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SHARING THE COST:

Accelerating Water Resilience through Infrastructure Finance in California

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EXECUTIVE SUMMARY

In 1957, the California Water Plan stated that California's water supply issues had "never before reached such widespread and serious proportions" and, to avoid future disaster, advised "further control, protection, conservation, and distribution of her most vital resource—water." Sixty-five years later, it is clear that efforts to avoid disaster have failed. In 2021, California reported its driest year in a century, and 95 percent of Californians lived in extreme drought as the state's aging and underdeveloped water infrastructure struggled to manage the impacts of climate change and prolonged periods of water uncertainty.[1]

California's economy has always operated under the specter of looming water constraints. Historically, this led to the establishment of the federally owned Central Valley Project (CVP) and, later, the state-owned State Water Project (SWP), which, combined, supply water to two-thirds of California's population and 4 million acres of farmland.[2] The economic viability of most large urban areas—including the San Francisco Bay Area and most of Southern California—depends on the ability to import water from distant regions through these systems, as does that of much of the state's millions of acres of land devoted to irrigated agricultural production.

California's water infrastructure system has not kept pace with needed investments to capture, increase, and distribute water supply. This need for increased investment is vital not only to provide

greater conveyance and storage capacity for water users in more arid parts of the state but also for the beneficiaries of California's $50 billion agriculture economy.[3] The state's globally leading agriculture industry provides national food security and affordability—important now more than ever as pent-up demand and global conflict have resulted in supply constraints and inflated costs. Lower SWP and CVP surface-water allocations, new restrictions on groundwater pumping, and more frequent and severe hydrologic extremes have put California in a situation like the one in 1957. This untenable reality is most troubling in agricultural communities in the San Joaquin Valley—home to some of the most productive farmland in the world—which experience many of the state's greatest water infrastructure challenges.

Currently, local agencies and direct users (e.g., farmers) must cover most of the costs associated with operating, maintaining, and upgrading water infrastructure. This financial responsibility for agricultural and rural communities—which have lower population density, more lower-income households, and limited access to alternative water sources—is becoming more cost prohibitive. Building a sustainable and equitable economy and maintaining California's position as the nation's leading food supplier and economic powerhouse will require streamlining, coordinating, and—ultimately—sharing the costs of water-infrastructure investments.

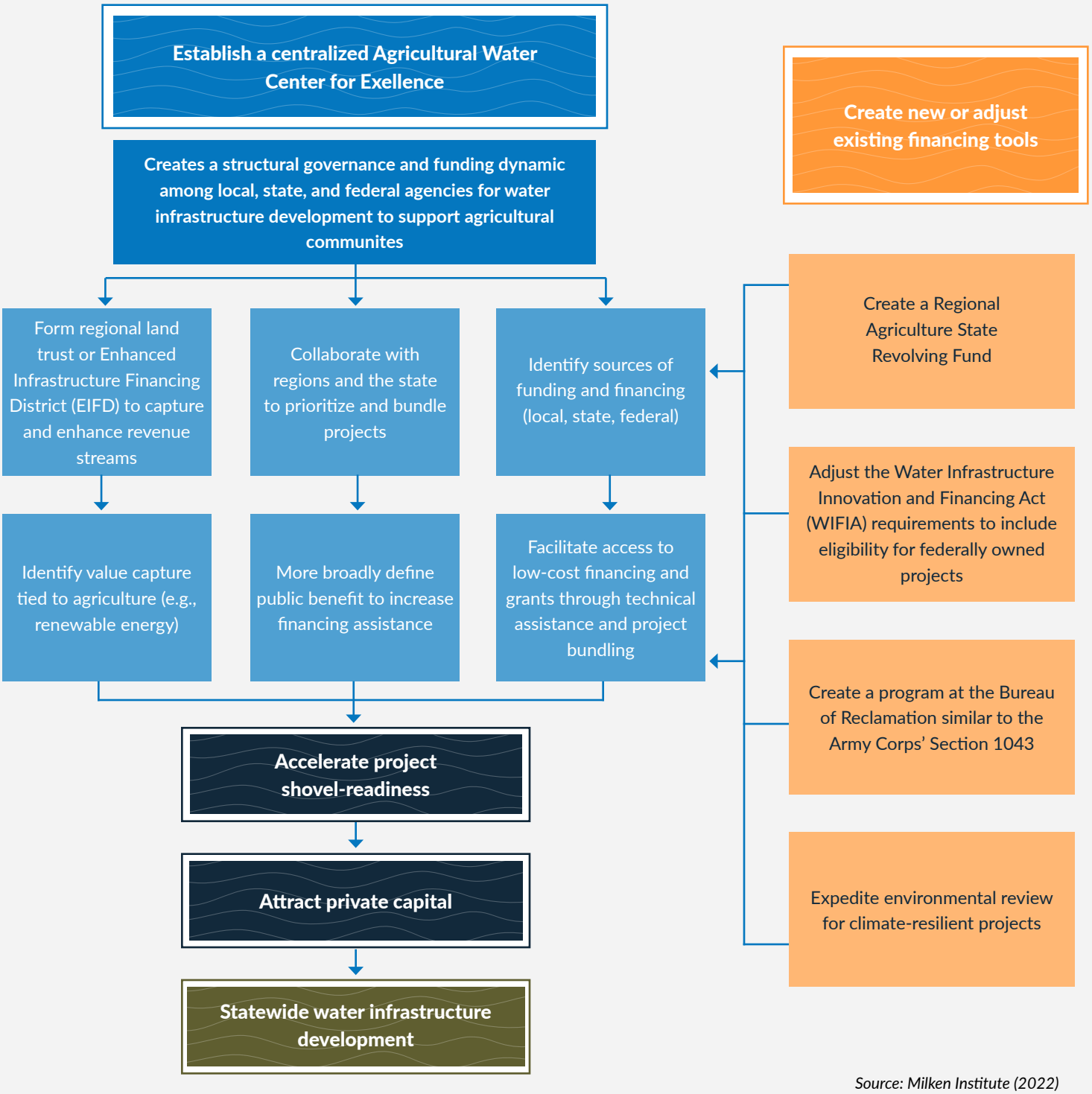
State and regional leaders must figure out how best to harness new historic levels of funding matched with innovation and effective strategies at scale. Ultimately, federal, state, and local funding alone will be insufficient to meet total project-development needs. Filling California's water infrastructure gap will require public- and private-sector collaboration to accelerate infrastructure financing along with prioritizing a pipeline of next-generation infrastructure investments.

This report aims to spur needed political action by establishing a collaborative policy, governance, and investment framework to enhance water resiliency, accelerate economic growth, and improve quality of life. The report also identifies gaps in funding and critical federal, state, and local policy barriers that increase risk, uncertainty, costs, and timelines for water-infrastructure projects. In doing so, the report outlines the opportunity to mobilize political leadership and the funding capacity needed to address this global challenge with regionally informed and impactful solutions.

As outlined in the Investment Roadmap below, this report recommends:

- **Establishing a centralized Agricultural Water Center for Excellence**
- **Creating new credit-enhancement tools and adjusting or expanding existing programs to increase project funding**
- **Cultivating a development and project delivery ecosystem more welcoming to public-private partnerships**

Investment Roadmap for Statewide Water Infrastructure Development



Source: Milken Institute (2022)

This report includes:

- a summary of challenges and consequences resulting from inadequate water infrastructure in California, particularly for the state's rural and agricultural communities;
- an analysis of current governance and funding barriers at the federal, state, and local levels that inhibit water-infrastructure development in California; and
- a detailed explanation of recommendations outlined in the Investment Roadmap.

INTRODUCTION

"California is presently faced with problems of a highly critical nature—the need for further control, protection, conservation, and distribution of her most vital resource—water. While these problems are not new … never before have they reached such widespread and serious proportions … Unless corrective action is taken—and taken immediately—the consequences may be disastrous."

—Bulletin No. 3 of The California Water Plan, 1957

In 1957, the California Water Plan advised immediate action to protect California's water supplies and prevent future disasters. Almost 65 years later, in 2021, California reported its driest year in a century,[4] and, in mid-August, more than 95 percent of the state's 40 million residents were living in severe drought compared to 32 percent the year before.[5] Record-low precipitation levels were coupled with unusually high temperatures, drying out soil and vegetation, increasing evaporation from reservoirs, and depleting snowpack. And while California is no stranger to drought, conditions and water shortages have been intensifying at alarming rates as climate change worsens and crumbling infrastructure fails to meet growing needs. The Environmental Protection Agency reported that California faces $65 billion in necessary water transmission, distribution, treatment, and storage needs over 20 years (adjusted to 2022 dollars).[6]

In California, a primary challenge is that water resources are not proportionately available throughout the state. Approximately 75 percent of California's water originates in the northern third of the state (north of Sacramento), while roughly 80 percent of water demand for municipal, industrial, and irrigation districts occurs in the more arid southern two-thirds of the state.[7] As a consequence, the economic viability of most large, urban areas—including the San Francisco Bay Area and most of Southern California—depends on the ability to import water from distant regions, as does that of much of the state's millions of acres of land devoted to irrigated agricultural production.

The existing infrastructure that captures and stores runoff and transports water is underdeveloped and aging. The state's systems of dams, reservoirs, canals, pipelines, pumping plants, and aqueducts—mostly contained within the state-owned State Water Project (SWP) and federally owned Central Valley Project (CVP)—transport and store water from California's wetter regions to its drier ones. About two-thirds of California's population and 4 million acres of farmland depend on water supplied by these two projects.[8] New storage and conveyance projects are needed to capture and store water in wet periods against use in dry periods. Inadequate infrastructure, regulations, and funding shortfalls—compounded by more extreme hydrologic conditions caused by climate change—have reduced surface water allocations from the SWP and CVP over time.

When state and federal surface-water allocations are reduced, some regions turn to groundwater, where available, as a primary supply source. On average, groundwater accounts for nearly 40 percent of California's water supply.[9] Historically, groundwater pumping has increased when surface water allocations from the SWP and CVP have been low. Over time, changes in surface water availability have led to circumstances in which groundwater has been over-pumped and used unsustainably.[10] Over-pumping of some groundwater aquifers has led to severe land subsidence, which has further impaired already-deteriorating infrastructure.

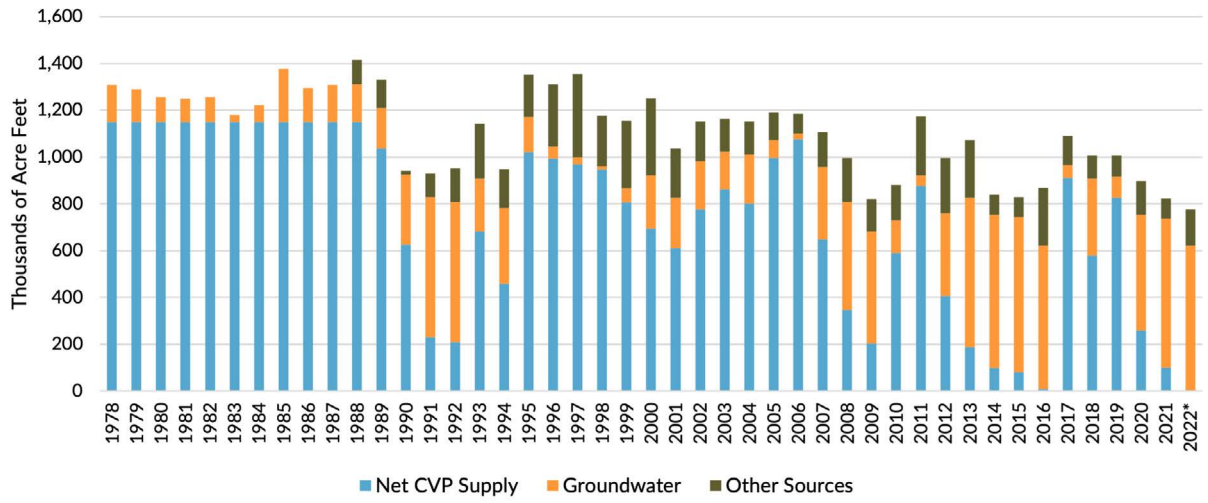
To stop further land subsidence and prevent future groundwater overdraft, California enacted the Sustainable Groundwater Management Act (SGMA) in 2014. However, SGMA only limits groundwater pumping; it does not provide a means to restore the infrastructure impaired by subsidence, nor does it generate necessary alternative water supplies.

With inadequate and aging infrastructure, lower SWP and CVP surface-water allocations, new restrictions on

groundwater pumping, and more frequent and severe hydrologic extremes, California now faces a situation like the one in 1957. This untenable reality is most troubling in the San Joaquin Valley, which experiences many of the state's greatest water infrastructure challenges. Much of the San Joaquin Valley now lacks reliable and sustainable water sources to support its communities—some of the state's most disadvantaged—and its prime farmland, some of the most productive in the world. The Westlands Water District—located in the San Joaquin Valley and serving farms and rural communities in Fresno and Kings counties—provides a case-in-point, as shown in **Figure 1**.

Over the last four decades, the water supply available to farmers in the district has shown an almost continuous decline. Climate change has reduced snowpack, altered temperatures, and increased the frequency and severity of drought and other hydrologic extremes. Regulations have diminished the amount of water that can be transported to central and southern California. Insufficient and aging infrastructure has been unable to capture, store, or transfer sufficient water supplies. While farmers initially compensated for inadequate surface water with increased groundwater pumping, SGMA and the district's Groundwater Sustainability Plan have significantly reduced the amount of groundwater pumped in the district.

Figure 1: Westlands Water District Historical Water Supply



Note: Net CVP Supply equals contract allocation from the current year adjusted for carryover water and rescheduled losses. For 1978–1987, data on Other Sources were unavailable, and Net CVP Supply is estimated based on the 100 percent CVP allocation received in those years.

**Preliminary*

Source: Milken Institute (2022), using data from Westlands Water District, California Department of Water Resources, US Bureau of Reclamation

The farmland that the Westlands Water District serves is a critical economic driver for the region, state, and nation. Agricultural activities in Westlands generate more than $4.7 billion in economic activity and support more than 35,000 jobs in the region annually. Despite having a relatively small scale of arable land, farms served by the Westlands Water District contribute 3.5 percent of the nation's total fruit and nut production and 5.4 percent of the nation's total vegetable and melon production.[11] However, with

unpredictable and often inadequate surface-water allocations and restricted groundwater use, water shortages will significantly impact the district's and the region's agricultural production, destabilizing local jobs and economies. When Westlands and other water districts receive a low or zero percentage of their Project allocations, they cannot contribute as much to the national output of fruits, nuts, and vegetables, which threatens the security and quality of the nation's food supply.[12]

Across California, the impacts of the 2021 drought and the inability of the state's infrastructure to adapt to changing needs (e.g., inability to store water in wet periods against use in dry periods) have already resulted in severe effects that ripple throughout the state. Water reduction caused by the current drought resulted in nearly 400,000 additional acres of cropland idled in 2021—in addition to land already taken out of production because of reduced water supplies. Of this amount, nearly 60 percent was land that produced field and grain crops. This idled land amounted to an estimated loss of $1.2 billion in economic output and 9,000 agricultural jobs.

When multiplier impacts on other sectors down the agriculture industry's supply chain and household spending are included, economic losses totaled $1.7 billion and nearly 15,000 jobs[13]—and these impacts are expected to double in 2022.[14] During a time when pent-up demand and global conflict have resulted in food shortages and inflated costs, preserving as much irrigated land as possible to maintain food security and affordability is critical.

The impacts of climate change will only grow, increasing the frequency and severity of droughts that will continue to impact the most vulnerable and underserved communities disproportionately. Building a sustainable and equitable economy and maintaining California's position as the nation's food supplier and economic powerhouse will require streamlining of water-infrastructure investments. Prioritizing storage and conveyance projects to capture and store water in wet periods, so that it can be used in dry periods, will be necessary for sustainability. While new funding sources like the California Comeback Plan—which invests $5.1 billion for water infrastructure and drought response over four years—and the Infrastructure Investment and Jobs Act—which will allocate $3.5 billion to California water system improvements—are becoming available, it will be critical to prioritize certain types of projects and overcome existing policy barriers to ensure that funds are allocated and that plans are implemented and result in completed projects that are finished promptly.[15]

POLICY BARRIERS TO WATER INFRASTRUCTURE DEVELOPMENT IN CALIFORNIA

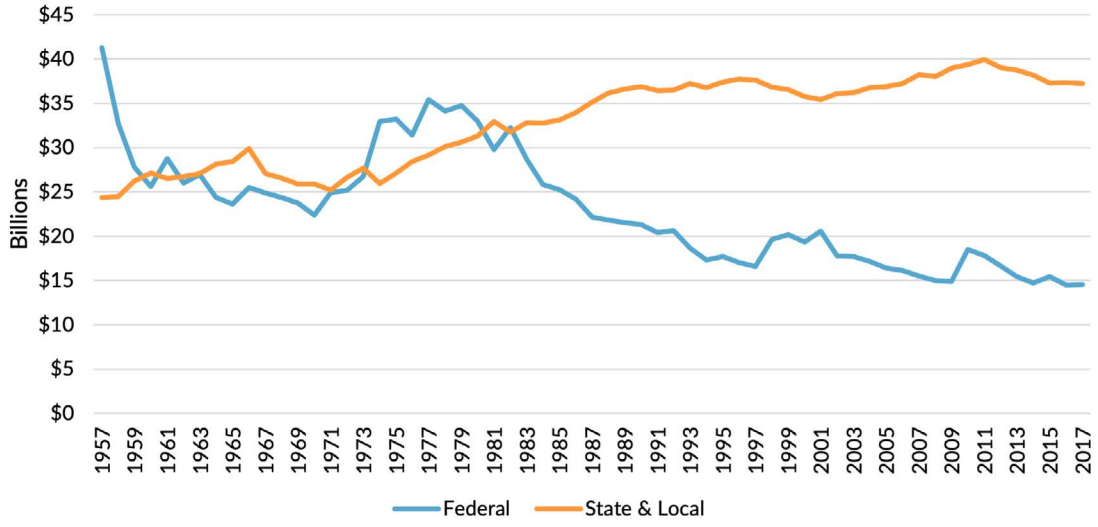
California's water system is managed by a complicated network of federal, state, and local agencies. Water infrastructure development in California faces myriad policy barriers that challenge stable funding streams and cohesive governance. At the same time, maintaining water affordability for households, farms, and businesses, and determining who pays for water, are growing concerns as infrastructure costs rise. The following are critical federal, state, and local policy barriers hindering California's water infrastructure development.

FEDERAL BARRIERS

FEDERAL POLICY BARRIER 1:
Inconsistent Funding and Financing Indicate Water Infrastructure Development Is Not a Priority on Capitol Hill

The federal government invests in water infrastructure through various financing mechanisms, including tax-exempt bonds, state revolving funds, direct federal credit programs, and grants. But federal spending on water infrastructure has declined notably since the late 1970s, leaving state and local governments primarily responsible for funding water infrastructure operation, maintenance, and developments, as shown in Figure 2.

Figure 2: US Water Infrastructure Funding by Source



Source: Milken Institute (2022), using data from Congressional Budget Office (2017)

In November 2021, the Biden administration passed the $1.2 trillion Infrastructure Investment and Jobs Act (IIJA), which provides a little more than $55 billion in new funding for water infrastructure across the United States. Most of this amount—$43.4 billion—will be directed toward state revolving funds addressing clean water and drinking water, and $5.5 billion will go toward implementing the Safe Drinking Water Act. Another $3.0 billion is allocated to address sewer overflow, stormwater control, water-infrastructure resiliency and technology programs, and lead reduction.[16] About $8.3 billion is provided to the Bureau of Reclamation—the entity that operates the Central Valley Project—for Western Water Infrastructure, including $3.2 billion for aging infrastructure and $1.5 billion for storage projects.[17]

Although the IIJA is a historic contribution to water infrastructure, relatively little attention is paid to storage and conveyance projects, which are essential to the long-term availability of water supply. At the same time, most funding provided in the IIJA must be reimbursed—meaning states or local entities must repay funds, so they end up paying the entire project cost. This financing mechanism works well for some projects, but for larger projects that benefit a wide population and are far more expensive, reimbursing large portions of project costs is financially unfeasible, especially for local entities in rural communities.

Further, the IIJA's water infrastructure investments pale compared to its investments in the transportation sector, which received nearly $600 billion in allocations. Water infrastructure is often overshadowed by transportation. Whereas transportation infrastructure deficiencies (e.g., potholes in roads, traffic congestion) are immediately noticed and more homogeneous throughout the United States, water infrastructure deficiencies (e.g., higher food and production costs) may not be immediately apparent, and different regions face different types and severities of water challenges. Even in California, where water supply challenges are severe, the state's investment in the water sector is not nearly as high as for the transportation sector. With decades of underinvestment in water infrastructure, communities are beginning to experience the consequences.

FEDERAL POLICY BARRIER 2:
Cost Burden Falls on Direct Users to Pay for Central Valley Project Infrastructure Improvements as the Public Benefit Is Not Clearly Defined and Most Federal Funding Must Be Reimbursed

The Central Valley Project (CVP), operated by the Bureau of Reclamation, is the largest water-supply project in the country, providing water to 2.5 million Californians and 3 million acres of farmland.[18] CVP water users must cover most of the costs of maintaining the facilities and any needed infrastructure improvements. In addition, the federal government financed most initial construction costs of CVP projects, which users must repay. For instance, farmers in the Westlands Water District have until 2030 to repay nearly $500 million for water projects built in the 1960s; it took almost 50 years to repay just 15 percent of this debt.[19]

This financial responsibility for agricultural water users is overly burdensome and becoming more cost prohibitive. While urban water agencies can distribute costs across millions of households, agricultural water agencies can do so only among hundreds of farmers. Further, these farmers are unable to pass their costs on to the end user because the agricultural market does not adjust prices to compensate farmers for high water costs (or for farmers paying fair wages, using safe labor practices, or any other improvements). The market is often set by the price of food from unregulated farms abroad that have lower standards for labor, health, and safety. Ultimately, despite the countless beneficiaries and benefits provided by their farms—including jobs, food security, and food affordability—American farmers can no longer afford to bear the disproportionate responsibility for needed maintenance and improvements to critical water infrastructure.

Identification of the beneficiaries of infrastructure improvements influences funding allocations and decisions. Often, the working understanding is that the entity that receives the water is the one that benefits from it. For example, a farmer who uses water supply to grow crops is the direct beneficiary. But this does not take account of the broader ripple effects, in which other entities also benefit from investments in critical water infrastructure and the state's agricultural industry. By placing the burden solely on farmers, the current method by which beneficiaries are determined and charged does not accurately represent a public benefit. For instance, improved storage or conveyance capacity in the San Joaquin Valley allows for a more reliable and, in some cases, increased water supply for the region, which leads to numerous public benefits not traditionally considered under the

current definition. Improved facilities lead to more water supply, reliable and affordable agriculture (especially critical for food assistance programs like CalFresh), community growth, and upward economic and social mobility across the state.

California's San Joaquin Valley feeds the nation and provides food security that is often taken for granted. The concept needs a better way to capture the tangible and inevitable benefits that accrue to the public from these projects (e.g., increased supply or restored water reliability resulting from new or improved facilities). The definition of public benefits should expand to include benefits such as having a reliable and affordable food source and domestic security, labor and jobs benefits, dust control, and prevention of desertification. With proper identification of public benefits, the state and federal governments can provide additional grants or other nonreimbursable funding sources for critical water facilities.

FEDERAL POLICY BARRIER 3:
Eligibility and Creditworthiness Requirements Inhibit Access to Federal Funds

Beyond the funding challenges, many water users also face financing challenges. Projects looking to access loans from federal programs must be creditworthy, which can exclude the entities and communities that need financial support the most, especially rural and low-income communities. Access is also challenging for smaller communities that lack the technical and management resources to apply for loans and other programs, regardless of their creditworthiness.

The Water Infrastructure Finance and Innovation Act (WIFIA) of 2014 is a federal loan and guarantee program administered by the Environmental Protection Agency (EPA). WIFIA provides low-cost, long-term supplemental credit assistance for critical water-infrastructure projects. WIFIA loans support a range of projects and various stages of development, from preliminary engineering and environmental reviews to land acquisition and construction.[20] For some, WIFIA provides a convenient source of financing for water infrastructure projects; in 2021, the program provided more than $5 billion in water-infrastructure funding to support almost $12 billion in projects. However, a key eligibility requirement for WIFIA funding is that projects must be creditworthy.

Additionally, federally owned projects are not eligible for WIFIA financing.[21] This means that infrastructure developments made through the CVP, which the Bureau of Reclamation owns, cannot receive WIFIA loans, which offer lower interest rates than other programs. Not all CVP storage and conveyance facilities are operated by the Bureau of Reclamation. Several irrigation districts operate their own distribution systems, which are part of the CVP, including the Westlands Water District, the Contra Costa Water District, the Madera Irrigation District, the El Dorado Irrigation District, and the State of California Department of Water Resources and Parks and Recreation.[22] These nonfederal entities cannot access WIFIA financing for needed CVP infrastructure improvements that would benefit millions of people and acres of farmland. In 2020, Congressman John Garamendi of California's 3rd District introduced the WIFIA Improvement Act to Congress, allowing public water projects to be eligible for WIFIA financing, specifically those with longer useful life cycles.[23] At the time of this writing, no further actions on the bill have been taken.

STATE BARRIERS

STATE POLICY BARRIER 1:
The State Lacks a Predictable and Long-Term Source of Water-System Funding

State-level financing for water infrastructure is primarily generated through taxes (e.g., state general fund revenues), fees, and debt (e.g., government-issued bonds and federal loans). But many of these funding sources do not offer long-term support, are generally unpredictable, and must be reimbursed. Further, it often takes years for allocated funds to be implemented and projects to break ground, especially for debt-financing projects.

Using general fund dollars means that water-infrastructure projects must compete with other programs for budget dollars each year, which is even more competitive during economic downturns when tax revenue tends to decline. Similarly, state general-obligation (GO) bonds, which are reimbursed with general fund tax revenue, have been critical in water-infrastructure financing but do not offer long-term support. Proposition 1, approved in 2014, is a $7.5 billion bond measure to fund water quality, supply, and infrastructure improvements.[24] The most recent water bond, Proposition 68, which passed in 2018, allocates $4.1 billion for projects focused on recreation and habitat restoration. However, funds from these bonds are only a one-time source and are running out: 80 percent has already been assigned to projects, although much of this has not yet been spent. Of the total $11.6 billion allocated by Propositions 1 and 68, only half of that amount had already been spent as of May 2021.[25] Such delays only serve to increase the costs of such projects.

Although water bonds are not a recurring source of funding, they are a significant source of funding for the State Water Project (SWP), accounting for 82 percent of SWP financing, which the project's 29 contractors repay instead of general taxpayers.[26] The SWP delivers water to more than 25 million Californians and 750,000 acres of irrigated cropland,[27] but if reduced or no water is delivered because of low supply, contractors still need to pay for their share of SWP delivery. In 2020, the Metropolitan Water District received 20 percent of its water allocation and paid $654 million; in 2021, it received only 5 percent of what had been promised but still paid the same amount.[28]

California lacks predictable long-term sources of funding for the state's water system. A broader, more consistent funding mix is required to pay for needed infrastructure investments. Because infrastructure projects are costly and risky, there is difficulty in incentivizing the private sector, a key funding source, to engage in water infrastructure development.

STATE POLICY BARRIER 2:
State Policy Can Further Delay Projects, Which Makes Investments Risky and Uncertain

Water-infrastructure projects carry significant risks and uncertainty. Infrastructure projects often face cost overruns, delays in construction, and prolonged procurements due to time delays and canceled contracts. Water infrastructure is also highly vulnerable to uncertainty surrounding climate-related changes, such as future precipitation levels and aridity.

High predevelopment and planning costs—which include activities such as engineering and architectural work, market assessments, land or property acquisition, and acquisition of permits—contribute to this uncertainty. Predevelopment activities greatly influence which projects move forward and get built.[29] Typically, private investors do not expect to allocate capital to predevelopment activities, which are expected to be paid by the public sector or through philanthropy.[30]

Environmental laws, such as the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), are among the main sources of delays in project development. Signed into law in 1970, CEQA imposes mandatory environmental standards that supplement the federal-level NEPA with stricter state guidelines. CEQA greatly limits the capacity to develop projects quickly; the law requires public agencies to evaluate and minimize potential environmental impacts of development and land use-related projects. Large-scale projects typically require lengthy analysis and documentation in the form of environmental impact reports. Local governments release these reports for public review and comment, at which point anyone with an opinion—environmental or otherwise—can block or delay a project with legal challenges.[31] About 49 percent of all CEQA lawsuits target taxpayer-funded projects with no private-sector sponsors.[32]

Permit acquisition and compliance with environmental laws have caused major delays for water-storage projects in California. Proposition 1, the 2014 California water bond discussed in the section above, allocated $2.7 billion for new water storage infrastructure. Unfortunately, as of May 2021, only $150 million of that $2.7 billion had been spent.[33] Environmental compliance is the primary reason for the delay in the allocation of this money. Prior to receiving its share of the Proposition 1 funding, a project is required to submit all completed environmental documents, permits, non-public benefit cost-share contracts, and contracts with state agencies for the administration of public benefits.[34]

A project's success depends on meeting cost estimates and receiving partner funding commitments in a consistent and timely manner. For large-scale projects, certainty and timing are critical factors, especially when private investors are involved. Unfortunately for water-storage infrastructure in California, the current cumbersome environmental permitting process requires at least seven years and even more if a lawsuit is filed.[35] In addition, for many projects, an environmental review can become outdated if completed a couple of years before the permit issuance.[36]

The delays, litigation costs, and overall uncertainty associated with environmental compliance in California often create insurmountable hurdles for the public agencies supporting these projects. If the potential costs associated with the uncertainty of the environmental review, loan terms, timing, and overall approval processes outweigh the benefit of these programs, the private sector may look elsewhere to dedicate its resources.

STATE POLICY BARRIER 3:
Lack of Prioritization for Storage and Conveyance Projects

When it comes to funding for the water sector, the state invests most heavily in clean water and drinking water improvements, environmental and habitat preservation, and water conservation. As at the federal level, the state pays relatively modest attention to storage projects, such as groundwater recharge, surface water storage development (e.g., reservoirs), and canals. Of the proposed $750 million general-fund dollars allocated to Governor Gavin Newsom's 2022-23 drought response, only $150 million is directed toward water storage and reliability, and, of that amount, just $30 million is dedicated to groundwater recharge projects.[37]

The California Comeback Plan 2022, which provides $5.1 billion out of $100 billion for water infrastructure and drought response, allocates $200 million for water-conveyance improvements, whereas $1.3 billion was allocated towards drinking water and wastewater infrastructure.[38]

Similarly, most of the state's $27 billion allocation from water bonds has gone toward environmental protection.[39] Even Proposition 1 (2014), where water storage was the single largest spending category and received $2.7 billion out of $7.5 billion in total funding, has barely implemented funding toward storage projects; only $172 million had been spent on storage projects as of May 2021.[40] As mentioned, bond issuances are especially critical for the State Water Project, accounting for more than 80 percent of SWP financing. With more than 25 million Californians receiving water from the SWP, it is crucial to provide resources that will address infrastructure deficiencies and support needed improvements for these systems.

Although the state has undoubtedly made growing investments in these areas, there is still a gap, and investments need to be accelerated so that projects can become operational as soon as possible. With extreme weather becoming more common due to climate change, increasing the state's water storage will be critical for flood control and capturing excess water during wet periods so that it can be stored for distribution during dry periods. Increasing long-term water supply cannot happen without significant statewide storage and conveyance developments.[41]

STATE POLICY BARRIER 4:
Lack of Coordination and State and Regional Silos Inhibit Water Infrastructure Development

California's water system lacks a centralized framework to prioritize and coordinate projects. Infrastructure programs developed decades ago are siloed from their government agencies. Local agencies often need to approach multiple regional and state government offices for infrastructure funding and guidance. Local agencies may also lack the technical assistance and capacity to build large infrastructure projects or packages (e.g., applying for state and federal grants, or engaging in public-private partnerships), which can prevent or delay project readiness and increase costs.

Rural communities often face duplicative application processes when applying to federal or state programs—an inefficiency that increases both costs and delays. For instance, increasing preliminary engineering work could cost anywhere from $5,000 to $50,000, and an additional environmental analysis could cost up to $15,000.[42]

Lack of coordination on regulatory and environmental permitting, including how laws will be implemented, has contributed to the uncertainty around water-infrastructure development, extending the time it takes to complete projects. Coordination across multiple projects and collaboration among permitting agencies will be needed to shorten permitting times and lower costs. Greater coordination across regions would also help maximize benefits and reduce costs by allowing regions to bundle projects that are likely to benefit a wide population.[43]

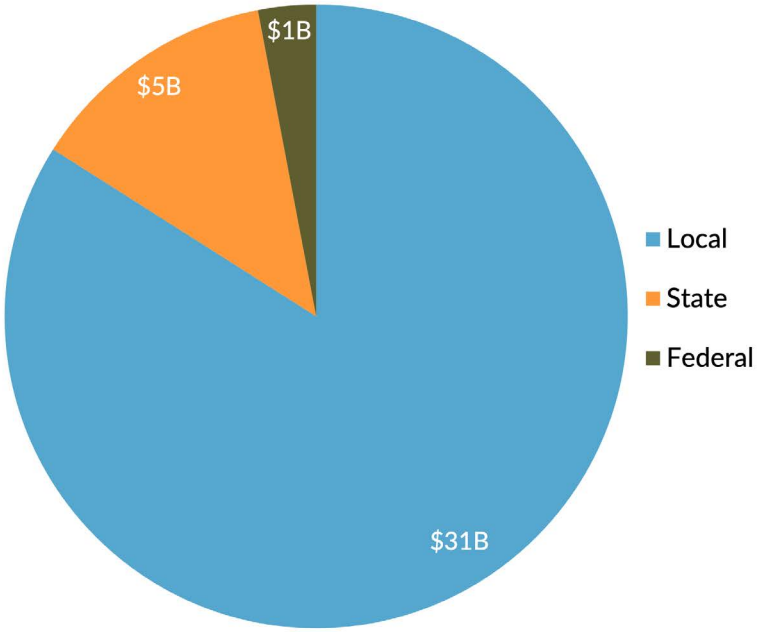
There is potential for state and federal governments to play a role in prioritizing projects, facilitating access to capital, and helping to create financial and political leverage. States can also help strengthen local technical capacity, push policy outcomes, and coordinate funding.

LOCAL BARRIERS

LOCAL POLICY BARRIER 1:
Local Agencies Maintain Infrastructure without Long-Term Resources and Must Navigate Burdensome State Policy

The brunt of California's water-infrastructure spending falls mainly on local entities. California spends about $37 billion on its water system annually, of which 84 percent comes from local agencies—primarily in the form of local water bills and taxes—as shown in **Figure 3**.[44] Further, most state and federal funds require a cost share from local agencies.

Figure 3: California Annual Water System Spending (2016–2018)



Source: Milken Institute (2022), using data from Public Policy Institute of California

With declining federal investment and state revenues, local governments and agencies have had either to find alternative sources or allow water infrastructure to degrade. Alternative funding sources include local general taxes, public-private partnerships, dedicated user fees or taxes, or some combination of those sources.[45] In Los Angeles County, voters approved Measure W, a parcel tax of 2.5 cents per square foot of impermeable area to raise revenue for projects, infrastructure, and programs to capture, treat, and recycle rainwater. The measure will raise $300 million annually for these programs. Forty percent of the funds raised flows directly to municipalities for funding local stormwater programs, and 50 percent of revenues is used to fund projects at the watershed level.[46]

However, these alternative funding sources can be hard to implement because of certain legislative and regulatory hurdles, and smaller populations in agricultural and rural districts make generating new funding through taxes and fees more limited. For example, Proposition 218 (1996) and Proposition 26 (2010) made it harder for local agencies to raise funding for water infrastructure by imposing strict cost-recovery requirements whereby water rates cannot exceed the cost of service; this affects localities' ability to charge rates that promote water conservation. Proposition 218 also imposed stricter voting requirements for stormwater and flood management. Supermajority approval by two-thirds of voters is necessary for local taxes and bonds that provide broad benefits.[47] Rural regions face the additional challenge of not having the underlying tax base to generate the revenue needed to fund infrastructure improvements through such taxes and fees.

LOCAL POLICY BARRIER 2:
Rural Communities Lack Resources and Access to Develop Alternative Water Supplies

The availability of, and feasibility for, water agencies to diversify water supplies vary by regional characteristics. First, the geographic location of an agency fundamentally changes the availability or existence of alternative supplies. Agencies on the coast naturally have different opportunities to use sources like desalinization than regions sandwiched between mountain ranges.

Additionally, the density of a region influences the feasibility of diversifying the water supply. Metropolitan agencies will naturally have access to more financial resources than rural or agricultural agencies and will have a greater ability to leverage a large rate base to fund needed water-infrastructure projects. For instance, San Diego has successfully invested in and built a diverse water portfolio by relying on rate increases and engaging private capital. As a result, the region has some of the most expensive water bills in the state. For agricultural areas, the high cost required for creating a diversified water portfolio would be spread among a handful of water users rather than the millions of households that shared the cost of funding San Diego's water portfolio, which also tend to be wealthier. Smaller cities and rural communities would not be able to shoulder such price increases and often struggle to meet the financial burden of existing water bills.

Finally, the end-user of the water also changes an agency's ability to diversify water supplies. Agricultural agencies have the added complication of being more constrained in passing higher water rates on to end-users—the people who purchase and consume the agricultural products. The global market establishes commodity prices, and California farmers compete for market share with farmers from all over the world who may not be restricted by the same high environmental, safety, and labor standards. These differences—geography, density, and end-use—are critical when regional water funding challenges are considered.

LOCAL POLICY BARRIER 3:
Water Supply Uncertainty Disincentivizes Investments

The lack of federal and state coordination on prioritizing water-infrastructure projects, coupled with regulatory uncertainty and climate change, have resulted in an unstable and unpredictable water supply for much of California. Adding to this already precarious situation is the implementation of the Sustainable Groundwater Management Act (SGMA). Designed to bring local groundwater basins into balance by 2042,

SGMA requires local agencies to form Government Sustainability Agencies (GSAs) to develop plans to eliminate overdraft within 20 years. Historically, water users have relied on groundwater to shore up the water supply when surface supplies are unavailable or inadequate. Implementation of SGMA will reduce the amount of groundwater available to users throughout California and necessitate investment in water infrastructure and technology. Water agencies and GSAs will also need to build recharge and storage facilities to address the additional supply shortfall. Even with these investments, at least 500,000 acres of farmland are likely to be left fallow by 2040 to meet SGMA goals.[48]

At this early stage of SGMA implementation and with volatile surface-water supplies, farmers and cities alike are reluctant to invest in this additional water infrastructure and technology, and wonder whether it is worth the cost. Further, many financial lending institutions have expressed concerns over the reliability of supply as well as future uncertainties surrounding these investments. While local agencies play a central role in attaining groundwater sustainability, the state must work to stabilize and protect water supplies by providing the necessary funding for crucial infrastructure, streamlining permitting requirements, offering grants and financial assistance for land-fallowing programs, and pursuing other means to incentivize and enable drought resilience throughout the state.

ACCELERATING A REGIONAL INVESTMENT ROADMAP: GOVERNANCE AND FINANCING SOLUTIONS

California's standing as a leading global economy was shaped by fundamental infrastructure investments that transformed its landscape and established the promise of the California dream for millions of people. In the case of water, this reality was also shaped by political leadership that resulted in the establishment of the CVP and, later, the SWP. As we grapple with a future beyond the current drought and the associated impacts of climate change and the state's aging water-delivery infrastructure—which has seen little in terms of capital improvements or capacity-building efforts over the last 30 years—Californians must yet again muster the political leadership and funding capacity necessary to address this global challenge with regionally informed and impactful solutions.

This may seem a daunting task, and although government funding alone is unlikely to be sufficient to meet the total water infrastructure need, it is a necessary catalyst to mitigate risk and prioritize regional needs. The focus for state and regional leaders should (1) be centered on collaboration, especially for large and expensive projects, while identifying core revenue streams such as the mechanisms described throughout this section, which can ultimately provide sufficiently bankable and reliable sources to serve as repayment for financing; (2) acknowledge that this dynamic requires a change in the paradigm of governance surrounding who is paying and filling in gaps in capital, which will require nimble solutions that can enhance the portfolio and accessibility of financing tools; and (3) understand what *could* be funded and financed from the current core beneficiaries, what the remaining gap is, and who can fill that gap (e.g., state, federal, or private capital). Building toward this dynamic will allow and empower regional partners to approach the state (or any other beneficiaries) with this high-level proposition and a feasible funding and financing plan that includes a clear ask for the amount that needs to be funded.

Establish a Centralized Agricultural Water Infrastructure Center for Excellence

California's water-system management, especially in rural and agricultural communities, lacks coordination in prioritizing water projects and adapting to changing climate conditions. The state must prioritize water-system delivery upgrades and improvements, and use cost-effective funding to deliver projects on the ground as soon as possible. The state must collaborate more often and effectively with the federal government, water purveyors, and municipalities to determine the most-needed projects, such as restoring or building large conveyance facilities or surface storage projects.[49] Establishing an Agricultural Water Infrastructure Center for Excellence could convene local, state, and federal entities to identify which projects need to be prioritized and have limited alternative funding sources. Once projects are prioritized, the center could work on identifying and providing detailed action plans to facilitate access to grants and funding, and ensure that the state and federal shares of projects are covered so that the financial burden is shared appropriately.

The Agricultural Water Infrastructure Center for Excellence would be especially critical to larger, more expensive projects (where costs can be billions of dollars) that support a wide population—as the CVP and SWP do—to identify and facilitate applications for programs such as competitive grants. Funding for water infrastructure primarily comes in the form of loans—meaning entities cover 100 percent of the project costs, which many local agencies cannot afford. Increasing access to grants, where local entities do not need to repay a cost share, is pivotal to developing larger statewide projects that are otherwise financially unfeasible.

Further, the establishment of an Agricultural Water Infrastructure Center for Excellence would allow for an inventory of public assets and strategic development alignment with planned projects, as well as the land available to coordinate, streamline, and accelerate regional water-infrastructure development needs (e.g., water storage, conveyance, business formation, renewable energy generation, desalination, and broadband). The Agricultural Water Infrastructure Center for Excellence could support demonstration of project readiness, identification of climate-resilient impact, and determination of funding needs—all crucial steps in reducing barriers to state and federal grants.

The state could also look to harness a portion of the budget surplus (or Inflation Reduction Act, or unspent American Rescue Plan Act dollars) for the creation of an infrastructure predevelopment fund to prioritize critical water-infrastructure development, facilitated by the newly established Agricultural Water Infrastructure Center for Excellence. However, access to predevelopment capital funds would require a commitment to resiliency, performance standards, a plan to address life-cycle costs, and improving access for underserved and rural communities. State requirements should also include sufficient data-tracking and accountability frameworks. This fund would help spur the infrastructure developments and enhancements needed to revitalize communities through enhanced storage and conveyance, and support business growth.

Create New Credit-Enhancement Tools and Adjust or Expand Existing Programs to Increase Project Funding

Direct grant funding is not the only way state or governmental entities may be able to support projects; zero-interest loans or credit-enhancement tools can also enhance project affordability and bankability, especially for smaller projects. To attract more private capital, the state and federal governments could expand their array of existing credit-enhancement tools and prioritize eligible

Actions for a Regional Governance Coordination Framework

Establish an Agricultural Water Infrastructure Center for Excellence at the Department of Water Resources to coordinate the following action items:

- Identify sources of funding (e.g., local, state, or federal) and financing mechanisms (e.g., loans or grants) for critical water-infrastructure projects
- Create a new land trust, like a real estate investment trust (REIT) and/or enhanced infrastructure financing districts (EIFD) that provide financial services to agricultural communities for water infrastructure
    - Identify value capture tied to agricultural land (e.g., renewable energy). This development strategy allows communities to adapt fallow or underutilized land (e.g., installing solar farms) to maximize limited federal and state funding capacity through generating sustainable revenues for infrastructure development.
- Provide project bundling to help secure financing from the private sector and focus on climate resilience
    - Long-term institutional investors and private investors are not attracted to small projects. The state should bundle small projects of similar scale into larger packages by infrastructure type or region. Bundling allows for cost savings on design and construction costs and unlocks institutional capital by creating projects of an investable size.
- Provide technical assistance (TA) or partner with existing TA agencies (e.g., Water Efficiency Technical Assistance Program, California Rural Water Association) and facilitate access to low-cost financing or grants
    - Integrate existing state support and technical assistance programs among the SWP and CVP to better coordinate regional needs.
    - Increase access to funding and financing for under-resourced communities by improving the efficiency of the application process.
- Market to define the public benefit of agriculture more broadly, to join forces with other regions/entities and integrate infrastructure management (inland/coastal, upstream investments)
    - Identify larger-scale impact to increase financial assistance from state and federal programs (e.g., competitive grants).

projects. Funding and policy support for water have traditionally been siloed by region or use throughout the state, with governance further disconnected from water users in urban and agricultural communities. At the same time, the state lacks a cohesive solution that mitigates these competing interests and uses.

The state should consider a state general obligation bond to fund a Regional Agriculture State Revolving Fund (SRF) that could support ongoing water projects and the state's leading global agriculture production centers. Currently, there are two water-related SRFs: one for projects relating to clean water and the other to drinking water. The Regional Agriculture SRF could be structured similarly and be used to fund the local portion of larger storage and conveyance projects or smaller regional projects, as outlined below.

An option for the federal government is to reconsider the eligibility of federally owned projects for accessing WIFIA loans. Currently, because the CVP is owned by the Bureau of Reclamation, CVP projects cannot apply for WIFIA financing, which generally offers lower-cost loans than other programs. Removing this barrier and allowing local entities that manage regional CVP infrastructure projects to access WIFIA loans would facilitate the development of more projects.

In 2021, North Dakota's Fargo-Moorhead Regional Flood Protection project, operated by the US Army Corps of Engineers, became the first project owned by the Army Corps (a federal entity) to use a public-private partnership (P3) engagement and received nearly $570 million in WIFIA financing. The project's P3 model is estimated to save the project $330 million and 10 years in development.[50] The project was selected as one of 38 new water-infrastructure projects the EPA invited to receive WIFIA financing through a competitive process.[51] This financing should become available to more projects that otherwise face barriers to accessing—such as projects within the Bureau of Reclamation—with the proposed Agricultural Water Infrastructure Center for Excellence facilitating this process.

The Army Corps of Engineers also has a program, the Nonfederal Implementation Pilot Program (Section 1043) of the Water Resources Reform and Development Act (2020), that allows for nonfederal construction of federal projects. External agencies (e.g., local public agencies or a third party) have access to a share of federal funds to develop projects entirely on their own.[52] Eliminating federal involvement in the execution of a project reduces many of the stop-and-start issues associated with grant funding, such as the extra permitting needed to receive federal funds before the development of a project—an issue highlighted previously with regard to the slow turnaround of appropriated Proposition 1 funding. Projects that have used this program have streamlined project delivery and reduced costs.[53] The Bureau of Reclamation should harness a similar program to allow regional leaders to build out a further portfolio of projects (e.g., conveyance and storage) that qualify for this program.

The Agriculture State Revolving Funds (SRF) and other funding programs can further streamline resilient infrastructure projects by allowing for expedited environmental review of eligible projects that prioritize climate resilience. As noted earlier, environmental review processes are one of the significant sources of delays in infrastructure project development. Expediting environmental reviews would reduce infrastructure costs, shorten project delivery timelines, and provide greater certainty. This is already being done for certain projects in California, including those related to housing (homeless shelters and permanent supportive housing in Los Angeles are exempt from CEQA requirements) and specified green transportation projects (certain pedestrian, bicycle, and transit improvements became CEQA exempt under SB 288).[54] For projects to be approved under SB 288, they must be shown not to cause negative environmental impacts.[55]

But certain projects that may have environmental effects can also be exempt if the benefits outweigh the negative impacts. In its CEQA Exemptions Topic Paper, the Association of Environmental Professionals relates that activities "that result in significant environmental effects, but for which the Legislature has determined that the benefits of these projects to the state or a particular community outweigh the benefits of complying with CEQA" can be exempt. This measure was implemented to develop infrastructure to support the 1984 Olympic Games in Los Angeles.[56]

Recognizing that water infrastructure development is vital for sustaining the growth of California's communities and the state's position as the nation's leading agricultural producer, for certain water-infrastructure projects, the state should allow exemption from, or expedited, CEQA review to reduce costs and streamline the development of needed projects.

Cultivate a Development and Project Delivery Ecosystem More Welcoming to Public-Private Partnership Opportunities

Once significant barriers and risks are mitigated, more opportunities will emerge to engage the private sector in providing capital for water-infrastructure projects, such as through public-private partnerships (P3s). A P3 is a collaboration between a government agency and a private entity to finance, build, and maintain large projects. The most popular benefits of P3s are transferring risk, fostering innovation, reducing deferred maintenance, and accessing new capital sources to accelerate project delivery.[57]

The California Infrastructure Finance Act (IFA), adopted in 1996, authorizes local government agencies (including cities, counties, joint power authorities, and local infrastructure commissions)

Actions for Enhancing Water Infrastructure Funding Tools

Structuring a new Regional Agriculture State Revolving Fund

- Designed to catalyze irrigation, conveyance, and storage projects in agriculture regions
- Modeled after the Clean Water and Drinking Water SRFs:
    - Environmental Protection Agency funds the Agriculture SRF, and the state provides a 20 percent match
    - The state can take a variety of set-asides, which helps fund state programs and activities (e.g., state program management and technical assistance to small systems). In total, the state may take about 31 percent of their capitalization grant in set-asides
        - After taking its set-asides, the state places the balance of the capitalization grant alongside the state match into a dedicated revolving loan fund.
        - Loan fund provides loans and other authorized assistance to water systems for eligible infrastructure projects.
        - As water systems repay their loans, the repayments and interest flow back into the dedicated revolving fund, which can be used to make additional loans.
    - The state sets up specific loan terms, including interest rates (0 percent to market rate) and repayment periods
        - Extend the repayment period to 50 years for disadvantaged communities. Currently, the Clean Water and Drinking Water SRFs offer up to 30 years of loan terms or 40 years for disadvantaged communities.
    - Eligible projects: projects for publicly or privately owned community water systems and nonprofit or non-community water systems

Work with Congress to amend and expand project eligibility criteria for WIFIA financing

- Currently, projects owned by federal entities, e.g., the CVP and Bureau of Reclamation, cannot receive WIFIA financing

Restructure and expedite environmental review processes for climate-resilient projects

to use private financing as an exclusive or supplemental revenue source for fee-producing infrastructure projects, including those related to water. IFA offers greater flexibility for local agencies to meet their needs with private capital. The statute requires project selection to be based on qualifications, the facility to be operated at fair and reasonable prices to users, and a competitive negotiation process, but otherwise allows local agencies a broad range to use private capital to meet their needs.[58]

Most P3s involve long-term contracts, sometimes covering the life of the project, which provide certainty on schedules, budgets, and long-term asset maintenance. As such, P3 arrangements are structured to ensure stability for both parties. In a typical contract, the private partner gets paid only after these project expectations are met.[59]

Engaging with a private sponsor who provides capital investment is particularly useful when the government agency lacks the financial capacity or technical skills to execute a project effectively, in order to avoid going into public debt. Instead, private debt can provide project funding in exchange for other benefits (e.g., tax breaks). Across infrastructure sectors, studies have found minimal cost or schedule overruns for P3 projects—typically 1 to 3 percent cost overruns on average, compared to 15 percent or more for traditional procurements.[60]

The number of P3 delivery models in the water sector is lower than in other infrastructure classes. Over the range of infrastructure sectors, P3 opportunities are most popular for transportation projects. A survey conducted in partnership between EY and the American Water Works Association asked stakeholders in the water sector (mostly from public and municipal utilities) what they viewed as the main barriers to P3 engagement. Key barriers identified included stakeholder skepticism over costs and benefits of P3s, resistance to ceding technical control over an asset to a third party, absence of internal executive and/or political support, limited understanding of P3 structures, and lack of resources and experience to procure P3 projects.

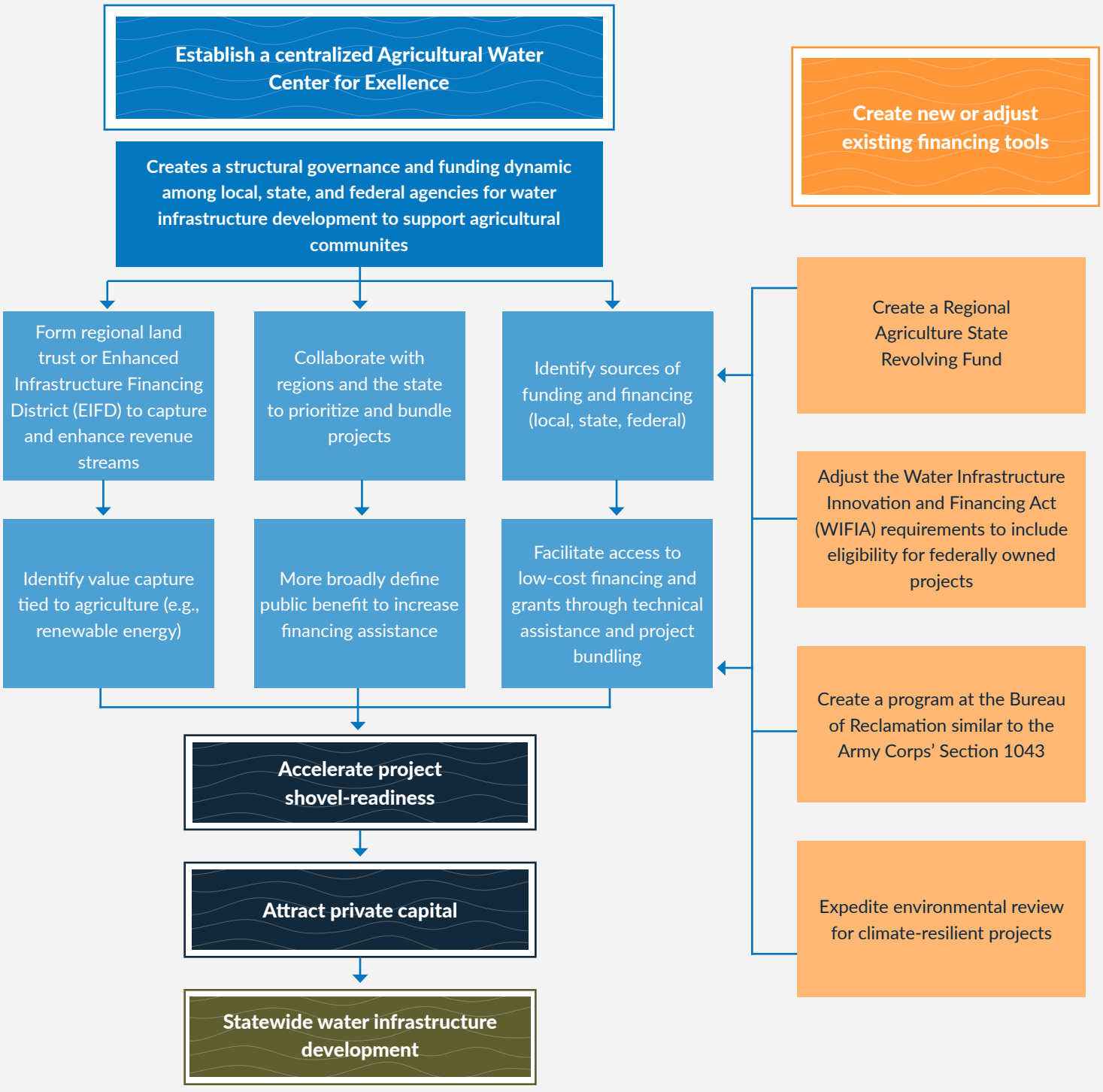
Actions for Increasing P3 Engagement:

- De-risk and provide certainty to water-infrastructure development by coordinating projects through the Agricultural Water Infrastructure Center for Excellence
- Increase public financing mechanisms to appeal to the private sector and identify future revenue streams

For municipal utilities to have confidence in a P3 engagement, key preconditions need to be in place to ensure project success. These preconditions include developing a robust project feasibility analysis, providing clear legislative and regulatory authority, establishing a strong and knowledgeable project team, harnessing organizational and political support, engaging with key stakeholders, and ensuring a robust and transparent competitive procurement process. The implementation of these preconditions determined the success of the Carlsbad Desalination Plant, where Poseidon Water owns and operates the plant and sells desalinated seawater to the San Diego County Water Authority to meet nearly 10 percent of the region's water needs.[61]

The Agricultural Water Infrastructure Center for Excellence would provide a structural funding dynamic to help lower barriers and increase access to public financing that would attract the private sector. Increasing P3 opportunities in the water sector would go a long way to ensure that money was being spent effectively and efficiently on projects, not processes. At the same time, diversifying funding portfolios is critical in generating a sustainable revenue source to fund water-infrastructure projects.

Figure 4: Investment Roadmap for Statewide Water Infrastructure Development



Source: Milken Institute (2022)

CONCLUSION

Beyond the intensifying drought and widening infrastructure inefficiencies, there are billions of dollars' worth of unmet operation and maintenance costs and system improvements currently to be found in the SWP and CVP, and throughout California. Accelerating water resilience throughout the state will require the state to gather better information regarding gaps in local water infrastructure project funding, operations and maintenance, and delivery systems. Additionally, the state will need to work with regions to facilitate the coordination, governance, and capacity-building capabilities necessary to harness innovative financing mechanisms that enhance economic growth and improve the quality of life for the residents in urban, rural, and agricultural communities.

Adequate and resilient infrastructure is needed to support people, communities, and a thriving economy. California is the world's fifth largest economy. Although its population declined in 2020 for the first time in history, the state expects the population to grow by another 11 percent over the next 30 years. The nation's most populous and biggest agricultural state needs resilient infrastructure that can withstand inevitable impacts from climate change and sustain its economic prosperity not only for its 40 million (and counting) residents, but for the rest of the nation that depends on California's agricultural output.

ENDNOTES

1. Laura Anaya-Morga, "California Records Driest Year in a Century," *Los Angeles Times*, October 18, 2021, https://www.latimes.com/california/story/2021-10-18/california-records-driest-year-in-a-century; "US Drought Monitor," National Drought Mitigation Center, University of Nebraska-Lincoln, accessed September 20, 2022, https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?CA.
2. "State Water Project," California Department of Water Resources, accessed September 20, 2022, https://water.ca.gov/Programs/State-Water-Project; "Central Valley Project," Valley Water, accessed September 20, 2022, https://www.valleywater.org/your-water/where-your-water-comes/imported-water/central-valley-project#:~:text=The%20CVP%20provides%20water%20for,3%20million%20acres%20of%20farmland.
3. "California Agricultural Production Statistics," California Department of Food and Agriculture, accessed September 20, 2022, https://www.cdfa.ca.gov/Statistics/#:~:text=In%202020%20California's%20farms%20and,of%202.8%20percent%20from%202019.
4. Laura Anaya-Morga, "California Records Driest Year in a Century."
5. "US Drought Monitor," National Drought Mitigation Center, University of Nebraska-Lincoln.
6. "Drinking Water Infrastructure Needs Survey and Assessment" (Environmental Protection Agency, March 2018), https://www.epa.gov/sites/default/files/2018-10/documents/corrected_sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf; Adjusted to 2022 dollars using the Bureau of Labor Statistics CPI Inflation calculator.
7. "The California Water System," California Department of Water Resources, accessed September 20, 2022, https://water.ca.gov/water-basics/the-california-water-system.
8. "State Water Project," California Department of Water Resources; "Central Valley Project," Valley Water.
9. "California Groundwater Conditions Update—Spring 2020" (California Department of Water Resources, Spring 2020), https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Maps/Groundwater-Level-Change/DOTMAP_Reports/Spring-2020-Groundwater-DOTMAP-Report.pdf.
10. Ellen Hanak, Caitrin Chappelle, and Thomas Harter, "Groundwater in California" (Public Policy Institute of California, May 2017), https://www.ppic.org/publication/groundwater-in-california/#:~:text=Groundwater%20is%20a%20vital%20component,portion%20of%20their%20water%20supply.
11. Michael A. Shires, "The Economic Impact of the Westlands Water District on the Local and Regional Economy: 2022 Update" (Westlands Water District, March 16, 2022), https://r20.rs6.net/tn.jsp?f=0011v9xQyQHeGz6QG-NFxfZEhjQi7Ag29HnwsDTII4bi9GZISdSesPFoYCIPvaJXJfueLhAjCLlx8iEM3BvLT3O_fc3otjdTmICb3FlXZZkgh9UvPygTMuqHDnB9Pgaezo_IpAgVEFL3V_N25GftrXgsVe5pJSEST37rw85daEE1rW57EM2J1kGCiMB-kZxrLMP-29_sbjHmF9rZCGH2O2yE_tRWVGr6r2s6rzpObGXH8k=&c=&ch=.
12. Michael A. Shires, "The Economic Impact of the Westlands Water District on the Local and Regional Economy: 2022 Update."

13. Lorena Anderson, "Last Year's Drought Cost Ag Industry More Than $1 Billion, Thousands of Jobs, New Analysis Shows," *UC Merced Newsroom*, February 24, 2022, https://news.ucmerced.edu/news/2022/last-year%E2%80%99s-drought-cost-ag-industry-more-1-billion-thousands-jobs-new-analysis-shows.

14. Kim Chipman, "California's Idle Crop Land May Double as Water Crisis Deepens," *Bloomberg*, July 15, 2022, https://www.bloomberg.com/news/articles/2022-07-16/california-s-idle-crop-land-may-double-as-water-crisis-deepens.

15. Dan Walters, "California Gets Small Share of Infrastructure Bill," *CalMatters*, November 9, 2021, https://calmatters.org/commentary/2021/11/california-gets-small-share-of-infrastructure-bill/; "Governor Newsom Announces $5.1 Billion Package for Water Infrastructure and Drought Response as Part of $100 Billion California Comeback Plan," Office of Governor Gavin Newsom, May 10, 2021, https://www.gov.ca.gov/2021/05/10/governor-newsom-announces-5-1-billion-package-for-water-infrastructure-and-drought-response-as-part-of-100-billion-california-comeback-plan/.

16. Aaron Bielenberg, Sarah Brody, Rob Dunn, and Adi Kumar, "The US Bipartisan Infrastructure Law: Reinvesting in Water," McKinsey & Company, February 17, 2022, https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-us-bipartisan-infrastructure-law-reinvesting-in-water.

17. Katharhynn Heidelberg, "Hope Seen for Western Water Storage in Infrastructure Bill," *Montrose Press*, November 24, 2021, https://www.montrosepress.com/hope-seen-for-western-water-storage-in-infrastructure-bill/article_f8761786-4cd1-11ec-940b-67f67777ab0a.html.

18. "Central Valley Project," Valley Water, accessed September 20, 2022, https://www.valleywater.org/your-water/where-your-water-comes/imported-water/central-valley-project.

19. "Central Valley Project," Water Education Foundation, accessed September 20, 2022, https://www.watereducation.org/aquapedia/central-valley-project.

20. "EPA WIFIA Annual Report Celebrates Over $5 Billion in Water Infrastructure Loans," United States Environmental Protection Agency, March 24, 2022, https://www.epa.gov/newsreleases/epa-wifia-annual-report-celebrates-over-5-billion-water-infrastructure-loans#:~:text=%E2%80%9CThe%20WIFIA%20program%20has%20been,said%20EPA%20Administrator%20Michael%20S.

21. "Water Infrastructure Finance and Innovation Act Program (WIFIA) Criteria Pursuant to the Further Consolidated Appropriations Act, 2020," Federal Register, June 30, 2020, https://www.federalregister.gov/documents/2020/06/30/2020-13889/water-infrastructure-finance-and-innovation-act-program-wifia-criteria-pursuant-to-the-further.

22. "About the Central Valley Project," US Bureau of Reclamation, accessed September 20, 2022, https://www.usbr.gov/mp/cvp/about-cvp.html.

23. "Garamendi Bill Unlocks Federal Financing for Sites Reservoir and Central Valley Project Pumps Modernization," US Congressman John Garamendi, September 14, 2020, https://garamendi.house.gov/media/press-releases/garamendi-bill-unlocks-federal-financing-sites-reservoir-and-central-valley.

24. Jon Christensen, "Striving for Equity in Public Investments in Water in California: An Analysis of Prop 1 Implementation" (UCLA Institute of the Environment and Sustainability, July 29, 2019), https://www.ioes.ucla.edu/wp-content/uploads/UCLA-Prop-1-Implementation-Analysis-20190729.pdf.

25. Annabelle Rosser and Caitrin Chappelle, "How Water Bonds Plug Spending Holes," Public Policy Institute of California, June 7, 2021, https://www.ppic.org/blog/how-water-bonds-plug-spending-holes/.

26. "SWP Financing and Cost Recovery," California Department of Water Resources, accessed September 20, 2022, https://water.ca.gov/Programs/State-Water-Project/Management/Financing-and-Cost-Recovery.

27. "California's State Water Project," Coachella Valley Water District, accessed September 20, 2022, https://www.cvwd.org/170/Californias-State-Water-Project.

28. "Here Is the First Step to a Sustainable Water Policy," *CalMatters*, January 26, 2022, https://calmatters.org/commentary/2022/01/here-is-the-first-step-to-a-sustainable-water-policy/.

29. "Memorandum on Expanding Federal Support for Predevelopment Activities for Nonfederal Domestic Infrastructure Assets," Administration of Barack Obama, January 16, 2015, https://www.govinfo.gov/content/pkg/DCPD-201500034/html/DCPD-201500034.htm.

30. "The Impact of Early-Stage Community Investing: Why Predevelopment Is So Cool," SOCAP Global, November 25, 2019, https://socapglobal.com/2019/11/why-is-predevelopment-so-cool/#:~:text=Even%20most%20impact%2Doriented%20investors,of%20total%20project%20capital%20costs.

31. Elijah Chiland and Adrian Glick Kudler, "A Guide to CEQA: California's Environmental Law That Developers Love to Hate," *Curbed Los Angeles*, October 10, 2018, https://la.curbed.com/2012/2/7/10398386/ceqa-california-environmentalquality-act-law.

32. Jennifer L. Hernandez and David Friedman, "In the Name of the Environment: Litigation Abuse Under CEQA," Holland & Knight, August 2015, https://www.hklaw.com/en/insights/publications/2015/08/in-the-name-of-the-environment-litigation-abuse-un.

33. Annabelle Rosser and Caitrin Chappelle, "How Water Bonds Plug Spending Holes."

34. "Proposition 1 Water Storage Investment Program: Funding the Public Benefits of Water Storage Projects," California Water Commission, accessed September 12, 2022, https://cwc.ca.gov/Water-Storage.

35. Julie Forgie and James Salzman, "Legal Risks and Timeline Associated with Increasing Surface Water Storage in California" (UCLA Law, Pritzker Environmental Law and Policy Briefs, June 2017), https://law.ucla.edu/sites/default/files/PDFs/Publications/Emmett%20Institute/_CEN_EMM_PUB%20Surface%20Water%20Storage.pdf.

36. "CEQA Document and Permit Consistency," CalRecycle, accessed September 12, 2022, https://calrecycle.ca.gov/swfacilities/permitting/ceqa/consistency/.

37. "The 2022-23 Budget: Water and Drought Response Proposals" (Legislative Analyst's Office, January 31, 2022), https://lao.ca.gov/Publications/Report/4509.

38. "Governor Newsom Announces $5.1 Billion Package for Water Infrastructure and Drought Response as Part of $100 Billion California Comeback Plan," Office of Governor Gavin Newsom.

39. Caitrin Chappelle, Ellen Hanak, and Annabelle Rosser, "Paying for California's' Water System," (Public Policy Institute of California, May 2021), https://www.ppic.org/publication/paying-for-californias-water-system/.

40. Annabelle Rosser and Caitrin Chappelle, "How Water Bonds Plug Spending Holes," Public Policy of California, June 7, 2021, https://www.ppic.org/blog/how-water-bonds-plug-spending-holes/#:~:text=Since%202000%2C%20California%20voters%20have,management%20of%20floods%20and%20stormwater.

41. Bill Diedrich, "California Must Move Forward with Water Projects," *CalMatters*, March 7, 2022, https://calmatters.org/commentary/2022/03/california-must-move-forward-with-water-projects/.

42. "Rural Water Infrastructure: Federal Agencies Provide Funding but Could Increase Coordination to Help Communities," US Government Accountability Office, February 27, 2015, https://www.gao.gov/products/gao-15-450t.

43. Ellen Hanak et al., "Priorities for California's Water" (Public Policy Institute of California, November 2021), https://www.ppic.org/wp-content/uploads/priorities-for-californias-water-november-2021.pdf.

44. Caitrin Chappelle, Ellen Hanak, and Annabelle Rosser, "Paying for California's' Water System."

45. Can Chen and John R. Bartle, "Infrastructure Financing: A Guide for Local Government Managers" (2017), *Public Administration Faculty Publications*, 77, https://digitalcommons.unomaha.edu/pubadfacpub/77.

46. "Program Overview," Safe Clean Water Program, accessed September 20, 2022, https://safecleanwaterla.org/program-overview/.

47. Caitrin Chappelle, Ellen Hanak, and Annabelle Rosser, "Paying for California's' Water System."

48. Ellen Hanak and Alvar Escriva-Bou, "Testimony: Implementing SGMA at Ground Zero—Challenges and Opportunities for the San Joaquin Valley," Public Policy Institute of California, February 15, 2022, https://www.ppic.org/blog/testimony-implementing-sgma-at-ground-zero-challenges-and-opportunities-for-the-san-joaquin-valley/.

49. "The 2022-23 Budget: Water and Drought Response Proposals" (Legislative Analyst's Office, January 31, 2022).

50. "Hoeven: Fargo-Moorhead Regional Flood Protection a First-in-the-Nation Project," United States Senator for North Dakota John Hoeven, June 18, 2021, https://www.hoeven.senate.gov/news/news-releases/hoeven-fargo-moorhead-regional-flood-protection-a-first-in-the-nation-project.

51. Lisa McClain-Vanderpool, "Fargo, N.D. Invited to Apply for EPA Water Infrastructure Financing for Project that Will Help Manage Stormwater Flooding," Environmental Protection Agency, October 22, 2019, https://www.epa.gov/newsreleases/fargo-nd-invited-apply-epa-water-infrastructure-financing-project-will-help-manage.

52. "The Water Resources Reform and Development Act of 2014," United States Congress, January 3, 2014, https://www.congress.gov/113/bills/hr3080/BILLS-113hr3080enr.pdf; Written Statement of R.D. James, Assistant Secretary of the Army for Civil Works before United States Committee on Appropriations, April 10, 2019, https://www.appropriations.senate.gov/download/041019_-rd-james-testimony.

53. "Revolutionize Army Corps of Engineers Civil Works," US Army Corps of Engineers, February 2020, https://usace.contentdm.oclc.org/digital/api/collection/p16021coll11/id/4393/download.

54. M. Nolan Gray, "How Californians Are Weaponizing Environmental Law," *The Atlantic*, March 12, 2021, https://www.theatlantic.com/ideas/archive/2021/03/signature-environmental-law-hurts-housing/618264/.

55. Melanie Curry, "Bill to Streamline Transit, Bike, Pedestrian Projects Sails Through to the Governor," *StreetsBlog Cal*, August 31, 2020, https://cal.streetsblog.org/2020/08/31/bill-to-streamline-transit-bike-pedestrian-projects-sails-through-to-the-governor/.

56. "CEQA Exemptions" (Association of Environmental Professionals, February 2, 2020), https://ceqaportal.org/tp/CEQA%20Exemptions%20Paper%202020%20Update.pdf.

57. "To P3 or Not to P3" (American Water Works Association, 2019), https://www.awwa.org/Portals/0/AWWA/Communications/P3Report.pdf.

58. "Public-Private Partnerships in California" (Bay Area Council Economic Institute, August 2018), http://www.bayareaeconomy.org/files/pdf/P3inCaliforniaWeb.pdf.

59. Ibid.

60. Ibid.

61. "To P3 or Not to P3" (American Water Works Association, 2019).

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