.
- Adopt site-level soil erosion mitigation standards for new development to reduce sedimentation and runoff and to protect water quality from land disturbance.
- Further your community's equity priorities by siting stormwater capture projects in areas of highest need.[47]
- Integrate stormwater capture Best Management Practices into parks and local government property.
- Establish funding sources to pay for stormwater capture projects, such as a parcel tax.[48]
- Implement stormwater capture projects that generate the greatest number of benefits across socio-economic and environmental priority areas.[49]
- Monitor stormwater capture projects and evaluate to determine if the expected results are achieved and to improve future practices.[50]

[46] Carlson, Wayne, CIAP, LEED AP. 2017. USER GUIDE & TEMPLATE: Municipal Landscape Gap Analysis Tool for Planning & Development Review Standards and Procedures. www.casqa.org/wp-content/uploads/2022/12/20171109_gap_analysis_user_guide.pdf

[47] California Stormwater Quality Association. 2024. The Socioeconomic Value of Urban Stormwater Capture. www.casqa.org/programs-initiatives/stormwater-capture-use

[48] Measure W, passed by Los Angeles County voters in 2018, is a parcel tax that is assessed to every property in the County and is based on the amount of stormwater each property generates. The tax revenue will be used to fund projects that capture stormwater.

[49] Ahwahnee Water Principals, Implementation Principle 2. civicwell.org/civic-resources/ahwahnee-water-principles

[50] Ahwahnee Water Principals, Implementation Principle 3. civicwell.org/civic-resources/ahwahnee-water-principles

Photo by Varun Gaba

CASE STUDY

INFILTRATION PARKING LOT RETROFIT AT SAN DIEGO'S KELLOGG PARK

The Kellogg Park Green Lot Infiltration project, located in the La Jolla Shores community of San Diego, was designed to remove 18,000 square feet of asphalt concrete and replace it with permeable pavement that will allow the city to absorb large amounts of surface water. It also included elements that capture runoff from the parking lot and nearby public right-of-way. The captured water was then filtered to minimize pollutants. A "vegetated bioswale" and filter bed were added to further capture and infiltrate runoff.

Other project benefits include a reduction in the volume of stormwater and waterborne pollutants that could potentially reach the adjacent beach, enhanced aesthetics through landscaping features and trash enclosures, new curb ramps for improved accessibility, and improved drainage near current storm-drain inlets.

Photo by Carree Michel

CASE STUDY

ELK GROVE NATURE PARK

From 2020 to 2022, the Cosumnes Community Services District planned and created a community park that specifically incorporates green stormwater infrastructure. The Elk Grove Nature Park seeks to mitigate the effects of climate-related weather events, improve community health, increase community access to green space and nature, and provides opportunities for education, employment, and social inclusion.

The green infrastructure uses natural processes to filter and slow the flow of stormwater to protect communities from flooding and restore waterways. The park includes rain gardens, bioswales, constructed wetlands, daylighted streams, and permeable pavement. The project took two years from planning to implementation, and included numerous community engagement activities to design the features of the park. In 2021, volunteers worked in conjunction with District Staff to install the rain garden with over 300 native California plants.

SECTION 5

EFFICIENT WATER DEMAND PROGRAMS

Rate structuring, retrofits, incentive programs, and consumer education enable water conservation and efficiency opportunities for existing development.

CASE STATEMENT

Water demand for a property can vary greatly due to size, type, and age. Additional factors such as season, weather, demographics (e.g., income and education level), infrastructure maintenance, and water conservation habits also contribute to the level of demand. Approaches for reducing water demand in existing development include conservation rate structuring, fixture, appliance, and landscape retrofits, post-occupancy incentive programs, and consumer educational messaging. While any one of these efforts can reduce consumer water demand, a combination of these strategies will maximize water savings and greatly reduce water demand.

Sending a price signal to incentivize water conservation.	Helping consumers invest in and manage efficient fixtures, appliances, and irrigation.	Monitoring and communicating data about water usage to customers.

TOOLBOX: CONSERVATION RATE STRUCTURING

Water wholesalers, municipal water districts, and regional water agencies set rates to generate revenue to finance the acquisition, treatment, delivery, and management of water resources and infrastructure to meet the needs of customers. California law restricts how public utilities can use revenue from property-related fees (such as water and wastewater). This complicates public utilities' ability to develop rate structures that meet their economic objectives and state conservation requirements.

During the 2012-2016 California drought, Governor Jerry Brown signed Executive Order B-29-15, under which Directive 8 ordered the State Water Board to guide local agencies in developing rate structures and pricing mechanisms for water conservation. These pricing mechanisms are complicated, however, by Proposition 218, which requires voter approval for local governments to impose or increase various types of taxes, assessments, and fees. Proposition 26, passed in 2010, expanded the definition of taxes to include certain fees, charges, and other levies imposed by state or local governments.

The San Juan Capistrano decision of 2015[51] upheld Proposition 218's proportional cost provision, which requires water agencies to correlate their tiered prices with the actual cost of providing water at those tiered levels. The proportionality clause limits the ability of conservation-based pricing to respond to drought conditions. Even though the ruling indicates that the case "does not foreclose the use of conservation-oriented rate structures," many water agencies now avoid tiered rate structures for fear of legal challenges from their ratepayers. Private water suppliers (such as mutual water companies) face no such restrictions. There are approximately 1,200 mutual water companies in California.[52]

In the 2022 Alliance for Water Efficiency State Policy Scorecard, water conservation rate structuring and eliminating the ban on water utilities using customer revenues for low-income assistance were highlighted as key recommendations for California.[53]

Water rates are determined by two factors: fixed and variable costs. The fixed cost of water is established by the costs of acquiring water supply, and the costs to establish and maintain the infrastructure that treats and conveys the water. The variable cost of water is based on the amount of water consumed by a customer. Water agencies are encouraged to set their rates so that the majority of their fixed costs are covered by the lowest possible water demand, so that the volume of water consumed by customers poses less risk to the agency's basic operations.

A variety of rate structuring strategies exist, but only two are generally applicable in California, budget-based rates and tiered rates.

Budget-Based Rates

Each customer is given a water budget based on property-specific characteristics (e.g. property type,

[51] CAPISTRANO TAXPAYERS ASSOCIATION, INC. v. CITY OF SAN JUAN CAPISTRANO, 235 Cal.App.4th 1493 (2015). law.justia.com/cases/california/court-of-appeal/2015/g048969m.html

[52] Aligica, P. D., Ostrom, E., Ostrom, V., Tiebout, C. M., & Warren, R. (2014). Elinor Ostrom and the Bloomington School of Political Economy: polycentricity in public administration and political science (Vol. 1). Lexington Books.

[53] Alliance for Water Efficiency. 2022 State Policy Scorecard for Water Efficiency and Sustainability. www.allianceforwaterefficiency.org/2022Scorecard

number of people in the household, landscaped areas), which allocates the lowest cost of water for essential uses. Water use that exceeds the water budget or allocation is billed at a higher rate, proportional to the increased cost the agency incurs for providing that additional water to the customer. These are also known as "allocated," "goal-based," or "customer-specific" water rates.

Tiered Rates

The utility sets several rate tiers based on water usage and customers are charged lower rates for water used in the lower tiers. Rates per tier increase as water use increases to reflect the cost incurred by the agency to provide the water. These are also known as "inclining block" or "proportion-based" rates. A supplementary approach during times of water scarcity is a drought demand surcharge, where a supplier issues flat fees per water meter at each stage of a drought, regardless of the rate tier.

Navigating Rate Structuring Challenges

For households and businesses sensitive to the price of water, rate structuring is an effective way to modify human behavior. Rate setting is complicated in California by strict utility regulations and tax law, as well as by the diversity in regional water supply infrastructure. However, the core principle of incentivizing water conservation by charging higher prices for higher usage can still be applied. Well-executed rate structuring can result in water use reductions and can expedite desired shifts in water use behavior while also ensuring the water agency remains solvent.

Common goals for adopting water conservation rate structures include:

- Sending a price signal to incentivize water conservation.
- Helping consumers invest in and manage efficient fixtures, appliances, and irrigation.
- Monitoring and communicating data about water usage to consumers.

While rate structuring can be extremely beneficial, it must be done equitably. In 2012, California passed Assembly Bill 685 and became the first state to recognize the human right to water. The state recognizes that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking and sanitary purposes." Unfortunately, more than a half-million California residents lack access to water that is reliably safe for drinking but are still required to pay their utility bills. This is due in part to the inability of some small water systems to maintain their aging infrastructure or to keep up with regulations for both legacy and emerging contaminants.[54]

The Safe and Affordable Funding for Equity and Resilience (SAFER) program implemented through the passage of SB 200 (2019) established the Safe and Affordable Drinking Water Fund. The fund will provide tools and funding to help bring clean water to California communities that have, as of yet, been unable to ensure safe water at a reasonable cost. If implemented effectively, the program will ensure a more equitable distribution of resources and associated costs while also providing assistance to water agencies to ensure they can meet their customers' basic water needs.

[54] California Water Boards. Safe Drinking Water Program Overview Factsheet. www.waterboards.ca.gov/publications_forms/publications/factsheets/docs/faq_safe_drinking_water_program_overview_factsheet.pdf

Strategies for Conservation Rate Structures

Water utilities can develop and implement conservation rate structures that promote sustainable water use practices, align with regulatory requirements, and address the unique needs and priorities of their communities by considering the following:

- Conduct a water demand analysis to understand current demand levels, including seasonal variations, historical water use, customer surveys, climate impacts, population growth, socioeconomic factors, and development patterns.
- Develop a utility water conservation plan to clarify water conservation goals.
- Conduct a rate assessment to determine options for rate structuring.
- Engage with stakeholders, including water utility staff, customers, community organizations, environmental groups, and regulatory agencies.
- Adhere to the applicable laws, regulations, and guidelines governing water rates and conservation measures, including Proposition 218, Proposition 26, and directives from the California Public Utilities Commission or the State Water Resources Control Board.
- Develop an equitable rate structuring plan and analyze its financial impacts.
- Conduct community education and outreach to minimize opposition to potential rate increases.
- Adopt and implement a conservation rate structuring strategy.
- Monitor the updates to track performance over time. Key metrics include water usage, revenue collection, customer satisfaction, and conservation outcomes.

Proportionality and Price Signals

The proportional cost provision established by Proposition 218 (1996) limits the scale of price signal an agency can send to its customers through rate structuring. For example, in some areas of the state water is acquired and conveyed relatively inexpensively, and the relative cost difference to the agency for providing one unit of water to the next, on a per-customer basis, is minuscule. The agency could still set a conservation-based rate structure, but the minimal cost difference to the customer would be unlikely to influence their water use behavior.

On the other hand, in regions where water acquisition and conveyance have high costs (such as Southern California, where much of the water supply is imported over long distances), the cost to the agency of providing that additional unit of water to the customer is significant. The agency can pass that cost on to the customer to send a price signal that is more likely to change behavior. The more money a customer can save by reducing water use, the more likely they are to do so. Greater water conservation results might be obtained by structuring rates proportional to total water usage so that users with the greatest impact have the greatest incentive to conserve.

Proposition 218 also requires that agencies put all assessments, charges, and user fees out to a vote prior to creation or increase. These must be approved by a two-thirds supermajority, which limits the agencies' ability to cover their operating costs or raise capital for reinvestment.


Photo by Ariel Blanco

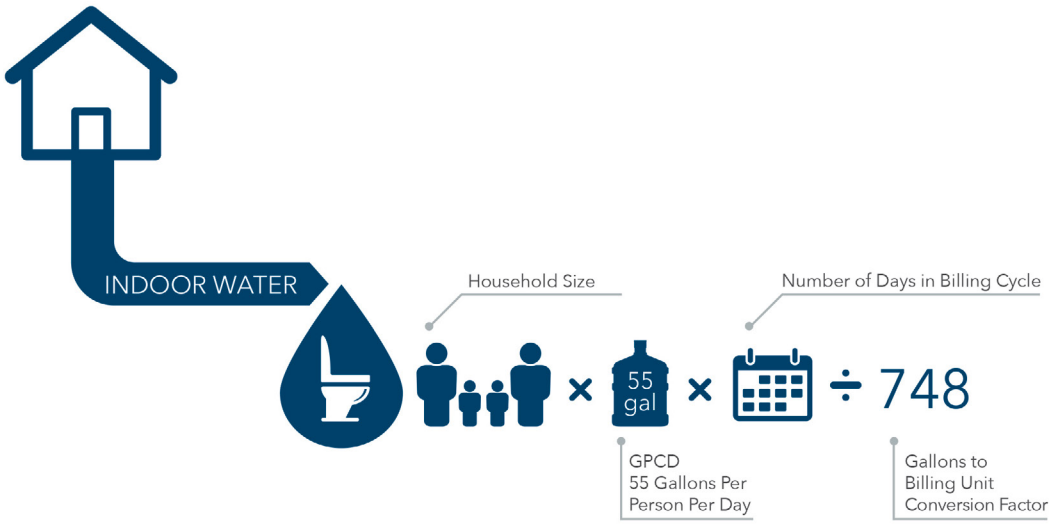
CASE STUDY

MOULTON NIGUEL WATER DISTRICT'S WATER-SMART RATE STRUCTURING

Moulton Niguel Water District (MNWD) serves 170,000 customers in Laguna Niguel, Aliso Viejo, Mission Viejo, Laguna Hills, Dana Point, and San Juan Capistrano. In December 2017, MNWD approved new water budget-based rates. The rates are tailored for each customer and broken down into an indoor water budget and an outdoor water budget. The formula for single-family and multi-family residential customers is:

- Indoor Water Budget = Persons per household x 55 gal per person per day x days in billing cycle / 748 conversion factor (to calculate budget in HCF).
- Outdoor Water Budget = Irrigable area (sq. ft. per parcel) x Evapotranspiration x 0.7 plant factor x 0.62 / 748 conversion factor (to calculate budget in HCF).

Revenue from water rates that exceed the cost of imported water is designated to the District's Water Efficiency Fund to invest in water efficiency improvements that maintain reliability and to fund new water supply projects. The fund receives the majority of its dollars from Tiers 3, 4, and 5 (charged incrementally) for residential customers.



**1 billing unit of water is equal to 100 cubic feet (HCF), or 748 gallons.*
**Household sizes are assumed to be 4 for Single-Family Residential Detached Homes, 3 for Single-Family Residential Attached Townhomes or Condos, and 2 for Multi-Family Residential apartments unless otherwise specified when beginning service or through the water budget modification process.*

Image: Moulton Niguel Water District Residential Water Budgets.

TOOLBOX: WATER METERING, AUDITS, AND LEAK DETECTION

Water customers—including commercial, industrial, and residential users—may not be aware that water leaks and inefficient fixtures could be unnecessarily increasing their water use. While water providers may perform their own system-wide water loss audits, they can also support and incentivize customers to do the same.

Water metering is a method of measuring water consumption. Advanced metering technology, including Automatic Meter Reading and Advanced Metering Infrastructure (also called AMI or "smart meters") eases the data collection process and increases the specificity of the data. This increased granularity of information creates the opportunity for easily justifiable rate structures, rapid leak detection, and customized demand management programs. Utilities that pair metering and commodity rate structures report a 15% to 30% reduction in water consumption.

Recent droughts have motivated water providers to seek approval from the California Public Utilities Commission for comprehensive plans to implement utility-wide advanced metering. In some areas where water providers have not yet designed a meter replacement initiative, municipalities can encourage consumers to purchase their own meters to achieve water demand reductions on individual properties.

Sub-metering—the practice of installing individual meters within a property or a building to measure the consumption of water for each residential or commercial unit—or indoor and outdoor meters can provide data granularity to empower the refinement and optimization of water policies, rates, and fees. The value of this information may be worth more than the cost of installing an extra meter.

Metering to interpret real time and long term data and subsequent audits can identify opportunities to modify water-consumptive behaviors. They can also detect leaks in the system and signal when infrastructural updates are necessary to mitigate water loss.

If residents of a property are renters, on a domestic well, or part of a small water supply system, issues of equity can arise around meter conversion, water use audits, and leak detection. Consider designing programs to include community members like renters, who are responsible for paying the water bill but who might not have the funds or property rights to approve projects at their home.

Approaches for Water Metering, Audits, and Leak Detection:

- Require submeters to be installed in new development to measure unit-by-unit and indoor-outdoor water use.
- Utilize advanced metering technology to increase collection and analysis of water use data.
- Offer landscape audits that recommend watering schedules, infrastructure upgrades, and drought-tolerant plants.
- Offer audits at no cost to customers or pair them with an incentive, like a free fixture.
- Encourage participation by providing water audit results of public buildings as examples that demonstrate potential water-saving outcomes.
- Use the aggregated analysis of audit results to identify code and policy changes.
- Update your codes to allow individuals to install privately purchased metering devices on the utility meter and provide guidance on how to attach them in a way that avoids disturbance to utility operations.

[55] Alliance for Water Efficiency. www.allianceforwaterefficiency.org/resources/metering

CASE STUDY

LANDSCAPE EVALUATIONS AND AUDIT PROGRAM (LEAP)

Inland Empire Utilities Agency (IEUA) is a regional wastewater treatment agency and water distributor catering to approximately 935,000 individuals across 242 square miles in western San Bernardino County. It serves seven contracting agencies for sewage utility services and nine retail agencies for wholesale imported water distribution.

Despite the dual challenges of increased population and prolonged and more frequent periods of drought, IEUA has shown resilience and adaptability, evidenced by a decline in gallons per capita per day (GPCD) water use over the past five years. This reduction is achieved in part by the eight Water Use Efficiency Programs, all of which have verified water savings.

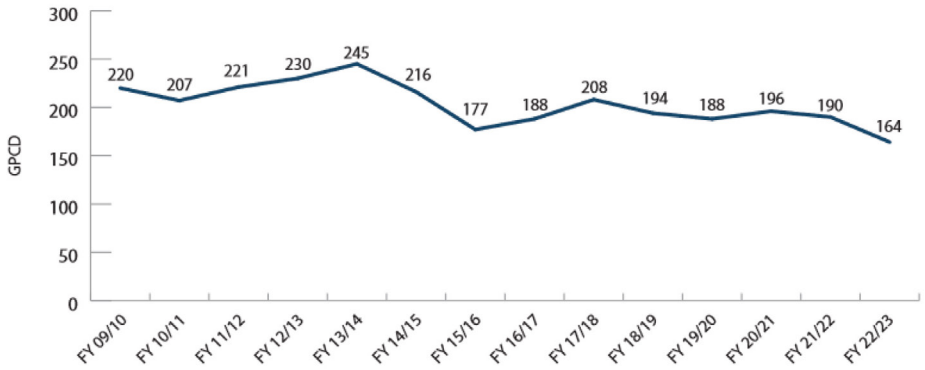
One of the standout programs is the Landscape Evaluation and Audit Program (LEAP), conducted in partnership with the Chino Basin Water Conservation District (CBWCD).

LEAP targets residential, commercial, institutional, and industrial customers and offers a comprehensive landscape and irrigation system audit at no cost.

Participants receive tailored recommendations to enhance irrigation system efficiency, including personalized schedules based on site-specific conditions. LEAP also thoroughly analyzes prior water consumption against personalized water budgets derived from local evapotranspiration and landscape areas. Participants also benefit from water-saving tips and information on available rebate opportunities.

LEAP has emerged as a cost-effective water management program, fostering sustainable water practices among diverse customer segments. By providing personalized guidance and resources, IEUA and CBWCD have empowered stakeholders to make informed decisions regarding water usage. This holistic approach conserves water, promotes environmental stewardship, and fosters community resilience in the face of climate uncertainties.

Regional Gallons Per Capita Per Day (GPCD)



Landscape Evaluation and Audit Program Water Savings

	ANNUAL SAVINGS (GPY)	ANNUAL SAVINGS (AF)	LIFETIME SAVINGS (AF)	ACREAGE
Residential	4,561,920	14	71	5
Commercial	18,899,382	58	290	32

TOOLBOX: POST-OCCUPANCY INCENTIVE PROGRAMS

Both land use planning programs and water providers can engage consumers and provide incentives and education on the benefits of using water efficiently. Using technology like advanced water meters and sub-metering helps tailor these post-occupancy interventions.

Strategies for Conservation Rate Structures

Incentive programs can be a useful way to reduce current water demand for both residential and commercial water users. They can serve as a complementary way to involve current residents and post-occupancy developments in implementing water-smart building and design features. Providing rebates for homeowners and businesses to remove grass and retrofit water-smart plumbing fixtures is a well-tested tool that can generate meaningful water savings. Consider creative ways to support community participation in local conservation programs so that renters, elders, and other low-income community members can receive benefits.

As California confronts the challenges posed by climate change and seeks to enhance water use efficiency and drought resilience, it is crucial to implement effective post-occupancy rebate programs targeting both residential and commercial water users. Proposed and existing regulations underscore the importance of long-term improvements in water management practices. Recent data highlight the efficacy of certain programs, particularly indoor fixture and outdoor turf rebate initiatives, in reducing water demand. These programs have demonstrated impressive results, saving up to 97 acre-feet per year (AFY) for indoor fixtures and 42 AFY for outdoor turf replacements.[56]

Such initiatives play a vital role in supporting water suppliers' efforts to meet Urban Water Use Objectives, encompassing various aspects of efficient water use. These include indoor and outdoor residential consumption, landscape irrigation, water loss reduction, and compliance with regulations such as AB 1572. By providing rebates for replacing non-functional turf in commercial, industrial, and institutional properties, water agencies can not only enhance water conservation efforts but also ensure compliance with relevant legislation aimed at prohibiting potable water use on non-functional turf.

Approaches for Water Metering, Audits, and Leak Detection:

- Offer rebates to residents for installation of low-flow plumbing fixtures such as toilets and showerheads, appliances such as high-efficiency washing machines, and "smart" home water monitors to reduce indoor water use.
- Offer rebates to residents and commercial customers for "smart" irrigation controllers, xeric landscaping, and removal of turf grass to reduce outdoor water use.
- Use rebates or grants to incentivize homeowners' associations to remove turf grass and install water-efficient irrigation systems and controllers.
- Establish a rebate program for multi-family residential buildings with cooling towers to upgrade their conductivity controllers.

[56] Inland Empire Utilities Agency, Regional Water Use Efficiency Programs Report. https://www.ieua.org/wp-content/uploads/2023/01/Final-IEUA-FY-21-22-Annual-WUE-Report-1.pdf

CASE STUDY

CITY OF LOS ANGELES TURF REPLACEMENT PROGRAM

In 2009, the City of Los Angeles partnered with the Metropolitan Water District of Southern California to roll out a turf replacement program with the aim of achieving conservation benefits while ensuring cost-effectiveness. The UCLA Luskin Center for Innovation analyzed relevant data from 2009-2015 and set out to better understand the conditions that affect participation in the turf replacement program, and if this investment is cost-effective for utilities and ratepayers.

Household Participation:

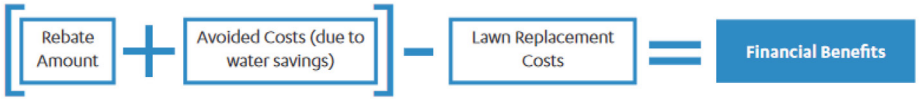
The study identified financial benefit as a key driver for household participation in the turf rebate program. Analyzing various rebate levels, researchers found that higher rebates significantly impacted household financial benefit. With rebates set at $3.75 per square foot, households recouped their initial investment in less than 10 years, akin to payback periods deemed appropriate for comparable investments like solar panels. Even at lower rebate levels of $1.75 per square foot, typical households in medium climate zones saw payback periods under 10 years. However, upfront costs of turf replacement remained a barrier, particularly for lower-income households. While lower rebates may still incentivize participation, higher rebates could influence households' replacement decisions, potentially leading to improved property values and neighborhood aesthetics.

Cost-effectiveness for Ratepayers:

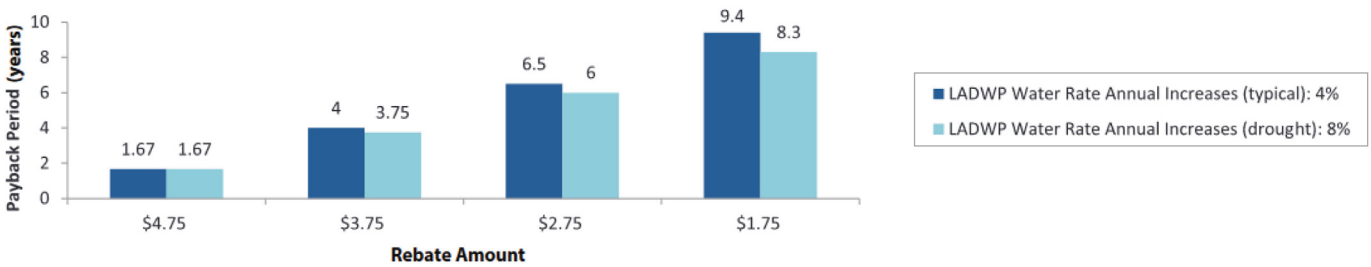
The financial benefit to ratepayers and the utility were realized after multiple years. Rebates as low as $1.00 per square foot resulted in a payback period of approximately 10 years, while higher rebates extended the period to 11-29 years. By amortizing the utility's investment in the program over 20 years, it became clear that investing in turf replacement was generally more cost-effective than purchasing water from external sources. Even considering different timeframes for the expected lifetime benefits of turf replacement—estimated to be close to 20 years or longer—the program proved financially advantageous for ratepayers.

The turf replacement program in the City of Los Angeles holds promise for achieving conservation goals while delivering financial benefits to households and ratepayers alike. By offering rebates that facilitate reasonable payback periods for participants and amortizing investments over time, the program ensures affordability and sustainability. Additionally, the potential for long-term benefits underscores the importance of continued investment in water conservation initiatives, positioning the city as a leader in adaptive and cost-effective water management practices amidst the challenges posed by climate change.

Household financial benefit from participation in the turf replacement program



Household payback period for different rebate levels and expected LADWP water rate annual increases ($5.50 per sq. ft. replacement costs in medium climate zone)



TOOLBOX: POST-OCCUPANCY INCENTIVE PROGRAMS

There are many ways for planners and water providers to reach consumers with conservation messaging. Municipal and utility bills often include an educational insert about water efficiency tips, or other informational materials about water saving measures and consumer water efficiency programs like water-smart appliance rebates and lawn conversion offsets. Messaging techniques that promote a sense of control, offer social incentives, provide immediate rewards, and are framed positively are more effective in changing behavior.

Other effective tools to develop and implement a conservation message to consumers are workshops and seminars, social media campaigns, community events and outreach programs, collaborations with local organizations, school programs and many more.

Ensuring accessibility and inclusivity in water efficiency and conservation messaging is critical to reaching all members of the community, regardless of language or socioeconomic status. By developing messages that are culturally and linguistically inclusive, communities can bridge communication barriers and empower individuals from diverse backgrounds to access rebates, programs, and resources aimed at promoting water conservation and efficiency.

Recognizing the importance of socioeconomic diversity, efforts should be made to tailor messaging to resonate with different income levels and address barriers to participation, such as financial constraints or lack of awareness. By fostering an environment of inclusivity, water providers can effectively engage with communities, foster a sense of ownership in conservation efforts, and work collaboratively towards achieving sustainable water use practices for the benefit of all.

Approaches for Compelling Messaging:

- Provide tangible acts or decisions that your audience can make to "move the needle" toward a goal. This helps them to feel they have control or influence over the issue.
- Offer comparisons or share high compliance figures (e.g., "Nine out of ten residents follow these irrigation best practices to save water") to increase competitiveness and "gameify" the challenge.
- Near-term rewards make people feel good. This reward structure can even motivate behavior changes that relate to long-term goals or outcomes that are not immediately visible. The reward can be external or intrinsic.
- People are more likely to believe and act on positive rather than negative information. When given an opportunity to describe a trend, note progress toward goals.
- Translate your messaging into the languages of your audience to enable accessibility and equity.[57]

[57] For example, Walnut Valley Water District water use efficiency programs and activities are reaching Mandarin-speaking and Asian American and Pacific Islander (AAPI) community members by translating their materials.

CONCLUSION

The toolboxes outlined in this guidebook highlight some of the most effective strategies communities can employ to take a more holistic and sustainable approach to water management. There are opportunities for integrated water and land use actions throughout the planning process, from the visioning and planning stage through development review and in post-occupancy. All communities can apply an integrated water and land use intervention. Ultimately, by linking land use to water demand, California can wisely manage its limited resources in a way that sustains the state's thriving economies, healthy environments, and vibrant communities for generations to come.

ADDITIONAL ONLINE RESOURCES

GROWINGWATERSMART.ORG

The Growing Water Smart program offers additional resources to Growing Water Smart participants through our program website. The website provides information related to all of our state programs, including Arizona, Colorado, California, and the US-Mexico Border.

- **Learn about peer projects and share individual experiences** advancing water-smart goals.
- **Explore and identify innovations** in the field.
- **Access technical expertise** to support organizational policy change and action.
- **Be a champion** in the region for water smart principles.

THE GROWING WATER SMART PEER NETWORK

Our **Growing Water Smart Peer Network** is a place for workshop participants to strengthen their professional connections with other local government leaders and affiliates who are integrating water and land use in their communities.

If you or your community recently attended a Growing Water Smart workshops, visit https://www.linkedin.com/showcase/growing-water-smart/ and click the "follow" button.

As a Network Member, you gain an opportunity to:

- **Strengthen professional knowledge and skills** by accessing resources, studies, and news related to integrating water and land use.
- **Build a network of peers** working on similar challenges and advancing community change.

GROWING WATER SMART METRICS: TRACKING THE INTEGRATION OF WATER AND LAND USE PLANNING

Tracking the results of water and land use integration are an important component to determining whether community goals are being met. Sonoran Institute's Growing Water Smart Metrics guidebook offers a set of baseline data that can be assessed for year-over-year trends to empower adaptation. Ten "progress" metrics track things such as the development of long-range plans, implementation of water conservation and efficiency programs, adoption of landscaping and building codes, implementation of adequate water supply rules, and regionalization efforts.

Fourteen metrics are then recommended to measure the "impact" of your community's strategies by assessing trends in land use, development patterns, and water demand.

Grow Water Smart

GrowingWaterSmart.org

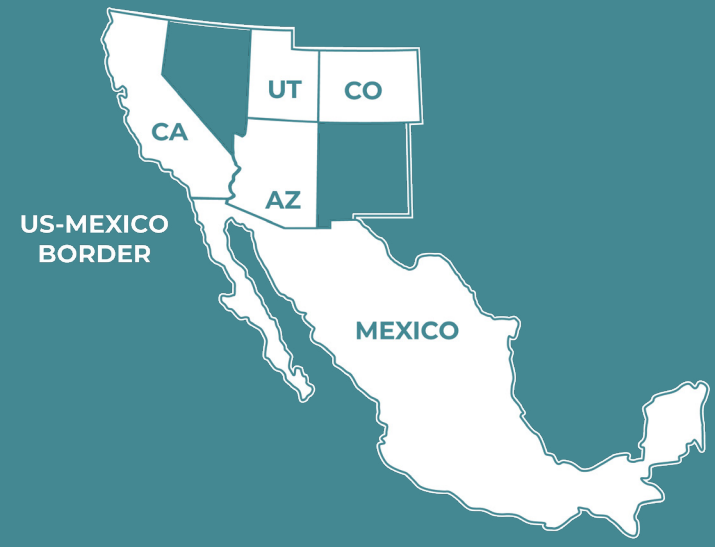
450+ Community Representatives

Growing Water Smart Workshops are helping leaders build capacity and implement action plans to steward their community's future by ensuring clean, reliable water for people, nature, and industry.

Through the Growing Water Smart workshop series, we have trained over 450 community leaders representing over 7 million residents in Arizona, California, Colorado, Utah, and along the US-Mexico Border.

With your continued support of Growing Water Smart, more communities can take advantage of our expertise and lessons learned through nearly thirty years of shaping the future of the West.

GET INVOLVED



WHERE WE WORK

JOIN US. MAKE THIS WORK HAPPEN.

To sponsor a workshop in a community you care about, contact us.

GrowingWaterSmart@sonoraninstitute.org

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