Attachment 3 - Project Justification

Introduction

This attachment is organized into the following sub-sections:

- ☑ Project Summary Table
- ☑ Project Descriptions
- ☑ Regional Map and Project Maps
- ☑ Project's Physical Benefits
- ☑ Technical Analysis of Physical Benefits Claimed
- ☑ Cost Effectiveness Analysis

Supporting technical documentation for the projects can be found in "Att3_ProJust_2of2.pdf".

Project Summary Table

Table 4 lists the applicable drought and Integrated Regional Water Management (IRWM) project elements for each project contained in this Proposal.

Table 4 – 2014 IRWM Drought Solicitation Project Summary Table

	Drought Project Element	1-Lower American River Pipeline	2-Hazel/50 Intertie Improvements	3-Well #2 Reactivation	4-Nelson Well Improvements	5-PFE and Zone 4 Transfer Pump Stations	6-Phase 2B Well Rehabilitations	7-Sacramento River pump Station Modifications	8-Lower American River Pump Station Modifications	9-Main Ditch Piping	10-Madison Well Construction	11-American River Pump Station Improvements	12-Agricultural and Rural Residential Drought Response Incentives Program	13-Regional Water Efficiency Drought Measures	14-Striker Well Upgrades	15-Antelope Booster Pump Station Phase 2	16-Enterprise Intertie Improvements	17-Barton Road Intertie
D.1	Provide immediate regional drought preparedness		X	X	X		X	X			X				X		X	X
D.2	Increase local water supply reliability and the delivery of safe drinking water	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
D.3	Assist water suppliers and regions to implement conservation programs and measures that are not locally cost-effective												X	X				
D.4	Reduce water quality conflicts or ecosystem conflicts created by the drought	X					X			X		X				X	X	
	IRWM Project Element																	
IR.1	Water supply reliability, water conservation, and water use efficiency	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
IR.2	Stormwater capture, storage, clean-up, treatment, and management									X								
IR.3	Removal of invasive non-native species, the creation and enhancement of wetlands, and the acquisition, protection, and restoration of open space and watershed lands	X																
IR.4	Non-point source pollution reduction, management, and monitoring												X	X				
IR.5	Groundwater recharge and management projects	X	X					X	X			X	X	X				
IR.6	Contaminant and salt removal through reclamation, desalting, and other treatment technologies and conveyance of reclaimed water for distribution to users																	
IR.7	Water banking, exchange, reclamation, and improvement of water quality	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
IR.8	Planning and implementation of multipurpose flood management programs																	
IR.9	Watershed protection and management																	
IR.10	Drinking water treatment and distribution	X	X	X	X	X	X				X	X			X	X	X	X
IR.11	Ecosystem and fisheries restoration and protection									X								

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Project Descriptions

This section includes an introduction to the overall American River Basin Drought Response Program. For each proposed project, this section includes a brief project description and a more detailed project description discussion related to how the project will alleviate the drought impact(s) identified in Attachment 2, how the project can be considered as one or more of the four eligible drought project types (Section C), and why expedited funding is needed. **[Note: Immediate regional drought preparedness is taken to mean that by September 30, 2014, either construction is complete or, in the case of incentive programs, implementation has begun.]**

Introduction – American River Basin Drought Response Program

Overview

California is experiencing unprecedented drought conditions. In early 2014, the previously unthinkable almost happened -- Folsom Reservoir levels dropped to the point where water purveyors in the American River Basin Region (ARB Region) began to seriously evaluate emergency water delivery options if water levels continued to decline in Folsom Reservoir and water could no longer be physically diverted to customers. In the American River Basin watershed, already dry conditions have been exacerbated by operational decisions related to the multiple purposes of Folsom Reservoir for water supply deliveries, water quality and environmental releases and flood control purposes. Municipal water suppliers in the Region have developed a water supply system that has historically been reliable under nearly all hydrologic conditions. However, current drought conditions and the potential for an extended drought into 2015 necessitate that immediate actions be taken to provide basic levels of service to those areas most impacted by the historically low levels of water in Folsom Reservoir, reduced flows in the upper watershed, and dwindling snowpack which the region depends on to replenish the reservoir. Although challenging, it could have been much worse had the Region not initiated and continually invested in a regional conjunctive use plan, starting over two decades ago.

History

The Water Forum Process began in 1993 involving over 40 interest based groups including government, business, and environmental interests with the intention of bringing regional balance to two coequal objectives:

1. Meeting the water demands in the growing Sacramento Region and
2. Protecting the in stream values of the Lower American River

The Water Forum Agreement was signed in 2000, which in a summary, prescribed a regional conjunctive use plan through interlinked assurances to maximize the use of regional surface water supplies (when available and allowable) while preserving and restoring overdrafted groundwater supplies for use in times of shortage so that surface water could be used to preserve the environmental values, and recreational benefits of the Lower American River.

As the Water Forum effort drew to a close, the American River Basin Cooperating Agencies (ARBCA) formed in 1998 to begin preparing a Regional Water Master Plan (RWMP) which later evolved into the American River Basin Integrated Water Management Plan (ARB IRWMP) to collectively explore the technical details, institutional considerations, and infrastructure requirements needed to implement the Water Forum Agreement. Groundwater over-reliance and overdraft with then newly-discovered groundwater contamination plumes were deemed the most pressing regional water resource issues at the time. Consequently, in the early years, regional investments were made with the assistance of the California Department of Water Resources (DWR) through Propositions 13 and 50, and the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) were made primarily in surface water treatment and delivery infrastructure with smaller investments in targeted groundwater extraction capacity, monitoring activities, recycled water infrastructure and long-range regional planning efforts, and other

cooperative actions. Over a period of time, these investments bore fruit and the underlying groundwater elevations improved. Groundwater elevations have risen to levels much better than anticipated, accumulating some 300,000 acre-feet (AF) of replenished groundwater through in-lieu recharge in the underlying groundwater basin. Investments in long-range regional planning and infrastructure have continued through regional expenditures, and State Proposition 84 and Reclamation funding.

As stated in the ARB IRWMP 2013 Update, the ARB IRWMP vision, goals, principles, objectives, and strategies all support long-term, adaptable, proactive management in the Region, and are implemented by the projects and programs that are led by project proponents in the Region. The strategies and projects support adaptability to future situations (e.g., drought conditions, funding opportunities), as both of these elements are designed to be dynamic and adaptive. ARB IRWMP projects are updated, reviewed, reported, and vetted quarterly. Therefore, the list of approved projects is always aligned to regional and statewide priorities.

Examples of current strategies that have influenced projects included in this proposal include:

- Water Resources Strategy 2. Increase groundwater production capacity to 550 MGD by 2030.
- Water Resources Strategy 4. Improve connections between water systems in the Region for greater operational flexibility.
- Water Resources Strategy 6. Implement water conservation to reduce regional per capita water use by 20% by 2020.
- Water Quality Strategy 6. Increase use of remediated groundwater for beneficial uses.
- Community Stewardship Strategy 1. Increase availability and access to educational material on sustainable water resources.

Successful IRWM planning and implementation requires the identification of, and collaboration on, projects of regional significance. It is a "living process" that continues after formal adoption of the IRWMP and project implementation. This proposal is the result of this process within the ARB Region.

Drought Needs within the Region

To date, the severity of drought conditions have forced the State into curtailing post-1914 water rights, warning senior water rights holders of potential future actions, and approving emergency regulations to ensure increased water conservation in urban settings. Reclamation has reduced M&I water service contract allocations to 50 percent of historic usage and is releasing more than it had planned in the current situation to provide water for meeting Delta water quality requirements.

Hydrologic conditions in combination with State and federal actions have caused, or are likely to cause, the Region to encounter the following drought impacts by September 30, 2014 (described in detail in *Attachment 2 Drought Impacts*):

☑ At Risk of Not Meeting Existing Drinking Water Demands

☑ At Risk of Not Meeting Existing Agricultural Demands

☑ At Risk of Not Meeting Ecosystem Water Demands

☑ Drinking Water MCL Violations

☑ Groundwater Basin Overdraft

☑ Other Drought Related Adverse Impacts (recreation, economic)

Regional Drought Solutions

In early 2014, local water purveyors convened to strategize on potential solutions to the looming specter of a severe drought and the needs (or problems) that were arising. Individually, some purveyors were finding it difficult to see continuing to provide basic levels of service in the absence of supply from Folsom Reservoir, the lower American River, or the Sacramento River; others were concerned about sufficient groundwater extraction capacity or mobilization of the contaminant plume; while still others were apprehensive about the water quality of the limited supplies.

However as a Region, solutions began to emerge that built on previous investments in infrastructure and the Region's long history of collaboration and creativity – moving water supplies through pipelines but in the reverse direction, extracting replenished groundwater, augmenting existing transmission capacities and building new interties between water systems, additional conservation of available supplies and increasing community awareness. Participants and implementing agencies used the ARB IRWMP process to reprioritize already-vetted projects and identified a subset of projects that were either ready to proceed in 2014, or could be accelerated to be, to further expand the Region's ability to move water to those areas most impacted by the drought and loss of water supply. These projects are summarized in the table below and described in more detail in the *Project Description Discussions* that follow.

The improvements create opportunities for more flexibility in operations at Folsom Reservoir, which in turn create significant benefits beyond the Region. For example, more flexibility in release scheduling from Folsom allows for releases for downstream environmental needs, water quality control in the Delta, or other downstream M&I or Ag water needs.

In the short-term, the Region's replenished groundwater will help serve current drought-related needs with external financial assistance for needed infrastructure improvements without significant impact to the basin. However, should the drought further intensify later in 2014, or severe drought conditions persist into 2015, the Region runs the risk of returning to groundwater overdraft conditions and the attendant threat of remobilizing known groundwater contamination plumes. Going forward, the Region will continue to invest in and rely upon its proven IRWMP process and tools, adapting to changing conditions and developing long-term solutions.

American River Basin Drought Response Program – Brief Project Descriptions, Drought Project Types, and Drought Impacts Alleviated										
	Drought Project Types				Attachment 2 Drought Impacts Alleviated					
Brief Project Description	Provide Immediate Drought Preparedness*	Increase Local Water Supply Reliability & Delivery of Safe Drinking Water	Assist Water Suppliers & Regions to Implement Conservation Programs & Measures (Not Locally Cost-Effective)	Reduce Water Quality Conflicts or Ecosystem Conflicts Created by Drought	At Risk of Not Meeting Existing Drinking Water Demands	At Risk of Not Meeting Existing Agricultural Water Demands	At Risk of Not Meeting Ecosystem Water Demands	Drinking Water MCL Violations	Groundwater Basin Overdraft	Other Drought Related Adverse Impacts
Project 1: Lower American River Pipeline. Construct interconnecting transmission pipeline by Carmichael Water District for immediate regional drought water conveyance benefits for Carmichael, Rancho Cordova, and City of Folsom communities.		●		●	●		●	●		
Project 2: Hazel/50 Intertie Improvements. Upgrade an existing intertie between the City of Folsom (Folsom) and Golden State Water Company (GSWC) to move water from GSWC to Folsom.		●			●					
Project 3: Well #2 Reactivation. The City of Lincoln will purchase and install a new submersible pump and other necessary equipment to bring Well #2 back online.	●	●		●	●	●	●			
Project 4: Nelson Well Improvements. The City of Lincoln will purchase new and replace the pump equipment on its Nelson Well.	●	●		●	●	●	●			
Project 5: PFE and Zone 4 Transfer Pump Stations. The City of Roseville proposes to install two pump stations for reliable water supply to manage the water shortage situation in 2014 drought.		●			●					
Project 6: Phase 2B Well Rehabilitations. City of Sacramento will construct improvements to return nine existing groundwater wells to service in the potable water system.	●	●		●	●		●	●		
Project 7: Sacramento River Pump Station Modifications. City of Sacramento to improve the Sacramento River Water Treatment Plant river diversion structure allowing operation during abnormally low river releases without pumps vortexing.	●	●			●				●	
Project 8: Lower American River Pump Station Modifications. City of Sacramento to improve E.A. Fairbairn Water Treatment Plant river diversion structure, allowing operation during abnormally low American River releases without pumps vortexing.		●			●				●	
Project 9: Main Ditch Piping. El Dorado Irrigation District's Main Ditch Piping project will conserve/use water more efficiently and effectively, improve water quality, and assist in preventing water-related crises.		●		●	●	●	●	●		
Project 10: Madison Well Construction. Add a groundwater production facility to increase water supply and reliability of the Fair Oaks Water District and Region's water supply during periods of drought.	●	●			●					

American River Basin Drought Response Program – Brief Project Descriptions, Drought Project Types, and Drought Impacts Alleviated										
	Drought Project Types				Attachment 2 Drought Impacts Alleviated					
Brief Project Description	Provide Immediate Drought Preparedness*	Increase Local Water Supply Reliability & Delivery of Safe Drinking Water	Assist Water Suppliers & Regions to Implement Conservation Programs & Measures (Not Locally Cost-Effective)	Reduce Water Quality Conflicts or Ecosystem Conflicts Created by Drought	At Risk of Not Meeting Existing Drinking Water Demands	At Risk of Not Meeting Existing Agricultural Water Demands	At Risk of Not Meeting Ecosystem Water Demands	Drinking Water MCL Violations	Groundwater Basin Overdraft	Other Drought Related Adverse Impacts
Project 11: American River Pump Station Improvements. Install additional pump at the existing American River Pump Station operated by Placer County Water Agency to increase water supply reliability to approximately 270,000 residents.		●		●	●	●	●		●	
Project 12: Agricultural and Rural Residential Drought Response Incentives Program. Placer County Water Agency and local RCD's will provide irrigation scheduling support; incentives to upgrade irrigation and plant replacement to agricultural and rural residential customers.		●		●	●	●	●		●	●
Project 13: Regional Water Efficiency Drought Measures. Regional Water Authority will implement outdoor water efficiency measures by expanding their current drought awareness campaign, and landscape and irrigation upgrade programs.		●		●	●	●	●		●	●
Project 14: Striker Well Upgrades. Sacramento County Water Agency is outfitting the Striker Well hole with a pump, to provide drought relief to the City of Sacramento's drinking water system.		●		●	●		●			
Project 15: Antelope Booster Pump Station Phase 2. Install a booster pump station to pump groundwater supply from Sacramento Suburban Water District's North Service Area to various San Juan Water District Wholesale customers.		●			●					
Project 16: Enterprise Intertie Improvements. Improve existing intertie to allow Sacramento Suburban Water District to deliver groundwater supplies to City of Sacramento in dry years or other emergency conditions.		●		●	●		●			
Project 17: Barton Road Intertie. Install new transmission pipeline for Placer County Water Agency to convey water supply during drought or emergency conditions to San Juan Water District (Implementing Agency).		●			●					

* Immediate regional drought preparedness is taken to mean that by September 30, 2014, either construction is complete or, in the case of incentive programs, implementation has begun.

Project Description Discussions

Project 1: Lower American River Pipeline

Implementing Agency: Carmichael Water District (CWD)

Description: The ongoing Aerojet/Rocketdyne groundwater remediation effort in eastern Sacramento County produces approximately 30,000 acre-feet per year and is estimated to require over 200 years of operation to remediate the contamination plume. The extractions are under a continuous pump and treat operation in order to provide containment of the existing contamination plume, thereby providing a continuous supply available under all water year types including the most severe drought. Golden State Water Company (GSWC) is not able to construct additional groundwater wells due to this contamination and does not currently have the available summer capacity and would thus rely on this pipeline project.

This project will utilize CWD's existing unused water diversion, treatment, and pumping capacity to provide 4.5 million gallons per day (mgd) of remediated groundwater to GSWC (total of 5,000 acre-feet per year), plus capacity to provide an additional 4.5 to 5 mgd of capacity. The water will be delivered through a new 24-inch diameter pipeline crossing under the American River (1,000 lineal feet) by horizontal direction drilling trenchless methods. Remaining pipeline segments (6,400 lineal feet) will be constructed using traditional open cut construction techniques and will connect to the existing distribution system located within the GSWC's Cordova System.

The Lower American River Pipeline Project is the first phase of a larger project to provide remediated groundwater to City of Folsom and other areas within Sacramento County, thereby helping reduce groundwater pumping in the Central Sacramento basin. This project is in the implementation stages and was recently identified by the Association of California Water Agencies June 2014 Drought Impacts and Strategies for Resilience Document as an example of a project that will provide an immediate benefit and relief to a drought-stricken area (ACWA, 2014, pg 25).

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- This pipeline will provide a critical conveyance mechanism to allow for the capture, treatment, pumping, and delivery of remediated groundwater to the Cordova Service area of GSWC to meet **existing drinking water demands** and **reduce the potential for drinking water MCL violations**.
- The pipeline will also have adequate additional conveyance capacity (up to 5 mgd) to provide regional water supply benefits for emergency drought response to meet **existing drinking water demands** for communities in Sacramento County.
- Immediate regional drought preparedness? No (construction completion = 10/30/2015)

Need for Expedited Funding: Expedited funding is needed to complete this project. Without access to this remediated groundwater supply, GSWC is at risk of not meeting existing water supply demands during severe drought or other emergency.

Project 2: Hazel/50 Intertie Improvements

Implementing Agency: City of Folsom (Folsom)

Description: Folsom and Golden State Water Company (GSWC) will construct necessary improvements to an existing intertie to allow GSWC to deliver water to Folsom, providing added flexibility to both purveyors to manage current drought conditions as well as provide operational flexibility to manage future drought and emergency conditions. Currently, the intertie at Hazel Avenue and Highway 50 allows water flow from Folsom to GSWC due to differing pressure zones. Reverse flow will require new infrastructure including pumps, pipes, power, and controls to move water from a lower pressure zone in GSWC to a higher pressure zone in Folsom. The proposed project will

allow GSWC to deliver approximately 2,000 gallons per minute (gpm) of treated groundwater to Folsom. This will meet up to 15 percent of Folsom's demand.

Folsom does not have direct access to groundwater and relies completely on surface water deliveries from Folsom Reservoir. Should drought conditions persist and less water be available, this project will assist in meeting basic drinking water demands for Folsom. With the potential of the water levels in Folsom Reservoir dropping below the intake, the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) may have to install a temporary pumping station in Folsom Reservoir to meet minimum Public Health and Safety demands for the cities of Folsom and Roseville, San Juan Water District, and Folsom State Prison. This project will help offset some of the demands in Folsom's water system and potentially make surface water available for the other agencies.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- The added flexibility from improving the intertie will allow both purveyors to conjunctively manage surface and groundwater resources when applicable, aiding with regional water management objectives and ensuring that local agencies have water available to meet **existing drinking water demands**.
- Immediate regional drought preparedness? No (construction completion = 01/31/2015)

Need for Expedited Funding: Expedited funding for this project will provide necessary infrastructure to meet Folsom water demands should drought conditions persist throughout 2014 and into 2015. Folsom's current Capital Improvement Program does not include this intertie project as a project to be funded. Funding for this project will have a direct impact on meeting existing drinking water demands should drought condition persist now or in future years.

Project 3: Well #2 Reactivation

Implementing Agency: City of Lincoln (Lincoln)

Description: Well #2 was taken offline a few years ago as it moved to replenish groundwater supplies by increasing surface water deliveries from Placer County Water Agency (PCWA). Since this well went offline, Lincoln's demands that had been met with groundwater were instead met using surface water from PCWA. To bring Well #2 back online, Lincoln will purchase and install a new submersible pump and other necessary equipment, and connect the pump to the existing electrical system. Fully upgraded, this well is capable of producing about 800 gpm.

Lincoln's surface water supplier (PCWA) had its supply from PG&E reduced due to the drought and turned to pumping additional water from the American River to make up for some of the reductions from PG&E reservoirs. In total, PCWA will have to offset over 30,000 acre-feet of water through a combination of conservation, increased American River diversions, and groundwater pumping. Lincoln will use the water from Well #2 to offset some of reductions allowing PCWA greater flexibility to meet its other customers' demands.

This same offset will also have a benefit to instream flows, Folsom Reservoir inflows, and Lower American River flows. With the record light snowpack in 2014, flows in the upper American River system are being hit doubly by increased reliance from PCWA. This translates to less summer inflow into an already low Folsom Reservoir. The inflow and storage in Folsom Reservoir is used maintain lower American River flows. The drought has placed Folsom operators in a situation where a second dry year would leave the reservoir with inadequate supplies to meet flows or domestic water demands.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Bringing this well back online results in a like amount of water being left in the river to reach Folsom Reservoir. Given the low level of the reservoir, any additional water should be considered a benefit to

ecosystem water demands on the lower American River as well **as existing drinking water demands**, and **agricultural water demands** of downstream users.

- Immediate regional drought preparedness? Yes (construction completion = 08/31/2014)

Need for Expedited Funding: The reactivation of Well #2 serves as part of a regional package to address the drought situation in an expedited manner. This project is one step Lincoln is taking to improve the American River Basin's regional water supply picture. It is Lincoln's desire to have this project operational this summer so as to improve on planned summer shortage issues; thus external funding support is essential.

Project 4: Nelson Well Improvements

Implementing Agency: City of Lincoln (Lincoln)

Description: Nelson Well was taken offline a few years ago as Lincoln moved to secure more surface water deliveries from PCWA for its customers. Since this well went offline, Lincoln's demands that had been met with groundwater were instead met using surface water delivered by PCWA from the American River system. To bring the Nelson Well back online, Lincoln will purchase and install a new submersible pump and connect it to the existing electrical system. Fully upgraded, this well is capable of producing about 2,000 gpm if fully upgraded.

Lincoln's surface water supplier (PCWA) had its supply from PG&E reduced due to the drought and turned to pumping additional water from the American River to make up for the reduction from PG&E reservoirs. In total, PCWA will have to offset over 30,000 acre-feet of water through a combination of conservation, increased American River diversions, and groundwater pumping. Lincoln will use the water from the Nelson Well to offset some of these American River diversions allowing PCWA greater ability to meet its other customers' demands.

This same offset will also have a benefit to instream flows, Folsom Reservoir inflows, and Lower American River flows. With the record light snowpack in 2014, flows in the upper American River system are being hit doubly by increased reliance from PCWA. This translates to less summer inflow into an already low Folsom Reservoir. The inflow and storage in Folsom Reservoir is used to maintain lower American River flows. The drought has placed Folsom operators in a situation where a second dry year would leave the reservoir with inadequate supplies to meet required flows or domestic water demands.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Bringing this well back online results in a like amount of water being left in the river to reach Folsom Reservoir. Given the low level of the reservoir, any additional water should be considered a benefit to **ecosystem water demands** on the lower American River as well **as existing drinking water demands**, and **existing agricultural water demands** of downstream users.

- Immediate regional drought preparedness? Yes (construction completion = 07/31/2014)

Need for Expedited Funding: The Nelson Well Improvements project serves as part of a regional package to address the drought situation in an expedited manner. This project is one step Lincoln is taking to improve the American River Basin's regional water supply picture. It is Lincoln's desire to have this project operational this summer so as to improve on planned summer shortage issues; thus external funding support is essential.

Project 5: PFE and Zone 4 Transfer Pump Stations

Implementing Agency: City of Roseville (Roseville)

Description: Roseville relies on surface water diverted from Folsom Reservoir as its primary water supply but that source may be inadequate for supplying the desired minimum levels of service during dry years or drought conditions, planned outages, curtailments, cutbacks by Reclamation, or difficulties with Roseville's Barton Road Water Treatment Plant facilities. The majority of Roseville's existing water distribution system is gravity-fed. Due to

the natural terrain, zone 1 is at a higher elevation and water from other zones or outside the city must be pumped into zone 1. To continue meeting drinking water demands, Roseville will construct two pump stations:

- 6,000 gpm pump station to move water from Roseville's pressure zone 4 to zone 1. Roseville's pressure zone 4 is a newer zone with ample groundwater supply to provide up to 8.6 mgd throughout the distribution system, when needed.
- 5,000 gpm pump station to move water from Sacramento Suburban Water District (SSWD) to Roseville's zone 1. SSWD may provide up to 7 mgd of groundwater to Roseville in drought or emergency situations.

The proposed projects are intended to address shortages brought about during drought or emergency conditions. In the case of drought conditions, the proposed project will provide the greatest benefits, up to about 15.6 mgd of water, in delivering alternative water supplies (groundwater) to areas otherwise dependent on surface water from Folsom Reservoir.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- This project will allow Roseville to use groundwater to meet **existing drinking water demands** in its zone 1.
- Immediate regional drought preparedness? No (construction completion = 04/30/2015)

Need for Expedited Funding: Without access to the groundwater supplies, Roseville is at risk of not meeting existing water supply demand. Although this project is envisioned in Roseville's long-term water supply reliability for drought and emergencies, the project is now critical to meeting water demands and has been moved up for implementation in summer/fall 2014 due to drought conditions. As such, expedited funding through this drought grant is imperative.

Project 6: Phase 2B Well Rehabilitations

Implementing Agency: City of Sacramento (Sacramento)

Description: On January 14, 2014, Sacramento City Council passed a resolution declaring a water shortage emergency and implementing stage 2 of Sacramento's water shortage contingency plan which included a mandatory reduction in water usage, ("2014-00057 Water Shortage Contingency Plan," page 1, City of Sacramento, 2014). In light of the ongoing drought crisis impacting flows in the American and Sacramento rivers as well as Sacramento's heavy reliance on surface water supplies, maximizing groundwater production capability was deemed critical to meeting drinking water demands.

Normally, Sacramento diverts and extracts an average of approximately of 100 mgd for potable usage. Of that, about 20 mgd is groundwater. A number of Sacramento's active groundwater wells are already being rehabilitated to restore flow capacities, replace aged equipment, and improve security at the sites. In addition to those wells, Sacramento has nine existing and permitted groundwater wells that were taken out of active service but could be returned to service after service restoration work and testing – wells 91, 92, 93, 112, 114, 123, 127, 139, and 158. Of these, four wells have mechanical issues requiring repair, and five wells are on emergency stand-by status because they require upgrades to comply with current California Department of Public Health regulatory requirements for active service. In general, each site will require a pump, motor, electrical and mechanical improvements, chemical feed systems, and small prefabricated shelters to secure chemicals and electrical equipment.

Returning these nine existing wells to active service will not increase the capacity of these wells; rather they will be brought back into service with a total expected production of 7.7 mgd to supplement diminished surface water supplies in the potable water system.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Bringing these nine wells back into service will allow Sacramento to increase groundwater production to meet **existing drinking water demands** and **ecosystem water demands**, and **reduce the potential for drinking water MCL violations**.
- Immediate regional drought preparedness? Yes (construction completion = 09/01/2014)

Need for Expedited Funding: Due to the emergency nature of securing a reliable water supply to meet drinking water demands, Sacramento has already initiated this project using rate payer funds that were not anticipated or budgeted. The improvements cannot be completed without expedited funding.

All forecasts by the State and federal agencies have identified declining storage reservoirs and anticipated stressed and strained river levels. Any project that secures a groundwater supply to supplement a surface water supply under these circumstances must be performed immediately. This project is fundamental to continuing to meet potable water demands of Sacramento residents.

Project 7: Sacramento River Pump Station Modifications

Implementing Agency: City of Sacramento (Sacramento)

Description: Drought conditions have triggered current and projected future cutbacks in reservoir releases statewide, and these reductions are threatening to drop river elevations below the functioning level of Sacramento's existing 160 mgd drinking water intake structure on the Sacramento River, the Sacramento River Water Treatment Plant (limited to 130 mgd by treatment process restrictions).

River levels have already dropped 1 foot below the design operating level of the facility. This project will design and construct vortex breakers for the river intake pumps. Each will be comprised of a 6 foot x 6 foot x 3 foot steel screened box that will surround each of the river intake pumps. Design calculations indicate this will allow the facility to operate at, or perhaps a half foot below, the lowest river elevation currently being projected. Vibration monitoring equipment will be added to each pump to ensure they are safely operating at the projected low flows. No changes to the treatment process will be required.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Without reliable operation of this facility, approximately 40 percent of the water supply to Sacramento's 473,000 residents and its many commercial entities is threatened. Sacramento will be at risk of not meeting **existing drinking water demands** if this project is not completed.
- These modifications will help ensure that **groundwater overdraft conditions** are less likely, or less exacerbated in the Region as a result of the drought.
- Immediate regional drought preparedness? Yes (construction completion = 09/01/2014)

Need for Expedited Funding: Due to the emergency nature of securing reliable water supply to meet drinking water demands, Sacramento has already initiated this project using rate payer funds that were not anticipated or budgeted. The modifications cannot be completed without expedited funding.

All forecasts by the State and federal agencies have identified declining storage reservoirs and anticipated stressed and strained river levels. This project is fundamental to continuing to meet potable water demands of Sacramento residents.

Project 8: Lower American River Pump Station Modifications

Implementing Agency: City of Sacramento (Sacramento)

Description: Drought conditions have triggered current and projected future cutbacks in reservoir releases statewide, and these reductions are threatening to drop river elevations below the functioning level of Sacramento's existing 200 mgd drinking water intake structure on the lower American River, the E.A. Fairbairn Water Treatment Plant. (Note: Various regulations and/or treatment/hydraulic restriction prevent full utilization of the intake capacity. For example, drier water year restrictions limit the intake to 65-100 mgd, depending on time of year.)

In 2014, river elevations have already dropped to the design operating level of the facility. The State/Federal joint Central Valley Operations Group is projecting a return to those low flows in a matter of months ("CVO-AROG Handouts_20140619," page 3, Reclamation, 2014). In response, Sacramento has rented and temporarily installed 20 mgd in submersible pumps to ensure partial operation.

This project will design and construct vortex breakers for the river intake pumps and install vibration monitoring equipment on the permanent pumps. If the ongoing engineering evaluation yields results similar to the completed evaluation of Sacramento's other intake structure then these vortex breakers will likely comprise of an approximately 6 foot x 6 foot x 3 foot steel screened box surrounding each of the river intake pumps. Vibration monitoring equipment will be added to ensure pumps are safely operating at projected low flows. No changes to the treatment process are required. The rented submersible pumps will be returned if the analysis yields satisfactory results.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Without reliable operation of this facility approximately 40 percent of the water supply to the City's 473,000 residents and its many commercial entities is threatened. Sacramento will be at risk of not meeting **existing drinking water demands** if this project is not completed.
- These modifications will help ensure that **groundwater overdraft conditions** are less likely, or less exacerbated in the Region as a result of the drought.
- Immediate regional drought preparedness? No (construction completion = 10/01/2014)

Need for Expedited Funding: Due to the emergency nature of securing reliable water supply to meet drinking water demands, Sacramento has already initiated this project using rate payer funds that were not anticipated or budgeted. The modifications cannot be completed without expedited funding.

All forecasts by the State and federal agencies have identified declining storage reservoirs and anticipated stressed and strained river levels. This project is fundamental to continuing to meet potable water demands of Sacramento residents.

Project 9: Main Ditch Piping

Implementing Agency: El Dorado Irrigation District (EID)

Description: The EID Upper Main Ditch is an open ditch that conveys raw water from the Forebay Reservoir to EID's Reservoir 1 Water Treatment Plant. EID intends to construct a buried pipeline that will replace the open ditch to convey raw water, reduce leakage and losses, and improve the water quality of water entering the treatment plant. The pipeline will be approximately three miles in length and will result in a quantifiable water savings of about 1,300 acre-feet annually with improved water management through improved raw water quality, reducing the need to acquire new water supplies while continuing to meet existing drinking water and agricultural demands. This reduction in conveyance losses will aid EID in drought, assist in meeting the State mandate of 20 percent

water conservation by 2020, protect existing water supplies for future needs, and preserve water for renewable hydroelectric power generation.

As open ditches are susceptible to contamination and failure, this project will also improve water quality, especially during dry or emergency conditions, protect drinking water supplies at risk and prevent erosion and water quality issues.

Given that the project will result in an additional 1,300 acre-feet annually that will be not need to be diverted from the South Fork American River, the project will benefit South Fork American River flows, Folsom Reservoir flows and Lower American River flows which support listed and/or candidate species.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- This pipeline will conserve and use water more efficiently and effectively to continue meeting **existing drinking water demands**, **existing agricultural water demands**, and **ecosystem water demands**, **improve drinking water quality**, **reduce the potential for drinking water MCL violations**, increase the use of renewable energy, improve energy efficiency, and assist in preventing water-related crises.
- Immediate regional drought preparedness? No (construction completion = 09/30/2016)

Need for Expedited Funding: Expedited funding will allow the project to move forward more quickly, in the event that 2015 is another dry or drought year and during a time of increased uncertainty with regard to impacts on both supplies and demands from continuing severe drought conditions.

Project 10: Madison Well Construction

Implementing Agency: Fair Oaks Water District (FOWD)

Description: The local conjunctive use program prescribed by the Water Forum Agreement established the basis for a regional groundwater banking and exchange program. Since the Sacramento Region's banking and exchange pilot study in 2000, FOWD has actively participated in a regional conjunctive use program. In 2005, the drilling and equipping of the Madison Well was identified as adding water supply critical to meeting the needs of FOWD's customers as well as continued involvement in an active conjunctive use program.

In 2006, as a part of the development project known as Gum Ranch Phase I, FOWD secured the Madison Well site for a future groundwater extraction facility. With 2013 and 2014 being unprecedented dry years in the Sacramento Region, the Madison Well Project was identified as a project that could immediately add to available water supplies to the Region. The Madison Well will be equipped based on an estimated production capacity of 1,000 gpm.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- This project will provide necessary water supply to meet **existing drinking water demands** during the time when surface water diversions from Folsom Reservoir and the lower American River are limited due to the low water levels in the reservoir.
- Immediate regional drought preparedness? Yes (construction completion = 08/2014)

Need for Expedited Funding: Expedited funding is necessary to continue to meet the water demands of FOWD residents and the Region. All forecasts by the State and federal agencies have identified declining storage reservoirs and anticipated stressed and strained river levels. Any project that secures a groundwater supply to supplement a surface water supply under these circumstances must be performed immediately to secure supplies.

Project 11: American River Pump Station Improvements

Implementing Agency: Placer County Water Agency (PCWA)

Description: The recent drought conditions experienced in the State, evidenced by the lack of snowpack and the resulting low levels in Folsom Reservoir, have necessitated water purveyors in the Region to consider alternative sources of supply beyond this single source of water for drinking water. The existing American River Pump Station (ARPS), operated by PCWA, was initially constructed to allow for installation of future pumps when needed. The pump station, with current pumping capacity of 148 cubic feet per second (cfs), supplies water to PCWA water treatment plants which then can distribute treated water to Roseville and the San Juan Water District (SJWD) when Folsom Reservoir supply is insufficient. Additionally, PCWA retail service areas are very dependent on PG&E for water supplies originating in the Yuba River basin which have been thus far reduced by 30 percent.

A new 41 cfs pump and associated variable frequency drive (VFD) will be installed in the existing pump station to help meet PG&E supply shortfalls. This will increase the pumping capacity of the facility to 189 cfs and will increase the reliability of the pump station as well as the operational flexibility with the associated VFD. In addition to the pump and VFD, the project includes installing a concrete masonry unit building with a chilled water cooling system to house the new VFD, electrical conduit and wiring, cooling water improvements for the new pump, mechanical piping, valves and other appurtenances, control/programming modification's, and start up and testing.

As PCWA can directly regulate flows on the upper American River system, expanding ARPS pump capacity protects against further cutbacks from PG&E increasing reliability for cities of Rocklin, Lincoln, Loomis, Auburn, Colfax, and unincorporated Placer County.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Additional surface water from this project will help meet **existing drinking water demands** for several municipalities in the Region, and help meet **existing agricultural water demands** and **ecosystem water demands**.
- Improvements to the American River Pump Station will help ensure that **groundwater overdraft conditions** are less likely, or less exacerbated in the Region as a result of the drought.
- Immediate regional drought preparedness? No (construction completion = 03/31/2015)

Need for Expedited Funding: The changes in operations at PCWA due to the drought have a very significant financial impact to the agency. Initial indications are that PCWA could lose between $2.7 million and $3.8 million in revenue as a result of reduced water supply. The estimate of added operational costs is $4 million. Most of this is a result of added pumping costs. Reduced revenues and added costs are planned to be offset by reserves and reprioritization of projects. However, if the drought continues into subsequent years, this approach may not be adequate. Expedited funding is required to immediately commence construction and install the pump for operation by April 2015. If water supplies are further reduced at Folsom Reservoir, measures can be taken to supply water to Roseville, Lincoln, SJWD, and potentially others, as needed.

Project 12: Agricultural and Rural Residential Drought Response Incentives Program

Implementing Agency: Placer County Water Agency (PCWA)

Description: Increasing water use efficiency and conservation in the agricultural and rural residential community is a primary method of reducing water supply related impacts associated with the 2014 drought. To increase the level of water conservation and efficiency, PCWA and the resource conservation districts developed the Agricultural and Rural Residential Drought Response Incentives Program (ARDRIP), focusing on conservation practices that can be implemented consistent with U.S. Department of Agriculture's Natural Resources Conservation Service Environmental Quality Incentive Program (EQIP). The ARDRIP will be implemented

throughout the American River Basin and jointly managed by PCWA and the Placer County Resource Conservation District. In this program, three separate water conservation and efficiency components will be targeted: (1) provide irrigation scheduling support, (2) provide incentives to upgrade irrigation systems and upgrade existing irrigation systems, and (3) provide incentives to replace high water use plant material. In addition to the incentives, all participants will be required to participate in an irrigation audit.

ARDRIP implementation will result in conserving an estimated 787 acre-feet per year, or 11,805 acre-feet over the assumed program lifetime.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Much of the conserved water is surface water that will be allowed to remain in regional waterways making it available as water to meet **existing drinking water demands**, **agricultural water demands**, or **ecosystem water demands**.
- For portions of the project served by groundwater, the reduced demand will help ensure that conditions of **groundwater basin overdraft** are not experienced or exacerbated as a result of the drought.
- This project will help customers control increased costs of water due to rates, thereby reducing **other drought related adverse impacts (economic)**.
- Immediate regional drought preparedness? No (implementation starts 10/01/2014)

An additional benefit of the project is that efficient usage will also reduce erosion and water quality impairments that typically result from excessive irrigation runoff.

Need for Expedited Funding: The low cost of agricultural and self-supplied water is not sufficient to afford robust conservation programs in the Region, so funding to incentivize customer reductions is necessary. Growers want to do their part to assist PCWA, the Region, and the State in reaching the 20 percent reduction goal. Many growers irrigate using outdated and inefficient irrigation systems. By providing innovative and new irrigation technology, growers will now have the opportunity to become more efficient thereby benefiting storage, minimizing water waste, and achieving the 20 percent reduction in water use.

Project 13: Regional Water Efficiency Drought Measures

Implementing Agency: Regional Water Authority (RWA)

Description: Water supply agencies, the business community, and environmental interests in the American River Basin have identified urban water use efficiency as a primary method of reducing water use and improving overall water management in the region. To capture the consistency of implementation and economies of scale, RWA developed a Regional Water Efficiency Program (RWEP) in 2003. The RWEP program has two main components: (1) public outreach and education, and (2) projects that offer rebates, incentives, and large landscape water budgets. For the past 4 years, the RWEP award-winning public outreach campaign has focused on outdoor water use because 65 percent of a household's water use is outdoors. In order to prepare and minimize the effects of another dry winter, there must be a redoubled focus on reducing outdoor water use. In order to achieve this goal, this project will have two related components. The first component is an increase in public outreach through the current drought awareness campaign, focusing on extending current media and event outreach and advertising buys to further communicate a regional, consistent message on how to save water outdoors. The second component is the distribution of landscape-related incentives and irrigation equipment upgrades, including but not limited to, smart controller rebates and installation, landscape water budgets, drip irrigation, nozzle replacements and cash for grass programs. The average incentive will cost $800 and may include $150 for smart controller installation, if applicable, for a total of 1,400 sites assuming, at a minimum, that each of those sites will need a controller installed.

This project will be managed by the RWA and will be implemented throughout the American River Basin. The public outreach component will be targeted to the Region's 1.9 million customers. This project will provide an estimated 1,400 incentives for landscape upgrades conserving an estimated 145 acre-feet per year or 1,450 acre-feet of water over the life of the project (10 years).

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Much of the conserved water will be surface water that will be allowed to remain in regional waterways making it available as water to meet **existing drinking water demands, agricultural water demands**, or **ecosystem water demands**.
- For portions of the project served by groundwater, the reduced demand will help ensure that conditions of **groundwater basin overdraft** are not experienced or exacerbated as a result of the drought.
- This project will help customers control increased costs of water due to rates, thereby reducing **other drought related adverse impacts (economic)**.
- Immediate regional drought preparedness? No (implementation starts 12/01/2014)

Need for Expedited Funding: Expedited funding is needed because incentives for inducing customer behaviors to reduce water use are a well-established means of achieving results. Additionally, funding to support these incentives is most critical during drought conditions as water agency revenues are significantly declining as a result of water conservation by customers, and as a result, they do not have funds available to contribute to this effort.

Project 14: Striker Well Upgrades

Implementing Agency: Sacramento County Water Agency (SCWA)

Description: In the current drought, there is a risk that Sacramento will be unable to provide adequate levels of water service to meet basic drinking water needs in its north service area. The SCWA has expedited the Striker Well Upgrades in anticipation of water deliveries to Sacramento in fall 2014.

The Striker Well is located on Striker Avenue within SCWA's Northgate 880 service area just north of the City of Sacramento. The Striker Well location was drilled in 2002, but needs to be outfitted with: electrical service and related systems, SCADA system, chemical systems, electric motor, well pump, associated plumbing, and on-site power back-up generator with automatic transfer switching gear. The well is not currently needed to serve SCWA's Northgate 880 service area, but in the meantime can serve Sacramento's north area through water system interties. Based on actual production of similar SCWA wells in the area, the Striker Well will produce 2 mgd.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- This well will be used as a drought relief production source for Sacramento to **meet existing water demands** and **ecosystem water demands**.
- This well could serve Sacramento in a conjunctive use program helping **sustain the groundwater aquifer**.
- Immediate regional drought preparedness? No (construction completion = 10/31/2014)

Need for Expedited Funding: Without this potable water source available to Sacramento, there is a risk of their customers not receiving adequate levels of water service to meet the most basic drinking water needs. SCWA has expedited this project in anticipation of the water deliveries to Sacramento sometime in fall of 2014.

Project 15: Antelope Booster Pump Station Phase 2

Implementing Agency: Sacramento Suburban Water District (SSWD)

Description: SJWD relies on surface water diverted from Folsom Reservoir as its main supply source, but that source is inadequate for supplying SJWD's desired minimum levels of service if deliveries from Folsom Reservoir are compromised by drought or system failure. This project will supplement SJWD's water supplies during times of limited surface water availability from Folsom Reservoir. The project will allow for the reversal of flow in the Antelope and Cooperative Transmission pipelines to provide conserved and banked groundwater to the other agencies connected to the pipelines and SJWD who does not have direct access to groundwater.

The proposed project includes constructing a new booster pump station with an initial capacity of 10,000 gpm to pump groundwater from SSWD's North Service Area (NSA) into the Antelope and Cooperative Transmission pipelines for conveyance to SJWD and its customers Citrus Heights Water District, Fair Oaks Water District and Orangevale Water Company-- a population of approximately 221,200 people served which rely on surface water for the majority of their water needs.

Minimum SJWD service level needs are estimated at 25 mgd. The minimum service level assumes customers are reduced to and achieving indoor only use in July when demands are typically 75 mgd. The proposed project can provide up to 10,000 gpm (14.4 mgd) needed to meet SJWD minimum service level demands. Remaining minimum service level demands will be met by cooperation with Citrus Heights Water District, Fair Oaks Water District and Orangevale Water Company and other partners.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- This project will allow for SSWD supplying SJWD with groundwater to meet **existing drinking water demands** during drought conditions when surface water supplies are reduced or limited. Currently there are no provisions for transferring water from SSWD to SJWD.
- Immediate regional drought preparedness? No (construction completion = 06/30/2015)

Need for Expedited Funding: Due to the drought and risk of not meeting water supply needs, this is an unanticipated and unplanned project for SSWD and SJWD that was not included in the past budget documents or master planning efforts. Without access to additional groundwater supply, SJWD is at risk of not meeting existing water supply demands during severe drought or emergency conditions. As such, funding from DWR from this grant is imperative.

Project 16: Enterprise Intertie Improvements

Implementing Agency: Sacramento Suburban Water District (SSWD)

Description: Sacramento is highly reliant on surface water supplies to meet customer demands. Drought conditions and/or decisions made by State and federal operators regarding flow releases from the Shasta, Oroville, and Folsom reservoirs have led to low flows in the American and Sacramento rivers reducing river diversions.

The Enterprise Intertie Improvements Project will improve regional supply reliability and promote conjunctive use. SSWD has an existing intertie with Sacramento at SSWD's Enterprise Reservoir site. This intertie was originally designed for SSWD to receive treated surface water purchased from Sacramento. With the addition of some piping, a control valve, and instrumentation and controls this intertie will be used by SSWD to move groundwater in the opposite direction for delivery to Sacramento in dry years and emergencies. It is estimated that an instantaneous supply of as much as 20 mgd can be made available to Sacramento.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- This project will be used to help Sacramento meet **existing drinking water demands** and **ecosystem water demands** during periods when low flows in the American and/or Sacramento rivers reduce or limit its ability to use surface water.
- Immediate regional drought preparedness? No (construction completion = 02/28/2015)

Need for Expedited Funding: Expedited funding is needed to complete this project. Without access to this groundwater supply, Sacramento is at risk of not meeting existing water supply demands during severe drought or other emergency. All forecasts by the State and federal agencies have identified declining storage reservoirs and anticipated stressed and strained river levels. This project is fundamental to continuing to meet potable water demands of Sacramento residents.

Project 17: Barton Road Intertie

Implementing Agency: San Juan Water District (SJWD)

Description: The water supply for SJWD's retail system is limited to surface water from Folsom Reservoir and 1 mgd of emergency supply though an existing intertie with PCWA in the northeast portion of its northern retail area. Approximately 7 mgd of supply is needed to meet minimum service levels (approximate "health and safety" level) for the SJWD retail service area. Due to geologic conditions, appreciable groundwater does not exist in SJWD's retail area. During periods of surface water curtailments or when surface water supply is unavailable due to low lake levels, SJWD is at risk due to lack of alternative water supplies.

The primary purpose of this intertie project is to supply treated water from PCWA to SJWD. This project consists of installing approximately 2,700 lineal feet of 12-inch diameter pipeline, a pressure control valve station, a flow meter facility, and ancillary work. The project will be constructed within Barton Road right-of-way. When completed, this project will connect PCWA to SJWD distribution system piping. This project will allow PCWA to supply SJWD with approximately 2 mgd of emergency, drought, or dry year water. Additionally, the project will also allow SJWD to supply PCWA with water when available.

Alleviating Drought Impacts Identified in Attachment 2 / Four Eligible Drought Project Types:

- Without this intertie, SJWD is at risk of not meeting **existing drinking water demands** during severe drought or emergency.
- Immediate regional drought preparedness? No (construction completion = 02/07/2015)

Need for Expedited Funding: Due to the drought and risk of not meeting water supply needs, this is an unanticipated and unplanned project for SJWD and PCWA that was not included in the past budget documents or master planning efforts. As such, expedited funding is imperative.

Regional and Project Maps

The American River Basin Drought Response Program includes a regional map and seventeen individual project maps that are presented in the figures below.

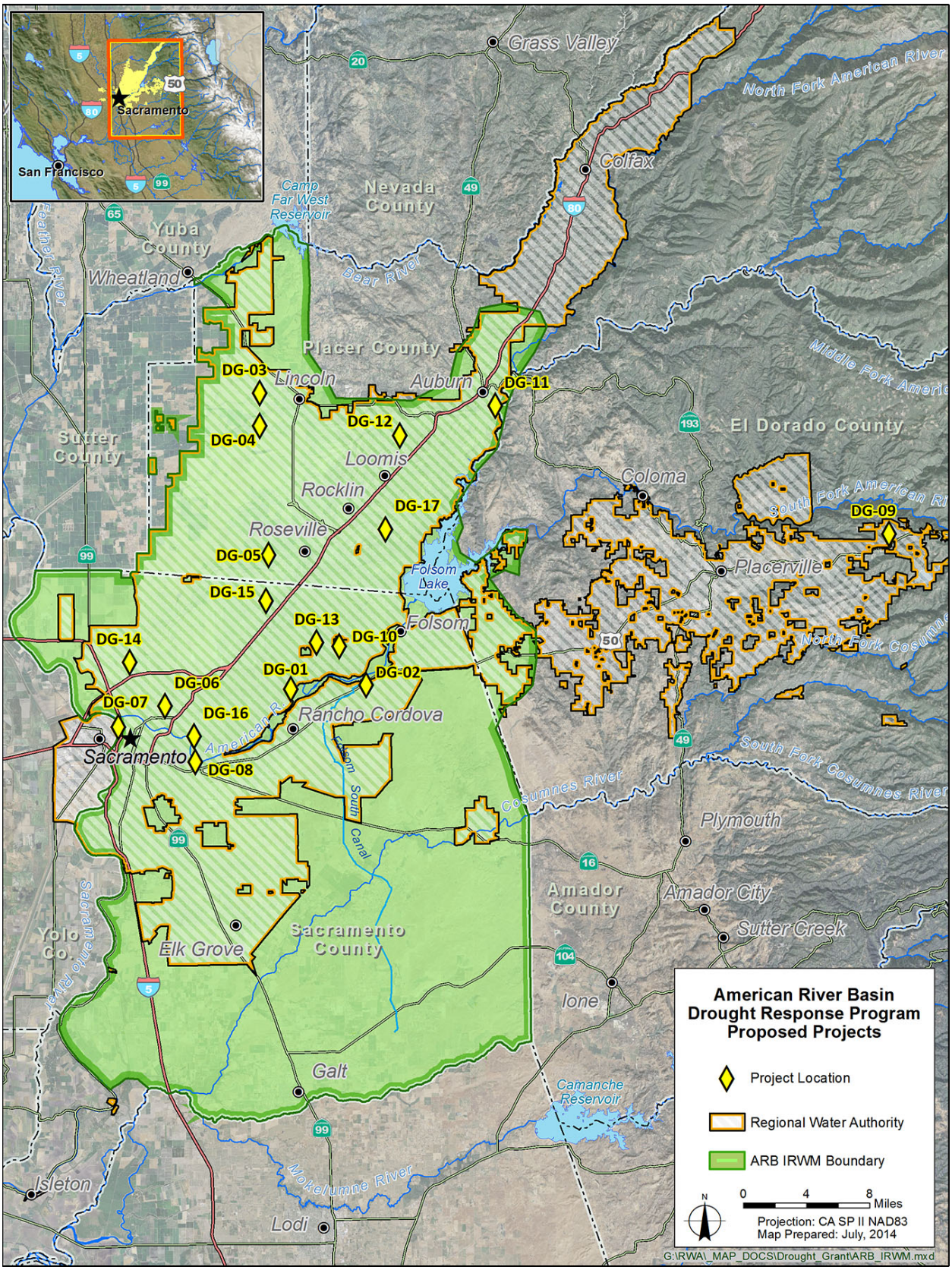


Figure 1: Regional Map displaying all 17 proposed project locations

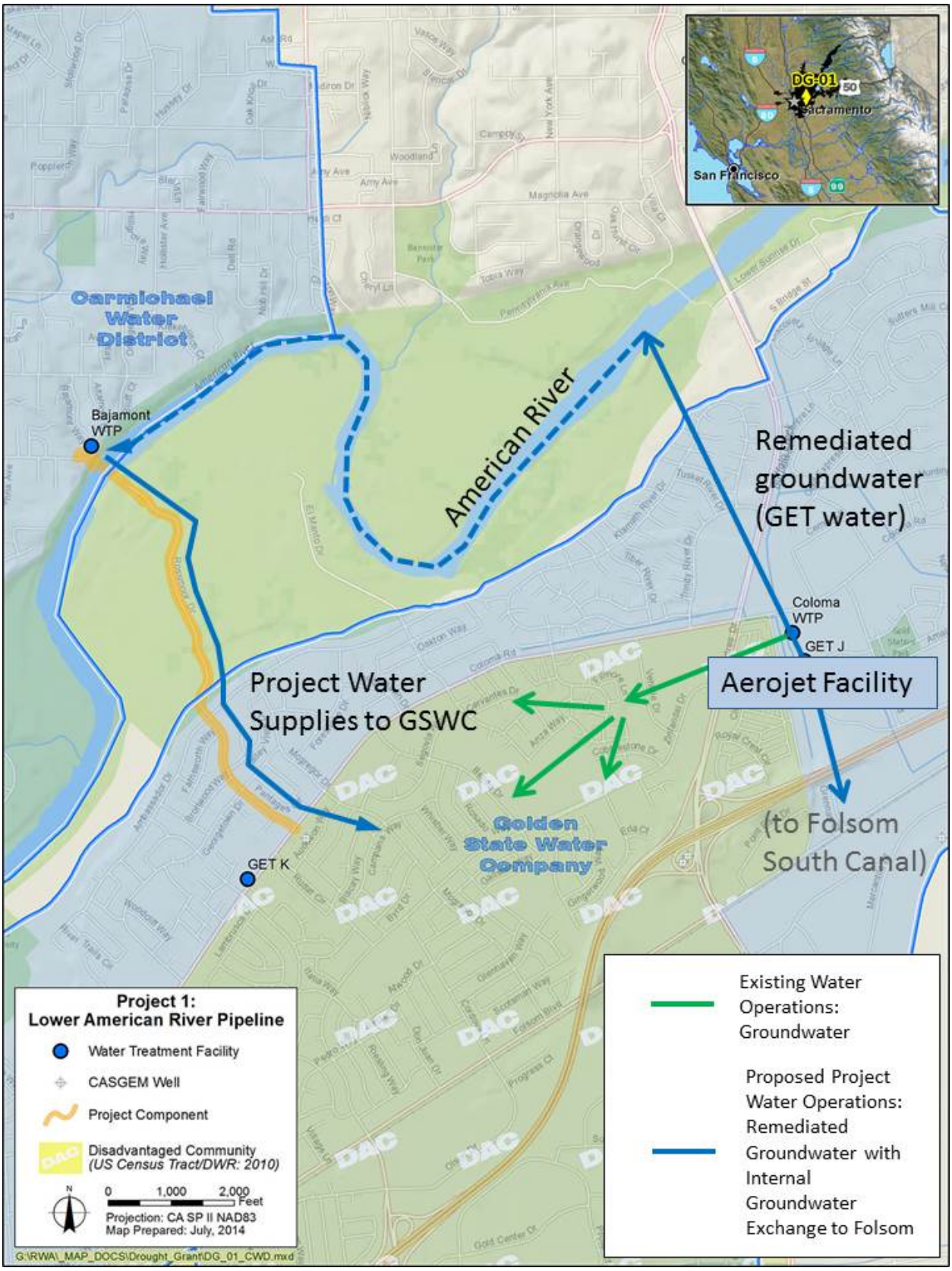


Figure 2: American River Basin Drought Response Program – Project 1

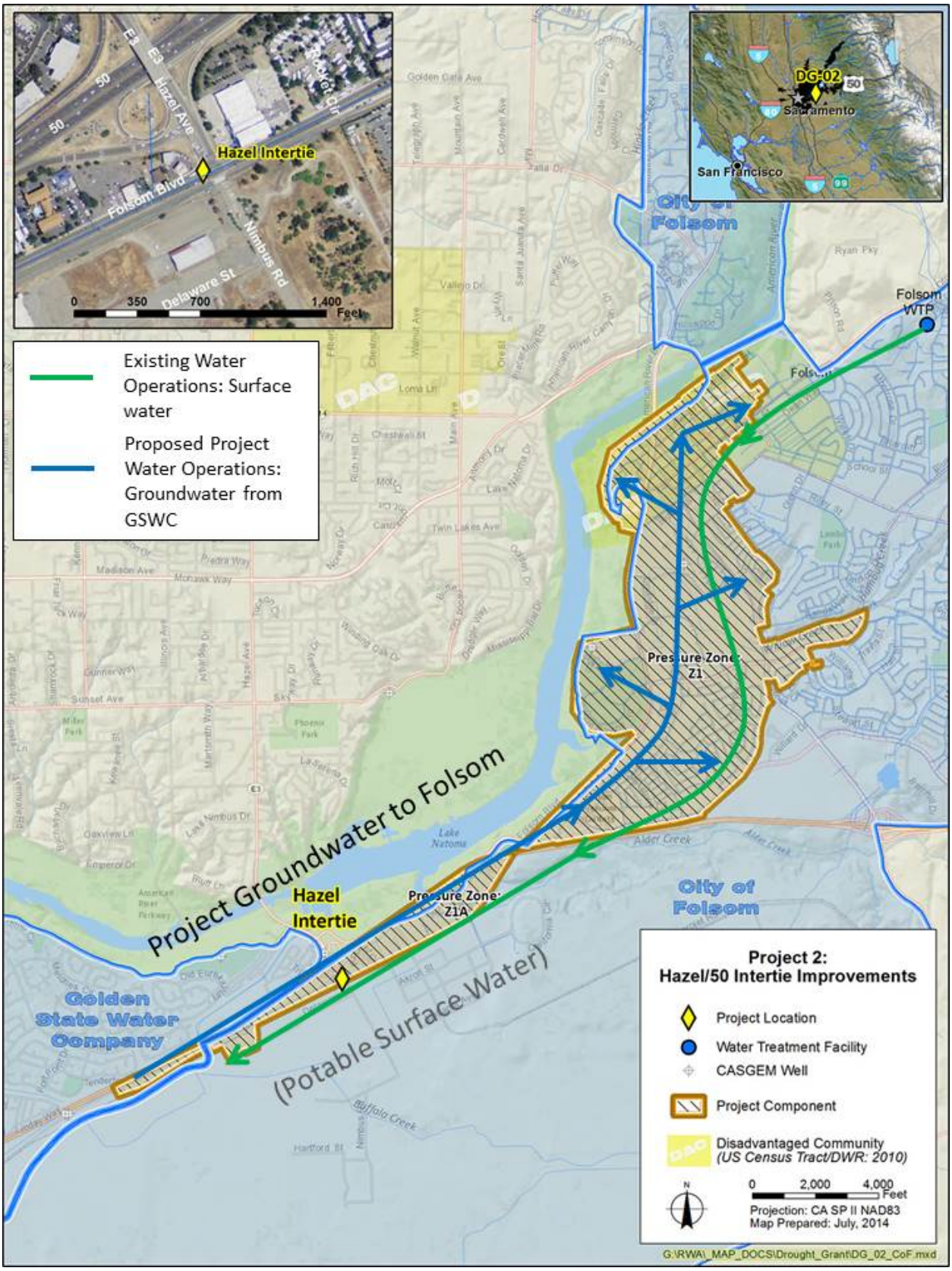


Figure 3: American River Basin Drought Response Program – Project 2

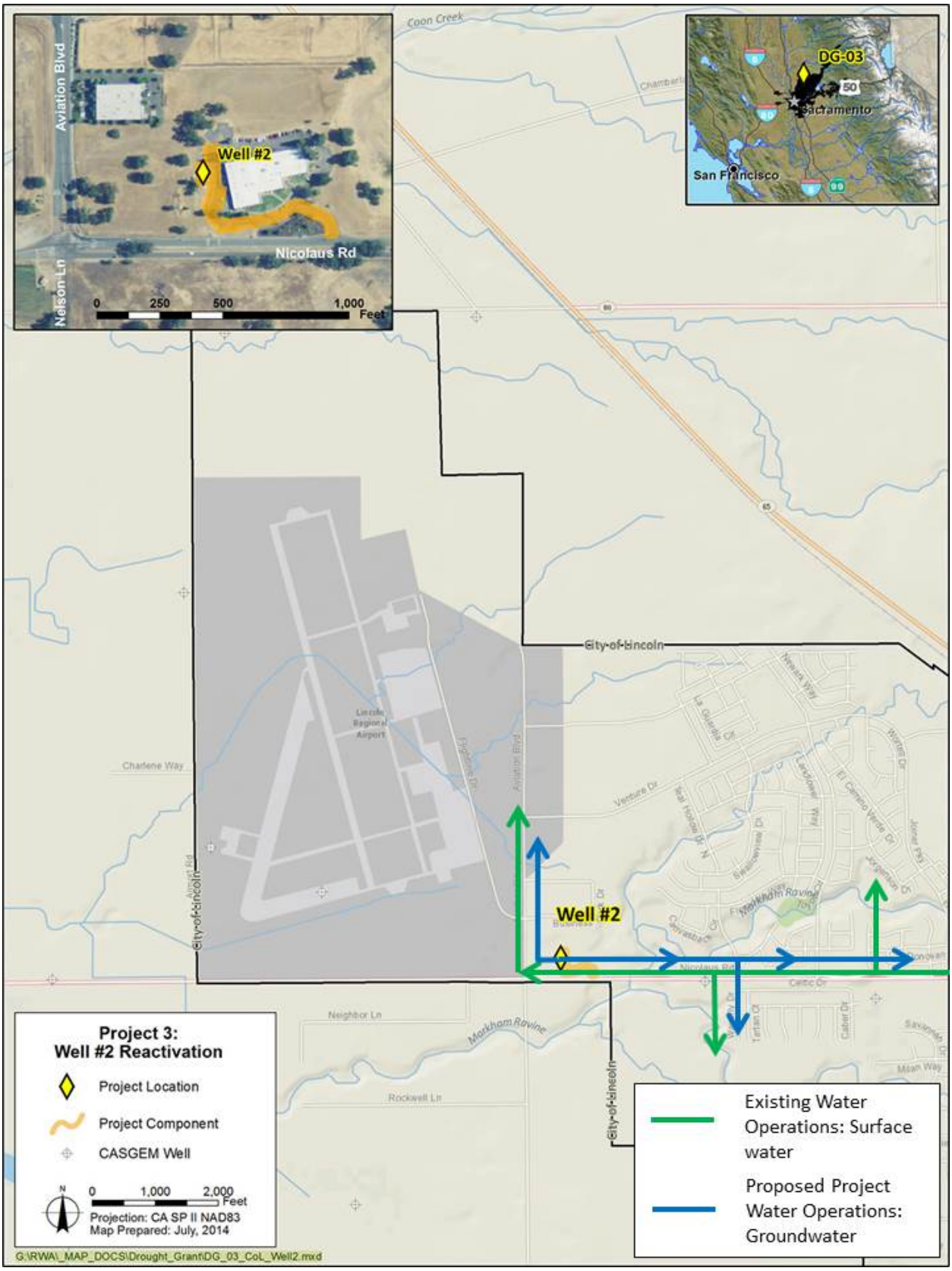


Figure 4: American River Basin Drought Response Program – Project 3

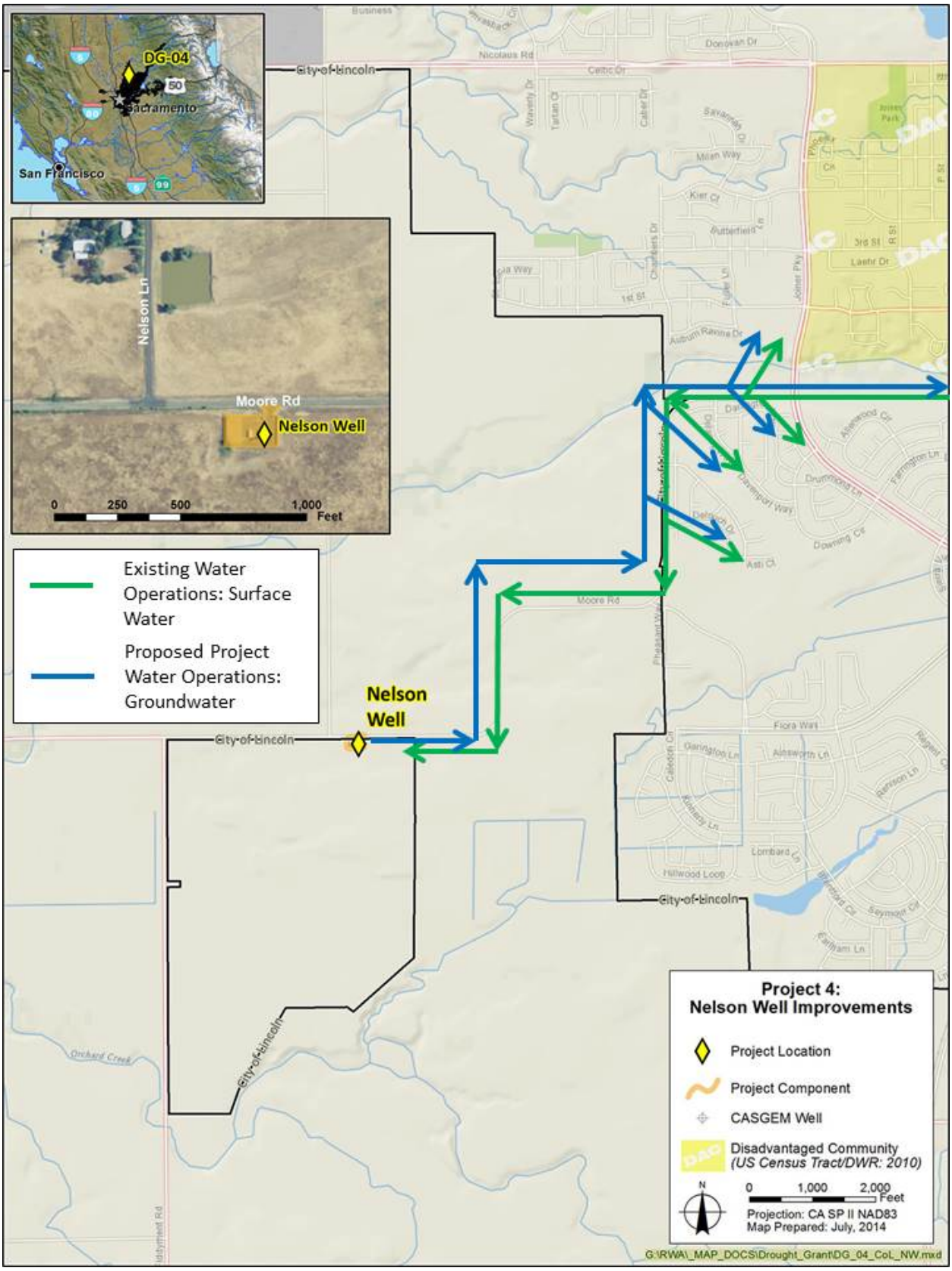


Figure 5: American River Basin Drought Response Program – Project 4

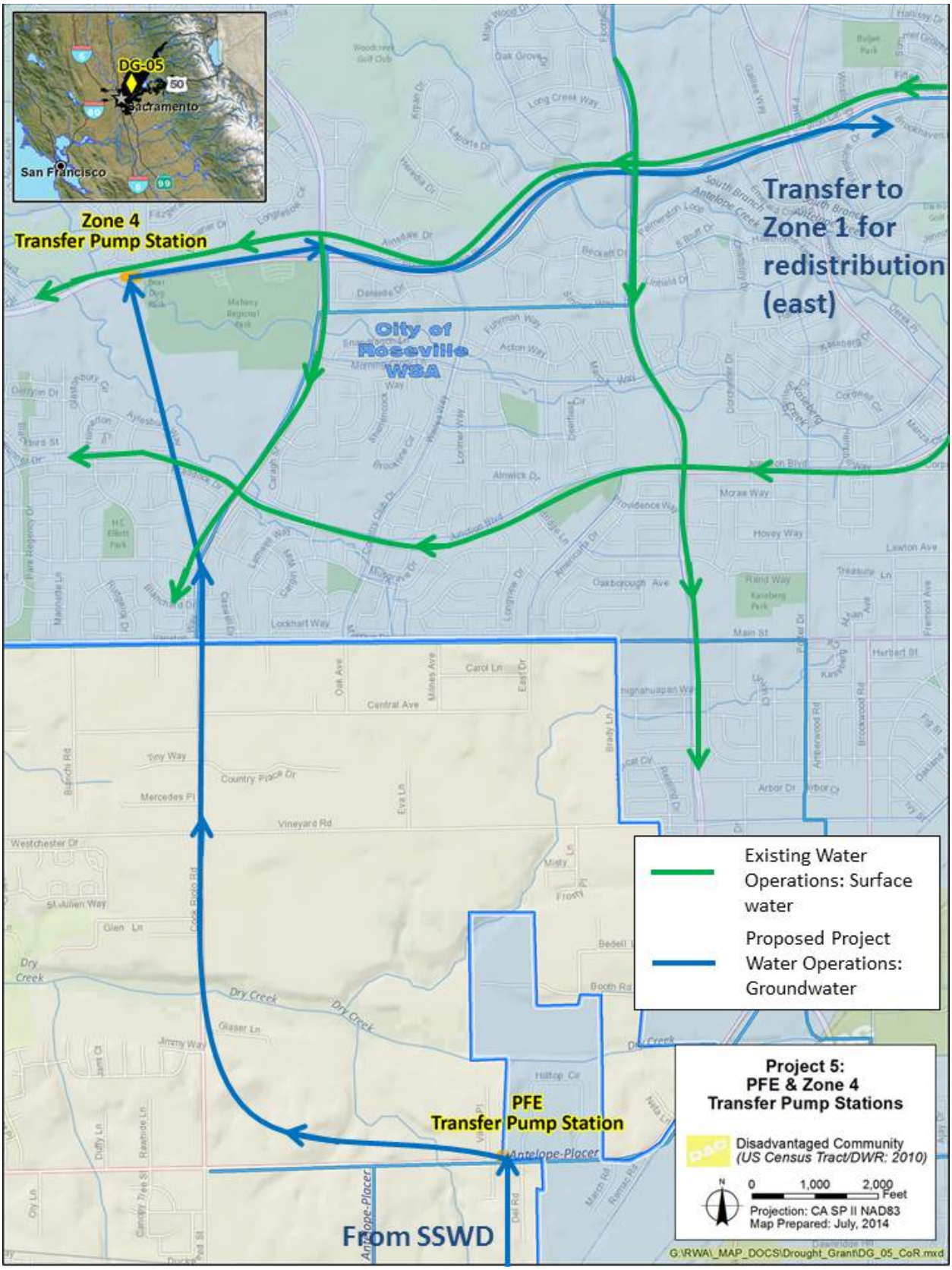


Figure 6: American River Basin Drought Response Program – Project 5

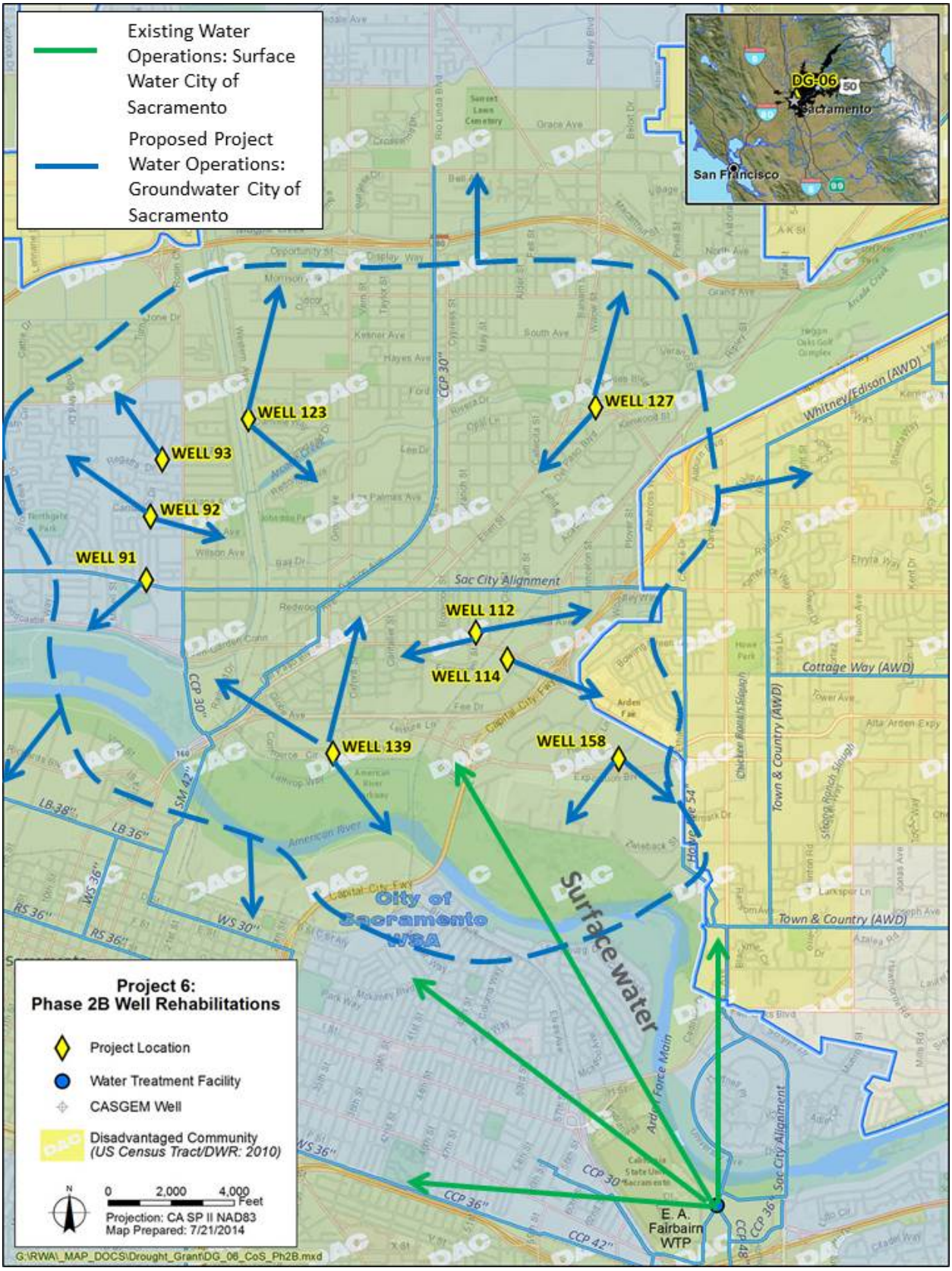


Figure 7: American River Basin Drought Response Program – Project 6

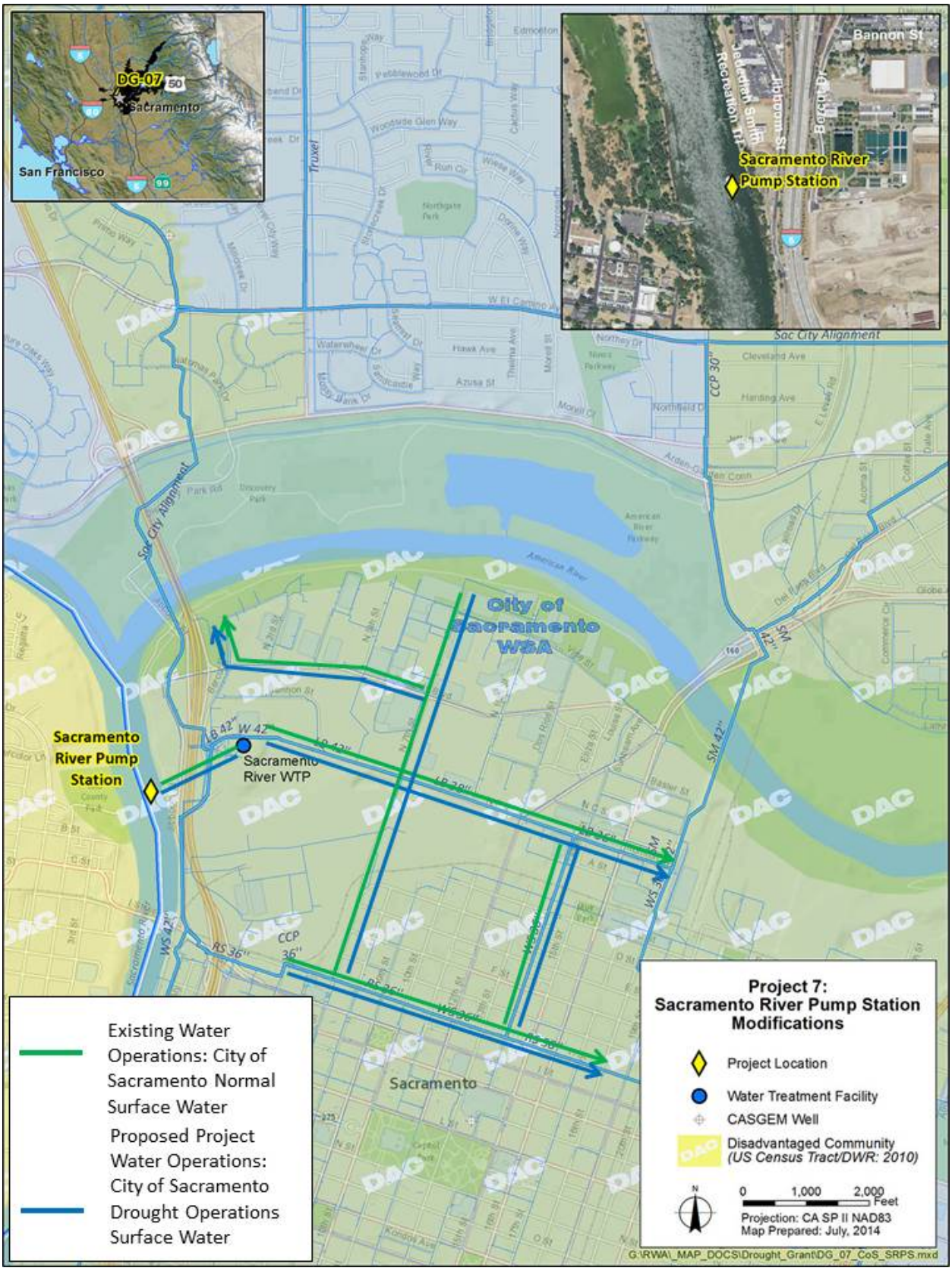


Figure 8: American River Basin Drought Response Program – Project 7

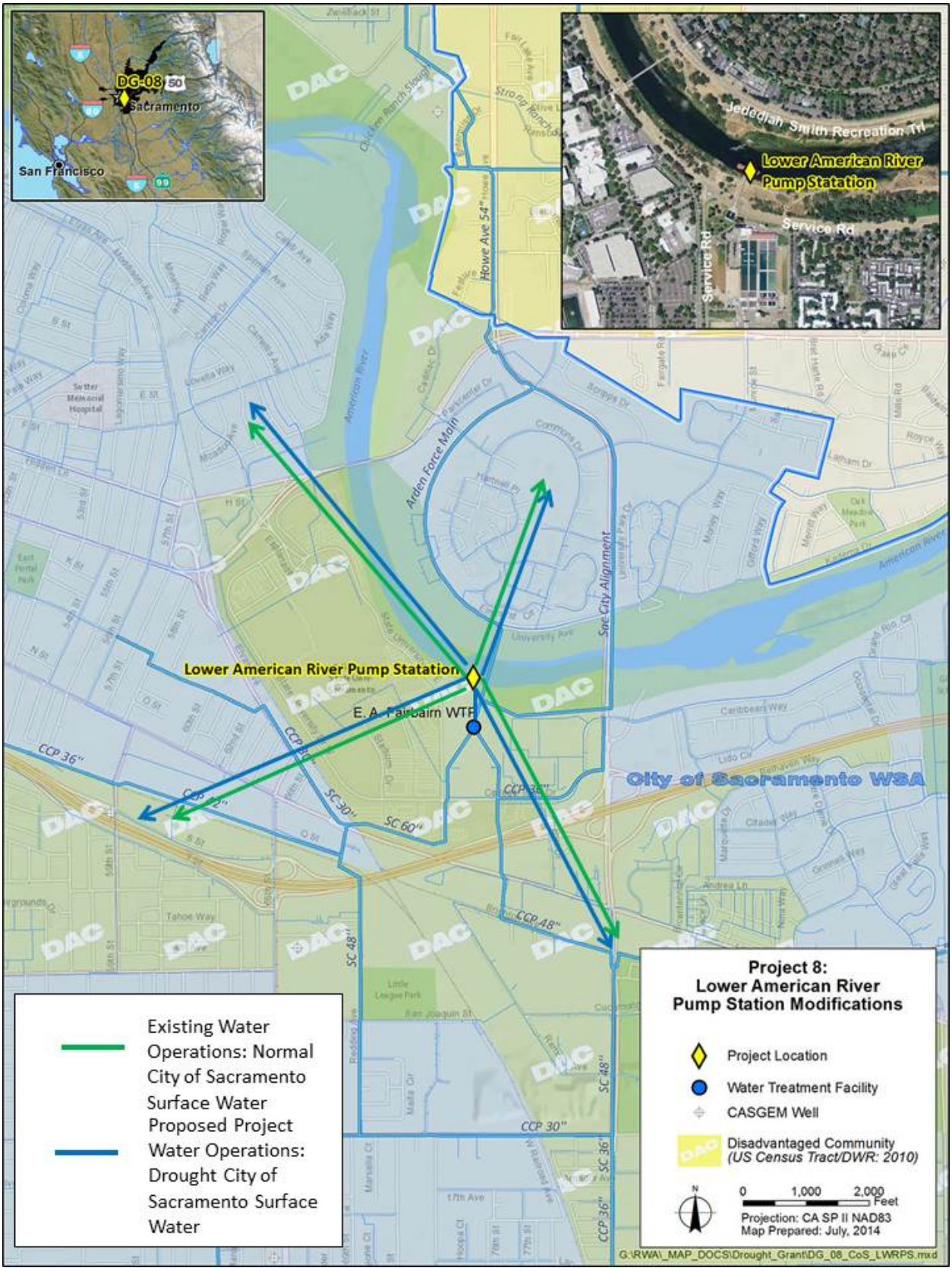


Figure 9: American River Basin Drought Response Program – Project 8

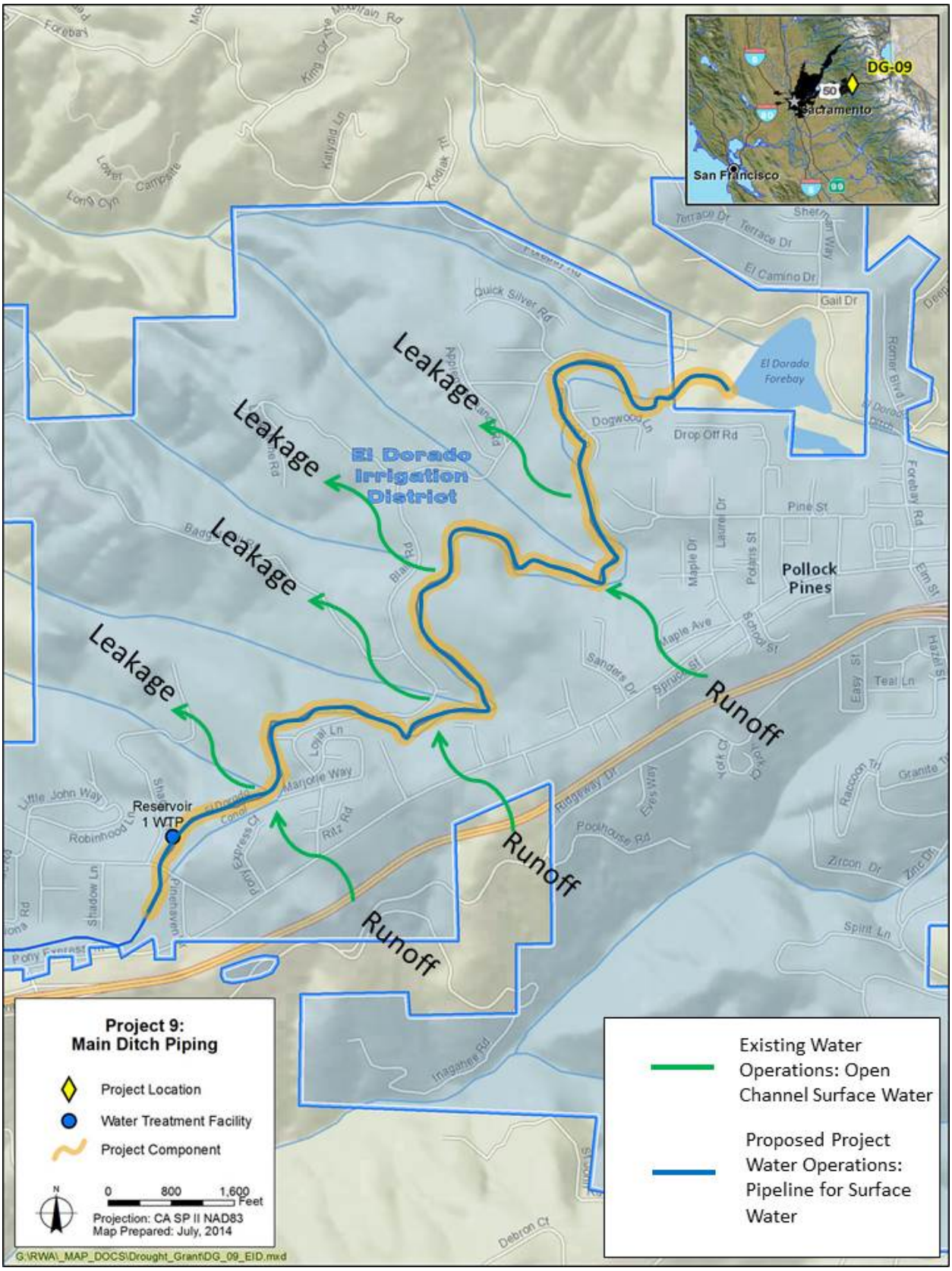


Figure 10: American River Basin Drought Response Program – Project 9

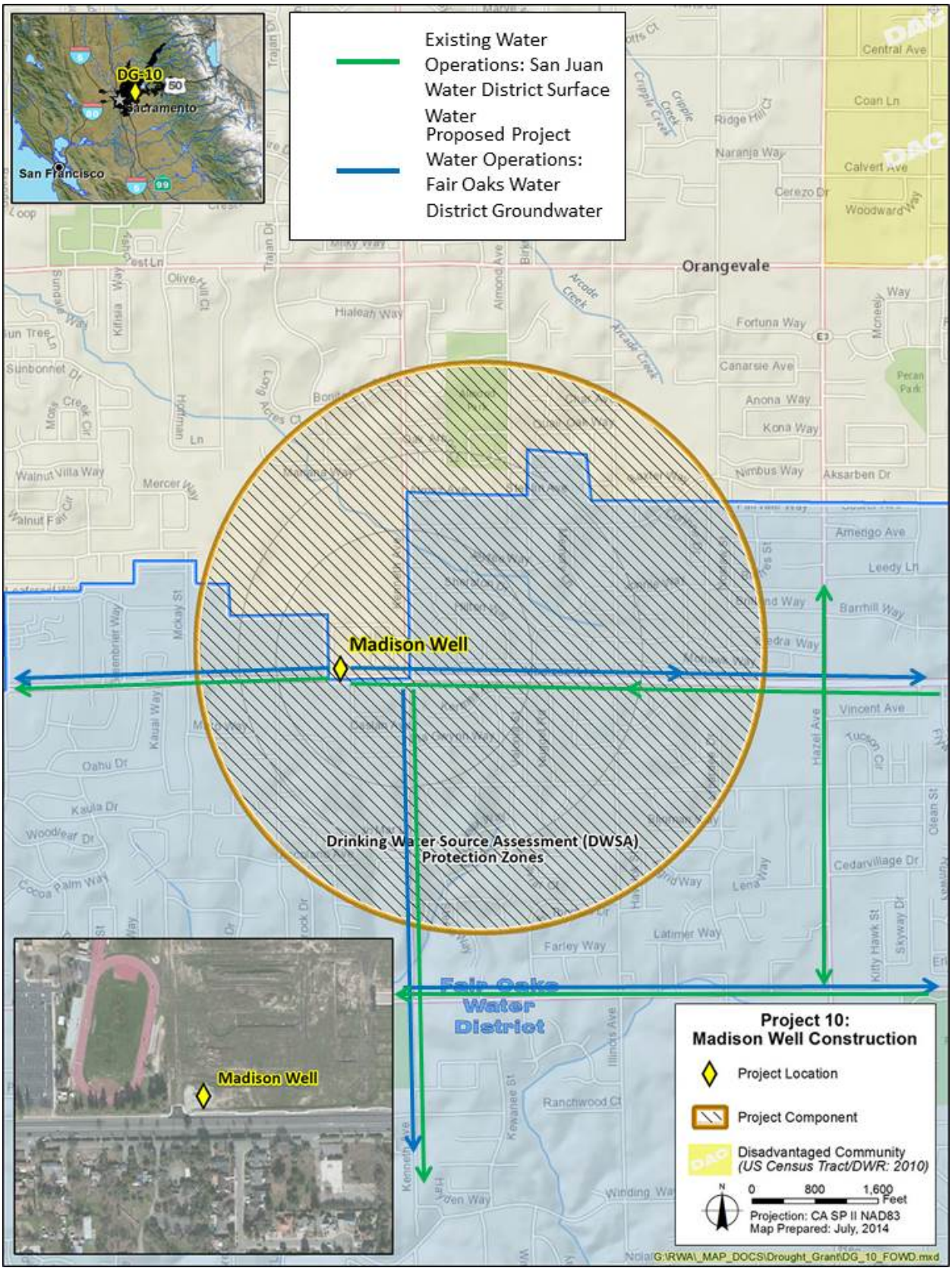


Figure 11: American River Basin Drought Response Program – Project 10

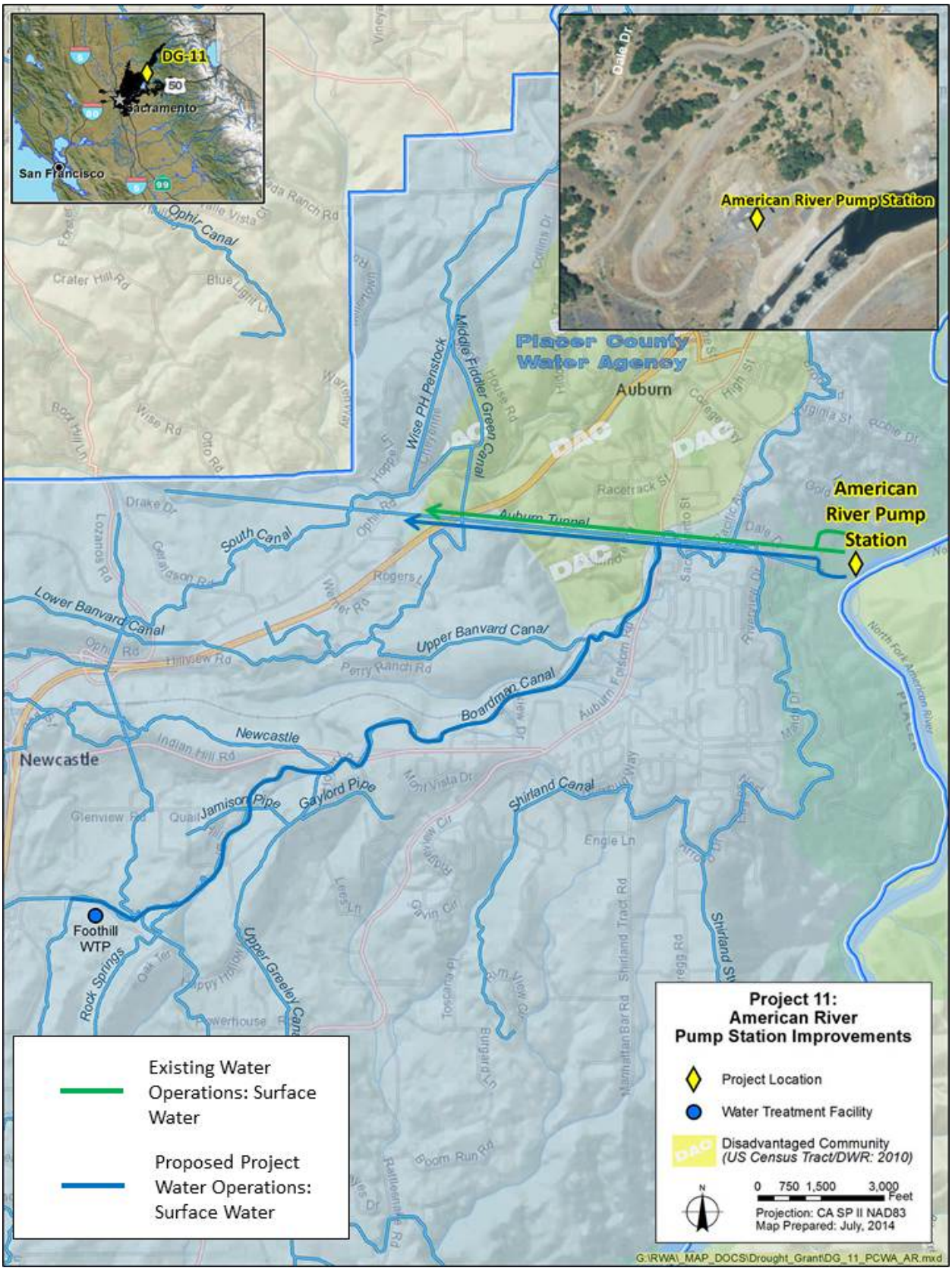


Figure 12: American River Basin Drought Response Program – Project 11

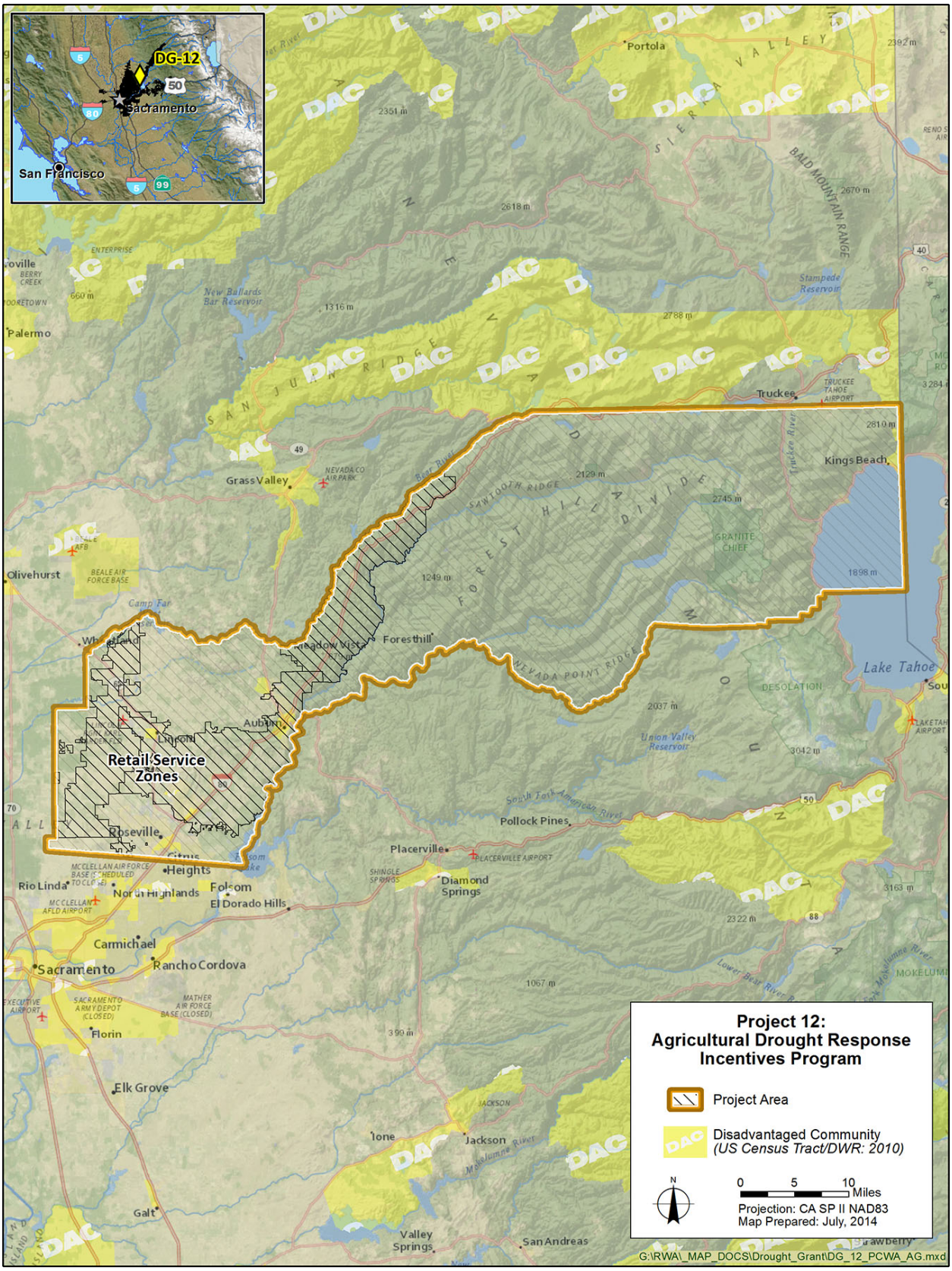


Figure 13: American River Basin Drought Response Program – Project 12

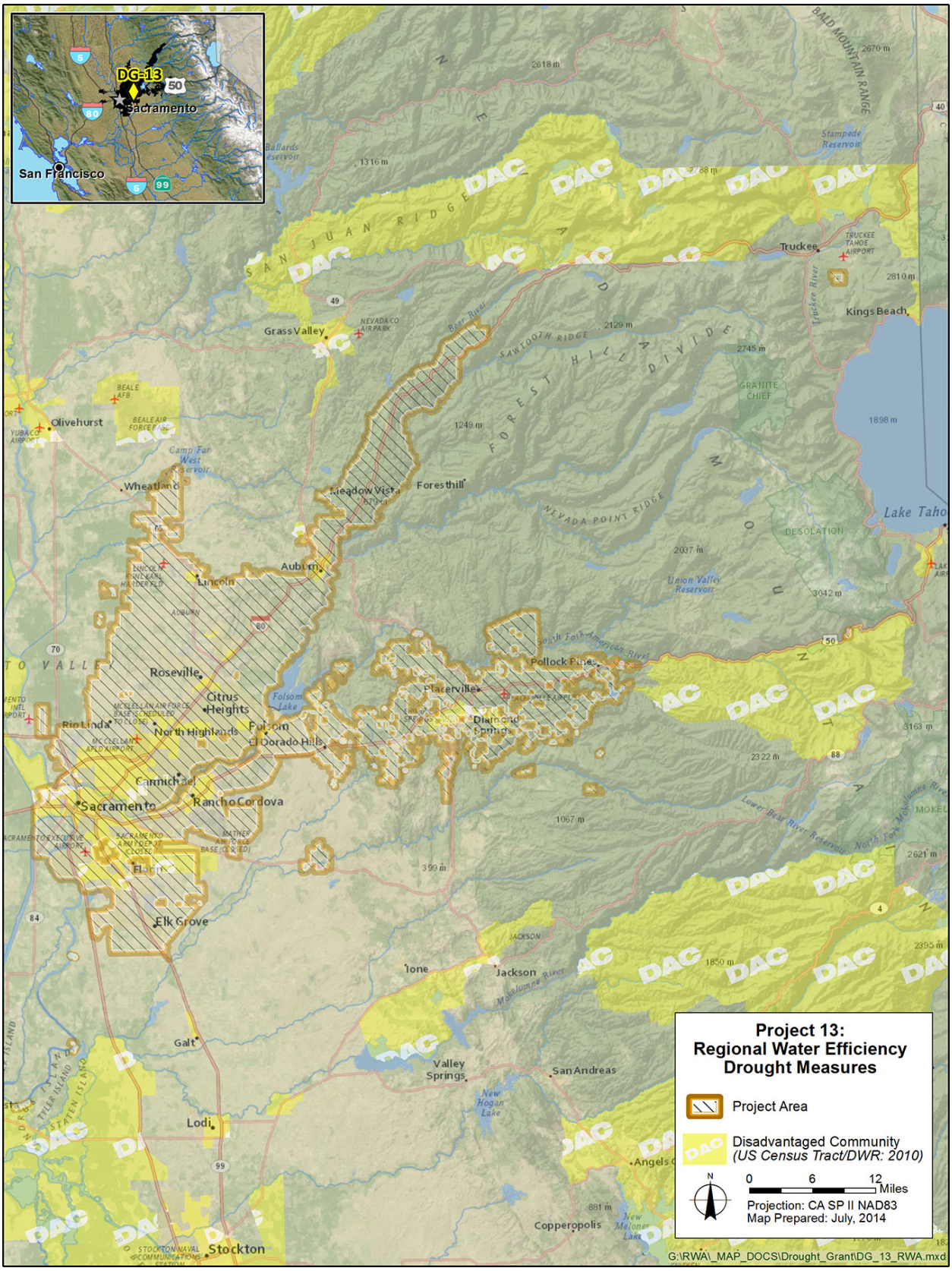


Figure 14:American River Basin Drought Response Program – Project 13

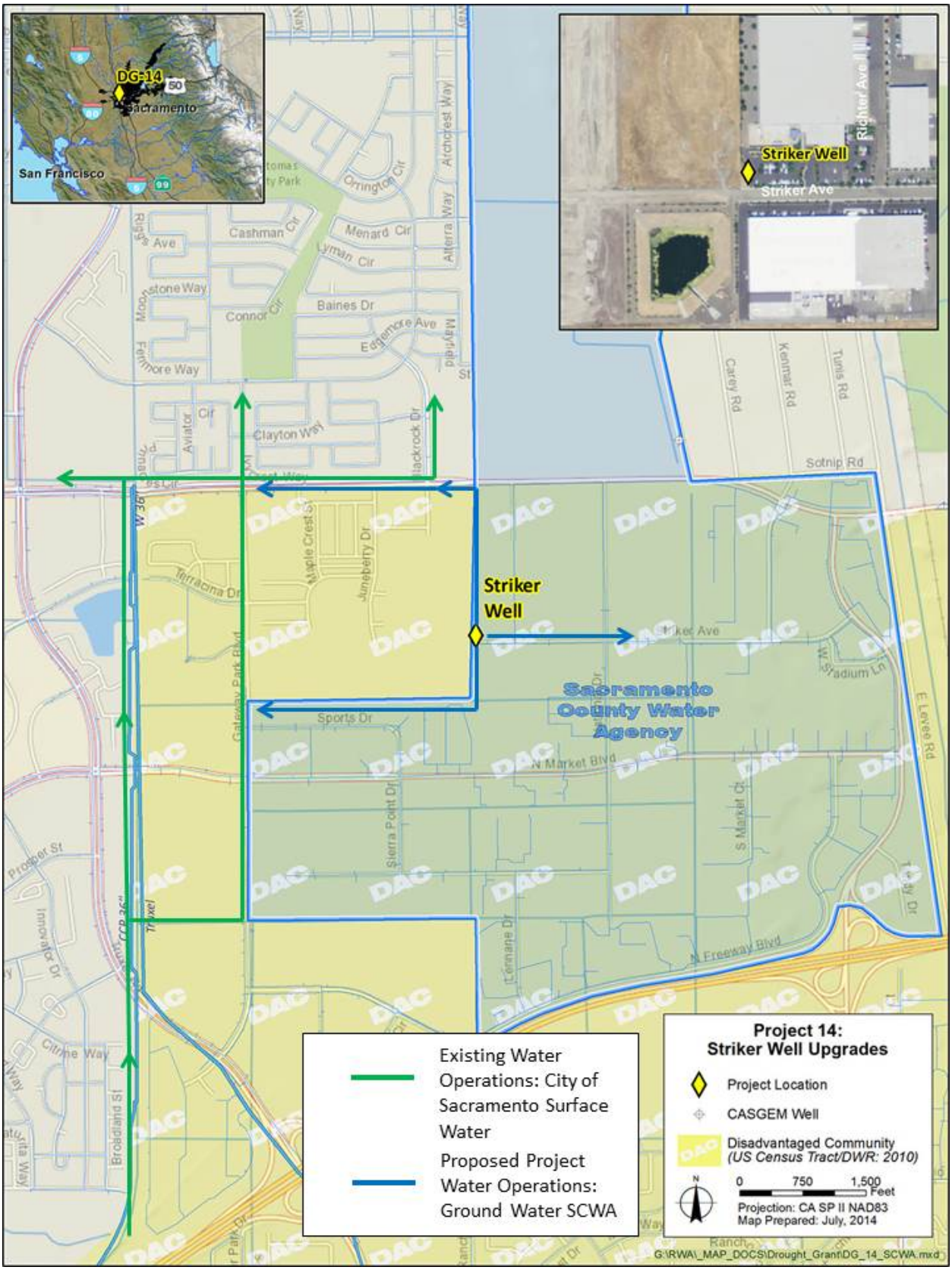


Figure 15:American River Basin Drought Response Program – Project 14

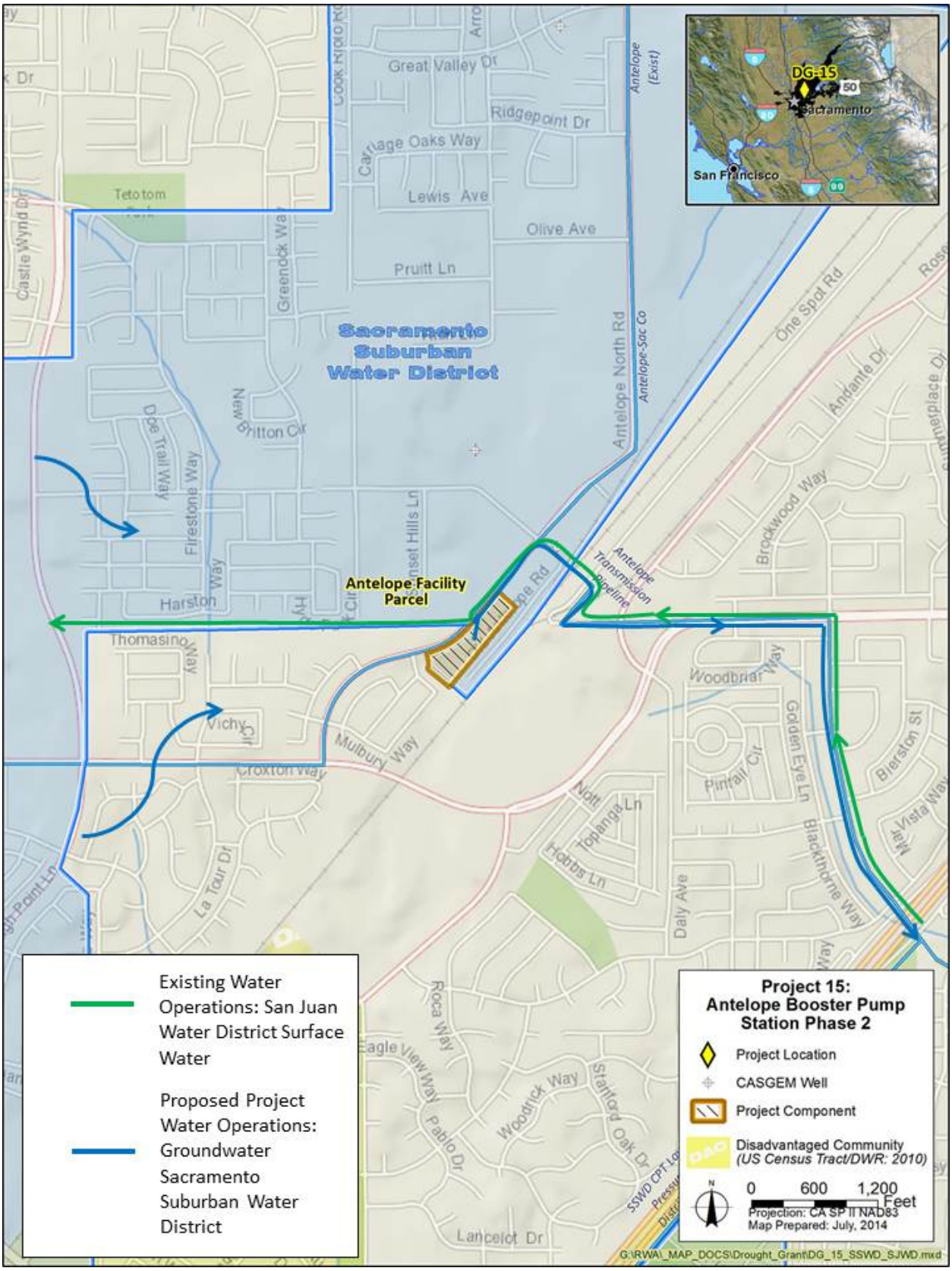


Figure 16: American River Basin Drought Response Program – Project 15

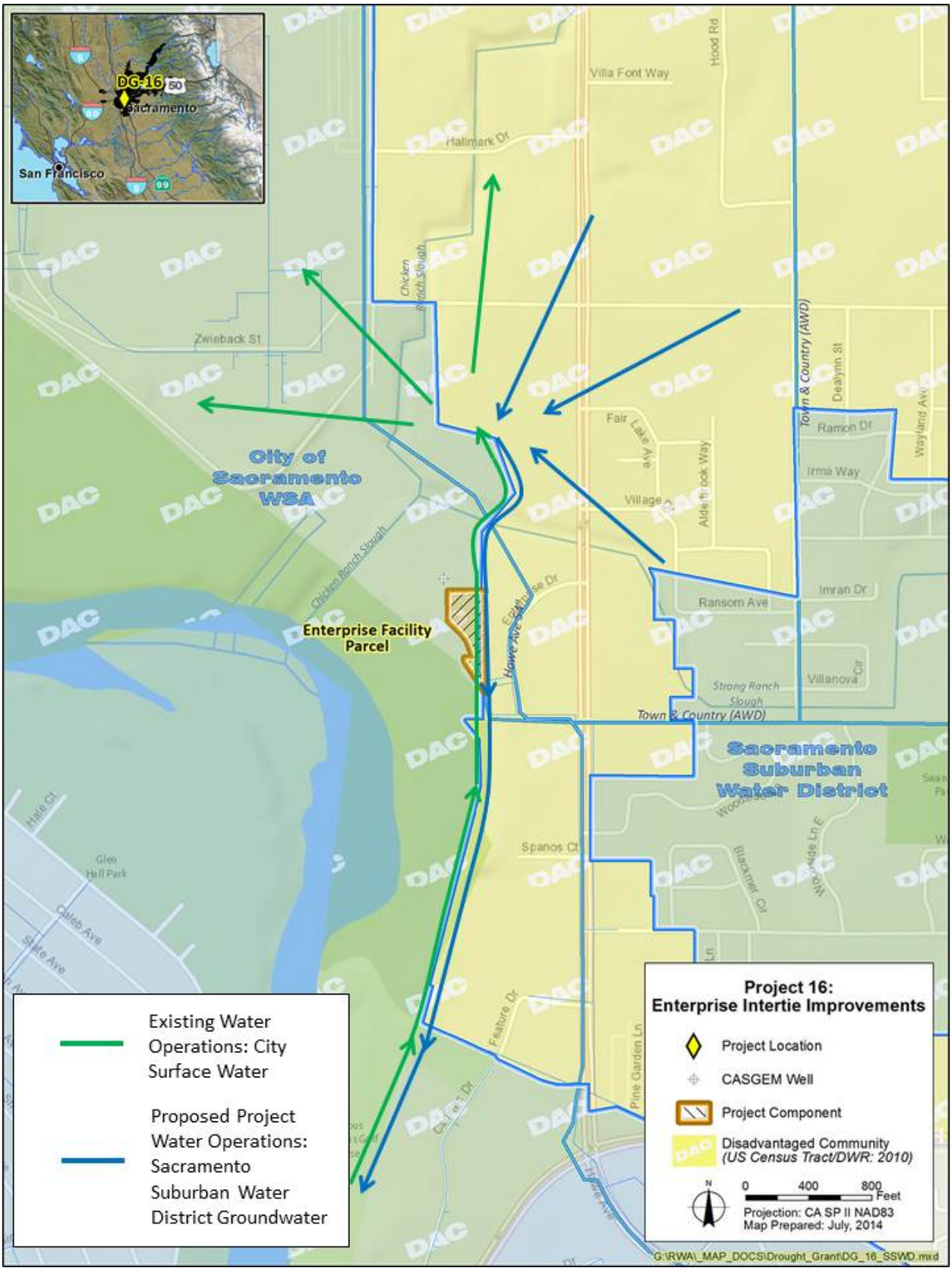


Figure 17:American River Basin Drought Response Program – Project 16

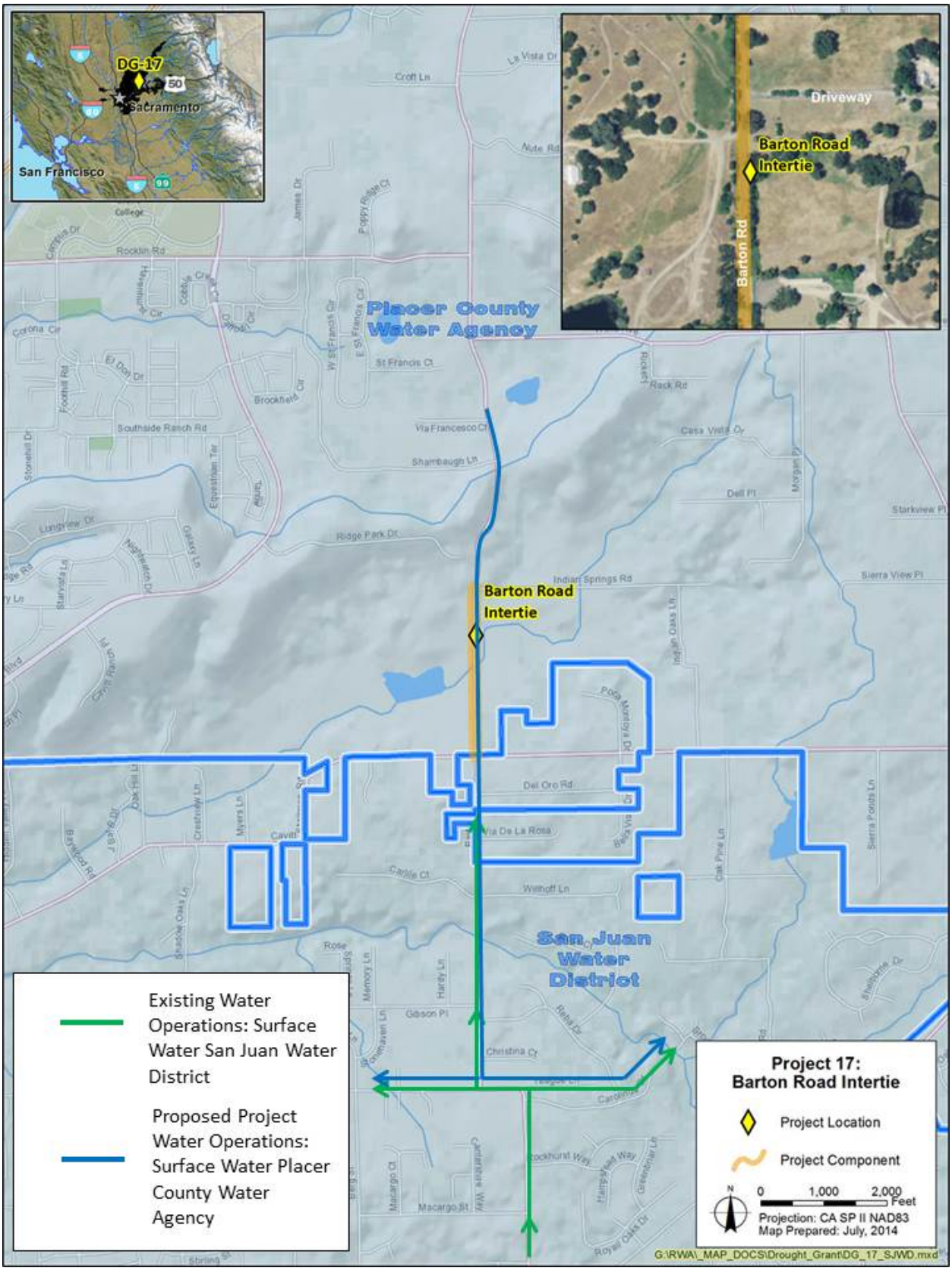


Figure 18:American River Basin Drought Response Program – Project 17

Project Physical Benefits

This section presents the expected measurable accomplishments of the proposed projects. Physical benefits are quantified and presented below in DWR's Table 5, provided in the PSP.

Project 1: Lower American River Pipeline

Implementing agency: Carmichael Water District

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Acre-feet per year (AFY) Additional Information About this Benefit: This is a drought-proof reliable water supply that will be available in all water year conditions.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (c) – (b)
50 (all hydrologic year types)	19,850 AFY	24,850 AFY	5,000 AFY
Comments: Source: Golden State Water Company 2010 Urban Water Management Plan, Page 6-3 Table 6-1 Projected Normal Year Supply Availability for the Cordova System in AFY from the year 2020 through 2035 (GSWC, 2010). This project will provide a vehicle for conveying granted remediated water supply to Golden State Water Company's Cordova System to address previously lost groundwater pumping capacity due to contamination. (a) The 50 year duration was selected as the minimum expected service life of the pipe; actual service life may exceed 80 to 100 years.			

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Environmental Benefits Units of the Benefit Claimed : Acres Additional Information About this Benefit: Habitat area restored and hydrologically reconnected to the American River.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
50	0 Acres	0.25 Acres	0.25 Acres
Comments: Project will improve 0.25 acres of land.			

Project 2: Hazel/50 Intertie Improvements

Implementing agency: City of Folsom

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Gallons per minute (gpm) Additional Information About this Benefit: Provides groundwater water supply from Golden State Water Company to the City of Folsom and reduces surface water required from Folsom Reservoir			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
50	0 gpm	2,000 gpm	2,000 gpm
Comments: (a) Based on the service life of the equipment; this duration may be longer depending on how often it is operated and the level of maintenance performed. These will be permanent improvements and as such should be in the ground until they are no longer needed. (b) Currently the intertie only allows water to be delivered from the City of Folsom to Golden State Water Company. Intertie upgrades would allow water to be pumped from Golden State Water Company to the City of Folsom. (c) This is what will be available during drought conditions, which are not likely to last a whole year, but the infrastructure will be ready to turn on at any time and provide the benefit. Golden State Water Company will provide this through existing groundwater wells and will turn on some wells that are not currently used to meet their demands.			

Project 3: Well #2 Reactivation

Implementing agency: City of Lincoln

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Gallons Per Minute (gpm) Additional Information About this Benefit: This project will allow conjunctive use of Groundwater to free supplies for other users in the region.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
25	0 gpm	800 gpm	800 gpm
Comments: Given that the well is currently offline there is no comparison for units without the project. The City of Lincoln expects to be able to run this well for approximately half of the year offsetting as much as 640 Acre-feet of surface water. This water would then be available for other PCWA users of available for regional users downstream of PCWA's American River Pumping Station located in Auburn (PCWA, 2014, pages 1-2).			

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water quality improvement Units of the Benefit Claimed : Cubic feet per second (cfs) Additional Information About this Benefit: The use of this well will offset 2 cfs of American River Water			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
25	(Low August and September flows) 37 cfs	(low August and September flows) 39 cfs	2 cfs

Comments: Utilizing a supply from this well will result in a like amount of surface water not being diverted. This water will be allowed to remain in the American River to meet LAR and Delta water quality needs.
DWR Station A7310000, located on the American River near Auburn shows ends of summer flows as low as 37 cfs. Data also shows increases in hardness, EC, dissolved sodium, and PH when flows are reduced. Leaving water in the river would serve to dilute constituents entering the river downstream of the diversion point. It should be noted that these measurements of constituents date back into the 1960's as no more recent data is available.

Additionally it should be noted that USGS Gauge AMA located on the American River has 6 times measured monthly total flows averaging less than 37 cfs and once measured 0 AF of total flow in the month of September. All of these low measured months were in August and September.

Gage Data Sources Provided below-
DWR A7310000:
http://www.water.ca.gov/waterdatalibrary/includes/include_wqstation_details.cfm?qst_id=2254&sampleID=WDIS_0882644

USGS Gauge AMA: http://cdec.water.ca.gov/cgi-progs/selectQuery?station_id=AMA&sensor_num=66&dur_code=M&start_date=1912-01-01&end_date=2014-07-01&geom=

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Environmental Benefit Units of the Benefit Claimed : Acre-feet/year (AFY) Additional Information About this Benefit: The use of this well will offset 800GPM of American River Water			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
25	200,000 AFY	200,640 AFY	640 AFY

Comments: Utilizing the supply from this well will result in a like amount of surface water not being diverted. This water would remain in the American River benefitting fish flows and fish habitat in the American River watershed. Flows in the lower American are subject to the amount of storage in Folsom Reservoir and the years inflow into the reservoir. Based on the current storage into Folsom, sever conservation will be mandatory to prevent Folsom from reaching deadpool levels. 2014 is looking more like the falls of 90,91, and 92 where the reservoir was left with little usable water in storage and an apparent volume of only 200,000 AF going into the 2014-2015 Water Year.
Source: http://www.waterforum.org/DraftPolicyDoc-final.pdf
http://cdec.water.ca.gov/cdecapp/resapp/resDetailOrig.action?resid=FOL

Project 4: Nelson Well Improvements

Implementing agency: City of Lincoln

Table #5 – Annual Project Physical Benefits
Type of Benefit Claimed: Water Supply Produced
Units of the Benefit Claimed : Acre-feet per year (AFY)
Additional Information About this Benefit: This project will allow conjunctive use groundwater to free surface water supplies for other users in the region.

(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
25	0 AFY	1600 AFY	1,600 AFY

Comments: Given that the well is currently offline there is no comparison for units without the project. The City of Lincoln expects to be able to run this well for approximately half of the year offsetting as much as 1,600 Acre-feet of surface water. This water would then be available for other PCWA users of available for regional users downstream of PCWA's American River Pumping Station located in Auburn.
Source: http://www.pcwa.net/files/News_Releases/2014/04-11-2014_PCWA_Calls_for_Water_Conservation.pdf

Table #5 – Annual Project Physical Benefits
Type of Benefit Claimed: Water quality improved
Units of the Benefit Claimed : Cubic feet per second (cfs)
Additional Information About this Benefit: The use of this well will offset 5 cfs of American River Water

(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
25	(low August and September flows) 37 cfs	low August and September flows) 43 cfs	5 cfs

Comments: Utilizing a supply from this well will result in a like amount of surface water not being diverted. This water will be allowed to remain in the American River to meet LAR and Delta water quality needs.
DWR Station A7310000, located on the American River near Auburn shows ends of summer flows as low as 37 cfs. Data also shows increases in hardness, EC, dissolved sodium, and PH when flows are reduced. Leaving water in the river would serve to dilute constituents entering the river downstream of the diversion point. It should be noted that these measurements of constituents date back into the 1960's as no more recent data is available.

Additionally it should be noted that USGS Gauge AMA located on the American River has 6 times measured monthly total flows averaging less than 37 cfs and once measured 0 AF of total flow in the month of September. All of these low measured months were in August and September.

Gage Data Sources Provided below-
DWR A7310000:
http://www.water.ca.gov/waterdatalibrary/includes/include_wqstation_details.cfm?qst_id=2254&sampleID=WDIS_0882644

USGS Gauge AMA: http://cdec.water.ca.gov/cgi-progs/selectQuery?station_id=AMA&sensor_num=66&dur_code=M&start_date=1912-01-01&end_date=2014-07-01&geom=

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Environmental Benefit Units of the Benefit Claimed : Acre-feet/year (AFY) Additional Information About this Benefit: The use of this well will offset 1,600 AFY of American River Water			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
25	200,000 AFY	201,600 AFY	1,600 AFY
Comments: Utilizing the supply from this well will result in a like amount of surface water not being diverted. This water would remain in the American River benefitting fish flows and fish habitat in the American River watershed. Flows in the lower American are subject to the amount of storage in Folsom Reservoir and the years inflow into the reservoir. Based on the current storage into Folsom, sever conservation will be mandatory to prevent Folsom from reaching deadpool levels. 2014 is looking more like the falls of 90, 91, and 92 where the reservoir was left with little usable water in storage and an apparent volume of only 200,000 AF going into the 2014-2015 Water Year. Source: http://www.waterforum.org/DraftPolicyDoc-final.pdf http://cdec.water.ca.gov/cdecapp/resapp/resDetailOrig.action?resid=FOL			

Project 5: PFE and Zone 4 Transfer Pump Stations

Implementing agency: City of Roseville

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Million gallons per year Additional Information About this Benefit: Proposed pumps increase access to available groundwater, stored through a conjunctive use program, to meet the minimum level of service during this drought.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
30	0 million gallons per year	1560 million gallons per year	1560 million gallons per year
Comments: (b) The without project benefit is 0, because there is no existing infrastructure that can deliver groundwater from Sacramento Suburban Water District to Roseville nor infrastructure that can move water from a lower elevation Zone 4 to a higher elevation Zone 1 within Roseville. Roseville operates a gravity water distribution system. (c) 15.6 MGD * 100 days = 1560 million gallons per year Up to 7 MGD from SSWD and 8.6 MGD from zone 4. (d) It is assumed that, on average, Roseville would pump about 100 days per year during drought conditions and utilizing the City's existing ASR capabilities during normal years.			

Project 6: Phase 2B Well Rehabilitations

Implementing agency: City of Sacramento

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Million gallons per day (MGD) Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
30	0 MGD	7.7 MGD	7.7 MGD
Comments: (a) Based on the expected service life of the rehabilitated wells. (b) Currently no water is being pumped from these nine wells because they were taken out of service for restoration work and testing.			

Project 7: Sacramento River Pump Station Modifications

Implementing agency: City of Sacramento

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Million gallons per day (MGD) Additional Information About this Benefit Low river levels threatens approximately 40% of the drinking water supply			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
70	0 MGD	130 MGD	130 MGD
Comments: (a) 70 years is the expected life cycle on non-mechanical stainless steel structure such as a vortex breaker. The electrical components associated with vibration monitoring will have a reduced expected lifespan of 25 years until replacement is required. (b) If river levels continue to drop, no water can be pumped with the existing facility. (c) Facility is designed to produce 160 mgd, but process restriction limit flow to 130 mgd.			

Project 8: Lower American River Pump Station Modifications

Implementing agency: City of Sacramento

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed: Million gallons per day (MGD) Additional Information About this Benefit: Low river levels threatens approximately 40% of the drinking water supply			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
70	0 MGD	65-100 MGD	65-100 MGD

Comments:
(a) 70 years is the expected life cycle on non-mechanical stainless steel structure such as a vortex breaker. The electrical components associated with vibration monitoring will have a reduced expected lifespan of 25 years until replacement is required.
(b) If river levels continue to drop, no water can be pumped with the existing facility.
(c) During reduced river releases the intake is legally restricted to 65-100 mgd (Hodge decision to be found in the City's 2010 UWMP, page 54). The specific diversion limitation within that range is a function of the month when these "Hodge flows" are in effect.

Project 9: Main Ditch Piping

Implementing agency: El Dorado Irrigation District

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply saved Units of the Benefit Claimed : Acre-feet per year (AFY) Additional Information About this Benefit: Assists in meeting the goal of 20% conservation by 2020 for EID and California by reducing leakage and losses.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
100	13,780 AFY	15,080 AFY	1,300 AFY

Comments:
(a) Life expectancy of 100 years is based on the industry accepted life-expectancy of HDPE pipe with proper installation and maintenance.
(b) Derived from (c) and (d) below
(c) The total water supply available for diversion at this point is 15,080 acre-feet/year based on historical availability.
(d) Average loss based on flow measurements. Losses vary by flow rates and weather conditions.

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water quality improved Units of the Benefit Claimed : mg/l, NTU Additional Information About this Benefit : Eliminates turbidity and coliforms, as without project the ditch will remain susceptible to contamination.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
100	varied	0	eliminated

Comments:
(a) Life expectancy of 100 years is based on the industry accepted life-expectancy of HDPE pipe with proper installation and maintenance.
(c) Contamination from an open ditch will be eliminated once piped.

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Renewable Energy Produced Units of the Benefit Claimed : Megawatt-hour (MWhr) annually Additional Information About this Benefit: Helps meet State of California mandate of holding an energy portfolio that includes 33% renewable energy by the year 2020.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
100	0 MWhr	785 MWhr	785 MWhr

Comments:
(a) Life expectancy of 100 years is based on the industry accepted life-expectancy of HDPE pipe with proper installation and maintenance. The water conserved through piping the Main Ditch can be used for renewable hydroelectric power generation at the existing El Dorado Powerhouse until such time as the water is needed for consumptive purposes. Buildout of the area is not expected for several decades and therefore, the water can be used for renewable energy production until that time.
(b) No renewable energy currently produced.
(c) Based on the efficiency rating of the El Dorado Powerhouse of 0.6 acre-feet/MWhr and 1,300 acre-feet of conserved water. This is enough energy to serve more than 100 households with certified renewable energy.

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Environmental Benefits: Units of the Benefit Claimed : Acre-feet/year (AFY) Additional Information About this Benefit : See comments below			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
100	0 AFY	1,300 AFY	1,300 AFY
Comments: Given that the project will result in an additional 1,300 acre-feet annually that will not be diverted from or will be sent back to the South Fork American River, the project will have a beneficial effect to listed and/or candidate species that may be present outside of the project area, but within the South Fork American River and lower American River. At this time the only listed species known to be present in the lower American River is the Central Valley Steelhead Distinct Population Segment, Central Valley Fall and Late Fall Run Chinook Salmon Evolutionary Significant Unit is currently designated as a Species of Concern. Both of these species will benefit from additional conserved water that will be available in the lower American River. (a) Life expectancy of 100 years is based on the industry accepted life-expectancy of HDPE pipe with proper installation and maintenance. (b) Assumed equal to the amount of water supply conserved.			

Project 10: Madison Well Construction

Implementing agency: Fair Oaks Water District

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Acre-feet/year (AFY) Additional Information About this Benefit: Groundwater extraction allows reduction of surface water consumption from the American River.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
40	0 AFY	540 AFY	540 AFY
Comments: The Madison Well will be equipped based on the estimated production capacity of 1,000 gallons per minute (gpm). The safe annual yield is estimated at 540 AFY based on well operation during high demand time and droughts. 1,000 gpm x 1440minutes x 365x 0.333/325,851 gallons = 540 AFY			

Project 11: American River Pump Station Improvements

Implementing agency: Placer County Water Agency

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Cubic feet per second (cfs) of emergency water supply produced Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
40	148 cfs	189 cfs	41 cfs
Comments: (a) The new pump is estimated to have a life of 40 years based on PCWA's adopted Capital Asset Policy. (b) This is the current rate from the existing pump station.			

Project 12: Agricultural and Rural Residential Drought Response Incentives Program

Implementing agency: Placer County Water Agency

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply saved Units of the Benefit Claimed : Acre-feet/year (AFY) Additional Information About this Benefit: This benefit is the amount of reduced application of irrecoverable water.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
15	2,066 AFY	1,534 AFY	532 AFY
Comments: (a)Natural Resources Conservation Service cost share guidelines (as referenced in the Technical Analysis) were used to determine the 15 years project life. (b) The without project amount of water applied represents an average of four acre-feet of water per project acre per year. (c) The with project amount of water is the amount of water that will be applied after the implementation of the conservation measures			

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Increased Water Use Efficiency Units of the Benefit Claimed : Acre-feet (Cumulative over 15 years) Additional Information About this Benefit This benefit is the amount of reduced application of recoverable water.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
15	1,019 AFY	764 AFY	255 AFY
Comments: (a) Natural Resources Conservation Service cost share guidelines (as referenced in the Technical Analysis) were used to determine the 15 years project life. (b) The without project amount of water applied represents an average of four acre-feet of water per project acre per year. (c) The project amount of water is the amount of water that will be applied after the implementation of the efficient measures.			

Project 13: Regional Water Efficiency Drought Measures

Implementing agency: Regional Water Authority

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply saved Units of the Benefit Claimed : Acre-feet/year (AFY) Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
10	0	145 AFY	145 AFY
Comments: With implementation of this project we expect to achieve additional water savings that would not be realized without this project.			

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Energy saved Units of the Benefit Claimed : Kilowatt hour (kWh) per year Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
10	0 kWh per year	47,248 kWh per year	47,248 kWh per year
Comments: With implementation of this project we expect to achieve the energy savings stated above that would not be realized without this project.			

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Greenhouse gas emissions (GHG) avoided Units of the Benefit Claimed: Pounds (lbs) of Carbon dioxide (CO2) emissions Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
10	0 lbs of CO_2	24,663 lbs of CO_2	24,663 lbs of CO_2
Comments: With implementation of this project we expect to achieve the GHG reduction stated above that would not be realized without this project.			

Project 14: Striker Well Upgrades

Implementing agency: Sacramento County Water Agency

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced. Units of the Benefit Claimed : Million gallons per day (MGD) Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
75	0 MGD	Up to 2 MGD	2 MGD
Comments: A 2.0 MGD well is typical for this area and standard construction for SCWA facilities.			

Project 15: Antelope Booster Pump Station Phase 2

Implementing agency: Sacramento Suburban Water District

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Gallons Per Minute (gpm) Additional Information About this Benefit: San Juan Water District-Wholesale has insufficient alternative water supplies to meet minimum service level demands. The proposed project supply, along with the Barton Road Intertie and existing groundwater wells, will provide this level of service to all of the Wholesale agencies during times of drought or emergency conditions.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
50	4,200 GPM	10,000 GPM	5,800 GPM
Comments: The life of the project is based on the expected life span of a pump station with regular maintenance, and the without project estimates are based on benefits earlier award from a Proposition 84 grant.			

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Environmental benefit Units of the Benefit Claimed : Gallons per Minute (GPM) Additional Information About this Benefit Utilizing this supply will reduce the amount of water conveyed from Folsom Lake during times of drought allowing additional supply to downstream beneficiaries.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
100	52,000 GPM	42,000 GPM	10,000 GPM
Comments: The life of the project is based on the expected life span of a pump station with regular maintenance. Summer demand on Folsom Reservoir is approximately 75 MGD or 52,000 gpm.			

Project 16: Enterprise Intertie Improvements

Implementing agency: Sacramento Suburban Water District

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Acre-feet/year (AFY) Additional Information About this Benefit:			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
50	0 AFY	5,850 AFY	5,850 AFY
Comments: The life of the project is based on the expected life span of the intertie components with regular maintenance. An existing intertie is already in place but it was designed only for Sacramento Suburban Water District (SSWD) to take delivery of treated surface water purchased from the City of Sacramento. An existing check valve has been reversed to temporarily allow water to be supplied to the City of Sacramento. However, this was only done as an interim step and using this check valve is not a long term solution. Also, there is no control or monitoring capability. With the addition of some piping, a control valve and instrumentation and controls, this intertie can also be used on a permanent basis for SSWD to deliver excess groundwater supplies to the City of Sacramento in dry years or other emergency conditions.			

Project 17: Barton Road Intertie

Implementing agency: San Juan Water District

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Water supply produced Units of the Benefit Claimed : Millions of Gallons Per Day (MGD) Additional Information About this Benefit : 2 Million Gallons Per Day from PCWA to be delivered to SJWD-Retail			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
75-100	1 MGD	3 MGD	2 MGD
Comments: There is an existing 1 MGD intertie with PCWA to the northeast, but is limited in use to SJWD's smaller Upper and Lower Granite Bay Pressure zones. The new intertie will be centrally located into SJWD's largest pressure zone and therefore having the greatest capability to service a larger component of SJWD and maintain water quantity and quality over a larger region. The new pipeline will include cement lining, external polyethylene wrapping and will have a passive cathodic protection system to achieve the proposed service life of the project.			

Table #5 – Annual Project Physical Benefits Type of Benefit Claimed: Energy saved Units of the Benefit Claimed : Kilowatt hours (kWh) Additional Information About this Benefit New Intertie would be supplied via gravity to SJWD's northern pressure zone. Currently water is pumped into this area.			
(a)	(b)	(c)	(d)
	Physical Benefits		
Years	Without Project	With Project	Change Resulting from Project (b) – (c)
75-100	70 kWh	0 kWh	70 kWh
Comments: 70 kWh is the power required to pump the 2 MGD from the District's Pump Station to the project location. The new intertie will provide water via gravity into the District's retail area; therefore, reducing pumping costs if water was delivered from the lake. The new pipeline will include cement lining, external polyethylene wrapping and will have a passive cathodic protection system to achieve the proposed service life of the project.			

Technical Analysis of Physical Benefits Claimed

This section provides a narrative description for each of the proposed projects that describes the expected physical benefits.

Project 1: Lower American River Pipeline

Implementing Agency: Carmichael Water District

This project provides three key physical benefits. The primary physical benefits are the provision of up to 5,000 acre-feet per year of granted supply capacity to Golden State Water Company (GSWC), and the transmission pipeline capacity to wheel water to provide drought relief to GSWC and the City of Folsom. The secondary benefit is the restoration of a small habitat area of the incised bank and channel where the unnamed tributary stream discharges into the American River.

This project includes the construction of a pipeline connecting the Bajamont Water Treatment Plant (WTP)'s existing facilities and the treated water to GSWC's service area in Rancho Cordova. The water will be diverted from the American River through CWD's existing infiltration Ranney Collectors to the Bajamont WTP on the north side of the river. The water will be treated by the existing WTP and pumped through an existing 24-inch transmission main to a new point of connection and the starting point for the proposed pipeline to serve GSWC.

Two technical analysis studies were conducted in a joint collaborative effort by CWD and GSWC to confirm the technical feasibility of the pipeline interconnection project. The first study titled Technical Memorandum – Water Treatment Capacity Evaluation was completed by CWD which included analysis of CWD's existing water treatment and delivery assets to confirm available water treatment and pumping capacity, as well as analysis of the technical feasibility and constructability of a river crossing at the proposed location (Technical Memorandum – Water Treatment Capacity Evaluation – Golden State Water Company Replacement Water Project, 2012, All pages). The second technical memorandum prepared in December 2012 was titled Golden State Water Company Replacement Water Project and evaluated the feasibility of constructing a water transmission pipeline connecting CWD to the GSWC water system (Technical Memorandum – Golden State Water Company Replacement Water Project, 2012, pages 14-15, 20).

The Water Treatment Capacity Evaluation study confirmed that CWD's existing assets provided adequate capacity to divert, pump, treat, and deliver up to 5,000 acre-feet per year of drinking water to GSWC's Cordova System, pending completion of the interconnecting transmission main (Technical Memorandum – Golden State Water Company Replacement Water Project, 2012, pages 14-15, 20). The study recommended several other elements of the CWD's system be confirmed, including diversion capacity at low river levels, and other system improvements. These recommendations and any resulting actions are being considered with CWD's Master Plan update process, which is currently under development, but are not project to impact the feasibility of the project.

The GSWC Replacement Water Project technical memorandum evaluates the feasibility and constructability of completing a trenchless pipeline crossing underneath the American River, and confirms the hydraulic water distribution system characteristics necessary for GSWC to receive water from CWD. The memorandum confirmed the project constructability, evaluated various pipeline alignments to select the preferred alignment, provides initial construction cost estimates, and identified next steps and anticipated permitting requirements for the project (Technical Memorandum – Golden State Water Company Replacement Water Project, 2012, pages 14-15, 20). One of the project constructability challenges identified is the crossing of the American River. The north bank of the river adjacent to the existing Bajamont WTP is in an incised channel area and there is limited area for setup and staging of the trenchless equipment. Therefore, various trenchless technologies and configurations were considered before selecting horizontal directional drilling as the preferred construction method. This technology will provide for the ability to drill from the south side of the river, where there is adequate area for staging, and

requires a minimal footprint and equipment access on the north river bank. The remainder of the pipeline after the river crossing will be constructed using conventional open cut methods in the shoulder of the access road (Rossmoor Drive) traversing through the American River Parkway (owned and managed by Sacramento County), and in the paved street within the City of Rancho Cordova.

The driving force for the project is the need for a reliable water supply source for the Cordova service area, and the opportunity to provide a water transmission main that provides a regional water supply benefit by connecting water systems on the north and south sides of the American River. Both of these issues have greater urgency to be addressed considering the existing and ongoing drought conditions currently facing Northern California. This project is in the implementation stages and was recently identified by the Association of California Water Agencies June 2014 Drought Impacts and Strategies for Resilience Document as an example of a project that will provide an immediate benefit and relief to a drought stricken area (ACWA First Drought Action Report, 2014, page 25). The project was also presented to and discussed with the Rancho Cordova City Council on June 16, 2014.

GSWC relies on a combination of surface water from City of Folsom and the Folsom South Canal, and groundwater from local groundwater wells. The Aerojet/Rocketdyne groundwater contamination in the GSWC Cordova service area has continued to impact the groundwater aquifer, and GSWC has removed many wells from service, greatly limiting their ability to construct any new groundwater wells to offset lost capacity or provide drought relief. Although GSWC is currently under voluntary drought conservation measures, additional conservation requirements are being considered. Further, the State Resources Control Board could curtail surface water, which will affect GSWC's surface water supply in 2014 or 2015. GSWC's need for additional supply and dependence upon existing sources is documented in the 2010 Urban Water Management Plan, see page 5-5.

Water Supply Produced
The primary physical benefit for this project is provision of 5,000 acre-feet/year of water supplies for GSWC. This remediated groundwater has been legally available to GSWC via the Master Settlement Agreement and Release between Aerojet and GSWC (Golden State Water Company Urban Water Management Plan, 2010, pages 4-2, 4-3). Construction of the project will allow GSWC to access and use this water, which requires installation of a new river crossing and connecting pipeline between CWD's existing Bajamont Water Treatment Plant and the GSWC Cordova system. No additional policies or facilities are expected to be required for this phase of the project.

This benefit meets the American River Basin Integrated Regional Water Management (IRWM) Plan objectives 1, 3, and 5. These objectives include:

1. Meet current and future water resources needs: This project will help the Region meet current water resources supply needs in the Rancho Cordova community.

3. Improve supply capacity and ability to reliable meet water demands during dry or emergency conditions:

5. Remediate contaminated groundwater and reuse it to the extent feasible: This project uses remediated groundwater to provide a new replacement water supply source for the GSWC Cordova area and reduces additional need for groundwater aquifer extractions or surface water diversions in the contaminated area.

Environmental Benefits
The project includes ecosystem restoration benefits to the areas along the American River bank near the proposed pipeline. During construction, both the north and south banks of the American River will be improved to offer increased ecosystem benefits.

South Bank: Aerojet's groundwater extraction and treatment (GET) LB Facility discharges in to a naturally ephemeral waterway, and this unnamed tributary discharges into the American River at the south bank. This waterway is approximately 100 acres, based on delineation of the catchment contributing to the waterway based on a USGS topographic map, and provides habitat for indigenous aquatic and terrestrial species. Currently, the

discharge point of the waterway consists of a drop outlet with an approximate 10 foot drop dependent on American River flows, which completely removes the connectivity of the drainage with the American River. The project will restore connectivity of the American River with this waterway by installing an arched culvert.

North Bank: The large drop at the outfall of the ephemeral waterway on the south bank of the American River has and continues to cause erosion and scouring along the adjacent north bank of the river. Installation of the arch culvert will also stabilize the north bank, and the project will additionally re-build and stabilize a portion of the bank that has been washed away. Further, the project will remove any non-native species along the north bank of the project area and replace it with native plants as recommended by the environmental consultant. These seed mixes will be chosen based on the existing topography to improve bank stabilization where necessary. The area to be improved includes an approximately 0.25 area. This will improve the watershed through restoration to a more natural state.

These components of the project contribute towards the ARB IRWM Plan objective 8: Maintain and improve the ecosystem function of area streams and watersheds.

Implementation of this project will require construction of pipeline and associated features, which will result in temporary impacts from operating construction equipment, excavating, grading, horizontal directional drilling under the river, and trenching for pipeline installation. Temporary impacts could include noise from the construction equipment, which will be mitigated by limiting the time of day of construction. Erosion and runoff will be managed through obtaining a construction stormwater permit and implementing a Stormwater Pollution and Prevention Plan (SWPPP) and appropriate best management practices. The site will be completely restored to its pre-existing condition or better following construction.

The ability of this pipeline to deliver the projected capacity was confirmed through completion of the hydraulic analyses in the preliminary project planning stages. New facilities include the system interconnections, a flow control valve and a meter vault, a 1,000 foot pipeline river crossing of 24-inch internal diameter, approximately 6,500 linear feet of 24-inch pipeline, site restoration and cleanup. Further, project approval is needed from CWD, GSWC, Aerojet/Rocketdyne, and the various permitting and regulatory agencies that would be involved in the process.

Project 2: Hazel/50 Intertie Improvements

Implementing Agency: City of Folsom

City of Folsom (Folsom) almost entirely relies on surface water diverted from Folsom Reservoir as its primary water supply, but that source may be inadequate for supplying the desired minimum levels of service during dry years or drought conditions, planned outages, curtailments, and cutbacks by Reclamation. Folsom's service area is not located above a groundwater subbasin and thus has only very limited access to groundwater. This proposed intertie project allows Folsom to access available surface and/or groundwater from neighboring districts for emergency situations.

Water Supply Produced

The benefit of the proposed project is to deliver water from Golden State Water Company (GSWC) to Folsom in response to drought concerns. Currently the intertie only allows water to be delivered from Folsom to GSWC; therefore the without project condition is 0 gallons per minute (gpm). However, Folsom has contracts to groundwater extraction and treatment (GET) water from Aerojet's Facilities A and B, pursuant to terms of the 2007 Aerojet Agreement. At the completion of Aerojet treatment facilities, Facility B is expected to extract above 2,000 gpm, of which about 1,500 gpm will be available to Folsom (2010 Urban Water Management Plan, 2011, pages 4-3 through 4-5). This available groundwater will need to be pumped from GSWC to Folsom via the Hazel/50 Intertie. For this immediate drought, GSWC will provide Folsom treated groundwater available from other sources. The Hazel/50 Intertie Improvement project has been designed for a capacity of 2,000 gpm to accommodate conveyance of this GET water expected to be available in the future.

The intertie upgrades would include piping, pumps and controls to move up to 2,000 gpm of treated groundwater from GSWC to Folsom. With the improvements, future drought conditions can be offset through this intertie, thus reducing Folsom's surface water diversion from Folsom Reservoir.

Project 3: Well #2 Reactivation

Implementing Agency: City of Lincoln

The quantification of the benefits projected is based off of the historic production of the well prior to coming offline. Knowledge from City operators, former city consultants, and well contractors used all concur with the number presented. Prior to the purchase of any equipment for this well, the City will be having a pump test done on the well to confirm an optimal production number. It is estimated that the well will be able to produce 800 gpm when reactivated.

From 2007 "Western Placer County Groundwater Management Plan" page 2-18 see "Att_3_DG_ProJust_2of6.pdf:"

> *"Future Conditions. The City has plans to increase the number of municipal water supply wells in order to increase water supply reliability, provide emergency supplies and help meet peak demand. Studies by Spectrum-Gasch (1999) and Boyle Engineering (1990) show that groundwater resources are available in the Lincoln area. The City is currently completing additional groundwater investigations. The results of these investigations will be analyzed and used to help determine optimal well spacing and pumping schedules. The City estimates additional wells will be built. Geologic logging, bore hole geophysical logging and aquifer stress tests have been and will continue to be conducted as the City expands its well capacity.*

From 2010 "City of Lincoln Urban Water Management Plan" page 3-12, see "Att_3_DG_ProJust_2of2.pdf:"

> *"The City, working with PCWA and others, developed the WPCGMP.19 This effort builds upon and expands the geographic coverage of the City's own GMP.20 As documented in both the City's GMP and the WPCGMP, the groundwater conditions underlying the City and the SOI indicate currently and historically stable groundwater elevations and reliable water quality. A Memorandum of Agreement was signed by all parties in the fall of 2007 allowing implementation of the actions in the WPCGMP, which will continue to manage the basin in a sustainable manner."*

Water Supply Produced

The City is planning to install additional wells within the Lincoln sphere of influence (SOI) to be able to, when necessary in back-up and emergency situations, meet 75% of the average day demand at build out (approximately 34 mgd) with groundwater. The City is conducting ongoing groundwater investigations to help determine optimal well spacing and pumping schedules.

The City will continue its field and theoretical analyses over the next few years, developing a Lincoln area groundwater model and quantifying recharge and recoverable groundwater volumes. The City is currently in discussions with the Regional Water Authority, PCWA, the County of Placer and the City of Roseville regarding the sharing of groundwater data in the Western Placer County area, and developing a mutually beneficial Integrated Water Resources Management Program. The Integrated Water Resources Management Plan will address anticipated water use policies and goals regarding surface water, groundwater and reclaimed water in western Placer County. The WPCGMP is designed to assist the City of Lincoln, City of Roseville, Placer County Water Agency (PCWA), and the California American Water Company (CAW) in an effort to maintain a safe, sustainable and high-quality groundwater resource within a zone"

From the April 11, 2014 PCWA Press Release see "Att_3_DG_ProJust_2of2.pdf":

> *PCWA drought project manager Tony Firenzi said, "The reduction of deliveries from PG&E would amount to about 36,000 acre-feet of water. This shortfall could partially be offset with additional water diverted from the American River, groundwater use in parts of West Placer and water use reductions by all customers."*

Water Quality Improvement

Utilizing a supply from this well will result in a like amount of surface water not being diverted. This water will be allowed to remain in the American River to meet LAR and Delta water quality needs. DWR Station A7310000, located on the American River near Auburn shows ends of summer flows as low as 37 cfs. Data also shows increases in hardness, EC, dissolved sodium, and pH when flows are reduced. Leaving water in the river would serve to dilute constituents entering the river downstream of the diversion point. It should be noted that these measurements of constituents date back to the 1960's as no more recent data is available.

Additionally, it should be noted that USGS Gauge AMA located on the American River has 6 times measured monthly total flows averaging less than 37 cfs and once measured 0 AF of the total flow in the month of September. All of these low measured months were in August and September.

Environmental Benefit

Utilizing the supply from this well will result in a like amount of surface water not being diverted. This water would remain in the American River benefitting fish flows and fish habitat in the American River watershed. Flows in the lower American are subject to the amount of storage in Folsom Reservoir and the years inflow into the reservoir. Based on the current storage into Folsom, sever conservation will be mandatory to prevent Folsom from reaching deadpool levels. 2014 is looking more like the falls of 90,91, and 92 where the reservoir was left with little usable water in storage and an apparent volume of only 200,000 AF going into the 2014-2015 Water Year.

From "Draft Policy Document, Lower American River Flow Management Standard" page 2, see "Att_3_DG_ProJust_2of2.pdf:"

> *The primary purpose of the proposed Flow Management Standard is to maximize the annual production and survival of the anadromous fall-run Chinook salmon and steelhead in the lower American River, within water availability constraints and in consideration of Reclamation's obligation to provide for multi-purpose, beneficial uses of the project. With improved habitat conditions for salmonids, the proposed Flow Management Standard also is expected to benefit other fish species within the lower American River.*

Project 4: Nelson Well Improvements

Implementing Agency: City of Lincoln

The quantification of the benefits projected is based off of the historic production of the well prior to coming offline. Knowledge from City operators, former city consultants, and well contractors used all concur with the number presented. Prior to the purchase of any equipment for this well, the City will be having a pump test done on the well to confirm an optimal production number. It is estimated that the well will be able to produce 2000 gpm , or 1,600 AFY, when reactivated.

From 2007 "Western Placer County Groundwater Management Plan" page 2-18 see "Att_3_DG_ProJust_2of2.pdf:"

> *"Future Conditions. The City has plans to increase the number of municipal water supply wells in order to increase water supply re- liability, provide emergency supplies and help meet peak demand. Studies by Spectrum-Gasch (1999) and Boyle Engineering (1990) show that groundwater resources are available in the Lincoln area. The City is currently completing additional groundwater investigations. The results of these investigations will be analyzed and used to help determine optimal well spacing and pumping schedules. The City estimates additional wells will be built. Geologic logging, bore hole geophysical logging and aquifer stress tests have been and will continue to be conducted as the City expands its well capacity."*

From 2010 "City of Lincoln Urban Water Management Plan" page 3-12, see "Att_3_DG_ProJust_2of2.pdf:"

> *"The City, working with PCWA and others, developed the WPCGMP.19 This effort builds upon and expands the geographic coverage of the City's own GMP.20 As documented in both the City's GMP and the WPCGMP, the groundwater conditions underlying the City and the SOI indicate currently and historically stable groundwater elevations and reliable water quality. A Memorandum of Agreement was signed by all parties in the fall of 2007 allowing implementation of the actions in the WPCGMP, which will continue to manage the basin in a sustainable manner."*

Water Supply Produced

The City is planning to install additional wells within the Lincoln SOI to be able to, when necessary in back-up and emergency situations, meet 75% of the average day demand at build out (approximately 34 mgd) with groundwater. The City is conducting ongoing groundwater investigations to help determine optimal well spacing and pumping schedules.

The City will continue its field and theoretical analyses over the next few years, developing a Lincoln area groundwater model and quantifying recharge and recoverable groundwater volumes. The City is currently in discussions with the Regional Water Authority, PCWA, the County of Placer and the City of Roseville regarding the sharing of groundwater data in the Western Placer County area, and developing a mutually beneficial Integrated Water Resources Management Program. The Integrated Water Resources Management Plan will address anticipated water use policies and goals regarding surface water, groundwater and reclaimed water in western Placer County. The WPCGMP is designed to assist the City of Lincoln, City of Roseville, Placer County Water Agency (PCWA), and the California American Water Company (CAW) in an effort to maintain a safe, sustainable and high-quality groundwater resource within a zone"

From the April 11, 2014 PCWA Press Release see "Att_3_DG_ProJust_2of2.pdf":

> *PCWA drought project manager Tony Firenzi said, "The reduction of deliveries from PG&E would amount to about 36,000 acre-feet of water. This shortfall could partially be offset with additional water diverted from the American River, groundwater use in parts of West Placer and water use reductions by all customers."*

Water Quality Improvement

Utilizing a supply from this well will result in a like amount of surface water not being diverted. This water will be allowed to remain in the American River to meet LAR and Delta water quality needs.
DWR Station A7310000, located on the American River near Auburn shows ends of summer flows as low as 37 cfs. Data also shows increases in hardness, EC, dissolved sodium, and PH when flows are reduced. Leaving water in the river would serve to dilute constituents entering the river downstream of the diversion point. It should be noted that these measurements of constituents date back into the 1960's as no more recent data is available.

Additionally is should be noted that USGS Gauge AMA located on the American River has 6 times measured monthly total flows averaging less than 37 cfs and once measured 0 AF of total flow in the month of September. All of these low measured months were in August and September.

Environmental Benefit
Utilizing the supply from this well will result in a like amount of surface water not being diverted. This water would remain in the American River benefitting fish flows and fish habitat in the American River watershed. Flows in the lower American are subject to the amount of storage in Folsom Reservoir and the years inflow into the reservoir. Based on the current storage into Folsom, sever conservation will be mandatory to prevent Folsom from reaching deadpool levels. 2014 is looking more like the falls of 90, 91, and 92 where the reservoir was left with little usable water in storage and an apparent volume of only 200,000 AF going into the 2014-2015 Water Year.

From "Draft Policy Document, Lower American River Flow Management Standard" page 2, see "Att_3_DG_ProJust_2of2.pdf:"

> *The primary purpose of the proposed Flow Management Standard is to maximize the annual production and survival of the anadromous fall-run Chinook salmon and steelhead in the lower American River, within water availability constraints and in consideration of Reclamation's obligation to provide for multi-purpose, beneficial uses of the project. With improved habitat conditions for salmonids, the proposed Flow Management Standard also is expected to benefit other fish species within the lower American River.*

Project 5: PFE and Zone 4 Transfer Pump Stations

Implementing Agency: City of Roseville

City of Roseville (Roseville) relies on surface water diverted from Folsom Reservoir as its primary water supply, but that source may be inadequate for supplying the desired minimum levels of service during dry years or drought conditions, planned outages, curtailments, cutbacks by Reclamation, or difficulties with Roseville's Barton Road Water Treatment Plant facilities. The majority of Roseville's existing water distribution system is gravity-fed. Due to the natural terrain, zone 1 is at a higher elevation and water from other zones or outside the city must be pumped into zone 1.

The American River Basin (ARB) Region has a history of regional conjunctive use management and planning. There is available drought-year groundwater in Sacramento Suburban Water District (SSWD) and in Roseville's zone 4.

Water Supply Produced

SSWD and its Engineer, Domenichelli & Associates, Inc. (D&A) has completed a hydraulic modeling analysis to determine the amount of groundwater available. The modeling results shows that the system can supply up to 14.4 MGD (10,000 gallons per minute [gpm]) of groundwater to either San Juan Water District (SJWD) or Roseville. The results of the hydraulic modeling are contained in a Technical Memorandum titled "Groundwater Supply Options" dated January 2014. Roseville would need up to 7 MGD (almost 5,000 gpm) of the available groundwater supply from SSWD. Roseville has also contracted with West Yost and Associates and conducted a water distribution system modeling study for different supply availability scenarios. The modeling results showed that the City would need 7 MGD (approximately 5,000 gpm) from SSWD and a pumpback (transfer) pump station from zone 4 to zone 1 for groundwater transfers when Folsom Reservoir water is unavailable.

The PFE pump station, which will move water from SSWD to Roseville, is currently designed to be 5,000 gpm to allow about 7 MGD of water transferred for drought conditions. The pump station will include three 100-hp constant speed pumps in a factory furnished building. In addition, there will be instrumentation facility with PLC controls for SCADA operations.

The Pleasant Grove Pump Station is designed to transfer approximately 6,000 gpm (8.6 MGD) of flow from zone 4 to zone 1. The flow design is based on the availability of wells currently available in zone 4 and based on historical groundwater use in zone 4. There is adequate groundwater capacity for use in zone 1. This facility is designed to transfer 6,000 gpm of water with three 100-hp constant speed pumps in a factory furnished building. A new bi-directional magnetic meter will also be installed. This facility will also have PLC instrumentation and be connected to the City's SCADA system.

The pre-design phase of the project to pump water from zone 4 has been completed and a technical memorandum titled "Roseville EU Zone 4 to Zone 1 Pumps" see "Att_3_DG_ProJust_2of2.pdf" was completed by Bennett Engineering Services dated February 20, 2014 and revised March 19, 2014. The TM included zone 4 groundwater supply, zone 4 demand, transfer pump station sizing, and pump station design criteria. A preliminary equipment specification has also been developed for the equipment as of May 30, 2014. The specification included pump motors, valves, PLCs, buildings, cooling/heating equipment, lighting, water meters, and pressure transmitters.

Without this project, higher elevation zones will continue to not have access to groundwater and Roseville will face increasing difficulty meeting minimum service levels as the drought continues. Roseville has already announced a mandatory 20 percent reduction in water use in March 2014.

Project 6: Phase 2B Well Rehabilitations

Implementing Agency: City of Sacramento

The City of Sacramento (Sacramento) normally has access to sufficient surface water, exercising water rights on both the American and Sacramento Rivers and operating water treatment plants on each river. However, as will be described in Sacramento's other two projects that involve pump station modifications at the intakes of these water treatment plants, the river flows has dropped so low that Sacramento's access to surface water is threatened.

Water Supply Produced

Groundwater can help the current water situation and deliver water to a highly urban population. Many of Sacramento's wells have been decommissioned for restoration, service work, and as a part of the regional conjunctive use plan. Rehabilitating these old wells, however, will provide an immediate emergency supply of water.

Sacramento maintains historical information on the groundwater well facilities targeted for rehabilitation. Well name, age, capacity history, and expected capacity of the Phase 2B wells upon return to service are as follows:

Well Name	Year Constructed	Pre-Rehab Capacity (gpm)	Expected Capacity (gpm)
91	1956	320	256
92	1955	888	711
93	1956	533	427
112	unknown	726	581
114	1945	814	652
123	1960	829	664
127	1965	722	578
139	1965	841	673
158	1968	1,000	800
	Sum (gpm)	**6,673**	**5,342**
	Sum (MGD)	**9.6**	**7.7**
Key: gpm = gallons per minute mgd = million gallons per day			

As shown in the table above, the total historical capacity is 9.6 million gallons per day (MGD) (6673 gallons per minute [gpm]), but the City is estimating capacity to be 7.7 MGD. This reduction is based on a 20 percent loss of flow capacity, because these wells have not been recently used and Sacramento does not plan to clean well screens at this time. A future project will address well screen rehabilitation when the high demand for groundwater subsides, at the end of the drought, and the bidding climate is more favorable.

Sacramento is currently finishing phase 1 rehabilitation of 4 groundwater wells in a different portion of the city (wells 134, 154, 156, and 159), and thus has recent experience with the full rehabilitation process. This experience has also informed the yield estimates.

The project design is complete and construction is in progress. This work was authorized on February 25th, 2014 (2014-00143_Well2B_CO, 2014, All pages, 2014 see "Att_3_DG_ProJust_2of2.pdf"). There is the possibility that

not all 9 wells would be returned to service, if the wells do not pass Title 22 drinking water quality tests in full. Aquifer testing to ensure these permitted wells will still meet all drinking water standards is pending. Should a well not pass, Sacramento will assess if additional work is warranted, or if that portion of the project should be eliminated.

Project 7: Sacramento River Pump Station Modifications

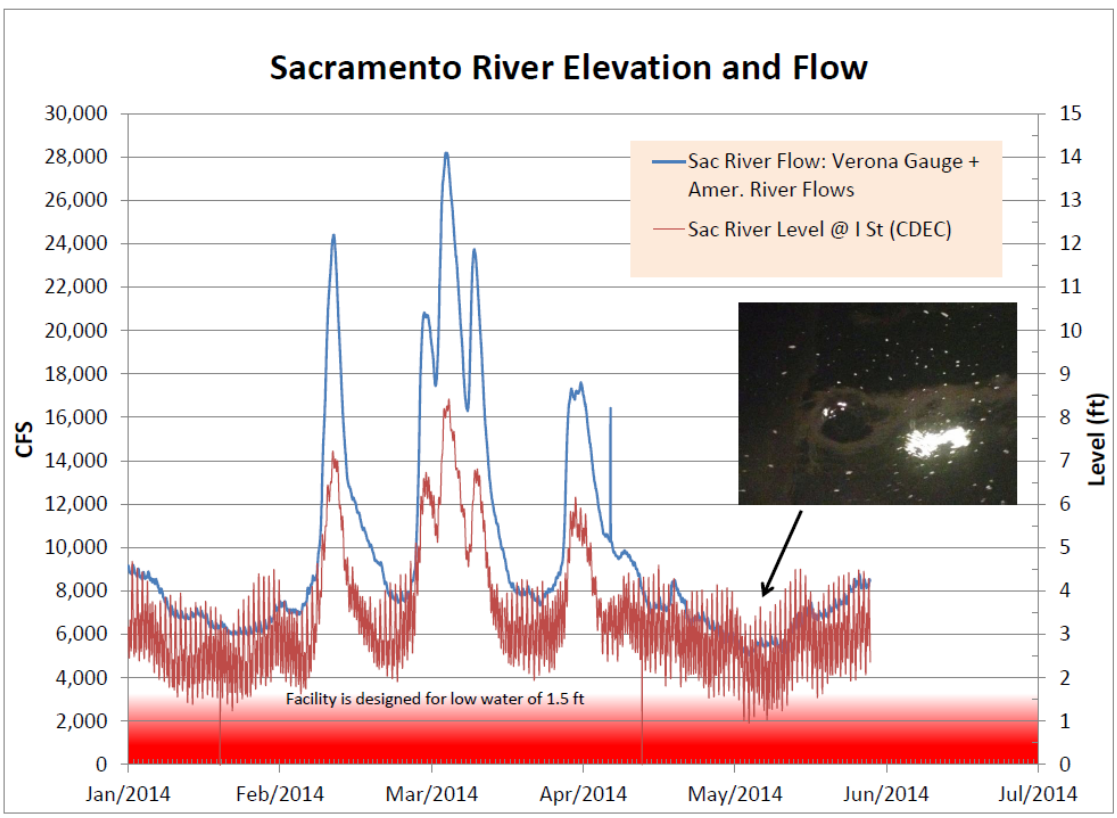
Implementing Agency: City of Sacramento

The existing facility was designed to operate at a minimum elevation of 2 feet ("Sacramento River Water Treatment Plant Memorandum No 1, 1998", MWH, 1998, pg 7, see "Att_3_DG_ProJust_2of2.pdf"). It has a capacity of 160 mgd, but is limited to 130 mgd by treatment process restrictions. Recent water levels in the Sacramento River have dropped below the minimum design level (elev. 2 feet) of the diversion structure for the City's Sacramento River Water Treatment Plant. If river levels continue to drop, this facility could no longer function as is and 130 mgd of Sacramento's drinking water supply could not be provided.

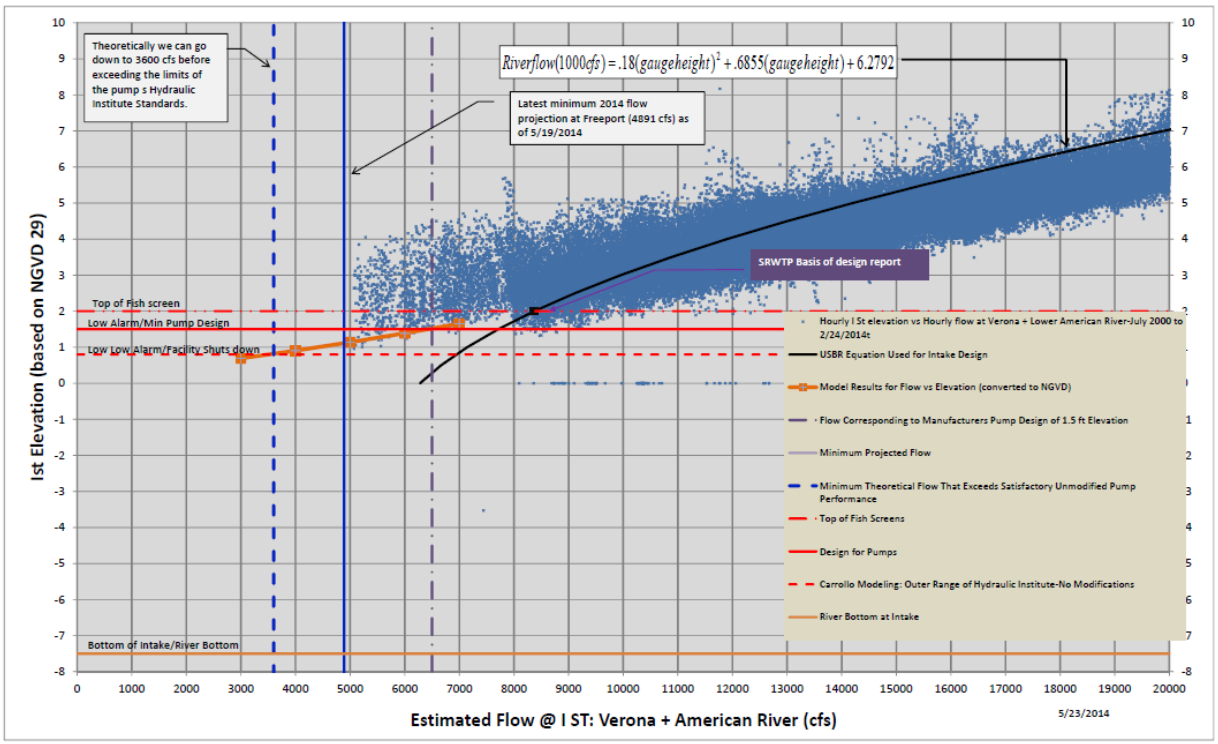
Water Supply Produced

The proposed project would lower the elevation of the intake structure, but maintain the same design and operating capacity, allowing the facility to operate at lower river elevations.

To demonstrate the recent low water levels, water levels taken from the USGS water level monitoring gauge for the Sacramento River at I Street on California Data Exchange Center (CDEC) are plotted below. The chart also includes a photo of surface vortices occurring inside the intake facility at low flow rates. This figure shows that water levels have already dropped one foot below design elevation in 2014. Furthermore, the State/Federal Joint Central Valley Operations Group is anticipating future lower water releases. Page 1 of "CVO_Delta summary" gives future projections and the dire consequences of losing a significant portion of Sacramento's water supply ("CVO_Delta summary", 2014, page 1, see "Att_3_DG_ProJust_2of2.pdf").



With approximately 40 percent of Sacramento's supply being at risk, Sacramento has already tasked CBEC engineering with modeling the water surface election at the intake at low river discharge. That information along with historical flow vs. depth data (from CDEC) is shown in the figure below.



Carollo Engineering was also contracted to complete a 3-dimensional computational hydraulic model of the facility to understand the operational limits and to suggest methods of operating at lower levels as well as designing the improvements. This work has been substantively completed to allow for design to commence. A formal report will be created and similar work will be performed at Sacramento's intake structure on the American River. The final report is due in September 2014. The vortex breaker detail is provided as a reference ("SRWTP Vortex Breaker Detail", Carollo, 2014, All pages, see "Att_3_DG_ProJust_2of2.pdf").

In addition, a categorical exemption has already been issued ("Notice of Exemption", City of Sacramento, 2014, All pages, see "Att_3_DG_ProJust_2of2.pdf") and no adverse physical effects are anticipated as no expansion in capacity of increase use is proposed.

Project 8: Lower American River Pump Station Modifications

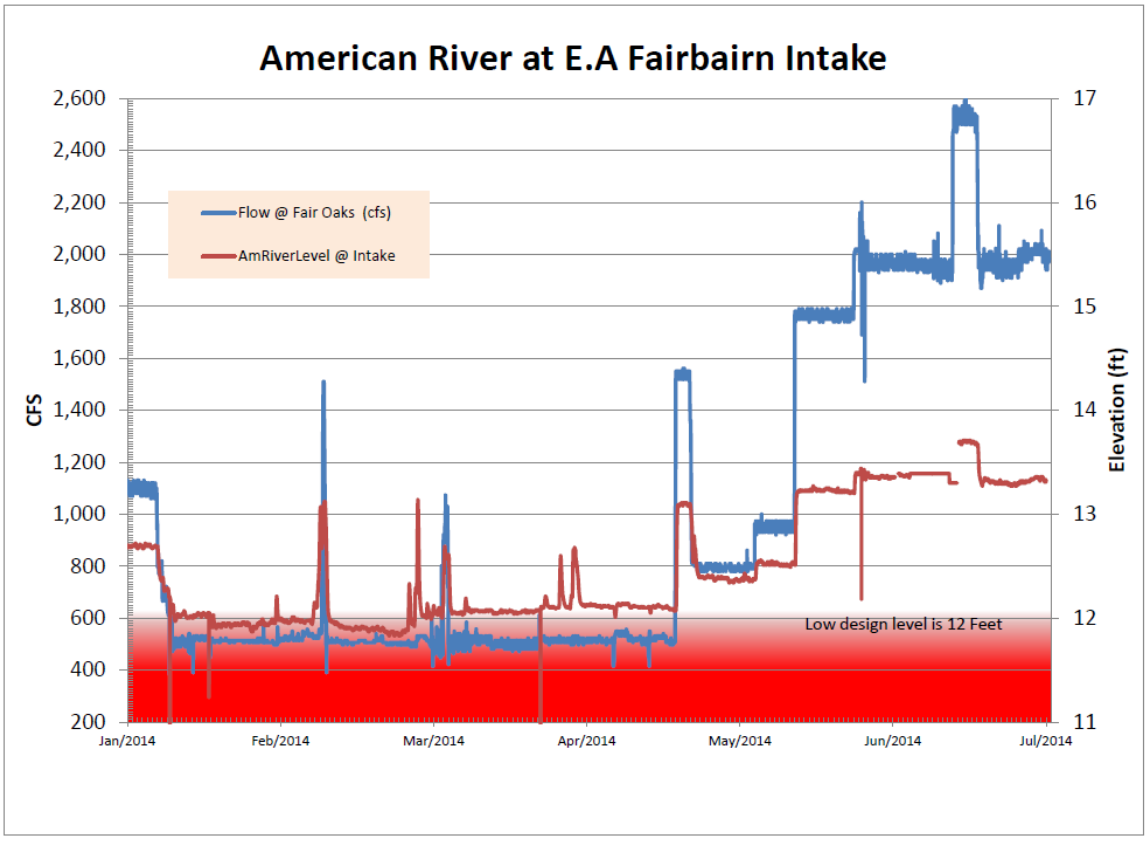
Implementing Agency: City of Sacramento

The existing facility was designed to operate at a minimum elevation of 12 feet (MWH, 1999, pg 4). It has a capacity of 200 mgd, but is limited to 65-100 mgd during drier water years (note, capacity varies based on various regulations and/or treatment/hydraulic restrictions). Recent water levels in the American River have recently dropped to the minimum design level (elev. 12 feet) of the diversion structure for the City's E.A. Fairbairn Water Treatment Plant. If river levels continue to drop, this facility could no longer function as is and 65-100 mgd of Sacramento's drinking water supply could not be provided during drier years.

Water Supply Produced

The proposed project would lower the elevation of the intake structure, but maintain the same design and operating capacity, allowing the facility to operate at lower river elevations.

To demonstrate the recent low water levels, water levels taken from the water level telemetry at the intake and flow rate information for the lower American river (CDEC, 2014) are shown in the figure below. This figure shows that water levels have already dropped below design elevation in 2014. Furthermore, the State/Federal Joint Central Valley Operations Group indicates that the low flow conditions will return by this fall (CVO-AROG Handouts_20140619, 2014, pages 1, 3-4, see"Att_3_DG_ProJust_2of2.pdf").



No adverse physical effects are anticipated as no expansion in capacity of increase use is proposed.

Project 9: Main Ditch Piping

Implementing Agency: El Dorado Irrigation District

Water Supply Saved

Currently 15,080 acre-feet/year of water is available for diversion to EID. With this project, losses would be reduced and the amount of water supply that could be delivered to EID would be 15,080 acre-feet/year. Without this project, losses will continue and only about 13,780 acre-feet/year of water would be delivered to EID. This was computed based on an initial estimate of 1,300 acre-feet/year of flows losses. Initial losses were computed by flow measurements which vary by flow rates and weather conditions, but the average of 1,300 acre-feet/year was measured ("Environmental Assessment of Proposed El Dorado Main Canal Pipeline Project", Jones and Stokes Associates, Page 6-7, see "Att_3_DG_ProJust_2of2.pdf")

Canal piping benefits will be refined using pre- and post-project estimations. Pre-project estimations of baseline data will be based on physical measurements of losses made prior to construction of the project to determine current losses in the Main Ditch. Upon receipt of confirmation that the District will be a recipient of funding, the District will formalize compiling flow measurements at the Forebay Reservoir diversion to the Main Ditch. At the same time, the District will compile the data of the water made available at the downstream end of the Main Ditch as it enters Reservoir 1 Water Treatment Plant (WTP). Gages, weirs, and SCADA will be used to capture flow data. Post-project methods for quantifying the benefits of canal piping include using the tests listed above, and comparing pre-project and post-project test results to calculate water savings. Because this is a ditch piping project, evaporation will be calculated based on weather data available at the Camino CIMIS Station and subtracted from the total loss measured by testing. As a back check, the estimated historical seepage and evaporation for the Main Ditch will be compared to the post-project seepage and evaporation with documentation of the method of measuring or estimating post-project provided.

The project will assist in meeting Bay-Delta Program Goals, through reducing existing irrecoverable losses through excessive seepage of earthen ditches and evapotranspiration from open ditches, optimizing the efficient use of water supply, promoting the local conservation of water supply to serve the needs of local consumers, with availability to sell water to meet growing demands for domestic and raw water use, and increasing the efficiency of water supply to customers.

Three raw water customers are served along the Main Ditch prior to the water treatment plant. Customer use is currently measured in miner's inches using a V-notch weir with ditch operators manually turning service on and off. Once piping has been completed, these customers will be served by new individual meters equipped with automatic read devices. The newly installed meters will allow for accurate reliable water accounting and billing rather than using archaic assumed flows with manual operation. The previously assumed deliveries will be compared to the meter reads to determine actual amount of water delivered.

Along with the installation of pipe within the open earthen ditch, the existing SCADA system that monitors flows in the Main Ditch will be expanded to provide real-time data on the flow and volume of water at key points along the water delivery system. Access to such data will allow the District to make accurate and timely deliveries of water and reduce over-deliveries. This will also enable tracking and recording diversions to water users to compare to pre-project diversions using meter data and SCADA data.

Water Quality Improved

The Main Ditch is susceptible to contamination and failure, putting drinking water supplies at risk and resulting in erosion and water quality issues. Water quality sampling was conducted that shows the increase in turbidity, and total coliform, and E-coli as the water travels through the earthen ditch to the Reservoir 1 WTP. Areas along the ditch have been subject to erosion; the accumulated sediment is then carried to the Reservoir 1 WTP. There are also crossings and bridges along the ditch alignment which are used by the general public for access to properties.

At the bridge on Blair Road, a large diameter culvert capturing drainage from the road and surrounding area enters the ditch. Because of the open channel ditch, debris and sediment can enter Reservoir 1 WTP at the intake.

Turbidity, total coliform, and E-coli were measured at the diversion and 3-miles downstream at the inflow to the Reservoir 1 WTP. The measurements show the trend of decreased water quality along the 3-mile stretch before entering the WTP. By piping the Main Ditch there will also be a water quality benefit due to the reduction in potential for infiltration from adjacent residential septic system leach fields and surface water runoff inflow and protect raw water quality for downstream municipal water users.

Implementing this project (i.e., piping the Main Ditch) would eliminate turbidity and coliforms associated with the currently open Main Ditch.

Renewable Energy Produced

The water conserved through piping the Main Ditch can be used for renewable hydroelectric power generation at the existing El Dorado Powerhouse until such time as the water is needed for consumptive purposes. Buildout of the area is not expected for several decades and therefore, the water can be used for renewable energy production until that time. Until the water is delivered to customers, the amount of energy that can be generated by the 1,300 acre-feet of water conserved is equal to 785 MWhr annually if diverted to the El Dorado Powerhouse. This calculation is based on the efficiency rating of the El Dorado Powerhouse at 0.60 acre-feet/MWhr and 1,300 acre-feet of conserved water (Domenichelli and Associates, 2014, pg 1 see "Att_3_DG_ProJust_2of2.pdf")). This is enough energy to serve over 100 households with certified renewable energy. The hydroelectric power generated at the El Dorado Powerhouse is currently sold under contract to PG&E and will assist them in meeting the State of California mandate of holding an energy portfolio that includes 33% renewable energy. After power generation, the water is released to the South Fork of the American River, eventually reaching Folsom Reservoir.

Also, if water is served to customers by gravity rather than pumped from Reservoir A WTP at a cost of $150 per acre-feet or Folsom Reservoir at a cost of more than $200 per acre-feet, pumping needs can be greatly reduced or eliminated through the conservation of 1,300 acre-feet annually. The cost to treat the water is essentially the same at either WTP; therefore, reduced pumping will save over $250,000 annually in electrical costs.

In addition, all water that passes through the El Dorado Powerhouse is sent back into the South Fork American River, eventually entering Folsom Reservoir. No water consumption is necessary for the production of the certified renewable energy.

Environmental Benefits: Flow Provided

Given that the project will result in an additional 1,300 acre-feet annually that will not be diverted from or will be sent back to the South Fork American River, the project will have a beneficial effect to listed and/or candidate species that may be present outside of the project area, but within the South Fork American River and lower American River. At this time the only listed species known to be present in the lower American River is the Central Valley Steelhead Distinct Population Segment, Central Valley Fall and Late Fall Run Chinook Salmon Evolutionary Significant Unit is currently designated as a Species of Concern. Both of these species will benefit from additional conserved water that will be available in the lower American River.

Project 10: Madison Well Construction

Implementing Agency: Fair Oaks Water District

Fair Oaks Water District (FOWD) normally relies on surface water supplied from San Juan Water District (SJWD) to meet most of its demand, and a collection of local groundwater wells. Should the drought continue and Folsom Reservoir levels drop, and water agencies face more curtailments, FOWD, along with SJWD, will face issues meeting minimum service requirements.

Water Supply Produced

The 2007 "FOWD Water System Master Plan," Section 5, 5.7.3, see "Att_3_DG_ProJust_2of2.pdf" considered emergency and drought conditions, and identified projects with the ultimate goal to develop sufficient groundwater pumping capacity to meet the entire district's average day demand. The plan identified Madison project as an essential water supply improvement to provide additional emergency and operational capabilities for the FOWD water system (Section 5- Future Water Supply, subsection 5.7.3- Madison Well).

The construction of Madison Well construction will reduce surface water use from the American River and provide reliable water supply during prolonged drought periods. The safe annual production is be 540 acre feet per year (AFY), and the well is designed accordingly to have a capacity of 1,000 gallons per minute (gpm), assuming it can run at full capacity for about a third of the time.

The well site is located on the property acquired by FOWD in 2011. The site is approximately 90 feet by 90 feet and is adjacent to the Bella Vista High School on Madison Avenue. The site will be protected by the 8-foot high concrete block wall with access to the site through a 16 feet-wide vehicular gate. The well head will be located within the block building along with electrical and disinfection facilities.

The well discharge piping will be connected to the 24-inch transmission water main on Madison Avenue and will allow groundwater to be pumped under constant head; therefore, saving energy and simplifying well operations.

Project 11: American River Pump Station Improvements

Implementing Agency: Placer County Water Agency

Placer County Water Agency (PCWA) receives about 90 percent of its normal year water supply from Pacific Gas and Electric (PG&E)'s Drum Spaulding Hydroelectric system on the South Fork Yuba River, which it uses to provide municipal, industrial and agricultural water to communities that stretch from Alta, west along the I-80 corridor to Auburn, Rocklin, Lincoln and northern Granite Bay. The remaining 10 percent is supplied via PCWA Middle Fork Project water diverted from the American River at Auburn through PCWA's American River Pump Station (ARPS), which was completed in 2007. PCWA has the rights to pump up to 35,500 acre-feet annually from the American River at this location, and currently pumps at a rate of 148 cfs. The San Juan Water District (SJWD), which serves the remainder of the Granite Bay community in Placer County, and the City of Roseville (Roseville), divert PCWA Middle Fork Project water out of Folsom Reservoir. Roseville also has a contract for Central Valley Project (CVP) water diverted out of Folsom Reservoir.

The recent drought has had a substantial impact on western Placer County. PCWA's Yuba River supplies were reduced by 30 percent, but PCWA has been able to reduce the impact to customers by about half by increasing pumping from the ARPS. At Folsom Reservoir, conditions were a grave concern earlier this year. In early February 2014, Folsom Reservoir storage level was down to 162,000 acre-feet, just 70,000 acre-feet above dead pool. Roseville and SJWD approached PCWA about any water that PCWA might be able to provide if Folsom Reservoir storage level fell below the outlet. PCWA has treated water interties with both of these water systems and offered to increase the rate of pumping from its ARPS to its maximum and share its available resources, even though it would result in deeper cuts to PCWA customers.

Fortunately spring 2014 rains brought Folsom Reservoir storage levels up, eliminating the threat of reaching dead pool this summer. The U.S. Bureau of Reclamation's current operating plan for the remainder of this year and into 2015 shows Folsom Reservoir returning again to dangerously low levels if we have another year of drought ("Central Valley Project and State Water Project Drought Operations Plan and Operational Forecast April 1, 2014 through November 15", Reclamation 2014, see "Att_3_DG_ProJust_2of2.pdf").

Water Supply Produced

The ARPS was constructed with reserve screen capacity and 2 empty pump bays in anticipation of future expansion. The potential expansion was included in the environmental assessment for the original construction. The proposed project would install one new 41 cfs pump in an empty bay of the existing pump station increasing the overall capacity to 189 cfs. This additional capacity would substantially improve the drought resilience of PCWA's western Placer water system to not only meet the needs of PCWA's retail customers but also to assist neighboring water systems of Roseville and SWJD in the event of a disruption of service from Folsom Reservoir. A 41 cfs pump would be used because of weight limitations of PCWA's crane that will be used for installation.

In addition to the pump and variable-frequency drive (VFD), the project includes installing a concrete masonry unit building with a chilled water cooling system to house the new VFD, electrical conduit and wiring, cooling water improvements for the new pump, mechanical piping, valves and other appurtenances, control/programming modification's, and start up and testing to place the new pump into operation and integrate it within the existing system.

The new pump is estimated to have a life of 40 years based upon PCWA's adopted Capital Asset Policy.

Project 12: Agricultural and Rural Residential Drought Response Incentives Program

Implementing Agency: Placer County Water Agency

An average of four acre-feet of water per acre of land is applied to agricultural lands in the American River Basin (ARB) with the supply coming from a mixture of surface water and groundwater. Due to the 2014 drought declaration, water purveyors have asked landowners to reduce the amount of applied water. In addition, in some areas of the Central Basin portion of the ARB, the groundwater levels have been dropping potentially due to increased agricultural and rural residential landowners pumping to supplement the reduction in surface water. The implementation of the Agricultural and Rural Residential Drought Response Incentives Program (ARDRIP) will reduce the demand for applied water from both surface water and groundwater resources.

This project requires that growers participate in an incentive program that provides rebates for the use of irrigation scheduling services, irrigation system upgrades, or the replacement of plant material. The benefits of this project include both a reduction in irrecoverable flows (evaporation and plant transpiration) and a reduction in recoverable flows (deep percolation and surface runoff). Efficient water usage will also reduce erosion and water quality impairments that result from excessive irrigation run-off. Introducing landowners to these best management practices will likely also produce a cultural change, in that they will continue to improve the efficiency of their irrigation systems over time. There are no potential adverse physical effects of the project.

The without project and with-project demands were calculated to determine project benefits, and are based on five factors, listed below. For the technical basis for water savings estimates and their service life, refer to best management practices developed by the US Department of Agriculture's (USDA), Natural Resource Conservation Service (NRCS) for its Environmental Quality Incentives Program (EQIP) and Placer County Water Agency (PCWA)'s ongoing plant material replacement (cash-for-grass) program. The NRCS conservation practices are regularly updated based on the best available science, and are published at http://efotg.sc.egov.usda.gov/treemenuFS.aspx and http://wqic.nal.usda.gov/publications/dynamic-bibliographies.

1) The expected project area (acres served), assumed to be 1,450 acres for irrigation scheduling, 425 acres for system upgrades and 45,000 feet squared for plant material replacement.

2) The without project unit demand, assumed to be four acre-feet/acre.

3) The savings provided by each conservation measure. On average the mix of practices to be implemented are expected to reduce the amount of applied water by 20-30 percent over current use.

4) The life of each conservation measure. The life of the irrigation scheduling support is three years and the life of irrigation upgrades and plant material replacement is 15 years.

5) The portion of water savings that is recoverable or irrecoverable. For this project, water conservation is achieved by applying less water to a crop but maintaining the same productivity. The conservation practices selected for this project save two types of water; irrecoverable (evaporation and plant transpiration) and recoverable (reduced runoff and reduced deep percolation). For each of the selected conservation practices there is a portion of the savings that is considered irrecoverable and a portion that is recoverable. For the three selected practices it was assumed that between 60 and 80 percent of the reduction in applied water are irrecoverable savings and between 20 and 40 percent are recoverable savings.

The life-time total demand without the project is 46,275 acre-feet. This demand is composed of an irrecoverable portion (2,066 AFY) column b in Table 5 (Conservation Water Savings) plus the recoverable portion (1,019 AFY) column b in Table 5 (Water Use Efficiency). Applying the savings rates from project implementation and the life of the practice to the estimated 1,875 affected acres equates to 11,805 acre-feet of reduced application over the 15-year life of the project or 787 acre-feet per year.

Water Supply Saved

Specifically, for Table 5 (Conservation Water Savings), the expected without project irrecoverable demand is 2,066 AFY (column b). After considering savings by practice for the life of the measure and the portion of the savings that is considered irrecoverable, the demand is expected to be 1,534 AFY (column c). The difference, 532 AFY (column d) are the with-project irrecoverable savings.

Water Use Efficiency

For Table 5 (Water Use Efficiency), the without project efficiency (reduced runoff and reduced deep percolation) savings are based on the expected project area, the without project demand, and the life of each conservation measure. Using the same values for project area and the life of the measures, the without project efficiency demand is 1,019 AFY (column b). After considering the efficiency portion of the conservation measures the with-project demand is 764 AFY (column c) which represents an efficiency savings of 255 AFY (column d).

Project 13: Regional Water Efficiency Drought Measures

Implementing Agency: Regional Water Authority

The primary benefit of this project is water savings. The water savings will be gained through the implementation of proven water efficiency best management practices (BMPs) including public outreach, landscape surveys and irrigation upgrades as outlined and included in the California Urban Water Conservation Council (CUWCC)'s Memorandum of Understanding (MOU) in Exhibit 1: BMP Definitions, Schedules and Requirements, specifically BMP 2.1 Public Information Programs, BMP 3 Residential and BMP 5 Landscape found on pages 14, 35, 41, and 48 see "Att_3_DG_ProJust_2of2.pdf".

Additionally the project will incentivize the use of native and low water use plants that have multiple long standing benefits including reduced irrigation water demand, improved water quality and habitat benefits further outlined in the CUWCC's "New Normal for California Landscapes" initiative. To quantify the savings of implementing these measures, the following methodology was used.

Water Supply Saved

Estimating 55 annual inches of water, the project falls within Climate Zones 13 and 14 as identified by DWR California Irrigation Management Information System Stations which have an ET_o of 57 and 54 inches respectively. Homes in the area average about 2,000 square feet (sq ft) of landscaping. The total estimated applied water for cool season turf grass is 68,530 gallons per site. This is calculated by (55 inches per year) * 2,000 sq ft * 0.623 (inches/sq ft/gallons) = 68,530 gallons used per site. Finally, 30% savings is estimated from SMART Controllers and efficiency upgrades (drip systems, etc.) installation. Sources used for assumptions include: U.S. Department of the Interior, Bureau of Reclamation, Final Technical Memorandum No. 86-68210-SCAO-01, Summary of Smart Controller Water Savings Studies, page April 2008 and U.S. Department of the Interior, Bureau of Reclamation, Weather and Soil Moisture-Based Landscape Irrigation Scheduling Devices, Technical Review Report, 4th edition, July 2012, page 90 (Att_3_DG_ProJust_2of2.pdf).

- Water savings estimated = 68,530 gallons per year * 30% savings = 20,500 gallons
- Converted to AF = 0.063 AF per controller
- Number of improved properties = 1,400
- Total annual water savings estimated= 88 AF
- Lifetime savings over 10 year project life= 880 AF

Additionally the city of Roseville, an RWA water agency member, has provided preliminary savings from a study that conducted on their Cash for Grass participants. Even though results will likely improve as more landscape data is analyzed, initial results show that each square foot of turf removed (and replaced with water efficient landscaping) saves 37 gallons per year per square foot. This equates to an average 17% overall reduction in use per site. For established landscapes, savings improve resulting in a savings of 46 gallons per year per square foot removed with an average 21% overall reduction in water use. The project estimates that in addition to installing SMART controllers about a third the properties will receive a cash for grass incentive as well. This assumption is in line with the City of Sacramento's Cash for Grass program in which each participant must also install a SMART meter in order to be eligible for the program. With 500 properties receiving an estimated $500 for cash for grass incentive each at $0.50/square foot (sq ft) for a maximum of 1,000 sq ft, an additional water savings of 18.5 million gallons or 56.7 acre-feet a year can be expected. The lifetime savings over a 10 year project life amounts to 567.7 acre-feet.

- Water savings estimated = 37* (1,000 sq ft*500 properties)= 18.5 Million Gallons
- Average site = 1,000 SF of turf
- Number of improved properties = 500
- Converted 18.5 MG to AF = 57 AF per year
- Total annual water savings estimated= 57 AF

- Lifetime water savings over 10 year project life= 570 AF

The combined water savings from the controllers and cash for grass measures is 1,450 AF over the 10 year life of the project or 145 AF per year. Please note the watering savings from the public outreach component were not able to be calculated.

If the project was not implemented and the estimated savings were not realized, there will be additional stress on existing supplies to meet demand. The Sacramento region's water supply primarily depends on surface water. With concurrent back to back dry years, another dry year in 2015 could result in region's main reservoir Folsom Lake with extremely low storage levels (as described above). The water savings achieved through this project, 1,450 AF, will reduce customer demand resulting in the retention of that additional water supply to remain in Folsom Lake. In addition the public outreach component of this grant will provide information to customers to use water efficiently outdoors now and in the future to minimize the effects of future dry years ahead.

Energy Saved

An additional benefit of this project is energy savings. It takes energy to produce water and water to produce energy. Therefore water savings also creates energy savings from reduced pumping and treatment. For this project, we estimate an energy savings of 1,000 kilowatt hours (kWh) per million gallon (MG). This estimate is derived from an ongoing joint project with local energy provider, SMUD, to evaluate the energy necessary to deliver water in Sacramento County. The project is currently in progress, however, preliminary results indicate a very conservative energy intensity estimate for the Sacramento region at around 1,000 kWh/MG. This number will need to be refined over time as the region's water systems are better understood and measured. For this project, we estimate an energy savings of 472,480 kWh for the 10 year lifetime of the project or 47,248 kWh per year.

- Annual water savings estimated = 145 AF
- Converted to MG = 47.248 MG
- Energy savings estimated = 1,000 kWh/MG
- Total annual energy savings estimated=1,000*47.248= 47,248 kWh
- Lifetime energy savings over 10 year project life= 472,480 kWh

Greenhouse Gas Emissions Avoided

This energy savings can be translated into associated greenhouse gas (GHG) reductions as well. According to the Sacramento Municipal Utility District (SMUD)'s 2012 California Climate Registry Report, a reduction of .522 pounds (lbs) of Carbon Dioxide (CO_2) per kWh can be assumed (see "Att_3_DG_ProJust_2of2.pdf") Therefore the project will provide 24,663 lbs of CO_2 emissions reduction on annual basis and 246,634 lbs of CO_2 reductions over the 10 year lifetime of the project.

- Estimated GHG emissions reduction = .522 per kWh
- Total annual energy savings estimated=47,248 kWh
- Total annual GHG emissions reduction=.522*47,248=24,663 lbs of CO_2
- Lifetime energy savings over 10 year project life=472,480 kWh
- Lifetime GHG emissions reduction=.522*472,480=246,634 lbs of CO_2

This information was provided by the Climate Registry at http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/ .

Project 14: Striker Well Upgrades

Implementing Agency: Sacramento County Water Agency

City of Sacramento serves a highly urbanized population that is in risk of facing water shortage with the drought, lower river flow levels, and possibility of water rights curtailments. Sacramento County Water Agency (SCWA)'s Northgate 880 service area is located immediately to the north of the City of Sacramento. This SCWA water service area serves exclusively industrial and commercial businesses and is adjacent to the City of Sacramento with several water interties with the City of Sacramento's water system. This SCWA project was a planned construction for SCWA that can provide immediate relief to City of Sacramento's north service area.

SCWA's Northgate Business Park was constructed in the 1970's through the early 2000's and The Northgate water system was transferred from the business park developer to SCWA (aka Sacramento County Water Maintenance District at the time) on December 30, 1974. The water system design included direct feed wells providing 5 gallons per minute (gpm) per acre of production capacity. Additional capacity beyond the minimum design has been constructed as water demands increased. Some sites for groundwater well installation have been acquired for expected increases in future demands. The Striker Well site is one of those sites.

The Striker Well hole was drilled in 2002 as a future well site when demands dictated. SCWA scheduled the well to be completed sometime between 2015 and 2016. As the drought became more severe and it became apparent that available surface water supplies may be reduced or curtailed, SCWA moved the Striker well project up in schedule for 2014. This well's groundwater production will provide partial drought relief for the City of Sacramento.

Water Supply Produced

The Striker Well is expected to have the capacity to produce about 2 million gallons per day, typical for this area according to SCWA's past experience. The project will require purchasing and installation of an electrical system, SCADA, a motor, pump, plumbing, and a generator with automatic transfer switching.

Without this project, the City of Sacramento would not have access to the production from the Striker well, up to 2 million gallons per day, and would need to continue seeking other drought relief options.

Project 15: Antelope Booster Pump Station Phase 2

Implementing Agency: Sacramento Suburban Water District

San Juan Water District (SJWD) and its wholesale customers are heavily reliant on surface water supplies from Folsom Reservoir to meet urban demands. With the drought, these agencies risk not being able to provide a minimum level of service.

Water Supply Produced

Sacramento Suburban Water District (SSWD)'s engineer, Domenichelli & Associates, Inc. (D&A) performed a hydraulic modeling analysis to determine how much groundwater could potentially be supplied by SSWD to SJWD during drought or other emergency conditions. The modeling shows that under maximum day conditions, the system can deliver 10,000 gallons per minute (gpm) (or 14.4 million gallons per day [MGD]) of excess groundwater. Over a period from April through November, this could result in the delivery of up to 1,370 acre feet per month depending on the operational strategy. The results of the hydraulic modeling are contained in a Technical Memorandum titled "Groundwater Supply Options to SJWD for 2014" dated January 8, 2014, by D&A (see "Att_3_DG_ProJust_2of2.pdf").

Currently there are no facilities or other means of supplying groundwater from SSWD to SJWD and its wholesale customers. A new pump station is the least cost alternative for providing this needed supply. SJWD's and SSWD's Board of Directors have approved a Memorandum of Understanding (signed June 16, 2014) for the design, construction and use of the new pump station facility to supply an estimated 10,000 gpm to SJWD and its wholesale customers during times of drought or emergency (see "Att_3_DG_ProJust_2of2.pdf").

The pre-design phase of the project has been completed and a report titled "Antelope Pumpback Booster Pump Station Pre-Design Report," dated January 10, 2014, has been prepared by D&A (See "Att_3_DG_ProJust_2of2.pdf"). The pre-design report includes pump station design criteria, a recommended pump station layout, and cost estimates. The pre-design report recommends that the pump station initially include three separate pumps. Two, larger 5,000 gpm pumpback pumps would be sized to pump water from SSWD's Antelope Pressure Reducing Valve (PRV) Station all the way back upstream to SJWD's Hinkle Reservoir (pg 8). A smaller, 2,000 gpm pump would be used by SSWD for the pump around option to the Arvin Area (pg 8). Space would be provided in the pump station for the future addition of another 5,000 gpm pump back pump as more groundwater supply is developed (pg 8). Provisions would also be made to allow for the installation of a small hydroelectric turbine if the in-conduit hydro project ever becomes cost-effective. The pumps and related equipment would be housed inside a separate building located to the west of SSWD's new security building.

SSWD has completed and submitted a Rule 16 New Service Application to Sacramento Municipal Utility District (SMUD) that showed the proposed power needs for the pump station. SMUD has now issued SSWD a Commitment Letter dated March 7, 2014, which outlines the necessary facilities to be installed and the fees to obtain electrical service for this facility. A Commitment Sketch (drawing) is attached to SMUD's letter (see "Att_3_DG_ProJust_2of2.pdf").

SSWD has received 50% plans and specifications, dated June 2014, for the pump station as prepared by D&A (D&A, 2014). These drawings include various site plans, a pump station floor plan, building elevations and sections, typical piping details, and electrical and instrumentation and control drawings (see "Att_3_DG_ProJust_2of2.pdf").

The Phase 1 of the Antelope Booster Pump Station project allowed reversal of flow in the Antelope and Cooperative Transmission Pipeline and had a capacity of 4,200 gpm. This Phase 2 project builds and additional 5,800 gpm capacity onto this system.

Environmental Benefit

Utilizing this supply will reduce the amount of water conveyed from Folsom Lake during times of drought allowing additional supply to downstream beneficiaries. The life of the project is based on the expected life span of a pump station with regular maintenance. Summer demand on Folsom Reservoir is approximately 75 MGD or 52,000 gpm.

Project 16: Enterprise Intertie Improvements

Implementing Agency: Sacramento Suburban Water District

City of Sacramento serves a highly urbanized population that is in risk of facing water shortage with the drought, lower river flow levels, and possibility of water rights curtailments. Sacramento Suburban Water District (SSWD) is located adjacent to City of Sacramento, and with the history of regional conjunctive use programs, SSWD has groundwater supplies available in emergency situations.

Water Supply Produced

An existing intertie (service connection) already exists between SSWD and the City of Sacramento at SSWD's Enterprise Reservoir site. However, this intertie was designed only for SSWD to take delivery of treated surface water from the City of Sacramento. The intertie was never intended to allow SSWD to supply the City of Sacramento with water. However, by reversing an existing check valve, and manually modulating the flow via a 24" butterfly valve, SSWD staff discovered it was possible to deliver water to the City at this existing intertie.

As a result, a flow test was conducted by SSWD and the City of Sacramento personnel to confirm that water can be delivered to the City of Sacramento through the existing Enterprise Intertie. The flow test was conducted over approximately 3 hours on March 14, 2013, and a maximum of 12,577 gallons per minute (gpm) was delivered through the intertie. This test was performed specifically to see if a substantive amount of water could be delivered to City of Sacramento through this intertie. A second flow test was conducted from November 21 through November 26, 2013, due to an emergency request for water due to an unforeseen disruption of the City of Sacramento's supply. A total of 330.6 acre-feet of water was delivered through the intertie. Both of these flow tests were manned tests with no way to remotely control the flow of water or system pressures, leaving both systems at risk. Additional above-ground piping, isolation valves, a flow control valve, instrumentation and controls, and Supervisory Control and Data Acquisition (SCADA) integration and programing are needed to make this a permanent, automated intertie that safely control the flow of water and maintains adequate pressures in both systems.

In addition, hydraulic modeling has been performed to estimate the amount of water that SSWD could supply to the City of Sacramento through the Enterprise Intertie during a 90-day summer period for 2014. Their analysis concluded that a total of 5,850 AF of water could be delivered over a 90-day summer period. The results of the hydraulic modeling analysis are included in a Technical Memorandum titled "South Service Area Capacity Analysis," dated May 12, 2014, by Brown and Caldwell (Att_3_DG_ProJust_2of2.pdf).

Project 17: Barton Road Intertie

Implementing Agency: San Juan Water District

Project specific details which support the project benefits can be found in the 2013/14 Water Emergency Supply Study, dated March 25, 2014 by San Juan Water District (see "Att_3_DG_ProJust_2of2.pdf").

Water Supply Produced

Since the planning document was developed, PCWA has reviewed the conveyance capacity and water supply availability, and has concluded that during a drought or emergency condition they have the excess capacity to transfer the proposed 2 MGD to SJWD through the proposed intertie. Inversely, SJWD has also evaluated the hydraulic model and determined under a scenario where PCWA needs emergency supply and there is surface water available from Folsom Lake, that SJWD can provide 2 MGD to PCWA through the same proposed intertie. SJWD and PCWA have developed the details of the mutual aid conveyance agreement between the two agencies, and is expected to be signed in the next month.

Energy Saved

The location of the proposed intertie is at an ideal location for conveyance and distribution into SJWD's system. Since the new water supply is entering at the northern boundary of the system, it will be fed by gravity throughout the largest SJWD pressure zone. Currently water is pumped into this area from the District's Bacon Booster Pump Station. The new gravity fed intertie will allow this water supply to provide the greatest benefit to the largest component of SJWD-Retail area and reduce pumping costs to this area by approximately 70 Kwh.

The proposed pipeline is located within the roadway of Barton Road and therefore has no adverse environmental affects and no other adverse physical effects on either system.

SJWD expects the 100% design plans to be completed by July 15, 2014.

Cost Effectiveness Analysis

A cost effectiveness Analysis has been conducted for each of the proposed projects below. This analysis evaluates whether the physical benefits provided by each project are provided at the least possible cost. Table - 6 was provided by DWR for this analysis.

Project 1: Lower American River Pipeline

Implementing agency: Carmichael Water District

Table 6 – Cost Effective Analysis	
Project name Lower American River Pipeline	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water supply produced -Environmental benefit
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Four alternatives were analyzed (Golden State Water Company Replacement Water Project, 2012, page 14). Alternatives 1 through 3 – GSWC only Ranney Collector Well and Conveyance (3 different locations) - $7,500,000 to 11,700,000 plus cost of additional surface water treatment, Alternative 4 – CWD-GSWC Pipeline Conveyance Project - $5,365,000
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 2: Hazel/50 Intertie Improvements

Implementing agency: City of Folsom

Table 6 – Cost Effective Analysis	
Project name: Hazel/50 Intertie Improvements	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water supply produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Surveys of potential intertie locations were performed with neighboring water districts/agencies. The partnering with Golden State Water Company at the Hazel location is strategically located the shortest distance from Folsom and uses an independent water supply (groundwater). Other regional interties to move groundwater from other agencies to Folsom were eliminated from consideration due to costs in the many millions of dollars.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 3: Well #2 Reactivation

Implementing agency: City of Lincoln

Table 6 – Cost Effective Analysis	
Project name: Well #2 Reactivation	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced -Water Quality Improvement -Environmental Benefit
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Lincoln compared a number of alternatives and found rehabilitation far less expensive than developing new wells which cost in the $2 million and up range. Additionally the dry year has resulted in a shortage of available well drilling equipment and contractors impacting schedule.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives..
Comments:	

Project 4: Nelson Well Improvements

Implementing agency: City of Lincoln

Table 6 – Cost Effective Analysis	
Project name: Nelson Well Improvements	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced -Water Quality Improvement -Environmental Benefit
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Lincoln compared a number of alternatives and found rehabilitation far less expensive than developing new wells which cost in the $2 Million and up range. Additionally the dry year has resulted in a shortage of available well drilling equipment and contractors impacting schedule.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 5: PFE and Zone 4 Transfer Pump Stations

Implementing agency: City of Roseville

Table 6 – Cost Effective Analysis	
Project name: PFE and Zone 4 Transfer Pumping Stations	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?.
	If yes, list the methods (including the proposed project) and estimated costs. The only option to provide the same amount of water to the City's zone 1 is to rent and install temporary pumping equipment at the current sites. The rental equipment could be cheaper for short durations, but would be significant costs associated with altering the existing pipelines to install the rental equipment, demobilizing the temporary equipment, potential public safety considerations with temporary equipment and, no residual value as once complete, the rental equipment would need to be returned.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 6: Phase 2B Well Rehabilitations

Implementing agency: City of Sacramento

Table 6 – Cost Effective Analysis	
Project name: Phase 2B Well Rehabilitations	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Siting, design, and construction of new well takes far more time and would utilize far more resources as compared to returning existing wells that are capable of rehabilitation to service. The City has also entered into agreements with neighboring water districts to take any excess groundwater capacity when needed. This project is not considered an alternative to utilization of neighboring interties, but an addition.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 7: Sacramento River Pump Station Modifications

Implementing agency: City of Sacramento

Table 6 – Cost Effective Analysis	
Project name: Sacramento River Pump Station Modifications	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. The City contemplated installation of new submersible pumps to allow for capture of low water levels. Competitive bids were collected and some in-house construction activities were initiated in anticipation of this project, such as cutting and welding new flanges onto the diversion facility intake header to accept piping from the submersible pumps. Projected construction cost alone was over $2 million. Ultimately, that project was put on hold when it became evident that satisfactory results could be attained through a significantly cheaper alternative, the addition a vortex breakers with vibration monitoring to extend the useful range of the existing pumps, which is included in this application.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives. It does not provide the same level of reliable benefit (depth of flow accessible for diversion) as the more expensive submersible pump alternative, but the evaluated benefit was deemed reliable enough given the range of hydrologic predictions.
Comments:	

Project 8: Lower American River Pump Station Modifications

Implementing agency: City of Sacramento

Table 6 – Cost Effective Analysis	
Project name: Lower American River Pump Station Modifications	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. The City rented and installed 20 mgd of submersible pumping capacity to provide for partial plant capacity when river releases drop to the minimum envisioned in the facility design, and contemplated purchase and installation of approximately 55 mgd in new submersible pumps to allow for capture of low water levels. Competitive bids were collected with projected construction cost over $1 million to complete the project. Ultimately, that project was put on hold when it became evident that satisfactory results could likely be attained through a significantly cheaper alternative, the addition of vortex breakers and pump vibration monitoring equipment to extend the useful range of the existing pumps that are included in this application.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives as it allows the City to utilize existing equipment. It does not provide the same level of reliable benefit (depth of flow accessible for diversion) as the more expensive submersible pump alternative, but the evaluated benefit was deemed reliable enough given the range of hydrologic predictions.
Comments:	

Project 9: Main Ditch Piping

Implementing agency: El Dorado Irrigation District

Table 6 – Cost Effective Analysis	
Project name: Main Ditch Piping	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Saved -Renewable Energy Produced -Environmental Benefits -Water Quality Improved
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Piping and lining of the ditch was explored by EID, but was not fully evaluated or costed out because lining does not meet all of the project objectives.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. Other alternatives were considered by EID such as lining the canal without piping. While this alternative was less costly, it did not meet the water quality and public safety objectives for the project. Thus, this alternative is the least cost alternative that meets all project objectives.
Comments:	

Project 10: Madison Well Construction

Implementing agency: Fair Oaks Water District

Table 6 – Cost Effective Analysis	
Project name: Madison Well Construction	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. Alternative well sites were reviewed and examined. The Madison well site was preferable due to the following: immediate availability of the site for construction, easy access for drilling and construction equipment, proximity to a large (24 –inch) transmission water main and good potential for high quality water. See Fair Oaks Water District Water System Master Plan, 2007, page 5-13 for estimated project costs.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 11: American River Pump Station Improvements

Implementing agency: Placer County Water Agency

Table 6 – Cost Effective Analysis	
Project name: American River Pump Station Improvements	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒ No ☐
	If no, why? This is the best alternative for supplying water from this existing source.
	If yes, list the methods (including the proposed project) and estimated costs. PCWA pursued the procurement of a 50 cfs pump which was originally deemed to be the largest size pump that could fit within the available wetwell. During the procurement phase it was determined that a 50 cfs would not work due to the weight of the pump and limited lifting capacity of the existing crane system. Modification of the crane system would require major modifications to the existing pump house structure and therefore was determined to be economically infeasible.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 12: Agricultural and Rural Residential Drought Response Incentives Program

Implementing agency: Placer County Water Agency

Table 6 – Cost Effective Analysis	
Project name: Agricultural and Rural Residential Drought Response Incentives Program	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Saved -Increased Water Use Efficiency
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☐No ☒
	If no, why? There are no similar alternative methods for reducing outdoor watering. A potential structural alternative would be to upgrade the agricultural water delivery system to provide service analogous to what urban customers receive. This would require changing the open ditch delivery system to a closed pipe network along with sufficient storage to enable agricultural deliveries. Although no cost study has been conducted, excavating and installing a closed pipe distribution system is assumed to be a cost-prohibitive approach at this time.
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 13: Regional Water Efficiency Drought Measures

Implementing agency: Regional Water Authority

Table 6 – Cost Effective Analysis	
Project name: Regional Water Efficiency Drought Measures	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) - Water Supply Saved - Energy Saved - Greenhouse Gas Emissions Avoided
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☐No ☒
	If no, why? There are no alternative methods for reducing outdoor watering. The energy savings is simply an additional benefit provided as a result of water savings because of the direct connection between the two resources.
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. NA – There are no other alternative methods.
Comments:	

Project 14: Striker Well Upgrades

Implementing agency: Sacramento County Water Agency

Table 6 – Cost Effective Analysis	
Project name: Striker Well Upgrades	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☐No ☒
	If no, why? The SCWA Northgate 880 service area does not have access to water sources other than groundwater. Ultimately there are opportunities for conjunctive use by purchasing surface water, when available, from the City of Sacramento.
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of many projects in progress to increase the production of water in service areas adjacent to the City of Sacramento for possible limited drought relief.
Comments:	

Project 15: Antelope Booster Pump Station Phase 2

Implementing agency: Sacramento Suburban Water District

Table 6 – Cost Effective Analysis	
Project name: Antelope Booster Pump Station Phase 2	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced -Environmental Benefit
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. SJWD does not have groundwater capabilities within its system and looked for opportunities to install additional wells for increase water supply reliability; however, the estimated cost for each 1,500 GPM capacity groundwater well would be on the order of $3 million. Therefore, the cost for 6 to 7 groundwater wells that would be equivalent to the 10,000 GPM of capacity of the pump facility would be in excess of $21 million. The estimated total cost of the booster pump station is $2.9 million.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 16: Enterprise Intertie Improvements

Implementing agency: Sacramento Suburban Water District

Table 6 – Cost Effective Analysis	
Project name: Enterprise Intertie Improvements	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☐No ☒
	If no, why? An existing intertie with the City of Sacramento already exists at this location but it was designed only to allow for the delivery of treated surface water from the City to SSWD. Since the connection (intertie) with the City is already in place, modifying the existing intertie is the most cost-effective means of allowing SSWD to deliver excess groundwater supplies to the City.
	If yes, list the methods (including the proposed project) and estimated costs.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives.
Comments:	

Project 17: Barton Road Intertie

Implementing agency: San Juan Water District

Table 6 – Cost Effective Analysis	
Project name: Barton Road Intertie	
Question 1	Types of benefits provided as shown in Table 5 (Annual Physical Project Benefits) -Water Supply Produced -Energy Saved
Question 2	Have alternative methods been considered to achieve the same types and amounts of physical benefits as the proposed project been identified? Yes ☒No ☐
	If no, why?
	If yes, list the methods (including the proposed project) and estimated costs. In 2008 SJWD completed a Hydraulic Investigation to determine the potential for groundwater supply for the District. This report concluded that any well installed would produce between 350 gpm to 500 gpm (0.5 to 0.72 MGD). The report also identified iron and manganese in the water which would require a treatment facility or blending system to remain below the California Department of Public Health secondary requirements. Including property purchase, down-hole construction, pump station and treatment facility and system improvements, it is estimated that a single 500 gpm groundwater well would cost in excess of $3 million to construct. Based on the cost to benefit ratio, SJWD determine that this was not a viable project for alternative water supply. For comparison, 500 gpm is one quarter of the proposed intertie capacity.
Question 3	If the proposed project is not the least cost alternative, why is it the preferred alternative? Provide an explanation of any accomplishments of the proposed project that are different from the alternative project or methods. This project is the least cost of all viable project alternatives. Additionally, for comparison and justification, to construct four (4) new water wells to obtain the same capacity, the comparable alternative cost is estimated in excess of $12 million dollars. Furthermore, this comparison was based on the assumption that sufficient groundwater is available in the project area, which it is not.
Comments:	