Lower American River Pipeline – Carmichael Water District

List of References

- ACWA First Drought Action Report, 2014, **page 25**
- Technical Memorandum – Water Treatment Capacity Evaluation – Golden State Water Company Replacement Water Project, 2012, **All pages**
- Technical Memorandum – Golden State Water Company Replacement Water Project, 2012, **pages 14-15, 20**
- Golden State Water Company Urban Water Management Plan, 2010, **pages 4-2, 4-3, 5-5, 6-3**
- Kennedy Jenks 60% Design Cost Estimate, 2014, **All pages**

Association of California Water Agencies
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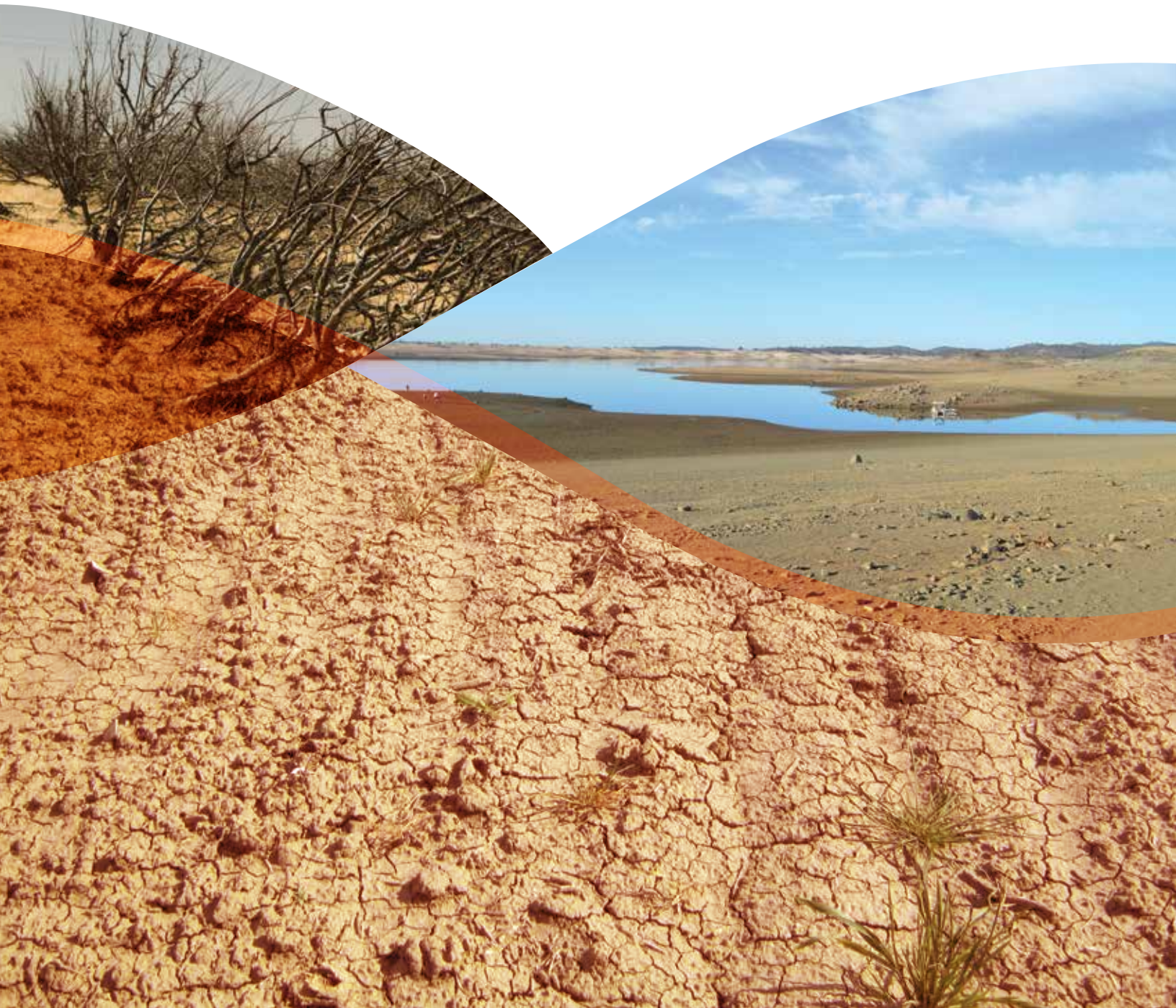
2014 DROUGHT

IMPACTS AND STRATEGIES FOR RESILIENCE

June 2014



- Plan on additional pump(s) in American River to increase access to this supply. Contract under negotiation, plan to authorize work in spring 2014 and have running ahead of summer 2015

South Tahoe Public Utility District

- Install 8,030 meters for connections that are currently not metered but are scheduled for meter installation within the next five years
- Install MTBE treatment for Glenwood and Paloma wells
- Implement Waterline Replacement Program to conserve water and provide sufficient fire flows
- Irrigation piping upgrades
- Increase funding for turf removal program and hire a water efficiency technician for next 4 summer irrigation months.
- Continue leadership on Tahoe Sierra Integrated Regional Water Management Planning (TSIRWMP) partnership/regional water conservation program

Tahoe City Public Utilities District

- Build the West Lake Tahoe Regional Water Treatment Plant, a permanent, all season surface water treatment plant on the West Shore of Lake Tahoe utilizing Lake Tahoe as the water source (replaces an interim seasonal water treatment plant that TCPUD constructed in 2004 that has reached its useful life and needs to be replaced)
- Consolidate with Tahoe Cedars Water Company and install water meters on TCWC connections
- Implement the Tahoe City Main Emergency Water Supply Project, which would construct an emergency raw water line from the Grove Street lake intake, up to a level publicly-owned parcel, for the opportunity to install a connection to an emergency water treatment plant

LOWER SACRAMENTO VALLEY AND DELTA (REGION 4)

Carmichael Water District (CWD)/Fair Oaks Water District (FOWD)

- Build booster pump station at Sweitzer School (2.0 MGD) to deliver water to FOWD
- Build Dewey booster pump station (2.0 MGD) to deliver water to FOWD
- Build booster pump station near San Juan Ave and Lincoln Ave (2.0 MGD) to deliver water to FOWD

City of Folsom

- Secure funding for developing groundwater wells in city's east area
- Include regional infrastructure projects in drought relief bills or legislative water bills
- Pass legislative language to facilitate "in watershed" surface water transfers when infrastructure is in place to move water

City of Sacramento

- Secure funding and regulatory support for interties with the Sacramento Suburban Water District and Sacramento County Water Agency that could potentially supply up to 29 MGD of additional supply through emergency agreements
- Include regional infrastructure projects in drought relief bills or legislative water bills
- Secure support for drought relief projects that include water conservation programs and shovel-ready infrastructure projects to improve water supply quality and reliability, including:
  - Five ground water projects to build new capacity and restore stand by wells to service
  - Two treatment plant projects to ensure functionality at lower river levels
  - Expansion of River Friendly Landscape (cash for grass) program in line with 20% water consumption mandates

City of West Sacramento

- Develop Southport Well 19 conditioning project to pump and treat groundwater
- Implement Bryte Bend Water Treatment Plant well project to pump and treat groundwater
- Implement City of West Sacramento Parks Grey Water Retrofit Project, which will serve 19 parks with grey water

21 December 2012

Technical Memorandum

To: Paul Schubert, District Manager
Golden State Water Company

From: Alex Peterson, P.E. 46095
Kennedy/Jenks Consultants

Subject: Golden State Water Company Replacement Water Project
K/J 1270033*00, 9.09

Introduction

This Technical Memorandum (TM) presents an evaluation of the feasibility of constructing a water transmission pipeline connecting Carmichael Water District's (CWD) existing Bajamont Water Treatment Plant (WTP) to the Golden State Water Company's (GSWC) existing Cordova water system. The study area vicinity is shown in Figure 1 in the back of this TM. Prior work completed by CWD confirms that 4.5 million gallons per day (MGD) of treatment capacity exists within the existing Bajamont WTP facility and delivery of up to 5,000 acre feet annually of a replacement water supply for GSWC's Cordova System could be met through the existing diversion, treatment and treated water pumping capacity of CWD.

This evaluation is of the necessary pipeline improvements necessary for connecting the systems and includes initial siting and feasibility of a river crossing, assessment of hydraulic grade line requirements for the system connection and opinion of the cost for the transmission main improvements. This TM is complementary to the *Technical Memorandum – Water Treatment Capacity Evaluation – Golden State Water Company Replacement Water Project* (CWD TM) prepared for CWD that evaluated the available capacity to support a GSWC supply project. The CWD TM included a summary of the cost of the Bajamont facilities and an estimate of the economic considerations for a pro-rata operation and maintenance liability associated with committing 4.5 MGD capacity for GSWC's use. The CWD TM is provided as Attachment 1 for information and the evaluation is generally not repeated in this TM.

The work summarized in this Technical Memorandum includes the following:

- Project overview, background and description.
- CWD treatment capacity evaluation, based on *Technical Memorandum – Water Treatment Capacity Evaluation – Golden State Water Company Replacement Water Project,* including recommendations for additional testing, or required CWD system improvements.
- Hydraulic evaluation of the CWD and GSWC water system hydraulic grade line (HGL) conditions to test static (maximum pressure) and peak hour (minimum pressure) operating conditions using the CWD and GSWC water system models. GSWC water modeling scenarios evaluation was conducted by GSWC.

entry point regardless of soil type in order to facilitate mud management and to prevent settlement above the initial portion of the bore.

The soils anticipated to be encountered along the alignment should also be sufficiently stable to help protect against hydrofracture beneath the American River. As mentioned above, the HDD process utilizes pressurized drilling fluids at all stages of the drilling process to excavate the borehole. The drilling fluid is comprised of a mixture of water and drilling fluid additives, primarily bentonite – a non-toxic naturally occurring clay mineral that is formed by the chemical alteration of volcanic ash which swells to several times its original volume when mixed with water.

Hydrofracture, commonly referred to as "frac-out," is a result of the drilling fluid pressure exceeding the strength and confining stress of the soils surrounding the borehole. The excess pressure fractures the soil around the bore, allowing drilling fluid to escape from the borehole and potentially up to the ground surface. Although drilling fluid is non-toxic and is typically 97-99% water, it is still important to reduce the risk of hydrofracture through proactive design and good construction practices. In most cases, this involves designing the bore to have sufficient depth and overburden to resist the drilling fluid pressure. The proposed HDD alignment shown in Figure 4 maintains sufficient depth throughout the critical section of the bore beneath the river and where overburden is low to protect against the risk of hydrofracture.

Should further geotechnical investigations show that the soil conditions require a deeper bore path, a different HDD installation method may be required to protect the slope stability of the northern bank. The intersect method would require an additional small HDD rig (not included in the current cost estimate) to facilitate the deeper bore path. The intersect method would allow the successful installation of the second conductor casing and reduce the required drilling pressures by up to 50%, minimizing the risk of hydrofracture in this environmentally sensitive area.

Preferred Alignment and Preliminary Cost Estimate

The preferred alignment is shown in Figure 3 with additional information developed to support the alignment feasibility and cost estimate shown in Figures 5 – North Bank Connection Detail, Figure 6 - Proposed Grading, North Bank and Figure 7 - Preferred Alternative, North Bank Constructability. Not shown are the drainage restoration elements including an arched culvert replacing the existing 23-inch culvert. A 10% level preliminary design was prepared and is provided with the figures as the basis for the cost estimate. The work also requires the temporary removal of the existing CWD transmission main to allow for excavation and demolition of existing abandoned facilities.

A preliminary cost estimate was prepared for the HDD crossing based on the following:

- 1,000 feet of 30-inch HDPE pipeline (30-inch HDPE wall thickness provides the same inside diameter as the transmission main)
- Final bore diameter of 42 inches
- 150 feet of conductor casing installed at entry
- Only one mobilization of drill rig (to Rossmoor Bar)

With markups and contingency, the preliminary cost for the HDD installation only was estimated at approximately $1.2 million. This estimate does not include earthwork, site access, restoration and temporary grading or erosion protection. However, it does confirm that the approach is significantly less that a micro-tunneling approach which would require two pits to be constructed at a cost on the order of $1.0 million each.

The detailed cost estimate is provided following the Figures. The summary is presented in Table 2 – Opinion of Probable Cost

Table 2
Opinion of Probable Cost

Description	Estimated Cost
Pipeline Construction	$3,676,000
Engineering, Permitting, Construction Management 15%	$551,400
Opinion of Probable Cost	$4,227,400

Permitting Requirements

Because this project is located within the American River Channel, a number of permits will be required prior to beginning construction. Below is a list of the anticipated permitting requirements for this project as previously outlined for the *Constraints Analysis CWD Bajamont Way Culvert Replacement, Creek Restoration and American River Pipeline Removal Project Assessment of Existing Conditions and Preliminary Study* which covers the same overall project area:

- 401 Water Quality Certification or Waste Discharge Requirement
- State Lands Commission Permit
- Cultural Resource-Submission of Findings to State Historic Preservation Officer
- U.S. Fish and Wildlife Service Section 7 Consultation
- U.S. Army Corps of Engineers – Clean Water Act, Section 404 Permit

U.S. Army Corps of Engineers – CWA Section 404 Permit

The Crops regulates discharge of dredged or fill material into water of the United States, including wetlands, under Section 404 of the Clean Water Act (CWA). “Discharge of fill material” is defined as the addition of fill material into waters of the U.S., including, but not limited to, the following:

18 October 2012

Technical Memorandum – Water Treatment Capacity Evaluation – Golden State Water Company Replacement Water Project

Revised 10/12/12

REGISTERED PROFESSIONAL ENGINEER
ALEXANDER R. PETERSON
No. 046095
Exp. 12/31/12
CIVIL
STATE OF CALIFORNIA
10/18/12

To: Steve Nugent, General Manager
Carmichael Water District

From: Alex Peterson, P.E. 46095
Kennedy/Jenks Consultants

Subject: Carmichael Water District, Water Supply Evaluation – Golden State Water Company Replacement Water Project
K/J 1270025*00, 9.09

Introduction

This Technical Memorandum presents the evaluation of using Carmichael Water District (District) water treatment assets to treat and deliver replacement water supply for Golden State Water Company (GSWC) as part of the GenCorp/Aerojet (Aerojet) response to groundwater contamination in Rancho Cordova. GSWC existing water supplies include both surface water and groundwater and recently impacted GSWC wells have made the resolution of replacement water supply critical.

The District was approached by representatives of GSWC and Aerojet to explore the feasibility for using the District's Bajamont Water Treatment Plant (WTP) to capture, treat and deliver new water introduced to the river via Aerojet produced groundwater extraction and treatment (GET) remediated water discharged to the American River at Buffalo Creek, upstream of the District's river intake collectors. The work summarized in this Technical Memorandum includes the following:

- Review and summarize existing District water demands and changes in the demand pattern during the last 10 years and provide an opinion as to the District Maximum Day Demand projected through ultimate build out.
- Review and summarize existing District water supply capacity and compare to projected District Maximum Day Demand to determine if there is available treatment capacity at the WTP to supply a constant 4.5 million gallons per day (MGD) (or 5,000 acre-feet/year) without reducing the level of service the existing District rate payers.
- Evaluate the District distribution system model for delivery of 4.5 million gallons per day (MGD) to GSWC during the District Maximum Day and identify the likely delivery pressure at the proposed GSWC service connection and resulting District system pressures.
- Review and develop estimated cost of service reflecting the prior capital cost of constructed assets, operation and maintenance and foreseeable significant renewal/restoration projects to maintain District water treatment reliability.

Not evaluated at this time was the possible reconfiguration of the Dewey Pressure Zone to increase the area served. The existing 1 MG tank and booster pump station have sufficient additional capacity to increase the demand served by 50 to 75 percent. This would support the expansion of the pressure zone to include the easterly portion of the District and the high elevation area in the vicinity of San Juan Avenue and Fair Oaks Boulevard. These improvements would require installation of in-line check valves in the distribution system and limited additional piping on the eastern reach of the District.

The benefits of expanding the Dewey Pressure Zone are that the peak hour demand for the customers transitioned from the central zone 2 to the upper Dewey zone 1 will no longer need to be supplied directly by the treated water pump station. However, these improvements do not appear to be immediately necessary to provide 4.5 MGD to the GSWC.

Key Findings

The following are the key findings of the evaluation for District water demand and supply production capacity.

- District Demand Projections for Maximum Day Demand – 18 MGD at ultimate buildout.
- Supply Production Capacity
  - Bajamont WTP Capacity
    - The 2010 and 2012 maximum day treated water volumes at the treatment plant was approximately 12.8 MGD for a corresponding 18 MGD existing demand; there is approximately 8 MGD of available treatment capacity under current Maximum Day Demand conditions.
    - It appears that the existing treated water pumps provide enough capacity to meet the project PHD + GSWC flows with a possible reduced system pressure approximately 5 psi during peak hour in the middle zone.
    - There would be approximately 2 hours of clear well drawdown (greater than 22 MGD pumping) during maximum day demand conditions. The estimated resulting clearwell volume used to meet peak demand is approximately 300,000 gallons, leaving up to 1,700,000 remaining to buffer treatment plant operations, backwash cycles, provide emergency storage, etc.
    - Improvements to the treated water pump station, La Vista booster pump station, or modifications to enlarge the Dewey pressure zone may allow current discharge pressure and the higher flow conditions to be maintained.
- Groundwater Capacity – the existing groundwater capacity is sufficient to meet demands without additional reliance on groundwater. The District could expand use of existing wells if desired.

Golden State
Water Company
A Subsidiary of American States Water Company

Final Report

2010 Urban Water Management Plan
Cordova

Corporate Office
630 E. Foothill Blvd.
San Dimas CA 91773

July 2011

Kennedy/Jenks Consultants

4.1 Water Sources

GSWC obtains its water supply for the Cordova System from a combination of surface water diverted from the American River and groundwater pumped from the Central Sacramento Basin. Regional contamination has resulted in the loss of high quality groundwater. As a result of litigation filed by GSWC against the Gencorp/Aerojet Corporation (Aerojet), a Master Settlement Agreement and Release (Settlement Agreement) was entered between Aerojet and GSWC in 2004. The Settlement Agreement obligates Aerojet to supply GSWC with 5,000 ac-ft/yr of replacement water to offset contaminated groundwater (referred to herein as "Granted Water") as well as an additional 10,200 ac-ft/yr of contingent replacement water if necessary to satisfy system demands.

GSWC's temporary water transfer agreement with the Sacramento Municipal Utility District (SMUD) allows GSWC to divert up to 6,000 ac-ft/yr from the Folsom South Canal through December 31, 2012 under SMUD's Central Valley Project (CVP) contract entitlement. SMUD has a water service contract with the United States Bureau of Reclamation (Contract No. 14-06-200-5198A) for delivery of as much as 60,000 ac-ft/yr of municipal and industrial water from CVP.

American River water withdrawn from the Folsom South Canal is treated at the Coloma Water Treatment Plant (Coloma WTP) and the Pyrites Water Treatment Plant (Pyrites WTP) for a combined treatment capacity of approximately 14.4 million gallons per day (mgd). The Coloma WTP has a maximum reliable daily treatment capacity of approximately 7,140 gallons per minute (gpm). The Pyrites WTP has a maximum reliable daily treatment capacity of about 3,150 gpm.

Currently, groundwater is pumped from a total of 8 active wells in the Central Sacramento Basin for the Cordova System. These wells have a current total active capacity of 20,751 ac-ft/yr (12,865 gpm). Between 2005 and 2009, the actual production averaged 10,576 ac-ft/yr.

Table 4-1 summarizes the current and planned water supplies available to GSWC for the Cordova System that will meet the projected water demands under normal water years. This water supply summary is based on analysis of supplies from surface water, groundwater, and granted and contingency replacement Aerojet water. Surface water from the American River is based on GSWC's pre-1914 water rights not currently leased to the City of Folsom (see Chapter 4.2). The Aerojet Granted Water source is currently under negotiation and relies on wheeling a new supply of up to 5,000 ac-ft/yr of discharged remediated groundwater through existing or future facilities which may include increased diversions from the Folsom South Canal, a new point of diversion and treatment off the American River, or SCWA's Freeport diversion on the Sacramento River and the newly constructed SCWA Vineyard WTP.

There is currently no projected recycled water supply available for this system (see Chapter 4.8 for details).

Table 4-1: Current and Planned Water Supplies for the Cordova System in ac-ft/yr						
Source	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Surface Water from American River	9,827	5,000	5,000	5,000	5,000	5,000
Groundwater(1)	6,651	26,641	14,850	14,850	14,850	14,850
Aerojet Granted Water	0	5,000	5,000	5,000	5,000	5,000
Recycled water	0	0	0	0	0	0
Total	16,479	36,641	24,850	24,850	24,850	24,850

Notes:
1. Based on projected use in the Central Sacramento Groundwater Basin.
2. 2010 water supplies are based on actual production records.
3. Table format based on DWR Guidebook Table 16.

GSWC's water demands are projected to increase from 2010 to 2035 with corresponding projected water supply increases to meet demands. The projected increase in demand will be met by reliance on GSWC's appropriative right to groundwater, Aerojet Granted Water supplies, and if necessary, additional replacement water to which GSWC is entitled under the Settlement Agreement. Water demand projections are documented in Chapter 3. Details of the groundwater supply are presented in the following section including a discussion of the reliability of both sources of water supply.

4.2 Surface Water

GSWC possesses a pre-1914 appropriative right to divert up to 10,000 ac-ft/yr from the American River via the Folsom South Canal at a maximum withdrawal rate of 20 cubic feet per second (cfs) or 13 mgd. Appropriative surface water rights initiated prior to 1914 are not subject to the Water Commission Act and successor laws relating to water right permitting requirements, and therefore do not require a permit from the State Water Resources Control Board. The point of diversion for this right has been changed since its initiation, so that the water is now diverted from the American River through the Folsom South Canal, which is operated by the United States Bureau of Reclamation. The Folsom South Canal is part of the Folsom Unit of the CVP. In 1994 GSWC entered into an "Agreement for Reallocation of Water under Co-Tenancy Agreement" with the City of Folsom to lease 5,000 ac-ft/yr of water rights in perpetuity. The company retained 5,000 ac-ft/yr of its right, which is diverted from the Folsom South Canal for use within the Cordova System. In addition to the 5,000 ac-ft/yr obtained from GSWC's pre-1914 water right to the American River, GSWC's temporary water transfer agreement with SMUD allows GSWC to divert up to an additional 6,000 ac-ft/yr from the Folsom South Canal under SMUD's CVP contract entitlement. The SMUD agreement became effective in 2008 and expires on December 31, 2012, unless renewed pursuant to a request by GSWC. As explained in the Reliability of Replacement Water section in Chapter 6, after the expiration of the SMUD water transfer, GSWC will receive 5,000 ac-ft/yr replacement water pursuant to the terms of the Settlement Agreement with Aerojet.

The Cordova System's distribution facilities also have been designed with several interconnections to neighboring water purveyors for emergency purposes. GSWC maintains three 6-inch interconnections with the California-American Water Company's distribution system in the west side of the Cordova System, and a 12-inch interconnection with the City of Folsom at

6.1.3 Reliability of Replacement Water

As previously stated, the Settlement Agreement with Aerojet guarantees that replacement water supplies will be made available to offset lost groundwater production in the Cordova System, up to a maximum of 15,200 ac-ft/yr.

Aerojet establishes replacement water rights from its extraction and treatment of contaminated groundwater at several GET facilities. The facilities extract and treat the contaminated groundwater and then discharge the treated water into several tributaries of the American River. When needed, GSWC will divert up to 5,000 ac-ft/yr of the granted water via the Folsom South Canal.

In addition, the Settlement Agreement entitles GSWC to receive the remaining 10,200 ac-ft/yr of replacement water from Aerojet, if needed to satisfy system demands. Replacement water diversion alternatives are currently being evaluated, but include options such as increased diversions from the Folsom South Canal, direct diversions from the American River, or the Freeport Project Sacramento River diversion. In the third option, surface water would be treated by SCWA and delivered to GSWC's Cordova System.

6.1.4 Overall Assessment of Cordova System Water Supply Reliability

Supply reliability for the Cordova System depends upon the reliability of the surface water rights, groundwater production, granted and replacement water supplied from the Settlement Agreement. The combination of replacement water measures to be undertaken by Aerojet pursuant to the Settlement Agreement will ensure that GSWC has the supplies necessary to meet its water demands through 2035. Five production wells are expected to remain operational until at least 2035 (assuming successful operation of Aerojet's GET facilities), which will produce up to 14,850 ac-ft/yr of groundwater (Table 4-4). Combined with 5,000 ac-ft/yr of surface water rights from the American River and up to 15,200 ac-ft/yr of replacement water from Aerojet, a sufficient water supply of 24,850 ac-ft/yr exists to meet all of the water demands in the Cordova System. It should be noted that the supplies available (Table 4-1) exceed the supplies needed to meet the projected demands (Table 3-15). Buffer (excess available supply) serves to increase reliability of supplies.

Table 6-1: Projected Normal Year Supply Reliability for the Cordova System in ac-ft/yr

Water Supply Source	2010	2015	2020	2025	2030	2035
GSWC American River Rights (1)	5,000	5,000	5,000	5,000	5,000	5,000
SMUD Water Transfer (2)	4,827	0	0	0	0	0
Aerojet Granted Water (3)	0	5,000	5,000	5,000	5,000	5,000
GSWC Untreated Groundwater (4)	6,651	26,641	14,850	14,850	14,850	14,850
Total Supplies	**16,479**	**36,641**	**24,850**	**24,850**	**24,850**	**24,850**

5.2.3 Distribution System Water Quality

Distribution system water quality monitoring is performed for several water quality parameters in the Cordova System, including general physical parameters, presence of coliform bacteria, disinfectant and disinfection by-product (D-DBP) levels, and corrosivity of the water by monitoring lead and copper levels at customers' water taps. All monitoring parameters and levels currently meet drinking water standards. The ability to continue to meet these standards is not expected to change in the foreseeable future. Along with the increase in disinfection by-product precursors in the treated groundwater supplies, the water system will become dependent on water storage facilities to maintain peak hour water demands with the loss of wells. As a result, water age of the treated groundwater will inadvertently increase. This increase in water age and increase in disinfection by-products precursors will certainly increase disinfection by-product levels. It is unknown at this time if the increased levels of disinfection by-products will be at levels of concern.

5.3 Projected Water Quality Impacts

Water quality will impact the supply of both surface water and groundwater to the water system in several ways. After December 31, 2012 the water system will begin replacing 5,000 ac-ft/yr of SMUD appropriated surface water transfer water with GET water that has been discharged to the American River by Aerojet, as it becomes available. This change will in essence change the designation of water usage from surface water to groundwater. However, the treated groundwater from Aerojet will be discharged into and commingle with other water in the American River, flow down either the Folsom South Canal or American River, and be withdrawn by the water system at either its current surface water point-of-diversion location along the Folsom South Canal or another location. The quality of the water is not expected to change the ability to treat the water due to this water transfer. As the water system loses additional wells due to groundwater contamination beyond 5,000 ac-ft/yr, the water system's infrastructure will require alternative means to deliver water to its customers. Aerojet will replace the additional contaminated groundwater supply with treated groundwater including the required water transmission improvements.

The quantity of water transferred in this method is not to exceed 10,200 ac-ft/yr. Several options for this replacement water supply are being considered, including construction of facilities locally to divert water from the American River or Folsom South Canal, or obtaining water from the SCWA via the Sacramento River Freeport diversion and Vineyard WTP. GSWC would be responsible for ensuring drinking water standards are met for the local diversion options, but if the water is delivered from a SCWA project, water would be treated to drinking water standards by the SCWA, and there will be no water quality impact to the water system for this water supply.

Table 5-2 summarizes the projected impact on water supply due to water quality issues with water sources in the water system.

Table 5-2: Summary of Projected Water Supply Changes Due to Water Quality Issues in ac-ft/yr						
Water Source Projected Change	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Surface Water - American River (Water system's pre 1914 Water Rights)	0	0	0	0	0	0
Surface Water - American River (SMUD Water Transfer)	0	(5,000)	0	0	0	0
Groundwater (Untreated)	0	6,533	(7,662)	0	0	0
Aerojet Granted Water	0	5,000	0	0	0	0
Aerojet Replacement Water	0	0	0	0	0	0

Note:
Table format based on DWR Guidebook Table 30.

OPINION OF PROBABLE CONSTRUCTION COST

KENNEDY/JENKS CONSULTANTS

Division Number
Project: CWD - Pipeline Conveyance Project

Prepared By: R Young
Date Prepared: 7/9/14
K/J Proj. No. 1470002*00

Current at ENR 9795 May 2014
Escalated to ENR 9800 April 2015
Months to Midpoint of Construct 8

Estimate Type:
- [ ] **Conceptual**
- [ ] **Preliminary (w/o plans)**
- [x] **Design Development @** **60** **% Complete**
- [ ] **Construction**
- [ ] **Change Order**

Spec. No.	Item No.	Description	Qty	Units	Materials $/Unit	Materials Total	Installation $/Unit	Installation Total	Subcontractor $/Unit	Subcontractor Total	Total
DIVISION 1 - GENERAL REQUIREMENTS											
	1	Mobilization/Demobilization	1	LS		0.00	67,365.86	67,365.86	0.00	0.00	67,366
	2	Submittals	1	LS		0.00	3,000.00	3,000.00		0.00	3,000
	3	Insurance, Bonds, etc.	1	LS		0.00	40,419.52	40,419.52		0.00	40,420
	7	Traffic Control	1	LS		0.00	12,000.00	12,000.00		0.00	12,000
SUBTOTAL - DIVISION 1						0.00		122,785.38		0.00	122,785
DIVISION 2 - SITE WORK											
		(E) Intake Structure Demolition									
	1	Remove Grating and Headwall to Intake Structure	1	LS		0.00	12,000.00	12,000.00		0.00	12,000
	2	SWPPP	1	LS		0.00	25,000.00	25,000.00		0.00	25,000
	3	Remove Intake Structure	1	LS		0.00	18,000.00	18,000.00		0.00	18,000
	4	Hall Concrete Offsite	125	TN		0.00	72.00	9,000.00		0.00	9,000
	5	Fill	1	LS		0.00	15,000.00	15,000.00		0.00	15,000
		Grading, Excavation, Restoration North Bank									
	6	Clearing and Grubbing/Site Preparation - North Bank	1.0	AC		0.00	4,000.00	4,000.00	0.00	0.00	4,000
	7	Rough Grading - North Bank	1,550	CY	20.00	31,000.00	15.00	23,250.00		0.00	54,250
	8	Pit Excavation	400	CY		0.00	15.00	6,000.00		0.00	6,000
	9	Pit Shoring	50	LF	162.00	8,100.00		0.00		0.00	8,100
	10	Temporary 12-inch PVC Drainage Pipe with Dam	200	LF	12.00	2,400.00	17.00	3,400.00		0.00	5,800
	11	Demo Existing Culvert and Facilites									
	12	Embankment Foundation	1	LS		0.00	10,000.00	10,000.00		0.00	10,000
	13	Earthwork Culvert -(Exc/Fill)	500	CY		0.00	32.00	16,000.00		0.00	16,000
	14	Embankment Fill	120	CY	20.00	2,400.00	45.00	5,400.00		0.00	7,800
	15	Demolition - 24" Dia	67	LF	10.00	670.00	35.00	2,345.00		0.00	3,015
	16	Stream Realignment									
	17	Headwall	25	CY	600.00	15,240.00	200.00	5,080.00		0.00	20,320
	18	Trash Rack	1	EA	1,200.00	1,200.00	1,000.00	1,000.00		0.00	2,200
	19	57"x38" Arch Culvert	200	LF	46.00	9,200.00	41.00	8,200.00		0.00	17,400
	20	Arch Pipe Footing	400	Feet	35.00	14,000.00	75.00	30,000.00		0.00	44,000
	21	Cemented Channel	200	Feet	90.00	18,000.00	125.00	25,000.00		0.00	43,000

	22	Cobble Stones	120	Ton	40.00	4,800.00	250.00	30,000.00		0.00	34,800
	23	Aggregate Base	8	Ton	20.00	154.00	15.00	115.50		0.00	270
	24	Gabbion Retaining Wall	8	EA	700.00	5,600.00	800.00	6,400.00		0.00	12,000
	25	Landscaping	1	LS		0.00	10,000.00	10,000.00		0.00	10,000
	26	Slope Restoration/Grading	1	LS	10,000.00	10,000.00	25,000.00	25,000.00		0.00	35,000
	27	Habitat Restoration at North Bank	1	EA		0.00	52,800.00	52,800.00		0.00	52,800
	28	Channel Cobbles	98	Ton	40.00	3,920.00	33.00	3,234.00		0.00	7,154
	29	Hydroseeding	333	SY	0.50	166.67	1.25	416.67		0.00	583
	30	Planting	60	Plt	30.00	1,800.00	40.00	2,400.00		0.00	4,200
		Horizontal Directional Drill									
	31	Clearing and Grubbing/Site Preparation - South Bank	0.25	AC		0.00	4,000.00	1,000.00	0.00	0.00	1,000
	32	Site Resoration South Bank									
	33	Hydroseeding	1,210	SY	0.50	605.00	1.25	1,512.50		0.00	2,118
	34	Planting	10	Plt	30.00	300.00	40.00	400.00		0.00	700
		HDD Subcontractor Breakdown									
	35	Mob/demob	1	LS		0.00	10,000.00	10,000.00	40,000.00	40,000.00	50,000
	36	48" Conductor Casing	1	LS		0.00	15,000.00	15,000.00	120,000.00	120,000.00	135,000
	37	Horizontal Directional Drilling	1	LS		0.00	30,000.00	30,000.00	550,000.00	550,000.00	580,000
	38	30-inch DR 11 HDPE	1	LS		0.00	15,000.00	15,000.00	90,000.00	90,000.00	105,000
		North Bank Connection									
	39	Excavation and Backfill	25	CY		0.00	32.00	800.00		0.00	800
	40	Precast Vault with Hatch	1	EA	10,000.00	10,000.00	1,560.00	1,560.00		0.00	11,560
	41	24"X12" Weld 'o' let Connect	1	EA	6,500.00	6,500.00	1,200.00	1,200.00		0.00	7,700
	42	12-inch Butterfly Valve	2	EA	4,000.00	8,000.00	2,000.00	4,000.00		0.00	12,000
	43	12-inch Flow Meter	1	EA	4,800.00	4,800.00	2,500.00	2,500.00		0.00	7,300
	44	12-inch Flow Control Valve with Valve Position Indicator	1	EA	22,000.00	22,000.00	2,000.00	2,000.00		0.00	24,000
	45	SCADA	1	EA	7,500.00	7,500.00	8,000.00	8,000.00		0.00	15,500
	46	24"X12" Reducer	1	EA	2,200.00	2,200.00	1,100.00	1,100.00		0.00	3,300
	47	12-inch Water Line	25	LF	37.00	925.00	13.00	325.00		0.00	1,250
		South Bank Connection									
	48	Ductile Iron to HDPE	2	LS	3,000.00	6,000.00	4,500.00	9,000.00		0.00	15,000
	49	Excavation and Backfill	500	CY	0.00	0.00	32.00	16,000.00		0.00	16,000
	50	24-inch 90 Degree Elbow	4	EA	6,275.00	25,100.00	192.00	768.00		0.00	25,868
	51	Anchor Blocks	4	LS	3,000.00	12,000.00	2,000.00	8,000.00		0.00	20,000
	52	Temporary Water Supply	1	LS	11,700.00	11,700.00	19,500.00	19,500.00		0.00	31,200
	53	Post-Fence Repair	1	LS	1,200.00	1,200.00	1,200.00	1,200.00		0.00	2,400
		New Pipe in Pavement									
	54	Saw Cut (E) AC	2,500	LF	0.50	1,250.00	1.50	3,750.00		0.00	5,000
	55	Remove (E) AC	926	SY	2.00	1,851.85	3.00	2,777.78		0.00	4,630
	56	Excavation and Backfill	2,325	CY	2.00	4,650.00	7.50	17,437.50		0.00	22,088
	57	Pipe Bedding Material	662	CY	35.00	23,170.00	5.00	3,310.00		0.00	26,480
	58	Aggregate Base	2,113	Ton	20.00	42,250.00	2.00	4,225.00		0.00	46,475
	59	Asphalt Concrete (3" thick)	930	Ton	75.00	69,750.00	4.00	3,720.00		0.00	73,470
	60	24-inch Water Line	2,500	LF	81.00	202,500.00	30.25	75,625.00		0.00	278,125
	61	24"X16" Reducer	1	EA	2,200.00	2,200.00	1,100.00	1,100.00		0.00	3,300
	62	16-inch Butterfly Valve	3	EA	5,400.00	16,200.00	2,700.00	8,100.00		0.00	24,300
	61	16-inch DI Flanged Tee	1	EA	3,600.00	3,600.00	480.00	480.00		0.00	4,080
	62	16-inch Water Line	10	LF	49.50	495.00	21.00	210.00		0.00	705

	63	16-inch Transition Coupling	2	EA	1,800.00	3,600.00	900.00	1,800.00	0.00	5,400
	64	16-inch FCA	2	EA	2,800.00	5,600.00	1,400.00	2,800.00	0.00	8,400
		New Pipe in Park								
	65	Saw Cut (E) AC	3,900	LF	0.50	1,950.00	1.50	5,850.00	0.00	7,800
	66	Remove (E) AC	1,444	SY	2.00	2,888.89	3.00	4,333.33	0.00	7,222
	61	Excavation and Backfill	2,648	CY	2.00	5,296.20	7.50	19,860.75	0.00	25,157
	62	Pipe Bedding Material	984	CY	35.00	34,440.00	5.00	4,920.00	0.00	39,360
	63	Asphalt Concrete (3" thick)	298	Ton	75.00	22,320.00	4.00	1,190.40	0.00	23,510
	64	Aggregate Base	2,991	Ton	20.00	59,814.00	2.00	5,981.40	0.00	65,795
	65	24-inch Water Line	3,900	LF	64.00	249,600.00	30.25	117,975.00	0.00	367,575
	66	Hydrant	2	EA	2,500.00	5,000.00	1,500.00	3,000.00	0.00	8,000
	67	Water Service	1	LS	3,000.00	3,000.00	1,500.00	1,500.00	0.00	4,500
	68	Drinking Fountain	1	LS	3,000.00	3,000.00	1,500.00	1,500.00	0.00	4,500
		South Bank Details								
	69	Post-Fence Repair	1	LS	1,200.00	1,200.00	1,200.00	1,200.00	0.00	2,400
	70	Excavation and Backfill	25	CY		0.00	32.00	800.00	0.00	800
	71	24-inch Check Valve	1	EA	2,400.00	2,400.00	200.00	200.00	0.00	2,600
	72	24-inch Butterfly Valve	2	EA	8,000.00	16,000.00	4,000.00	8,000.00	0.00	24,000
	73	Blow Off Valve	2	EA	1,200.00	2,400.00	2,400.00	4,800.00	0.00	7,200
	74	Precast 5'x5'x5' Vault with 5'x5' Hatch	1	EA	9,500.00	9,500.00	1,425.00	1,425.00	0.00	10,925
	75	16-inch Butterfly Valve	2	EA	5,400.00	10,800.00	2,700.00	5,400.00	0.00	16,200
	76	16-inch Impeller Flow Meter	1	LS	6,200.00	6,200.00	2,500.00	2,500.00	0.00	
	77	16-inch Water Line	25	LF	50.00	1,250.00	20.00	500.00	0.00	1,750
	78	24"X16" Reducer	1	EA	2,200.00	2,200.00	1,100.00	1,100.00	0.00	3,300
	79	Transition Coupling	2	EA	3,400.00	6,800.00	1,200.00	2,400.00	0.00	9,200
SUBTOTAL - DIVISION 2						1,070,656.61		817,677.83	800,000.00	2,679,634
		Subtotals				1,070,656.61		940,463.21	800,000.00	2,802,420
		Taxes	@	8%		85,652.53				85,653
		Subtotals				1,156,309.14		940,463.21	800,000.00	2,896,772
		Contractor OH&P	@	15%		173,446.37		141,069.48		314,516
		Subtotals				1,329,755.51		1,081,532.69	800,000.00	3,211,288
		Contractor Mark-up on Sub	@	10%					80,000.00	80,000
		Subtotals				1,329,755.51		1,081,532.69	880,000.00	3,291,288
		Estimate Contingency	@	15%		199,463.33		162,229.90	132,000.00	493,693
		Estimated Bid Cost				1,529,218.83		1,243,762.59	1,012,000.00	3,784,981
		Total Estimate				1,529,218.83		1,243,762.59	1,012,000.00	3,784,981
		Total Estimate of Project Cost								**$ 3,785,000**

Hazel/50 Intertie Improvements – City of Folsom

List of References

- 2010 Urban Water Management Plan, 2011, City of Folsom, 2011, **pages 4-3 through 4-5**
- White paper SOI supply through Zone 3 analysis_110512, Brown & Caldwell, 2013, **page 7**
- Draft FPA Cost Reports_7-2013, Brown & Caldwell, 2013, **pages 21-22**

Under this agreement, Reclamation delivers this entire water supply without reduction on a permanent basis.

4.1.3 CVP Project Contract Right up to 7,000 Acre-Feet per Year

On April 8, 1999, Reclamation entered into Contract No. 6-07-20-W1372 with the Sacramento County Water Agency (SCWA) under Section 206 of Public Law 101-514. The contract dedicated 22,000 acre-feet of water to SCWA, commonly called "Fazio Water." The City was specifically named in the SCWA-Reclamation contract as a subcontractor to gain benefit of a portion of the Fazio Water supply. On April 25, 2000, SCWA entered into a separate contract with the City to provide 7,000 acre-feet of the 22,000 acre-feet of Fazio Water.

The Fazio Water supply is a standard "project supply" water entitlement – derived entirely from Central Valley Project ("CVP") water supplies. These supplies are junior to water rights that existed prior to the development of the CVP and are more likely than some other forms of water rights to be burdened with reduction. As explained in more detail in **sub-section 5.1.1**, the analyses in this assessment will limit reliance upon the City's CVP entitlement to 75% of the contract amount, or 5,250 acre-feet per year, as a result of potential reductions pursuant to Reclamation's municipal and industrial shortage policy, which could potentially be triggered even in what appear to be normal hydrologic years.

4.1.4 Contract Rights with San Juan Water District

The City has a contract with the San Juan Water District (SJWD) for use in the Ashland Service Area. In the Ashland Service Area, the City controls the water conveyance facilities but the water provided to those facilities is delivered by SJWD. Water will be made available by San Juan to the City under the *San Juan Water District and City of Folsom Wholesale Water Supply Agreement* from water supplies that are available to San Juan from time to time.

During each year throughout the term of this agreement, consistent with San Juan's Water Rights and Entitlements and subject to the terms of this agreement, San Juan will make available to the City supplies of treated water at the Point of Delivery that are scheduled by the City. The City will make reasonable and beneficial use of the water supplies provided to the City by San Juan, in a manner that is consistent with the terms of San Juan's Water Rights and Entitlements.

4.1.5 Groundwater

Groundwater within the City of Folsom is discussed in **sub-section 4.1.5.1** and **4.1.5.2.** This includes a discussion on the Groundwater Extraction and Treatment

(GET) Water pursuant to the 2007 Aerojet Agreement[61] and other potential groundwater within the City's water service area. The City does not currently pump groundwater for use in its service area, and has not pumped groundwater in the past five years.[62]

In previous years, the City of Folsom relied on groundwater to serve the area south of U.S. Highway 50, including the areas within the Aerojet area (referred to as the Natomas Nimbus service subarea). During the late 1970's to 1980's, the City recognized the need to develop the conjunctive use of groundwater and surface water to meet future water demands. However, with the recognized contamination of groundwater within the City's water service area from the 1990's to present, the City pursued surface water as the primary and only source of water supplies, and a reliance on other agencies outside of the Folsom water service area to meet any conjunctive use plans for dry-year water supplies.

4.1.5.1 Groundwater Extraction and Treatment (GET) Water

Pursuant to terms of the 2007 Aerojet Agreement between the City and Aerojet, the City acquired rights to treated groundwater produced by Aerojet's Groundwater Extraction and Treatment Facilities A and B (GET A and GET B).[63] The GET A facility consists of extraction wells and a treatment facility. It is currently undergoing modification to increase extraction.

Upon completion of those modifications, the facility's 17 wells will produce treated water of approximately 537 gallons per minute (GPM). The GET B Facility, also currently consisting of extraction wells and a treatment facility, is undergoing modification to increase extraction and treatment. Upon completion of modifications, the GET B Facility will be extracting approximately 2,077 GPM, of which approximately 1,477 GPM will be made available to the City.

The modifications of the GET facilities are being undertaken pursuant to the Partial Consent Decree which Aerojet entered with the United States Environmental Protection Agency and state agencies. Operationally, these GET facilities will pump at the indicated rates on a year-round basis. Therefore, when

[61] This Agreement replaced the 1986 agreement between the City and Aerojet. This Agreement releases the City from the obligation to supply Aerojet's "Industrial Property" with water from the City's existing supplies, but requires the City to supply that "Industrial Property" with either GET water or new supplies to be acquired by the City at Aerojet's cost and excludes Easton Place/Glenborough from that "Industrial Property."

[62] As described above, there are groundwater wells and groundwater use within Folsom's service area, but there uses are not controlled by the City of Folsom.

[63] As described previously, this Agreement is not effective yet as the conditions within the Agreement have not been satisfied. Nevertheless, there is nothing to suggest that the conditions will not be satisfied.

combined, these facilities will provide the City with an additional water supply of approximately 3,250 acre-feet per year. Water derived from the GET facilities will be used to meet industrial demands within the Aerojet Industrial Property (projected to average 2,731 acre-feet per year) as well as other potential non-potable demands throughout the City.

Because the City has not yet developed additional non-potable uses for the GET water supply, the amount of GET water represented will show this supply as only that which is projected to be used by Aerojet industrial facilities. Any GET water remaining above and beyond the demonstrated use by Aerojet can be used by the City for other non-potable demands.

4.1.5.2 Other Groundwater within the City's Water Service Area

Other groundwater use within the City's service area is limited to private use by the Empire Ranch Golf Course and as an emergency supply for Intel Corporation. The golf course uses groundwater in the spring and early summer months as a primary source of irrigation water. As the irrigation season progresses, groundwater levels typically decline and the golf course purchases supplemental potable surface supplies from the City. Intel has established two emergency backup wells capable of delivering 100 GPM and 15 GPM, respectively.

To better understand the groundwater conditions and supply potential that may underlie the golf course and other areas within the City limits, the City completed a Groundwater Resources Investigation through an AB 303 grant. Two test wells were installed for this study in localized areas of high electrical resistivity in ancestral paleochannels of the American River. These wells are considered to be of the South American Groundwater Sub-basin (5-21.65) of the Sacramento Valley Basin. The two test wells yielded 200 to 400 GPM during short-term pumping tests, but additional aquifer testing would be required to confirm the sustainability of the yields.

The wells were constructed with steel casing so they can be utilized as irrigation supply wells at some point in the future if desired by the City. Although analyses indicate good water quality in both wells, supply wells constructed for potable use must have a sanitary seal of at least 50 feet bgs. Wells constructed with the minimum seal would most likely result in a significant reduction in groundwater production, thereby resulting in a non-economic municipal groundwater supply. Moreover, additional groundwater protection would need to be considered if the aquifer were used for a potable supply since the dredge tailings are highly

Technical Memorandum

10540 White Rock Road, Suite 180
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Prepared for: Todd Eising

Project Title: FPA Interim Water Supply Planning Level Costs

Project No: 143386

Technical Memorandum [No. 1]

Subject: FPA Interim Water Supply Planning Level Costs

Date: November 2, 2012

To: Todd Eising

From: Melanie Holton

REGISTERED PROFESSIONAL ENGINEER
MELANIE ELISE HOLTON
No. 64983
exp 6/30/13
CIVIL
STATE OF CALIFORNIA

Prepared by: _____

Melanie Holton, Project Manager

Reviewed by: _____

Jeff Lawrence, QA/QC

Table 2. Interim FPA and FPA Ultimate Folsom WTP Supply Scenarios

Improvement	Unit cost (for new facilities)	Units	Existing facility total costs [d]	Current firm capacity [e]	2018 existing system capacity needs [c]	Units	Scenario 1. [a] Interim FPA (2 mgd) through Zone 3 East					Scenario 2. [b] FPA Ultimate (9.2 mgd) through Zone 3 East				
							FPA needs from existing capacity [f]	% FPA share of existing capacity [g]	FPA needs in new capacity [f]	Units	Cost	FPA needs from existing capacity	% FPA share of existing capacity [g]	FPA needs in new capacity	Units	Total Cost Share
Existing Facilities Shared Capacity																
WTP-Phase III (Improvements to entire WTP)[h]			$13,286,280	50	34	mgd	2.0	4%		mgd	$ 540,000	9.2	18%		mgd	$ 2,450,000
WTP-Phase IV A (improvements to entire WTP) [h]			$ 6,012,724	50	34	mgd	2.0	4%		mgd	$ 250,000	9.2	18%		mgd	$ 1,110,000
WTP-Phase IV B (30 mgd (6-train) expansion) [i]			$ 20,659,548	6		trains	0.4	7%		trains	$ 1,380,000	2	33%		trains	$ 6,886,516
Zone 3 East BPS [j]			$ 3,852,171	8,000	7,500	gpm	500	6%		gpm	$ 250,000	500	6%		gpm	$ 250,000
Natoma raw water pipeline			$ 8,386,682	50		mgd	2.0	4%		mgd	$ 340,000	9.2	18%		mgd	$ 1,543,150
Foothills Reservoirs (existing 5 MG capacity)			$ 1,792,120	5	3.9	MG	1.0	20%		MG	$ 360,000	1.0	20%		MG	$ 360,000
Zone 3 East distribution system (24-in dia pipeline from Zone 3 East BPS to Blue Ravine) [j]			$ 2,808,000	12.7	10.7	mgd	2.0	16%		mgd	$ 500,000	-	0%		mgd	$ -
Subtotal existing facilities share cost											**$ 3,620,000**					**$ 12,599,666**
New Facilities																
Transmission pipelines - 12-in diameter	20	$/in-dia/LF							3,000	LF	$ 720,000					
Transmission pipelines - 24-in diameter	20	$/in-dia/LF												29,600	LF	$ 14,208,000
Zone 3East BPS (additional capacity)	350	$/gpm							900	gpm	$ 320,000			5,900	gpm	$ 2,065,000
Total new facilities construction											**$ 1,040,000**					**$ 16,273,000**
Planning (new facilities)	6%										$ 62,400					$ 980,000
Design (new facilities)	10%										$ 104,000					$ 1,630,000
Construction management (new facilities)	8%										$ 83,200					$ 1,310,000
Contingency (new facilities)	30%										$ 390,000					$ 6,060,000
Subtotal new facilities cost											$ 1,679,600					$ 26,260,000
Project total											**$ 5,300,000**					**$ 38,900,000**

Notes:

[a] Interim FPA through Zone 3 is based on serving 2 mgd through Zone 3 East to interim FPA development near Placerville Rd, south of HWY 50. This scenario is exclusive of Ultimate FPA, and no phasing is included.

[b] Ultimate FPA through Zone 3 East is based on serving 9.2 mgd through Zone 3 to the FPA. This scenario is exclusive of Interim FPA, and no phasing is included.

[c] All scenarios are based on 80% of the 2018 demand for the existing service area and Ultimate Easton demands.

[d] Existing facility total costs are based on historical actual costs, provided in Attachment A.

[e] Zone 3 East BPS total capacity is 11,000 gpm. With the largest pump out of service the firm capacity is 8,000 gpm.

[f] Total FPA booster pumping needs for Interim FPA is 2 mgd (1,400 gpm) and for FPA Ultimate is 9.2 mgd (6,400 gpm).

[g] Percent share calculated assuming FPA will utilize available capacity in the City's system before building new facilities.

[h] WTP-Phase IV A includes cost for improvements to the entire WTP, 50 mgd capacity.

[i] WTP-Phase IV B includes cost for the expansion improvements for the new and existing WTP from 20 mgd to 50 mgd. These costs are based on the addition of 6 treatment trains, each train is 5 mgd.

[j] Zone 3 East BPS and distribution 2018 capacity needs are based on the Zone 3 East 2018 maximum day demand of 5.7 mgd (4,000 gpm) plus maximum day demand for Zones 4, 5, and 6 which are served through Zone 3 East. Zones 4, 5, and 6 2018 maximum day demand is 5 mgd (3,500 gpm).

ADMINISTRATIVE DRAFT

Technical Memorandum

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Prepared for: City of Folsom

Project Title: Folsom Plan Area Water System Infrastructure Plan

Project No.: 144078-004

Technical Memorandum

Subject: Water Backbone Infrastructure Plan

Date: July 9, 2013

To: Todd Eising, City of Folsom

From: Melanie Holton, Brown and Caldwell

Prepared by: _____

Melanie Holton, Project Manager
P.E. No. 64983, Expiration 6/30/2015

Reviewed by: _____

Jeff Lawrence,
P.E. No. C54303, Expiration 12/13

Limitations:

This is a draft memorandum and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

This document was prepared solely for the City of Folsom in accordance with professional standards at the time the services were performed and in accordance with the contract between City of Folsom and Brown and Caldwell dated February 7, 2013. This document is governed by the specific scope of work authorized by the City of Folsom; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by the City of Folsom and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Section 6: Planning Level Estimate of Probable Costs

The FPA system improvement planning level estimate of probable costs are based on the backbone water distribution requirements described in Section 5 and illustrated on Figure 3-1. The unit costs for pipelines, storage tanks, booster pump stations, and valves are shown in Table 6-1. Also included in the costs are contingency factors. Due to the uncertainties at this planning level a 30% contingency has been added to all costs. This level of contingency is commonly used during the planning stages of a project.

Table 6-1. Folsom Plan Area Water System Backbone Planning Level Cost Estimate

Facilities	Unit costs		Quantity		Cost	Notes
	Cost	Units	Quantity	Units		
Pipelines						
12-in diameter	15	$/in-dia/LF	88,596	LF	$15,947,228	
18-in diameter	12	$/in-dia/LF	22,233[a]	LF	$4,802,330	
24-in diameter	10	$/in-dia/LF	8,014[b]	LF	$1,923,398	
Subtotal (pipelines)	--	--	118,843		$22,672,956	
Booster pump stations						
Zone 3 to 4	350	$/gpm	1,000	gpm	$350,000	50 hp
Zone 3 to 5	350	$/gpm	1,200	gpm	$420,000	100 hp
Zone 5 to 6	350	$/gpm	750	gpm	$262,500	50 hp
Storage tanks						
Zone 2/3 gravity[c]	0.75	$/Gal	8	MG	$6,000,000	
Zone 4 gravity	0.85	$/Gal	2	MG	$1,700,000	
Zone 5/6 gravity	0.85	$/Gal	2.5	MG	$2,125,000	
Control valves[d]						
FPA Zone 2 to Existing Zone 2 Two-Way PRV Station	50,000	$ ea	2	ea	$100,000	
Existing Zone 3 to FPA Zone 3	50,000	$ ea	1	ea	$50,000	12-in to 16-in valve
Zone 3 to 2	25,000	$ ea	3	ea	$75,000	8-in to 10-in valve
Zone 4 to 3	25,000	$ ea	1	ea	$25,000	8-in to 10-in valve
Zone 4 to 3	50,000	$ ea	1	ea	$50,000	12-in to 16-in valve
Zone 5 to 4	25,000	$ ea	1	ea	$25,000	8-in to 10-in valve
Zone 6 to 5a	25,000	$ ea	2	ea	$50,000	8-in to 10-in valve
Subtotal					**$33,906,000**	
Design	8%				$2,713,000	
Construction management	8%				$2,713,000	

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Table 6-1. Folsom Plan Area Water System Backbone Planning Level Cost Estimate						
Facilities	Unit costs		Quantity		Cost	Notes
	Cost	Units	Quantity	Units		
Contingency	30%				$10,172,000	
Total[e]					**$49,504,000**	

[a]*Includes 3,000 linear feet of 18-in diameter redundant supply pipeline from existing Zone 3.*

[b]*Includes 5,700 linear feet of 24-inch diameter supply pipeline from existing Zone 3*

[c] *It is assumed this will be two 4-MG tanks or 3-MG/5-MG tanks*

[d] *Only control valves are included in this table. Other valves such as normally closed manual valves and distribution system isolation valves are not shown.*

[e] *Environmental costs are not included in this estimate.*

DRAFT for review purposes only. Use of contents on this sheet is subject to the limitations specified at the beginning of this document.
P:\44000\144078 - Folsom FPA Water Backbone\04_Deliverables\4_2_Memos\1 Drafts\Draft FPA 070813.docx

Well #2 Reactivation – City of Lincoln

List of References

- Water Quality Station Details, 2014, **pages 1-2**
- California Data Exchange Center, 2014, **pages 1-16**
- SWRI Draft Policy Document Lower American River Flow Management Standard, 2004, **pages 2, 7-11**
- Major Reservoir Current Conditions Graphs, 2014, **pages 1-2**
- Western Placer County Groundwater Management Plan, 2007, **page 2-18**
- City of Lincoln Urban Water Management Plan, 2010, **page 3-12**
- PCWA Press Release, April 11, 2014, **All pages**

Water Quality Station Details

Station Number:	A7310000
Station ID:	2254
Short Station Name:	AMERICAN R NF NR AUB
Full Station Name:	AMERICAN R NF NR AUBURN
Description:	
Station Type:	River Mile
Elevation:	540
Latitude:	38-54-51
Longitude:	121-2-7
Datum:	NAD27
Projection:	LL
Units:	DMS
Zone:	
Township:	12N
Range:	08E
Section:	01
Tract:	P
Sequence:	0
Base & Meridian:	M
County:	El Dorado
Quad:	AUBURN
Data Source:	WDIS
Watershed:	SACRAMENTO HB

Back

AMERICAN MF NR AUBURN *(AMA)*

Elevation: 88' · AMERICAN R basin · Operator: US Geological Survey

Provisional data, subject to change.

Query executed Thursday at 12:45:33

FLOW, MONTHLY VOLUME (4477)

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07/1912	18300
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09/1912	8700
10/1912	5900
11/1912	33130
12/1912	15990
01/1913	39350
02/1913	36660
03/1913	49190
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05/1913	184500
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09/1913	4490
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Warning! This data is preliminary and subject to revision.

Download Data Now | Plot AMA Data | Show AMA Map | AMA Info

Station ID	Sensor Number	Duration Code	Start date	End date	
AMA	66	M D H E	mm/dd/yyyy	mm/dd/yyyy	Get data

DRAFT POLICY DOCUMENT
LOWER AMERICAN RIVER FLOW MANAGEMENT STANDARD

Prepared for:

WATER FORUM

Prepared by:

SWRI SURFACE WATER RESOURCES, INC.
2031 Howe Ave., Suite 110
Sacramento, CA 95825

FEBRUARY 2004

implements the Fisheries and In-stream Habitat Plan (FISH Plan), which constitutes the aquatic habitat management plan for the lower American River. The FISH Plan was developed as part of another Water Forum element, the "*Lower American River Habitat Management Element*." Development of the habitat management element is necessary to comply with the California Environmental Quality Act (CEQA), as described in the *Water Forum Agreement* Environmental Impact Report (EIR). The FISH Plan is consistent with the mitigation described and certified in the *Water Forum Agreement's* EIR and associated mitigation, monitoring, and reporting plan.

The Flow Management Standard is intended to result in improved conditions for fish in the lower American River, particularly fall-run Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*). In addition, it is anticipated that the Flow Management Standard will comply with California Department of Fish and Game (CDFG) Code 5937, which requires that lower American River fish resources be maintained in "*good condition.*" The Flow Management Standard also is intended to be consistent with the National Oceanic and Atmospheric Administration/National Marine Fisheries Service's (NOAA Fisheries) *Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units* (2000). This NOAA Fisheries document provides an explicit framework for identifying attributes of viable salmonid populations so that parties may assess the effects of management and conservation actions, and ensure that their actions promote the listed species' survival and recovery. NOAA Fisheries and the U.S. Fish and Wildlife Service (USFWS) define recovery under the Endangered Species Act as "*improvement in the status of a listed species to the point at which listing is no longer appropriate*" under the ESA (50 CFR 5402.02). In the lower American River, the standard of "promoting recovery" would only be applicable to federally protected species, in this case the Central Valley steelhead Evolutionarily Significant Unit (ESU).

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. Development of an improved flow standard will:

- Improve currently required flow, water temperature, ramping rate, and flow fluctuation criteria;
- Establish a river management process for Folsom Reservoir and lower American River operations; and
- Monitor, evaluate, and report the resultant hydrologic and biologic conditions.

Thus, the proposed Flow Management Standard consists of three separate elements: *Required Flows and Water Temperatures; River Management;* and *Monitoring and Evaluation*.

early part (September to November) of the adult fall-run Chinook salmon upstream migration and spawning period.

High water temperatures during the fall can delay the onset of spawning by Chinook salmon and result in fewer fish spawning, less eggs spawned per female, lower egg fertilization rates, and increased mortality of eggs in the spawning nests ("redds"). In addition, relatively low October and November flows, when they occur, reduce the amount of available spawning habitat and tend to increase the amount of fall-run Chinook salmon redd superimposition (multiple nest building in one location that results in decreased egg survival), thereby potentially limiting initial year-class strength (the number of surviving fish). Flow fluctuations can expose redds to the atmosphere, causing redd dewatering and egg mortality.

After the eggs hatch, juvenile fall-run Chinook salmon begin their seaward migration the same year in which they were spawned. By contrast, juvenile steelhead may remain in the lower American River a year or more prior to their seaward migration. The environmental factor believed to be most limiting to the survival of steelhead in the lower American River is high water temperatures during the summer and early fall. In their biological opinion on the operation of the Central Valley Project (CVP), NOAA Fisheries specified a water temperature of 65ºF or less to protect rearing juvenile steelhead in the lower American River.

Water temperatures in the lower American River during summer months exceed the upper range of water temperatures reported to be suitable for juvenile steelhead rearing. Summer water temperatures often exceed 65ºF, and can exceed 70ºF particularly during the months of July and August. Water temperatures higher than the suitable range can affect the growth and survival of juvenile steelhead. In addition to water temperature effects, large fluctuations in flow can strand fry and juvenile steelhead, as well as juvenile fall-run Chinook salmon, near the river edges and in shallow pools, or prevent their access to the main river channel from the side channels in which they rear.

CURRENT OPERATIONS

Currently, the 1958 SWRCB Decision (D-893) specifies the legally required minimum flows in lower American River for all months of the year (500 cfs between September 15 and December 31, and 250 cfs at all other times). From today's perspective, D-893 is based on outdated information and assumptions about available water supplies and operational constraints. For example, D-893 standards do not address requirements of the Central Valley Project Improvement Act, the 1995 Bay-Delta Plan, or biological opinions to protect Central Valley anadromous salmonids. These and other mandates drive current decision-making associated with CVP operations.

Reclamation operates Folsom Dam to meet these more recent flow recommendations, as well as those consistent with other relevant habitat management plans geared toward the protection and enhancement of anadromous fish resources. Under recent CVP operations, flows in the lower American River have been well in excess of the D-893 minimum flow requirements (**Figure 2**).

Folsom Dam and Reservoir is operated by Reclamation to meet CVP-wide multi-purpose beneficial uses, while taking into consideration input received from the AROG. Reclamation provides the AROG with information such as flows in the river during the previous several months, reservoir storage, projected reservoir inflow, water temperature data, and projected outflows. The AROG uses this information to plan and develop flow release schedules for Folsom Dam. During this iterative process, the AROG adapts and refines the projected flow release schedule for the next month, making necessary adjustments for the remainder of the year.

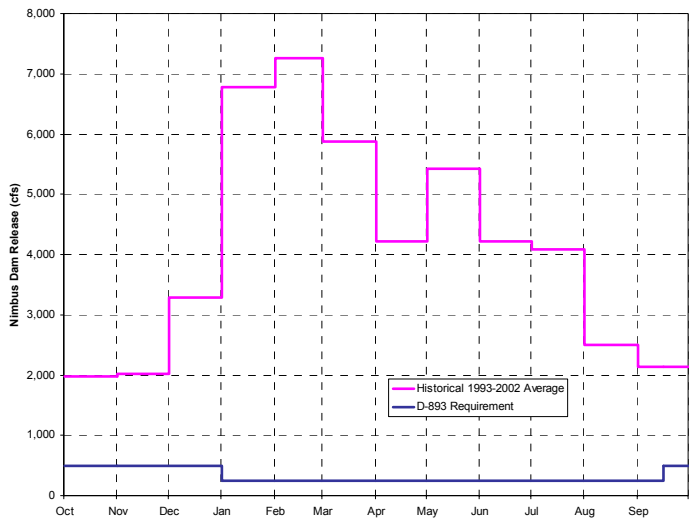


Figure 2. Comparison of D-893 Minimum Instream Flow Requirements with Average Monthly Flows Released from Nimbus Dam (1993-2002).

The AROG not only provides input into the flow release schedule for Folsom Dam, but also into management of the coldwater pool in Folsom Reservoir. The coldwater pool is influenced by numerous factors including inflow, inflow water temperatures, diversions, storage, and the volume of cooler, hypolimnetic waters in the reservoir. Water temperatures in the lower American River also are influenced by these factors, as well as by decisions about the elevation from which to draw water for release from Folsom Reservoir into the Nimbus and American River Fish Hatcheries, and down the lower American River. The AROG provides regular input regarding how best to configure the shutters on the power penstocks at Folsom Dam to most effectively manage the coldwater pool reserves, and provide maximal thermal benefits to downstream aquatic resources, specifically anadromous salmonids.

The AROG has been voluntarily implementing adaptive management of lower American River flows since 1996. Although the AROG recommendations are advisory and the group has no authority to oversee Folsom and Nimbus dam releases, Reclamation currently manages releases from Folsom and Nimbus dams according to AROG recommendations to the fullest extent feasible, given its existing obligations. There is consensus among the AROG members and the many other diverse

stakeholders involved in the lower American River that a comprehensive river management process is the most productive and effective approach to managing lower American River flows for instream benefits (**Figure 3**).

What is not working on the lower American River?		*How the proposed Flow Management Standard addresses these issues*
❑ Inappropriate Flow Pattern ▪ Flow volumes are too high or too low ▪ Timing of flow does not always coincide with the needs of fish ▪ Flow fluctuations can cause redd dewatering and juvenile salmonid stranding	→	❑ Improved Regulatory Flows (Element One) ▪ Required flow standard ▪ Ramping rate standard ▪ Flow fluctuation objectives
❑ Warm Water Temperatures ▪ Limited cold water supply and accessibility - need cold water in summer for steelhead rearing, and in fall for Chinook salmon spawning	→	❑ Required water temperature standards (Element One)
❑ Lack of comprehensive river management ▪ Need comprehensive river management to balance the operation of Folsom Dam and Reservoir for all beneficial uses	→	❑ Formulation of a River Management Group (Element Two) and required monitoring, evaluation, and reporting procedures (Element Three)

Figure 3. Need for Updated Flow Management Standard.

ELEMENT ONE – REQUIRED FLOWS AND WATER TEMPERATURES

The required flow, water temperature, ramping rate, and flow fluctuation standards discussed below together comprise the first element of the Flow Management Standard, *Required Flows and Water Temperatures*. Detailed discussion and analyses supporting development of these standards will be included in the Lower American River Flow Management Standard report currently under preparation.

The primary objective of the *Required Flows and Water Temperature* element of the Flow Management Standard is to sustain increased habitat availability, while concurrently minimizing flow fluctuations and reductions, within the context of hydrologic uncertainty. Specifically, the required flow, water temperature, ramping rate, and flow fluctuation standards intend to:

- ❑ Provide the best possible flow and temperature based on water availability;
- ❑ Maximize the occurrence of target Chinook salmon and steelhead spawning flows;
- ❑ Stabilize flows during the Chinook salmon and steelhead egg incubation periods;
- ❑ Reduce month-to-month flow reductions to minimize juvenile salmonid stranding and isolation; and
- ❑ Manage flow releases and reservoir storage to effectively utilize coldwater pool availability.

REQUIRED FLOW STANDARD

The required flow, as measured by the total release at Nimbus Dam, would vary throughout the year depending on the hydrology of the Sacramento and American rivers. As used in the flow standard, the term "required flow" is meant to describe the minimum required flow and does not

preclude Reclamation from making higher releases at Nimbus Dam. Except for extremely dry conditions, from October through May required flows would be established between 800 cfs and 2,250 cfs. During June through September, required flows would be established between 800 cfs and 1,750 cfs. Actual required flow would be determined by specified conditions at biologically significant times of the year. For instance, during wetter years, the required flow would generally be higher, but not so high as to substantially reduce the coldwater pool volume in Folsom Reservoir by the end of summer. During drier years, the required flow would be reduced to most effectively utilize the limited availability of Folsom Reservoir storage and coldwater pool.

During the October through December period, the required flow would be based on an index of American River Basin carryover storage conditions. This index, referred to as the FRI (Four Reservoir Index), is calculated as the combined end-of-September storage in four reservoirs – French Meadows, Union Valley, Hell Hole, and Folsom. If, for example, the combined carryover storage in Folsom Reservoir and the upstream American River reservoirs was low, the required flow would be near 800 cfs; if carryover conditions were high, the required flow would be near 2,250 cfs. During October of each year, flows would be "stepped-up" until the required flow is met, at different rates depending on the magnitude of the required flow, as follows:

- **Required Flows equal to 2,250 cfs**
  - 250 cfs step increases from 1,500 cfs on October 1 to 2,250 cfs on November 9
    - Oct 1 to Oct 24 — 1,500 cfs
    - Oct 25 to Oct 31 — 1,750 cfs
    - Nov 1 to Nov 8 — 2,000 cfs
    - Nov 9 to Dec 31 — 2,250 cfs
- **Required Flows between 2,250 cfs and 1,500 cfs**
  - Incremental step increases from 1,500 cfs on October 1 to Required Flows on November 9
    - Oct 1 to Oct 15 — Required Flows = 1,500 cfs
    - Oct 16 to Oct 31 — Required Flows -500 cfs, or 1,500 cfs, whichever is greater
    - Nov 1 to Nov 8 — Required Flows -250 cfs, or 1,500 cfs, whichever is greater
    - Nov 9 to Dec 31 — Required Flows
- **Required Flows less than or equal to 1,500 cfs**
  - Implemented on October 1
  - Continue at same level through December 31

This "stepping-up" of flow, or increasing flow progression, was developed to maximize flow release utilization efficiency based on analysis of the last decade of fall-run Chinook salmon spawning distribution. In other words, more water is provided when more fish are expected to be spawning. In addition, the increasing flow progression is intended to minimize the incidence of redd superimposition.

During January and February, adjustments to the required flows would be based on the Sacramento River Index (SRI), an index of water year runoff for the entire Sacramento River Basin that is updated monthly. During this time, the fall-run Chinook salmon spawning period is completed, and the first part of the steelhead spawning period has begun. Based on the early January SRI, the January flow requirement may be modified from the December value. If the SRI predicts a critically dry year, then the January flow requirement would be set as 85 percent of the December requirement or 800 cfs, whichever is greater. If the SRI predicts a dry or normal year, then the January flow requirement remains the same as December. If the SRI predicts an above normal or wet year, the required flow would be set at 2,250 cfs. In February, the calculation is the same as the January routine, except the January flow is used as the basis.

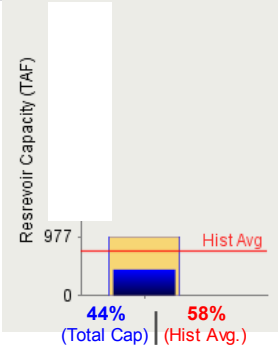
Generally, by March, water supply availability and snow-pack conditions are reasonably certain for the remainder of the water year. At this time, knowledge of the actual available water supply can be used to make flow management decisions. Early in the spring, tradeoffs must be made between maintaining flows to sustain current habitat conditions *versus* reserving water supply for future releases to ensure that sufficient coldwater is available during both the steelhead over-summer rearing period and Chinook salmon spawning in the fall. From March through September, the required flow is based on the Impaired Nimbus Inflow Index (INI). The INI is defined as the May through September Folsom Reservoir inflow, minus May through September Folsom Reservoir diversions, minus May through September Folsom Reservoir evaporation, minus May through September Folsom South Canal diversions. Using the INI as an index, the flow requirement for the entire March through May period is established between 800 and 2,250 cfs. The same flow requirement is used for June through September, except the maximum flow requirement is capped at 1,750 cfs.

Preliminary model results associated with the Flow Management Standard required flows are presented in **Appendix A**.

Conference Year Principles

Implementation of the required flows discussed above facilitates the release of available water for aquatic resources during all types of water years. The Flow Management Standard also recognizes agreements for water diversions, which are necessary because of the wide variation in runoff, ranging from over 6 million acre-feet (AF) in one year to less than 400,000 AF in the driest water year on record. As defined in the *Water Forum Agreement*, "conference years" are those years when the projected March to November unimpaired inflow to Folsom Reservoir is less than 400,000 AF. It is during times of low runoff that demands on the available water supply are the greatest. Therefore, special provisions for conference years are included in the Flow Management Standard. A summary of these provisions is provided below. For a more detailed discussion regarding conference year principles, please refer to the *Water Forum Agreement*.

FOLSOM LAKE - STORAGE CONDITIONS AS OF JULY 16, 2014



Data as of Midnight: July 16, 2014

- Current Storage: 431,685 AF
- 44% of Total Capacity
- 58% of Historical Avg. For This Date
- (Total Capacity: 977,000 AF)
- (Avg. Storage for Jul 16: 748,478 AF)

Change Date: 16-Jul-2014

Refresh Data

Major Reservoir Current Conditions Graphs

Printable Version of Current Data

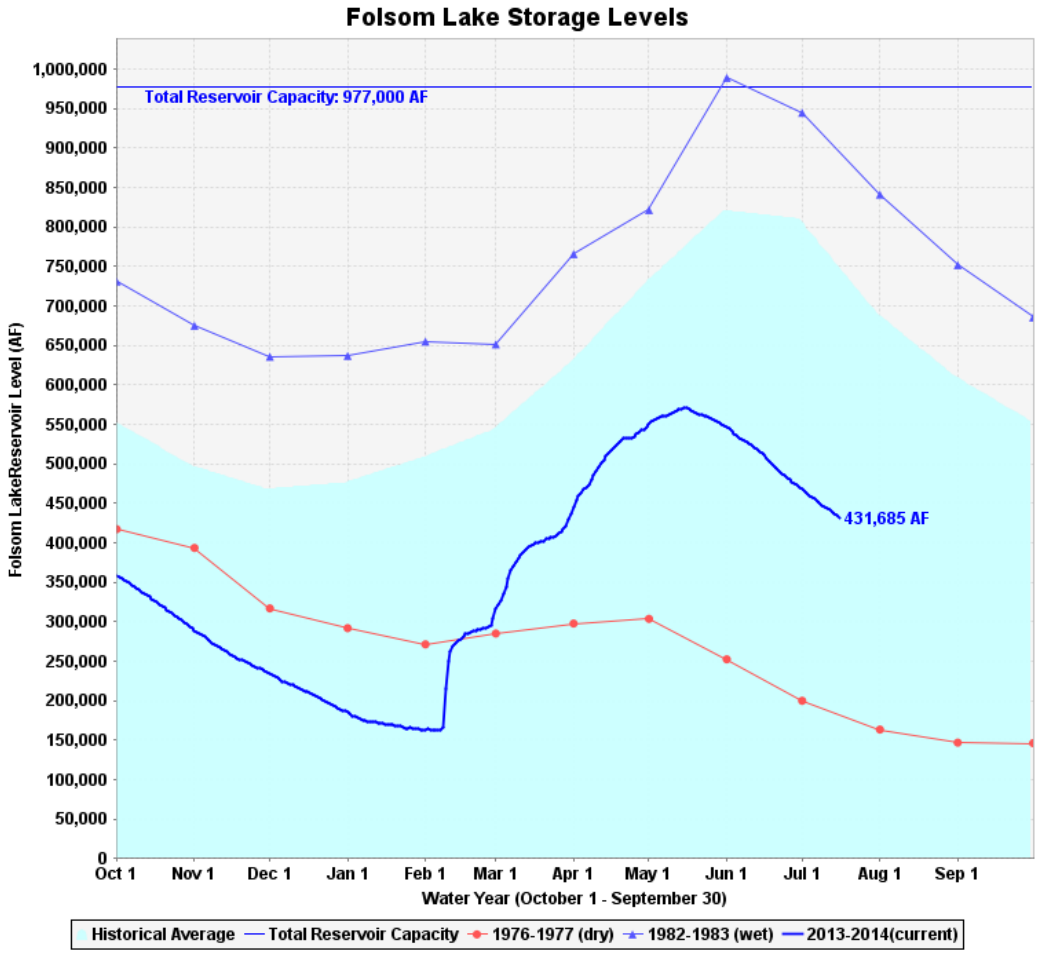
Folsom Lake Storage Level Graph: **Choose water years to plot:**

1976-1977 (dry)
1982-1983 (wet)
1988-1989
1989-1990
1990-1991

(ctrl+click for multiple selections)

Draw chart

(chart legend appears at bottom)



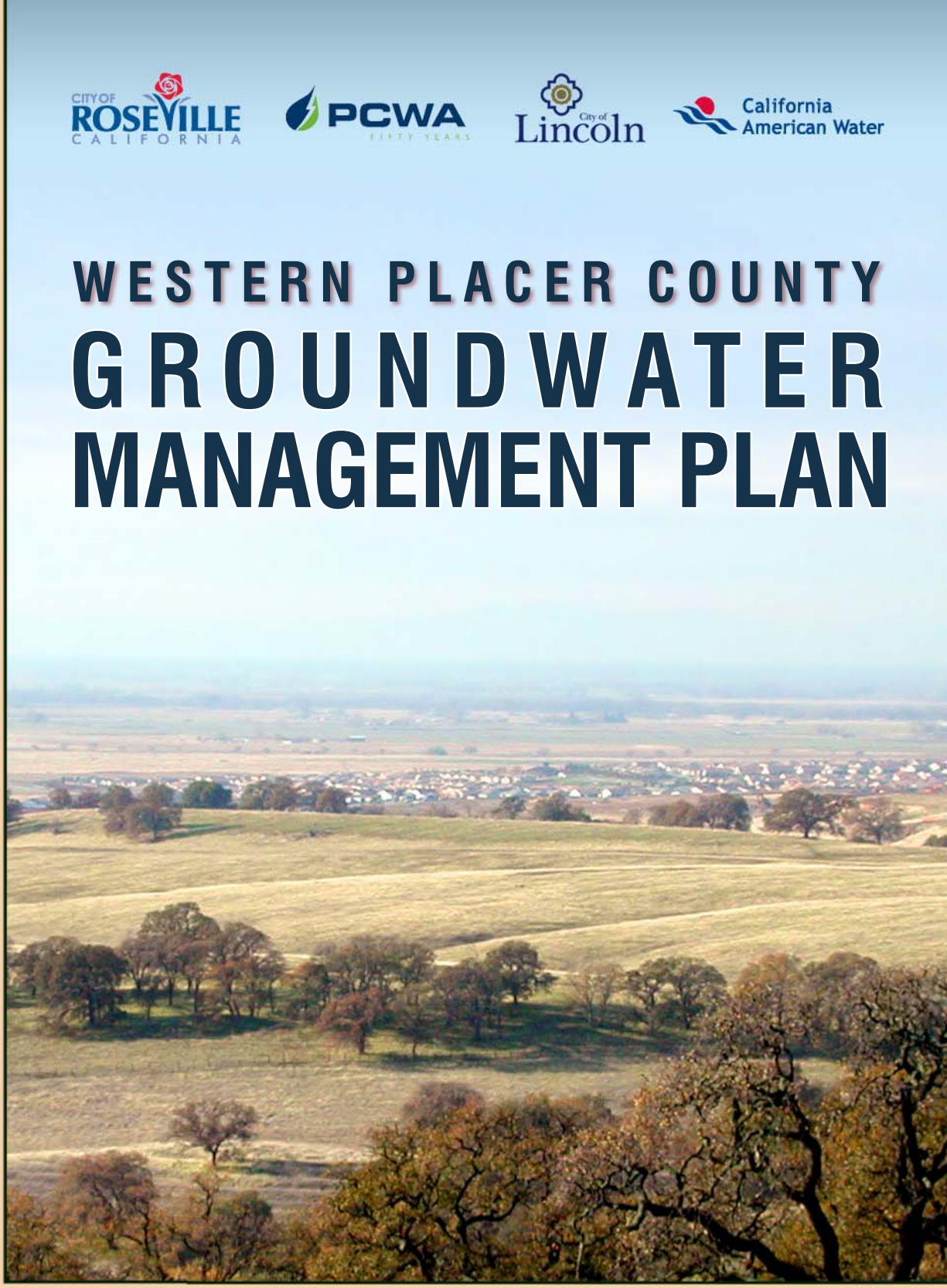
City of Roseville California

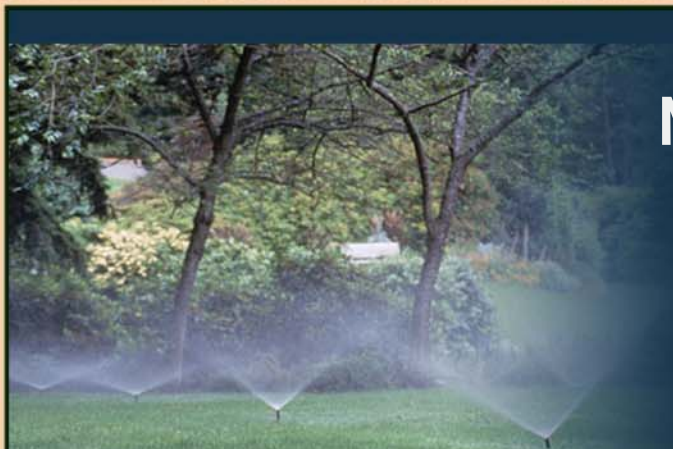
PCWA Fifty Years

City of Lincoln

California American Water

WESTERN PLACER COUNTY GROUNDWATER MANAGEMENT PLAN





NOVEMBER 2007

MWH

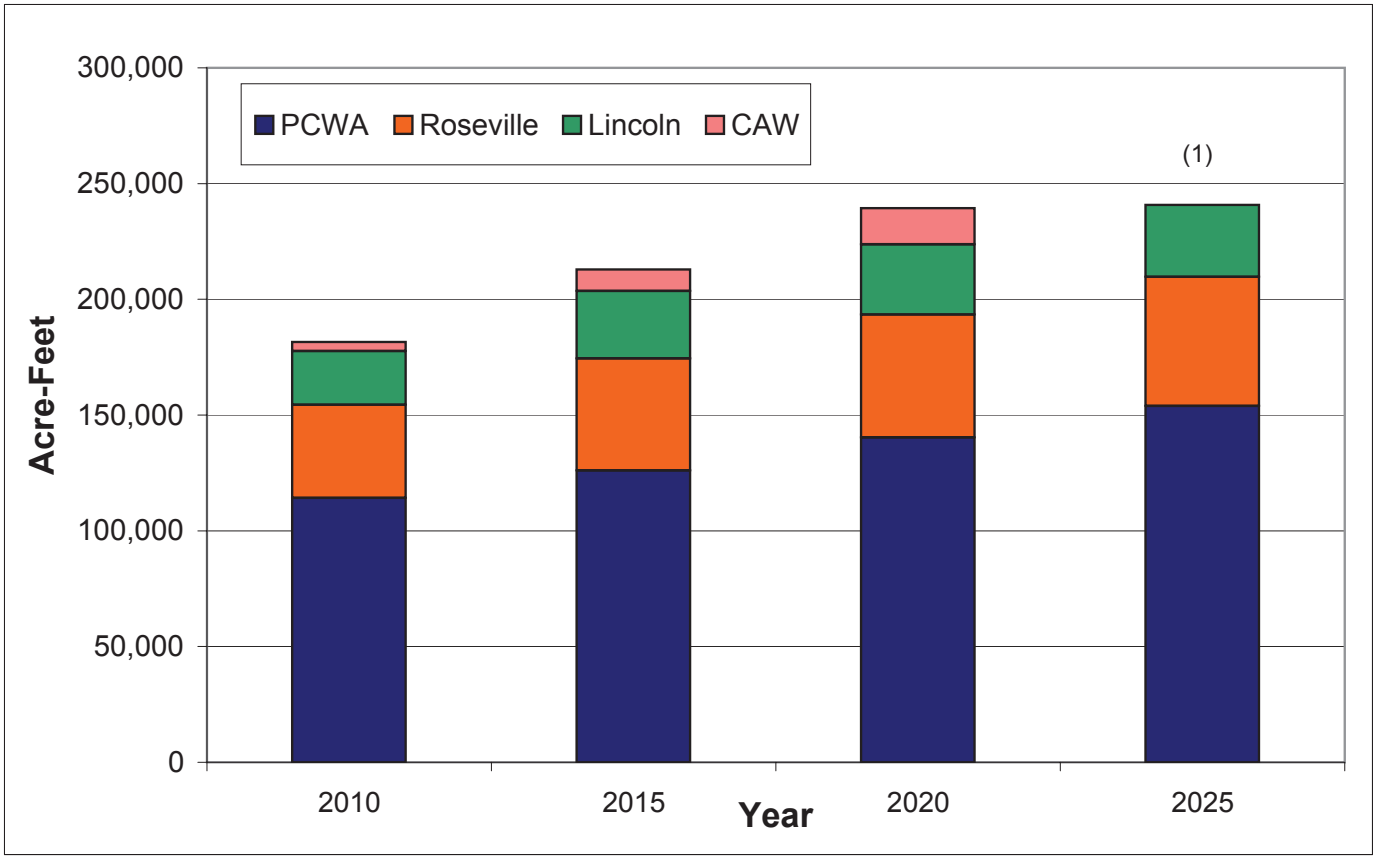


Figure 2-7 – Projected Water Demands (treated and raw water)

2.4.2.3 Groundwater

Existing Conditions. The City utilizes groundwater from five wells to provide emergency, back up, and peaking supplies as a source for its backup water supply. Liquid chlorine (sodium hypochlorite) is added to the pumped groundwater at the well site for preventative disinfection. All well sites have 10,000-gallon pressure tanks. In 2004, Lincoln pumped 298 acre-feet of groundwater.

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.

2.4.2.4 Recycled Water

Lincoln recently completed a new Wastewater Treatment and Reclamation Facility (WWTRF) for the purpose of treating wastewater generated within the City.

Existing Conditions. The 3.3 MGD WWTRF began operation in 2004 and generated an initial 2.4 MGD of average dry weather flow with expansion capacity to 12 MGD. Flow is expected to increase to 6 MGD over the next 5 to 10 years. The WWTRF replaced the former Waste Water Treatment Plant, which is being decommissioned. Effluent from the WWTRF undergoes treatment processes that include oxidation, coagulation, clarification, filtration, and disinfection with ultraviolet light.

Recycled water from the WWTRF is currently used for irrigation on approximately 400 acres at three sites, including:

1. Approximately 170 acres at West Placer Waste Management Authority (Lastufka) property, south of the WWTRF
2. 105 acres at Antonio Mountain Ranch, south of the WWTRF
3. 117 acres at the Warm Springs site, west of the WWTRF

During the non-irrigation season, effluent is stored for future use. Areas that currently receive recycled water are capable of using approximately 400 million gallons per year in normal precipitation conditions.

The WWTRF is capable of producing recycled water that meets DHS requirements in Title 22 for unrestricted reuse. Projects currently in design will allow construction of the necessary distribution system to deliver additional recycled water to users within the city limits by 2008. It is anticipated that these new users may

City of Lincoln

2010 Urban Water Management Plan

FINAL
Adopted

July 12, 2011

- Management of the groundwater basin shall not have a significant adverse effect on groundwater quality;
- Manage groundwater elevations to ensure an adequate groundwater supply for backup, emergency, and peak demands without adversely impacting adjacent areas;
- Participate in State and Federal land surface subsidence monitoring programs;
- Protect against adverse impacts to surface water flows in creeks and rivers due to groundwater pumping; and
- Ensure groundwater recharge projects comply with State and federal regulations and protect beneficial uses of groundwater.

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.

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

[19] Adoption by the City of Lincoln of the WPCGMP occurred in December 2007. The WPCGMP can be viewed at the City of Lincoln Public Works Department.
[20] The City of Lincoln November 2003 Groundwater Management Plan can be viewed at the City of Lincoln Public Works Department.

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WWW.PCWA.NET

NEWS RELEASE

April 11, 2014

Contact: David A. Breninger, PCWA
(530) 823-4850
Or: Dave Carter
(530) 265-NEWS

FOR IMMEDIATE RELEASE:

PCWA Calls for Water Conservation

All Customers Urged to Cut Use by 10% Or More

AUBURN -- Directors of the Placer County Water Agency on Thursday (Apr. 10) adopted a series of water use regulations and restrictions and appealed to all customers to conserve water for the duration of the drought.

"In an effort to achieve equitable availability of water for all," said PCWA General Manager David A. Breninger, "we're asking that all customers reduce water use by a minimum of 10 percent with overall conservation of 20 percent, a desired goal for the duration of the drought."

The board's vote followed several staff reports and a presentation by Pacific Gas and Electric Company partnership manager Dave Ward. He said PG&E deliveries to PCWA this year would be reduced to 67 percent of normal levels.

Ward noted that wet weather during February and March eased what had appeared to be a very critical situation but said the mountain snowpack now holds 22 percent of average water content. "The real story this year is the lack of Sierra snowpack, which we depend upon annually for a full water supply," he said.

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."

-more-

Some of the water use reductions spelled out in the board's resolution include:

Treated Water Users. Outdoor irrigation no more than three days per week in July and August; two days per week in April, May, June, September, October, November. Irrigate between 6 p.m. and 9 a.m., add mulch, prevent runoff onto streets and driveways. Use a bucket and hose with shutoff nozzle when washing vehicles or equipment or go to commercial car wash that uses recycled water. Indoor use: limit showers to five minutes or less, wash only full loads of dishes and clothes, and promptly fix all water leaks.

Untreated Water Users. Customers receiving 1 miner's inch or more of untreated water will have the water service orifices resized to reduce water supply by 10 percent. Customers with untreated meter service and those who receive one-half (1/2) miner's inch or less are asked to reduce water use by a minimum of 10 percent.

Directors also determined that untreated customers who choose to limit or forego service this year would not lose priority or face reconnection charges.

The board authorized new treated water connections to continue with the provision that the new services adhere to landscape specifications outlined in the California Model Water Efficient Landscape Ordinance.

PCWA staff will be sending letters to all 38,000 customers to inform them of the water reduction actions taken by the Board. Staff will provide drought updates at each meeting of the Board. Also, timely updates on the drought and water saving actions and tips are posted on the agency's website at *www.pcwa.net* which features a Drought Update link with many water saving tips and techniques.

The next regular board meeting will be held at 2 p.m. on Apr. 17 at the PCWA Business Center, 144 Ferguson Road, in Auburn. PCWA board meetings are open to the public.

Information on PCWA board meetings may be obtained through the Clerk to the Board at (530) 823-4850 or (800) 464-0030.

-30-

Nelson Well Repair – City of Lincoln

List of References

- Water Quality Station Details, 2014, **pages 1-2**
- California Data Exchange Center, 2014, **pages 1-16**
- SWRI Draft Policy Document Lower American River Flow Management Standard, 2004, **pages 2, 7-11**
- Major Reservoir Current Conditions Graphs, 2014, **pages 1-2**
- Western Placer County Groundwater Management Plan, 2007, **page 2-18**
- City of Lincoln Urban Water Management Plan, 2010, **page 3-12**
- PCWA Press Release, April 11, 2014, **All pages**

Water Quality Station Details

Station Number:	A7310000
Station ID:	2254
Short Station Name:	AMERICAN R NF NR AUB
Full Station Name:	AMERICAN R NF NR AUBURN
Description:	
Station Type:	River Mile
Elevation:	540
Latitude:	38-54-51
Longitude:	121-2-7
Datum:	NAD27
Projection:	LL
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Range:	08E
Section:	01
Tract:	P
Sequence:	0
Base & Meridian:	M
County:	El Dorado
Quad:	AUBURN
Data Source:	WDIS
Watershed:	SACRAMENTO HB

Back

AMERICAN MF NR AUBURN *(AMA)*

Elevation: 88' · AMERICAN R basin · Operator: US Geological Survey

Provisional data, subject to change.

Query executed Thursday at 12:45:33

FLOW, MONTHLY VOLUME (4477)

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Warning! This data is preliminary and subject to revision.

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Station ID	Sensor Number	Duration Code	Start date	End date	
AMA	66	M D H E	mm/dd/yyyy	mm/dd/yyyy	Get data

DRAFT POLICY DOCUMENT
LOWER AMERICAN RIVER FLOW MANAGEMENT STANDARD

Prepared for:

WATER FORUM

Prepared by:

SWRI SURFACE WATER RESOURCES, INC.
2031 Howe Ave., Suite 110
Sacramento, CA 95825

FEBRUARY 2004

implements the Fisheries and In-stream Habitat Plan (FISH Plan), which constitutes the aquatic habitat management plan for the lower American River. The FISH Plan was developed as part of another Water Forum element, the "*Lower American River Habitat Management Element*." Development of the habitat management element is necessary to comply with the California Environmental Quality Act (CEQA), as described in the *Water Forum Agreement* Environmental Impact Report (EIR). The FISH Plan is consistent with the mitigation described and certified in the *Water Forum Agreement's* EIR and associated mitigation, monitoring, and reporting plan.

The Flow Management Standard is intended to result in improved conditions for fish in the lower American River, particularly fall-run Chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*). In addition, it is anticipated that the Flow Management Standard will comply with California Department of Fish and Game (CDFG) Code 5937, which requires that lower American River fish resources be maintained in "*good condition.*" The Flow Management Standard also is intended to be consistent with the National Oceanic and Atmospheric Administration/National Marine Fisheries Service's (NOAA Fisheries) *Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units* (2000). This NOAA Fisheries document provides an explicit framework for identifying attributes of viable salmonid populations so that parties may assess the effects of management and conservation actions, and ensure that their actions promote the listed species' survival and recovery. NOAA Fisheries and the U.S. Fish and Wildlife Service (USFWS) define recovery under the Endangered Species Act as "*improvement in the status of a listed species to the point at which listing is no longer appropriate*" under the ESA (50 CFR 5402.02). In the lower American River, the standard of "promoting recovery" would only be applicable to federally protected species, in this case the Central Valley steelhead Evolutionarily Significant Unit (ESU).

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. Development of an improved flow standard will:

- Improve currently required flow, water temperature, ramping rate, and flow fluctuation criteria;
- Establish a river management process for Folsom Reservoir and lower American River operations; and
- Monitor, evaluate, and report the resultant hydrologic and biologic conditions.

Thus, the proposed Flow Management Standard consists of three separate elements: *Required Flows and Water Temperatures; River Management;* and *Monitoring and Evaluation*.

early part (September to November) of the adult fall-run Chinook salmon upstream migration and spawning period.

High water temperatures during the fall can delay the onset of spawning by Chinook salmon and result in fewer fish spawning, less eggs spawned per female, lower egg fertilization rates, and increased mortality of eggs in the spawning nests ("redds"). In addition, relatively low October and November flows, when they occur, reduce the amount of available spawning habitat and tend to increase the amount of fall-run Chinook salmon redd superimposition (multiple nest building in one location that results in decreased egg survival), thereby potentially limiting initial year-class strength (the number of surviving fish). Flow fluctuations can expose redds to the atmosphere, causing redd dewatering and egg mortality.

After the eggs hatch, juvenile fall-run Chinook salmon begin their seaward migration the same year in which they were spawned. By contrast, juvenile steelhead may remain in the lower American River a year or more prior to their seaward migration. The environmental factor believed to be most limiting to the survival of steelhead in the lower American River is high water temperatures during the summer and early fall. In their biological opinion on the operation of the Central Valley Project (CVP), NOAA Fisheries specified a water temperature of 65ºF or less to protect rearing juvenile steelhead in the lower American River.

Water temperatures in the lower American River during summer months exceed the upper range of water temperatures reported to be suitable for juvenile steelhead rearing. Summer water temperatures often exceed 65ºF, and can exceed 70ºF particularly during the months of July and August. Water temperatures higher than the suitable range can affect the growth and survival of juvenile steelhead. In addition to water temperature effects, large fluctuations in flow can strand fry and juvenile steelhead, as well as juvenile fall-run Chinook salmon, near the river edges and in shallow pools, or prevent their access to the main river channel from the side channels in which they rear.

CURRENT OPERATIONS

Currently, the 1958 SWRCB Decision (D-893) specifies the legally required minimum flows in lower American River for all months of the year (500 cfs between September 15 and December 31, and 250 cfs at all other times). From today's perspective, D-893 is based on outdated information and assumptions about available water supplies and operational constraints. For example, D-893 standards do not address requirements of the Central Valley Project Improvement Act, the 1995 Bay-Delta Plan, or biological opinions to protect Central Valley anadromous salmonids. These and other mandates drive current decision-making associated with CVP operations.

Reclamation operates Folsom Dam to meet these more recent flow recommendations, as well as those consistent with other relevant habitat management plans geared toward the protection and enhancement of anadromous fish resources. Under recent CVP operations, flows in the lower American River have been well in excess of the D-893 minimum flow requirements (**Figure 2**).

Folsom Dam and Reservoir is operated by Reclamation to meet CVP-wide multi-purpose beneficial uses, while taking into consideration input received from the AROG. Reclamation provides the AROG with information such as flows in the river during the previous several months, reservoir storage, projected reservoir inflow, water temperature data, and projected outflows. The AROG uses this information to plan and develop flow release schedules for Folsom Dam. During this iterative process, the AROG adapts and refines the projected flow release schedule for the next month, making necessary adjustments for the remainder of the year.

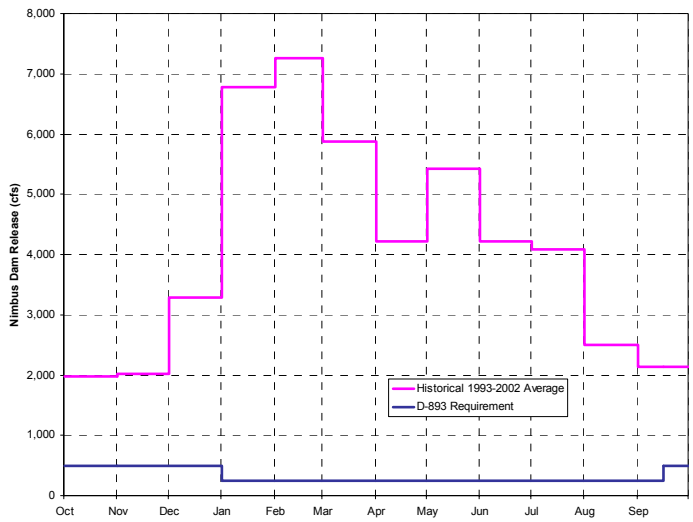


Figure 2. Comparison of D-893 Minimum Instream Flow Requirements with Average Monthly Flows Released from Nimbus Dam (1993-2002).

The AROG not only provides input into the flow release schedule for Folsom Dam, but also into management of the coldwater pool in Folsom Reservoir. The coldwater pool is influenced by numerous factors including inflow, inflow water temperatures, diversions, storage, and the volume of cooler, hypolimnetic waters in the reservoir. Water temperatures in the lower American River also are influenced by these factors, as well as by decisions about the elevation from which to draw water for release from Folsom Reservoir into the Nimbus and American River Fish Hatcheries, and down the lower American River. The AROG provides regular input regarding how best to configure the shutters on the power penstocks at Folsom Dam to most effectively manage the coldwater pool reserves, and provide maximal thermal benefits to downstream aquatic resources, specifically anadromous salmonids.

The AROG has been voluntarily implementing adaptive management of lower American River flows since 1996. Although the AROG recommendations are advisory and the group has no authority to oversee Folsom and Nimbus dam releases, Reclamation currently manages releases from Folsom and Nimbus dams according to AROG recommendations to the fullest extent feasible, given its existing obligations. There is consensus among the AROG members and the many other diverse

stakeholders involved in the lower American River that a comprehensive river management process is the most productive and effective approach to managing lower American River flows for instream benefits (**Figure 3**).

What is not working on the lower American River?		*How the proposed Flow Management Standard addresses these issues*
❑ Inappropriate Flow Pattern ▪ Flow volumes are too high or too low ▪ Timing of flow does not always coincide with the needs of fish ▪ Flow fluctuations can cause redd dewatering and juvenile salmonid stranding	→	❑ Improved Regulatory Flows (Element One) ▪ Required flow standard ▪ Ramping rate standard ▪ Flow fluctuation objectives
❑ Warm Water Temperatures ▪ Limited cold water supply and accessibility - need cold water in summer for steelhead rearing, and in fall for Chinook salmon spawning	→	❑ Required water temperature standards (Element One)
❑ Lack of comprehensive river management ▪ Need comprehensive river management to balance the operation of Folsom Dam and Reservoir for all beneficial uses	→	❑ Formulation of a River Management Group (Element Two) and required monitoring, evaluation, and reporting procedures (Element Three)

Figure 3. Need for Updated Flow Management Standard.

ELEMENT ONE – REQUIRED FLOWS AND WATER TEMPERATURES

The required flow, water temperature, ramping rate, and flow fluctuation standards discussed below together comprise the first element of the Flow Management Standard, *Required Flows and Water Temperatures*. Detailed discussion and analyses supporting development of these standards will be included in the Lower American River Flow Management Standard report currently under preparation.

The primary objective of the *Required Flows and Water Temperature* element of the Flow Management Standard is to sustain increased habitat availability, while concurrently minimizing flow fluctuations and reductions, within the context of hydrologic uncertainty. Specifically, the required flow, water temperature, ramping rate, and flow fluctuation standards intend to:

- ❑ Provide the best possible flow and temperature based on water availability;
- ❑ Maximize the occurrence of target Chinook salmon and steelhead spawning flows;
- ❑ Stabilize flows during the Chinook salmon and steelhead egg incubation periods;
- ❑ Reduce month-to-month flow reductions to minimize juvenile salmonid stranding and isolation; and
- ❑ Manage flow releases and reservoir storage to effectively utilize coldwater pool availability.

REQUIRED FLOW STANDARD

The required flow, as measured by the total release at Nimbus Dam, would vary throughout the year depending on the hydrology of the Sacramento and American rivers. As used in the flow standard, the term "required flow" is meant to describe the minimum required flow and does not

preclude Reclamation from making higher releases at Nimbus Dam. Except for extremely dry conditions, from October through May required flows would be established between 800 cfs and 2,250 cfs. During June through September, required flows would be established between 800 cfs and 1,750 cfs. Actual required flow would be determined by specified conditions at biologically significant times of the year. For instance, during wetter years, the required flow would generally be higher, but not so high as to substantially reduce the coldwater pool volume in Folsom Reservoir by the end of summer. During drier years, the required flow would be reduced to most effectively utilize the limited availability of Folsom Reservoir storage and coldwater pool.

During the October through December period, the required flow would be based on an index of American River Basin carryover storage conditions. This index, referred to as the FRI (Four Reservoir Index), is calculated as the combined end-of-September storage in four reservoirs – French Meadows, Union Valley, Hell Hole, and Folsom. If, for example, the combined carryover storage in Folsom Reservoir and the upstream American River reservoirs was low, the required flow would be near 800 cfs; if carryover conditions were high, the required flow would be near 2,250 cfs. During October of each year, flows would be "stepped-up" until the required flow is met, at different rates depending on the magnitude of the required flow, as follows:

- **Required Flows equal to 2,250 cfs**
  - 250 cfs step increases from 1,500 cfs on October 1 to 2,250 cfs on November 9
    - Oct 1 to Oct 24 — 1,500 cfs
    - Oct 25 to Oct 31 — 1,750 cfs
    - Nov 1 to Nov 8 — 2,000 cfs
    - Nov 9 to Dec 31 — 2,250 cfs
- **Required Flows between 2,250 cfs and 1,500 cfs**
  - Incremental step increases from 1,500 cfs on October 1 to Required Flows on November 9
    - Oct 1 to Oct 15 — Required Flows = 1,500 cfs
    - Oct 16 to Oct 31 — Required Flows -500 cfs, or 1,500 cfs, whichever is greater
    - Nov 1 to Nov 8 — Required Flows -250 cfs, or 1,500 cfs, whichever is greater
    - Nov 9 to Dec 31 — Required Flows
- **Required Flows less than or equal to 1,500 cfs**
  - Implemented on October 1
  - Continue at same level through December 31

This "stepping-up" of flow, or increasing flow progression, was developed to maximize flow release utilization efficiency based on analysis of the last decade of fall-run Chinook salmon spawning distribution. In other words, more water is provided when more fish are expected to be spawning. In addition, the increasing flow progression is intended to minimize the incidence of redd superimposition.

During January and February, adjustments to the required flows would be based on the Sacramento River Index (SRI), an index of water year runoff for the entire Sacramento River Basin that is updated monthly. During this time, the fall-run Chinook salmon spawning period is completed, and the first part of the steelhead spawning period has begun. Based on the early January SRI, the January flow requirement may be modified from the December value. If the SRI predicts a critically dry year, then the January flow requirement would be set as 85 percent of the December requirement or 800 cfs, whichever is greater. If the SRI predicts a dry or normal year, then the January flow requirement remains the same as December. If the SRI predicts an above normal or wet year, the required flow would be set at 2,250 cfs. In February, the calculation is the same as the January routine, except the January flow is used as the basis.

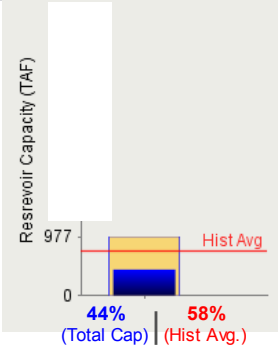
Generally, by March, water supply availability and snow-pack conditions are reasonably certain for the remainder of the water year. At this time, knowledge of the actual available water supply can be used to make flow management decisions. Early in the spring, tradeoffs must be made between maintaining flows to sustain current habitat conditions *versus* reserving water supply for future releases to ensure that sufficient coldwater is available during both the steelhead over-summer rearing period and Chinook salmon spawning in the fall. From March through September, the required flow is based on the Impaired Nimbus Inflow Index (INI). The INI is defined as the May through September Folsom Reservoir inflow, minus May through September Folsom Reservoir diversions, minus May through September Folsom Reservoir evaporation, minus May through September Folsom South Canal diversions. Using the INI as an index, the flow requirement for the entire March through May period is established between 800 and 2,250 cfs. The same flow requirement is used for June through September, except the maximum flow requirement is capped at 1,750 cfs.

Preliminary model results associated with the Flow Management Standard required flows are presented in **Appendix A**.

Conference Year Principles

Implementation of the required flows discussed above facilitates the release of available water for aquatic resources during all types of water years. The Flow Management Standard also recognizes agreements for water diversions, which are necessary because of the wide variation in runoff, ranging from over 6 million acre-feet (AF) in one year to less than 400,000 AF in the driest water year on record. As defined in the *Water Forum Agreement*, "conference years" are those years when the projected March to November unimpaired inflow to Folsom Reservoir is less than 400,000 AF. It is during times of low runoff that demands on the available water supply are the greatest. Therefore, special provisions for conference years are included in the Flow Management Standard. A summary of these provisions is provided below. For a more detailed discussion regarding conference year principles, please refer to the *Water Forum Agreement*.

FOLSOM LAKE - STORAGE CONDITIONS AS OF JULY 16, 2014



Data as of Midnight: July 16, 2014

- Current Storage: 431,685 AF
- 44% of Total Capacity
- 58% of Historical Avg. For This Date
- (Total Capacity: 977,000 AF)
- (Avg. Storage for Jul 16: 748,478 AF)

Change Date: 16-Jul-2014

Refresh Data

Major Reservoir Current Conditions Graphs

Printable Version of Current Data

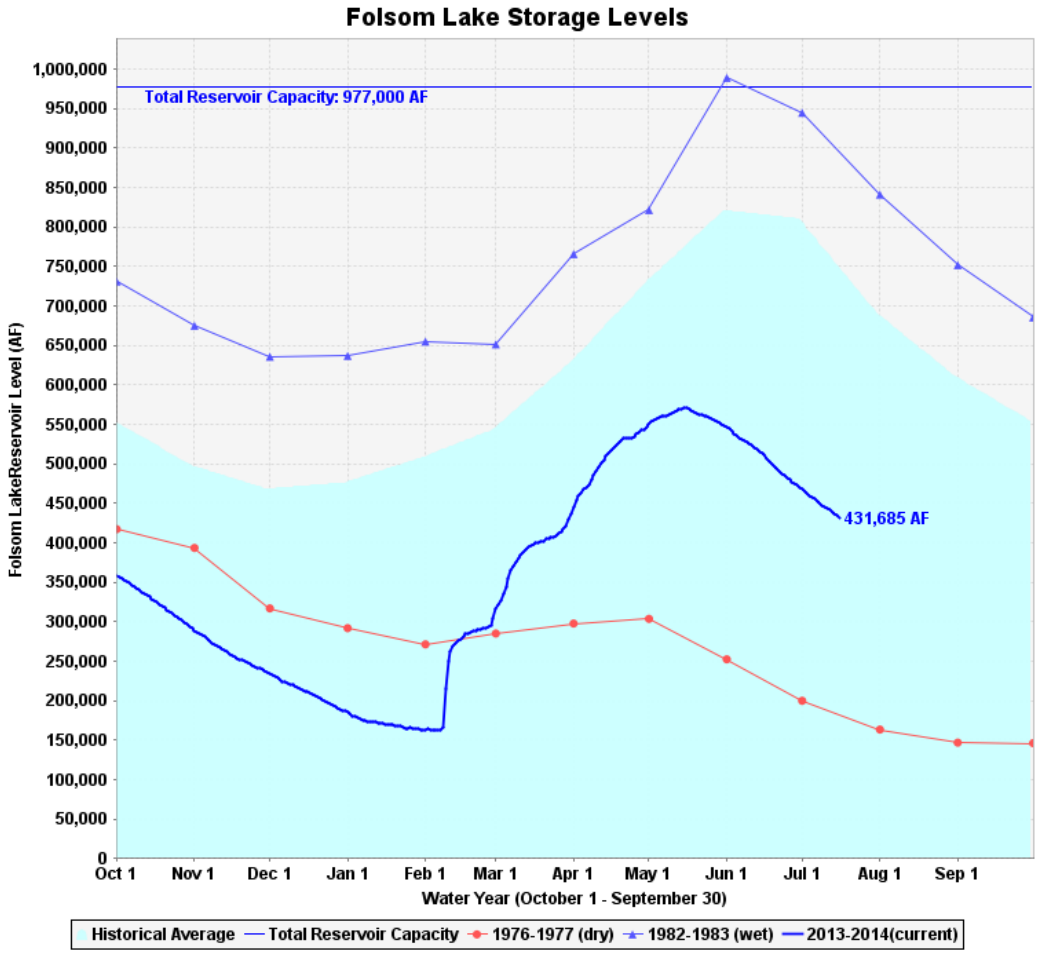
Folsom Lake Storage Level Graph: **Choose water years to plot:**

1976-1977 (dry)
1982-1983 (wet)
1988-1989
1989-1990
1990-1991

(ctrl+click for multiple selections)

Draw chart

(chart legend appears at bottom)



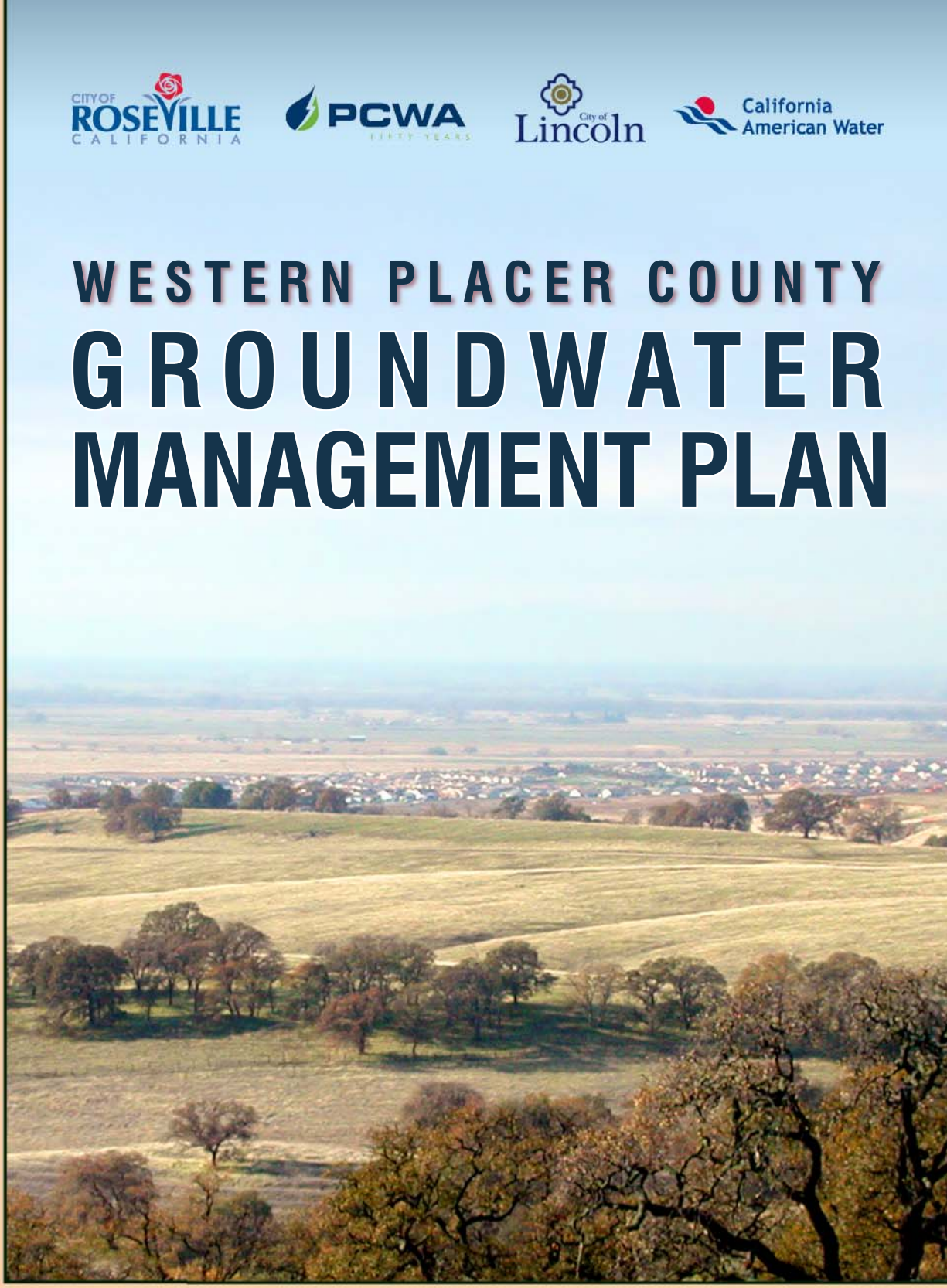
City of Roseville California

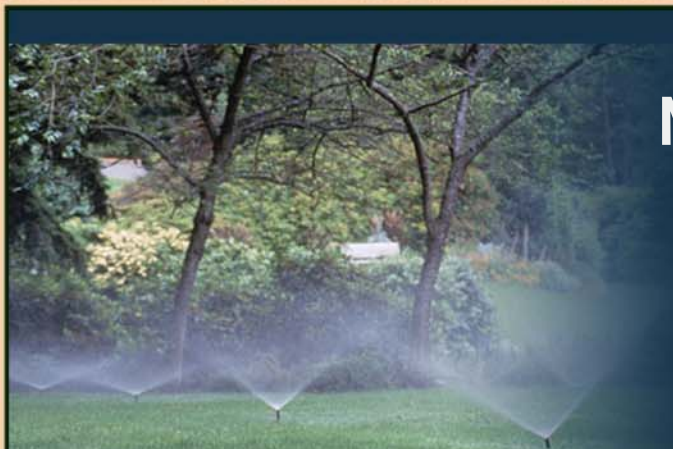
PCWA Fifty Years

City of Lincoln

California American Water

WESTERN PLACER COUNTY GROUNDWATER MANAGEMENT PLAN





NOVEMBER 2007

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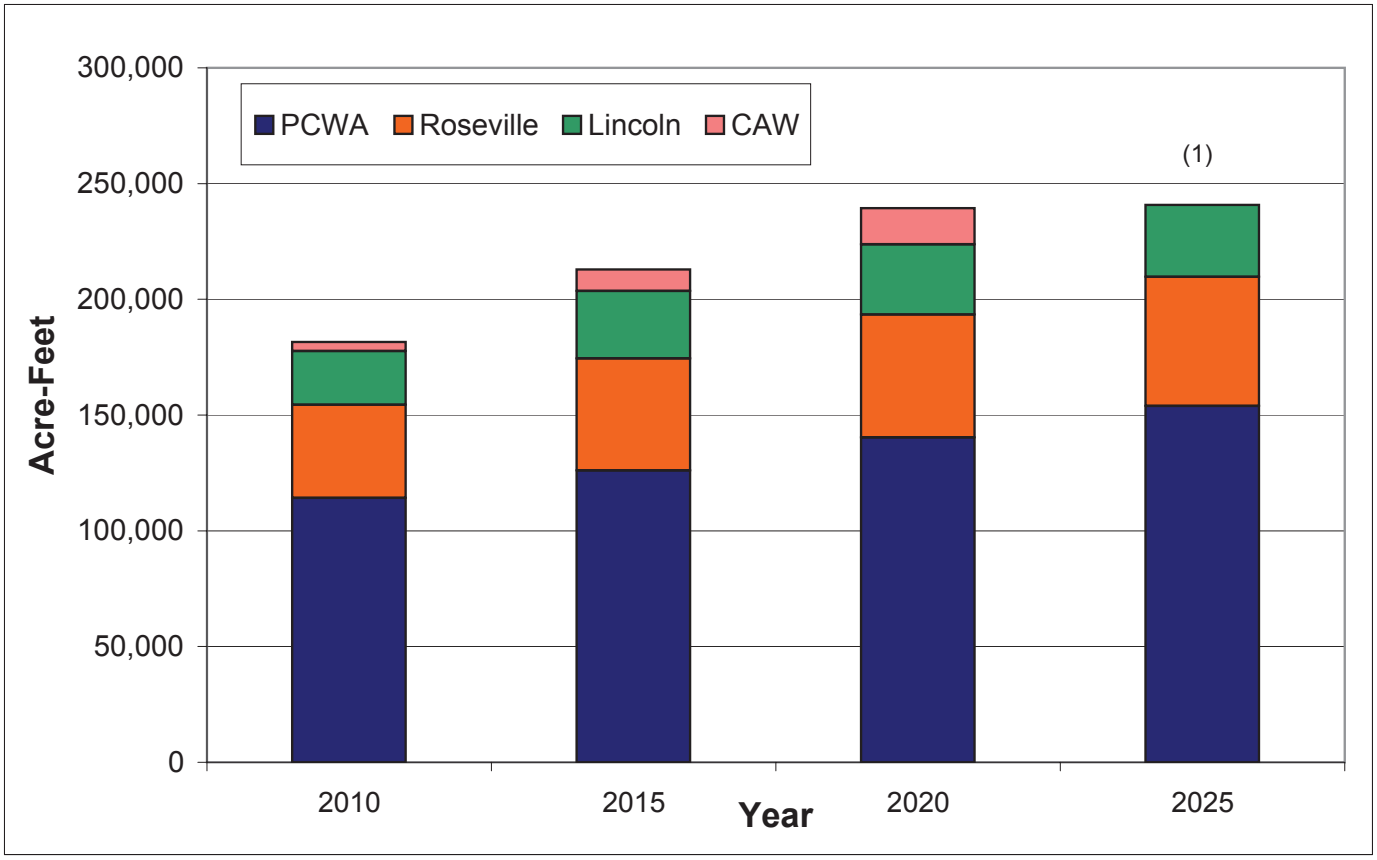

Figure 2-7 – Projected Water Demands (treated and raw water)

2.4.2.3 Groundwater

Existing Conditions. The City utilizes groundwater from five wells to provide emergency, back up, and peaking supplies as a source for its backup water supply. Liquid chlorine (sodium hypochlorite) is added to the pumped groundwater at the well site for preventative disinfection. All well sites have 10,000-gallon pressure tanks. In 2004, Lincoln pumped 298 acre-feet of groundwater.

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.

2.4.2.4 Recycled Water

Lincoln recently completed a new Wastewater Treatment and Reclamation Facility (WWTRF) for the purpose of treating wastewater generated within the City.

Existing Conditions. The 3.3 MGD WWTRF began operation in 2004 and generated an initial 2.4 MGD of average dry weather flow with expansion capacity to 12 MGD. Flow is expected to increase to 6 MGD over the next 5 to 10 years. The WWTRF replaced the former Waste Water Treatment Plant, which is being decommissioned. Effluent from the WWTRF undergoes treatment processes that include oxidation, coagulation, clarification, filtration, and disinfection with ultraviolet light.

Recycled water from the WWTRF is currently used for irrigation on approximately 400 acres at three sites, including:

1. Approximately 170 acres at West Placer Waste Management Authority (Lastufka) property, south of the WWTRF
2. 105 acres at Antonio Mountain Ranch, south of the WWTRF
3. 117 acres at the Warm Springs site, west of the WWTRF

During the non-irrigation season, effluent is stored for future use. Areas that currently receive recycled water are capable of using approximately 400 million gallons per year in normal precipitation conditions.

The WWTRF is capable of producing recycled water that meets DHS requirements in Title 22 for unrestricted reuse. Projects currently in design will allow construction of the necessary distribution system to deliver additional recycled water to users within the city limits by 2008. It is anticipated that these new users may

City of Lincoln

2010 Urban Water Management Plan

FINAL
Adopted

July 12, 2011

- Management of the groundwater basin shall not have a significant adverse effect on groundwater quality;
- Manage groundwater elevations to ensure an adequate groundwater supply for backup, emergency, and peak demands without adversely impacting adjacent areas;
- Participate in State and Federal land surface subsidence monitoring programs;
- Protect against adverse impacts to surface water flows in creeks and rivers due to groundwater pumping; and
- Ensure groundwater recharge projects comply with State and federal regulations and protect beneficial uses of groundwater.

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.

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

[19] Adoption by the City of Lincoln of the WPCGMP occurred in December 2007. The WPCGMP can be viewed at the City of Lincoln Public Works Department.
[20] The City of Lincoln November 2003 Groundwater Management Plan can be viewed at the City of Lincoln Public Works Department.

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NEWS RELEASE

April 11, 2014

Contact: David A. Breninger, PCWA
(530) 823-4850
Or: Dave Carter
(530) 265-NEWS

FOR IMMEDIATE RELEASE:

PCWA Calls for Water Conservation

All Customers Urged to Cut Use by 10% Or More

AUBURN -- Directors of the Placer County Water Agency on Thursday (Apr. 10) adopted a series of water use regulations and restrictions and appealed to all customers to conserve water for the duration of the drought.

"In an effort to achieve equitable availability of water for all," said PCWA General Manager David A. Breninger, "we're asking that all customers reduce water use by a minimum of 10 percent with overall conservation of 20 percent, a desired goal for the duration of the drought."

The board's vote followed several staff reports and a presentation by Pacific Gas and Electric Company partnership manager Dave Ward. He said PG&E deliveries to PCWA this year would be reduced to 67 percent of normal levels.

Ward noted that wet weather during February and March eased what had appeared to be a very critical situation but said the mountain snowpack now holds 22 percent of average water content. "The real story this year is the lack of Sierra snowpack, which we depend upon annually for a full water supply," he said.

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."

-more-

Some of the water use reductions spelled out in the board's resolution include:

Treated Water Users. Outdoor irrigation no more than three days per week in July and August; two days per week in April, May, June, September, October, November. Irrigate between 6 p.m. and 9 a.m., add mulch, prevent runoff onto streets and driveways. Use a bucket and hose with shutoff nozzle when washing vehicles or equipment or go to commercial car wash that uses recycled water. Indoor use: limit showers to five minutes or less, wash only full loads of dishes and clothes, and promptly fix all water leaks.

Untreated Water Users. Customers receiving 1 miner's inch or more of untreated water will have the water service orifices resized to reduce water supply by 10 percent. Customers with untreated meter service and those who receive one-half (1/2) miner's inch or less are asked to reduce water use by a minimum of 10 percent.

Directors also determined that untreated customers who choose to limit or forego service this year would not lose priority or face reconnection charges.

The board authorized new treated water connections to continue with the provision that the new services adhere to landscape specifications outlined in the California Model Water Efficient Landscape Ordinance.

PCWA staff will be sending letters to all 38,000 customers to inform them of the water reduction actions taken by the Board. Staff will provide drought updates at each meeting of the Board. Also, timely updates on the drought and water saving actions and tips are posted on the agency's website at *www.pcwa.net* which features a Drought Update link with many water saving tips and techniques.

The next regular board meeting will be held at 2 p.m. on Apr. 17 at the PCWA Business Center, 144 Ferguson Road, in Auburn. PCWA board meetings are open to the public.

Information on PCWA board meetings may be obtained through the Clerk to the Board at (530) 823-4850 or (800) 464-0030.

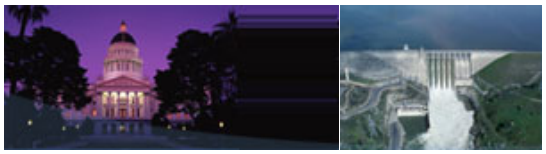
-30-

PFE and Zone 4 Transfer Pump Stations – City of Roseville

List of References

- American River Basin Regional Conjunctive Use Program (ARBCUP), 2014, **All pages**
- City of Roseville Dry Year Evaluation, 2014, **All pages**
- Roseville EU Zone 4 to Zone 1 Pumps Technical Memorandum, 2014, **pages 1-2**

Regional Water Authority
BUILDING ALLIANCES IN NORTHERN CALIFORNIA



The Regional Water Authority (RWA) is a joint powers authority that serves and represents the interests of over 20 water providers and associated agencies in the greater Sacramento area.

WEP
IRWMP
ARBCUP
Training

ARBCUP

The RWA American River Basin Regional Conjunctive Use Program (ARBCUP) is a $43 million project to build and upgrade water facilities throughout the region to better manage surface and groundwater resources. The project's 12 program components include new pipelines, pumps, and other facilities to store, treat, and convey water throughout the region.

The ARBCUP is a case study in the power of regional collaboration. First, RWA brought together seven local water purveyors - Citrus Heights Water District, Fair Oaks Water District, Placer County Water Agency, San Juan Water District, Sacramento Suburban Water District, and the cities of Roseville and Sacramento - to transform individual projects into a regional conjunctive use plan. Based on the strength of that regional effort, RWA secured a $21.7 million grant to fund 50% of the project costs. The grant, awarded in 2002 by the California Department of Water Resources, is funded by the Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Act of 2000 (Proposition 13).

ARBCUP's objectives include:

- Improving the flexibility of the local water system
- Helping preserve the groundwater basin for use in drought years
- Promoting implementation of the Sacramento Water Forum Agreement
- Exploring options for future state or federal partnerships to provide broader, system-wide benefits.

Completed in late 2008, the ARBCUP project increases the region's water supplies by more than 20,000 acre-feet of water annually at significant savings to area ratepayers.

For ARBCUP Information Contact
Rob Swartz
916-967-7692
rswartz@rwah2o.org

Map of Project Facilities

Description of Project Facilities

Sacramento Bee Article on ARBCUP

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TECHNICAL MEMORANDUM

TO:	Jim Mulligan, Cathy Lee, Charles Aycock, Roseville EU
FROM:	Steve Ainsworth, Dave Harden
DATE:	March 19, 2014
SUBJECT:	Design Assumptions Zone 4 to Zone 1 Transfer Pumps (Rev 3/19/14)
PROJECT:	Roseville EU Zone 4 to Zone 1 Pumps

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Design Assumptions

1. Transfer Pump Station that was to be located at the Blue Oaks PRV site is not feasible due to site constraints
2. One Transfer Pump Station to be located at the Pleasant Grove PRV site
3. One Transfer Pump Station to be located at the PFE PRV site
4. Zone 4 Well production
   - Diamond Creek (Well 6) 2,700 gpm
   - Hayden Parkway (Well 8: WRSP1) 1,800 gpm
   - Del Webb (Well 12) 1,800 gpm

   Total Well Production: 6,300 gpm
5. Zone 4 demand

   July 2014 projected (based on 2008 SCADA data with conservation applied)

Minimum	1,200 – 2,400 gpm
Average	2,400 – 4,800 gpm
Maximum	8,000 – 16,000 gpm

   Based on August 2008 SCADA data
6. Transfer Pump Flow (based on 2008 demands)

	2008 Demands	With Conservation
Maximum	6,300 - 2,400 = 3,900 gpm	6,300 - 1,200 = 5,100 gpm
Average	6,300 - 4,800 = 1,500 gpm	6,300 - 2,400 = 3,900 gpm
7. Pleasant Grove Site – Elevation 112.2 feet
   - Inlet pressure (static) 264 feet
   - Outlet pressure (static) 357 feet
   - Design TDH – 105 feet
   - PRV flow 2,200 gpm
   - Pump Station design flow approximately 6,000 gpm
   - Number of pumps – 3
   - Pump horsepower – 100 each
   - Pump type – constant speed
   - Existing propeller meter will be replaced with bi-directional magnetic meter to monitor pump flow
   - Property near the PRV station is available for the Transfer Pump Station
   - Transfer Pump Station to include factory furnished building
   - Electrical cabinets are to be installed in separate room within building
   - Connect to existing SCADA system
   - Pumps to be PLC controlled (see 9 below)
8. PFE Site – Elevation 129 feet
   - Inlet pressure (static) 247 feet (assumed)
   - Outlet pressure (static) 356 feet (assumed)

DRAFT

- Design TDH – 110 feet
- Design flow 5,000 gpm (1,700 gpm/pump)
- Number of pumps – 3
- Pump horsepower – 100 each
- Pump type – constant speed
- New pump station will be plumbed to utilize existing magnetic meter for flow
- Station to include factory furnished building
- Electrical cabinets to be inside building in separate room
- Connect to existing SCADA system
- Pumps to be PLC controlled (see 9 below)

9. Controls
    - "Flow Control" balancing between Zone 4 and Zone 1 will be accomplished by using PRV stations for return flow to match Zone 4 demands
    - Wells – On/Off based on Zone 4 pressure or manual
    - On/Off manual/Auto
        - Low Zone 4 pressure cut-off
        - High Zone 1 pressure cut-off
    - City to provide programming
10. Electrical
    - Provide design level short circuit and arc flash study
    - Provide as-constructed arc flash study with labels

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CITY OF ROSEVILLE WATER SYSTEM 2014

~~(No Treatment Plant Water)~~

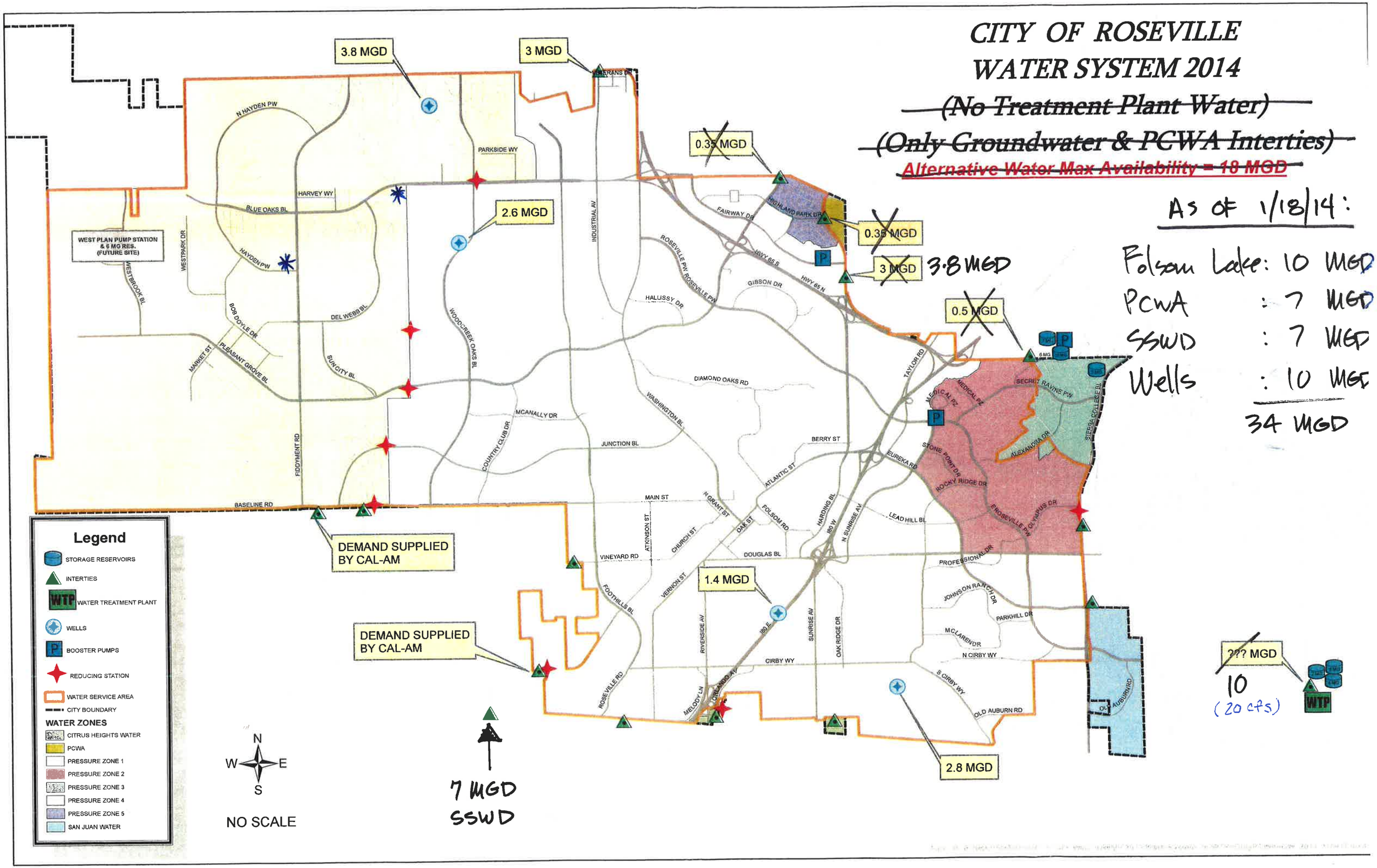
~~(Only Groundwater & PCWA Interties)~~

~~Alternative Water Max Availability = 18 MGD~~

As of 1/18/14:

Folsom Lake: 10 MGD
PCWA : 7 MGD
SSWD : 7 MGD
Wells : 10 MGD

34 MGD



Scenario	WTP Flow	Roseville Wells Flow	PCWA/SSWD Available Flow	Assumed Demand	Summary of Results	Refer to Figure Number	Comments---description of special assumptions or modifications
1	23 mgd	• Diamond Creek Well=2.92 mgd • Woodcreek North = 2.6 mgd • Darling Well = 1.4 mgd • Oakmont Well = 2.88 mgd	• Pleasant Grove = 0.35 mgd • Highland Conn = 0.35 mgd • Five Star Conn = 3 mgd • Tinker = 3 mgd	40 mgd (20% demand reduction)	Most pressure are above 50 psi, except for these following areas: • Area located along Eureka Road, between Douglas Boulevard and Sunrise Avenue. The minimum pressure at this area ranged from 40 to 49 psi. • Area located near Antelope Creek Drive. The minimum pressure was 46 psi. • Area located near Zone 3, on Secret Ravine Parkway. The minimum pressure ranged from 37 to 41 psi.	Scenario 1 Figures 1, 2, 3	• 72-hour period simulation • Assumed hydraulic head at PCWA connections o Five Star @ HGL 405' o Pleasant Grove @ HGL 405' o Highland @ HGL 405' o Tinker @ HGL 380'
2	23 mgd	• Diamond Creek Well=2.92 mgd • Woodcreek North = 2.6 mgd • Darling Well = 1.4 mgd • Oakmont Well = 2.88 mgd	• Pleasant Grove = 0.35 mgd • Highland Conn = 0.35 mgd • Five Star Conn = 3.8 mgd • Tinker = 0 mgd	40 mgd (20% demand reduction)	Most pressure are above 45 psi, except for these following areas: • Area located along Eureka Road, between Douglas Boulevard and Sunrise Avenue. The minimum pressure at this area ranged from 39 to 48 psi. • Area located between Eureka Road, Lead Hill Boulevard and Rocky Ridge Drive. The minimum pressure ranged from 43 to 45 psi. • Area located near Antelope Creek Drive and Creekside Ridge Court. The minimum pressure was 43 psi. • Area located near Automall Drive. The minimum pressure was 43 psi. • Area located near Zone 3, on Secret Ravine Parkway. The minimum pressure ranged from 25 to 34 psi.	Scenario 2 Figures 1, 2, 3	• Additional Operational Assumption: o Zone 1 BPS to fill Zone 1 Tanks from 9 pm to 8 am • Assumed hydraulic head at PCWA connections o Five Star @ HGL 405' o Pleasant Grove @ HGL 405' o Highland @ HGL 405' o Tinker @ HGL 380'
3	10.8 mgd	• Diamond Creek Well=2.92 mgd • Woodcreek North = 2.6 mgd • Darling Well = 1.4 mgd • Oakmont Well = 2.88 mgd	• Pleasant Grove = 0.35 mgd • Highland Conn = 0.35 mgd • Five Star Conn = 3.8 mgd Tinker = 6 mgd	36 mgd (28% demand reduction)	Most pressure are above 45 psi, except for these following areas: • Area located along Eureka Road, between Douglas Boulevard and Sunrise Avenue. The minimum pressure at this area ranged from 43 to 50 psi. • Area located between Eureka Road, Lead Hill Boulevard and Rocky Ridge Drive. The minimum pressure was 49 psi. • Area located near Antelope Creek Drive and Creekside Ridge Court. The minimum pressure was 43 psi. • Area located near Automall Drive. The minimum pressure was 48 psi. • Area located near Zone 3, on Secret Ravine Parkway. The minimum pressure ranged from 35 to 39 psi.	Scenario 3 Figures 1, 2, 3	• Additional Operational Assumption: o Zone 1 BPS to fill Zone 1 Tanks from 9 pm to 5 am • Assumed hydraulic head at PCWA connections o Five Star @ HGL 405' o Pleasant Grove @ HGL 405' o Highland @ HGL 405' o Tinker @ HGL 380'

4	0 mgd	• Diamond Creek Well=2.92 mgd • Woodcreek North = 2.6 mgd • Darling Well = 1.4 mgd • Oakmont Well = 2.88 mgd	• Pleasant Grove = 0.35 mgd • Highland Conn = 0.35 mgd • Five Star Conn = 3.8 mgd • Tinker = 6 mgd • SSWD = 7 mgd	32.8 mgd (34% demand reduction)	Most pressure are above 45 psi, except for these following areas: • Area located along Eureka Road, between Douglas Boulevard and Sunrise Avenue. The minimum pressure at this area ranged from 38 to 50 psi. • Area located between Eureka Road, Lead Hill Boulevard and Rocky Ridge Drive. The minimum pressure ranged from 44 to 48 psi. • Area located near Antelope Creek Drive and Creekside Ridge Court. The minimum pressure was 43 psi. • Area located near Automall Drive. The minimum pressure was 44 psi. • Area located near Zone 3, on Secret Ravine Parkway. The minimum pressure ranged from 30 to 35 psi.	Scenario 4 Figures 1, 2, 3	• New Pump Station at PFE Road to deliver SSWD flow into Roseville System at 7 mgd • Additional Operational Assumption: ○ Zone 1 BPS to fill Zone 1 Tanks from 9 pm to 3 am • Assumed hydraulic head at PCWA connections ○ Five Star @ HGL 405' ○ Pleasant Grove @ HGL 405' ○ Highland @ HGL 405' ○ Tinker @ HGL 380'
5	0 mgd	• Diamond Creek Well=2.92 mgd • Woodcreek North = 2.6 mgd • Darling Well = 1.4 mgd • Oakmont Well = 2.88 mgd 9.8 MGD	• Pleasant Grove = 0.35 mgd • Highland Conn = 0.35 mgd • Five Star Conn = 3.8 mgd • Tinker = 6 mgd • SSWD = 7 mgd 17.5 MGD	27.2 mgd (46% demand reduction) 29 MGD w/ clearwells	Most pressure are above 45 psi, except for these following areas: • Area located between Eureka Road and Douglas Boulevard. The minimum pressures at this area are around 42-43 psi. • Area located between Eureka Road, Lead Hill Boulevard and Rocky Ridge Drive. The minimum pressure is 45 psi.	Scenario 5 Figures 1, 2, 3, 4	• Assumed WTP Clearwells out of service. NE online • New Pump Station at PFE Road to deliver SSWD flow into Roseville System at 7 mgd • Assumed hydraulic head at PCWA connections ○ Five Star @ HGL 405' ○ Pleasant Grove @ HGL 405' ○ Highland @ HGL 405' ○ Tinker @ HGL 380'
6	0 mgd	• Diamond Creek Well=2.92 mgd • Woodcreek North = 2.6 mgd • Darling Well = 1.4 mgd • Oakmont Well = 2.88 mgd 9.8 MGD	• Pleasant Grove = 0 mgd • Highland Conn = 0 mgd • Five Star Conn = 3.8 mgd • Tinker = 3.2 mgd • SSWD = 3 mgd 24/7 10 MGD	21.6 mgd (57% demand reduction) -19.8 MGD 1.8 MGD	Most pressure are above 45 psi, except for these following areas: • Zone 5 areas near Sagemore Drive and Silver Mill Way. The minimum pressures at these areas are 42 to 44 psi.	Scenario 6 Figures 1, 2, 3, 4	• Assumed Zone 1 Tank Fill BPS offline, Zone 1 Tank Fill bypass was opened – NE Tanks float on Zone 1 pressure • WTP Clearwells were also operated off Zone 1 pressure • New Pump Station at PFE Road to deliver SSWD flow into Roseville System at 3 mgd • Assumed hydraulic head at PCWA connections ○ Five Star @ HGL 405' ○ Pleasant Grove @ HGL 405' ○ Highland @ HGL 405' ○ Tinker @ HGL 380'

BPS = booster pump station

7	0 mgd	• Diamond Creek Well=2.92 mgd
		• Woodcreek North = 2.6 mgd
		• Darling Well = 1.4 mgd
		• Oakmont Well = 2.88 mgd
		• Blue Oaks Well = 2.88 mgd
		2000gpm
		12.68 MGD
			• Pleasant Grove = 0 mgd
			• Highland Conn = 0 mgd
			• Five Star Conn = 3.8 mgd
			• Tinker = 3.2 mgd
			• SSWD = 3 mgd
			10 MGD
				24.8 mgd (50% demand reduction)
				22.7 MGD
				2.1 MGD
					Most pressure are above 45 psi, except for these following areas:
					• Area located between Eureka Road and Douglas Boulevard. The minimum pressures at this area are around 44-45 psi.
					• Zone 5 areas near Sagemore Drive, Iron Crest Drive, and Silver Mill Way. The minimum pressures at these areas are 40 to 45 psi.
						Scenario 7 Figures 1, 2, 3, 4	• New Pump Station at Pleasant Grove to pump from Zone 4 to Zone 1 – Operated only when PRV Station on Junction Boulevard is closed (zero flow)
							• New Blue Oaks Well operated at 2.9 mgd
							• Assumed Zone 1 Tank Fill BPS offline, Zone 1 Tank Fill bypass was opened – NE Tanks float on Zone 1 pressure
							• WTP Clearwells were also operated off Zone 1 pressure
							• New Pump Station at PFE Road to deliver SSWD flow into Roseville System at 3 mgd
							• Assumed hydraulic head at PCWA connections
							  ○ Five Star @ HGL 405'
							  ○ Pleasant Grove @ HGL 405'
							  ○ Highland @ HGL 405'
							  ○ Tinker @ HGL 380'
								18 MGD

8	0 mgd	• Diamond Creek Well=2.92 mgd
		• Woodcreek North = 2.6 mgd
		• Darling Well = 1.4 mgd
		• Oakmont Well = 2.88 mgd
		• Blue Oaks Well = 2.88 mgd
		• Hayden Way Well = 2.59 mgd
		1800gpm
		15.27 MGD
			• Pleasant Grove = 0 mgd
			• Highland Conn = 0 mgd
			• Five Star Conn = 3.8 mgd
			• Tinker = 3.2 mgd
			• SSWD = 3 mgd
			10MGD
				26.8 mgd (46% demand reduction)	Most pressure are above 45 psi, except for these following areas:
					• Area located between Eureka Road and Douglas Boulevard. The minimum pressures at this area are around 43-44 psi.
					• Zone 5 areas near Sagemore Drive, Iron Crest Drive, and Silver Mill Way. The minimum pressures at these areas are 39 to 44 psi.
						Scenario 8 Figures 1, 2, 3, 4	• New Hayden Parkway Well operated at 2.6 mgd
							• New Pump Station at Pleasant Grove to pump from Zone 4 to Zone 1 – Operated only when PRV Station on Junction Boulevard is closed (zero flow)
							• New Blue Oaks Well operated at 2.9 mgd
							• Assumed Zone 1 Tank Fill BPS offline, Zone 1 Tank Fill bypass was opened – NE Tanks float on Zone 1 pressure
							• WTP Clearwells were also operated off Zone 1 pressure
							• New Pump Station at PFE Road to deliver SSWD flow into Roseville System at 3 mgd
							• Assumed hydraulic head at PCWA connections
							  ○ Five Star @ HGL 405'
							  ○ Pleasant Grove @ HGL 405'
							  ○ Highland @ HGL 405'
							  ○ Tinker @ HGL 380'
								2.6 MGD

Phase 2B Well Rehabilitations – City of Sacramento

List of References

- 20014-00057 Water Shortage Contingency Plan, 2014, **pages 1-3**
- 2014-00143_Well2B_CO, 2014, **All pages**
- Well_91, 2014, **All pages**
- Well_92, 2014, **All pages**
- Well_93, 2014, **All pages**
- Well_112, 2014, **All pages**
- Well_114, 2014, **All pages**
- Well_123, 2014, **All pages**
- Well_127, 2014, **All pages**
- Well_139, 2014, **All pages**
- Well_158, 2014, **All pages**

Meeting Date: **1/14/2014**

Report Type: Public Hearing

Report ID: 2014-00057

City of SACRAMENTO 16

City Council Report
915 I Street, 1st Floor
www.CityofSacramento.org

Title: Water Shortage Contingency Plan

Location: Citywide

Issue: Current low storage in Folsom Reservoir and lack of rain and snow forecast for the foreseeable future warrant the declaration of a local water shortage condition and implementation of Stage 2 of the City of Sacramento Water Shortage Contingency Plan.

Recommendation: Pass a Resolution 1) declaring a water shortage, and 2) implementing Stage 2 of the City of Sacramento's Water Shortage Contingency Plan.

Contact: Dave Brent, Director, (916) 808-1400; Bill Busath, Engineering & Water Resources Manager, (916) 808-1434, Department of Utilities

Presenter: Bill Busath, Engineering & Water Resources Manager, (916) 808-1434, Department of Utilities

Department: Department Of Utilities

Division: Engineering & Water Resources

Dept ID: 14001311

Attachments:

1-Description/Analysis

2-Background

3-Resolution

4-Attachment - Folsom Lake Reservoir

City Attorney Review

Approved as to Form
Joe Robinson
1/8/2014 10:43:35 AM

Approvals/Acknowledgements

Department Director or Designee: Dave Brent - 1/3/2014 2:42:39 PM

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Description/Analysis

Issue Detail: Calendar year 2013 was the driest year on record for much of Northern and Central California. Storage in Folsom reservoir is below 20% of its storage capacity and there is no significant rain or snow forecast in the near future. If these conditions continue, in a matter of months the reservoir surface elevation is anticipated to drop to a level that will preclude upstream purveyors from diverting water from the reservoir. Continued drought conditions could significantly limit the City's ability to divert water from the American River for treatment. The critical nature of this drought condition is approaching an emergency condition and warrants the declaration of a water shortage, as authorized under City Code section 13.04.910, and implementation of Stage 2 of the City of Sacramento Water Shortage Contingency Plan (WSCP) outlined in the City's 2010 Urban Water Management Plan (UWMP). Stage 2 requires all customers to reduce water consumption by 20 to 30 percent and adhere to a variety of water conservation provisions.

Policy Considerations: The proposed action is consistent with the requirements of Section 10632 of the California Water Code, Chapter 5 of the City's 2010 UWMP, and Article XI (Outdoor Water Conservation) of Chapter 13.04 of the City Code.

Economic Impacts: Unknown.

Environmental Considerations:

California Environmental Quality Act (CEQA):

The proposed action would implement Stage 2 of the City's Water Shortage Contingency Plan (WSCP), which is designed to reduce water use by 20 to 30 percent. The action implements the City's Urban Water Management Plan and ongoing efforts to conserve water. The reductions in water use, including reductions in irrigation of parks and cemeteries, would not have a significant effect on the environment. The Master Environmental Impact Report (EIR) certified in connection with the adoption of the 2030 General Plan evaluated water supply and cumulative effects.

The proposed action is exempt from review under CEQA as part of the City's continuing administrative activities to implement the UWMP (CEQA Guidelines section 15378(b)(2)), and because it can be seen with certainty that the action would have no significant effect on the environment (CEQA Guidelines section 15061(b)(3)). A reduction in water usage will reduce potential environmental effects associated with water use, by reducing surface water diversions, as well as reducing energy consumption and other impacts associated with water production and distribution and the collection and treatment of this water after it has been used. A reduction in surface water diversions also will

increase the availability of surface water for the maintenance and protection of natural resources and the environment.

Sustainability: Implementation of the UWMP supports the City's sustainability goals of reducing greenhouse gasses and conserving resources.

Commission/Committee Action: Not applicable.

Rationale for Recommendation: Implementation of Stage 2 of the WSCP is the appropriate City response to the current drought conditions and will trigger the conservation actions designated under this stage in the UWMP.

Financial Considerations: Under the current rate structure, implementation of Stage 2 will likely decrease the Department of Utilities' revenues that are generated from its customer base that is billed on a volumetric basis. In addition to probable revenue reduction, the cost of implementing the public outreach requirements of Stage 2 of the WSCP is estimated to be about $200,000. The Department has sufficient funds in the current operation budget to cover the cost of Stage 2 implementation, and believes that current water fund reserves will be sufficient to cover any revenue decreases. The Department will be closely monitoring the cost and revenue impacts of Stage 2 implementation.

Local Business Enterprise (LBE): Not applicable.

Meeting Date: **2/25/2014**

Report Type: Consent

Report ID: 2014-00143

City of SACRAMENTO **10**

City Council Report
915 I Street, 1st Floor
www.CityofSacramento.org

Title: Well Rehabilitation Project Change Order No. 2 (Two-Thirds Vote Required)

Location: Districts 1, 2 and 3

Recommendation: Pass a Resolution 1) suspending competitive bidding, in the best interests of the City, for the emergency restoration to active service of nine existing groundwater wells, by adding this work to the City's Well Rehabilitation project contract with J.R. Sharp Construction, Inc.; 2) waiving the 10-day posting requirement for agreements greater than $1,000,000; 3) authorizing Change Order No. 2 to City Contract No. 2013-0420 with J.R. Sharp Construction, Inc., to perform this work and specified security upgrades for a cost of $1,157,775, bringing the contract's not-to-exceed amount to $1,609,342; 4) authorizing a transfer of $300,000 from the Fluoride Equipment Rehabilitation Program; and 5) increasing the City Manager's change order authority to $100,000 for the remainder of the contract.

Contact: Bill Busath, Engineering & Water Resources Manager, (916) 808-1434; Dan Sherry, (916) 808-1419, Department of Utilities

Presenter: None

Department: Department Of Utilities
Division: Cip Engineering
Dept ID: 14001321
Attachments:
1-Description/Analysis
2-Background
3-Location Map
4-Resolution
5-Exhibit A (Change Order)

City Attorney Review

Approved as to Form
Joe Robinson
2/19/2014 5:07:12 PM

Approvals/Acknowledgements

Department Director or Designee: Dave Brent - 2/18/2014 1:48:21 PM

James Sanchez, City Attorney Shirley Concolino, City Clerk Russell Fehr, City Treasurer
John F. Shirey, City Manager

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Description/Analysis

Issue Detail: Phase 1 of the City's Well Rehabilitation program, funded by the 2013 Water Revenue Bond sale, is rehabilitating four existing groundwater wells. This project was competitively bid, and the City Council awarded the Phase 1 construction contract to the low bidder, J.R. Sharp Construction, on April 18th, 2013. Since the initiation of the original project, security standards have been updated to protect groundwater well sites from vandalism and theft. City staff is recommending that City Council approve Change Order No. 2, to authorize additional work for J.R. Sharp Construction to bring these four City groundwater well sites up to the new security standards.

In addition, as the City is nearing the completion of Phase 1 work, Northern and Central California is facing a drought of historic proportions, with reduced river flows potentially affecting the City's available water supply from both the Sacramento and American Rivers. The City has nine existing permitted potable groundwater wells that are out of active service, but could be restored to service with service restoration work and testing.

In order to activate these wells as soon as possible, and before water demands peak this summer, City staff is recommending that the City Council suspend competitive bidding, and authorize J.R. Sharp Construction to restore these nine wells to service on an emergency basis, as part of Change Order No. 2. J.R. Sharp Construction is most familiar with this type of work and is available to start immediately. To expedite this work, staff also is requesting (1) that the City Council waive the 10-day posting requirement in the Council Rules for agreements greater than $1,000,000, and (2) that the City Manager's change order authority for the remainder of this contract be increased.

Policy Considerations:

Suspension of Competitive Bidding:

The City Charter and City Code Section 3.60.170(D) authorize the City Council to suspend competitive bidding when it determines, on a 2/3 vote, that it is in the City's best interests to do so. It is in the best interests of the City to suspend competitive bidding for the work necessary to put nine existing wells back into service because this work is needed to restore, as soon as possible, permitted groundwater capacity that can be used to augment surface water diversion capacity that may be affected by the drought, in order to maintain the City's ability to continue providing essential water service to City residents and businesses. Adding this work on an emergency basis to the City's existing contract with J.R. Sharp Construction, Inc. will allow this work to be performed as quickly as possible and prior to increased summer water supply demands.

Increase of Change Order Authority:

City Code Section 3.60.240 allows the City Council, by Resolution, to modify the monetary limits on the City Manager's authority to approve change orders, where the City Council finds that the circumstances are such that a variance is appropriate. The City Manager's current cumulative change order authority for this contract is 10% of the original contract amount, or $25,300. If Change Order No. 2 is approved, the contract

not-to-exceed amount will be $1,609,342.40. To provide greater flexibility to approve on an expedited basis changes necessary to complete the well restoration work, if any, this report recommends also increasing the City Manager's cumulative change order authority to $100,000 for the remainder of this contract.

Economic Impacts: This new infrastructure is expected to create 8.57 total jobs (5.44 direct jobs and 3.13 jobs through indirect and induced actives) and create $1,130,592.76 in total economic output ($724,739.36 of direct output and another $405,853.40 of output through indirect and induced activities).

The indicated economic impacts are estimates calculated using a calculation tool developed by the Center for Strategic Economic Research (CSER). CSER utilized the IMPLAN input-output model (2009 coefficients) to quantify the economic impacts of a hypothetical $1 million of spending in various construction categories within the City of Sacramento in an average one-year period. Actual impacts could differ significantly from the estimates and neither the City of Sacramento nor CSER shall be held responsible for consequences resulting from such differences.

Environmental Considerations: The additional security upgrades are exempt from environmental review under the California Environmental Quality Act (CEQA), because it can be seen with certainty that performance of this work will not have a significant effect on the environment (CEQA Guidelines Section 15061(b) (3)).

Returning the nine existing wells to service is exempt from environmental review under the California Environmental Quality Act (CEQA), under Sections 15301 and 15302 of the CEQA Guidelines. Section 15301 applies to the repair, maintenance, permitting, or minor alteration of existing facilities, including public utility facilities, involving negligible or no expansion of use. Section 15302 applies to the replacement or reconstruction of existing facilities, including utility facilities, where the new or reconstructed facility will be located on the same site and will have substantially the same purpose and capacity as the facility being replaced or reconstructed. These exemptions do not apply if there are significant cumulative impacts, or where there is a reasonable possibility that there will be significant environmental effects due to unusual circumstances (CEQA Guidelines Section 15300.2(b) and (c)).

These nine existing wells were taken out of service for two reasons: Four of the wells were taken out of service due to mechanical issues requiring repair, and five of the wells are on emergency stand-by status due to the need for upgrades to comply with current regulatory requirements for active service. Returning the nine existing wells to active service will not increase the capacity of these wells, and the wells will be used for the same purpose as before they were taken out of active service.

With regard to cumulative effects, the use of these nine existing wells was included in the City's existing groundwater capacity and usage analyzed in the Master Environmental Impact Report (MEIR) for the 2030 General Plan, certified by the City Council on March 3, 2009. The MEIR considered the City's deliveries of groundwater pumped from 33 existing permitted municipal groundwater supply wells that supplied the City with average groundwater deliveries from 1998 to 2006 of about 22,500 acre

feet annually (AFA), or 20 million gallons per day (annual groundwater pumping during this time period ranged from 17,924 AFA to 25,607 AFA). See MEIR, pp. 6.11-9, and Tables 6.11-1, 6.11-4, and 6.11-5. These 33 permitted wells included the nine existing wells proposed for restoration to active service, and it is anticipated that returning the nine wells to active service will not cause the City's average annual groundwater pumping volume and rate to exceed the average volume and rate analyzed in the MEIR. Department of Utilities staff also have reviewed the nine well locations and determined that none of these locations present unusual circumstances that will lead to significant environmental effects, and that resuming groundwater pumping will not result in any new project-specific effects that were not present during the previous well operations. City staff will file a Notice of Exemption if the proposed change order is approved.

Sustainability: This report's recommendation is consistent with the City's Strategic Plan Goals of achieving sustainability and livability, and promotes General Plan Policy U 2.1.7 (Water Supply During Emergencies) by taking emergency action necessary to maintain the City's ability to provide essential water service.

Commission/Committee Action: None.

Rationale for Recommendation: Maintaining a water supply that meets essential public health, safety, and welfare needs for the City and its residents and businesses is of critical importance. The proposed change order compensates the Contractor for performing additional work requested by the City.

Financial Considerations: The original contract amount for the Well Rehabilitation Project was $253,000, and the City Council approved Change Order No. 1 on October 8, 2013, for $198,567.40. The cost for the additional security work requested by City is $100,000, and the cost for the emergency restoration of nine wells is $1,057,775 for a total Change Order No. 2 amount of $1,157,775, bringing the total contract not-to-exceed amount to $1,609,342.40. There is insufficient funding in the Well Rehabilitation Project (Z14110100, fund 6310) for this additional amount. Staff requests a transfer of $300,000 from the Fluoride Equipment Rehabilitation Program CIP Z14130600, fund 6310, to Z14110100, to fund the portion of this cost attributable to the installation of fluoride equipment at the wells being returned to service.

Local Business Enterprise (LBE): The City's LBE program was not applicable when this contract was awarded to the contractor.

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Background

As part of the 2013 Water Bond sales, a number of the City's active groundwater wells have been scheduled for rehabilitation to restore flow capacities, replace aged equipment, and improve security at the sites.

Four wells are presently being rehabilitated under a contract with J. R. Sharp Construction Inc. and the work is nearing completion. However, over the past year, security requirements around well sites have been modified which was not included within the original contract. To ensure all wells are brought to current standards, a change order for an additional $100,000 is needed to complete the security improvements.

In addition to the groundwater rehabilitation efforts for these active well sites, there are an additional nine permitted wells that have been taken out of active service, but could be placed back into service with restoration work and testing. Five of these wells are currently in standby status, set to activate only under emergency conditions. Although these wells are available for use, they may not be restored to active status without being tested and brought up to current regulatory standards. The other four wells are out of service due to mechanical defects that require repair.

City staff is requesting that the City Council authorize the immediate performance of the work necessary to put these wells back into service as soon as possible. This action will restore approximately 7 million gallons per day of permitted groundwater capacity that can be used to augment surface water diversion capacity that may be affected by the ongoing drought and low river flows resulting from the drought.

To expedite this work, the Utilities Department recommends adding these nine wells to the existing Well Rehabilitation project with J. R. Sharp Construction Inc., for a not-to-exceed amount of $$1,057,775. This additional cost, plus the $100,000 for additional security measures, will increase the total contract not-to-exceed amount to $1,609,342.40. Approval of the proposed change order would allow the work to start immediately.

The wells that are slated to be put back into production are wells 91, 92, 93, 112, 114, 123, 127, 139, and 158. A location map is provided in this Council report.

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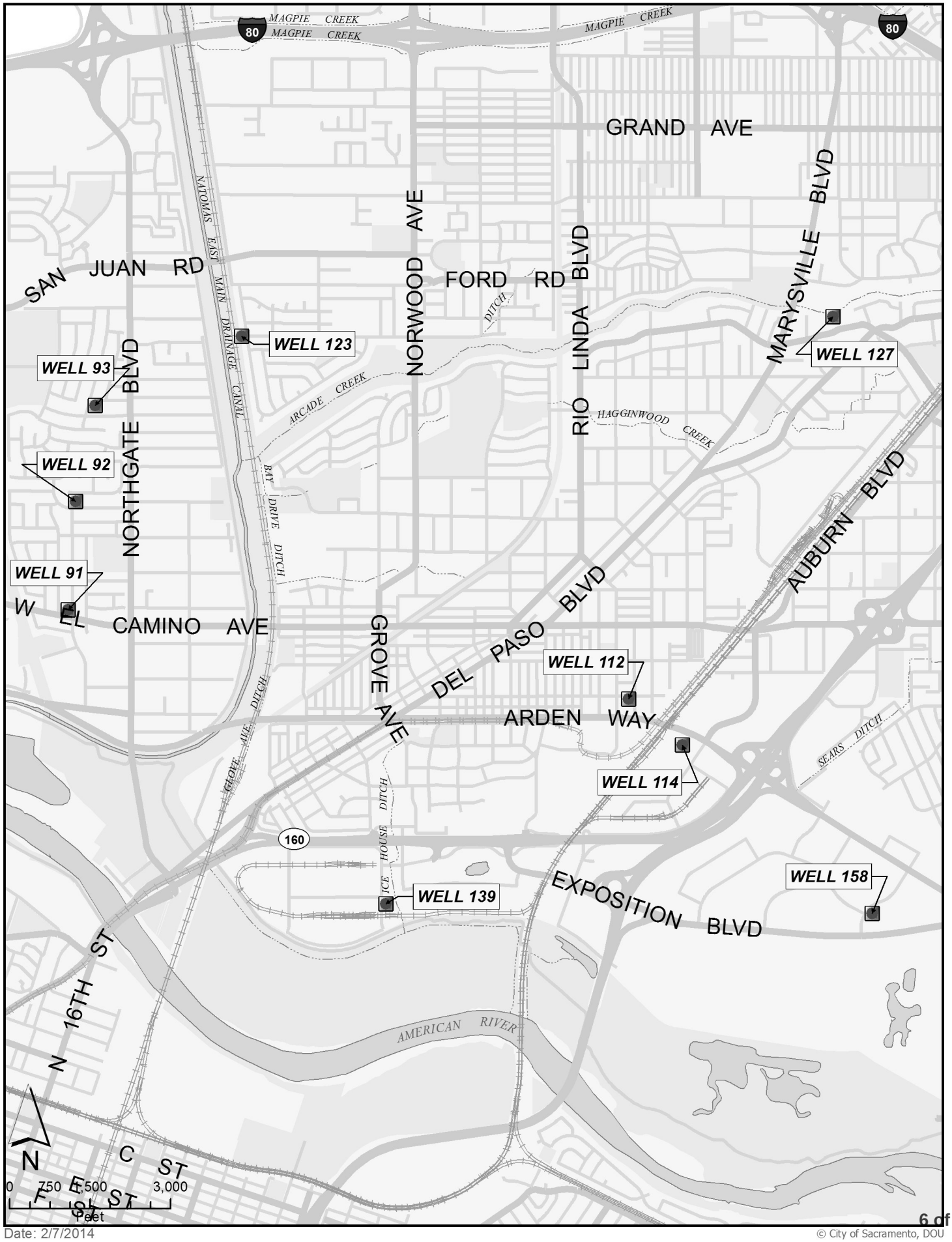
LOCATION MAP

Well Rehab 2B



Date: 2/7/2014

© City of Sacramento, DOU

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RESOLUTION NO. 2014-

Adopted by the Sacramento City Council

SUSPENDING COMPETITIVE BIDDING FOR THE EMERGENCY RESTORATION OF NINE EXISTING WELLS, WAIVING 10 DAY POSTING REQUIREMENT, AUTHORIZING CHANGE ORDER NO. 2 FOR THE WELL REHABILITATION PROJECT (Z14110100), APPROVING BUDGET TRANSFER, AND INCREASING CITY MANAGER CHANGE ORDER AUTHORITY

BACKGROUND

A. The City of Sacramento has three water supply sources: American River water, Sacramento River water, and groundwater. The City diverts surface water for approximately 85% of the City's water supply from the two rivers under its Sacramento and American River water rights, with the remaining 15% provided by groundwater wells. Normally, the City's water supplies are adequate to meet the City's water supply demands. However, California is now experiencing the driest year on record, snow pack in California's mountains and reservoir water storage levels in Northern and Central California are at alarmingly low levels, river flow levels upstream of the City's surface water intakes are significantly reduced and current forecasts call for continued drought.

B. On January 14, 2014, the Sacramento City Council declared a water shortage and imposed heightened water conservation requirements. On January 17, 2014, Governor Jerry Brown signed a proclamation declaring a drought State of Emergency in California. That same day, the State Water Resources Control Board (State Board) issued a Notice of Surface Water Shortage and Potential for Curtailment of Water Right Diversions, notifying water right holders that water right holders in critically dry watersheds may be required to limit or stop diversions of water under their water right, based on their priority. On January 31, 2014, the State Board approved a Temporary Urgency Change Petition filed by the California Department of Water Resources (DWR) and U.S. Bureau of Reclamation (USBR), lowering Bay-Delta flow requirements to allow the DWR and USBR to reduce releases and maintain more water in State Water Project and Central Valley Project reservoirs,

resulting in further reductions to river flow levels upstream of the City's surface water intakes.

C. Reduced river flows can negatively impact surface water diversions that constitute the main source of water supply for the City. Maintaining a water supply that meets essential public health, safety, and welfare needs for the City and its residents and businesses is of critical importance.

D. The City has nine existing permitted groundwater wells that have been taken out of active service but can be placed back into active service with the performance of service restoration work and testing – wells 91, 92, 93, 112, 114, 123, 127, 139, and 158. Four of the wells were taken out of service due to mechanical issues requiring repair, and five of the wells are on emergency stand-by status due to the need for upgrades to comply with current regulatory requirements for active service. Returning the nine existing wells to active service will not increase the capacity of these wells, and the wells will be used for the same purpose as before they were taken out of active service.

E. To expedite the performance of this work, staff recommends that the City Council suspend competitive bidding, and authorize a change order adding this work to the Well Rehabilitation project currently being performed by J.R. Sharp Construction, Inc., under City Contract No. 2013-0420. Authorizing the performance on an emergency basis of the work necessary to put these wells back into service will restore permitted groundwater capacity that can be used to augment surface water diversion capacity that may be affected by the drought. In addition, it is critical to complete this work as soon as possible, since the demands for essential water service will increase as winter ends and warmer weather begins. J.R. Sharp Construction is most familiar with this type of work and is available to start immediately.

F. Under the City Charter and City Code Section 3.60.170(D), the City Council can suspend competitive bidding when it determines, on a 2/3 vote, that it is in the City's best interests to do so.

G. It is in the best interests of the City to suspend competitive bidding for the work necessary to put nine existing wells back into service, because this work is needed to restore, as soon as possible, permitted groundwater capacity that can be used to augment surface water diversion capacity that may be affected by the drought, in order to maintain the City's ability to continue providing essential water service to City residents and businesses. Adding this work on an emergency basis to the City's existing contract with J.R. Sharp Construction, Inc.,

will allow this work to be performed as quickly as possible and prior to increased summer water supply demands.

H. Returning the nine existing wells to active service is exempt from environmental review under the California Environmental Quality Act (CEQA), under Sections 15301 (Existing Facilities) and 15302 (Replacement or Reconstruction) of the CEQA Guidelines. These exemptions do not apply if there are significant cumulative impacts, or where there is a reasonable possibility that there will be significant environmental effects due to unusual circumstances (CEQA Guidelines Section 15300.2(b) and (c)). Neither of these limitations apply here.

I. With regard to cumulative effects, the use of these nine existing wells was included in the City's existing groundwater capacity and usage analyzed in the Master Environmental Impact Report (MEIR) for the 2030 General Plan, certified by the City Council on March 3, 2009. The MEIR considered the City's deliveries of groundwater pumped from 33 existing permitted municipal groundwater supply wells, that supplied the City with average groundwater deliveries from 1998 to 2006 of about 22,500 acre feet annually (AFA), or 20 million gallons per day (annual groundwater pumping during this time period ranged from 17,924 AFA to 25,607 AFA). See MEIR, pp. 6.11-9, and Tables 6.11-1, 6.11-4, and 6.11-5. These 33 permitted wells included the nine existing wells proposed for restoration to active service, and it is anticipated that returning the nine wells to active service will not cause the City's average annual groundwater pumping volume and rate to exceed the average volume and rate analyzed in the MEIR. City staff also have reviewed the nine well locations and determined that none of these locations present unusual circumstances that will lead to significant environmental effects, and that resuming groundwater pumping will not result in any new project-specific effects that were not present during the previous well operations.

J. In addition to returning the nine existing wells to active service, staff recommends the approval of additional work for the Well Rehabilitation project to bring the four well sites included in the project up to new security standards. The estimated total cost for both of these additional work items is $1,157,775. To fund the portion of this cost attributable to the installation of fluoride equipment at the wells being returned to service, staff requests a transfer of $300,000 from the Fluoride Equipment Rehabilitation Program CIP into the Well Rehabilitation Project.

K. Section 3.60.210 of the City Code limits the City Manager's authority to issue change orders to a specified percentage of the original

contract amount, but, under City Code Section 3.60.240, the City Council may increase this limitation if the City Council finds that the circumstances are such that a variance is appropriate.

L. Section E(2)(d) of Chapter 7 of the Council Rules of Procedure specifies a 10 day posting requirement for agreements greater than $1,000,000, unless this requirement is waived by a 2/3 vote of the City Council.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE CITY COUNCIL RESOLVES AS FOLLOWS:

Section 1. Competitive bidding is suspended, in the best interests of the City, for the work necessary to put nine existing wells back into service as soon as possible, by adding this work to the City's Well Rehabilitation project contract with J.R. Sharp Construction, Inc..

Section 2. The 10 day posting requirement for agreements greater than $1,000,000, specified in Section E(2)(d) of Chapter 7 of the Council Rules of Procedure, is waived.

Section 3. The City Manager or the City Manager's designee is authorized to sign Change Order No. 2 to City Contract No. 2013-0420 with J.R. Sharp Construction, Inc., to perform this additional work and specified security upgrades, for a cost of $1,157,775, bringing the contract's not-to-exceed amount to $1,609,342.40.

Section 4. The City Manager or the City Manager's designee is authorized to transfer $300,000 from the Fluoride Equipment Rehabilitation Program CIP Z14130600, fund 6310, into the Well Rehabilitation Project (Z14110100).

Section 5. Pursuant to City Code Section 3.60.240, the limitation on the City Manager's authority to issue change orders specified in City Code Section 3.60.210 is increased to $100,000 for the remainder of the Groundwater Well Electrical Rehabilitation contract. This is appropriate to provide greater flexibility to approve on an expedited basis changes necessary to complete the well restoration work.

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CITY OF SACRAMENTO

CHANGE ORDER

Contract # & Date: 2013-0420 04/18/2013 **Budget #:** 6005-50000-51000000-Z14110101

Purchase Order #: 0000020431 **Change Order No:** 2

Sacramento, California Feb 14, 2014

TO: J. R. Sharp Construction, Inc. , Contractor

CONTRACT FOR: WELL ELECTRICAL REHABILITATION PROJECT (B13141321014)

Upon mutual acceptance of this document by the City of Sacramento, hereinafter referred to as "CITY", and your firm, hereinafter referred to as "CONTRACTOR", in accordance with the terms and conditions of the original contract documents, you are hereby directed to make the following change or changes for the consideration set forth below:

Description: SEE EXHIBIT A

The original contract sum was:	$ 253,000.00
Net change by previous change orders:	$ 198,567.40
The contract sum prior to this change order was:	$ 451,567.40
The contract sum will be ***increased*** by this C.O.:	$ 1,157,775.00
New contract sum including all Change Orders:	$ 1,609,342.40

CONTRACTOR agrees that the amount of increase or decrease in the contract sum specified in this change order shall constitute full compensation for the work required by this change order, including but not limited to all compensation for the additional and/or revised work specified herein, and shall fully compensate CONTRACTOR for any and all direct and indirect costs that may be incurred by CONTRACTOR in connection with such additional and/or revised work, including any changes, disruptions or delays in work schedules or in the performance or other work by CONTRACTOR. The time for performance of the Contract will be **increased by 80 working days** by reason of the performance of the work required by this Change Order. Except as herein above expressly provided, CONTRACTOR further agrees that the performance of the work specified in this Change Order or the rescheduling of other project work made necessary by this Change Order, shall not constitute a delay which will extend the time limit for completion of the work as said term is used in the Contract between CITY and CONTRACTOR for the project.

Approval Recommended By:

Project Manager – Paul Barnes

Approved By:

Contractor – J R Sharp Construction, Inc.

Approved as to Form by:

Joe Robinson, Deputy City Attorney

Approved By:

Dave Brent, Director, Department of Utilities

Approved By:

Shirley Concolino – City Clerk Date

CITY OF SACRAMENTO
CHANGE ORDER
EXHIBIT A

Contract # & Date: 2013-0420 04/18/2013 **Budget #:** 6005-50000-51000000-Z14110101

Purchase Order #: 0000020431 **Change Order No:** 2

1) **For Wells 134, 154, 156, and 159:** The contractor shall install a magnetic door switch on the motor junction box and run two number 14 conductors back to the PLC. The magnetic door switch shall be Sentrol model number 1044TW.

(Database Code: Customer Request) Total This Item: $1,272.00

2) **For Wells 134, 154, 156, and 159:** The contractor shall install a City supplied motion detector. Contractor shall install two number 12 conductors for 120 VAC power and two number 14 conductors for the relay contact. Contractor shall connect the motion detector to the 120 power supply inside the PLC cabinet and land the conductors for the relay contact to the PLC digital input card.

(Database Code: Customer Request) Total This Item: $0

3) **For Wells 134, 154, 156, and 159:** The contractor shall install a new ATI two module enclosure with a ATI power supply. Contractor shall mount the enclosure to the switchgear cover. Contractor shall mount the ATI display module inside the two module enclosure. Contractor shall power the power supply from the PLC cabinet. Contractor shall install conductors from the display module back to the PLC. Contractor shall connect the display module to the chlorine detector per the plans. Enclosure shall be ATI model number 80-0006. Power supply shall be ATI model number 00-0055. Contractor shall connect the chlorine detection system by ATI per the revised plans that will be given to the contractor.

(Database Code: Customer Request) Total This Item: $ 3,169.00

4) **For Wells 134, 154, 156, and 159:** The contractor shall remove and salvage the existing hydro pneumatic junction box. Contractor shall install new hydro pneumatic junction with the parts as shown in attachment 1. The contractor shall reuse the existing pressure transducer. For well 156 the contractor shall mount the new hydro pneumatic junction box to the hydro pneumatic tank using angle iron brackets and galvanized hardware and install new conduits from existing hydro pneumatic junction box to the new hydro pneumatic junction box.

(Database Code: Customer Request) Total This Item: $13,712.00

5) **For Well 134:** The contractor shall modify the hydro pneumatic tank by installing a site gauge with fittings and install a new well probe per attachment 2.

(Database Code: Design Change) Total This Item: $1,571.00

6) **For Well 159:** The contractor shall modify the lighting fixture brackets to mount the light fixtures higher. This will help to keep the new light fixtures from being vandalized.

(Database Code: Unforeseen Conditions) Total This Item: $467.00

7) **For Wells 154, 156, and 159:** The contractor shall remove and salvage the existing air compressor. Contractor shall install a new Air Charge 2000 Air compressor with probe and connect to the lighting panel. Contractor shall install a new well probe per attachment 2.

(Database Code: Customer Request) Total This Item: $9,525.00

8) **For Wells 134, 154, 156, and 159:** The contractor shall install modify the existing fence by extending the fence to 8 feet in height. Contractor shall reuse the existing fencing hardware and barbed wire. Contractor shall install new fence sleeves over the existing fence posts. Contractor shall reinstall the existing fence extensions with the existing barbed wire. Contractor shall install new fence fabric. Contractor shall rebuild each gate at 8' feet tall.

(Database Code: Customer Request) Total This Item: $49,254.00

9) **For Well 134:** The contractor shall remove the salvage the existing PLC enclosure within the chemical building. Contractor shall install a new 12"x12"x6" NEMA 1 junction box in same location as PLC enclosure. Contractor shall extend existing conduits into new junction box.

(Database Code: Customer Request) Total This Item: $653.00

10) **For Well 91:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, building foundation per attachment 3, portable heater, flow meter, antenna pole, antenna, antenna pole foundation, modification of the existing fence, motion detector, security LED lighting, chlorine detector and power supply, back flow preventer, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, ½" O.D. x 3/8" I.D. telfon PFA tubing & ¾" rubber hose for fluoride feed line encased inside a 2" schedule 40 PVC conduit with isolation valve, ¾" 200 psi horizon rubber hose for chlorine feed line encased inside a 2" schedule 40 PVC conduit with isolation valve, 1" schedule 80 PVC feed water line to chemical building with isolation valve, , ¾" water meter, 1" schedule 80 PVC feed water line to chemical building with isolation valve, air compressor, probe well, sight glass, eye wash station, and fence slats. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, fiber glass building, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $72,931.00

11) **For Well 92:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, flow meter, modification of the existing fence, motion detector, security LED lighting, chlorine detector and power supply, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, and fence slats. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $34,278.00

12) **For Well 93:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, flow meter, motion detector, security LED lighting, chlorine detector and power supply, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, and fence slats. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $37,943.00

13) **For Well 112:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, add window and exhaust fan to chemical building, portable heater, flow meter, 8 fence high fence with barbed wire, motion detector, security LED lighting, chlorine detector and power supply, back flow preventer, digital power meter, magnetic switch for jct

box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, ¾" water meter, air compressor, probe well, sight glass, and eye wash station. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $56,115.00

14) **For Well 114:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, fiber glass building sized to fit within the existing facility, building foundation per attachment 3, portable heater, flow meter, antenna pole, antenna, antenna pole foundation, modification of the existing fence, motion detector, security LED lighting, chlorine detector and power supply, back flow preventer, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, ½" O.D. x 3/8" I.D. telfon PFA tubing & ¾" rubber hose for fluoride feed line encased inside a 2" schedule 40 PVC conduit with isolation valve, ¾" 200 psi horizon rubber hose for chlorine feed line encased inside a 2" schedule 40 PVC conduit with isolation valve, ¾" water meter, 1" schedule 80 PVC feed water line to chemical building with isolation valve, air compressor, probe well, sight glass, and eye wash station.. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $88,066.00

15) **For Well 123:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, building foundation per attachment 3, portable heater, flow meter, antenna pole, antenna, antenna pole foundation, modification of the existing fence, motion detector, security LED lighting, chlorine detector and power supply, back flow preventer, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, ½" O.D. x 3/8" I.D. telfon PFA tubing & ¾" rubber hose for fluoride feed line encased inside a 2" schedule 40 PVC conduit with isolation valve, ¾" 200 psi horizon rubber hose for chlorine feed line encased inside a 2" schedule 40 PVC conduit with isolation valve, ¾" water meter, 1" schedule 80 PVC feed water line to chemical building with isolation valve, air compressor, probe well, sight glass, eye wash station, and fence slats. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, fiber glass building, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $74,348.00

16) **For Well 127:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, flow meter, modification of the existing fence, motion detector, security LED lighting, chlorine detector and power supply, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, and make all connections to activate the chemical treatment of the water. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $39,165.00

17) **For Well 139:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, add window to chemical building, portable heater, flow meter, modification of the existing fence, motion detector, security LED lighting, chlorine detector and power supply, back flow preventer, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, ¾" water meter, air compressor, probe well, sight glass, and eye wash station. The City will supply the

following items to be installed by the contractor: chlorine scale, chlorine actuator, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $54,385.00

18) **For Well 158:** The contractor shall perform all work specified by the City to activate this well with the proper chemical treatments which includes the following: conduits, conductors, flow meter, modification of the existing fence, motion detector, security LED lighting, chlorine detector and power supply, digital power meter, magnetic switch for jct box, chlorine booster pump with pressure gauge and isolation valves, make all connections to activate the chemical treatment of the water, and fence slats. The City will supply the following items to be installed by the contractor: chlorine scale, chlorine actuator, water softener and stand, gas chlorinator and injector. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $41,623.00

19) **Fluoride System:** The contractor shall provide nine Integrity FFS-55-2-1P Sodium Fluoride Saturator Systems for each of the nine wells on the Well Rehab 2B project. This price shall also include shipment, installation, all water connections, all electrical connections, and all PLC connections. The fluoride system shall meet the requirements of the NFS/ANSI 61 standards. This price is per each. Parts for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $258,462.00

20) **Eye Wash Station:** The contractor shall provide five HAWS Model 8320 eye wash stations for the wells identified on the Well Rehab 2B project. This price shall also include shipment, installation, concrete foundation, and all water connections. This price is per each.
(Database Code: Unforeseen Conditions) Total This Item: $14,500.00

21) **PLC System:** The contractor shall provide three PLC systems for the wells identified on the Well Rehab 2B project. This price includes shipment, installation, NEMA 1 fiberglass enclosure 36"x36"x12", Modicon M340 PLC modules, HMI panel model number HMISTU855, microhard radio model number Nano Series IPn920T, terminal blocks, circuit breakers, fuses, DIN rail, Eaton UPS model 9130, power supply, relays, four cable fast quick connectors, and Ntron Ethernet switch model 7010TX. The PLC modules shall include the following: BMX P34 2020 CPU, BMX CPS 3020 Power Supply, BMX XBP 1200 12 Slot Rack, BMX DDI 1602 Digital Input Card, BMX DDO 1602 Digital Output Card, BMX AMI 0810 Analog Input Card, BMX AMO 0410 Analog Output Card, BMX NOE 0100 Ethernet Card, BMX NOC 0401 Ethernet Card, and BMX NOM 0200 Communications Card. This price is per each. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $108,726.00

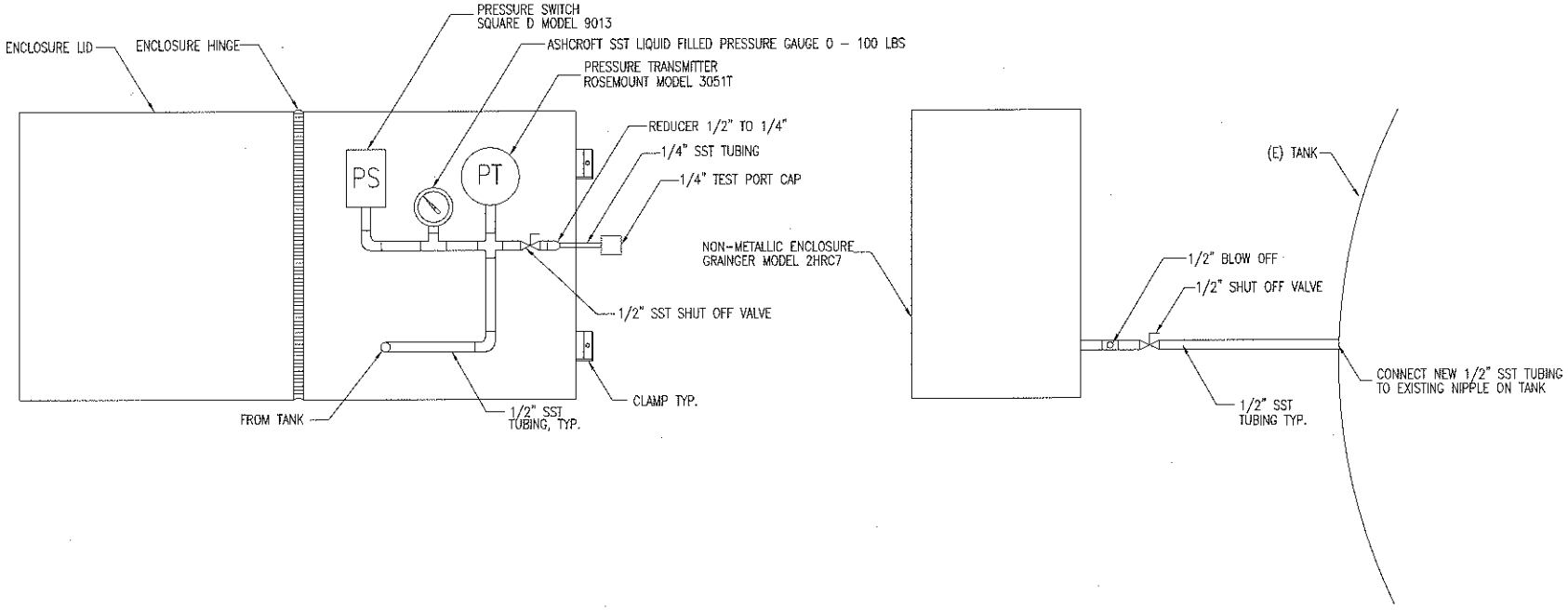
22) **PLC System:** The contractor shall provide six PLC systems for the wells identified on the Well Rehab 2B project. This price includes shipment, installation, back pan to fit existing enclosures, Modicon M340 PLC modules, HMI panel model number HMISTU855, microhard radio model number Nano Series IPn920T, terminal blocks, circuit breakers, fuses, DIN rail, Eaton UPS model 9130, power supply, relays, four cable fast quick connectors, and Ntron Ethernet switch model 7010TX. The PLC modules shall include the following: BMX P34 2020 CPU, BMX CPS 3020 Power Supply, BMX XBP 1200 12 Slot Rack, BMX DDI 1602 Digital Input Card, BMX DDO 1602 Digital Output Card, BMX AMI 0810 Analog Input Card, BMX AMO 0410 Analog Output Card, BMX NOE 0100 Ethernet Card, BMX NOC 0401 Ethernet Card, and BMX NOM 0200 Communications Card. This price is per each. Parts supplied by the contractor for this work shall conform to attachment 4.

(Database Code: Unforeseen Conditions) Total This Item: $197,610.00

Total This Change Order: $1,157,775

NOTES:

1. PAINT ENCLOSURE TO MATCH EXISTING TANK
2. SST = STAINLESS STEEL



NEMA 4X NONMETALIC
ENCLOSURE DETAIL

REVISIONS			
NO.	DESCRIPTION	DATE	BY

BENCH MARK ELEV. _____
DESCRIPTION:

FIELD BOOK
SCALE: H: N.A. V: N.A.

1"
ON ORIGINAL SCALE DRAWING ADJUST SCALED DIMENSIONS IF THIS DOES NOT SCALE AT 1"

CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: P. BARNES DATE: JAN 2014
DESIGNED BY: P. BARNES R.E.E. NO. 15329 DATE: JAN 2014
CHECKED BY: D. HANSEN R.E.E. NO. E12512 DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER PAUL R. BARNES No. E15329 Exp. 6/30/15 ELECTRICAL STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2A

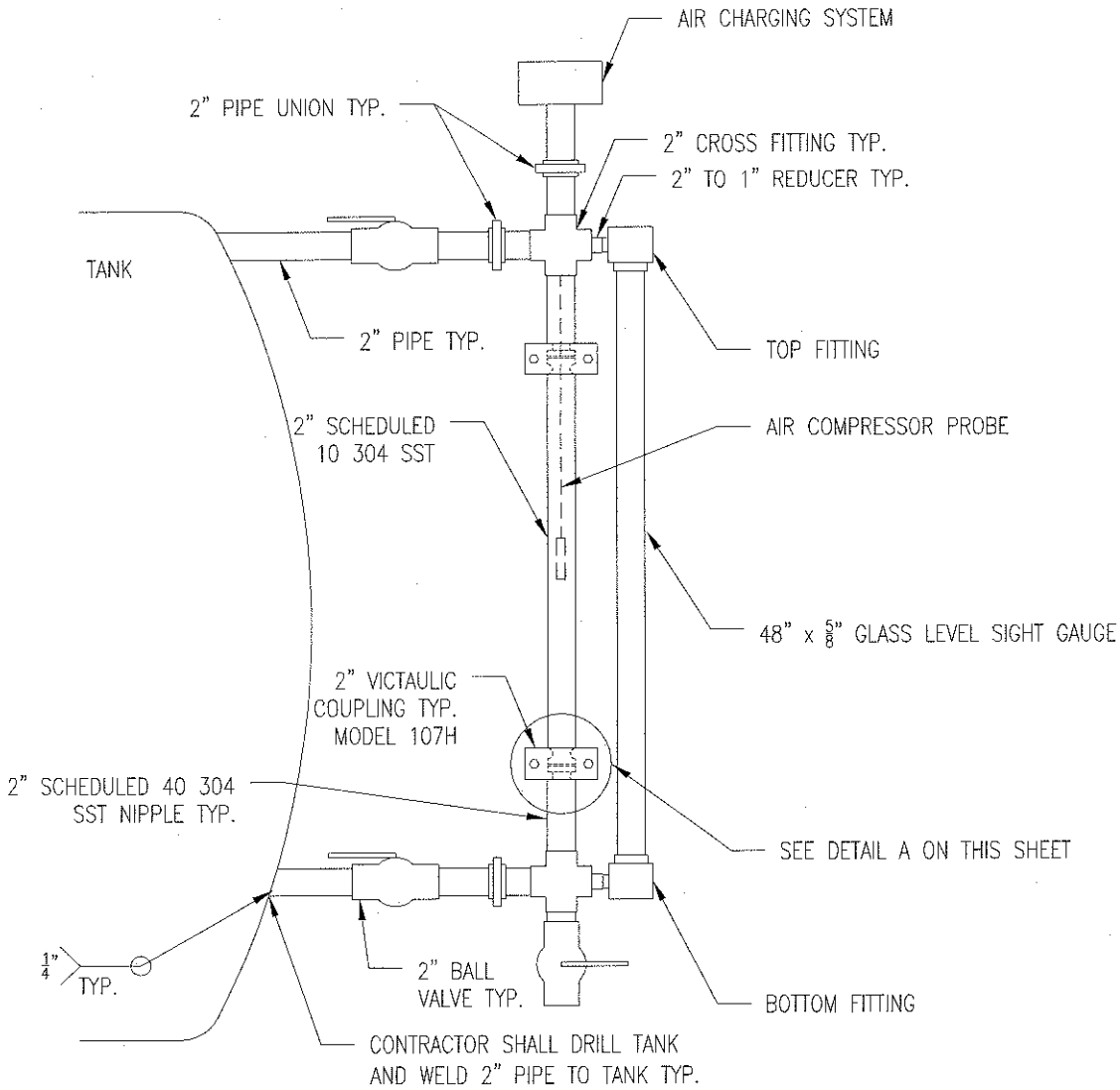
ATTACHMENT 1

GIS GRID NO.
GIS GEO.
PN: Z14110104

DWG. NO. E-26
SHEET 27 OF XX

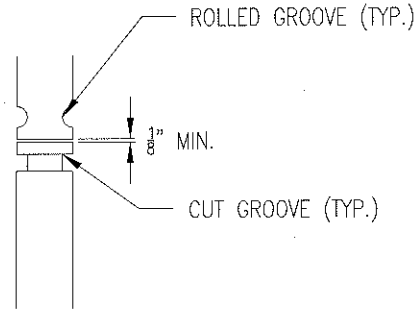
PN: Z14110104 WELL REHABILITATION PROJECT PHASE II
S:\Special Drawings\Well Rehab Phase 2

PN: Z14110104 WELL REHABILITATION PROJECT PHASE I



NOTES:

1. ALL PIPE SHALL BE GALVANIZED STEEL PIPE, UNLESS OTHERWISE NOTED.
2. SST = STAINLESS STEEL
3. CONTRACTOR SHALL MOUNT THE COMPRESSOR PROBE ABOVE THE TANK VENT.



DETAIL A

HYDROPNEUMATIC TANK

DETAIL

REVISIONS			
NO.	DESCRIPTION	DATE	BY
1			
2			
3			
4			

BENCH MARK DESCRIPTION: ELEV.

FIELD BOOK

SCALE: H: N.A. V: N.A.

1" ON ORIGINAL SCALE DRAWING ADJUST SCALED DIMENSIONS IF THIS DOES NOT SCALE AT 1"

CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: P. BARNES DATE: JAN 2014
DESIGNED BY: P. BARNES R.E.E. NO. 15399 DATE: JAN 2014
CHECKED BY: D. HANSEN R.E.E. NO. E12512 DATE: JAN 2014

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2A

ATTACHMENT 2

PGS CHKD NO. DWG CHKD

PN: Z14110104

DWG. NO. E-27
SHEET 28 OF XX

PN: Z14110104 WELL REHABILITATION PROJECT PHASE II S:\Electrical Drawings\Well Rehab Phase 2

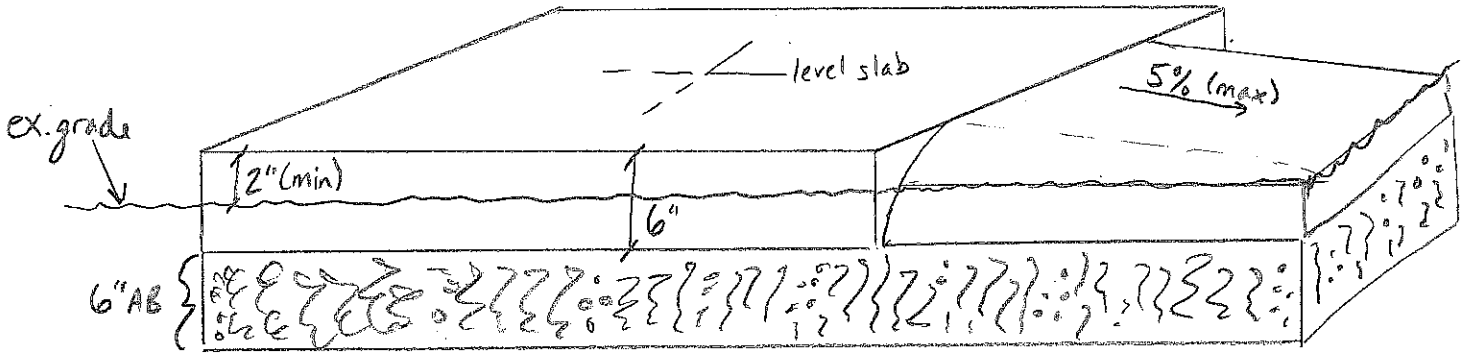
PN: Z14110104 WELL REHABILITATION PROJECT PHASE II

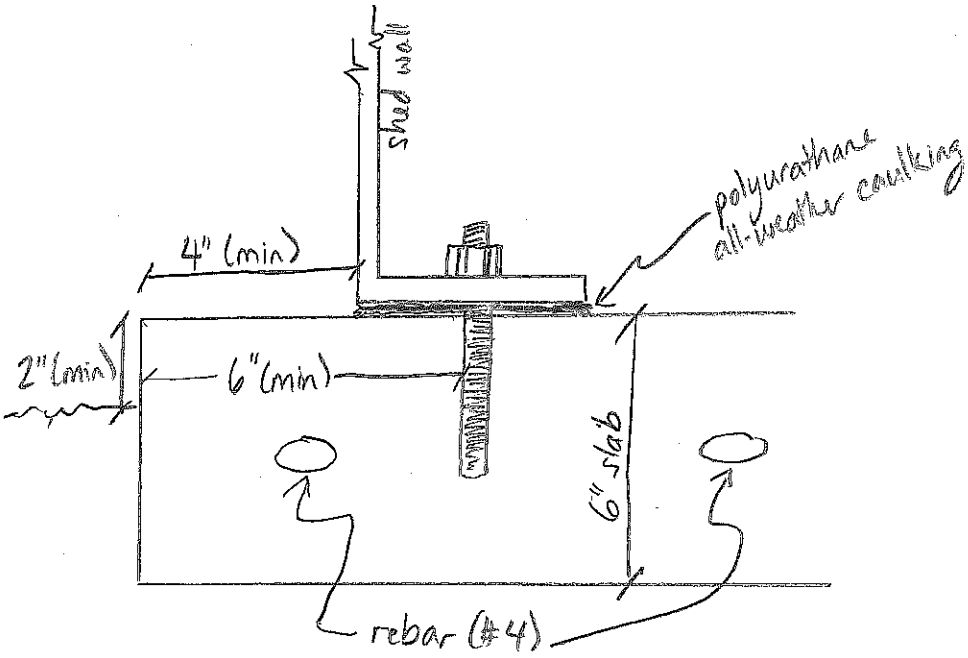
ATTACHMENT 3

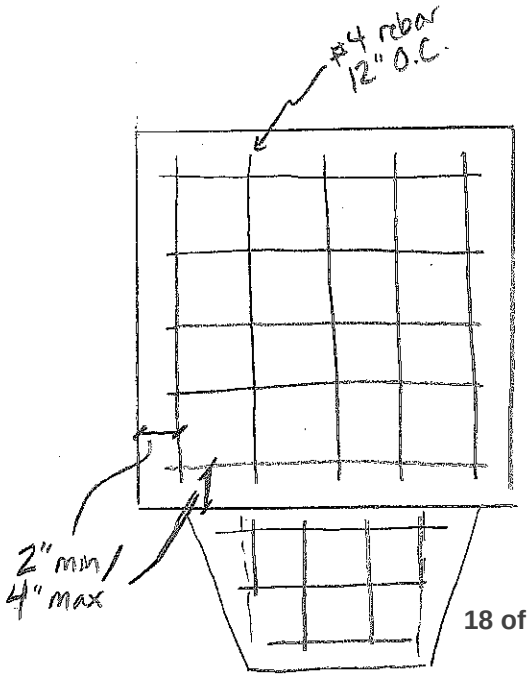
Chemical Shed:

- Slab –
  - **Materials**: 6-inch thick concrete slab with #4 rebar, 12-inches O.C. in a grid pattern installed level, with polyurethane caulking to form a seal between the shed and the concrete
  - **Base:** 6-inches of ¾" AB compacted to 95%
  - **Size Specifications:** Slab should extend 4-inches beyond the wall of the shed such that the bolts securing the shed are a minimum of 6-inches from the edge (a 6x8 shed would have a ~7x9 pad)
  - **Drainage Requirements:** Slab should extend 2-inches above grade (minimum), and higher as surrounding grades require, with a ramp at the shed entrance to allow for equipment to be rolled in (5% max. slope).

N.T.S.





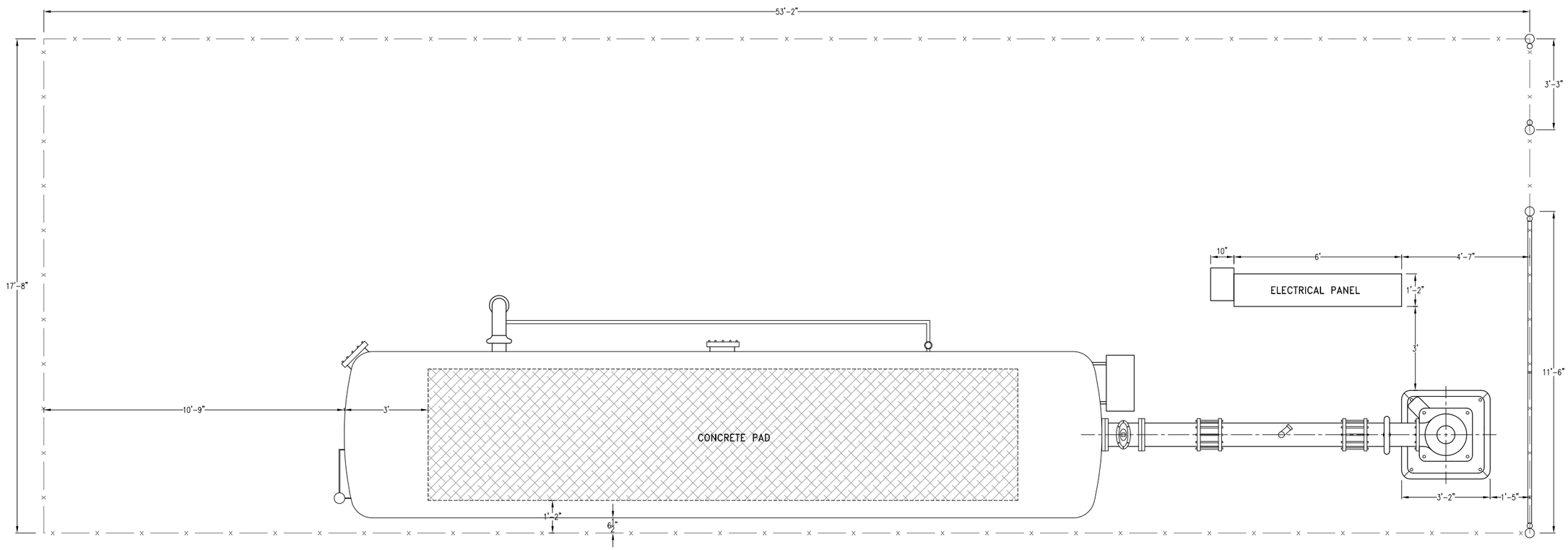


Attachment 4

Well Rehab 2B Parts List

PLC parts	BMX P34 2020 CPU BMX CPS 3020 Power Supply BMX XBP 1200 12 Slot Rack BMX DDI 1602 Digital Input Card BMX DDO 1602 Digital Output Card BMX AMI 0810 Analog Input Card BMX AMO 0410 Analog Output Card BMX NOE 0100 Ethernet Card BMX NOC 0401 Ethernet Card BMX NOM 0200 Comm Card Use Eaton Terminal blocks, fuses AC and DC, DIN rail, DIN circuit breakers, power supply, and relays similar to Well Rehab 1 Provide four cable fast quick connectors for each I/O PLC module
Microhard radio	Microhard Systems Nano Series IPn920T
Lightning Arrester	Lightning arrester model number Polyphaser Corp. IS-50NX-C2
Operator interface panel	Magelis Operator Interface panel model number HMISTU855
Antenna pole	Provide a 35 foot long, hot dipped galvanized steel antenna pole and other additional mounting hardware required for a complete installation. Antenna support members shall have sufficient strength to withstand local wind conditions of 80 MPH sustained. All the mounting hardware shall be hot dipped galvanized or stainless steel.
Antenna	SCALA RY-900B
Chlorine booster pump	Grundfos Model CR1-7 (3/4 hp 480v3p) 8 gpm @ 150'
480V Motor Starter	Eaton or equal rated NEMA 1.
3/4" Water meter	¾" badger water meter Model 35 with NPT pipe unions and rubber gaskets
Haws eye wash station	HAWS Model 8320
Chlorine detector	ATI A14/A11-11-0026-1-2 including the following parts: Two Module Enclosure: 80-0006 Power Supply Module: 00-0055
LED Security Lighting	Lithonia DSXF2 LED 4 40K with wall bracket

Flow Meter	E&H L400 with Ethernet communications
Fluoride System	Integrity FFS-55-2-1P Sodium Fluoride Saturator System
UPS	Eaton PW9130L1000T-XL
Ethernet Switch	Ntron model number 7010TX
Motion Detector	EW outdoor motion sensor model number EW-100-120
Digital Power Meter	Eaton PXM2260 PQ meter with Ethernet communications, include any PTs and CTs
Air Compress	ChargeAir 2000 manufactured by MAASS Midwest Inc. with probe
Back Flow Preventer	Zurn model number 975XL



PN: Z14110106

WELL REHABILITATION PROJECT PHASE 2B
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REVISIONS			
NO.	DESCRIPTION	DATE	BY

BENCH MARK
DESCRIPTION:
ELEV. _____

FIELD BOOK

SCALE:
H: 1"=40'
V: 1"=4'

1"
ON ORIGINAL SCALE DRAWING ADJUST SCALED DIMENSIONS IF THIS DOES NOT SCALE AT 1"

CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014

DESIGNED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014

CHECKED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER
MEGAN THOMAS
No. C66780
Exp. XX/XX/XX
CIVIL
STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:

WELL REHABILITATION PROJECT PHASE 2B
WELL 91 SITE PLAN
2507 NORTVIEW DRIVE

GIS GRID NO.
GOT GIS?

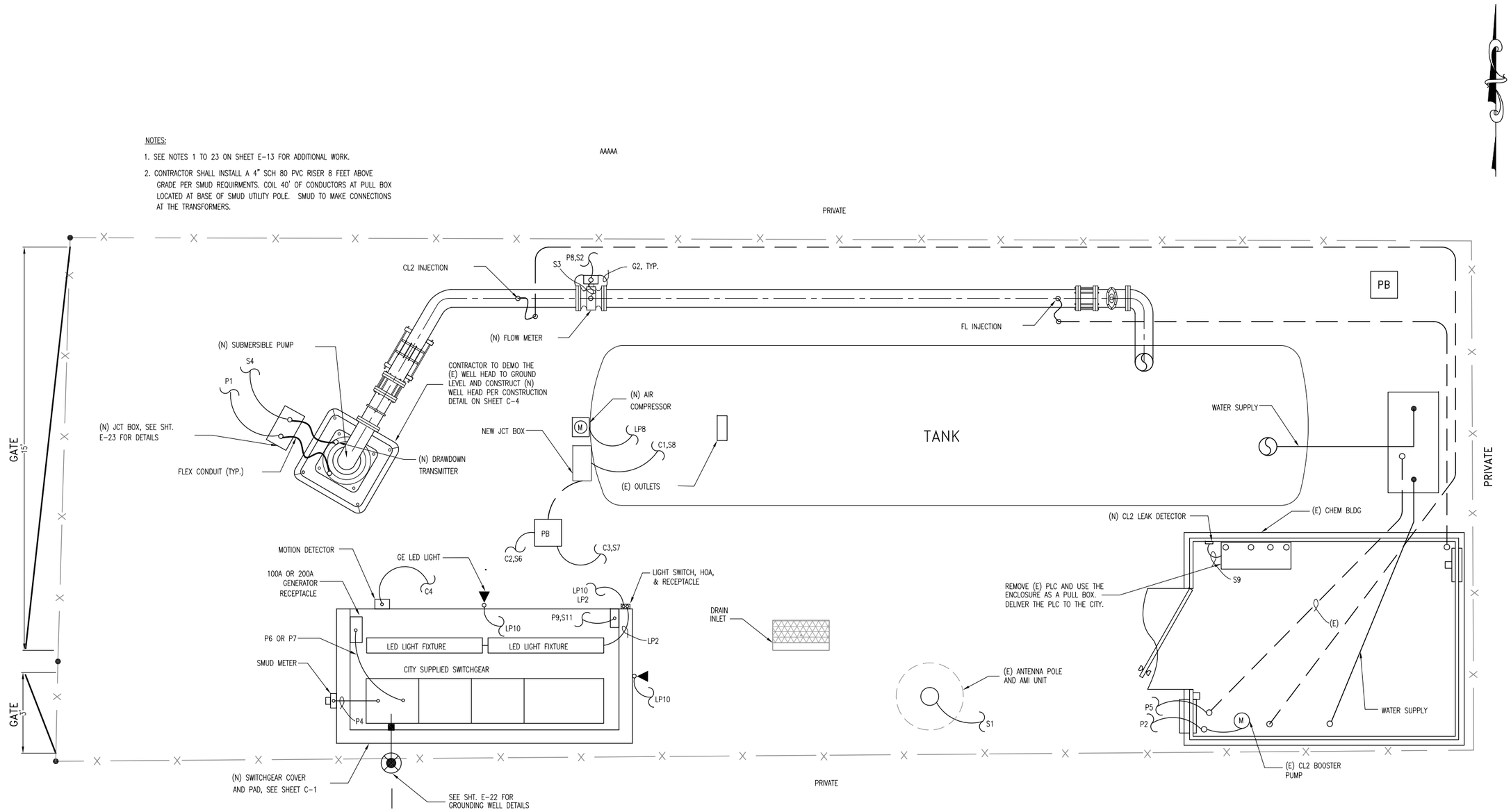
PN: Z14110106

DWG. NO. G1
SHEET 1 OF XX

PN: Z14110104 WELL REHABILITATION PROJECT PHASE 2B

NOTES:

1. SEE NOTES 1 TO 23 ON SHEET E-13 FOR ADDITIONAL WORK.
2. CONTRACTOR SHALL INSTALL A 4" SCH 80 PVC RISER 8 FEET ABOVE GRADE PER SMUD REQUIRMENTS. COIL 40' OF CONDUCTORS AT PULL BOX LOCATED AT BASE OF SMUD UTILITY POLE. SMUD TO MAKE CONNECTIONS AT THE TRANSFORMERS.



WELL REHABILITATION PROJECT PHASE 2B
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PN: Z14110106

REVISIONS			
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BENCH MARK ELEV. _____
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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014
CHECKED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER MEGAN THOMAS No. C66780 Exp. XX/XX/XX CIVIL STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL 92 ELECTRICAL SITE PLAN
2828 NORTHVIEW DRIVE

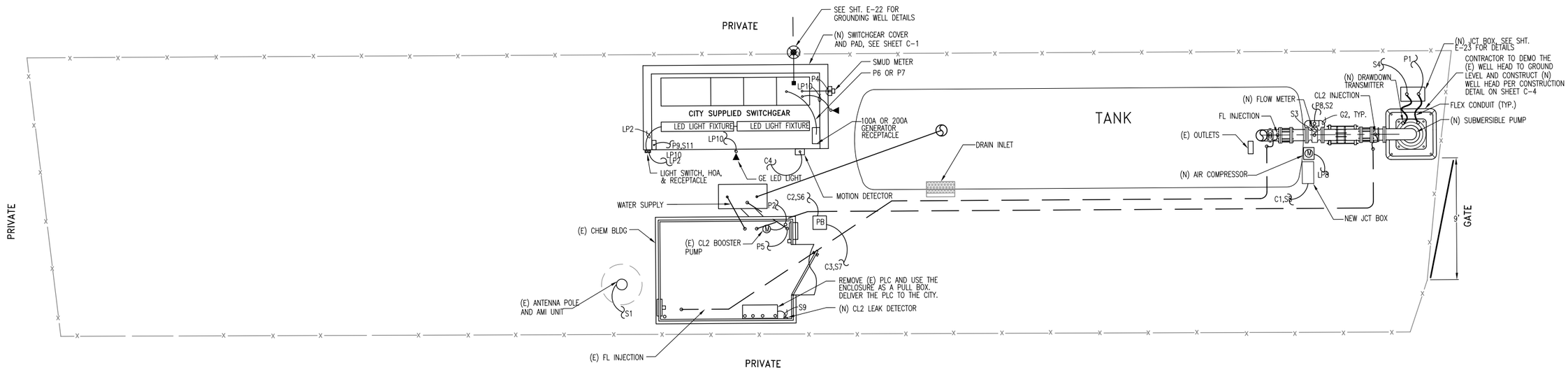
GIS GRID NO.
GOT GIS?
PN: Z14110106

DWG. NO. E-14
SHEET 15 OF XX

PN: Z14110104 WELL REHABILITATION PROJECT PHASE 2B

NOTES:

1. SEE NOTES 1 TO 23 ON SHEET E-13 FOR ADDITIONAL WORK.
2.



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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014
CHECKED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER MEGAN THOMAS No. C66780 Exp. XX/XX/XX CIVIL STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL 93 ELECTRICAL SITE PLAN
636 TENAYA AVE

GIS GRID NO.
GOT GIS?
PN: Z14110106

DWG. NO. E-15
SHEET 16 OF XX

PN: Z14110106
WELL REHABILITATION PROJECT PHASE 2B
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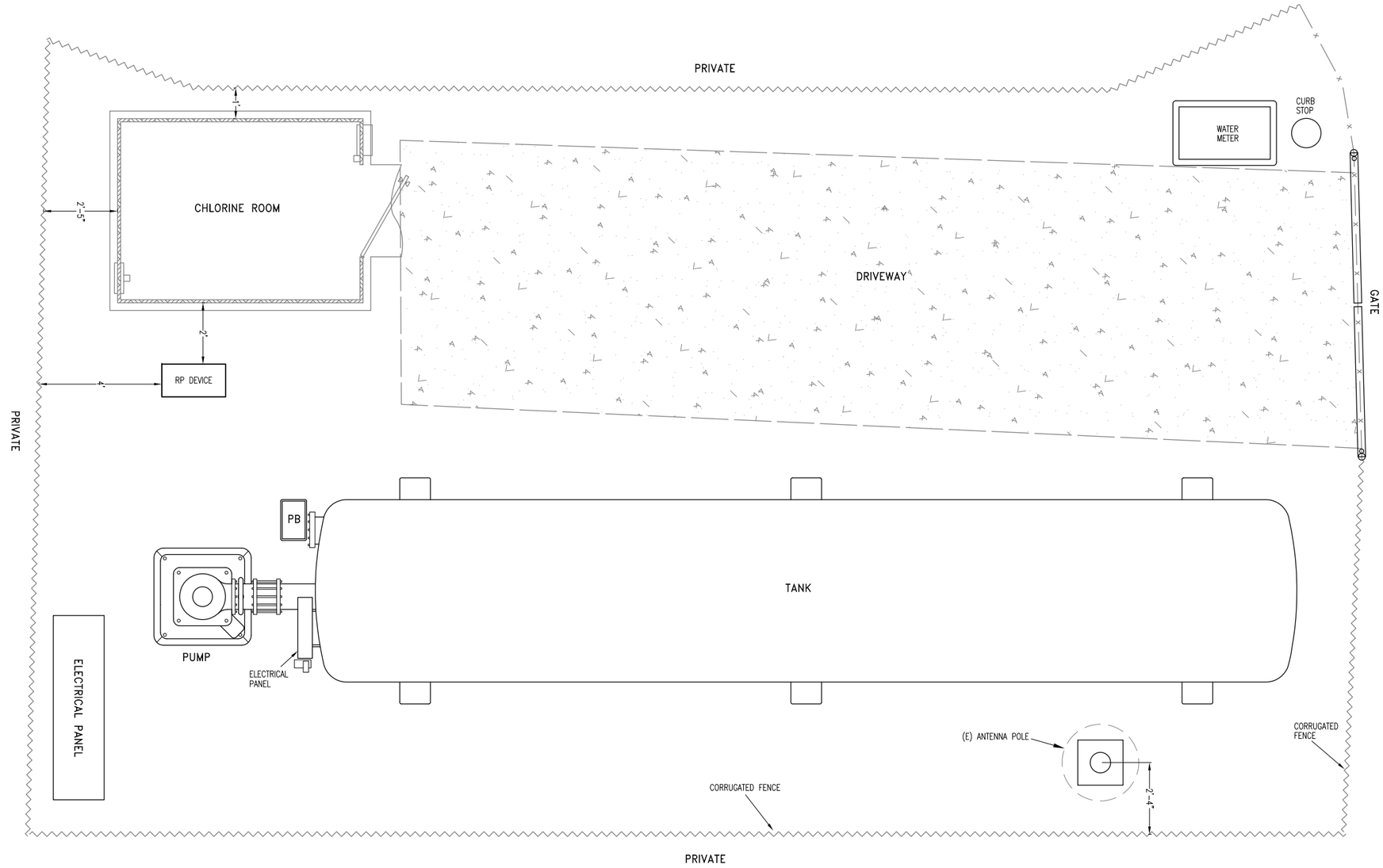
PN: Z14110104 WELL REHABILITATION PROJECT PHASE 2B



WELL REHABILITATION PROJECT PHASE 2B
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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014
CHECKED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER
MEGAN THOMAS
No. C66780
Exp. XX/XX/XX
CIVIL
STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL 112 SITE PLAN
1018 CALVADOS AVE.

GIS GRID NO.
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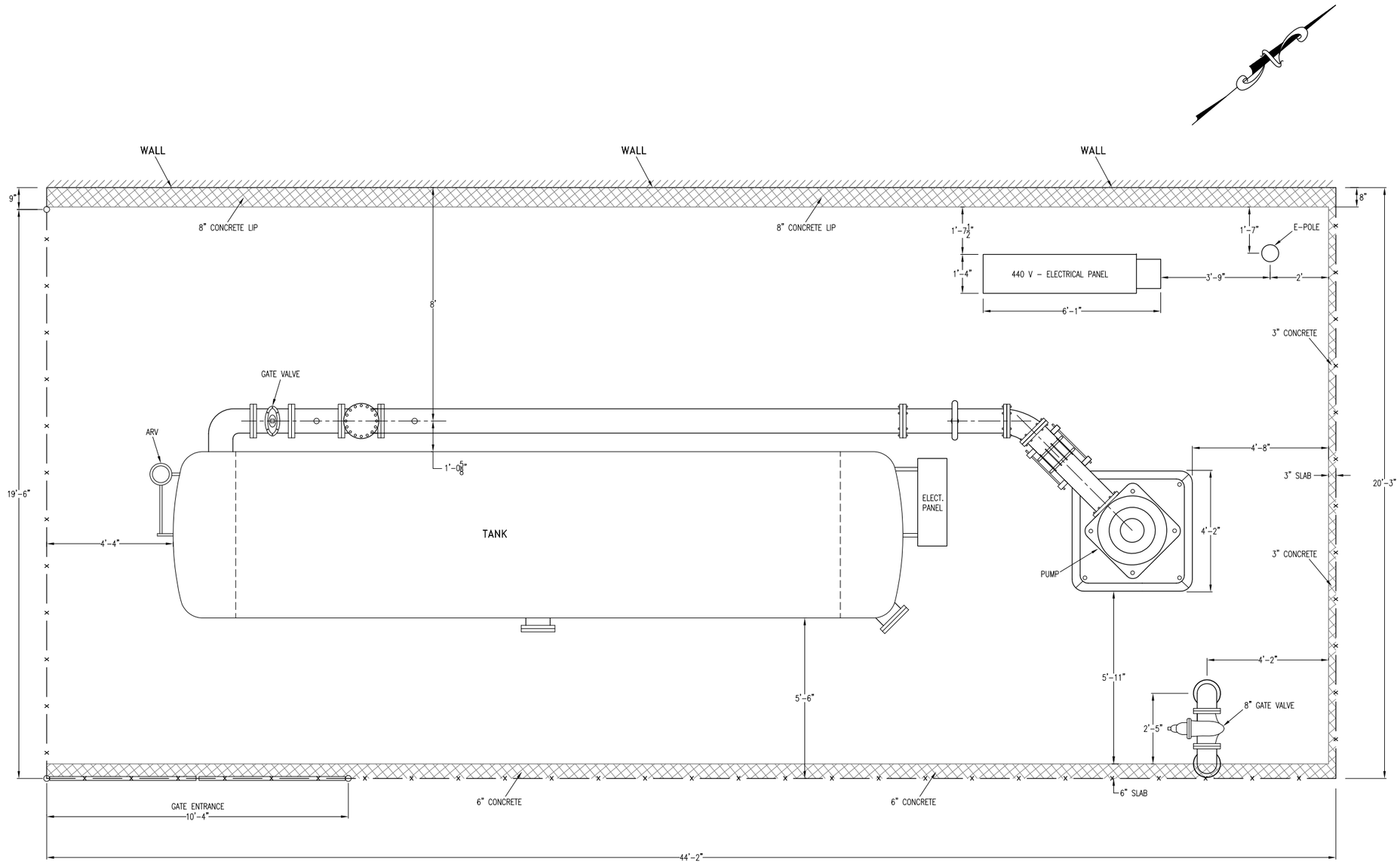
PN: Z14110106

DWG. NO. G1
SHEET 1 OF XX

PN: Z14110104 WELL REHABILITATION PROJECT PHASE 2B



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PN: Z14110106

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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

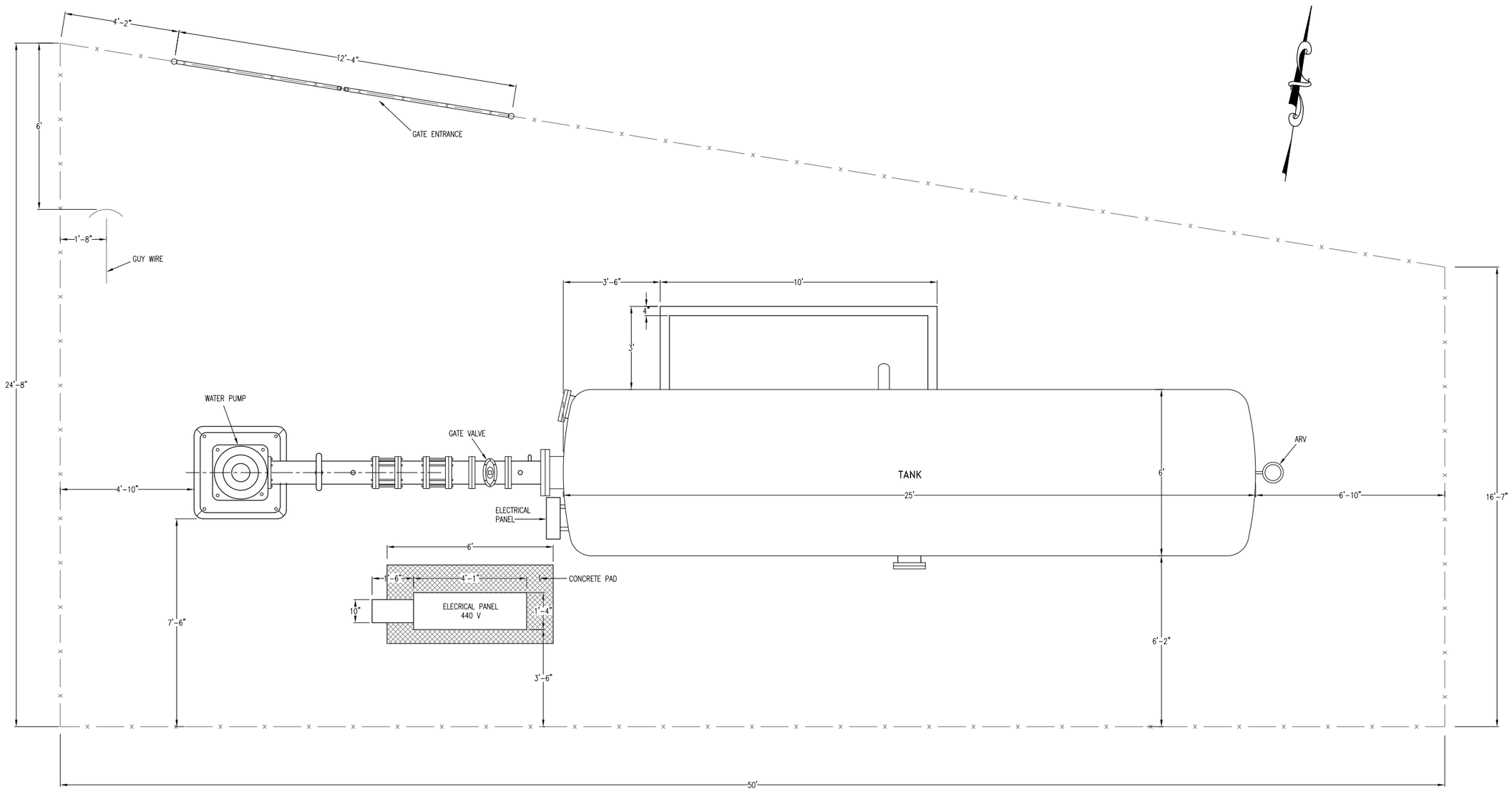
DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: P. BARNES
R.C.E. NO. E14584 DATE: JAN 2014
CHECKED BY: D. HANSEN
R.C.E. NO. _____ DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER
PAUL R. BARNES
No.E15329
Exp.6/30/13
ELECTRICAL
STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL# 114
1200 ARDEN WAY

GIS GRID NO.
GOT GIS?
PN: Z14110106

DWG. NO. C-1
SHEET 1 OF XX



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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: P. BARNES
R.C.E. NO. E14584 DATE: JAN 2014
CHECKED BY: D. HANSEN
R.C.E. NO. _____ DATE: JAN 2014

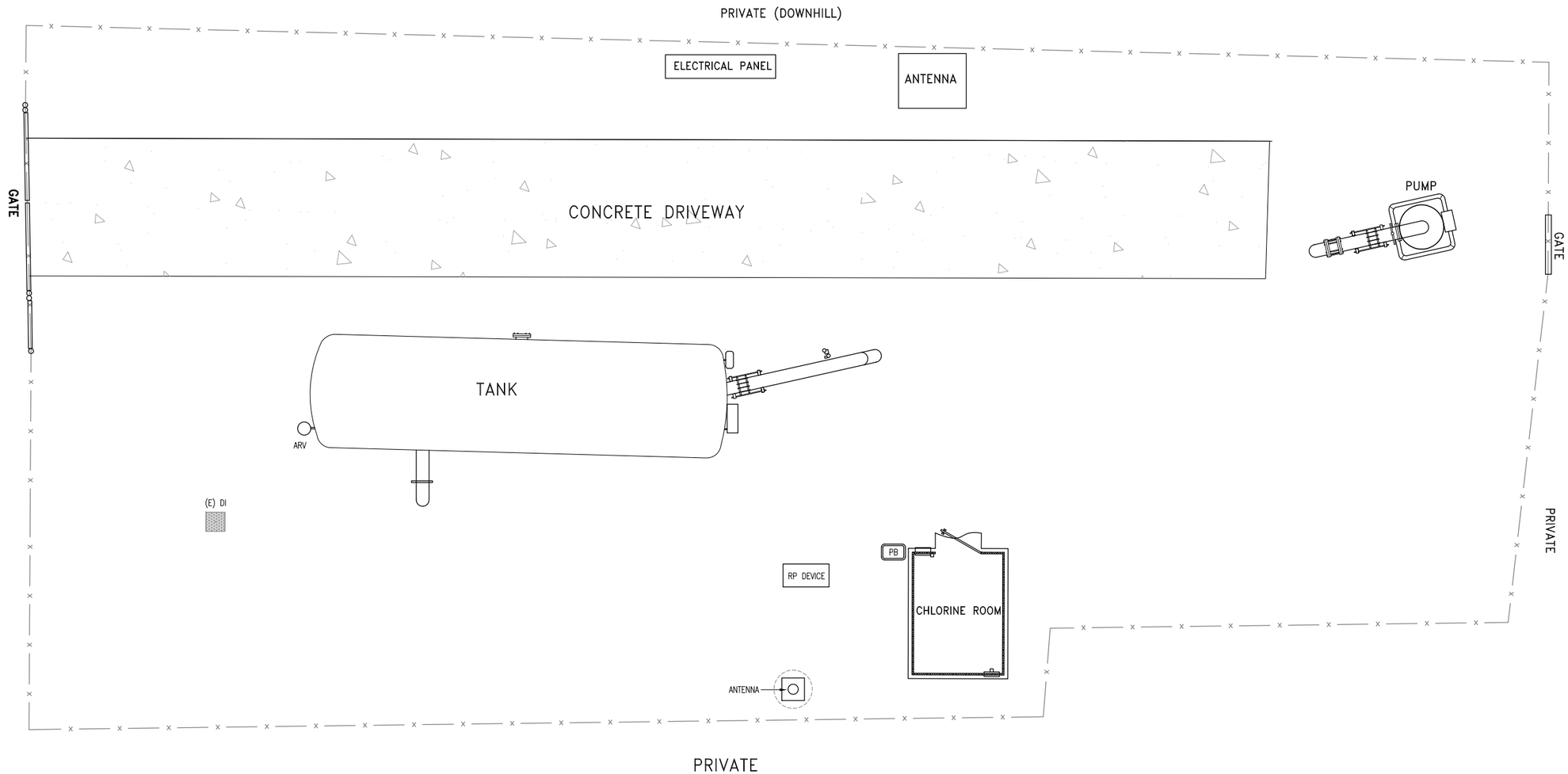
REGISTERED PROFESSIONAL ENGINEER
PAUL R. BARNES
No.E15329
Exp.6/30/13
ELECTRICAL
STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL# 123
3273 WESTERN AVE.

GIS GRID NO.
GOT GIS2
PN: Z14110106

DWG. NO. C-1
SHEET 1 OF XX

PN: Z14110104 WELL REHABILITATION PROJECT PHASE 2B



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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014
CHECKED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER
MEGAN THOMAS
No. C66780
Exp. XX/XX/XX
CIVIL
STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL# 127 ELECTRICAL SITE PLAN
1659 ARCADE BLVD

GIS GRID NO.
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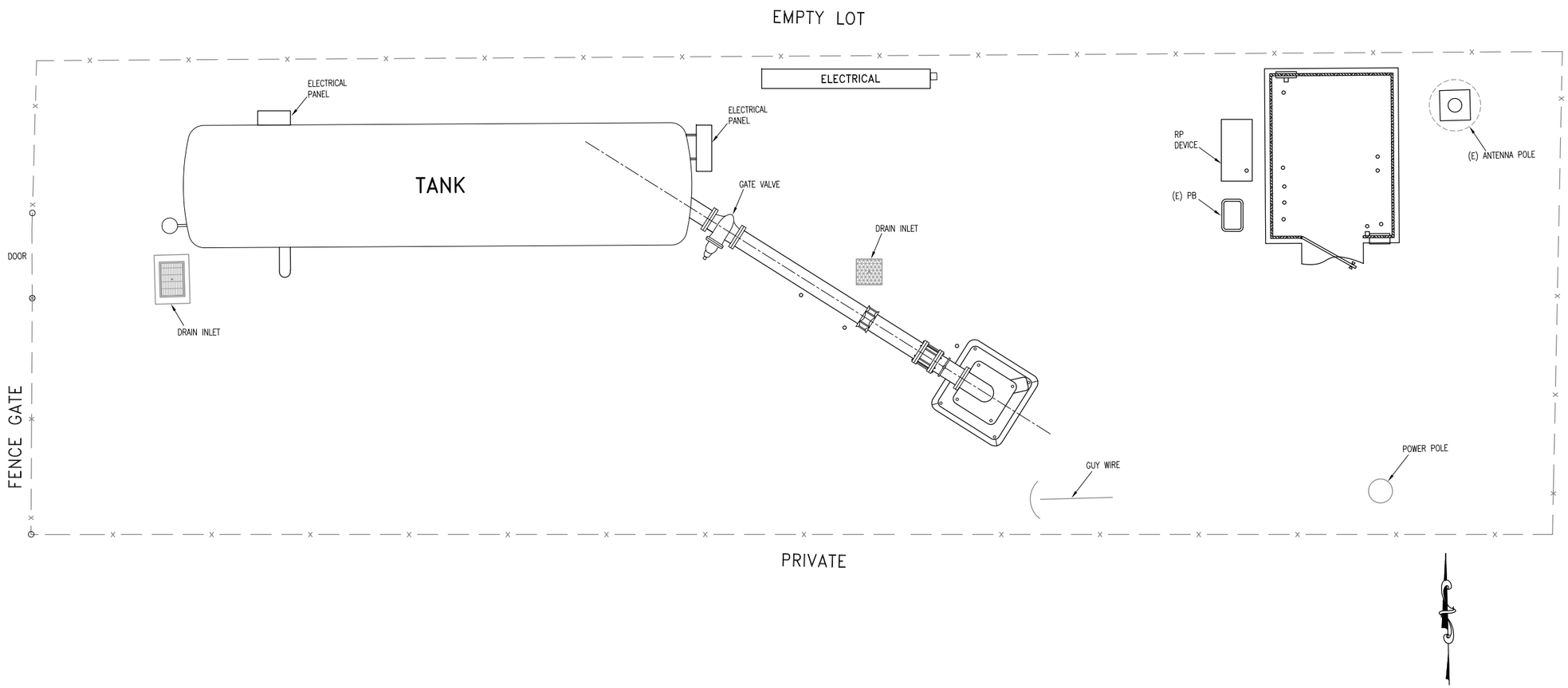
PN: Z14110106

DWG. NO. E-10
SHEET 11 OF XX



WELL REHABILITATION PROJECT PHASE 2B
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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: P. BARNES
R.C.E. NO. E14584 DATE: JAN 2014
CHECKED BY: D. HANSEN
R.C.E. NO. _____ DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER
PAUL R. BARNES
No.E15329
Exp.6/30/13
ELECTRICAL
STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL# 139
1730 LATHROP WAY

GIS GRID NO.
GOT GIS?

PN: Z14110106

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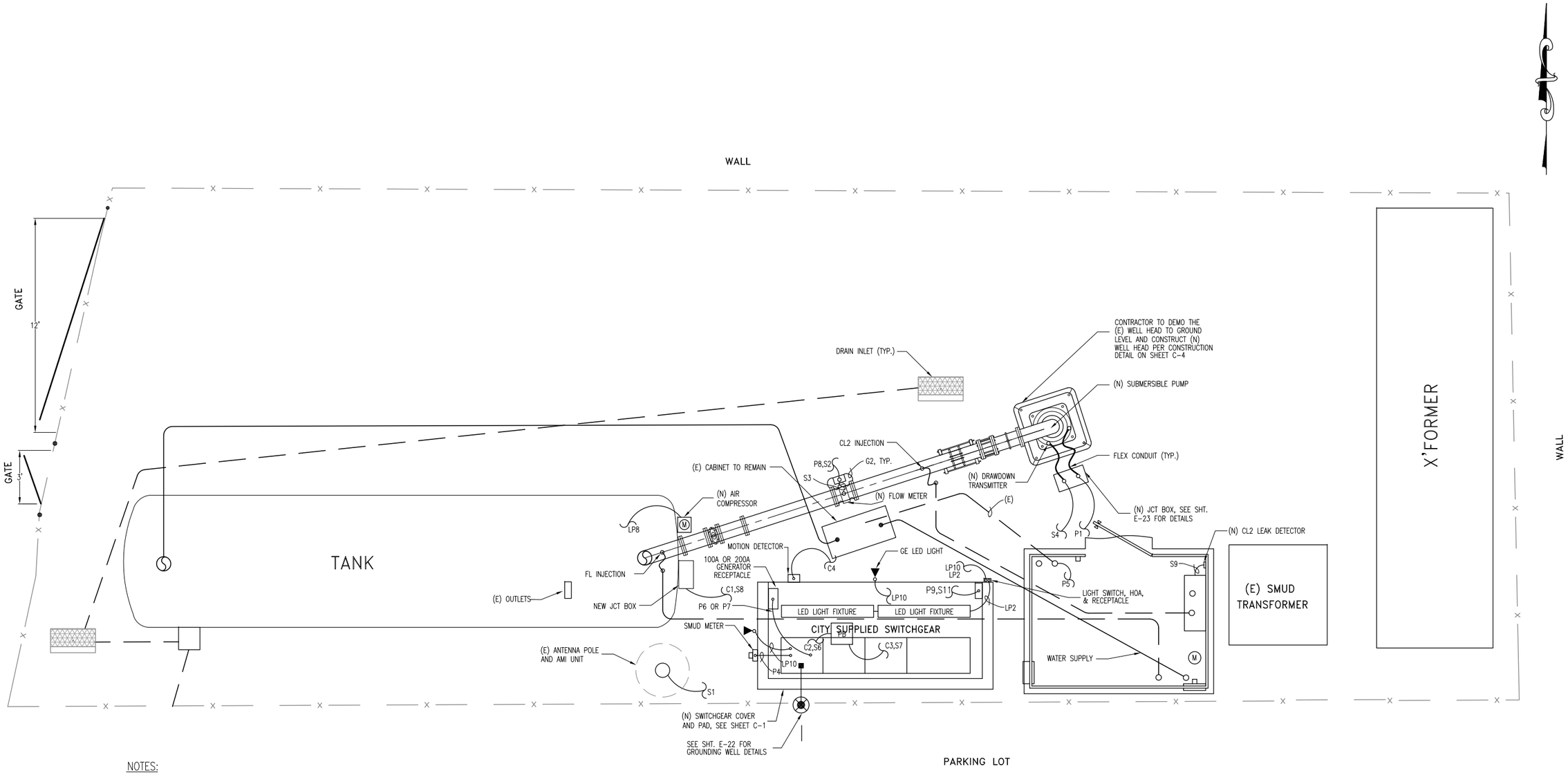
SHEET 1 OF XX



NOTES:

1. SEE NOTES 1 TO 23 ON SHEET E-13 FOR ADDITIONAL WORK.
2. REMOVE EXISTING ELECTRICAL PULL BOX.

WELL REHABILITATION PROJECT PHASE 2B
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PN: Z14110106

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BENCH MARK ELEV. _____
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CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

DRAWN BY: A. VELAZQUEZ
DATE: JAN 2014
DESIGNED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014
CHECKED BY: M. THOMAS
R.C.E. NO. XXXXXX DATE: JAN 2014

REGISTERED PROFESSIONAL ENGINEER
MEGAN THOMAS
No. C66780
Exp. XX/XX/XX
CIVIL
STATE OF CALIFORNIA

IMPROVEMENT PLANS FOR:
WELL REHABILITATION PROJECT PHASE 2B
WELL 158 SITE PLAN
1702 CHALLENGE

GIS GRID NO.
GOT GIS?
PN: Z14110106

DWG. NO. E-22
SHEET 23 OF XX

PN: Z14110104 WELL REHABILITATION PROJECT PHASE 2B

Sacramento River Pump Station Modifications – City of Sacramento

List of References

- Sacramento River Water Treatment Plant Memorandum No 1, 1998, **All pages**
- CVO_Delta summary, 2014, **page 1**
- Notice of Exemption, City of Sacramento, 2014, **All pages**
- SRWTP Vortex Breaker Detail, Carollo, 2014, **All pages**
- SRWTP Intake – Mod 2

TECHNICAL MEMORANDUM

MONTGOMERY WATSON

SACRAMENTO RIVER WATER TREATMENT PLANT
INTAKE REPLACEMENT PROJECT
TECHNICAL MEMORANDUM NO. 1

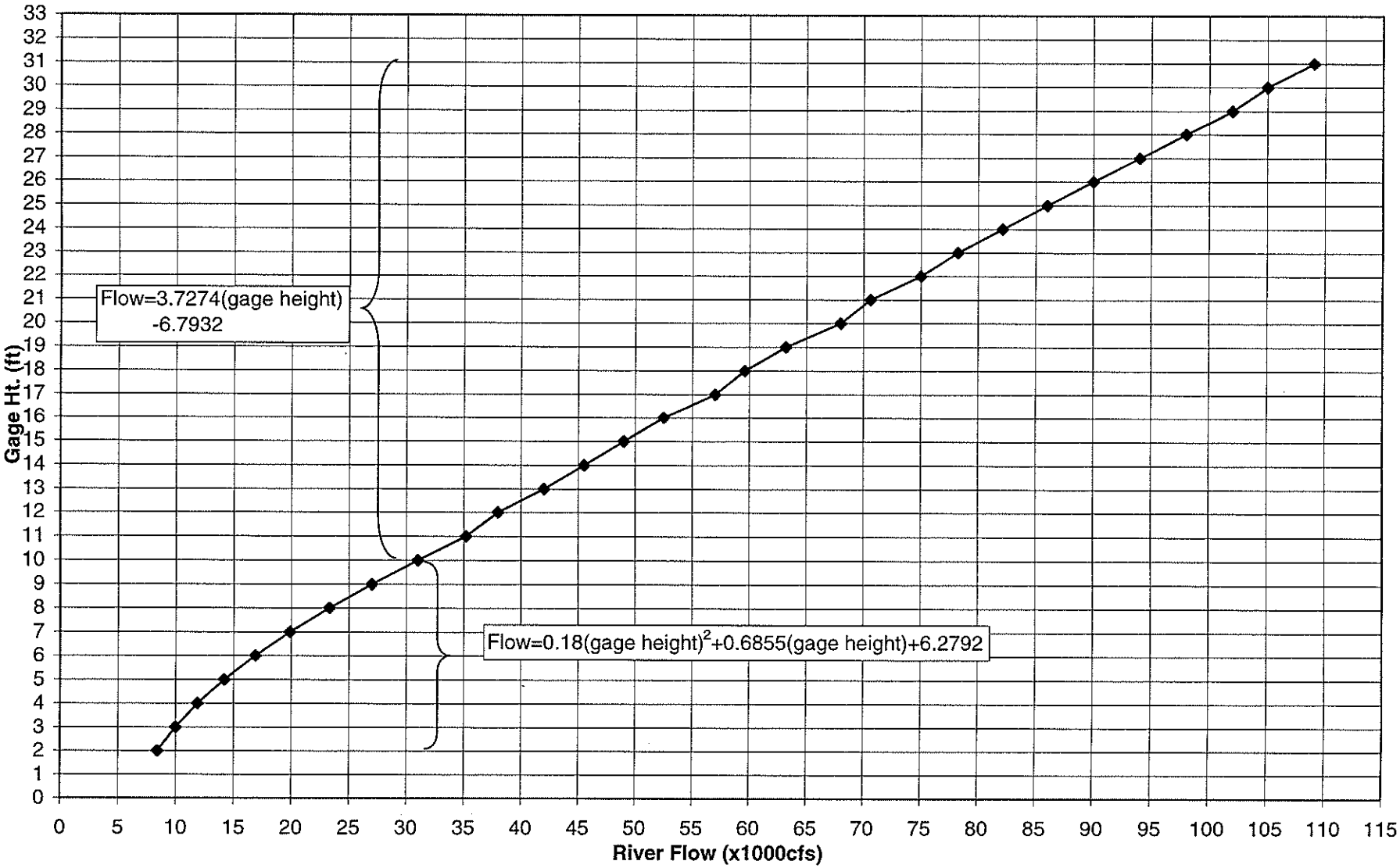
To:	Gary Gosse City Representative	**Prepared by:**	Maggie Kido
		Reviewed by:	Don Spiegel
From:	Don Spiegel Don Project Manager	**Reference:**	1076120.022501
Subject:	Sacramento River Hydrology in the Vicinity of the Replacement Intake Structure	**Date:**	September 25, 1998

This Technical Memorandum characterizes the hydrology of the Sacramento River in terms of river flow, river stage (height), and river velocity in the vicinity of the proposed Replacement Intake Structure for the Sacramento River Water Treatment Plant (SRWTP). Rating and exceedance curves were developed from data collected at the United States Bureau of Reclamation (USBR) I Street gage station, located approximately 1,250 feet downstream of the proposed intake site, and the Verona gage station located on the Sacramento River upstream of the American River confluence. River velocities were calculated based on the USBR stage and flow data and the Corps of Engineers bathymetry data for the Sacramento River.

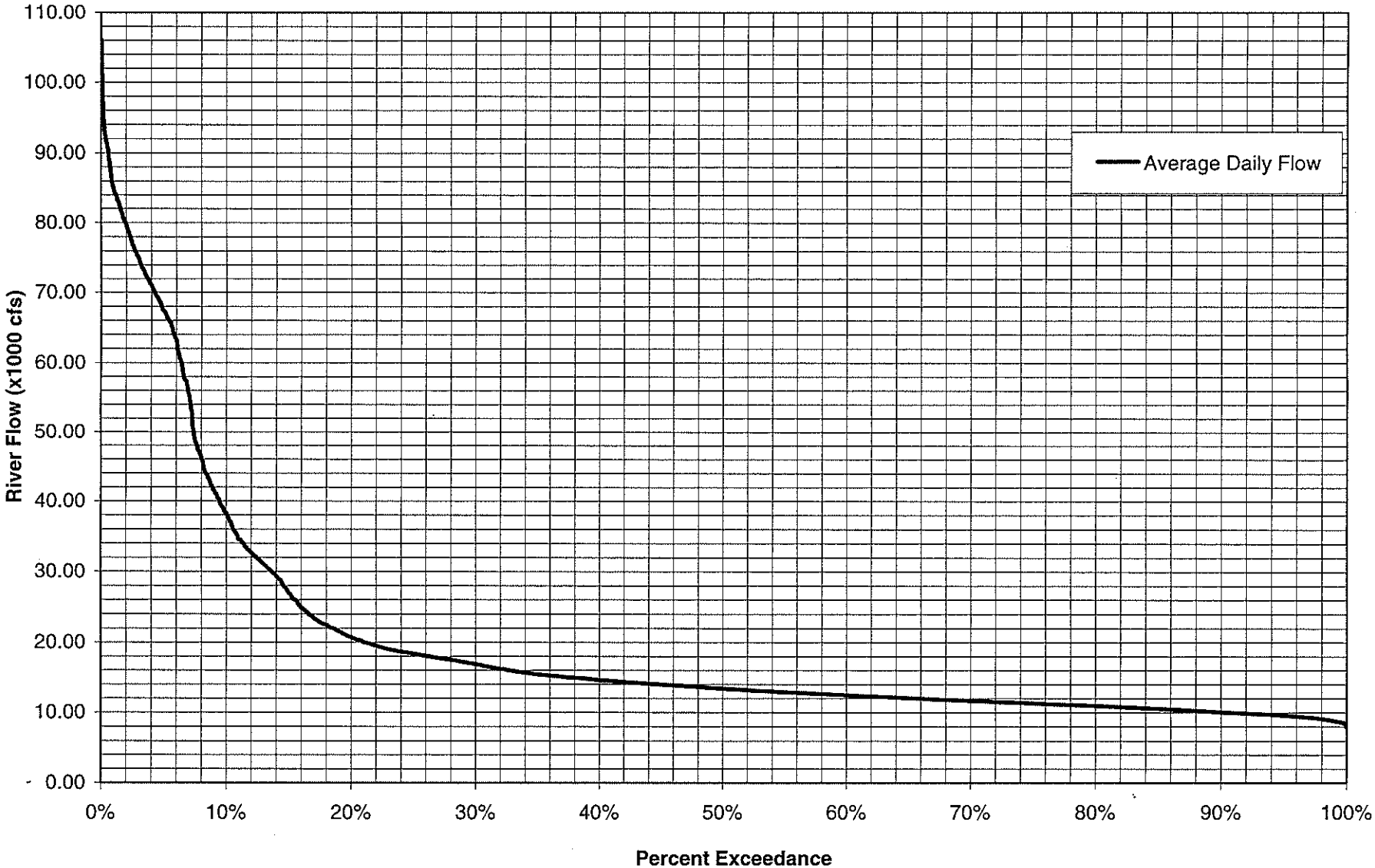
RIVER STAGE AND FLOW DATA

Hourly gage heights recorded from October 28, 1984 to December 31, 1997 at the I Street gage station, USGS gage number 11447500, were averaged to obtain daily gage heights. From these gage height data points, river flows were calculated using USBR-provided rating curves. For gage heights greater than 10 feet (the gage height datum for the I Street gage is sea level - elevation 0.0), the rating curve equation is:

River Flow (in cfs x 1,000) = 3.7274 (gage height) - 6.7932
(for gage heights above 10 feet)



I Street Gage Rating Curve for the Sacramento River at Sacramento
FIGURE 1



Exceedance Curve for Sacramento River Flows at the I Street Gage
FIGURE 2

River flows at the I Street gage when river levels are 10 feet and below were calculated using the following relationship (as provided by Valerie Ungvari of the USBR):

$$\text{I Street gage station flow at hour of specified gage height} = \frac{\text{Flow at Verona gage station at specified hour} + \text{Flow at Verona gage station at preceding hour}}{2} + \text{Average Nimbus outflow rate on specified day}$$

This relationship averages the flows at the Verona gage station, USGS gage number 11425500, located on the Sacramento River upstream of the American River confluence (and the SRWTP Replacement Intake Structure) and adds this average to the outflow from Nimbus Dam, located on the American River (this outflow estimates the American River flow contribution to the Sacramento River). From this river flow date, a rating curve equation has been developed by the USBR as follows:

$$\textbf{River Flow (in cfs x 1,000)} = 0.18\,(\text{gage height})^2 + 0.6855\,(\text{gage height}) + 6.2792$$
(for gage heights 10 feet and below)

A summary rating curve for the Sacramento River at the I Street gage is provided as Figure 1. An exceedance curve for Sacramento River flows at the I Street gage is provided as Figure 2. The raw Sacramento River flow and stage data for the 1984 through 1997 time period are provided in Appendix A.

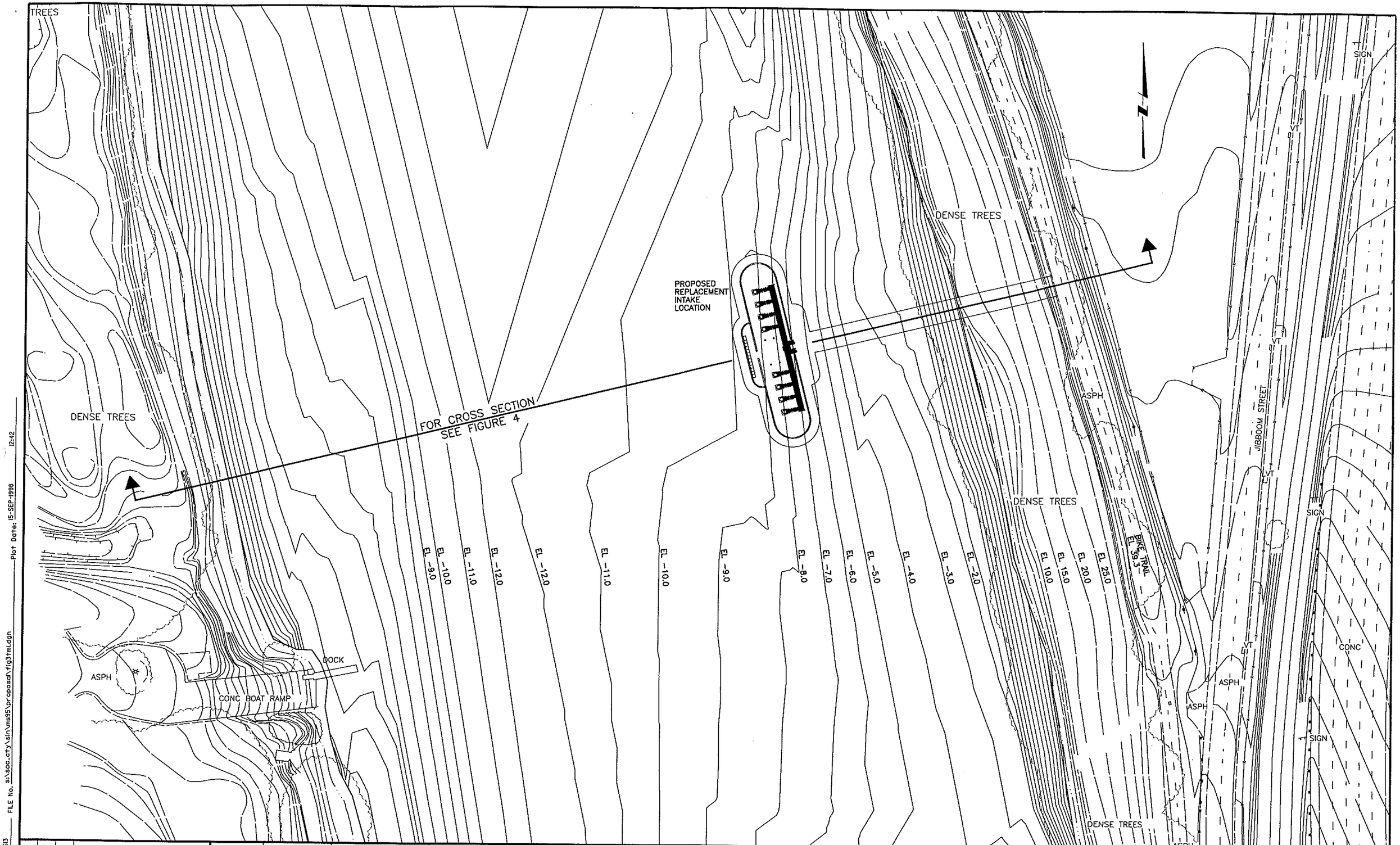
In review of this data, it is important to note that the Sacramento River at the I Street gage has dropped below a stage height of 2.0 feet for only five days in the past 13 years:

Day/Month/Year	River Stage
February 20, 1991	1.96 feet
May 10, 1991	1.89 feet
November 15, 1991	1.74 feet
November 20, 1992	1.98 feet
November 30, 1992	1.98 feet

RIVER VELOCITIES

To calculate river velocities at various river flows in the vicinity of the Replacement Intake Structure, river bottom elevations were obtained from the Corps of Engineers. These river bottom contours were obtained bathymetrically in the early spring of 1997. The bathymetry data were then matched to land survey data provided by Psomas and Associates in 1993. The integrated river and land survey data are presented as Figure 3.

Based on the survey data shown in Figure 3, a cross-section of the Sacramento River in the vicinity of the Replacement Intake Structure was produced (see Figure 4). From this cross section, river cross-sectional areas at one-foot intervals of river stage, beginning at elevation 2.0,



REV	DATE	BY	DESCRIPTION

SCALE: 1" = 40'

WARNING 0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED P. SALZMAN
DRAWN P. SALZMAN
CHECKED D. SPIEGEL

SUBMITTED
PROJECT MANAGER R. C. E. NO. DATE
MONTGOMERY WATSON R. C. E. NO. DATE

MONTGOMERY WATSON
Sacramento, California

CITY OF SACRAMENTO
SACRAMENTO RIVER INTAKE STRUCTURE REPLACEMENT
SACRAMENTO RIVER - RIVER BOTTOM AND LAND ELEVATIONS IN THE VICINITY OF THE SRWTP REPLACEMENT INTAKE

FIGURE 3

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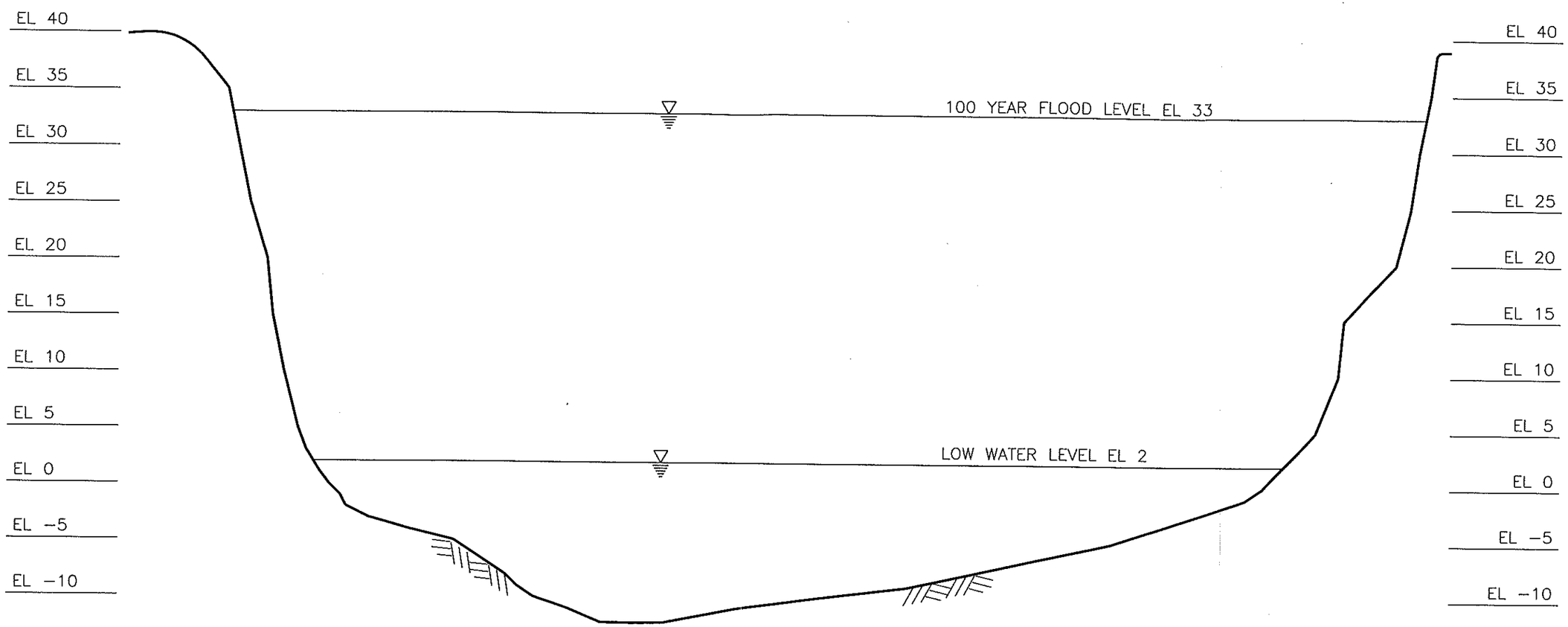

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WARNING 0 ½ 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED S. BOETTCHER
DRAWN M. KIDD
CHECKED D. SPIEGEL

SUBMITTED
PROJECT MANAGER R. C. E. NO. DATE
MONTGOMERY WATSON R. C. E. NO. DATE

MONTGOMERY WATSON
Sacramento, California

CITY OF SACRAMENTO
SACRAMENTO RIVER INTAKE STRUCTURE REPLACEMENT
SACRAMENTO RIVER CROSS-SECTION AT THE PROPOSED LOCATION OF THE SRWTP REPLACEMENT INTAKE

FIGURE 4

were calculated. River velocities at the various river stages were then calculated using the continuity equation; Q=VA (flow = velocity times cross sectional area). The results of these calculations are shown in Table 1.

RECOMMENDED DESIGN PARAMETERS

Design Low Water Level

Based on earlier discussions of river stage and river flow, it is recommended that a design low water level of elevation 2.0 be used for the Replacement Intake Structure. This design low water level impacts two features of the Replacement Intake Structure:

1. The top of the fish screens must be located below elevation 2.0.

2. The pump station (specifically the vertical turbine pumps) must be designed to deliver the design flow of 160 mgd at the low water level of elevation 2.0.

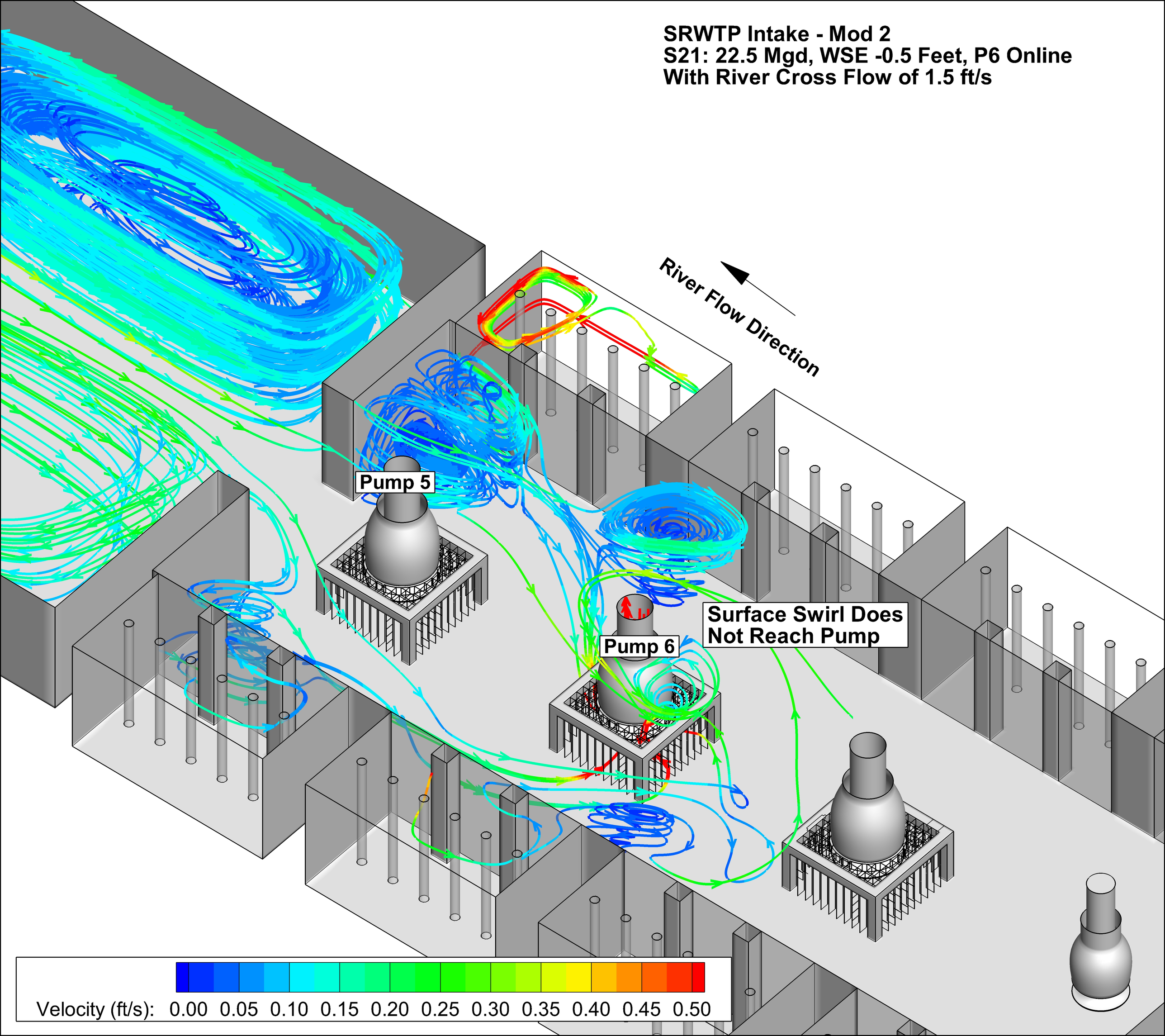
River Velocity

Based on earlier discussions of river velocity, it is recommended that a 1.3 feet per second river velocity be used in the hydraulic design of the fish screens. This design velocity is important for determining: (1) exposure time of fish to the fish screen surface, and (2) sweeping velocity at the screen face (the sweeping velocity is the velocity component parallel to the screen face).

Table 1
Sacramento River Velocities in the Vicinity of the Replacement Intake Structure

River Stage (elevation in feet)	River Flow (cfs)	River Cross-Sectional Area (sf)	River Velocity (fps)
2	8,400	6,392	1.31
3	10,000	6,897	1.45
4	11,900	7,800	1.53
5	14,200	8,304	1.71
6	16,900	9,185	1.84
7	19,900	9,966	2.00
8	23,300	10,310	2.26
9	27,000	11,020	2.45
10	31,000	12,147	2.60
12	38,000	13,523	2.81
15	49,000	16,065	3.05
17	57,000	17,484	3.26
20	68,000	20,118	3.38
22	75,000	21,490	3.49
25	86,000	23,884	3.60
30	105,000	28,455	3.69
31	109,000	28,854	3.78

	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
DELTA												
Federal Banks	28	0	0	0	0	0	0	0	0	0	0	0
Contra Costa	6.4	4.9	5.6	6.4	7.0	8.4	9.2	9.2	7.0	7.0	6.4	6.4
Tracy	10	45	45	45	110	59	160	160	109	125	45	25
Total Federal Exports	44	50	51	51	117	67	169	169	116	132	51	31
State Banks Pumping	20	18	27	117	135	211	216	220	153	126	45	18
Total Exports	64	68	78	168	252	278	385	389	269	258	96	49
USBR Monthly COA Account	-35.1	-15.5	-4.4	99.3	42.4	125.0	0.0	0.0	0.3	0.0	0.0	-12.8
Accumulated COA	-260.1	-275.6	-280.0	-180.7	-138.3	-13.2	-13.2	-13.2	-13.0	-13.0	-13.0	-25.8
Computed Delta Outflow (NDOI)	252	190	184	179	184	208	286	378	394	465	676	246
Excess Outflow (EO)	0	0	0	0	0	0	71	101	0	28	326	0
Freeport Flow (FF) cfs	7,438	7,385	7,266	7,625	6,758	7,479	9,510	10,155	9,589	10,452	12,313	5,149
X-channel Gates	open	open	open	open	open	open	closed	closed	closed	closed	closed	closed
% Inflow Diverted	12%	12%	15%	33%	47%	52%	57%	53%	42%	35%	11%	11%
% Inflow Diverted Std	35%	65%	65%	65%	65%	65%	65%	65%	45%	35%	35%	35%
X2 Location (km from GG)	84.7	88.4	89.8	90.2	90.4	89.3	86.7	83.8	81.7	80.5	77.0	83.9
X2 location Std.												


SRWTP Intake - Mod 2
S21: 22.5 Mgd, WSE -0.5 Feet, P6 Online
With River Cross Flow of 1.5 ft/s
River Flow Direction
Pump 5
Pump 6
Surface Swirl Does
Not Reach Pump
Velocity (ft/s): 0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45 0.50

Lower American River Pump Station Modifications – City of Sacramento

List of References

- 2014-00426_2014 Drought Response Update and Vibration Monitoring Equipment Purchase Approval, 2014, **All pages**
- CVO-AROG Handouts_20140619, 2014, **pages 1, 3-4**
- EAF_Intake_BasisOfDesign_Chapter1&2, 1999, **page 4**
- City of Sacramento Urban Water Management Plan, 2010, **page 54**

Meeting Date: **6/17/2014**

Report Type: Staff/Discussion

Report ID: 2014-00426

24

City of SACRAMENTO

City Council Report
915 I Street, 1st Floor
www.CityofSacramento.org

Title: 2014 Drought Response Update and Vibration Monitoring Equipment Purchase Approval

Location: Citywide

Recommendation: Pass 1) a Resolution declaring that a water shortage continues to exist, and implementing additional water conservation restrictions; and 2) a Motion authorizing the City Manager or the City Manager's designee to sign an emergency contract with Bently Nevada, Inc. for the purchase of vibration monitoring equipment for the City's water intake pumps, for an amount not-to-exceed $225,000.

Contact: Dave Brent, Director, (916) 808-1400; Terrance Davis, Program Manager, (916) 808-1868, Department of Utilities

Presenter: Terrance Davis, Program Manager, (916) 808-1868, Department of Utilities

Department: Department Of Utilities

Division: Office of the Director Admin

Dept ID: 14001011

Attachments:

1-Description/Analysis

2-Background

3-Resolution

4-SF1049217 City of Sacramento Online Monitoring

City Attorney Review

Approved as to Form
Joe Robinson
6/10/2014 6:32:21 PM

Approvals/Acknowledgements

Department Director or Designee: Dave Brent - 5/29/2014 5:24:16 PM

James Sanchez, City Attorney Shirley Concolino, City Clerk Russell Fehr, City Treasurer
John F. Shirey, City Manager

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Description/Analysis

Issue Detail: Calendar year 2013 was the driest year on record for much of Northern and Central California. Water storage in the Folsom Reservoir in May was approximately 57% of capacity and recent precipitation in the late winter and spring of 2014 had minimal impact on overall water storage. On January 14, 2014, the City Council adopted Resolution No. 2014-0018 declaring a water shortage as authorized under City Code section 13.04.910 and implemented Stage 2 of the City of Sacramento Water Shortage Contingency Plan (WSCP). On January 17, 2014, Governor Jerry Brown declared a State of Emergency due to critical drought conditions, and the Governor issued a second drought proclamation on April 25, 2014. This report provides an update of the City's ongoing drought and water shortage response and mitigation efforts, and requests adoption of a second water shortage resolution, and approval to purchase vibration monitoring equipment for the City's surface water intakes affected by low river flows resulting from the ongoing drought conditions.

Policy Considerations: The City's ongoing drought mitigation actions are consistent with the requirements of Section 10632 of the California Water Code, Chapter 5 of the City's 2010 Urban Water Management Plan, and Article XI (Outdoor Water Conservation) of Chapter 13.0 of City Code. City Council approval is required for purchases of $100,000 or more. On March 4, 2014, the City Council passed Resolution No. 2014-0057, suspending competitive bidding for the purchase or lease of equipment, supplies, and services needed on an emergency basis to mitigate water shortage impacts for a cumulative amount not-to-exceed $1,000,000.

Resolution No. 2014-0057 applies to the proposed purchase of vibration monitoring equipment for the City's surface water intakes, because the drought has resulted in significantly lower river levels than the City is used to seeing at the intakes, which potentially can cause cavitation that can lead to permanent intake pump damage. The purchase and installation of vibration monitoring equipment will detect potentially harmful vibrations so that operators are notified and the pumps are shut down before damage can occur. Due to the critical time-sensitive nature of this equipment, this purchase was not competitively bid. Given the immediacy of the City's drought response, Bently Nevada was selected as a vendor to provide this equipment for two reasons: 1) the vibration sensors desired contain programmable logic controls (PLC) which provide an immediate interface into existing Utilities pump control technologies; 2) the vendor provides regional support for troubleshooting and future maintenance.

Economic Impacts: Unknown.

Environmental Considerations: The proposed action is exempt from review under the California Environmental Quality Act (CEQA) as part of the City's continuing administrative activities to implement the UWMP (CEQA Guidelines section 15378(b)(2)), and because it can be seen with certainty that the action would have no significant effect on the environment (CEQA Guidelines section 15061(b)(3)). A reduction in water usage will reduce potential environmental effects associated with water use, by reducing surface water diversions, as well as reducing energy consumption and other impacts

associated with water production and distribution and the collection and treatment of this water after it has been used. A reduction in surface water diversions also will increase the availability of surface water for maintenance and protection of natural resources and the environment. Purchase and installation of the vibration monitoring equipment is exempt from CEQA under CEQA Guidelines section 15301(b), as a minor alteration of existing utility facilities with no expansion of existing levels of use.

Sustainability: Continued implementation of the WSCP supports the City's sustainability goals of reducing greenhouse gases and conserving resources.

Commission/Committee Action: Not applicable.

Rationale for Recommendation:

Financial Considerations: Under the current rate structure, continued or expanded implementation of the Water Shortage Contingency Plan will likely decrease the Department of Utilities' water revenues that are generated from its customer base that is billed by volumetric consumption. The Department will continue to closely monitor the cost and revenue impacts of sustained and expanded implementation of the City's water shortage measures.

The proposed purchase of vibration monitoring equipment, for an amount not-to-exceed $225,000, was not competitively bid because it is a drought-response measure for which the City Council suspended competitive bidding under Resolution No. 2014-0057. The contracting amount presently available without competitive bidding under Resolution No. 2014-0057 is sufficient for the proposed purchase. On April 22, 2014, the City Council authorized the continued lease of submersible pumps at the Fairbairn Water Treatment Plant, without competitive bidding, as an emergency drought-response measure under Resolution No. 2014-0057, for an amount not-to-exceed $313,500.

This reduced the amount available for emergency drought-response procurement without competitive bidding under Resolution No. 2014-0057 to $685,500, which is more than the proposed purchase amount of $225,000. Adequate funds are available in the Department's capital budget Z1414-0505 for this purchase.

Local Business Enterprise (LBE): Due to the emergency nature of the vibration equipment installation, and the City Council's prior suspension of competitive bidding for emergency drought-response actions, staff requested a LBE Participation Waiver.

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Background

Drought Conditions and Outlook

Calendar year 2013 was the driest year on record for much of Northern California. This condition was preceded by two consecutive years of below normal precipitation in the Sacramento region and snow pack in the Sierra Nevada Mountains. Water storage at Folsom Reservoir remains very low, at approximately 57% of capacity as of May 2014. No significant precipitation is forecast for the remainder of the spring and summer.

On January 17, 2014 Governor Brown declared a Drought State of Emergency for the State of California. Preceding the State's pronouncement, on January 14, 2014 the Sacramento City Council adopted Resolution No. 2014-0018 declaring a water shortage, pursuant to City Code section 13.04.910, and implementing Stage 2 of the Water Shortage Contingency Plan (WSCP) as outlined in the City's 2010 Urban Water Management Plan (UWMP).

On April 25, 2014, Governor Brown issued an additional proclamation redoubling drought mitigation efforts. Specifically, the Governor's order calls on Californians and California businesses to take specific actions to conserve water, including limiting lawn watering and car washing; recommends that schools, parks and golf courses limit the use of potable water for irrigation; and asks that hotels and restaurants give customers options to conserve water by not washing sheets and towels, and only serving water upon request. The order also prevents homeowner associations from fining residents that limit their lawn watering and take other water conservation measures.

WSCP Stage 2 Activities

The City's UWMP Stage 2 establishes a goal for at least 20% reduction in overall water consumption. The Department of Utilities (DOU) has measured this by comparing monthly 2014 water production to the baseline average of 2012 and 2013 production. To accomplish this reduction the City is employing a 'portfolio' water savings approach, which is inclusive of a range of water shortage measures intended to educate and provide tools to customers to achieve conservation, generally consisting of:

- Customer outreach and education;
- Increased Water Conservation Ordinance enforcement;
- Conservation incentive programs; and
- Operational efficiencies to enhance water production capabilities and minimize distribution water losses.

A Citywide Drought Taskforce has been established to work collaboratively on City communication and operational strategies to achieve Stage 2 water conservation objectives. Through the Task Force, City departments have developed water use reduction plans. Department plans include revised operational practices to reduce irrigation at City parks and medians and programs to recapture and reuse water used for maintenance and construction. Departments will provide ongoing updates of their drought mitigation activities.

Article XI of Chapter 13.04 of the Sacramento City Code establishes the City's outdoor water use requirements and penalties for noncompliance. Under City Code section 13.04.890 (D), when the City Council declares a water shortage, the penalty amounts specified for violations of the City's ordinance are doubled while the water shortage remains in effect.

Effective March 9, 2014, water shortage regulations limited outdoor irrigation during daylight savings time to two days per week. To improve enforcement, the DOU and Community Development Department have collaborated to utilize Code Enforcement staff to assist with outdoor water use patrols. Since April 2014, this strategy has bolstered the number of City staff involved in patrols from approximately 7 to 40, providing a significant augmentation to water conservation enforcement efforts.

The DOU recently completed a survey of customers to determine the most effective strategies to improve drought outreach and communication. Beginning in late February, a variety of media efforts including utility bill inserts began to educate customers on the daylight savings irrigation restrictions and other ways to reduce water consumption. In addition, the City continues ongoing collaborative outreach and planning efforts with regional and State partners, such as the Regional Water Authority (RWA), the Water Forum, and the Association of California Water Agencies (ACWA).

In April 2014, at Council's direction, DOU began implementation of the River Friendly Landscape Program (cash for grass). Participants in this program

will receive 50 cents per square foot in rebates for converting their existing turf grass to drought tolerate and water-wise landscapes. This program augments the existing incentive programs that are available to residential and business customers to upgrade to higher efficiency appliances and fixtures. As of May 2014, there are approximately 700 residents who have expressed interest in the program. Funds have been identified for the pilot Program in the approved Fiscal Year 2013/14 DOU operating budget.

Water losses in the distribution system are estimated to be roughly 10% of total annual water production. To address this, the DOU has expanded acoustic leak detection operations to identify and repair distribution system water losses. Since January 2014 this program has reduced water loss by approximately 1.3M gallons. Leak detection will be an ongoing component of the Department's strategy to recover and maximize existing water resources.

Given the lower flows in the American and Sacramento Rivers, the City has recently taken a number of actions to mitigate potential adverse impacts of the ongoing drought conditions on the City's water production capabilities. These actions include the installation of temporary submersible pumps at the American River Intake, contracting on an emergency basis for the removal of sediment at the Sacramento River intake, and the acceleration of work necessary to restore service at nine groundwater wells.

Recommended Purchase of Vibration Monitoring Equipment

The drought has resulted in significantly lower river levels than the City is used to seeing at its surface water intakes, which can potentially cause cavitation that can lead to permanent pump damage. To prevent this from happening, DOU is recommending the purchase and installation of vibration monitoring equipment that will detect potentially harmful vibrations before damage occurs. This equipment would tie into DOU's SCADA system with an alarm to alert Operations staff, and a subsequent automatic shutdown of the pumps before damage could occur. This equipment provides a twofold benefit with protection of our infrastructure and increased systems reliability. To purchase and implement a fully automated protective system will cost approximately $225,000.

Conservation Results

Customer outreach has been successful in raising awareness of Stage 2 water restrictions and resulted in a substantial increase in water use violation calls. Between January 1 and May 31, 2014 there were 1720 reports of improper water use, as compared to 60 in the same period in 2013.

Since the Council's water shortage declaration, water production [as measured in millions of gallons per day (MGD)] has begun to decline. Detailed water production results will continue to be provided on a regular basis to monitor progress and will serve as a trigger to determine future actions and recommendations.

Future Drought Mitigation Plans

Both the California Department of Water Resources and U.S. Bureau of Reclamation have significantly reduced upstream reservoir releases to conserve water and are considering reducing flows even lower based on an anticipated dry winter. This has resulted in lower flows in the American and Sacramento Rivers where the City's two surface water intakes are located, although Reclamation's releases into the lower American River currently are higher than previously anticipated, which Reclamation has indicated is occurring to meet salinity requirements in the Delta. The regional purveyors who rely on water from Folsom reservoir have expressed concerns that Reclamation's continued higher-then-expected releases from the reservoir may jeopardize future water availability from the reservoir if another dry year occurs.

During the last week of May, the State Water Resources Control Board (SWRCB) issued notices of curtailment to post-1914 appropriative water right holders in the San Joaquin and Sacramento River watersheds. The SWRCB's curtailment order applies to diversions of natural flow, but not to authorized diversions of water that is released from storage in upstream reservoirs.

The City holds both pre-1914 and post-1914 appropriative water rights. A significant portion of the water the City diverts under its post-1914 rights is water released from upstream reservoirs in the American River basin, which is not subject to the curtailment notice. The DOU anticipates that sufficient water will continue to be released from these upstream reservoirs to meet the City's surface water demands, but it is critical that the City maintain a

steadfast commitment to the ongoing water conservation measures while the drought persists, as well as long term water conservation planning to maintain water supply reliability.

Should the drought conditions persist into the fall and winter of 2014, it may be necessary to implement increased measures as called for in Stages 3 and/or 4 of the City's Water Shortage Contingency Plan. Staff has outlined a series of drought response triggers and actions to guide future decisions that may be necessary to achieve additional conservation and/or enhance water supplies. These actions may warrant immediate implementation if drought conditions persist. Therefore, it is prudent for the City to be proactive in the establishment of the fiscal policies necessary to expedite drought and water shortage mitigation plans and ensure adequate water supply.

RESOLUTION NO. 2014-0209

Adopted by the Sacramento City Council

June 17, 2014

DECLARING CONTINUING WATER SHORTAGE AND IMPLEMENTING ADDITIONAL WATER CONSERVATION RESTRICTIONS

BACKGROUND

A. The City of Sacramento has three water supply sources: American River water, Sacramento River water, and groundwater. The City diverts surface water for approximately 85% of the City's water supply from the two rivers under its Sacramento and American River water rights and entitlements, with the remaining 15% provided by groundwater wells.

B. Article XI of Chapter 13.04 of the Sacramento City Code (Outdoor Water Conservation) specifies outdoor water use limitations and restrictions to promote efficient water use and increase water conservation. City Code section 13.04.910 authorizes the City Council, by Resolution, to declare the existence of a water shortage and impose revised or additional limitations and restrictions on outdoor water use while the water shortage remains in effect.

C. On January 14, 2014, based on critical drought conditions, the Sacramento City Council adopted Resolution No. 2014-0018, declaring a water shortage and implementing Stage 2 of the City's water shortage contingency plan, which enacted water conservation measures and water use restrictions in addition to those already included in the City Code with the goal of reducing water use by 20% or more.

D. The City's Department of Utilities also activated an emergency drought response team, appointed an Incident Commander, and deployed an Incident Command Structure to effectively address all aspects of the drought including: operational issues, planning and strategy, public outreach and education, funding and financing, and logistics. The drought response team meets weekly.

E. On January 17, 2014, Governor Jerry Brown signed a proclamation declaring a drought State of Emergency in California.

F. On January 31, 2014, the State Board approved a Temporary Urgency Change Petition filed by the California Department of Water Resources (DWR) and U.S. Bureau of Reclamation (USBR), lowering Bay-Delta flow requirements to allow the DWR and USBR to reduce releases and maintain more water in State Water Project (SWP) and Central Valley Project (CVP) reservoirs, resulting in further reductions to river flow levels upstream of the City's surface water intakes. Since that time the State Board has approved subsequent revisions to SWP and CVP operations in response to the drought.

G. On April 25, 2014, Governor Jerry Brown signed a proclamation of a continued drought State of Emergency in California, which included, among other things, the following provisions:

3. Recognizing the tremendous importance of conserving water during this drought, all California residents should refrain from wasting water:

a. Avoid using water to clean sidewalks, driveways, parking lots and other hardscapes.

b. Turn off fountains and other decorative water features unless recycled or grey water is available.

c. Limit vehicle washing at home by patronizing local carwashes that use recycled water.

d. Limit outdoor watering of lawns and landscaping to no more than two times a week.

Recreational facilities, such as city parks and golf courses, and large institutional complexes, such as schools, business parks and campuses, should immediately implement water reduction plans to reduce the use of potable water for outdoor irrigation.

Commercial establishments such as hotel and restaurants should take steps to reduce water usage and increase public awareness of the drought through measures such as offering drinking water only upon request and providing customers with options to avoid daily washing of towels or sheets.

* * *

H. During the last week of May, 2014, the State Water Resources Control Board (State Board) issued notices of curtailment for post-1914 appropriative water rights in the Sacramento and San Joaquin River watersheds, and indicated that notices of curtailment to some pre-1914 and riparian right holders may be issued in the near future.

I. The City of Sacramento is implementing numerous measures to implement the City Council's declaration of water shortage and Governor's drought proclamations, promote water conservation, and increase water use efficiency, by:

- Prohibiting the use of City water to wash down sidewalks, driveways, or parking areas.

- Prohibiting the waste of City water from leaky water lines or fixtures, and prohibiting water runoff due to excessive application of City water for irrigation.

- Encouraging residents to limit residential car washing by patronizing carwashes that recycle water. The City also prohibits residential car washing with a hose unless the hose is equipped with an automatic shut-off nozzle attachment, and the attachment is being used to shut off the flow of water at all times when the hose is not being used to wash the vehicle.

- Limiting outdoor irrigation for residential or commercial purposes while daylight savings time is in effect to two days per week, based on the street address, with no watering allowed between 10 a.m. and 7 p.m., and no watering allowed at all on Mondays, Thursdays, and Fridays. Outdoor irrigation is restricted to one day per week when daylight savings time ends.

- Significantly increasing enforcement of the City's outdoor water use restrictions, with a doubling of violation penalties while the water shortage remains in effect. To enforce these restrictions, the City has trained code enforcement officers to augment City water conservation staff in patrolling the streets. Over 1,800 notices of violation have been issued for irrigation-related violations since the water shortage began.

- Establishing a multi-departmental task force to assure that the City would lead by example and significantly reduce the City's own water use. Following the City Council's declaration of a water shortage in January, the use of water from February through May by City parks and other City facilities (approximately 1,000 accounts) has been reduced by approximately 57 % from the same time period in 2013.

- Working with commercial and governmental water service customers to identify ways to reduce water usage, including reductions in outdoor irrigation usage, and encouraging restaurants and hotels to conserve water by offering drinking water on request and providing options to the daily washing of towels or sheets.

- Conducting an extensive and ongoing public information effort throughout the City to inform City residents and businesses of the need for water conservation, the water use limitations and restrictions adopted and enforced by the City, and practical ways to reduce water use.

- Doubling the City's ongoing leak detection and correction efforts.

- Advancing roll-out of the City's "River Friendly Landscape Program" (aka "cash for grass") to encourage residential customers to replace turf with drought tolerant landscaping.

- Expediting the rehabilitation of nine existing groundwater wells on an emergency basis to reduce surface water usage, and entering into agreements with neighboring agencies to receive supplemental groundwater if needed due to drought-related shortages.

J. The only item in the Governor's proclamation of a continuing drought State of Emergency excerpted in Recital G, above, not already being addressed by the City is the call for residents and businesses to turn off fountains and other decorative water features unless recycled or grey water is used.

K. This Resolution adds a provision addressing the use of water fountains to the City's Stage 2 water conservation measures, and adds restrictions to the City's current outdoor water use requirements to improve the enforcement and effectiveness of these requirements while the water shortage continues.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE CITY COUNCIL RESOLVES AS FOLLOWS:

Section 1. Based on the on-going drought conditions, the Sacramento City Council hereby declares that a water shortage continues to exist, and that each and every provision of Resolution No. 2014-0018 shall remain in full force and effect, as supplemented by the provisions of this Resolution.

Section 2. The water conservation measures and water use restrictions described below are adopted:

A. The City Manager shall encourage City residents and businesses to turn off fountains and other decorative water features that do not use recycled water or grey water.

B. No person shall knowingly or willingly cause or allow any city water used on residential property for non-irrigation purposes to flow away as water waste runoff (as defined in City Code section 13.04.840) from property owned or occupied by such person, except for water used to wash a vehicle in compliance with City Code section 13.04.870(B).

Section 3. The water conservation measures and water use restrictions described in Section 2 of this Resolution are in addition to the provisions of Resolution No. 2014-0018 and the existing provisions of Article XI of Chapter 13.04 of the City Code (Outdoor Water Conservation); in the event of any conflict between any provision of Article XI and this Resolution or Resolution No. 2014-0018, the provisions of this Resolution and Resolution No. 2014-0018 shall govern while these Resolutions remain in effect.

Section 4. The City Manager is authorized and empowered to delegate the City Manager's authority hereunder to such assistants, deputies, officers, employees, or agents of the City as the City Manager shall designate, and to establish such rules, regulations, and procedures, and to prepare or furnish such forms, as the City Manager deems necessary or appropriate to carry out the provisions of this Resolution.

Section 5. No person shall use, or cause to be used, City water in violation of any of the provisions of this Resolution, or of Resolution No. 2014-0018, while the water shortage remains in effect, as specified in City Code § 13.04.870(G).

Section 6. The penalties for violations specified in City Code § 13.04.890 shall continue to be doubled while the water shortage remains in effect, as specified in City Code § 13.04.890(D).

Section 7. This Resolution shall be effective upon its adoption, and shall remain in effect until rescinded or otherwise modified by subsequent resolution of the City Council.

Section 8. This Resolution shall be published within ten days after its adoption, pursuant to California Water Code § 376(a).

Adopted by the City of Sacramento City Council on June 17, 2014, by the following vote:

Ayes: Members Ashby, Cohn, Hansen, McCarty, Pannell, Schenirer, Warren, and Mayor Johnson.

Noes: None

Abstain: None

Absent: Member Fong.

Attest:

Shirley A. Concolino

Digitally signed by Shirley A. Concolino
DN: cn=Shirley A. Concolino, o=City of Sacramento, ou=City Clerk, email=sconcolino@cityofsacramento.org, c=US
Date: 2014.06.23 11:42:59 -07'00'

Shirley Concolino, City Clerk

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GE
Energy

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For the attention of: **Mr. Wasina**
Subject: **Bently Nevada online condition monitoring on Intake Pumps**
Reference: Proposal No. 1049217 rev 0 (Budgetary Price Proposal)
Proposal Date: 1-April-2014

GE - Bently Nevada is pleased to submit this Budgetary Price Proposal to provide Bently Nevada Machinery Protection hardware and services for the motor driven intake pumps at the Sacramento and American Rivers. Currently these machines are currently not equipped with vibration monitoring. After a review by our application best practices on these machines, the recommended monitoring includes our 1900/65A monitoring & Protection system, (3) case mounted Velomitor sensors and associated cabling per unit. The sensors will be placed on each of the motor bearings (top & bottom) and one placed perpendicular to the pump discharge piping near the coupling area. A site walk down on the Sacramento facility recorded the following details for the (8) machines. This proposal will focus on budgetary numbers for the Sacramento facility only for now, but price per unit estimates can be carried to the American River facility.
(6) – 300HP Motor Driven Pumps
(2) – 150HP Motor Driven Pumps

The 1900/65A monitoring protection systems contain (4) vibration inputs, (4) temperature inputs (not used in this case), 4-20mA outputs, relay outputs, local display and TCP/IP Modbus interface to export the data to the plant PLC/DCS. The 1900/65A is software configurable and all alarm and danger parameters as well as Modbus communications can be configured. The Modbus Gateway allows the monitor to provide static variables, statuses, event list, time and date information directly to any Modbus client, including Distributed Control Systems (DCSs), Supervisory Control and Data Acquisition (SCADA) systems, Programmable Logic Controllers (PLCs). Additionally, the 1900/65A systems will be provided with a NEMA 4X enclosure to be mounted on the unistrut next to the machines

imagination at work

By installing the Bently Nevada 1900/65A monitoring systems, the City of Sacramento will gain online continuous monitoring of these machines with data trended back and the PLC/DCS. This will allow the City of Sacramento to evaluate the operating conditions and the health of the equipment to make operating decisions. Recently with lower water levels, the machines have experienced cavitation, where the monitoring system can evaluate and determine the severity of the conditions. The scope of this proposal includes the necessary hardware (1900/65A, Velomitors and cables) along with services (Kick of meeting, electrical design drawings, configuration, loop checks, startup technical assistance, DCS integration and a project report).

Budgetary Priced Proposal

Description	Price
Base Project – 1900/65A monitoring systems: GE Energy-Bently Nevada will provide (8) 1900/65A monitoring & protection systems to monitor the intake pumps at the Sacramento River facility. Pricing includes (3) Velomitor sensors per unit and associated cabling. Services include, site kick off meeting, electrical design drawings, configuration, loop checks, Modbus communication (DCS support), startup/commissioning services and project report.	**$ 110,868.00** (Approx. $13,858 per unit)

Note 1: The above price does not include taxes or duties.

Scope of Work:

ADDITIONAL ASSUMPTIONS & CLARIFICATIONS:

- All prices are budgetary, +/- 15%
- Purchased and installed in 2014
- Services estimate is based on using local services from the Sacramento, CA area. 6 weeks notice required to ensure local resources can be used, otherwise airfare will need to be priced into the propsoal.
- Startup of the machines assocaited with the 8x 1900/65A systems is expected to occur over 2 days, as quoted.

BUYER RESPONSIBILITIES:

- Appoint a Project Manager as a single point of contact responsible for obligations associated with this project.
- City of Sacramento IT folks available to support integration of systems (Ethernet cable from 1900/65A rack to DCS)
- Installation and wiring of the 1900/65A systems is to be provided by City of Sacramento. Bently Nevada will provide electric drawings showing wiring connections. Connections required before Bently Nevda arriving onsite for testing.

- Provide advanced notification of safety training requirements.
- Supply GE with any site-specific policies and procedures.
- Coordination with plant operations for the implementation of scope of work.
- Plan internal resources as required to implement scope and schedule defined.
- Supply needed work permits prior to start of each workday.
- Buyer to provide a work area to consist of desk and phone access.
- Removal of covers to access transducers, if required.
- Buyer will provide all plant services such as light, heat, water, electric power and disposal of all waste materials.

TERMS AND CONDITIONS:

This proposal is subject to the terms and conditions listed below, and by reference are incorporated herein. To the extent there are conflicts or inconsistencies between this set of Terms and Conditions and the preceding information provided in this document, the preceding information shall prevail.

- GE Oil & Gas ES 104 Terms and Conditions (per below) noted below.

PAYMENT TERMS:

Our Firm Price Quotation is based upon the following invoicing schedule and terms:

1.1.1 All Pricing is in United States Dollars (US$)

1.1.2 All Payments are NET 30 Days from receipt of invoice

1.1.3 Project Invoicing Schedule:

Project Payment Milestone	***Invoice Amount***
Contract Signing/Purchase Order Receipt	25%
Shipment of Equipment (Hardware/Software)	70%
Demobilization from the jobsite	5%

PURCHASE ORDER:

Buyer's Purchase order shall provide the following deliverables:

- Purchase Order conforming to this proposal.
- Purchase Order should be made out to **Bently Nevada, Inc.** at the address listed below.

  Note: Deviations from the proposal in Scope, Price, payment schedule, Terms and Conditions, Shipment Cycle, or Installation Cycle may cause delays or non-acceptance of Purchase Order.
- The execution period of this contract starts from Sellers Order Acknowledgement date.

LEGAL ENTITY:

Upon the Buyer's decision to submit a purchase order, please address the Purchase order to the following Seller's Legal Entity:

- Upon the Buyer's decision to submit a purchase order, please address the Purchase order to:

  Bently Nevada, Inc.
  1631 Bently Parkway South
  Minden, NV 89423
  Attn: Darren Evans

NOTE: Please FAX Purchase Order to (360) 368-6067 or email PDF version to darren1.evans@ge.com.

GENERAL PRICING CONSIDERATIONS:

Pricing Basis and proposal validity
Prices herein are fixed price and valid for 60 days of the proposal date. Bently Nevada Inc. reserves the right to review the pricing assumptions and adjust the project pricing based upon an agreed upon project schedule.

Out of Scope Works
"Out of scope works" shall be defined as "Any additional work required, requested, or recommended not specifically defined in the scope of work proposed herein". Upon receipt of written request, Seller may provide a firm price quotation or perform the work at the rates provided herein. Additional works will not commence until additional pricing and/or changes to schedule have been agreed.

Delays
Delays in the performance of work beyond the reasonable control of Seller, or delays caused by acts of the Buyer or prerequisite work by others, shall entitle Seller to an adjustment of time and price for completion of its work and expenses resulting there from.

All information and pricing contained herein is confidential to GE Energy. Any distribution or use of this document for purposes other than its original intent is expressly forbidden without prior GE Energy written authorization.

We thank you for the opportunity to provide this fixed priced proposal for this project to help define project scope. Additional information on GE Energy and our products and services can be found on our website at www.ge-energy.com/oc. If you have any questions or concerns regarding this proposal, please do not hesitate to contact my cell phone at (775) 230-3983.

Yours sincerely,
For and On behalf of GE Energy – Measurement & Control Solutions

Darren Evans
Sales Manager
Bently Nevada Asset Condition Monitoring
M: (775) 230-3983

This document, all related and derivative information, whether written or oral is submitted in confidence for evaluation by the Buyer. As such, its contents are proprietary and confidential to Seller. In taking receipt of this document, Buyer agrees not to reveal its contents, to third parties or otherwise, except to those who must evaluate it. Upon written request of Seller, Buyer will return all copies of this document to Seller. The equipment listed in this document is based on preliminary information and is subject to change.

Sales Contact:

Darren Evans, Sales Manager

Bently Nevada, Inc.

1631 Bently Parkway South

Minden, NV 89423

Mobile Phone: (775) 230-3983

Office Phone: (360) 597-3138

Darren1.evans@ge.com

imagination at work

RECLAMATION
Managing Water in the West

U.S. Department of the Interior
Bureau of Reclamation

American River Group

Thursday, June 19, 2014 1:30 PM
Central Valley Operation Office, Room 302
3310 El Camino Ave.
Sacramento, CA 95821

1. Fisheries Updates

2. Operations Forecast

3. Temperature Management

4. Status Reports

5. Schedule Next Meeting

6. Adjourn

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. BUREAU OF RECLAMATION-CENTRAL VALLEY PROJECT-CALIFORNIA

DAILY CVP WATER SUPPLY REPORT

JUNE 18, 2014 RUN DATE: June 19, 2014

RESERVOIR RELEASES IN CUBIC FEET/SECOND

RESERVOIR	DAM	WY 2013	WY 2014	15 YR MEDIAN
TRINITY	LEWISTON	638	709	800
SACRAMENTO	KESWICK	13,738	9,165	12,574
FEATHER	OROVILLE (SWP)	3,500	3,500	3,500
AMERICAN	NIMBUS	2,311	2,559	2,998
STANISLAUS	GOODWIN	263	254	500
SAN JOAQUIN	FRIANT	381	0	351

STORAGE IN MAJOR RESERVOIRS IN THOUSANDS OF ACRE-FEET

RESERVOIR	CAPACITY	15 YR AVG	WY 2013	WY 2014	% OF 15 YR AVG
TRINITY	2,448	1,960	1,886	1,113	57
SHASTA	4,552	3,656	3,106	2,003	55
OROVILLE (SWP)	3,538	2,770	2,706	1,612	58
FOLSOM	977	789	698	502	64
NEW MELONES	2,420	1,612	1,287	750	47
FED. SAN LUIS	966	511	326	447	87
MILLERTON	520	417	416	0	0
TOT. N. CVP	11,360	8,529	7,303	4,815	56

ACCUMULATED INFLOW FOR WATER YEAR TO DATE IN THOUSANDS OF ACRE-FEET

RESERVOIR	CURRENT WY 2014	DRIEST WY 1977	WETTEST WY 1983	15 YR AVG	% OF 15 YR AVG
TRINITY	348	185	2,392	1,133	31
SHASTA	2,207	1,939	9,634	4,496	49
FOLSOM	753	293	5,496	1,968	38
NEW MELONES	268	0	2,122	748	36
MILLERTON	347	166	3,174	1,088	32

ACCUMULATED PRECIPITATION FOR WATER YEAR TO DATE IN INCHES

RESERVOIR	CURRENT WY 2014	DRIEST WY 1977	WETTEST WY 1983	AVG (N YRS)	% OF AVG	LAST 24 HRS
TRINITY AT FISH HATCHERY	16.41	12.76	54.65	31.07 (52)	53	0.00
SACRAMENTO AT SHASTA DAM	30.00	17.24	112.33	60.26 (57)	50	0.00
AMERICAN AT BLUE CANYON	43.07	15.64	103.88	63.96 (39)	67	0.00
STANISLAUS AT NEW MELONES	16.26	0.00	45.33	26.50 (36)	61	0.00
SAN JOAQUIN AT HUNTINGTON LK	16.49	17.20	81.40	40.90 (39)	40	0.00

DRAFT June 2014

90%-Runoff Exceedance Outlook

Federal End of the Month Storage/Elevation (TAF/Feet)

		Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Folsom	548	473	412	351	295	255	221	195	210	270	394	535	601
Elev.		413	405	396	386	379	372	366	369	382	402	421	429

Monthly River Releases (cfs)

American	2000	1624	1637	1430	792	794	800	800	800	800	1000	1771

Summary for Folsom Lake and Lower American River - May 2014

Day	Mean Daily Water Temperature (˚ F)									Storage (TAF)	Release (cfs)	Sacramento Mean Daily Air Temperature (˚ F)
	NFA	ARP	AFD	Penstock Units 1-2-3			AHZ	AWP	AWB	Folsom	Nimbus	
1	59.5	56.8	53.3	T(49)	T(50)	T(1)	56.6	61.3	64.0	550.5	809	75
2	60.1	55.7	53.4	T(42)	T(50)	T(8)	56.8	60.7	63.3	553.1	806	71
3	59.8	58.8	53.8	T(48)	T(51)	T(1)	57.1	60.7	62.6	555.6	808	62
4	60.4	58.9	53.3	T(43)	T(15)	T(42)	58.9	60.6	62.0	556.8	807	61
5	60.8	57.1	53.5	T(44)	T(1)	T(55)	58.7	61.4	62.9	559.1	809	61
6	60.8	58.2	53.7	T(64)	T(1)	T(35)	59.1	61.8	63.2	560.3	808	63
7	60.7	57.4	53.6	T(60)	O(1)	T(39)	58.1	62.1	63.7	561.4	812	62
8	60.9	60.6	53.4	T(48)	O(1)	T(51)	57.8	60.3	62.1	561.4	960	61
9	61.3	61.4	54.2	T(95)	O(1)	T(4)	58.7	61.2	62.3	563.1	965	63
10	60.7	59.9	54.3	T(54)	O(1)	T(45)	59.3	61.2	62.8	564.4	966	61
11	60.1	58.7	54.3	T(50)	O(1)	T(49)	60.5	61.8	62.8	566.0	964	66
12	60.5	59.2	54.3	T(49)	O(1)	T(50)	59.1	63.1	64.6	566.9	966	71
13	61.2	59.4	54.5	T(94)	O(1)	T(5)	58.2	62.3	64.9	568.9	965	74
14	62.7	60.0	54.6	T(98)	O(1)	T(1)	58.1	62.3	64.9	570.1	961	78
15	64.5	60.3	54.6	T(98)	O(1)	T(1)	57.9	62.1	64.8	571.4	968	79
16	64.2	61.3	54.6	T(46)	O(0)	T(54)	59.1	61.9	63.8	570.4	1,703	73
17	63.7	63.3	54.8	T(60)	O(0)	T(40)	59.1	60.8	62.4	568.8	1,746	67
18	63.9	63.1	54.7	T(38)	O(0)	T(62)	58.9	61.1	62.2	567.9	1,745	66
19	63.6	62.7	54.5	T(63)	O(0)	T(37)	58.8	60.4	61.6	566.5	1,747	62
20	62.6	61.2	55.4	T(67)	O(0)	T(33)	59.3	59.7	60.5	564.9	1,745	62
21	62.3	61.9	55.1	T(35)	O(0)	T(65)	58.4	61.0	62.2	562.8	1,747	67
22	64.2	62.4	55.1	T(42)	O(0)	T(58)	58.2	60.9	62.5	562.3	1,747	69
23	64.0	62.4	55.5	T(34)	O(19)	T(47)	58.7	61.2	62.8	561.1	1,747	71
24	66.4	63.7	55.4	T(39)	O(0)	T(61)	59.3	61.7	63.5	559.8	1,747	75
25	68.1	64.7	55.6	T(49)	O(0)	T(51)	59.4	62.2	64.1	558.5	1,747	75
26	68.5	64.8	55.7	T(53)	O(0)	T(47)	59.6	62.2	64.1	557.3	1,744	75
27	67.8	63.4	56.0	T(37)	O(0)	T(63)	59.3	61.7	63.4	555.9	1,745	72
28	65.9	65.7	56.2	T(44)	T(46)	T(10)	60.5	61.5	62.8	553.5	1,992	69
29	64.2	63.8	56.3	T(21)	T(49)	T(30)	59.5	61.9	63.0	551.1	1,926	71
30	62.5	63.5	56.4	T(0)	T(66)	T(34)	59.2	61.3	62.7	549.9	1,942	68
31	62.5	63.6	56.6	T(0)	T(43)	T(57)	59.7	61.3	62.4	547.9	1,917	68
Avg	62.9	61.1	54.7				58.8	61.4	63.1		1,357	68
Tot af											83,426	

! Incomplete or estimated
 # Station out of service
*** See notes on next page**

N Data not recorded or collected
Shutter Position (T-Top raised; M-Middle raised; B-Bottom raised; A-All lowered; O-Unit Outage)
Penstock Unit Blending (value in parentheses represents approximate % total daily load)

6/18/2014

Summary for Folsom Lake and Lower American River - June 2014

Day	Mean Daily Water Temperature (˚ F)									Storage (TAF)	Release (cfs)	Sacramento Mean Daily Air Temperature (˚ F)
	NFA	ARP	AFD	Penstock Units 1-2-3			AHZ	AWP	AWB	Folsom	Nimbus	
1	63.8	64.1	56.7	T(0)	T(41)	T(59)	59.8	62.0	63.4	545.9	1,914	73
2	63.4	65.1	56.9	T(38)	T(42)	T(20)	59.5	61.7	63.1	544.2	1,916	66
3	63.6	65.9	57.2	T(46)	T(28)	T(26)	60.3	61.9	62.9	541.4	1,916	66
4	65.1	68.5	57.3	T(36)	T(33)	T(31)	60.7	62.8	64.3	538.6	1,916	74
5	66.2	70.6	57.3	T(34)	T(31)	T(35)	60.4	63.3	65.3	535.9	1,917	75
6	66.4	69.9	57.6	T(39)	T(40)	T(21)	60.6	62.8	64.9	533.6	1,917	72
7	67.9	70.5	57.8	T(59)	T(40)	T(1)	61.2	63.4	65.5	531.4	1,916	74
8	67.3	70.5	57.8	T(45)	T(31)	T(24)	62.1	64.4	66.6	529.5	1,917	83
9	66.4	70.7	58.1	T(0)	T(55)	T(45)	61.5	64.9	67.3	527.7	1,916	82
10	64.0	68.4	58.2	T(0)	T(66)	T(34)	61.7	64.3	66.8	525.7	1,917	79
11	* 65.2	72.2	58.2	M(0)	T(46)	T(54)	61.1	63.7	65.8	523.3	1,917	67
12	64.7	70.4	58.4	M(0)	T(54)	T(46)	61.7	63.5	65.1	521.2	1,916	65
13	65.2	69.3	59.0	M(0)	T(42)	T(58)	62.4	63.9	65.5	518.5	1,979	71
14	64.3	68.0	59.1	M(0)	T(39)	T(61)	61.9	63.9	65.7	516.0	2,001	73
15	63.7	67.6	59.0	M(0)	T(39)	T(61)	61.3	63.6	65.1	513.5	2,002	69
16	65.6	68.5	59.1	M(0)	T(44)	T(56)	61.8	63.3	64.8	511.0	1,996	65
17	66.0	68.0	59.5	M(4)	T(38)	T(58)	62.7	63.8	65.2	506.8	2,550	68
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
Avg	65.2	68.7	58.1				61.2	63.4	65.1		1,972	72
Tot af											66,491	

! Incomplete or estimated
 # Station out of service
*** See notes on next page**

N Data not recorded or collected
Shutter Position (T-Top raised; M-Middle raised; B-Bottom raised; A-All lowered; O-Unit Outage)
Penstock Unit Blending (value in parentheses represents approximate % total daily load)

6/18/2014

* 6/11/2014 Middle Shutter raised on Unit 1

TECHNICAL MEMORANDUM

MONTGOMERY WATSON

E.A. FAIRBAIRN WATER TREATMENT PLANT
INTAKE STRUCTURE MODIFICATIONS
TECHNICAL MEMORANDUM NO. 1

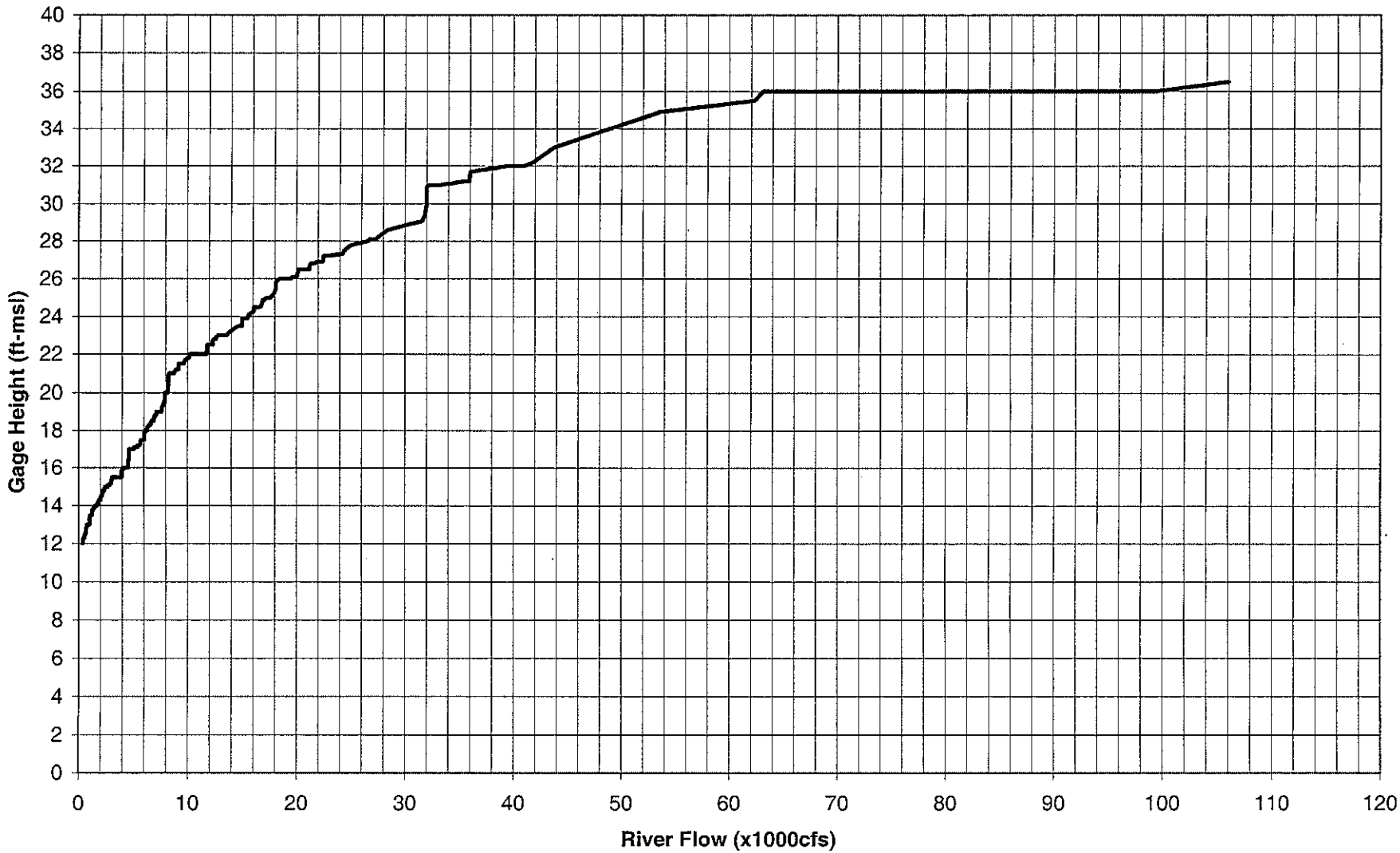
To:	Gary Gosse City Representative	**Prepared by:**	Maggie Kido
		Reviewed by:	Don Spiegel
From:	Don Spiegel Don Project Manager	**Reference:**	1076204
Subject:	American River Hydrology in the Vicinity of the E.A. Fairbairn WTP Intake Structure	**Date:**	March 29, 1999

This Technical Memorandum characterizes the hydrology of the American River in terms of river flow, river stage (height), and river velocity in the vicinity of the Intake Structure Modifications Project for the E.A. Fairbairn Water Treatment Plant (EAFWTP). Rating and exceedance curves were developed from data collected at the USGS Fair Oaks gage station (located adjacent to the Nimbus Fish Hatchery downstream of Nimbus Dam) and at the EAFWTP.

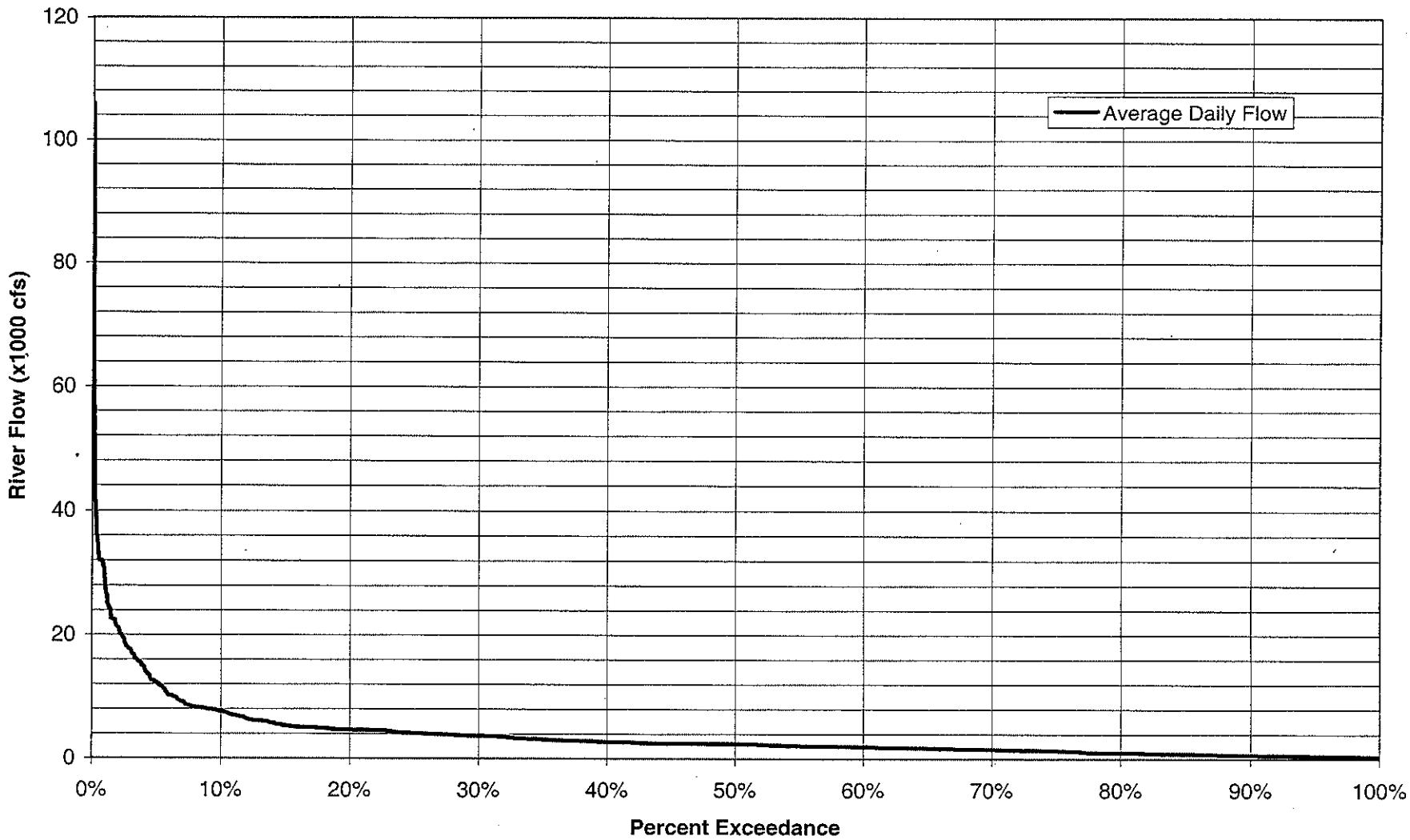
RIVER STAGE AND FLOW DATA

Daily river flows recorded from January 1, 1989 to September 30, 1997 at the Fair Oaks gage station were correlated to daily gage heights recorded at the EAFWTP Intake Structure. A rating curve for the American River at the EAFWTP Intake Structure is provided as Figure 1. An exceedance curve for American River flows at the Fair Oaks gage is provided as Figure 2. Flows at the Fair Oaks gage station are within about two percent of the flows at the EAFWTP Intake Structure. The American River at the E.A. Fairbairn WTP Intake Structure has never dropped below a stage height of 12.0 feet in its 35 years of operation.

Based on the above discussion, it is recommended that a design low water level of elevation 12.0 be used for the EAFWTP Intake Structure Modifications Project. This design low water level impacts three features of the Intake Structure:



American River Rating Curve at the E.A. Fairbairn WTP Intake Structure
(Based on Data from January 1, 1989 to September 30, 1997)
Figure 1



Exceedance Curve for American River Flows at the Fair Oaks Gage
(Based on Data from January 1, 1989 to September 30,1997)
Figure 2

1. Only the portion of the existing fish screens below elevation 12.0 can be used in calculating the approach velocity to the screens.

2. The top of the new fish screens must be located below elevation 12.0.

3. The pump station (specifically the vertical turbine pumps) must be designed to deliver their design flow at the low water level of elevation 12.0.

RIVER VELOCITIES

To calculate river velocities at various river flows in the vicinity of the EAFWTP Intake Structure, river bottom elevations were obtained from sounding the river. Integrated river and land survey data are presented as Figure 3. Based on the survey data shown in Figure 3, a cross-section of the American River in the vicinity of the Intake Structure was produced (see Figure 4). From this cross section, river cross-sectional areas and river velocities at various river flows, beginning at an American River flow of 500 cfs, were calculated. River velocities were calculated using the continuity equation; Q=VA (flow = velocity times cross sectional area). The results of these calculations are shown in Table 1.

Table 1
American River Velocities in the
Vicinity of the EAFWTP Intake Structure Modifications Project

River Flow (cfs)	River Stage (ft-msl)	River Cross-Sectional Area (sf)	River Velocity (fps)	Comments
500	12	1,400	0.34	Critical Dry Year Flow
1,000	13	1,500	0.67	Dry Year Flow
1,750	14	1,600	1.1	Hodge Flow Trigger (July 1 through October 14)
2,000	14	1,600	1.2	Hodge Flow Trigger (October 15 through February 28)
3,000	15	1,700	1.8	Hodge Flow Trigger (March 1 through June 30)

CITY OF SACRAMENTO
DEPARTMENT
OF UTILITIES

2010 Urban Water Management Plan

October 2011

carollo
Engineers...Working Wonders With Water®

has agreed to limit its diversions for water treated at the FWTP to 155 cfs and 50,000 AFY. Any additional water needs must be met by diversions at other locations and/or other sources.

Conference Years have occurred on the American River only twice over the period of record historical hydrology (1922-2010). These years were water year 1924 and water year 1977; a water year is the 12-month period, starting October 1 and ending on September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. For example, the year ending September 30, 1992 is called the "1992 water year."

4.1.2.5.2 *Hodge Flow Conditions*

The Water Forum parties agreed to use the Hodge Flow Criteria as a minimum flow that would preserve and protect the instream resources of the Lower American River. The PSA negotiated by the City restricted the City from using a portion of the FWTP diversion capacity during periods when these flows were not met.

Under the City's PSA, the FWTP may divert up to 310 cfs (200 mgd) as long as the flow in the river is greater than the Hodge criteria flow (Table 22). The 310 cfs is approximately equal to 205,000 AFY assuming the FWTP is down for one month during the year for maintenance, and can only operate for 334 days continuously. If needed, the plants could operate year-round.

During the early summer in many years, but not all, the American River flows above the Hodge criteria. However, in drier years in early summer, and in most years after August 15, the American River flows below the Hodge criteria, limiting FWTP withdrawal and potable water production. Whenever the river flow is less than the Hodge criteria flow, the FWTP cannot divert more than the maximum diversions shown in Table 22.

Table 22 Hodge Flow Criteria for FWTP Defined
Water Treatment Plants Rehabilitation Project
City of Sacramento Department of Utilities

River Flow at the Intake (cfs)	<2,000		<3,000			<1,750				<2,000		
Time of Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct 14th	Oct 15th	Nov	Dec
Max Diversion at FWTP (mgd)	77		77			100	100		77	65	65		

Notes: Source: Water Forum Agreement January 2000 Appendix C.

As shown in Table 23, the total annual diversion to the FWTP during a year when flows passing the FWTP are below Hodge Flow Criteria every day of the year (a hypothetical Hodge Flow year), and assuming the FWTP is down for maintenance one month of the year, is approximately 82,260 AFY.

Main Ditch Piping – El Dorado Irrigation District

List of References

- Draft Basis of Design Report, 2014, **page 42**
- Draft Basis of Design Report, Appendix F Opinion of Probable Construction Costs, **All pages**
- Environmental Assessment of Proposed El Dorado Main Canal Pipeline Project, **page 6-7**

DRAFT UPPER MAIN DITCH PIPING BASIS OF DESIGN REPORT

PREPARED FOR:

El Dorado Irrigation District

Prepared By:

D&A CIVIL ENGINEERING

DOMENICHELLI & ASSOCIATES
CIVIL ENGINEERING
1101 Investment Blvd., Suite 115
El Dorado Hills, CA 95762

July 11, 2014

EXECUTIVE SUMMARY

The purpose of this Basis of Design Report (BODR) is to determine final design criteria and prepare a 10% level of design for the piping of the Upper Main Ditch for the El Dorado Irrigation District (EID). The pipeline will be approximately three miles in length and travel along the Main Ditch between Forebay Reservoir and Reservoir 1 Water Treatment Plant (WTP). EID intends to construct a pipe that will replace the open ditch, convey raw water, reduce leakage and losses, and improve the water quality of water entering the treatment plant.

Pipeline Material Selection

Three pipe materials, Polyvinyl Chloride (PVC), Ductile Iron Pipe (DIP), and High Density Polyethylene Pipe (HDPE), were reviewed and evaluated. PVC pipe was selected based on its cost, estimated service life, hydraulic capacity, and ease of construction.

Pipeline Alignment Selection

Three alignments were reviewed. Alignment#1 follows the existing ditch alignment for 15,400 feet. Alignment #2 follows the existing ditch for 11,550 feet and has a 1,750 feet cross country portion that will require a creek crossing, an access road in relatively steep terrain, and erosion control at a blow off valve at the low point at the creek, for a total length of 13,300 feet. Alignment #3 follows the existing ditch for 6,100 feet and has a portion within Blair Road for approximately 6,800 feet, which will require saw cutting, asphalt removal, structural backfill, road repair, pavement/slurry placement, centerline restriping, and traffic control, for a total length of 12,900 feet.

Alignment #1 was selected as the preferred alignment due to ease of installation, least easement acquisition requirements, reduced O&M, and lowest cost.

Hydraulic Analysis

The hydraulic analysis is based on the recommended Alignment #1, design drawings for the Forebay Dam Modification project and a limited topographic survey prepared by Alan Divers, PLS. EID provided maximum and minimum operating water surface elevations in the Forebay Reservoir as a baseline for the hydraulic calculations. Based on a maximum design flow of 40 cfs, the recommended pipe size will be a combination of 36-inch and 42-inch diameter PVC pipe.

Other Design Considerations

- There are three existing EID raw water customers served from the Main Ditch. Continuation of service to these customers will be required.

- The need for a pig launching facility was initially reviewed, however Forebay water quality and flows above minimum scouring velocity eliminate the need for further consideration.

- At the inlet to the WTP a structure is proposed that will dissipate energy from the discharge pipe, and collect and screen debris that may enter the system at Forebay Reservoir.

Construction Schedule

The project must be constructed during the annual El Dorado Canal outage. The outage generally occurs from October through December each year. For this project the outage may be extended thru February. In order to construct approximately 15,400 feet of new pipe in Alignment #1 during the canal outage, either the contractor will have to use multiple construction crews, or construct the project during two separate annual outages. It is anticipated the project will require two construction seasons.

Preliminary Opinion of Probable Costs

A preliminary Opinion of Probable Construction Cost was prepared for each alignment. The estimated project costs are summarized below.

- Alignment #1 – Approximately $6.0 million
- Alignment #2 – Approximately $6.0 million
- Alignment #3 – Approximately $6.7 million.

Appendix F
Opinion of Probable Construction Costs

El Dorado Irrigation District
Main Ditch Basis of Design Report
Engineer's 10% Opinion of Probable Costs

Table F1 Alignment #1 - Preferred Alignment

July 2014

Element Description	Estimated Quantity	Units	Unit Price	Estimated Amount
Mobilization/Demolition	1	LS	$ 62,890	$ 62,890
Erosion Control & Sediment Plan Compliance (SWPPP)	1	LS	$ 43,000	$ 43,000
Project Safety, Trench Safety, and Traffic Control	1	LS	$ 47,168	$ 47,168
Mainline Construction				
Connection to Valve House at Forebay Reservoir	1	LS	$ 21,000	$ 21,000
36" PVC (DR51)	8,400	LF	$ 90	$ 756,000
42" PVC (DR51)	7,000	LF	$ 116	$ 812,000
Air Vaccum Release Valve	16	EA	$ 5,000	$ 80,000
Blow-off Valves	7	EA	$ 3,500	$ 24,500
Trench Cut Off Wall	16	EA	$ 750	$ 12,000
Earthwork - Cut	1,900	CY	$ 10	$ 19,000
Earthwork - Fill	36,000	CY	$ 20	$ 720,000
Pipe Trench Class 2 AB Backfill	9,700	CY	$ 45	$ 436,500
Tree Removal	1	LS	$ 67,500	$ 67,500
Gunite Removal (Crush and placed in fill)	1	LS	$ 2,000	$ 2,000
Outlet Structure (Concrete Vault, 1 BFV, 1 BOV, screen)	1	LS	$ 71,000	$ 71,000
Raw Water Service (36" saddle, meter strainer, box, etc.)	3	EA	$ 2,500	$ 7,500
Site Restoration	1	LS	$ 115,500	$ 115,500
Contractor Overhead and Profit	12%	LS		$ 396,000
Construction Contingency	25%	LS		*$ 824,000*
			Construction Subtotal =	*$ 4,517,600*
Non-Construction Costs				
Temporary Easement Acquisition	3.8	AC	$ 5,000	$ 19,000
Permenant Easement Acquisition	0.5	AC	$ 40,000	$ 20,000
Title Search Service	1	LS	$ 100,000	$ 100,000
Design/Engineering/Surveying	7%	LS		$ 316,000
Construction Administration/Overhead	8%	LS		$ 361,000
General Conditions, Taxes, Miscellaneous Items	15%	LS		$ 678,000
			Other Costs Subtotal =	*$ 1,494,000*
			TOTAL COST =	*$ 6,012,000*

El Dorado Irrigation District
Main Ditch Basis of Design Report
Engineer's 10% Opinion of Probable Costs

Table F2 Alignment #2 - Cross Country Alignment

July 2014

Element Description	Estimated Quantity	Units	Unit Price	Estimated Amount
Mobilization/Demolition	1	LS	$ 60,225	$ 60,225
Erosion Control & Sediment Plan Compliance (SWPPP)	1	LS	$ 58,000	$ 58,000
Project Safety, Trench Safety, and Traffic Control	1	LS	$ 45,169	$ 45,169
Mainline Construction				
Connection to Valve House at Forebay Reservoir	1	LS	$ 21,000	$ 21,000
36" PVC (DR51)	5,900	LF	$ 90	$ 531,000
36" PVC (DR41)	400	LF	$ 105	$ 42,000
42" PVC (DR51)	7,000	LF	$ 116	$ 812,000
Creek Crossing	50	LF	$ 250	$ 12,500
Air Vaccum Release Valve	13	EA	$ 5,000	$ 65,000
Blow-off Valves	7	EA	$ 3,500	$ 24,500
Trench Cut Off Wall	13	EA	$ 750	$ 9,750
Earthwork - Cut	4,500	CY	$ 10	$ 45,000
Earthwork - Fill	37,500	CY	$ 20	$ 750,000
Trench Class 2 AB Backfill	8,700	CY	$ 45	$ 391,500
Tree Removal	1	LS	$ 97,500	$ 97,500
Gunite Removal (Crush and placed in fill)	1	LS	$ 2,000	$ 2,000
Outlet Structure (Concrete Vault, 1 BFV, 1 BOV, screen)	1	LS	$ 71,000	$ 71,000
Raw Water Service (36" saddle, meter strainer, box, etc.)	3	EA	$ 2,500	$ 7,500
Site Restoration	1	LS	$ 129,000	$ 129,000
Contractor Overhead and Profit	12%	LS		$ 381,000
Construction Contingency	25%	LS		$ 794,000
			Construction Subtotal =	*$ 4,349,644*
Non-Construction Costs				
Temporary Easement Acquisition	3.5	AC	$ 5,000	$ 17,500
Permenant Easement Acquisition	1.5	AC	$ 150,000	$ 225,000
Title Search Service	1	LS	$ 100,000	$ 100,000
Design/Engineering/Surveying	7%	LS		$ 304,000
Construction Administration/Overhead	8%	LS		$ 348,000
General Conditions, Taxes, Miscellaneous Items	15%	LS		$ 652,000
			Other Costs Subtotal =	*$ 1,646,500*
			TOTAL COST =	$ 5,997,000

El Dorado Irrigation District
Main Ditch Basis of Design Report
Engineer's 10% Opinion of Probable Costs

Table F3 Alignment #3 - Blair Road Alignment

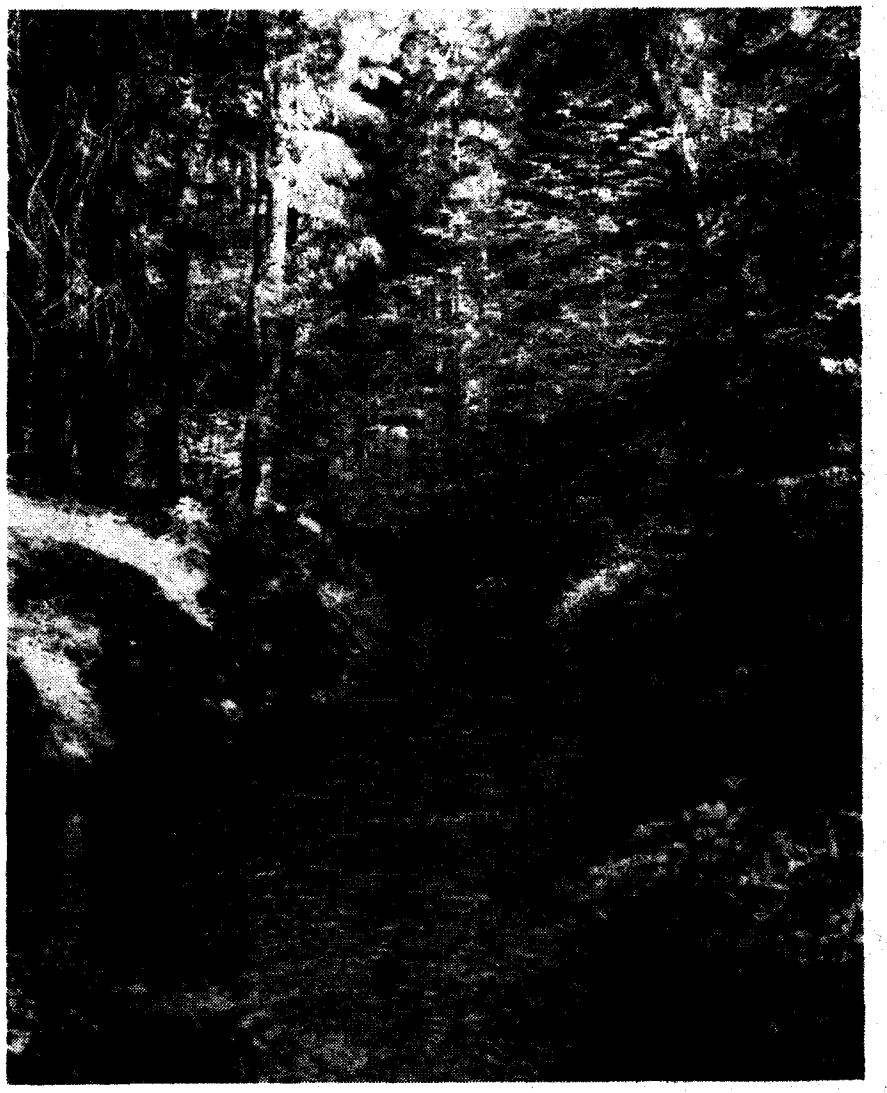
July 2014

Element Description	Estimated Quantity	Units	Unit Price	Estimated Amount
Mobilization/Demolition	1	LS	$ 69,899	$ 69,899
Erosion Control & Sediment Plan Compliance (SWPPP)	1	LS	$ 43,000	$ 43,000
Project Safety, Trench Safety, and Traffic Control	1	LS	$ 69,899	$ 69,899
Mainline Construction				
Connection to Valve House at Forebay Reservoir	1	LS	$ 21,000	$ 21,000
36" PVC (DR51)	4,400	LF	$ 90	$ 396,000
36" PVC (DR41)	1,500	LF	$ 105	$ 157,500
42" PVC (DR51)	7,000	LF	$ 116	$ 812,000
Air Vaccum Release Valve	13	EA	$ 5,000	$ 65,000
Blow-off Valves	6	EA	$ 3,500	$ 21,000
Trench Cut Off Wall	13	EA	$ 750	$ 9,750
Earthwork - Cut	11,300	CY	$ 10	$ 113,000
Earthwork - Fill	34,900	CY	$ 20	$ 698,000
Trench Class 2 AB Backfill	10,900	CY	$ 45	$ 490,500
Tree Removal	1	LS	$ 67,500	$ 67,500
Gunite Removal (Crush and placed in fill)	1	LS	$ 2,000	$ 2,000
Outlet Structure (Concrete Vault, 1 BFV, 1 BOV, screen)	1	LS	$ 71,000	$ 71,000
Raw Water Service (36" saddle, meter strainer, box, etc.)	3	EA	$ 2,500	$ 7,500
Site Restoration	1	LS	$ 122,300	$ 122,300
Type II Slurry Seal (12' 1/2 Road Width)	81,600	SF	$ 1.50	$ 122,400
3"AC/8"Class 2 AB Replacement	49,000	SF	$ 6.50	$ 318,500
Contractor Overhead and Profit	12%	LS		$ 441,000
Construction Contingency	25%	LS		*$ 919,000*
			Construction Subtotal =	*$ 5,037,800*
Non-Construction Costs				
Temporary Easement Acquisition	2.7	AC	$ 5,000	$ 13,500
Permenant Easement Acquisition	0.3	AC	$ 40,000	$ 12,000
Title Search Service	1	LS	$ 100,000	$ 100,000
Design/Engineering/Surveying	7%	LS		$ 353,000
Construction Administration/Overhead	8%	LS		$ 403,000
General Conditions, Taxes, Miscellaneous Items	15%	LS		*$ 756,000*
			Other Costs Subtotal =	*$ 1,637,500*
			TOTAL COST =	*$ 6,676,000*

ENV035

Environmental Assessment

Proposed El Dorado Main Canal Pipeline Project



El Dorado Irrigation District

In evaluating any of the proposed actions, it is useful to compare each to the project objectives to determine the degree to which each meets this set of objectives. This comparison is presented in the section on environmental impacts.

Project Need

The need for the project relates directly to each of the foregoing objectives. The purpose of this section is to describe the nature and extent of the need for some action by EID and to present all available information that substantiates and reinforces that need.

Water Losses

Various estimates of water losses from the ditch have been made, but until recently none was substantiated by actual field measurements or tests. On June 7, 1977, Mr. E. M. Padjen, a licensed civil engineer experienced in the measurement of surface flows, was retained by several property owners residing in the Blair Road area to quantify losses in the EID ditch. Mr. Padjen made one set of measurements using a current meter at Pine Wood Lane and another set at the Blair Road crossing of the EID canal. His figures indicate that, at a flow of approximately 15 cfs, losses from the ditch in that 1.7-mile stretch would equal approximately 3 percent of the flow, or slightly less than 0.5 cfs.

In June and July 1977, the EID staff was trained by the U. S. Bureau of Reclamation in the use of current meters to estimate the discharge in the canal. The EID staff took several sets of measurements on the ditch at locations immediately downstream from Forebay Reservoir, at the Pinewood Lane crossing of the ditch, and at the Blair Road crossing of the ditch. While there are some variations in the computed losses, the tests seem to show that at a discharge of 40 cfs that the ditch loses about 9 percent of its flow between Forebay and the Blair Road bridge (about 3.5 cfs). The figures further show that about two-thirds of this loss (6 percent of the ditch flow) is lost between Pinewood Lane and Blair Road at this flow. These figures indicate that at full deliveries to the ditch under the PG&E contract, losses would amount to about 1,260 acre-feet per year in this section. Appendix G further explains these loss estimates.

When considering the test results, it is important to note that the measurement of flowing water in an irregularly-shaped ditch using a current meter is subject to error. Each individual measurement may be off from 5 to 8 percent. It is

possible (although not probable) that errors in measuring could account for part or all of the indicated losses. It is also possible that the losses could be greater than those measured. However, it is known that discharges in downstream springs in the Blair Road area increase following an increase in flow in the ditch. This response of the springs is the reverse of the normal rainfall pattern in the area, thus indicating a strong relationship between these spring flows and flows in the ditch, as well as indicating that the seepage losses from the ditch do increase as the water level in the ditch increases.

Estimates of losses for the rest of the ditch are not presently available. Two series of flow measurements were made to evaluate losses downstream from the Blair Road crossing. However, during the days the measurements were made, PG&E changed the flows out of Forebay Reservoir several times. As a result, the measurements are not usable, although they do indicate that some losses may occur. Between Blair Road crossing and Reservoir No. 1, seepage is evident downhill from the canal. No seepage was observed downstream from Reservoir No. 1 along the canal.

As a result, the 1,260 acre-foot per year estimate does understate the losses, to an unknown degree.

Maximize Use of Available Water

During the severe 1977 drought year, EID has had to cut back total district-wide water use by approximately 42 percent. This is one of the greatest reductions in water supply that has had to be imposed in any area of California during the drought. Both domestic and agricultural uses have been cut back significantly. Most dramatic however, has been the effect on the non-commercial agricultural uses which have not been allocated any water whatsoever. Only property owners who are able to demonstrate a commercial and viable agricultural operation have been allocated water for agricultural purposes. This has been necessary to provide adequate water for domestic, commercial, agricultural and industrial endeavors in the district.

The situation is further pointed up by the fact that Sly Park Reservoir had an average annual inflow from 1960 to 1976 of about 35,000 acre-feet. At the end of last year, Sly Park contained only 7,675 acre-feet of water in its 41,000 acre-foot capacity. Inflow for the year amounted to only 3,167 acre-feet -- a new record low. As a result, the principal water supply for EID in 1977 is the flow from Forebay Reservoir through the main canal.

Madison Well Construction – Fair Oaks Water District

List of References

- Fair Oaks Water District Master Plan, 2007, **Section 5, 5.7.3**

June 2007

Fair Oaks Water District
Water System Master Plan

Fair Oaks Water District

Fair Oaks, California

FAIR OAKS
WATER DISTRICT

FAIR OAKS
WATER DISTRICT

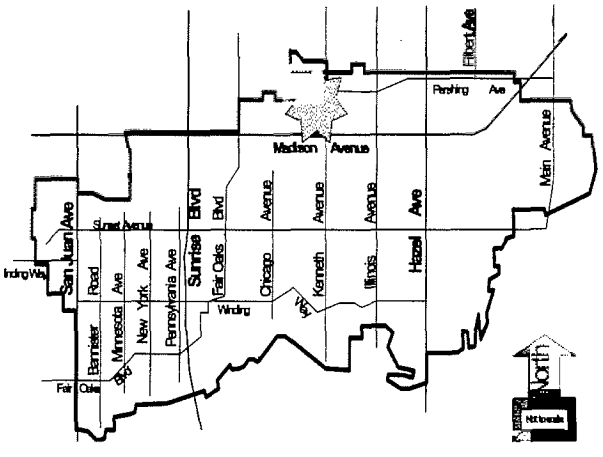
PROJECT DETAIL SHEET

Project Number:	08-05
Description:	Madison Well Construction
Funding Source:	Developer Contribution/ Capital Budget
Budget Year:	2008

Project Narrative:

As a part of the Gum Ranch Subdivision (Phase 1), the District secured a site for the future groundwater extraction facility. The site is located within the main pressure zone on Madison Avenue west of Kenneth Road, and is sized to accommodate groundwater well and other appurtenances. It is anticipated that, upon completion of the Madison Well and Kenneth Tank and Booster Station, these facilities will provide additional emergency and operational system capabilities.

Location:



Project Budget (Developer Contribution):

Item	Estimate ($)
Contract Bid	850,000
Contingency 10%	85,000
Engineering and Permitting 10%	85,000
Total Estimate:	**1,020,000**

Labor & Material Detail:

Description	Quantity	Unit	Price ($)
700-Ft. Deep Groundwater Well	1	LS	350,000
Pump and Motor	1	EA	100,000
Electrical Improvements	1	EA	250,000
Site Improvements	1	EA	150,000
Subtotal			**850,000**

- Develop groundwater supply capable of meeting average day demand for the entire system. This alternative water supply will provide the ability to serve the entire District service area under emergency and drought conditions.
- Pursue water exchange agreements with adjacent water purveyors.
- Complete a Memorandum of Understanding with Aerojet, securing water supply equal to all groundwater pumped from the District service area for groundwater contamination containment and cleanup.
- Develop and implement a preventive maintenance program for groundwater production facilities. Replace or rehabilitate wells as required.
- Continue the District's plan for water conservation and conduct a variety of water conservation activities.
- Investigate groundwater throughout the District service area and identify areas of highest water quality and quantity.
- Develop and calibrate a hydraulic model of the District water system.

5.7 Future Water Supply Projects

The following is a prioritized list of proposed water supply projects based on the water supply analysis completed in this report.

5.7.1 Relocation of Main Meter Inter-Tie with San Juan Water District

The existing inter-tie with SJWD, located on the corner of Main Avenue and Pershing Avenue, consists of two meters: a 36-inch turbine owned by the District and a second meter owned by SJWD. The size and type of the SJWD-owned meter is unknown. Water flow information from each meter is transmitted independently via telemetry to each corresponding agency. The accuracy of each meter is difficult to verify due to accessibility problems.

The District plans to fund a feasibility study to abandon a portion of 30-inch transmission main from the Main Meter, at the intersection of Walnut and Twin Lakes Road, and relocate it in the public right-of-way. As a part of this study, the possible relocation of the Main Meter will be evaluated. The feasibility study is scheduled for completion in 2007.

5.7.2 Groundwater Contamination Containment and Clean-Up

It is anticipated that future groundwater supplies may become available from remediation of contaminated groundwater as part of the containment and clean-up activities.

5.7.3 Madison Well (Gum Ranch Subdivision)

As a part of the development project known as Gum Ranch Phase 1, the District secured a site for the future groundwater extraction facility. The District plans to drill and equip a well on this property in 2008.

5.8 Estimated Cost of Proposed Water Supply Improvements

Table 5.11: Water Supply Improvements Projects

	Project Schedule	Type	Estimated Project Cost ($)	Comments
2007	Northridge Well Rehabilitation		65,000	
2008	Madison Well Construction	Drill and equip new well.	1,020,000	$ from development
2009	New York Well Construction	Re-drill well at present location.	665,000	
2010	Park Well Construction	Re-drill well at present location.	850,000	
	Miller Park Well Construction	Drill and equip new well.	995,000	
2011	Kenneth Tank and Booster Station	New 3.0 MG tank and booster station.	3,990,000	$ from development
	Skyway Well	New well at Skyway Tank site.	750,000	
Total			**8,335,000**	

American River Pump Station Improvements – Placer County Water Agency

List of References

- 90% Cost Estimate, **All pages**
- Central Valley Project and State Water Project Drought Operations Plan and Operational Forecast April 1, 2014 through November 15, 2014, **Page 2**

Project: American River Pump Station Improvements
Client: Placer County Water Agency
W.O.No.: 408-00-14-20

The purpose of this spreadsheet is to present the construction costs of the pump station improvements

		Bid Level Quantity	Unit		Unit Cost	Installn Adj		Cost
Div 1	**GENERAL**							
	Mobilization/Demobilization	8	PCT	$	1,293,000	1.00	$	103,440
Subtotal	**Division 1 General**						**$**	**103,440**
Div 2	**SITEWORK**							
	Demolition of existing pavement	3,754	SF	$	1	1.00	$	3,754
	Grading of area towards storm drain	2,699	SF	$	1	1.00	$	2,699
	Common Excavation	8	CY	$	15	1.00	$	124
	Rock Excavation	8	CY	$	200	1.00	$	1,659
	Dewatering during Construction	1	LS	$	5,000	1.00	$	5,000
	AC Paving (3" thick) with AB (8" thick)	2,699	SF	$	8	1.00	$	21,592
	Relocation of Storage Container	1	LS	$	1,000	1.00	$	1,000
	Bollards around Power Pole	4	EA	$	500	1.00	$	2,000
	Fish Screen Rotation	1	LS	$	34,323	1.00	$	34,323
	HVAC Cooling Water Supply, 4"	75	LF	$	100	1.00	$	7,500
	HVAC Cooling Water Return, 6"	75	LF	$	150	1.00	$	11,250
Subtotal	**Division 2 Sitework**						**$**	**90,902**
Div 3	**CONCRETE**							
	Cast-In-Place Concrete (pipe supports)	0.5	CY	$	1,200	1.00	$	556
	Cast-In-Place Concrete (building)	30	CY	$	1,200	1.00	$	36,267
	Housekeeping Pad around VFD	1	CY	$	1,200	1.00	$	1,333
Subtotal	**Division 3 Concrete**						**$**	**38,156**
Div 4	**Masonry**							
	Concrete Masonry Units	1720	SF	$	15	1.00	$	25,800
Subtotal	**Division 4 - Masonry**						**$**	**25,800**
Div 5	**Metals**							
	Ridge Beam (W12x30)	720	LB	$	10	1.00	$	7,200
	Roof Purlins (W8x10)	960	LB	$	10	1.00	$	9,600
	Pipe Supports	500	LB	$	10	1.00	$	5,000
Subtotal	**Division 5 Metals**						**$**	**21,800**

Div 6	**Wood and plastics - Not Used**							
Subtotal	**Division 6 Wood and Plastics**						**$**	**-**
Div 7	**Thermal and Moisture Protection**							
	Metal Roof Panels	816	SF	$	100	1.00	$	81,600
Subtotal	**Division 7 Thermal and Moisture Protection**						**$**	**81,600**
Div 8	**Doors and Windows**							
	3'x7'-2" Steel Door	2	EA	$	750	1.50	$	2,250
	6'-8" x 12' Coiled roll up door	1	EA	$	7,500	1.50	$	11,250
	2'-6" x 2'-6" window	4	EA	$	500	1.50	$	3,000
	2'-6" x 6'-8" window	2	EA	$	1,000	1.50	$	3,000
Subtotal	**Division 8 Doors and Windows**						**$**	**19,500**
Div 9	**Finishes -**							
	Painting and High Performance Coatings	1	LS	$	5,000	1.00	$	5,000
Subtotal	**Division 9 - Finishes**						**$**	**5,000**
Div 10	**Specialties - Not Used**							
Subtotal	**Division 10 Specialties**						**$**	**-**
Div 11	**Equipment**							
	Pump Installation	1	LS	$	39,690	1.00	$	39,690
	Spreading Beam and 2- 5-foot Slings	1	LS	$	2,832	1.00	$	2,832
	Amiad Filters	2	ea	$	21,000	1.68	$	70,560
Subtotal	**Division 11 Equipment**						**$**	**113,082**

Div 12	**Furnishings - Not used**						
Subtotal	**Division 12 Furnishings**					**$**	**-**
Div 13	**Special Construction - Not Used**						
Subtotal	**Division 13 Special Construction**					**$**	**-**
Div 14	**Conveying Systems - Not used**						
Subtotal	**Divsion 14 Conveying Systems**					**$**	**-**
Div 15	**Mechanical**						
	1 1/2" galvanized steel pipe	1256	LF	$12	1.50	$	22,420
	2" galvanized steel pipe	21	LF	$15	1.50	$	482
	4" PVC pipe	10	LF	$5	1.50	$	77
	30" steel pipe	4	LF	$720	1.50	$	4,320
	Pressure gage assembly	2	EA	507	1.50	$	1,522
	1 1/2" ball valve	9	EA	$28	1.50	$	374
	1 1/2" check valve	7	EA	$50	1.50	$	525
	1 1/2" union	7	EA	$62	1.50	$	655
	1 1/2" 90-deg bend	8	EA	$35	1.50	$	420
	1" ball valve	8	EA	$24	1.50	$	288
	1 1/2" x 1 1/2" x 1" Tee	8	EA	$15	1.50	$	186
	1" pressure reducing valve	1	EA	$1,000	1.50	$	1,500
	1" solenoid valve	1	EA	$577	1.50	$	866
	2" pressure reducing valve	1	EA	$1,277	1.50	$	1,916
	2" tee with 1/2" bushing	1	EA	$57	1.50	$	86
	2" union	1	EA	$84	1.50	$	125
	2" 90-deg bend	3	EA	$43	1.50	$	192
	4" check valve	1	EA	$582	1.50	$	873
	4" True Union ball valve	1	EA	$150	1.50	$	225
	6" air vacuum valve	1	EA	$9,000	1.50	$	13,500
	6" plug valve	1	EA	$942	1.50	$	1,413
	30" dismantling joint	1	EA	$6,481	1.50	$	9,722
	30" tilting disc check valve	1	EA	$63,000	1.50	$	94,500
	30" butterfly valve	1	EA	$22,550	1.50	$	33,825
	30" double bellow expansion coupling	1	EA	$5,000	1.50	$	7,500
	Water Cooled Air Handling Unit	1	LS	$25,000	1.00	$	25,000
	Existing piping modifciation for cooling water	1	LS	$10,000	1.00	$	10,000
Subtotal	**Division 15 - Mechanical**					**$**	**232,511**

Div 16	**Electrical**							
	MCC	1	LS	$	78,690	1.00	$	78,690
	Control Panel	1	LS	$	1,541	1.00	$	1,541
	VFD	1	LS	$	423,759	1.00	$	423,759
	PS Conduits & Wires	1	LS	$	61,638	1.00	$	61,638
	PS Panelboard Modifications	1	LS	$	925	1.00	$	925
	PS Miscellaneous Material	1	LS	$	12,328	1.00	$	12,328
	VFD Bldg Lighting & Receptacles	1	LS	$	3,637	1.00	$	3,637
	VFD Bldg Conduits and Wires	1	LS	$	30,819	1.00	$	30,819
	VFD Bldg Grounding System	1	LS	$	5,393	1.00	$	5,393
	VFD Miscellaneuous Material	1	LS	$	6,164	1.00	$	6,164
	Site Conduits and Wires	1	LS	$	30,819	1.00	$	30,819
	Site Trenching	1	LS	$	2,311	1.00	$	2,311
	Site Miscellaneous Material	1	LS	$	6,164	1.00	$	6,164
	Pressure Instruments	1	LS	$	462	1.00	$	462
	Flow Instruments	1	LS	$	385	1.00	$	385
Subtotal	**Division 16 - Electrical**						**$**	**665,033**
Subtotal	**Subtotal**						**$**	**1,397,000**
	Contractor Overhead and Profit	15	PCT	$	1,397,000	1.00		209,550.00
	~~**Estimating Contingency**~~	~~15~~	~~PCT~~	~~$~~	~~1,397,000~~	~~1.00~~		~~[illegible]~~
	Estimated Construction Project Cost, June 2014 (rounded) 20 Cities Ave		ENR =		9800		**$**	+ ~~**1,816,100**~~
	Construction Contingency, 10%						$	181,610

$1,606,550

w/o conting

Central Valley Project and State Water Project
Drought Operations Plan and
Operational Forecast
April 1, 2014 through November 15, 2014

Balancing Multiple Needs in a Third Dry Year

April 8, 2014

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    Shasta Operations/Keswick Release Schedule
  B. Folsom/American River Operations
  C. New Melones/Stanislaus River Operations
  D. Feather River Operations
VI. Proposed Delta Operations – April and May
  A. NMFS BiOp Provisions
  B. USFWS BiOp Provisions
  C. D-1641 Provisions
VII. Proposed Delta Operations – June Through November 15
  A. Emergency Drought Barriers
  B. NMFS BiOp Provisions
  C. USFWS BiOp Provisions
  D. D-1641 Provisions
VIII. Measures to Offset Effects to San Joaquin River Steelhead
IX. Emergency Fisheries Monitoring, Technology Improvement, and Science Planning

Attachments

A. February and March 2014 - Actual Delta Operations
B. March Operational Forecasts – 90% with Barriers, 90% without Barriers, 50% without Barriers
C. Temperature Modeling (including Clear Creek)
D. Winter-run Contingency Plan
E. Biological Review – Salmonids and Sturgeon
F. Biological Review – Delta Smelt and Longfin Smelt
G. Revised DCC Gate Triggers Matrix
H. April-May Delta Export and Hydrodynamic Forecasted Operations (with and without the proposed modifications)
I. Delta Smelt Monitoring Plan
J. Preliminary Science Plan for Anadromous Fish Monitoring and Technology Improvements

Central Valley Project and State Water Project
Drought Operations Plan and Operational Forecast
April 1, 2014 through November 15, 2014

Balancing Multiple Needs in a Third Dry Year

This Drought Operations Plan and Operational Forecast (the Plan) is based on collaborative discussions between the U.S. Bureau of Reclamation (Reclamation), California Department of Water Resources (DWR), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), and the State Water Resources Control Board (State Water Board). The Plan will be modified based on evolving information which could include additional conditions in State Water Board regulatory approvals as well as federal Endangered Species Act (FESA) and California Endangered Species Act (CESA) requirements. Most importantly, the Plan, as described below, is based upon hydrologic conditions as of early March including recent storms. Reclamation and DWR intend to continue to refine the Plan in collaboration with other agencies as ongoing weather changes current conditions and forecasts for the Sierra snowpack, reservoir storage, and river flow.

I. Introduction and Purposes of the Plan

As California approaches the summer of a third consecutive dry year, economic and environmental challenges for our State are mounting. Limited water supplies create a crisis that will require extraordinary management measures on the part of water project operators, water quality and environmental regulators, the hundreds of local water agencies that supply most Californians with water, and State residents themselves. The latest National Weather Service data continue to show nearly the entire State in severe drought and over two-thirds in extreme drought. According to this same data, more of the State is in exceptional or extreme drought than when the Governor issued his drought proclamation on January 17, 2014. In this extraordinarily dry year, all water users, including agricultural, municipal, and fish and wildlife uses will suffer hardship.

Since December of 2013, State and Federal agencies that supply water, protect fish and wildlife, and regulate water quality have worked together daily to cope with drought. Together, these agencies have maximized regulatory flexibility to adjust quickly to changes in the weather and environment and bolster water supplies when possible while minimizing impacts to fish and wildlife.

These agencies also are currently charting a collaborative course for the coming summer and fall of 2014. This Plan and Operational Forecast was developed in coordination with Reclamation and DWR, USFWS, NMFS, CDFW, and the State Water Board. The Plan outlines proposed actions and a likely range of coordinated operations of the Central Valley Project (CVP) and State Water Project

(SWP) from April 1 through November 15, 2014, and is based on the conservative but prudent assumption that conditions will remain dry, and that drought may persist into 2015.

The following are the purposes of the Plan:

1. During this extreme drought year, operate the CVP and SWP to provide for, at a minimum, essential human health and safety needs throughout the CVP and SWP service areas from April 1 through November 15, 2014, and retain the capability to provide for such minimum needs in water year 2015 if the drought continues. For clarity, Reclamation and DWR's consideration of these essential human health and safety needs includes adequate water supplies for drinking water, sanitation, and fire suppression, but does not extend to other urban water demands such as outdoor landscape irrigation. While most Californian communities have adequate reserve supplies, some will require continued delivery of limited amounts of water through the CVP and SWP systems to meet these basic needs.

2. Another primary purpose is control of saltwater intrusion in the Sacramento-San Joaquin Delta. The Delta drains roughly 40 percent of California. Enough fresh water must flow into the Delta throughout dry months to repel saltwater that pushes inland on ocean-driven tides from San Francisco Bay. If there is not enough water in upstream reservoirs to release to rivers to repel the saltwater, it can contaminate the channels from which water supplies are drawn, not just for the SWP and CVP, but also for Delta farmers and water districts in nearby Contra Costa, Alameda, and San Joaquin counties. Maintaining enough reservoir storage to control Delta salinity this spring through the fall is critical. Therefore, this Plan balances the need to protect upstream storage, the need to maintain minimal exports from the Delta in the spring and summer, and the need to maintain salinity control in the Delta for future deliveries later in the year and into 2015.

3. A third major purpose in crafting a plan for water project operations this spring through the fall involves the need to preserve enough cold water deep in Shasta Lake and other reservoirs to maintain cool water temperatures in the Sacramento River for different runs of Chinook salmon. These same water supplies may be needed to provide for critical needs in 2015, if conditions remain dry.

4. A fourth major purpose is the continued need to maintain minimum protections for endangered species and other fish and wildlife resources that are suffering from unavoidable impacts due to a drought of this magnitude and necessary drought-related actions. Most elements of the controlling regulations that provide protection will be fully implemented this year. This Plan calls out those elements that have been or could be modified in order to balance all needs, while providing minimum protections required by law. As such, Reclamation and DWR propose this Plan to ensure compliance with applicable laws and requirements of the regulatory agencies for operations through November 15, 2014. The Plan will be submitted by Reclamation and DWR for concurrent review under applicable laws, including the Federal ESA, CESA, and the California Water Code.

Regional Water Efficiency Drought Measures – Regional Water Authority

List of References

- California Urban Water Conservation Council Memorandum of Understanding, 2011, **pages 14, 35, 41, 48**
- CUWCC New Normal for California Landscapes, 2014, **All pages**
- U.S. Department of the Interior, Bureau of Reclamation, Final Technical Memorandum No. 86-68210-SCAO-01, Summary of Smart Controller Water Savings Studies, 2008, **page 12**
- 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**
- SMUD's California Climate Registry Report, 2012, **pages 1, 4-6**

MEMORANDUM OF UNDERSTANDING

REGARDING

URBAN WATER CONSERVATION

IN CALIFORNIA

As Amended September 14, 2011

EXHIBIT 1. BMP DEFINITIONS, SCHEDULES AND REQUIREMENTS

As Amended June 9, 2010

This Exhibit contains Best Management Practices (BMPs) that signatory water suppliers commit to implementing. Suppliers' water needs estimates will be adjusted to reflect estimates of reliable savings from these BMPs. For some BMPs, no estimate of savings is made.

It is recognized by all parties that a single implementation method for a BMP would not be appropriate for all water suppliers. In fact, it is likely that in the future, water suppliers will find new implementation methods even more effective than those described. Any implementation method used should be at least as effective as the methods described below.

The Council's 14 BMPs are now organized into five categories. Two categories, Utility Operations and Education, are "Foundational BMPs", because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the MOU as ongoing practices with no time limits. The remaining BMPs are "Programmatic BMPs" and are organized into Residential, Commercial, Industrial, and Institutional (CII), and Landscape categories. The minimal activities required of each signatory are encompassed within each list, except for activities from which a utility is exempt from completing under section 4.5 of the MOU and for which the utility has filed an exemption with the Council.

BMP Naming Changes

Old BMP Number & Name	**New BMP category**
1. Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers	Programmatic: Residential
2. Residential Plumbing Retrofit	Programmatic: Residential
3. System Water Audits, Leak Detection and Repair	Foundational: Utility Operations – Water Loss Control
4. Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	Foundational: Utility Operations – Metering
5. Large Landscape Conservation Programs and Incentives	Programmatic: Landscape
6. High-Efficiency Clothes Washing Machine Financial Incentive Programs	Programmatic: Residential

2. EDUCATION PROGRAMS *As amended December 10, 2008*

California water agencies have played a major role in stressing the need for their customers to conserve water through both public information and school education programs. The specifics of how these programs are to be implemented are detailed below.

2.1 PUBLIC INFORMATION PROGRAMS *(formerly BMP 7)*

This section addresses opportunities to use public information programs as an effective tool to inform customers about the need for water conservation and ways they can conserve, and to influence customer behavior to conserve.

A. Implementation

Implement a public information program to promote water conservation and water conservation-related benefits. Implementation shall consist of at least the following actions:

1) The program should include, when possible, but is not limited to, providing speakers to employees, community groups and the media; using paid and public service advertising; using bill inserts; providing information on customers' bills showing use for the last billing period compared to the same period the year before; providing public information to promote water conservation measures; and coordinating with other government agencies, industry groups, public interest groups, and the media.

2) The program should include, when possible, social marketing elements which are designed to change attitudes to influence behavior. This includes seeking input from the public to shape the water conservation message; training stakeholders outside the utility staff in water conservation priorities and techniques; and developing partnerships with stakeholders who carry the conservation message to their target markets.

3) When mutually agreeable and beneficial, the wholesale agency or another lead regional agency may operate all or part of the public information program. If the wholesale agency operates the entire program, then it may, by mutual consent with the retail agency, assume responsibility for CUWCC reporting for this BMP. Under this arrangement, a wholesale agency may aggregate all or portions of the reporting and coverage requirements of the retail agencies joining into the mutual consent.

B. Implementation Schedule

Implementation shall commence no later than July 1 of the first year following the latter of either: 1) the year the agency signed or became subject to the MOU, or 2) the year this Exhibit is amended.

PROGRAMMATIC BMPs

Signatories have the option of implementing each BMP as described below, or implementing measures identified in the Flex Track Menu alternative included in each Programmatic BMP.

3. RESIDENTIAL *As amended December 10, 2008*

Residential water users throughout California depend on a reliable and safe supply of water for their homes. This BMP will define the best and most proven water conservation methods and measures those residents, working in conjunction with water agencies, can implement. By implementing these methods and measures homeowners, multi-family property owners, and tenants will increase water use efficiency and reliability. Credit for prior activities, as reported through the BMP database, will be given for documented water savings achieved though 2008.

A. Implementation

Retail water agencies shall implement a water use efficiency program that consists of either the coverage goals listed below or achieving the water savings goals by implementing measures on the Flex Track Menu in Section F below.

1) Residential assistance program *(formerly BMPs 1 & 2)*
   Provide site-specific leak detection assistance that may include, but is not limited to, the following: a water conservation survey, water efficiency suggestions, and/or inspection. Provide showerheads and faucet-aerators that meet the current water efficiency standard as stipulated in the WaterSense Specifications (WSS) as needed.

2) Landscape water survey *(formerly BMP 1)*
   Perform site-specific landscape water surveys that shall include, but are not limited to, the following: check irrigation system and timers for maintenance and repairs needed; estimate or measure landscaped area; develop customer irrigation schedule based on precipitation rate, local climate, irrigation system performance, and landscape conditions; review the scheduling with customer; provide information packet to customer; and provide customer with evaluation results and water savings recommendations.

3) High-efficiency clothes washers (HECWs) *(formerly BMP 6)*
   Provide incentives or institute ordinances requiring the purchase of high-efficiency clothes washing machines (HECWs) that meet an average water factor value of 5.0. If the WaterSense Specification is less than 5.0, then the average water factor value will decrease to that amount.

4) WaterSense Specification (WSS) toilets *(formerly BMP 14)*
   Provide incentives or ordinances requiring the replacement of existing toilets using 3.5 or more gpf (gallons per flush) with a toilet meeting WSS.

5. LANDSCAPE *(formerly BMP 5)* *As amended December 10, 2008*

Irrigation accounts for a large portion of urban water use in California. Irrigation water use varies dramatically depending on water pricing and availability, plant choice, geographic locations, seasonal conditions, and the level of commitment to sound water efficiency practices. The goal of this BMP is that irrigators, with assistance from signatories, will achieve a higher level of water use efficiency consistent with the actual irrigation needs of the plant materials. Reaching this goal would reduce overall demands for water, reduce demands during the peak summer months, and still result in a healthy and vibrant landscape for California.

A. Implementation

Agencies shall provide non-residential customers with support and incentives to improve their landscape water use efficiency. Credit for prior activities, as reported through the BMP database, will be given for documented water savings achieved though 2008.This support shall include, but not be limited to, the following:

1) Accounts with Dedicated Irrigation Meters

a) Identify accounts with dedicated irrigation meters and assign ETo-based water use budgets equal to no more than an average of 70% of ETo (reference evapotranspiration) of annual average local ETo per square foot of landscape area in accordance with the schedule below.

Recreational areas (portions of parks, playgrounds, sports fields, golf courses, or school yards in public and private projects where turf provides a playing surface or serves other high-use recreational purposes) and areas permanently and solely dedicated to edible plants, such as orchards and vegetable gardens, may require water in addition to the water use budget. (These areas will be referred to as “recreational” below.) The water agency must provide a statement designating those portions of the landscape to be used for such purposes and specifying any additional water needed above the water use budget, which may not exceed 100% of ETo on an annual basis.

If the California Model Water Efficient Landscape Ordinance is revised to reduce the water allowance, this BMP will be revised automatically to reflect that change.

b) Provide notices each billing cycle to accounts with water use budgets showing the relationship between the budget and actual consumption.

c) Offer site-specific technical assistance to reduce water use to those accounts that are 20% over budget in accordance with the schedule given in Section B; agencies may choose not to notify customers whose use is less than their water use budget.

2) Commercial/Industrial/Institutional (CII) Accounts without Meters or with Mixed-Use Meters

a) Develop and implement a strategy targeting and marketing large landscape water use surveys to commercial/industrial/institutional (CII) accounts with mixed-use meters.

California Urban Water Conservation Council

Achieving a New Normal in California Landscapes

Two gatherings to accelerate the pace of change toward more sustainable landscapes in California

Join us for a day of ideas, discussions, and problem solving.

May 22, 2014 Southern CA | **May 29, 2014 Northern CA**

Etiwanda Gardens, Rancho Cucamonga

8:00 a.m. – 5:00 p.m.

Citrus Heights Community Center, Citrus Heights

It is widely known that reforming California's urban landscapes to use less water, fewer chemicals, and more climate-appropriate plants will yield huge benefits to our state in terms of water conservation, runoff and pollutant reduction, human health, and biodiversity.

Around the state, agencies, organizations and individuals are partnering to implement sustainable landscapes and reap the many benefits for their communities. Learn from their experiences, and join in the conversation about how we can make sustainable landscapes the "new normal" in California.

Get inspired. Join the conversation. Take action!

Cost

$45 before May 8

$55 on or after May 8

To register

http://landscape-south.eventbee.com

http://landscape-north.eventbee.com

Spend the day:

- **Learning** from successful case-studies
- **Hearing** about current and planned projects from **state agencies**
- **Identifying barriers** to change and **finding solutions** to overcome them
- **Building valuable partnerships**
- **Defining** an action plan for moving forward

Who should attend:

Anyone who is **dedicated to making landscapes more sustainable**, especially representatives from:

- Water agencies/providers
- Non-profit organizations
- County/state/federal agencies
- Professional associations
- Landscape industry
- Stormwater management

A collaborative effort of the CA Urban Water Conservation Council and:

CA Department of Water Resources

CA Department of Pesticide Regulation

CalRecycle

CA Water Boards

UC Davis

California Environmental Protection Agency dpr Department of Pesticide Regulation

CalRecycle

California Water Boards

UC DAVIS University of California

RECLAMATION

Managing Water in the West

Final Technical Memorandum No. 86-68210-SCAO-01

Summary of Smart Controller Water Savings Studies

Literature Review of Water Savings Studies for Weather and Soil Moisture Based Landscape Irrigation Control Devices

U.S. Department of the Interior
Bureau of Reclamation

April 2008

Weather and Soil Moisture Based Controller Study Report Summaries

The following study report summaries include brief descriptions of the reported water savings results and study design aspects related to the considerations discussed earlier in this document. The summaries are presented in chronological order from old to recent.

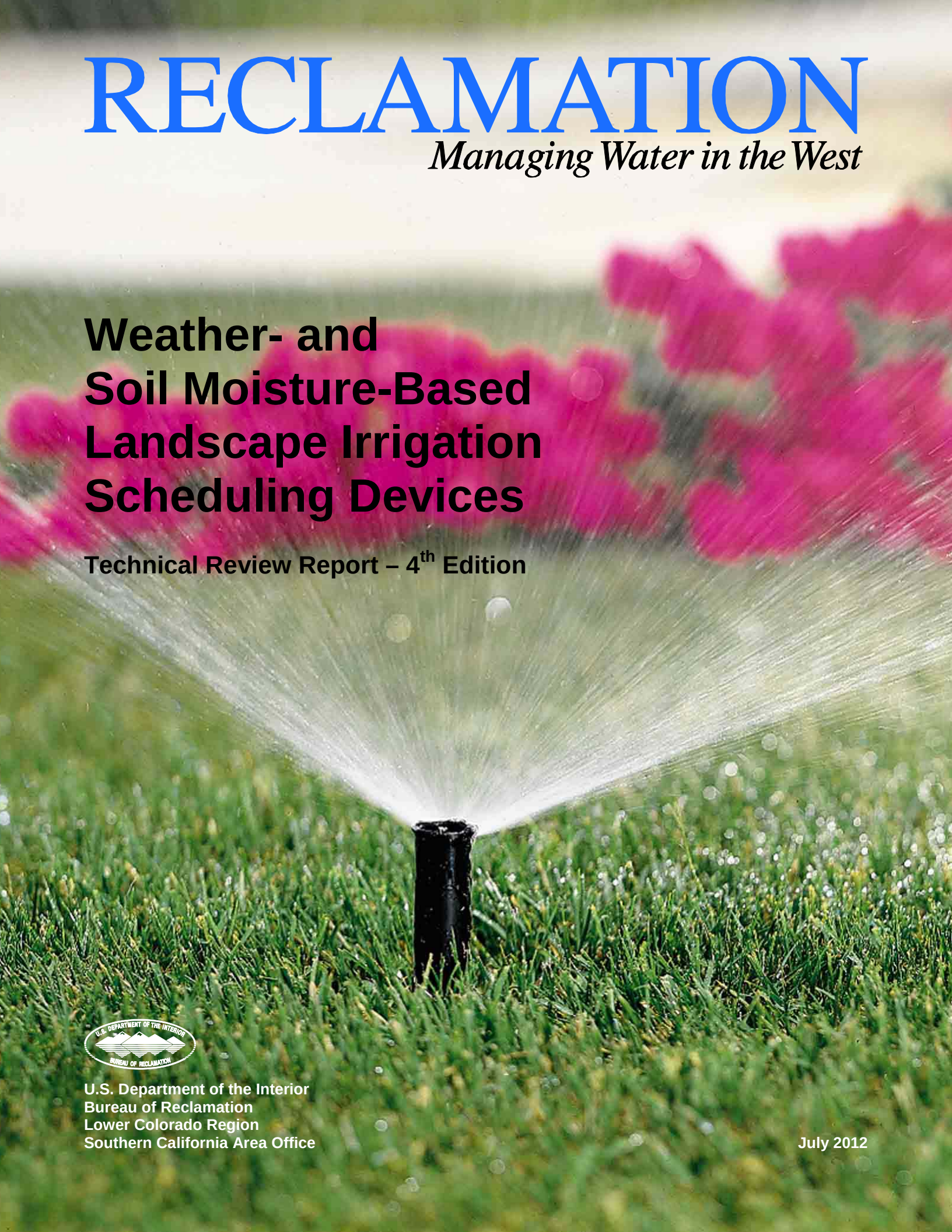
"Smart" Irrigation Controller Study in Tuscon, Arizona (Quanrud and France, 2007)

This field study evaluated water savings resulting from installation of weather and soil moisture based controllers. Data were collected at 27 residential sites in Tucson, Arizona during August 2004 to July 2006. The weather based controllers included in the study were products by Hydropoint WeatherTRAK and WeatherMiser, and the soil moisture system included was the Rainbird MS-100 (no longer available). The devices were installed by a landscape professional with support from manufacturer representatives. The participants consisted of volunteers and high water usage was not a selection criteria. Reported average water savings are 25% for Hydropoint WeatherTRAK, 3.2% for WeatherMiser, and 4.3% for Rainbird. Water savings calculations were based on 2 years of historic water usage and all data were adjusted for weather conditions. Average installation times are reported to be 4, 2 and 0.75 hours for the Rainbird, Hydropoint WeatherTRAK and WeatherMiser systems, respectively. Participant feedback is reported to be positive and the report also includes a cost-benefit analysis discussion.

Evaluation of Evapotranspiration and Soil Moisture Based Irrigation Control On Turfgrass (Shedd et. al., 2007)

This science-based study was conducted during 2006 at the University of Florida, Plant Science Research and Education Unit in Citra, Florida. The study evaluated soil moisture based systems by LawnLogic® (Alpine Automation, Inc.) and Acclima, Inc., weather based systems by Toro (Intelli-Sense) and Rain Bird (ET Manager), and clock-type controllers with and without rain sensors. The soil moisture based systems were tested with low, medium and high soil moisture threshold settings. The systems were tested with actual irrigation systems on plots of turf grass. Reported results include water savings relative to a clock-type control without rain sensor and reference ET-based plant water demand.

Reported soil moisture based water savings range from zero to 63% and reported weather based savings range from 36% to 59%. It is discussed that the highest soil moisture based savings (over 36%) from the low threshold setting systems resulted in unacceptable turf quality degradation. The report states: "The LawnLogic sensors did not bypass irrigation as predictably as the Acclima



RECLAMATION

Managing Water in the West

Weather- and Soil Moisture-Based Landscape Irrigation Scheduling Devices

Technical Review Report – 4th Edition

U.S. Department of the Interior
Bureau of Reclamation
Lower Colorado Region
Southern California Area Office

July 2012

net plant watering requirements (PWR). The study results sample graph of figure 6 shows the Weathermatic unit watered consistent with plant demand.

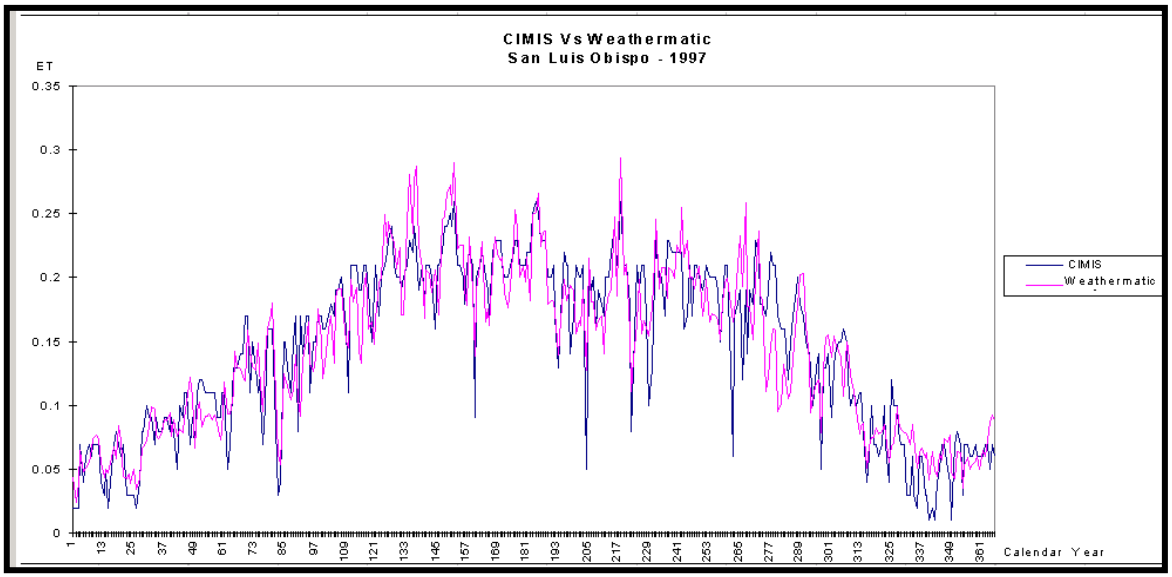


Figure 5 – Comparison of Weathermatic ET to CIMIS ET.

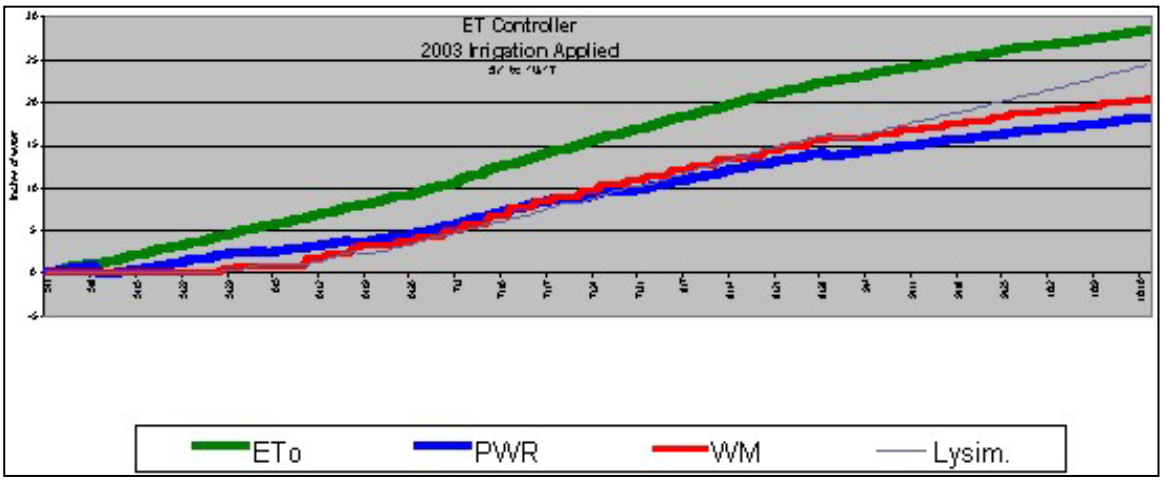


Figure 6 – Sample of Weathermatic field study results.

The Weathermatic SmartLine controllers were also part of a field pilot program conducted by the Marin Municipal Water District. In this study, 13 controllers were installed at 7 sites to compare water usage in 2002 and 2003 to the base year usage in 2001. Weathermatic reports that, in 2002, sites installed with the Weathermatic ET controller saved 26%. In 2003, the water savings climbed to

0 items - Log in

General Reporting Protocol

Spotlight

April 28, 2014 Climate Registered Member Exelon Corporation surpasses ambitious goal to eliminate carbon emissions seven years ahead of schedule.

April 18, 2014 Cool Planet Member The Grand Del Mar undergoes retrofits and reduces energy consumption to shrink its carbon footprint. Learn more about the resort's green initiatives here.

April 18, 2014 Natural Capital Leaders Index recognizes Registry member PG&E as the only US "Decoupling Leader" for growing revenue while simultaneously reducing their environmental impact .

February 18, 2014 Natural Capital Leaders Index recognizes Registry member PG&E as the only US "Decoupling Leader" for growing revenue while simultaneously reducing their environmental impact .

February 18, 2014CDSB releases CDSB Framework Draft Consultation to promote and advance disclosure of environmental information. The expanded framework includes information on natural capital, namely forest risk commodities and water. Learn more here.

February 7, 2014 Join the Climate Action Reserve for NACW, the longest running and most anticipated conference for discussing climate policy and carbon markets. The event will be held in San Francisco, March 26-28. More info here.

December 16, 2013 The Natural Resource Agency released 'Safeguarding California: Reducing Climate Risk', an update to the 2009 California Climate Adaptation Strategy." Link "Safeguarding California: Reducing Climate Risk.

December 16, 2013 Registry Members the California Department of Public Health and UC Irvine receive the 2013 Governor's Environmental and Economic Leadership Award for Sustainable Practices. Congratulations!

Members who choose to report emissions data from previous years can use the most up to date emission factors in the CRIS calculation tool at the time they report.

- 2014 Climate Registry Default Emission Factors – Released April 11, 2014
  - Table 14.4 in this document was updated to add 2011 defaults. In all other ways it is identical to the version released on January 10, 2014.
  - On November 29, 2013, U.S. EPA updated several default emission factors for the Greenhouse Gas Reporting Program. These updated factors are not incorporated in The Climate Registry's 2014 Default Factors or CRIS. However, Members *can* use the updated EPA emission factors to report 2013 data to The Climate Registry as long as they use factors from the same year consistently throughout their annual report. To support this, the document below includes the updated factors and identifies which defaults have been changed (in red). Please contact the help desk with any questions about how to include these updated factors in an inventory.
    - 2014 Climate Registry Default Emission Factors with integrated U.S. EPA 11/29/2013 Updates
- Archived versions of the emission factors

The Climate Registry relies on U.S EPA's emission factors from the eGRID to calculate electricity emissions in the U.S. Because the release of the eGRID factors by EPA varies from year to year, The Registry updates CRIS at the end of each year with the most current emission factors. With these regular updates, CRIS is ready each January for reporting the new emissions year. At any time that EPA publishes updated eGRID factors, The Registry shares these with our Members. If they are available before the reporting deadline, Members have the option of customizing their emission factors in CRIS to use any updated eGRID factors – as long as they use factors from the same year consistently throughout their annual report.

- On February 26, 2014 U.S. EPA updated the eGRID emission factors to reflect data from 2010. These emission factors can be accessed here: 2010 eGRID subregion Output Emission Rates. Members who choose to report using the updated defaults consistently across scope 2 should use the annual total output emission rates in the document linked above.

Registry Members Reporting to the Electric Power Sector (EPS) Protocol have the option to develop utility-specific retail electric or special power electric delivery metrics that their customers can use when quantifying scope 2 emissions. Registry Members who are customers of these utilities can use the relevant emission factors below when reporting scope 2 emissions to The Climate Registry:

2009 Emission Rates

Utility	Factor Type	Emission Factor (lbs CO_2/MWh)
	Retail Power	1,036.17
Modesto Irrigation District	Special Power	0.0
	Wholesale Power	2,048.09
Pacific Gas & Electric	System Average	575.38
Bonneville Power Authority	System Average	93.17

2010 Emission Rates

Utility	Factor Type	Emission Factor (lbs CO_2/MWh)
	Retail Power	526.47
Sacramento Municipal Utility District	Special Power	0.0
	Wholesale Power	828.58
Newmont Nevada Energy Investment	Wholesale Power	2055.79

Pacific Gas & Electric	System Average	444.64
City of Vernon, Light and Power	System Average	775.83
	Retail Power	942.99
Modesto Irrigation District	Special Power	0.0
	Wholesale Power	2026.12
Northern States Power Company (Xcel Energy)	System Average	1047.20
Public Service Company of Colorado (Xcel Energy)	System Average	1675.51
Southwestern Public Service Company (Xcel Energy)	System Average	1552.05
	Retail Power	45.57
Seattle City Light	Special Power	0.0
	Wholesale Power	537.64
Bonneville Power Authority	System Average	134.70

2011 Emission Rates

Utility	Factor Type	Emission Factor (lbs CO_2/MWh)
Pacific Gas & Electric	System Average	392.87
Bonneville Power Authority	System Average	47.86
	Retail Power	13.77
Seattle City Light	Special Power	0.0
	Wholesale Power	218.75
	Retail Power	429.29
Sacramento Municipal Utility District	Special Power	0.0
	Wholesale Power	795.14
City of Vernon, Light and Power	System Average	731.49
Northern States Power Company (Xcel Energy)	System Average	1071.45
Public Service Company of Colorado (Xcel Energy)	System Average	1618.19
Southwestern Public Service Company (Xcel Energy)	System Average	1472.69

2012 Emission Rates

Utility	Factor Type	Emission Factor (lbs CO_2/MWh)
City of Vernon, Light and Power	System Average	765.97
Pacific Gas & Electric	System Average	444.62
	Retail Power	521.73
Sacramento Municipal Utility District	Special Power	0.0
	Wholesale Power	799.77
	Retail Power	25.62
Seattle City Light	Special Power	0.0
	Wholesale Power	362.85
	Wholesale Power	658.73
Metropolitan Water District of Southern California	Self-consumed Power	157.87

NOTE: Utility-specific emission factors have been converted from tonnes/MWh to lbs/MWh in order to streamline reporting in CRIS.

Renewable Energy Certificates (RECs) generated using the following resource and technology types can be used to quantify scope 2 emissions associated with electricity consumption:

- solar electric, including concentrated solar thermal
- wind
- geothermal
- certified low-impact or EcoLogo hydropower
- pipeline or irrigation canal turbine hydropower
- biomass (non-chemically treated woody waste, agriculture crops or waste)
    - Eligible biomass cannot include wood that has been coated with paints, plastics, or formica; wood that has been treated for preservation with materials containing halogens, chlorine or halide compounds like chromated copper arsenate-treated materials, or arsenic, and railroad ties.

Please note, The Registry's criteria are aligned with the most recent version of the Green-e Energy National Standard program.

The following metrics for transit agencies can be used when quantifying the carbon efficiency of transit agency operations:

- **Metric 1:** Emissions per passenger mile travelled
- **Metric 2:** Emissions per vehicle mile
- **Metric 3:** Emissions per revenue vehicle hour

- Performance Metrics for Transit Agencies v. 1.0
- Transit Agency Performance Metric Report v. 1.1

The American Public Transportation Association (APTA) and Canadian Urban Transit Association (CUTA) were integral to the development of these metrics and their expertise ensured that the metrics reflect the best knowledge of the transit industry.

In rare instances, Members find it necessary to develop a unique methodology to complete their greenhouse gas inventory. The Climate Registry has developed a process to approve these member developed methodologies. Complete information and the necessary forms for this process can be found below. We encourage Members to complete this process prior to entering the verification stage.

Please note that **Members can only propose methodologies under three circumstances:** 1) the methodology is for an emissions source not covered under The Registry's guidance, 2) a member is unable to use any of the Registry-provided methodologies for a certain source or 3) a member is able to develop a methodology that is more accurate than The Registry's methodology for that source. To be approved, the methodology must be at least as accurate as one of The Registry's methodologies

- Member Developed Methodology Form

Members that have confidential business information can be exempted from The Registry's requirement to release facility-level information to the public. To obtain this exemption, Members must contact the help desk at help@theclimateregistry.org or (866) 523-0764 ext. 3.

The GRP was developed through a public stakeholder process. The Registry received over 1,140 individual comments on the draft GRP from 107 respondents representing industry, environmental non-governmental organizations, regulatory agencies, individuals and consultants.

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Antelope Booster Pump Station Expansion – Sacramento Suburban Water District

List of References

- Groundwater Supply options to SJWD, 2014, **All pages**
- Antelope Pumpback Booster Pump Station Pre-Design Report, 2014, **page 8**

Memorandum

To: John Valdes, SSWD

From: Joe Domenichelli, D&A

Date: 1-8-14

Subject: Groundwater Supply Options to SJWD for 2014

John-

As requested, we have estimated the flow and pressure available from the SSWD North Service Area (NSA) system to the Van Maren intertie to supply areas of Citrus Heights. Our analysis used well data from our recent NSA Capacity Analysis and the SSWD water system model. Using existing conditions rather than ultimate buildout in the NSA, we are finding more water available than indicated in the Pumpback analysis. Also, without new pumps the pressure available is limited. Our findings are as follows:

1. Under maximum day demand conditions, the model shows that the system can deliver up to 10,000gpm at a pressure of approximately 50 psi at the Van Maren intertie location. At this flow rate there are locations within the SSWD NSA dropping to approximately 45psi.
2. Under maximum day demand conditions, the model shows that the system can deliver 5000gpm at approximately 57psi at the intertie and the pressures in the NSA remain at 50psi and above.

These model results were checked against SCADA information at the Antelope PR station and at the Verner PR station. The values in the model corresponding to those locations were within 2 psi (lower) in the SCADA data under the prescribed conditions. Hand calculations confirmed that the model results were reasonable by estimating losses through the pipelines and valves to the Van Maren location, however we recommend using slightly lower pressure values (3 to 5 psi) for the estimates to account for unanticipated losses in the system.

To establish a conservative estimate of available head and flow at the desired Van Maren location, we recommend using the following until field testing can be conducted for verification.

Demand Condition	Available Flow	Pressure at Van Maren
Maximum Day	5,000 gpm	50psi
Maximum Day	10,000 gpm	45psi

Under winter or average day conditions, we anticipate that the flow may be increased, however the pressure would only increase slightly (possibly up to 5 psi) due to limitations of the NSA well pumps and distribution system conditions. As previously mentioned, we recommend field testing to establish these flows and head conditions. For a short duration peak hour demand conditions, SSWD storage with booster stations in the NSA can maintain pressure above 40psi (to approx 45psi at the tie-in) and still deliver between 2,500 gpm and 5,000 gpm.

ANTELOPE PUMPBACK BOOSTER PUMP STATION

PRE-DESIGN REPORT

For

SACRAMENTO SUBURBAN WATER DISTRICT

January 10, 2014

DRAFT

Prepared by:

Domenichelli & Associates, Inc.
1101 Investment Blvd, Suite 115
El Dorado Hills, CA 95762
916-933-1997

Joeseph Domenichelli

CA License: 20368

2. Based on current well and storage capacity in the NSA and assuming this level of supply is maintained over the study period (to 2035), maximum day excess capacity is approximately 5,100 gpm and peak hour excess capacity is 2,700 gpm.

3. Due to limitations in the NSA system to deliver the entire excess capacity and the uncertainties in the future demand forecast, a maximum 2,500 gpm pump-back rate is recommended as the design flow available during all demands conditions (including peak hour).

4. The pump station will be able to deliver non-peak hour flows up to 5,000 gpm. Therefore, the station should be equipped to provide the entire range of available flow up to 5000 gpm to SJWD family water purveyors up-gradient from SSWD.

5. The station will be equipped with additional headers for potential future pumps. These pumps would be added if over time the estimated NSA demands are shown to consistently less or future reliable well capacity is increased. The increased capacity could result through new well construction and/or addition of treatment at wells with quality issues.

6. SSWD also desires to include a 2,000 gpm low head pump dedicated to a local area of poor water quality in the NSA (which is referred to as a "pump around "option). When this area requires flow at the same time as SJWD up- gradient users, then the up-gradient capacity will be reduced accordingly.

7. All pumps will be metered and controlled by the District's SCADA system to ensure that service to the NSA is not compromised during pump-back operation and that all flow is accounted for to each purveyor.

PUMP STATION DESIGN CRITERIA

Pumping Scenarios

As stated in the conclusions of the previous section, the initial phase of the Antelope Pump Back Booster Station (APBS) will deliver up to 5000 gpm for SJWD up-gradient from SSWD and 2000 gpm to a local area, known as the Arvin Area.

Arvin Area Pump Around- The Arvin Area is in the NSA south of Interstate 80 (I-80), which is almost totally isolated from the rest of the NSA. When SJWD surface water is not available, the Arvin Area relies heavily on local wells. Of the 13 NSA wells south of I-80, five have significant water quality issues. The "pump around" option at the booster station will replace the capacity of approximately two poor quality wells during high summer use. The Arvin Area is a relatively low elevation zone served by a pressure reducing station (Verner PRS) off of the CTP.

Enterprise Intertie – Sacramento Suburban Water District

List of References

- South Service Area Capacity Analysis Technical Memorandum, 2014, **pages 2-6**

DRAFT Technical Memorandum

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Prepared for: Sacramento Suburban Water District

Project Title: Hydraulic Model Consulting Services

Project No.: 145866

Technical Memorandum

Subject: South Service Area Capacity Analysis

Date: May 12, 2014

To: John Valdes

From: Melanie Holton

Copy to:

Prepared by: _____
Melanie Holton, PE, License No. 64983, Expiration 6/30/2015

Reviewed by: _____
Paul Selsky, PE, License No. 43544, Expiration 6/30/2014

Limitations:

This is a draft memorandum and is not intended to be a final representation of the work done or recommendations made by Brown and Caldwell. It should not be relied upon; consult the final report.

This document was prepared solely for Sacramento Suburban Water District in accordance with professional standards at the time the services were performed and in accordance with the contract between Sacramento Suburban Water District and Brown and Caldwell dated March 5, 2014. This document is governed by the specific scope of work authorized by Sacramento Suburban Water District; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by Sacramento Suburban Water District and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

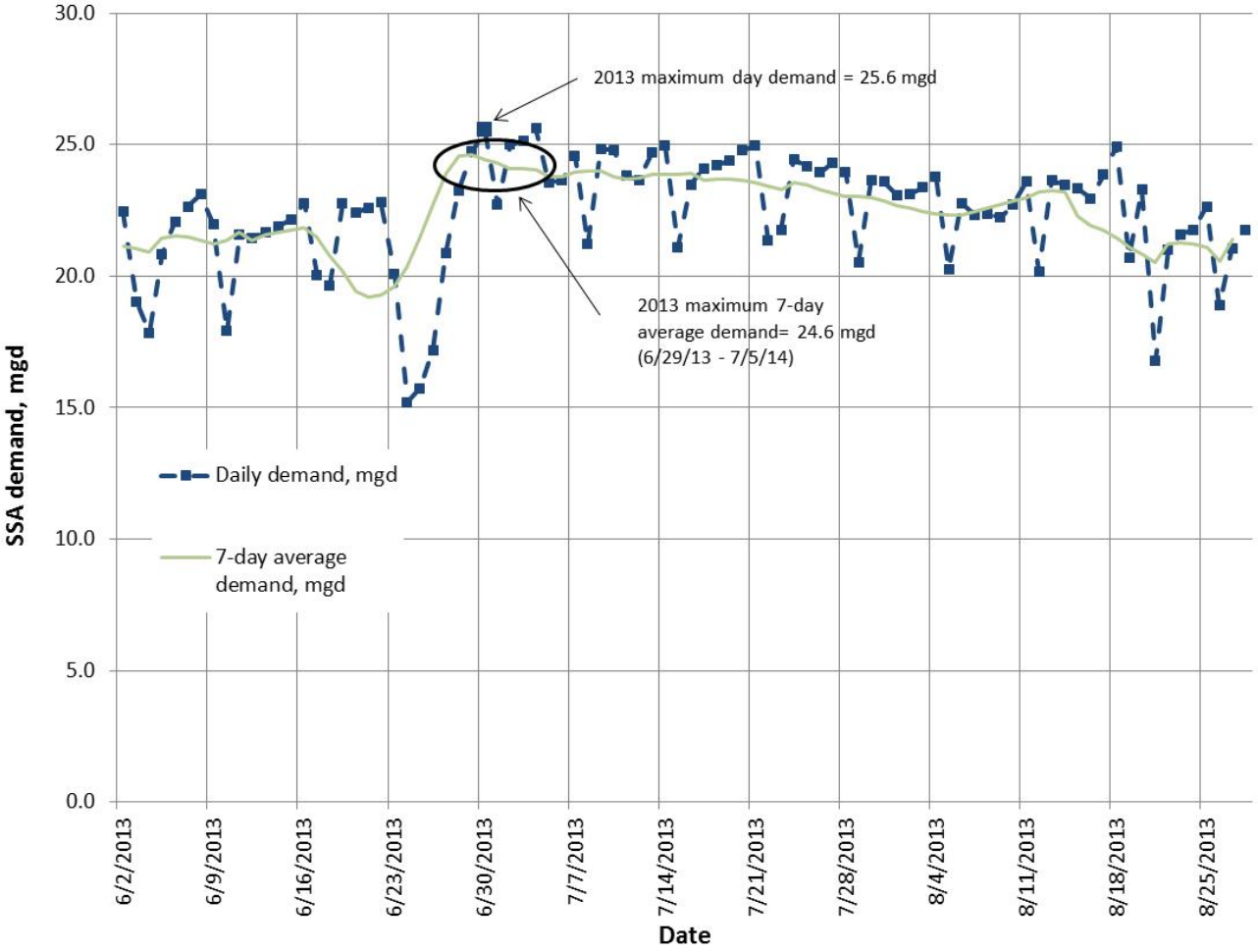

Figure 1. 2013 SSA Summer Demands

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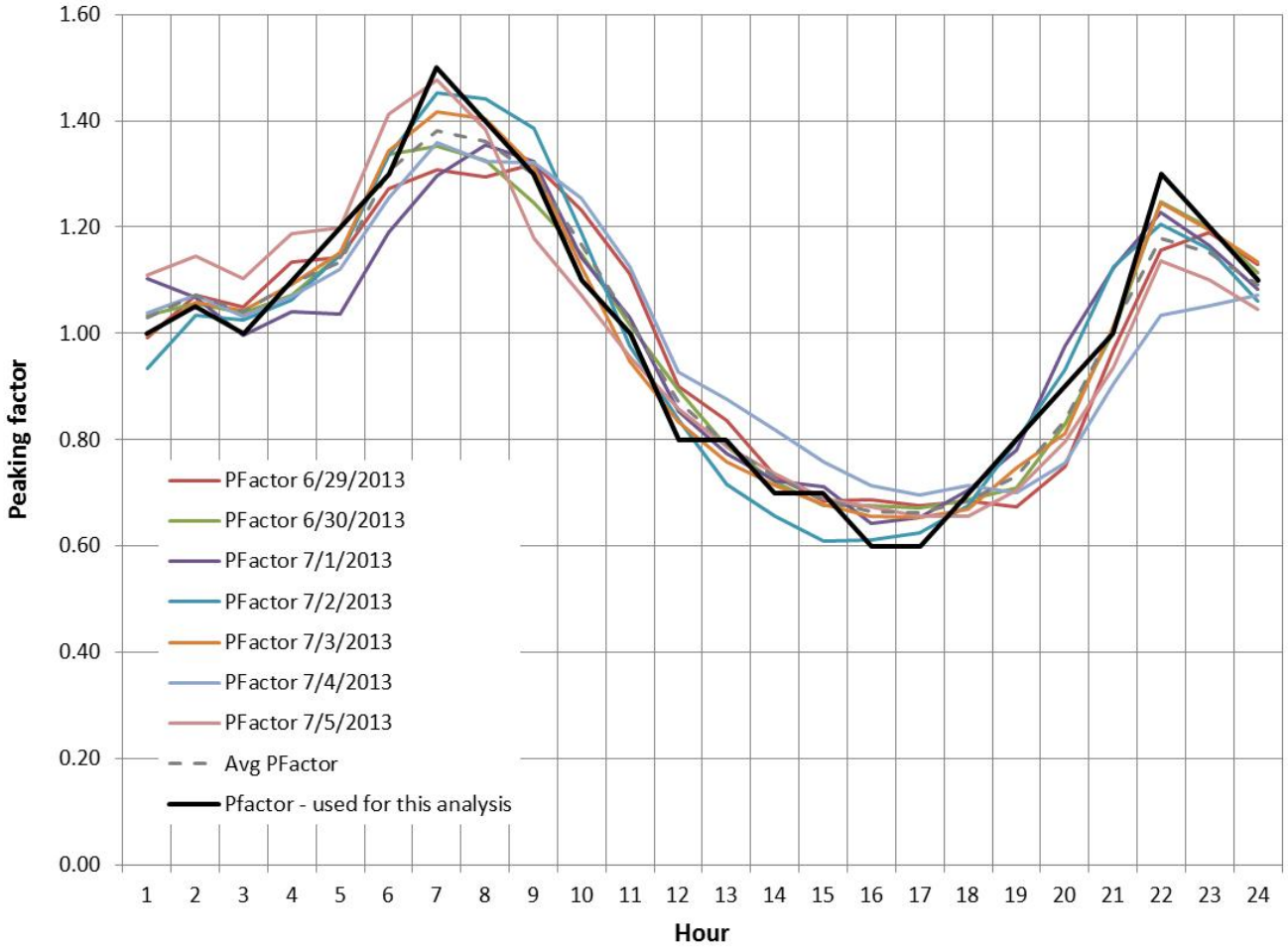

Figure 2. SSA Diurnal Peaking Factor Curve for Highest 7-day Period in 2013

1.1.1.2 SSA Supply Sources

Two supply scenarios are assumed: (1) All SSA wells available and (2) SSA fluoridated wells only available. In Scenario 1 it is assumed that all active wells are available and operating to provide supply to meet the District's SSA demand as well as City demands at the Enterprise Intertie. In Scenario 2 it is assumed that only wells with fluoridation capabilities are available to ensure the City only receives fluoridated water. Some wells have controls that trigger the well to shut down at specific pressure set points. The specific wells that are operating in each supply scenario are listed in Appendix A. This is analysis is performed assuming no supply from the Enterprise storage tank. If available the tank may enable the District to provide an additional 1 to 2 mgd to the City.

1.1.1.3 District Operational Criteria

Typically the District maintains minimum service pressures of 35 pounds per square inch (psi) with allowable minimum pressures down to 20 psi during maximum day plus fire flow demand conditions. Maximum headlosses of 10 feet per thousand feet (ft/1,000ft) and velocities of 5 feet per section (fps) should also be maintained.

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1.1.1.4 City of Sacramento Intertie

The City's demand at the Enterprise Intertie is modeled as a fixed head reservoir to simulate the average pressure of the City's water system during a summer maximum demand day. The hydraulic grade line in the City's system at this location is lower than the head of the SSA, therefore no booster pumping is required to provide supply to the City's system. The City's distribution system pressure ranges from 50 to 54 psi per discussion with City staff. In Scenario 1 (All SSA Wells) the average City system pressure at the intertie is 54 psi. The District's average pressure at the intertie is modeled as 58 psi. In Scenario 2 (Only Fluoridated SSA Wells) the average City system pressure at the intertie is modeled as 50 psi. Not modeled is the ability of the City to receive and distribute this supply into their distribution system. Headlosses in the transmission main to the City's distribution system are also not modeled.

Section 2: Analysis Results

This section describes the results of this analysis to determine the amount of supply that the District can provide to the City during a 90-day summer period in 2014.

2.1 Scenario 1. All SSA Wells Available

The flow range from each of the SSA wells under the maximum day demand condition and under the average summer demand condition, while providing supply to the City are listed in Attachment A, Tables A-1 and A-2, respectively. Figure 3 illustrates the supply available at the City intertie location on a maximum demand day and on the average summer day. Assuming that maximum day demand conditions will occur 15 days over the 90 day period from June through August with the remaining days are assumed to be average summer demand conditions, it is estimated that the District could provide an average of 21.3 mgd or 5,875 ac-ft to the City for the summer of 2014. Table 2 summarizes the analysis results.

Table 2. Scenario 1. All SSA Wells Available - Summary of Results, Flow to the City

SSA demand condition	Min – Max, gpm	Average, gpm	mgd	ac-ft/90 Days
Average summer demand	12-200 – 16,600	15,000	21.5	6,000
Maximum day demand	10,300 – 16,300	13,900	20.0	5,500
90-day summer period	10,300 – 16,600	14,800	21.3	5,875

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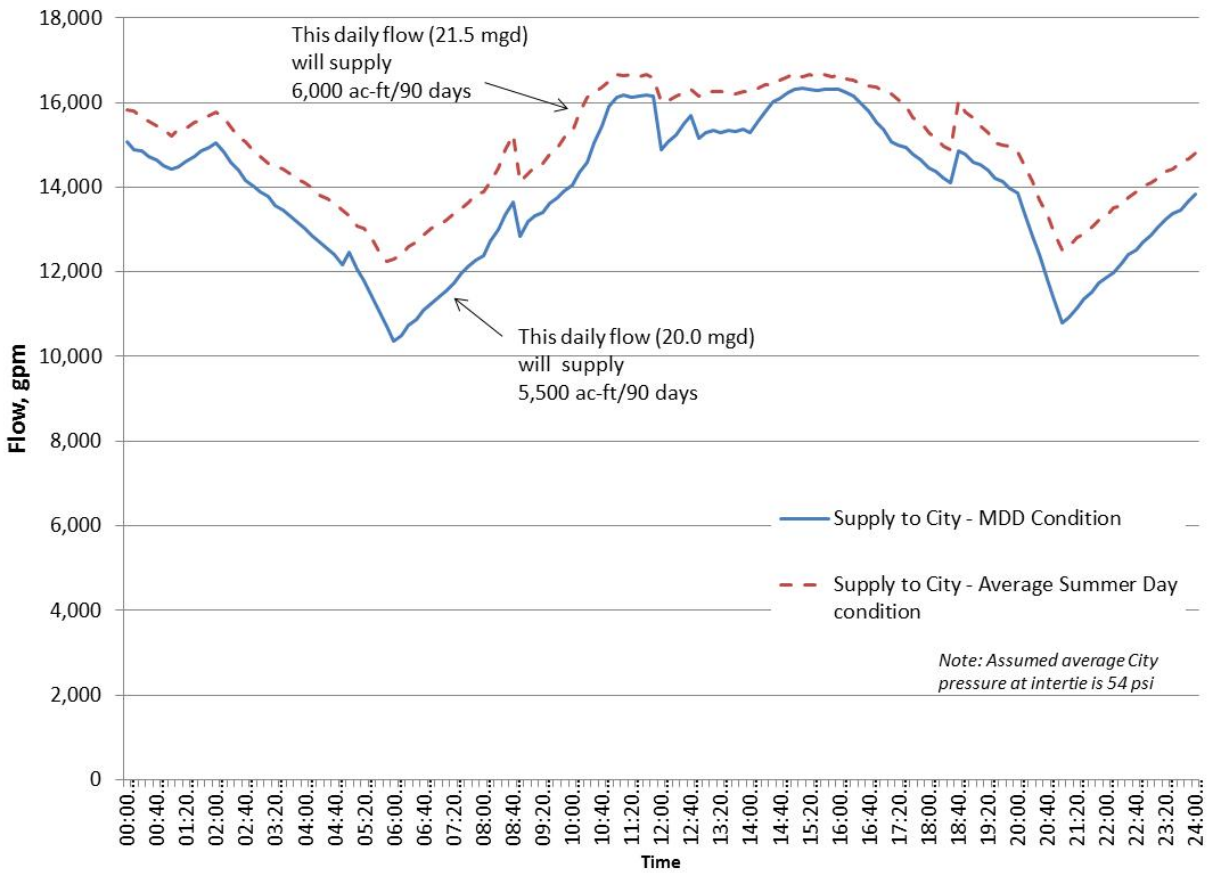

Figure 3. Scenario 1: All SSA Wells - Model Results for Supply Available to the City of Sacramento During Summer Demand Conditions

2.2 Scenario 2. Only Fluoridated SSA Wells Available

The flow range from each of the fluoridated SSA wells under the maximum day demand condition and under the average summer demand condition, while providing supply to the City are listed in Attachment A, Tables A-3 and A-4, respectively. Figure 4 illustrates the supply available at the City intertie location on a maximum demand day and on the average summer day. Assuming that maximum day demand conditions will occur 15 days over the 90 day period from June through August with the remaining days are assumed to be average summer demand conditions, it is estimated that the District could provide an average of 21.2 mgd or 5,850 ac-ft to the City for the summer of 2014. Table 3 summarizes the analysis results. It should be noted that during peak hour demands minimum pressures just below 35 psi (33 psi to 34 psi) occur in small area north of Well 32a. The average pressure in this area is greater than 35 psi. Pressures in this area are typically lower than the rest of the SSA.

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Table 3. Scenario 2. Only Fluoridated SSA Wells Available - Summary of Results, Flow to the City				
SSA demand condition	Min – Max, gpm	Average, gpm	mgd	ac-ft/90 Days
Average summer demand	11-200 – 17,600	15,000	21.5	6,000
Maximum day demand	9,500 – 17,900	13,500	19.4	5,400
90-day summer period	9,500 – 17,900	14,700	21.2	5,850

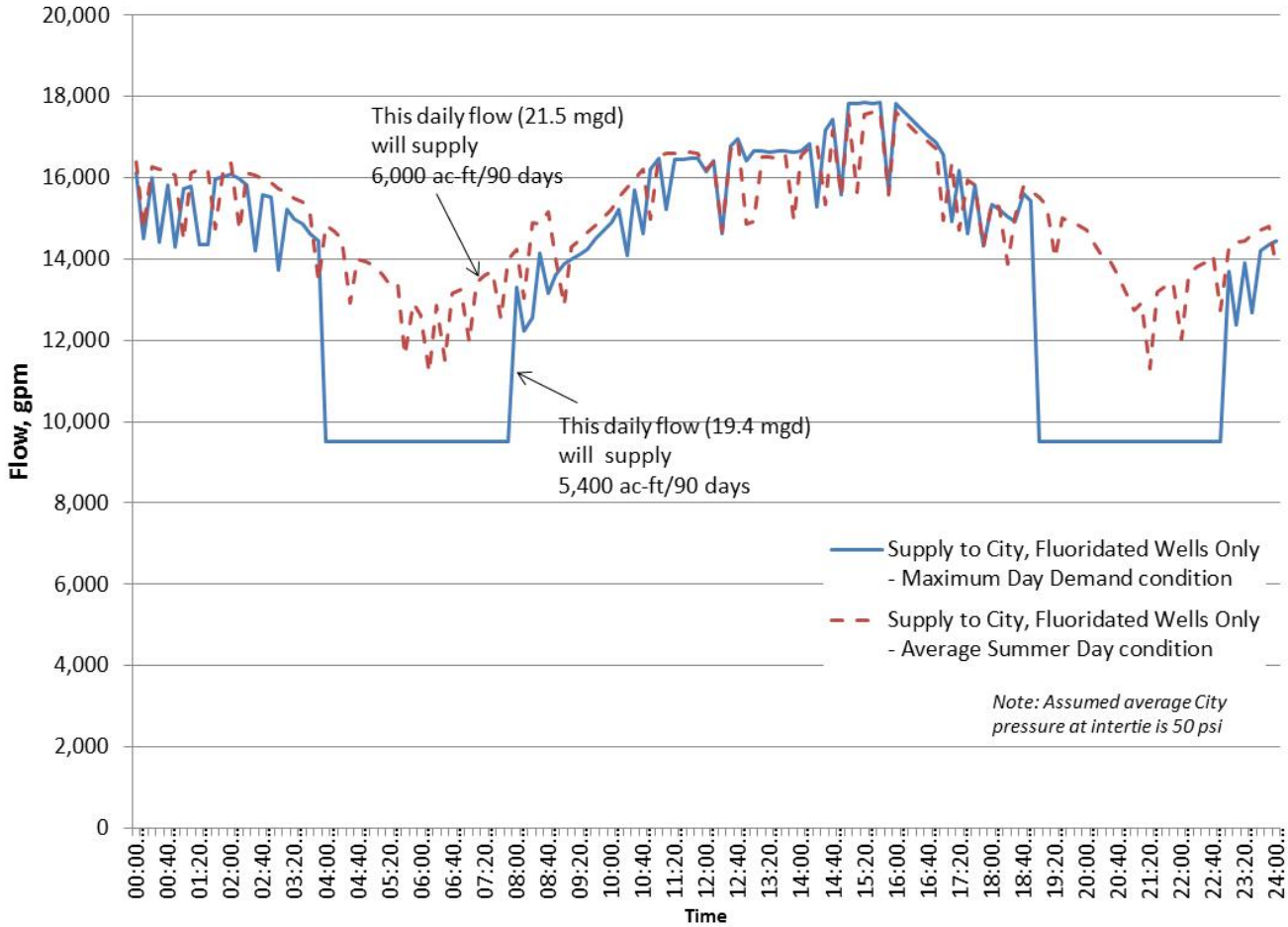

Figure 4. Scenario 2: Only Fluoridated SSA Wells - Model Results for Supply Available to the City of Sacramento During Summer Demand Conditions

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Barton Road Intertie – San Juan Water District

List of References

- 2013/2014 Water Emergency Supply Study, **All pages**
- Hydraulic Investigation, 2008, **pages 8-12**

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SAN JUAN WATER
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March 25, 2014

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From: Tony Barela, P.E.
Operations Manager
San Juan Water District
9935 Auburn Folsom Road
Granite Bay, CA 95746

Subject: 2014 Wholesale Drought Response Planning – Response Improvement Projects and Operational Narratives

---

INTRODUCTION

Under normal operations, San Juan Water District (SJWD or District) receives its water supply from Folsom Lake through U.S. Bureau of Reclamation's (USBR) facilities at Folsom Dam. In response to declining Folsom Lake levels and the potential for no supply, or greatly reduced supplies from USBR facilities this summer, District has reviewed multiple scenarios for providing a minimum service level of water supply to the District's wholesale (SJWD-W) customers. SJWD-W customers include Citrus Heights Water District (CHWD), Fair Oaks Water District (FOWD), Orange Vale Water Company (OVWC), City of Folsom (Ashland Area) and the SJWD Retail (SJWD-R) service area (See Figure 1).

All SJWD-W customers, except for the northern portion of SJWD-R and a small section of CHWD, are located in Sacramento County. SJWD-R population includes 10,260 in Sacramento County and 20,613 in Placer County; CHWD has approximately 1,090 in Placer County. The total population served by all agencies is approximately 138,400.

Figure 2 is a projection by USBR showing the Folsom Lake level declining to 127,000 AF by end of September and then rising in October through January. This is a 90% exceedance projection based on minimum downstream releases to meet regulatory requirements. Considering USBR is unable to deliver water supply through the existing intake at a storage of approximately 95,000 AF as illustrated on Figure 3, if there isn't significant rain in October through January, the District's intake may become unusable sometime in that timeframe. For this reason, the District is moving forward with the design and construction of the proposed drought response project in preparation of this occurrence.

The following sections provide background information and describe the projects necessary to provide the minimum level of service, including estimated costs and schedule to complete.

MINIMUM SERVICE LEVEL

Folsom lake is the sole source of water supply for SJWD-R. CHWD and FOWD have limited access to groundwater from existing wells, and there is very limited supply to all the wholesale customers through existing pipeline inter-ties with adjacent water agencies. The proposed projects and drought operations scenario is designed to provide a minimum level of service to all SJWD-W customers in response to current drought concerns. The proposed level of service is approximately the wintertime, or predominantly indoor demand for all SJWD-W. This demand for existing customers is estimated at 25 MGD. Additional projects and measures will be required to increase water supply reliability and service levels during future dry years. Table 1 shows the anticipated demand distribution for all SJWD-W.

Figure 4 shows SJWD-W system demands for 2005 and 2012 and how they relate to the proposed 25 MGD service level. The difference between the 2005 and 2012 demands is directly related to the conservation efforts employed by the District to meet the 20x2020 Initiative to reduce water usage by 20% by the year 2020.

Table 1 - SJWD-W Minimum Service Level Demands

Agency	Average Demand
San Juan Water District – Retail	7 MGD
City of Folsom (Ashland Area)	1 MGD
Citrus Heights Water District	8 MGD
Fair Oaks Water District	6 MGD
Orange Vale Water Company	3 MGD
Minimum Service Level Supply	**25 MGD**

DROUGHT RESPONSE PLAN

The District's drought response planning assumes Folsom Lake levels have dropped beyond the District's intake and that USBR is unable to supply any water from the lake to the District's water treatment plant. Figure 3 displays current and historic Folsom Lake levels, as well as critical elevations where District operations are impacted.

Under this scenario, SJWD-R and the City of Folsom's Ashland Service Area would receive groundwater supply from a new pump station to be constructed at the Sacramento Suburban Water District's (SSWD) connection to the SJWD's Cooperative Transmission Pipeline (CTP). Under normal operation, the CTP is used to deliver treated surface water from the District's water treatment plant to SSWD. Under the drought planning operational strategy, the CTP would be used to convey approximately 14.4 MGD from SSWD directly to Hinkle Reservoir located at SJWD's Water Treatment Plant (WTP) (See Figure 5). From Hinkle Reservoir the

SSWD groundwater can be delivered to SJWD-R and the City of Folsom, and the other wholesale customers as necessary, through the existing distribution system.

SJWD-R will also receive water supply from Placer County Water Agency (PCWA) through a new pipeline intertie to be constructed along the northern border of the District. It is anticipated that the new pipeline intertie will provide approximately 1 to 2 MGD into the District's northern service area, depending on the intertie connection points. A second temporary intertie may be installed between SJWD and PCWA at the District's Kokila Reservoir. It is anticipated this temporary intertie would also supply an additional 1 MGD to the District's northern service area. There is an existing SJWD/PCWA intertie that provides 1 MGD to a separate pressure zone located at the northeast corner of the District.

The main supply for CHWD, FOWD, OVWC and a small portion of SJWD's gravity zone would be provided from the existing groundwater wells and interties between the agencies. Only CHWD and FOWD have groundwater wells within their retail systems. Due to system limitations, the groundwater can only be utilized within CHWD, FOWD and OVWC; therefore, these agencies would be isolated from the District's WTP to maximize groundwater usage from the CHWD and FOWD wells.

Groundwater supply from the CHWD and FOWD wells is estimated at 17 MGD with all wells running. Understanding that wells may be out of services during the drought, supplemental water supply will be provided to the CHWD, FOWD, and OVWC through proposed control valve stations located along District boundaries. These control valve stations will provide water supply from Hinkle Reservoir as needed to replace a groundwater well being out of service, meet peak demand or to provide fire flow to the neighboring agencies.

Table 2 shows the estimated water supply and demand under this proposed operational strategy taking into account the potential for the largest water well in the system to be out of service. Table 2 shows there is a potential excess supply to the identified minimum level of service that provides an approximate 20 percent factor of safety to account for interruptions in service through the interties, or unsuccessful efforts to restrict customer water usage to winter levels during all periods of the drought.

Table 2 - SJWD-W Minimum Service Level Supply & Demand

Source	Flow
SJWD-W Demand	(25 MGD)
CHWD & FOWD Groundwater Supply	17 MGD
Well Out of Service	(4 MGD)
Intertie Supply	17.4 MGD
Potential Excess Water Supply:	**5.4 MGD**

Drought Response Water Supply Projects, Schedules and Estimated Costs

Table 3 identifies the proposed improvement projects required to provide the minimum level of water supply for SJWD-W in the event of a surface water supply interruption. Proposed project schedules and costs are planning level estimates for budgeting purposes only. It is anticipated that all projects will be constructed and in service by September 2015.

Table 3 – Emergency Water Supply Improvement Projects

Project Name	Description	Project Benefit	Cost Estimate	Schedule
SSWD-SJWD Groundwater Supply Pump Station	Pumps, interconnecting piping, valves, VFD controls, and related work to pump groundwater from SSWD's Antelope PRV Station to SJWD's Hinkle Reservoir at SJWD WTP.	Provides 14.4 MGD groundwater supply to SJWD to replace reduced surface water deliveries from Folsom Reservoir and maintain health and safety water supply to SJWD wholesale service area (includes SJWD –R).	$2,600,000	Design underway. Could be ready for construction in September 2014.
PCWA-SJWD Barton Road Intertie	1,500 lf of 12-inch diameter pipeline, pressure control valve, metering facility, and associated work constructed within Barton Road. Connects existing 12-inch PCWA piping to existing 8-inch SJWD distribution system piping.	Provides immediate supply of 1 MGD from PCWA to SJWD's Granite Bay service area to help support delivery of health and safety water supply. If Folsom Lake level declines below M&I intake, Granite Bay has no other access to water. Provides an emergency two-way agency intertie for future events.	$620,000	Design underway. Could be ready for construction in May 2014.
PCWA-SJWD Barton Road Intertie Extension	Extends intertie noted above an additional 1,500 lf to tie into existing 12-inch diameter SJWD distribution grid.	Increases intertie capacity to 2 MGD.	$400,000	Design underway. Could be ready for construction in May 2014.
SJWD Wholesale Interties and Control Facilities	Improvements to 4 existing interties between CHWD, FOWD, OVWC, and SJWD-R (the wholesale agencies) to allow distribution of available surface water supply and additional groundwater supplies from wells and interties throughout the SJWD wholesale service area. Improvements include pressure reducing/pressure sustaining valves, check valves to control flow direction, and related improvements.	Because of elevation and system pressures differences between the wholesale agencies, and between the neighboring agencies of PCWA and SSWD, these improvements are necessary to move surplus supplies from where they are available to where they are needed. Also ensures water deliveries can be maintained under fire flow or emergency conditions in any given area.	$670,000	Can be constructed to coincide with SSWD-SJWD GW Supply Pump Station
PCWA-SJWD Kokila Reservoir Intertie	Approximately 900 lf of temporary above ground 12-inch diameter piping including valves, meter, and associated work to connect PCWA piping to existing SJWD Kokila Reservoir.	Provides immediate supply of 1 MGD from PCWA to SJWD's Bacon Pressure Zone to help support delivery of health and safety water supply. If Folsom Lake level declines below M&I intake, Bacon Zone has no other access to water.	$164,000	Design underway. Could be ready for construction in May 2014.

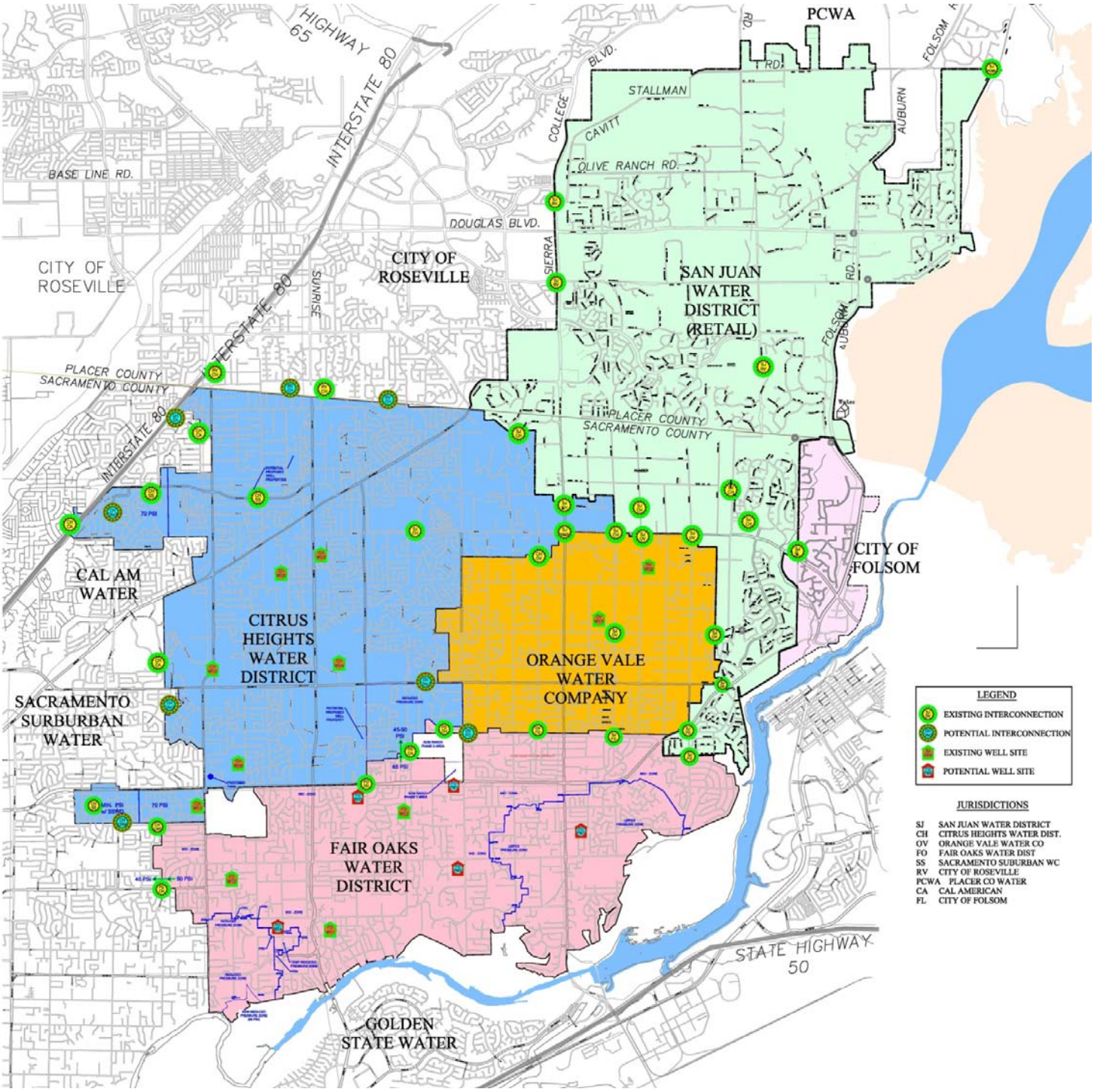

Figure 1 – SJWD Wholesale Service Area

February 2014 90% b2 Forecast
Minimum Regulatory Standards

Storages

Federal End of the Month Storage/Elevation (TAF/Feet)

		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Trinity	1162	1148	1150	1111	963	795	639	484	334	302	#N/A	#N/A	#N/A
	Elev.	2271	2271	2267	2251	2230	2208	2182	2150	2142	#N/A	#N/A	#N/A
Whiskeytown	205	206	206	238	238	238	238	238	230	206	201	186	206
	Elev.	1199	1199	1209	1209	1209	1209	1209	1207	1199	1197	1192	1199
Shasta	1656	1678	1703	1566	1326	948	442	194	150	84	93	152	276
	Elev.	887	888	886	843	808	813	785	751	722	727	752	788
Folsom	164	290	310	312	316	273	210	174	127	133	143	165	196
	Elev.	385	389	389	390	382	369	360	346	348	351	358	366
New Melones	1048	1061	1028	982	878	782	675	568	481	472	474	478	488
	Elev.	949	946	937	924	910	892	872	856	852	852	853	854
San Luis	333	342	350	344	310	245	170	124	189	335	464	617	777
	Elev.	415	413	404	389	374	356	341	354	391	431	464	494
Total		4714	4744	4533	4028	3281	2375	1781	1521	1532	#N/A	#N/A	#N/A

Monthly River Releases (TAF/cfs)

Trinity	TAF	17	18	36	92	47	28	28	27	23	18	18	18
	cfs	300	300	600	1,498	783	450	450	450	373	300	300	300
Clear Creek	TAF	11	12	12	12	9	7	5	9	12	12	12	12
	cfs	200	200	200	200	150	120	85	150	200	200	200	200
Sacramento	TAF	180	200	351	483	631	738	467	268	295	230	218	200
	cfs	3250	3250	5900	7950	10600	12000	7585	4501	4800	3870	3552	3250
American	TAF	28	31	33	33	54	65	49	58	31	30	31	31
	cfs	500	500	556	534	908	1054	798	973	500	500	500	500
Stanislaus	TAF	13	16	29	25	33	24	22	11	25	13	13	13
	cfs	214	268	480	410	561	396	352	240	577	210	200	213

Trinity Diversions (TAF)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Carr PP	6	1	39	76	127	128	127	122	17	15	10	29
Spring Crk. PP	5	8	10	70	120	120	120	120	30	10	17	4

Delta Summary (TAF)

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Tracy	55	45	45	46	45	45	63	153	213	155	170	180
USBR Banks	0	0	0	0	0	0	0	0	0	0	0	0
Contra Costa	7	7	6.4	6.4	6.4	4.9	5.6	6.4	7	8.4	9.2	9.2
Total USBR	62	52	51	53	51	50	69	159	220	163	179	189
Total Export	117	97	72	74	81	80	95	198	328	377	349	369
COA Balance	0	0	5	-14	-11	65	68	81	81	81	81	81
Old/Middle River Std.												
Old/Middle R. calc.	-1,549	-1,055	-873	-894	-1,157	-1,171	-1,412	-2,793	-3,919	-4,911	-4,413	-4,658
Computed DOI	9563	5840	4001	4002	4001	4002	2993	3009	2993	3496	3920	3741
Excess Outflow	2467	1838	0	0	0	0	0	0	0	0	423	244
% Export/Inflow	17%	17%	15%	14%	13%	13%	21%	41%	63%	65%	65%	64%
% Export/Inflow std.	45%	35%	35%	35%	35%	65%	65%	65%	65%	65%	65%	65%

Hydrology

	Clair Engle	Shasta	Folsom	New Melones
Water Year Inflow (TAF)	150	1,973	568	215
Year to Date + Forecasted % of mean	12%	36%	21%	20%

Figure 2 – USBR Storage Projections

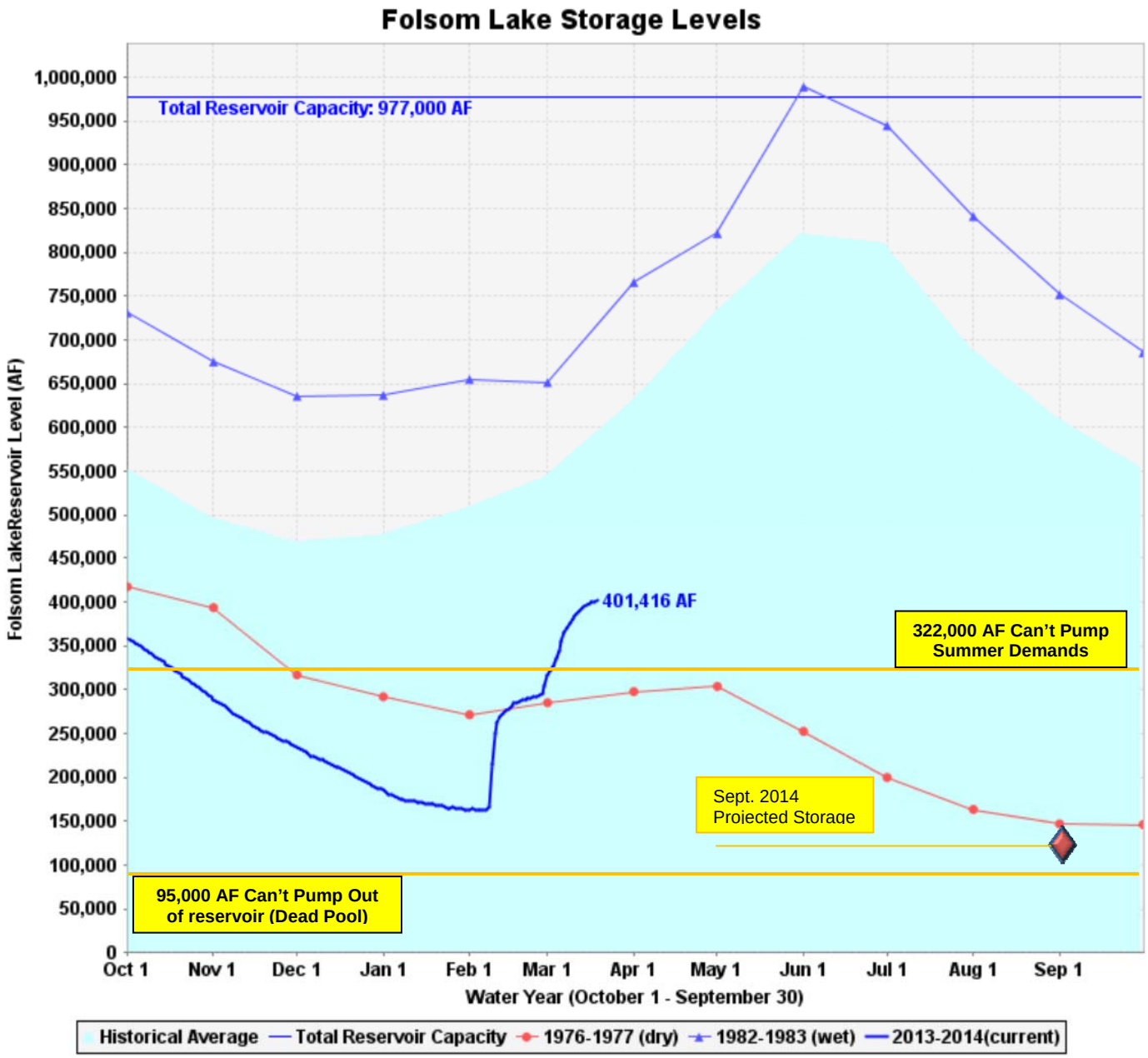

Figure 3 – Folsom Lake Storage Levels and Operation Levels

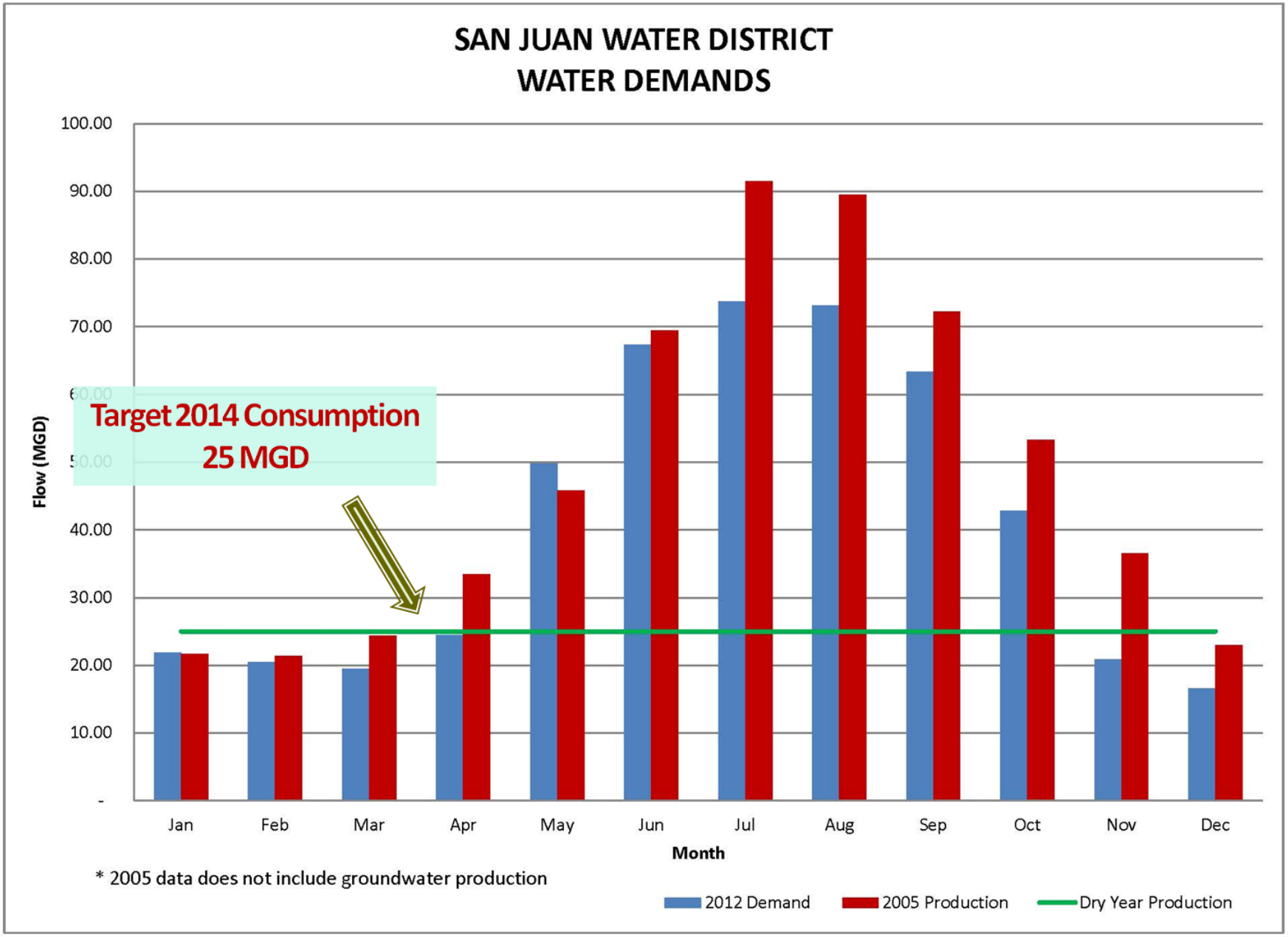

Figure 4 - SJWD-W System Demands

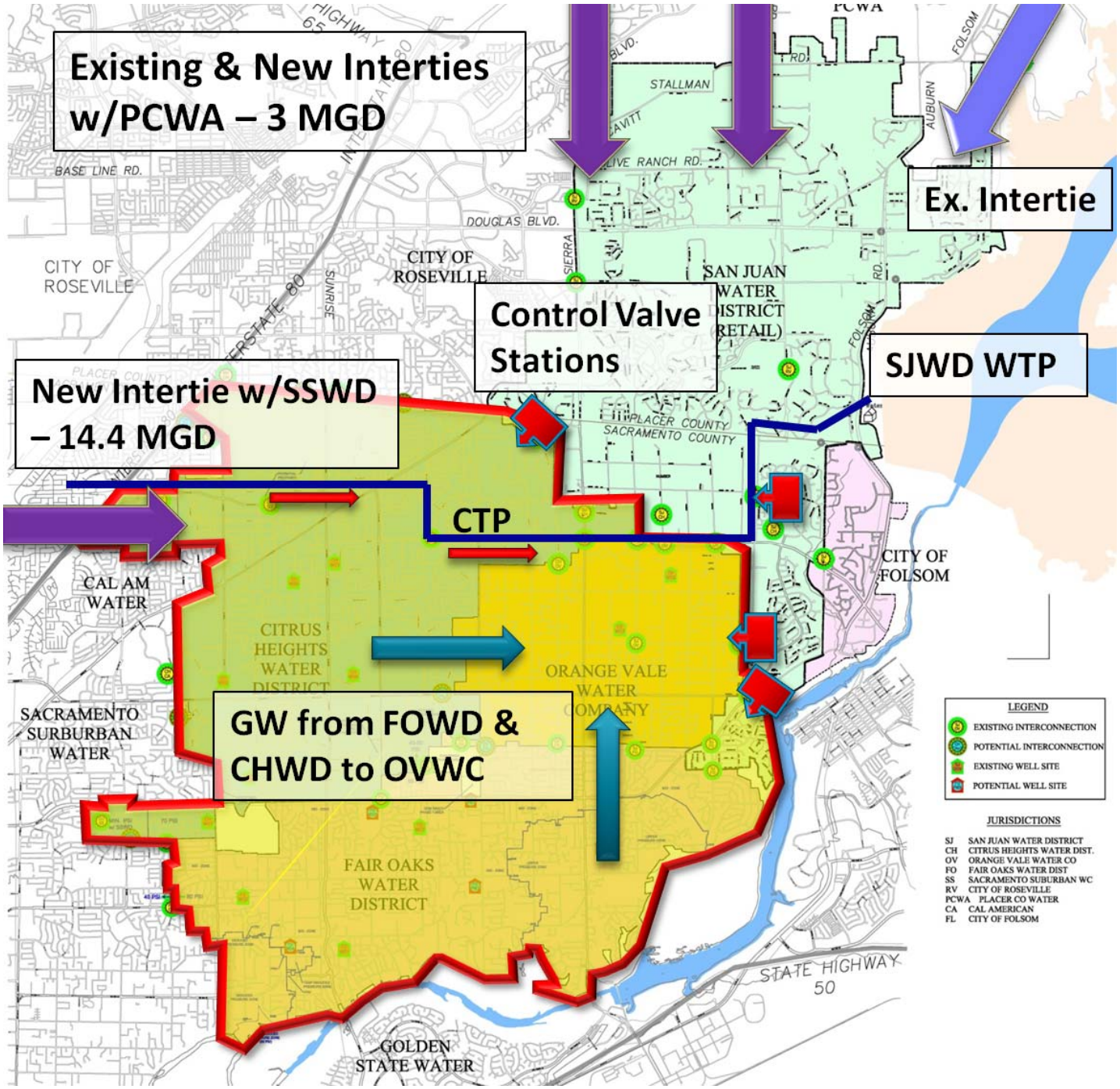

Figure 5 - SJWD-W Operational Strategy

HYDROGEOLOGIC INVESTIGATION – POTENTIAL FOR GROUNDWATER SUPPLY

PREPARED FOR

SAN JUAN WATER DISTRICT

PREPARED BY

GEI Consultants, Inc., Bookman-Edmonston Division

September 2008

2 Findings

The following sections describe the findings from coring, construction, and testing of the well. A discussion of the regional and local groundwater trends is also provided to assist in the interpretation of the findings.

2.1 Aquifers

The test hole drilling at TH-1 did not penetrate into an aquifer. The Salt Springs Slate (Jss) was encountered from just below ground surface to the total depth of TH-1, 99 feet bgs. The uplift of the granitic pluton displaced the Jss. The displacement created isolated slivers of the Jss adjacent to the granitic basement west of Folsom Reservoir within the District's boundary.

The test hole drilling at TH-2 encountered the sediments of the Turlock Lake and Laguna Formations from ground surface to about 130 feet bgs. These sediments appeared to be dry based on geophysical log interpretation. The base of the Laguna Formation is marked by a tuffaceous ash layer between 120-130 feet bgs followed by a clay layer from about 130-140 feet bgs. The very-fine to medium grained sands and small gravels of the Mehrten Formation begin below this 120-140 foot bgs ash-clay interval. The clay and ash layers from about 120-140 feet bgs probably act as a confining bed for the Mehrten aquifer. The Mehrten sands continue to a depth of about 225 feet bgs, except for one fine-grained interval. About 225 feet bgs is a fine-grained succession, which is the beginning of the Ione Formation. The Ione Formation typically contains poor quality water and is not a viable municipal water supply source. These fine-grained layers may produce semi-confined to confined conditions for the Ione aquifers. Figures 5 and 6 show the geology in the vicinity of TH-1 and TH-2.

2.2 Groundwater Levels

The monitoring well is screened between 145 to 165 and 185 to 215 feet bgs. The upper screen interval is opposite gravels and some fine sand and the lower screen interval is across multiple sand packages. From 170 to 190 feet bgs the electrical log signature indicates a finer, possibly clayey layer, which could act as a confining layer between the two screen intervals. This relationship could allow for two different heads within the Mehrten aquifer. The composite static water level on August 12, 2008, after the well was developed, was 100.8 feet bgs. Because the water levels (piezometric head) are above the top of the aquifer and above the clay layer, the aquifers are confined. The bottom of the confining bed is about 138 feet bgs.

The water level and pressure recorded by the transducer is graphed in Figure 4. The measurements show the water levels are mostly flat and only vary by about three-tenths of a foot. The depth to water remained between 102.2 to 102.5 feet below top of casing (btoc), which is about 101 feet bgs, due to the 1.58 feet of stick-up of the well casing.

The stability of the water level indicates the absence of influence by nearby pumping wells. If a local pumping well was present, the depth-to-water would abruptly drop and continue to fall during pumping, the drawdown would then recover to pre-pumping levels after the pumping stopped. Therefore, construction and pumping of a water supply well at the TH-2 location would not affect nearby wells.

2.3 Groundwater Quality

Groundwater quality samples were collected from the test well on August 12, 2008, at the end of well development. The samples were delivered to MWH Labs in West Sacramento for analysis. The water quality analysis did not detect N-Nitrosodimethlamine, volatile organic compounds, perchlorate, chlorinated herbecides, polycyclic aromatic hydrocarbons, N-chlorocarbamates, organopesticides, ethylene dibromide + 1,2-Dibromo-3-Chloropropane, or phthalate esters. The arsenic concentration is 5.3 µg/L which is less than the MCL of 10 µg/L. Dimethyl phthalate was detected at 96 µg/L, for which there is not a MCL. It is believed that the source for the dimethyl phthalate could be the latex gloves used during the collection or analysis of the water samples. Since dimethyl phthalate is used as an additive in rubber and polyvinyl chloride(PVC) manufacturing, the PVC well casing could also be a source.

The total dissolved solids were reported as 410 mg/L which is within drinking water standards, but is higher than the TDS of water supplied by SJWD to its customers. The level of iron and manganese reported are above the MCL. Iron is at 0.81 mg/L while the MCL is 0.3 mg/L. Manganese levels are 68 µg/L, where the MCL is set at 50 µg/L. Metals analytical results can be significantly affected by soil particles in the water as measured by turbidity. The samples are acidified to a pH of 1.0 to 3.0 upon sampling which can dissolve fine particles and take metals into solution. Although the turbidity was only 2.5 NTU and below the MCL, it suggests soil particles could have been present. Aluminum was also detected in the sample suggesting fine sediments were present in the sample. It is possible the iron and manganese detected are not dissolved. The Langelier Index is -0.50 which indicates the water could be slightly corrosive. Appendix D contains the analytical results.

2.4 Aquifer Characteristics

Monitoring wells cannot be pumped at high enough rates to estimate the potential yield of the aquifer. Based on the lithologic log some of the aquifer characteristics and potential water supply yield can be estimated. MW-2 was pump developed for 4-hours, during which time the pumping water levels were measured. To further develop an understanding of the aquifer

materials a soil sample was sieved. The sieve analysis indicates the formation to consist of relatively clean fine to coarse sand. The hydraulic conductivity for clean sand is about 100 feet/day (Todd, 1980).

Using the equations $T = Kb$; where T = transmissivity (gallons per day/ ft), K = hydraulic conductivity (feet/day), and b = aquifer thickness (feet), estimations of the hydraulic characteristics of the aquifer can be made. The aquifer thickness as confirmed by drilling is 80 feet. Using the above calculations data acquired during drilling and well development can be used to estimate the T and K. The estimates of the T and K are what allow a quantification of potential production wells pumping water level and potential yield. If the hydraulic conductivity of the aquifer is conservatively estimated to be within the 50 to 75 feet/day range, with a target pumping level of about 130 feet, then the yield of the well will be between 350 to 500 gpm. Appendix E shows aquifer characteristic calculations for pumping rates from 300 to 500 gpm with a range of hydraulic conductivity between 50 and 75 feet/day.

3 Conclusions and Recommendations

The drill cuttings and geophysical logs show that there are multiple sand and gravel beds that could contribute groundwater to the new well. The thickness of the aquifer that would be used for a future production well is about 80 feet thick.

The static water level is about 100 feet bgs, which allows about 45 feet of drawdown before reaching the top of the first aquifer. Estimates of the aquifer characteristics were made from the sediment grain size. Using conservative aquifer characteristics the new well should be capable of pumping between 350 to 500 gpm.

The water quality results indicate the well water to be of suitable drinking water quality after minor treatment procedures. The iron concentration is 0.81 mg/L and a concentration of iron above 0.5 mg/L could lead to iron precipitation (Driscoll, 1986). Similar to the iron, manganese can also precipitate if the concentration is too high. The reported result for manganese is 68 µg/L and is below the level at which manganese would be expected to precipitate; however, it is above the MCL of 50 µg/L (Driscoll, 1986). Iron and manganese may not be dissolved so we recommend additional purging and re-sampling of the well. The Langelier Index, used to determine if the water will be corrosive or incrusting, is -0.50 which indicates the water could be slightly corrosive if an abundance of dissolved oxygen is present.

For a production well to meet drinking water standards at Test Hole-2 a treatment facility for iron and manganese will need to be constructed or the water would have to be blended. The taste of the water with a TDS of 410 mg/L versus the District's normal delivered water of a TDS around 40 mg/L will be noticeable, which may cause customer complaints. These facilities will increase operation and maintenance costs. For these reasons the construction of a production well is not recommended because the higher TDS and the costs for the water treatment is too significant for a well producing 500 gallons per minute.

If a production well is still considered we recommend that it should be permitted and designed to pump 500 gpm. During production testing, groundwater levels should be monitored in the test well to further assess aquifer characteristics and its production capacity.

4 San Juan Water District Preliminary Well Design

The preliminary well design presented below is based on a design capacity of 500 gpm. Figure 7 presents the proposed well construction details.

4.1 Drilling Method

The selection of the drilling method will be based on the sediments anticipated to be encountered, the availability of water for drilling, and any special conditions.

- The sediments known to be present at the site are unconsolidated sand, clay, and small gravel.
- Because water can be obtained from a fire hydrant, the availability of water will not limit the choice of drilling method.

Based on these conditions, we recommend using either the mud rotary or the reverse circulation method to drill the boring.

The contractor should be allowed to employ a suitable method to drill the hole for the conductor casing, since specifying a method may increase the cost. The hole would typically be drilled with a solid-stem auger, bucket, or mud rotary tri-cone bit.

4.2 Conductor Casing and Sanitary Seals

A conductor casing is used to stabilize the borehole near the surface and to provide a sanitary seal, which, for municipal supply wells, is required to be a minimum of 50 feet deep (DWR, 1981) and the bottom be located in a clay or silt layer. The sanitary seal will occupy the space between the native sediments or conductor casing and well casing.

The annular space seal between the well casing and the conductor casing or borehole wall is placed to isolate off perched aquifers that may contain poor quality water. The bottom of the annular seal should be in a clay layer to provide a proper seal. At 138 feet bgs there is a clay layer that will allow allowing a 7-foot reservoir of gravel pack over the top well screen. The annular seal should be placed from 138 feet bgs to ground surface.

If the mud rotary method is selected, a conductor casing will not be needed. The reverse circulation drilling method typically needs a conductor casing to connect to above-ground storage tanks. To comply with this requirement, we recommend that the conductor casing be installed to a depth of about 50 feet.