APPENDIX F - EXCERPTS FROM THE SEWD WATER MANAGEMENT PLAN

Att7_SWF _TechJust_2of2

Stockton East Water District
Water Management Plan

December 17, 2012

Date of first draft – December 30, 2011
Date of final – December 17, 2012

(This page left blank intentionally.)

Index

		Page
Section 1:	Description of the District	1
Section 2:	Inventory of Water Resources	19
Section 3:	Best Management Practices (BMPs) for Agricultural Contractors	31
Section 4:	Best Management Practices for Urban Contractors	41
Section 5:	District Water Inventory Tables	45
References:		Ref-1

Attachment A	SEWD/ USBR and SEWD/CCWD Contracts for New Hogan Project Water Supply
Attachment B	SEWD/ USBR and SEWD/CSJWCD Contracts for Central Valley Project Water Supply (New Melones)
Attachment C	2009-2010 Temporary Water Transfer Agreements between OID and SEWD, and SSJID and SEWD
Attachment D	District Facilities Maps
Attachment E	District Soils Map
Attachment F	District Rules and Regulations
Attachment G	2010 Rate Ordinance
Attachment H	District Sample Bill
Attachment I	District Water Shortage Plan
Attachment J	Groundwater Management Plan
Attachment K	District Map of Groundwater Facilities
Attachment L	Farmington Groundwater Recharge Program
Attachment M	2010 Irrigation Water Quality Results
Attachment N	California Act Establishing the Stockton-East Water District
Attachment O	USBR Exemption Letter
Attachment P	Items to Address DWR Agricultural Water Management Plan Requirements: DWR Attachment A Legal Certification and Apportionment Required for Water Measurement DWR Attachment B Engineer Certification and Apportionment Required for Water Measurement DWR Attachment C Description of Water Measurement Conversion to Volume DWR Attachment D Description of Water Measurement Best Professional Practices DWR Attachment E Device Corrective Action Plan Required for Water Measurement
Attachment Q	Efficient Water Management Practices (EWMP) Report
Attachment R	Notice of AWMP Preparation

(This page left blank intentionally.)

Section 1: Description of the District

District Name: *Stockton East Water District*
Contact Name: John E. Morley
Title: Water Quality Control Analyst
Telephone: (209) 948-0537
E-mail: emorley@sewd.net
Web Address http://www.sewd.net/

A. History

1. Date district formed: 1948 *Date of first Reclamation contract*: 1964
Original size (acres): 79,500 *Current year (last complete calendar year)*: 2010

The Stockton East Water District (SEWD) provides surface water for both agricultural and urban uses. By providing surface water for agricultural irrigation, SEWD supports San Joaquin County's agricultural industry, which is the area's leading economic activity. SEWD also supplies wholesale treated drinking water, which is retailed to Stockton area customers by the California Water Service Company, the City of Stockton, and San Joaquin County.

SEWD owns and operates a water treatment plant (WTP) in Stockton, the Dr. Joe Waidhofer (DJW) WTP, which has a primary intake from the Calaveras River at Bellota, and a secondary diversion from Goodwin Reservoir on the Stanislaus River. The water diversion at Goodwin Dam marks the beginning of the New Melones Conveyance System.

Formation of SEWD

SEWD was formed in 1948 under the 1931 Water Conservation Act of the State of California. SEWD was originally organized as the Stockton and East San Joaquin Water Conservation District, an independent political subdivision of the state government. As such, SEWD was responsible for acquiring a supplemental water supply and developing water use practices that would secure a balance between SEWD's surface and groundwater supplies.

Establishing Water Supply and Financial Structure

From 1948 to 1963, SEWD focused its efforts on water resource planning by evaluating groundwater conditions and determining requirements for supplemental water. These intensive efforts on the part of SEWD and other local agencies resulted in the construction of New Hogan Dam in 1964. SEWD signed a contract for supplemental surface water with the United States Bureau of Reclamation (USBR) in 1970. Also in 1970, SEWD and Calaveras County Water District (CCWD) signed a Memorandum of Understanding (MOU) which assigned SEWD 56.5 percent of the yield from New Hogan Reservoir.

From its inception until 1962, SEWD's financial structure was dependent upon property taxes. In 1963, the Governor of California signed a bill establishing SEWD's right to levy groundwater use fees and surface water charges. SEWD used the additional revenue to contract for New

Hogan Reservoir water. About this time, SEWD began registering wells within the district, while check dams were built on the Calaveras River and Mormon and Mosher Sloughs to control surface irrigation water and promote groundwater recharge. SEWD also became actively involved in the pursuit of projects to mitigate significant groundwater issues, which included declining aquifer levels, pumping depressions under urban Stockton, and the continuing threat of saline intrusion in wells near the Delta.

Boundary Expansion and Drinking Water Treatment Plant Construction

In 1971, SEWD boundaries were expanded from its original 79,500 acres to approximately 114,000 acres to include the entire Stockton urban area. Plans were initiated for a 30 million gallon per day (MGD) drinking water treatment plant. In 1975, a district-wide election resulted in the approval of a $25 million bond to fund the new plant. The DJW WTP, located at 6767 East Main Street, was constructed in 1977 and began operation in 1978. In 1979, the Independent Benefit Commission concluded that the new drinking water treatment plant was a benefit to Stockton's planning areas. In 2005, SEWD annexed an additional 27,000 acres into the district. Today, SEWD's area encompasses approximately 143,300 acres.

Pursuit of Supplemental Water Supplies

SEWD has actively sought supplemental surface water from the American River via the Folsom South Canal and from the New Melones Reservoir. Efforts to obtain the American River supply have been thwarted by the Environmental Defense Fund (EDF), and litigation by the East Bay Municipal Utility District (EBMUD) and the Freeport Regional Diversion Project recently constructed by EBMUD and Sacramento County.

In 1983, SEWD and the Central San Joaquin Water Conservation District (CSJWCD) contracted with USBR for annual allocations of 75,000 and 80,000 acre-feet (ac-ft), respectively, from New Melones Reservoir. Also in 1983, SEWD expanded its surface water irrigation capabilities by constructing the 12,000 gallons per minute Potter Creek Pump Facility to facilitate diversions from New Melones Reservoir.

Plant Expansion and New Melones Conveyance Construction

In 1991, the DJW WTP was expanded to 40 MGD to accommodate increased demand from Stockton's urban areas. Construction of the New Melones Conveyance System, in anticipation of a new water supply from the New Melones Reservoir, was completed in 1994; however, under the Central Valley Project Improvement Act (CVPIA), USBR did not supply water for the New Melones Reservoir project in 1993-1994. In 1995, SEWD began receiving New Melones Reservoir water, but the amount received was less than the contracted amount. Legal action in this matter is ongoing.

Under the current USBR operation of New Melones Dam, SEWD and CSJWCD are provided with up to 150,000 ac-ft of water from New Melones Reservoir annually. Water allocation amounts are based on the March-September water forecast and the February end of month storage in New Melones each year.

Adoption of AB 3030 Groundwater Management Plan

In 1995, SEWD adopted a Groundwater Management Plan in accordance with Assembly Bill 3030 (AB 3030). The goal of the SEWD AB 3030 Groundwater Management Plan is to continue the district's efforts to protect existing water supplies, to relieve pressure on the local groundwater basin by seeking supplemental surface water supplies for conjunctive use, and to maintain pressure on USBR to meet the contracted delivery amounts for New Melones water.

In 2005, SEWD adopted the Eastern San Joaquin Groundwater Basin Groundwater Management Plan prepared by the Northeastern San Joaquin County Groundwater Banking Authority in compliance with AB 3030 and SB 1938 and pursuant to California Water Code Section 10750 et seq., replacing the 1995 Plan. The comprehensive plan developed by those agencies that overlay the local groundwater basin reviews, enhances, assesses and coordinates existing groundwater management policies and programs in Eastern San Joaquin County and develops new policies and programs to ensure the long-term sustainability of groundwater resources in Eastern San Joaquin County.

OID/SSJID Water Transfer Agreement

In 1997, SEWD entered into a water transfer agreement with Oakdale Irrigation District and South San Joaquin Irrigation District (OID/SSJID). This agreement allocated to SEWD 8,000 to 30,000 ac-ft per year (ac-ft/yr), based on New Melones Reservoir storage and inflow as of April 1 of each year. The contract period for the allocation ended in 2009, with a possible 10-year renewal, pending further studies. A one-year temporary water transfer agreement was entered into for the 2009-2010 water year. The agreement allows for a sale of up to 15,000 ac-ft/yr from each irrigation district. The total transfer amount to SEWD for the 2010 calendar year was 26,900 ac-ft.

Peters Pipeline Project

In 2003, SEWD applied for and received a Proposition 13 Groundwater Recharge Storage Construction Grant for the Peters Pipeline portion of the Farmington Project. The New Melones Conveyance System, which supplies water to the Dr. Joe Waidhofer WTP, consists, sequentially, of a diversion structure at Goodwin Dam, the Goodwin Tunnel, the Upper Farmington Canal, Shirley Creek, Hoods Creek, Rock Creek, the Lower Farmington Canal, and Peters Pipeline to the existing 54-inch-diameter Bellota Pipeline, or to the 6-mile Peters Pipeline extension. A 78-inch-diameter section of Peter's Pipeline extends 3 miles from the terminus of the Lower Farmington Canal to the existing 54-inch-diameter pipeline from Bellota to the WTP. Under this Groundwater Recharge Storage Project, SEWD built a 6-mile long, 60-inch diameter extension to the Peters Pipeline. This extension provides water for agricultural irrigation, groundwater recharge, and drinking water treatment. In dry years, well water resulting from wet year recharge is pumped into the pipeline for use in the Stockton urban area. Construction on the Peters Pipeline Project was completed in 2006. The availability of both the Bellota Pipeline and the Peters Pipeline extension gives SEWD redundancy and flexibility in supplying water to the Dr. Joe Waidhofer WTP. This conjunctive use project enables the treatment of a greater percentage

of available surface water, and benefits the groundwater basin by banking water in-lieu of pumping it by the construction of the 6-mile extension to the Peters Pipeline.

Efficiency Enhancement Project

In 2005, SEWD implemented a $7.1 million Efficiency Enhancement Project, which improved the water treatment plant's chemical mixing and settling efficiency and provided delivery of 11 percent more drinking water to the Stockton urban area.

In 2006, SEWD implemented a $3.8 million upgrade and modernization of its water treatment plant high service pump station. This upgrade allows SEWD to meet the various pumping requirements of its retail customers and increased pump capacity from the Efficiency Enhancement Project. In 2006 SEWD upgraded the WTP to include a parallel 27.6-million gallons per day (MGD) process train north of the existing pretreatment complex for a total treatment capacity of 60 MGD.

2. Current size, population, and irrigated acres

	2010
Size (acres)	143,000
Population served	300,000
Irrigated acres	50,981

3. Water supplies received in current year (2010)

Water Source	*acre-feet*
Federal urban water[a] (Tbl 1)	39,776
Federal agricultural water (Tbl 1)	51,540
State water (Tbl 1)	0
Other Wholesaler (define) (Tbl 1)	0
Local surface water (Tbl 1)	0
Upslope drain water (Tbl 1)	0
District ground water (Tbl 2)	0
Banked water (Tbl 1)	0
Transferred water (Tbl 6)	0
Recycled water (Tbl 3)	0
Other (transfer) (Tbl 1)	26,900
Total	118,216

Source: SEWD spreadsheets: New Melones 2010 Water Use, October 2011; New Hogan Flows, Calendar Year 2010, October 2011.

[a] SEWD provides surface water for both agricultural and urban uses. SEWD supplies wholesale treated drinking water that is retailed to Stockton area customers by the California Water Service Company, the City of Stockton, and San Joaquin County. SEWD does not own or operate an urban distribution system.

4. *Annual entitlement under each right and/or contract*

	acre-feet/year	*Source*	*Contract #*	*Availability period(s)*
Reclamation Urban, ac-ft/yr	56.5% of yield[a]	New Hogan	14-06-200-5057A	March-April
Reclamation Agriculture and M&I, ac-ft/yr	75,000	New Melones	4-07-20-WO329	January-December
OID/SSJID Transfer	30,000[b]	New Melones	Agreements	October-September

[a] The contract between SEWD and Reclamation entitles SEWD to take 56.5 percent of New Hogan Project water.
[b] One year agreements made in 2009 with OID and SSJID allowed transfers of up to 15 TAF from each irrigation district from October 1, 2009 through September 30, 2010.

5. *Anticipated land-use changes*

There are no estimated changes in District agricultural acres. SEWD boundaries increase as the City of Stockton's incorporated boundaries increase. Thus, as the urban area grows, SEWD boundaries expand. Agricultural acres are not expected to change significantly.

6. *Cropping patterns (Agricultural only) (List of current crops (crops with 5% or less of total acreage) can be combined in the 'Other' category.)*

Original Plan (1995)		*Previous Plan (2007)*		*Current Plan (2010)*	
Crop Name	*Acres*	*Crop Name*	*Acres*	*Crop Name*	*Acres*
Walnuts	15,876	Walnuts	19,423	Walnuts	22,743
Cherries	6,711	Cherries	9,422	Cherries	10,290
Tomatoes	3,759	Tomatoes	3,652	Vineyard	4,264
Beans	5,782	Vineyard	2,882		
Other (<5%)	22,821	*Other (<5%)*	9,810	*Other (<5%)*	13,684
Total	54,549	*Total*	45,189	*Total*	50,981

Source: SEWD 2010 Crop Report, October 2011.

SEWD was fully developed agriculturally when formed in 1948. Cropping patterns have not changed significantly since that time. District expansion in 1970 included additional urban Stockton area, and approximately 10,000 acres of fully developed agricultural lands. District expansion in 2005 added 27,000 additional agricultural acres, most of which are range land. Cropping patterns are not expected to change significantly through 2030, although a small, but not significant, reduction in irrigated agricultural acres is anticipated because of planned urban growth.

7. Major irrigation methods (by acreage) (Agricultural only)

Original Plan (1995)		*Previous Plan (2007)*		*Current Plan (2010)*	
Irrigation Method	*Acres*	*Irrigation Method*	*Acres*	*Irrigation Method*	*Acres*
Not available		Flood	5,192	Flood	4,021
		Furrow	6,069	Furrow	3,785
		Sprinkler	26,630	Sprinkler	31,350
		Drip	5,255	Drip	9,994
				Micro-sprinklers	1,814
Other		*Other*	2,000	*Other*	16
Total		*Total*	45,146	*Total*	50,981

Source: SEWD 2010 Irrigation Report, October 2011.

There is little historic information on irrigation practices within SEWD, although it is generally known that local irrigation practices have followed statewide trends which have evolved from flood to sprinklers, and more recently, to micro-sprinklers and drip. Nevertheless, all forms of irrigation continue to be practiced in SEWD.

B. Location and Facilities

SEWD receives surface water from both the Stanislaus and Calaveras Rivers.

1. Incoming flow locations and measurement methods

New Melones Dam is on the Stanislaus River and forms New Melones Reservoir which has a capacity of 2,400,000 ac-ft. The 625-foot-tall rockfill dam's primary purpose is to provide water for irrigation. The reservoir, owned and operated by USBR, is multipurpose, providing flood control, recreation, drinking water supply, irrigation supply, and hydroelectric power. SEWD diverts the New Melones Reservoir water supply from the Stanislaus River below Tulloch Reservoir, at the Goodwin Tunnel diversion structure.

New Hogan Reservoir is the main water storage facility on the Calaveras River. The U.S. Army Corps of Engineers (USACE) operates the reservoir for multiple uses, including flood control, municipal and industrial water supply, agricultural irrigation, and recreation. The reservoir stores 317,100 ac-ft at maximum flood stage; the 10-year average storage in the reservoir is 152,662 ac-ft. USACE, the California Department of Water Resources, and the U.S. Bureau of Reclamation jointly developed the operational plan for New Hogan Reservoir. USACE ensures that the reservoir storage capacity is operated to provide flood control. SEWD coordinates daily water releases, other than for flood control, with the USACE manager.
There are 27 removable check dams (unlined natural channels) on the Calaveras River, Mormon Slough, Mosher Slough, Potter Creek, and Diverting Canal from which surface water irrigators pump water. Irrigation also occurs from the Lower Farmington Canal, a District unlined canal and Peters Pipeline, a distribution pipeline providing water to agriculture and the DJW WTP. SEWD also diverts water at the Bellota Weir on the Calaveras River into a 13-mile pipeline to

the 60 MGD DJW WTP. Four regulating reservoirs are located at the treatment plant with a capacity of approximately 120 ac-ft.

Attachment D shows points of delivery, turnouts (internal flow), outflow (spill) points, conveyance system, storage facilities, and operational loss recovery system.

Location Name	*Physical Location*	*Type of Measurement Device*	*Accuracy*
Goodwin Reservoir	Goodwin Reservoir	ultra sonic	+/- 6%[a]
Farmington Dam Diversion	Farmington Dam	ultra sonic	+/- 6%[b]
treatment plant influent	Dr. Joe Waidhofer WTP	venturi	+/- 6%[c]

[a] The Goodwin Reservoir measurement device is calibrated four times a year, and maintained monthly.
[b] The Farmington Dam Diversion measurement device is calibrated and maintained four times a year.
[a] The Dr. Joe Waidhofer WTP measurement device is calibrated annually.

2. Current Year Agricultural Conveyance System (2010)

Miles Unlined - Canal	*Miles Lined – Canal*	*Miles Piped*	*Miles - Other*
17.5	0	19	64 miles natural waterways and flood control channels

3. Current Year Urban Distribution System (2010)

Miles AC Pipe	*Miles Steel Pipe*	*Miles Cast Iron Pipe*	*Miles - Other*
0	0	0	0

4. Storage facilities (tanks, reservoirs, regulating reservoirs)

Name	*Type*	*Capacity (ac-ft)*	*Distribution or Spill*
New Hogan Reservoir	reservoir	317,000	
New Melones Reservoir	reservoir	2,400,000	
Dr. Joe Waidhofer WTP	ponds	368	

Water for SEWD is stored at New Hogan Reservoir, which was completed in 1964. The water conservation storage capacity is 317,000 ac-ft. New Hogan Reservoir receives its water supply primarily from rain runoff. SEWD is the water master and controls dam releases for irrigation and municipal use for SEWD and Calaveras County Water District during non-flood control periods. The USACE operates the dam for flood control. New Hogan Reservoir is also used for recreation, offering camping, fishing, boating, etc. New Hogan Reservoir is located approximately 30 miles east of Stockton, south of State Highway 26 in Calaveras County.

Water is also stored at New Melones Reservoir which has a capacity of 2.4 million ac-ft. New Melones Reservoir receives its water from rain and snowmelt runoff. The USBR operates the

dam. There are a number of recreational activities offered including camping, fishing, boating, etc. New Melones Reservoir is located approximately 40 miles east of Stockton, north of State Highway 120 in Stanislaus County.

The ponds at the DJWWTP were initially constructed to provide groundwater recharge. The ponds also serve as a buffer to settle out stormwater. There are three ponds: a 19-acre storage and recharge deep pond, a 15-acre flat bottom recharge pond, and a 14-acre ridged recharge pond.

5. Description of the agricultural spill recovery system

Most of the irrigation water in SEWD is provided from New Hogan Reservoir. Scheduling of irrigation water is handled with a voluntary 24-hour notice. Irrigation water is provided on demand to the best of SEWD's ability. End loss is closely monitored. In an average or below average water year, SEWD operates the irrigation water to minimize or prevent any end loss. SEWD's voluntary on-demand call-in system has prevented spills from over-releases, as well as tailwater from over-irrigation. Due to the SCADA system, there are no losses of SEWD water that is under district control. In above average water years, the irrigation system is operated to ensure maximum recharge opportunities and minimize end of year releases required to evacuate flood control storage space in New Hogan. Wetter years, such as 2005 and 2006, result in higher system end loss.

SEWD has no formal agricultural spill recovery system, but with grant funding through a USBR 2025 Challenge Grant, is implementing a Supervisory Control and Data Acquisition (SCADA) system in the agricultural distribution system to help recover spills and minimize the limited system losses. SEWD is improving its monitoring system to reduce spillage and increase efficiency on the Calaveras River, Mormon Slough, Mosher Slough, Potter Creek, and Diverting Canal. It is estimated these improvements will ultimately conserve up to 3,600 ac-ft/yr of water in an average or below average water year, which would be available for agriculture, municipal and industrial (M&I), or recharge uses. The Project will enhance water supply reliability for SEWD and improve conditions in the Eastern San Joaquin County Groundwater Basin, which is designated as being in a state of critical overdraft (DWR B-118-80) and is subject to saline intrusion.

The SCADA system remotely monitors twelve sites in key locations within the water distribution system and provides off-site water gate control at three locations. The system includes one flow monitoring site and eleven pool level monitoring sites, and calls for the modification of existing flashboard dams with rectangular weirs to allow calculation of flow data. Additional tasks include the retrofit of two existing flow monitoring stations to transmit data to the SCADA system, and the automation of five water control gates at three locations, allowing off-site control. Acquisition of this "real time" data and automation of the gates will enhance operation and management of SEWD's agricultural water delivery system, which consists of approximately 64 miles of natural waterways and flood control channels.

6. Agricultural delivery system operation (check all that apply)

On-demand	*Scheduled*	*Rotation*	*Other (describe)*
X			

Agricultural water is delivered from New Hogan and New Melones Reservoir on an as needed basis. Individual irrigators call in with their order 24 hours prior to irrigating on a voluntary basis. Those who provide no notice are not penalized, except during drought (water shortage) periods.

7. Restrictions on water source(s)

Source	*Restriction*	*Cause of Restriction*	*Effect on Operations*
New Hogan	Per MOU any water not used by CCWD is available for SEWD use. Typically CCWD uses between 3,500 and 3,700 ac-ft per year.	Contractual	Provides additional water supply for SEWD.
New Melones	USBR water year is Jan. 1 - Dec. 31.	Contractual	Provides challenge to the annual water use plan.[a]
New Melones transfer water	Water year is Oct. 1 - Sept. 30.	Contractual	Provides challenge to the annual water use plan.[a]

[a] The water years specified in the New Melones agreements, in particular, the transfer water agreement, make it difficult to schedule water use at the needed times.

8. Proposed changes or additions to facilities and operations for the next 5 years

SEWD's permit amendment to the California Department of Public Health to increase plant capacity from 60 MGD to 65 MGD was recently approved. Expansion will allow SEWD to distribute more surface water to the urban area.

In addition, SEWD is considering adding a 10 million gallon finished water reservoir, 4 filters, additional sludge ponds and taste and odor control to the DJW WTP. These additions would provide greater reliability and increase the treatment plant capacity to 72 MGD. Funding would be through State Revolving Fund loans. SEWD has been approved for the loan on the finished water reservoir and is moving through the loan agreement process. The filters and additional enhancements are still in the planning stages.

Additional project components of the Peters Pipeline project include 30 planned irrigation outlets for delivery of surface water to farmland adjacent to the pipeline (currently, 4-6 outlets are constructed).

The Farmington Groundwater Recharge Program, a long-term banked surface water infrastructure project described in Section 3, is ongoing, and will be expanded if the demonstration scale testing is successful. Planned for this project are an additional approximately 25 well site locations and associated water pipelines.

C. Topography and Soils

1. Topography of the district and its impact on water operations and management

SEWD is located on the floor of the San Joaquin Valley with the City of Stockton lying at its western end. The City of Stockton is located at the confluence of the San Joaquin and Calaveras Rivers on the eastern edge of the Sacramento-San Joaquin Delta. Westerly portions of the City of Stockton are slightly above sea level. SEWD extends 15 miles into the adjoining easterly foothills along the alignment of the Calaveras River.

The land slopes gently upward as it extends to the east, comprised of basin soils, recent alluvial fans, and flood plain soils to an elevation of approximately 100 feet at the edge of the foothills of the Sierra Nevada. The eastern boundaries of SEWD are bordered by the adjoining foothills, which rapidly narrow the width of the district to the extent of the irrigable land lying along the Calaveras River within the foothills. SEWD extends along the Calaveras River for approximately 8 to 9 additional miles to the County line, between Calaveras, Stanislaus, and San Joaquin Counties, rising in elevation to approximately 170 feet.

2. District soil association map (Agricultural only)

See Attachment E, District Soils Map.

3. Agricultural limitations resulting from soil problems (Agricultural only)

SEWD does not have soil problems that affect water operations or management.

Soil Problem	*Estimated Acres*	*Effect on Water Operations and Management*
Salinity	0	
High-water table	0	
High or low infiltration rates	0	
Other (define)	0	

D. Climate

1. General climate of the district service area

SEWD has a semi-arid climate featuring hot, dry summers and mild winters. Average monthly temperatures in Stockton range from 46.8 degrees F in January to 76.4 degrees F in July, with a mean annual temperature of 62.2 degrees F. The average annual precipitation is 17.8 inches, consisting entirely of rainfall.

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
Avg Precip. [a]	3.41	3.1	2.68	1.41	0.56	0.10	0.00	0.02	0.29	0.99	2.16	3.05	17.77
Avg Temp. [a]	46.8	52.1	56.5	60.7	67.3	72.7	76.4	75.5	72.6	64.9	54.2	46.9	62.2
Max. Temp. [a]	55.8	63.0	68.4	74.2	81.8	88.7	93.6	92.9	89.5	80.3	66.4	56.5	76.0
Min. Temp [a]	37.8	41.2	44.5	47.3	52.7	56.8	59.1	58.1	55.7	49.5	41.9	37.3	48.5
Eto [b]	0.85	1.64	3.33	5.11	6.52	7.53	7.95	6.98	5.15	3.31	1.57	0.81	50.73

[a] Source: Stockton Fire Station #4 (048560), Western Regional Climate Center.
[b] Source: Average of Manteca (#70) and Lodi West (#166) CIMIS stations.

Weather station ID Stockton Fire Station #4 (048560) *Data period: Year* 1981 *to Year* 2010

Average wind velocity 7.5[c] *Average annual frost-free days:* 345[c]

[c] Source: Stockton airport station (048558), Western Regional Climate Center. Period of record: September 1996 to December 2008

2. Impact of microclimates on water management within the service area

The primary difference between the microclimates of the Calaveras River and Stanislaus River watersheds is their elevation. Most of the Stanislaus River watershed lies in the upper elevations (over 7000 ft mean sea level (msl)) of the Sierra Nevada, where there is abundant snow melt. The headwater elevations in the Calaveras River watershed are about 5000 ft msl, and precipitation throughout most of the watershed is rarely in the form of snow. Because of the lack of snow storage in the Calaveras River watershed, New Hogan dam operations are more difficult because releases often need to be made for flood control purposes, which are not replenished by spring snowmelt. Water that would otherwise be stored is released downstream even in very dry water years.

Because most of the Stanislaus River watershed lies in the upper elevations, the Stanislaus River flows are derived largely from snowmelt. Any decrease in snow storage resulting from climate change would have a significant impact on New Melones Dam storage. The Calaveras River flows are derived entirely from rainfall; therefore, the Calaveras River water supply would not be affected by a decrease in snow storage. Nevertheless, other changes in climate resulting from climate change (e.g., less rainfall), would affect both water supply sources.

E. Natural and Cultural Resources

1. Natural resource areas within the service area

Name	*Estimated Acres*	*Description*
Farmington Canal Wetland Mitigation Area	9.9	wetland habitat
Giant Garter Snake Mitigation Area	1.0	giant garter snake habitat
Calaveras River Habitat Conservation Plan (under	531	Calaveras River and Mormon Slough, Central Valley steelhead critical habitat

preparation)		

2. Description of district management of these resources in the past or present

The Farmington Canal and Giant Garter Snake mitigation areas were designed to offset the impacts of the New Melones Conveyance project to wetlands and the giant garter snake habitat. Both sites are outside of SEWD, but on district property. The sites were constructed at a 2:1 ratio of wetland habitat created to wetland impacted. The giant garter snake site uses one-third of an acre-foot of flood control water. The site drains into the CSJWCD.

In March 1998, the National Marine Fisheries Service (NMFS) (now the National Oceanic and Atmospheric Administration or, NOAA Fisheries) listed the Central Valley steelhead as a threatened species evolutionarily significant unit (ESU) under the Endangered Species Act. In March 2000, NOAA Fisheries designated the Calaveras River and Mormon Slough as critical habitat for the Central Valley steelhead ESU. Any actions that might harm the Central Valley steelhead or its habitat are restricted. Because this brought the entire management of the Calaveras River under review, SEWD immediately entered into a pre-informal consultation with federal and state regulators to begin discussing possible changes in the operation of New Hogan Dam and the Calaveras River water supply system.

To improve conditions for salmonids in the Calaveras River, SEWD and CCWD are working cooperatively with NOAA Fisheries through an Endangered Species Act Section 10 consultation. Conservation measures and an adaptive management plan are being developed as part of a Calaveras River Habitat Conservation Plan. The Calaveras River Habitat Conservation Plan will provide SEWD and CCWD and their water users with legal permission to continue using the water resources of the Calaveras River for agricultural, municipal, and industrial purposes. SEWD recently submitted the environmental documents to NOAA Fisheries in order to move forward with next steps to publish the Draft Calaveras River Habitat Conservation Plan.

Since 2001, SEWD has voluntarily implemented several temporary fish passage improvements, including placing sandbags at road crossings to provide better depths and velocities for passage at these structures; installing a temporary Denil fish ladder at the Bellota Weir to allow fish access above the weir; installing a temporary barrier (i.e., net) at the head of the Old Calaveras River channel to prevent juveniles from entering and becoming stranded in the channel; and creating a sandbag wall on the Bellota Weir apron to direct flow into a lower fish ladder so that it would operate more effectively.

SEWD has participated with the California Department of Water Resources (DWR) for a fish passage study with CH2M Hill that followed a CALFED-funded fish screen feasibility study that was completed in 2005. In 2011, it is anticipated that fish passage improvements will be completed at Budishlich Dam. Two other fish passage improvements are planned for subsequent years; both of these projects may be completed in 2012, including improvements at Caprini Crossing.

SEWD will continue to implement interim fish passage improvements until long-term fish passage and screening solutions are identified and put into operation. All of these studies have

been or are currently being conducted to collect information that will aid in the design and management of the long-term conservation measures and adaptive management processes that will be incorporated into the Calaveras River Habitat Conservation Plan.

SEWD also supports various research projects funded by the CALFED Bay-Delta Program and the U.S. Fish and Wildlife Service to help learn more about rainbow and steelhead trout in the river. At the request of SEWD, DWR is studying ways to improve fish passage in Mormon Slough and the Old Calaveras River. SEWD has concluded a CALFED Bay-Delta funded study to evaluate fish screen alternatives for water diversions on the Calaveras River. SEWD is dedicated to creating a balance between environmental and water supply needs.

3. Recreational and/or cultural resources areas within the service area

The City of Stockton has many neighborhood and community parks within the city limits, the largest of which are listed below. The larger regional parks, such as Oak Grove and Micke Grove, are outside of the city limits as well as the SEWD boundaries.

Name	*Estimated Acres*	*Description*
Louis Park	74	Located on the San Joaquin River, this city park offers boat ramps and baseball and softball fields, as well as the Pixie Woods Amusement Park which features a carousel, train rides, and children's theater
Oak Park	61	Located in central Stockton, this city park offers a large tennis complex, an ice arena, baseball and softball fields, pool, and senior citizen center.
Buckley Cove Park	53	Located on the San Joaquin River, this city park offers a boat launch.
Kennedy Memorial Park	18	Located just west of Highway 99 in southern Stockton, this county park features baseball fields, a basketball court and pool.
Giannone County Park	15	Located just west of Highway 99 in central Stockton, this county park features baseball and soccer fields, and a basketball court.

Source: City of Stockton General Plan, 2007.

The City of Stockton has 10 State Historic Landmarks, two State Historical Points of Interest, 48 City Historic Landmarks/Sites, several historic bridges, two Historic Preservation Districts—the Magnolia Historic District and Doctor's Row District—and an area designated the "Old City," that is bounded by Harding Way, Wilson Way, Charter Way, and Pershing Avenue (City of Stockton 2007). There are no additional landmarks within SEWD boundaries, outside of the City of Stockton (County of San Joaquin 1992).

Most prehistoric settlement in San Joaquin County was focused along the San Joaquin, Cosumnes, and Mokelumne Rivers, and along the banks on high ground above marshy areas.

Much of the historically significant resources are clustered around the City of Stockton downtown area. The evidence from previous survey work and site investigations in the area indicates that the prehistoric site types encompass the following:

- Surface scatters of lithic artifacts and debitage resulting from short-term occupation, and/or specialized economic activities, or long-term occupation.
- Bedrock milling stations, including mortar holes and metate slicks, in areas where suitable bedrock outcrops are present.
- Petroglyphs and/or pictographs.
- Isolated finds of cultural origin, such as lithic flakes and projectile points (City of Stockton, 2007).

F. Operating Rules and Regulations

1. Operating rules and regulations

See Attachment F, District Rules and Regulations (water related)

2. Water allocation policy (Agricultural only)

Riparian right users have first call on water from New Hogan Reservoir. Through contract, the urban area is guaranteed 20,000 ac-ft. Water is then allocated to all other surface water users. The agricultural water shortage plan for dry year or drought conditions is described below.

As Agricultural Water Master, SEWD assesses the water supply by April of each year. A sufficient volume to supply enough water for a full irrigation season is 152 TAF. SEWD generally has sufficient water to withstand two to three dry years. If a water year has been identified as a dry year, SEWD asks its customers for voluntary reductions in use. If a second subsequent year is identified as a dry year, SEWD still requests voluntary reductions, but identifies these reductions as critical. A third subsequent dry year may result in continued voluntary reductions, or may require mandatory reductions—SEWD makes this determination at the beginning of the water year. The district informs its customers of the available water supply, and any need for reductions, through its newsletter, as well as postcard reminders. A final option is to allow diversions only by riparian users and the water treatment plant.

In all water years, SEWD requests that its customers call the district in advance of diverting water, so that SEWD can adjust releases at the dam. Customers are asked to provide the following information 24 hours in advance of the diversion: location of diversion, name of owner or operator, beginning diversion time, pumping rate, and ending diversion time. In non-dry years, this request is voluntary. In dry years, the advance notice is mandatory, and the district may enforce penalties on customers who do not advise the district prior to their water use. The postcard reminds customers of this penalty.

See Attachment F for more detailed information.

3. Official and actual lead times necessary for water orders and shut-off (Agricultural only)

SEWD has a voluntary call-in program for water orders. Only during drought does the call-in program become mandatory and penalties may be assessed. See Attachment F for more detailed information.

4. *Policies regarding return flows (surface and subsurface drainage from farms) and outflow (Agricultural only)*

Soils within SEWD boundaries are permeable, so most irrigation tail water penetrates rapidly beyond the root zone of the crops and presents no problems during the irrigation season. Some drainage water collects in open farm ditches and flows to natural waterways where it is reused for irrigation. Present drainage practices present no problems to agriculture. See Attachment F for more detailed information.

5. *Policies on water transfers by the district and its customers*

Transfer water policy is in the SEWD Act under Section 6. The policy specifies that SEWD can sell water outside the district, as long as the SEWD water users' needs are met first, and water is available. See Attachment F for more detailed information.

Customers are not allowed to transfer water to other users.

G. Water Measurement, Pricing, and Billing

1. *Agricultural Customers*

a. *Number of farms* 178
b. *Number of delivery points (turnouts and connections)* 178
c. *Number of delivery points serving more than one farm* 0
d. *Number of measured delivery points (meters and measurement devices)* 173*
e. *Percentage of delivered water that was measured at a delivery point* 95 (estimate)

*There are 5 unmeasured delivery points. Recent field investigations have concluded that meters can be installed on these delivery points. Meters will be installed on these delivery points in 2013.

f. *Delivery point measurement device table (Agricultural only)*

Measurement Type	*Number*	*Accuracy (+/- %)* [a]	*Reading Frequency (Days)*	*Calibration Frequency (Months)*	*Maintenance Frequency (Months)*
Orifices					
Propeller meter	155	+/- 6%	30	As needed	As needed
Weirs					
Flumes					

Venturi					
Metered gates					
Acoustic doppler					
Other : Hour meters	18[b]	+/- 50%	30	As needed	As needed
Total	173				

[a] Accuracy is determined using a pump test combined with the number of hours the pump is run.
[b] There are 18 PG&E or hour meters that have recently been determined to be well above +/- 6% in accuracy. SEWD is replacing these meters within the next 3 years (by 2015).

2. Urban Customers

City of Stockton/California Water Service Company/County of San Joaquin

- ✓ *Total number of connections* __3____
- ✓ *Total number of metered connections*__3___
- ✓ *Total number of connections not billed by quantity* _____0_____
- ✓ *Percentage of water that was measured at delivery point* _____100___
- ✓ *Percentage of delivered water that was billed by quantity* _____100___
- ✓ *Measurement device table*

Meter Size and Type	*Number*	*Accuracy (+/-percentage)*	*Reading Frequency (Days)*	*Calibration Frequency (Months)*	*Maintenance Frequency (Months)*
5/8-3/4"					
1"					
1 ½"					
2"					
3"					
4"					
6"					
8"					
10"					
Compound					
Turbo					
Other[a]	3	+/- 6%	annual	annual	annual
Total	3				

[a] Two pipelines (24-inch and 42-inch) deliver water to south Stockton measured by one meter, and a second pipeline (48-inch) delivers water to north Stockton measured by a second meter. A 42-inch pipeline delivers water to California Water Service Company. The City of Stockton wheels water to the County of San Joaquin.

3. *Agriculture and Urban Customers*

a. *Current year agriculture and /or urban water charges - including rate structures and billing frequency*

See Attachment G, page 1 of 1, Sections 1-4, for current year rate ordinance

b. *Annual charges collected from customers (current year data)*

Fixed Charges			
Charges ($ unit)	*Charge units ($/acre), ($/customer)*	*Units billed during year (acres or customers)*	*$ collected ($ times units)*
Surface water	$20.00/ac-ft	4,150 ac-ft[a]	$83,008
Domestic groundwater	$37.50/domestic well[b]	5,042 wells	218,549[c]
Agricultural groundwater	$4.58[d]	117,424 ac-ft[a,e]	$537,806

Volumetric charges			
Charges ($ unit)	*Charge units ($/ac-ft)*	*Units billed during year (ac-ft)*	*$ collected ($ times units)*
Metered surface water	$20.00/ac-ft	18,965 ac-ft[a]	$379,304 [c]
Municipal groundwater	$164.31	16,122[c]	$2,506,012

[a] Source: Crop Report. These numbers total to 23,116 in Water Inventory Table 6 due to rounding.
[b] Additional domestic units on the same property are charged at $12.50 each.
[c] Actual per general ledger.
[d] Groundwater assessments calculated based on 2.8 ac-ft/ac of irrigated land.
[e] SEWD does not sell agricultural groundwater to its customers; SEWD assesses the use of the wells, based on acreage, as part of their mandate to protect the groundwater supply.

See Attachment H, District Sample Bill

c. *Water-use data accounting procedures*

See Attachment H, District Sample Bill

H. Water Shortage Allocation Policies

1. *Current year water shortage policies or shortage response plan - specifying how reduced water supplies are allocated*

See Attachment I, District Water Shortage Plan, for SEWD's Urban Water Shortage Plan, and Section F, No. 2, of this plan for SEWD's agricultural water shortage plan.

2. Current year policies that address wasteful use of water and enforcement methods

SEWD's Rule 139 discusses waste of surface water. Rule 139 establishes penalties for customers who do not request water 24 hours in advance, or do not inform the district of their cessation of use.

No procedures have been established for wasting water once the customer diverts the water, as customers pay for water received, and would not be expected to waste it.

Section 2: Inventory of Water Resources

A. Surface Water Supply

1. *Acre-foot amounts of surface water delivered to the water purveyor by each of the purveyor's sources*

See Water Inventory Tables, Table 1

2. *Amount of water delivered to the district by each of the district sources for the last 10 years*

See Water Inventory Tables, Table 8

B. Ground Water Supply

1. *Acre-foot amounts of ground water pumped and delivered by the district*

See Water Inventory Tables, Table 2

2. *Ground water basin(s) that underlies the service area*

Name	*Size (Square Miles)*	*Usable Capacity (ac-ft)*	*Safe Yield (ac-ft/yr)*
Eastern San Joaquin Groundwater Basin	938	See Groundwater Management Plan, Attachment J	689,920

3. *Map of district-operated wells and managed ground water recharge areas*

SEWD owns two wells; all others are privately owned. See Attachment D, map 6 of 10, and Attachment K, District Map of Groundwater Facilities.

4. *Description of conjunctive use of surface and ground water*

At present, recharge to the groundwater within SEWD is furnished by regulated releases from New Hogan Reservoir down the channel of the Calaveras River. These releases are regulated by SEWD to obtain the greatest beneficial use for the district. Recharge of the groundwater occurs from percolation in both the Calaveras River and Mormon Slough. Measurements made by Murray, Burns & Kienlen for a water rights study of the Calaveras River system indicate that there is an average percolation between New Hogan Dam and Jenny Lind of 6 cfs and between Jenny Lind and Bellota of >7 cfs (MBK 1969). Without the check dams in place, below Bellota the percolation is 13 cfs each in Mormon Slough and the old Calaveras River; with the check dams in place, the percolation rates increase to 19 cfs and 31 cfs, respectively. Current recharge operations verify all but the Mormon Slough percolation quantities.

Assuming that the check dams are in place and full for the maximum period permitted (213 days) and that sufficient water is flowing in the channels, the maximum annual percolation for the

remainder of the year (152 days) to permit maximum infiltration is 34,000 ac-ft, of which approximately 29,000 ac-ft percolates below Bellota. Water is not available for recharge at the maximum period during average years. Recharge for an average year is estimated at 26,000 ac-ft of which approximately 21,000 ac-ft percolates below Bellota.

Groundwater overdraft in Eastern San Joaquin County has been a growing problem over the past fifty years and is projected to worsen in the future. Groundwater levels below SEWD and the CSJWCD are declining at the long-term rate of about 1.7 feet per year (San Joaquin County, 1985). In the deepest portion of the overdraft area, groundwater levels reached nearly 100 feet below predevelopment conditions. The October 1996 update to DWR's 1990 California Water Plan, which reviews, analyzes and provides recommendations for managing and long-term planning of the state's water supply, noted that groundwater basins in the San Joaquin River region were in overdraft and predicted that without action continued use would exacerbate the situation. The 1990 California Water Plan had identified the annual groundwater overdraft in San Joaquin County at 70,000 acre-feet/year. The 2003 update to the 2000 California Water Plan identified the overdraft to Eastern San Joaquin County at 113,000 af/year.

The reduction in groundwater levels in eastern San Joaquin County has induced the eastern migration of saline water from below the Delta area to the western portion of the aquifer. In some areas below the City of Stockton, salinity concentrations in groundwater exceed drinking water standards. Several studies that evaluate saltwater intrusion and other related water supply problems in eastern San Joaquin County have recommended conjunctive use and groundwater recharge/banking to reduce overdraft conditions. Recharge for conjunctive use and groundwater storage can be accomplished through injection, percolation, and delivery of surface water supplies in-lieu of groundwater pumping.

The Farmington Groundwater Recharge Program was initiated after a series of studies that identified groundwater overdraft as a problem in Eastern San Joaquin County. The Farmington Dam and Reservoir Conjunctive Use Study, completed in 1998, evaluated potential structural and operational changes at Farmington Dam and found that long-term storage at Farmington Reservoir does not appear to be cost-effective. However, operations modifications to Farmington Dam and construction of groundwater recharge facilities do appear to be cost-effective. The Conjunctive Use Study recommended that the feasibility of groundwater recharge with integrated seasonal waterfowl habitat areas in eastern San Joaquin County be evaluated.

The 2001 Farmington Groundwater Recharge and Seasonal Habitat Study, prepared by SEWD in conjunction with the USACE and other local agencies, resulted from these concerns. This feasibility-level study was developed to determine the potential for development of integrated groundwater recharge and seasonal habitat improvements in Eastern San Joaquin County. Conclusions of the study became the outline for the first phase of the subsequent Farmington Groundwater Recharge Program, launched in 2003, which includes implementing the flooded-field groundwater recharge technique on up to 1,200 acres for an average water recharge of approximately 35,000 acre-feet per year

5. Ground Water Management Plan

See Attachment J, Groundwater Management Plan

6. Ground Water Banking Plan

The Farmington Groundwater Recharge Program is led by SEWD, in partnership with the Sacramento division of the USACE. SEWD and the USACE, in a cost-share agreement, created the Farmington Groundwater Recharge Program with the intent of replenishing the aquifer to help ensure future groundwater supply and protect against further saltwater intrusion. The program will primarily benefit the regional aquifer, or groundwater basin, known as the Eastern San Joaquin County Basin, a groundwater basin generally bound by Highway 99, Jake Tone Road, Mokelumne River and Temple Creek. As the program is implemented, local groundwater availability and quality will also improve as aquifer levels stabilize. Water quality and abundance will also improve in the Calaveras River with the recharging of the groundwater aquifer.

The goal of the program is to recharge an average of 35,000 acre-feet of water annually into the Eastern San Joaquin Basin by (1) directly recharging surface water to the groundwater aquifer on 800 to 1,200 acres of land and, (2) increasing surface water deliveries in-lieu of groundwater pumping to reduce overdraft and establish a barrier to saline water intrusion. Spreading water on agricultural fields and other recharge basins provides seasonal migratory waterfowl habitat.

A network of agricultural wells is needed to pump stored surface water from recharge efforts and assure reliability of water supply in years when ample surface water is not available. Based on the hydrologic history of the region, more average to wet years occur than below average to critically dry years. Therefore, over the long-term, if the aquifer is recharged during all average to wet years, and groundwater pumping reliance is limited to below average to critically dry years, aquifer levels are expected to rise and stabilize.

The Farmington Groundwater Recharge Program identifies areas suitable for recharge and seasonal habitat development, evaluates recharge techniques, and conducts pilot recharge tests. SEWD is continuing to identify and develop new recharge sites for this phased program. Available surplus water from SEWD's conveyance systems is diverted into recharge cells at the project site. Stored surface water would be pumped from the aquifer for agricultural, municipal, and industrial use.

The recharge method of choice is field-flooding, a practice where a small perimeter levee is built at the parcel, then flooded to a depth of up to 18 inches. Because many lands in the region have a gradual slope for drainage, typical 40 to 100 acre parcels will have varying water depths ideal for a wide range of migratory waterfowl. By applying this shallow-water recharge process, lands can be rotated in and out of the program quickly and economically. Construction inputs for field-flooding do not require specialized heavy equipment and, therefore, can be completed easily by the landowner.

Once a site has been identified, the four stages of the program are initiated: Stage 1, Initial Site Screening; Stage 2, Pilot-Scale Recharge Testing; Stage 3, Demonstration-Scale Recharge Testing; and Stage 4, Long-Term Operation and Maintenance. Data collected and evaluated during each of the first three stages are used to support a decision about whether a site advances

to the next stage, is archived for evaluation at a future time, or is eliminated from further consideration for artificial groundwater recharge.

In 2003, SEWD completed the Pilot Phase of the Farmington Groundwater Recharge Program, which consisted of 60 acres of recharge ponds and fields adjacent to the DJW WTP. This project was awarded the American Society of Civil Engineers Water/Environmental Project of the Year in 2003 and the San Joaquin Council of Government's Regional Excellence award in 2004.

The Demonstration Phase, which began in 2003, aims to obtain 25 to 30 parcels of land, totaling 1,200 acres, for directly recharging surface water to the groundwater aquifer. District construction of an additional 35 acres of recharge ponds at the DJW WTP is in the planning stages. It is anticipated recharge rates will be slightly more than the existing 60-acre site, which currently averages over 0.5 feet per day. The development of 1,200 acres into recharge areas is anticipated to return an estimated 35,000 ac-ft/yr of water into the overdrafted groundwater basin in eastern San Joaquin County. This represents approximately 15 percent of the surface water needed for groundwater recharge on an annual basis to assure the long-term sustainability of groundwater resources for the region.

As part of the Farmington Groundwater Recharge Program, a Demonstration-Scale Banked Surface Water Infrastructure Project is proposed to recover surface water stored in the ground to agricultural customers and the DJW WTP. This project will include approximately 25 well site locations and associated water pipelines located adjacent to existing SEWD conveyance facilities that may be used as a long-term banked surface water infrastructure project if the demonstration scale testing is successful. The project sites are located at various sites generally east of, but within 13 miles of, the DJW WTP site noted above. The well sites are all relatively small (less than 2,000 square-feet for construction purposes, and less than 200 square-feet as a final footprint).

See Attachment L, Farmington Groundwater Recharge Program, for a program brochure and the most recent newsletter, which gives an overview of the program.

C. Other Water Supplies

1. "Other" water used as part of the water supply

See the Water Inventory Tables, Table 1

D. Source Water Quality Monitoring Practices

1. Potable Water Quality (Urban only)

See Attachment M – 2010 Irrigation Water Quality Results

2. Agricultural water quality concerns: *Yes* _____ *No* ____X____
(If yes, describe)

There are no current surface water quality problems that limit the surface water as a potable water supply. However, *Phytophthora* fungus has been identified in the Calaveras River water and is of concern to some irrigators (Attachment M). The fungus is on the land and is spread by water. *Phytophthora* can cause root rot, crown rot and the decline and death of fruit and nut trees. There is concern by growers on the use of surface water for their crops and orchards. *Phytophthora* could be a limiting factor regarding the use of surface water for irrigation for affected permanent crops.

There are two groundwater quality problems within SEWD that limit the use of groundwater—saline intrusion and agricultural chemical contamination. Extensive groundwater pumping has caused movement of the saline waters eastward from under the Delta. Poor quality groundwater in the south Stockton area is barely adequate for some agricultural activities and would not be acceptable for urban uses. The saline front is projected to move beyond State Highway 99 by the year 2020. It is expected that additional surface water from New Melones Reservoir and other sources used in groundwater recharge efforts will stabilize the movement of the saline water.

After detecting dibromochloropropane (DBCP) in groundwater, SEWD conducted a study to investigate groundwater contamination as a result of normal irrigation practices. The 1986 study found that no major or extensive water quality problems exist within SEWD, with the exception of three pesticides, DBCP/ 1,2-D (12,2 dichloropropane), a contaminant of Telone II, and EDB (ethylene dibromide), which were identified as being of concern. On the borders of SEWD to the north (south of the City of Lodi) is an area where soil and groundwater are contaminated with DBCP and 1,2-D. Groundwater in both of these areas is expected to enter the SEWD boundaries by the year 2020 and result in the degradation of district groundwater.

3. Description of the agricultural water quality testing program and the role of each participant, including the district, in the program

SEWD began irrigation water quality monitoring for surface water at seven key points in the irrigation distribution system in 1997. The results are displayed on SEWD's web site

www.sewd.net and Water Conservation Information table at the SEWD office. See Attachment M.

4. Current water quality monitoring programs for surface water by source (Agricultural only)

Analyses Performed	*Frequency*	*Concentration Range*	*Average*
Domestic Water Quality and Monitoring Regulations California Code Chapter 15, Title 22	As required by code	Attachment M	
Ag Irrigation Suitability Test	Annual	Attachment M	

Current water quality monitoring programs for groundwater by source (Agricultural only)

Analyses Performed	*Frequency*	*Concentration Range*	*Average*
Specific Conductivity	As requested by well owner in the French Camp only. A high salinity area within SEWD.	600-2500 µmhos/cm	1000 µmhos/cm
Domestic Water Quality and Monitoring Regulations California Code Chapter 15, Title 22, District wells 74-01 & 74-02 (M&I use only)	As required by code	Attachment M	

E. Water Uses within the District

1. Agricultural

See Water Inventory Tables, Table 5 - Crop Water Needs

2. Types of irrigation systems used for each crop in current year

Crop name	*Total Acres*	*Level Basin - acres*	*Furrow - acres*	*Sprinkler - acres*	*Low Volume - acres*	*Multiple methods -acres*
Alfalfa	821	586	29	206	0	0
Apples	934	42	6	0	156	0
Apricots	6	4	0	1	1	0
Asparagus	127	19	108	0	0	0
Beans	768	27	582	102	56	0
Berries	30	0	0	0	30	0

Crop name	*Total Acres*	*Level Basin - acres*	*Furrow - acres*	*Sprinkler - acres*	*Low Volume - acres*	*Multiple methods -acres*
Blueberry	26	4	0	22	0	0
Cherries	10,287	414	35	8,902	936	0
Chestnuts	46	0	0	41	5	0
Corn	922	64	705	7	146	0
Cucumbers	50	0	0	50	0	0
Eggplant	27	0	27	0	0	0
Grapes/Vineyard	4,264	6	0	190	4,068	0
Grass	69	62	0	7	0	0
Landscaping	6	0	0	6	0	0
Lilac	5	0	4	1	0	0
Melons	211	0	0	42	170	0
Nectarines	3	2	0	1	1	0
Nursery stock	368	0	0	26	343	0
Oats	29	0	0	29	0	0
Olives	385	0	0	16	369	0
Onions	179	5	2	173	0	0
Orchard	1,384	31	3	1,061	288	0
Pasture	1,444	1,141	0	276	27	0
Peaches	782	161	104	117	401	0
Pears	339	26	0	313	0	0
Pecans	25	16	0	0	9	0
Peppers	78	4	29	43	2	0
Persimmons	11	0	0	10	1	0
Pistachios	17	0	0	17	0	0
Plums	19	0	0	4	15	0
Pomegranates	26	23	0	1	2	0
Pumpkins	205	0	10	80	115	0
Squash	351	35	154	80	82	0
Strawberries	15	0	5	10	0	0
Tomatoes	2,193	128	1,113	47	905	0
Vegetables	450	9	112	259	68	0
Walnuts	22,743	531	238	18,484	3,474	16[a]
Wheat	1,196	731	465	0	0	0

[a] Unknown

3. Urban use by customer type in current year

City of Stockton

Customer Type	*Number of Connections*	*acre-feet*
Single-family	41,070	18,644
Multi-family	3,643	3,049
Commercial	1,415	4,473
Industrial	5	623
Institutional	[a]	[a]
Landscape irrigation	872	3,392
Wholesale	NA	1,922
Recycled	0	0
Other: Const/hydrants/fireflow	NA	52
Unaccounted for		3,107
Total	47,005	35,262

Source: City of Stockton, October, 2011.
[a] Included in commercial connections.

California Water Service Company

Customer Type	*Number of Connections*	*acre-feet*
Single-family	37,200	16,577
Multi-family	389	2,437
Commercial	3,919	6,235
Industrial	84	2,821
Institutional	327	3,120
Landscape irrigation	25	88
Wholesale	0	0
Recycled	0	0
Other (specify)	0	0
Unaccounted for		1,815
Total	41,942	33,091

Source: California Water Service Company, October, 2011.

County of San Joaquin

Customer Type	*Number of Connections*	*acre-feet*
Single-family		
Multi-family		
Commercial	25	126.4
Industrial		
Institutional	2	1.5
Landscape irrigation	1	12.5
Wholesale		
Recycled		
Other (specify)	Assessed: 2,310	1805.1
Unaccounted for		
Total	2,338	1945.5

4. *Urban Wastewater Collection/Treatment Systems serving the service area – current year*

Treatment Plant	*Treatment Level (1, 2, 3)*	*acre-feet*	*Disposal to / uses*
Stockton Regional Control Facility	3	29,950	San Joaquin River
	Total		
Total discharged to ocean and/or saline sink			

Source: Personal Communication, Mr. Larry Parlin, 2011.

5. *Ground water recharge/management in current year (Table 6)*

Recharge Area	*Method of Recharge*	*acre-feet*	*Method of Retrieval*
	Farmington Groundwater Recharge Program ponds	4,960	Groundwater pumping
1,698 ac	natural creeks/rivers and canals	48,279	Groundwater pumping
	Total	53,239	

Sources: SEWD spreadsheet: New Melones 2010 Water Use, October 2011.
Calaveras River Water Rights Study, Murray, Burns & Kienlen, 1969

6. *Transfers and exchanges into or out of the service area in current year (Table 6)*

From Whom	*To Whom*	*acre-feet*	*Use*
OID and SSJID	SEWD and CSJWCD	26,900	M&I

Notes: Transfer water from OID/SSJID was accounted for in Water Inventory Table 1.

7. *Trades, wheeling, wet/dry year exchanges, banking or other transactions in current year (Table 6)*

From Whom	*To Whom*	*acre-feet*	*Use*
SEWD	CSJWCD	32,127	agricultural

8. Other uses of water in current year

Other Uses	*acre-feet*
NA	

F. Outflow from the District (Agricultural only)

See Attachment D, District Facilities Map, for the location of surface and subsurface outflow points, outflow measurement points, outflow water-quality testing locations

1. Surface and subsurface drain/outflow in current year

Outflow point	*Location description*	*acre-feet*	*Type of measurement*	*Accuracy (%)*	*% of total outflow*	*Acres drained*
	Main Street, McAllen on Calaveras, and Leffler on Mosher		SCADA		80%[a]	[a]

[a] Percent of total outflow is estimated, and acres drained is not known. There are no accurate measurements at this time. Over the next five years, SEWD will be installing measuring devices to determine how much water leaves the district.

Outflow point	*Where the outflow goes (drain, river or other location)*	*Type Reuse (if known)*
	Calaveras River	

2. Description of the Outflow (surface and subsurface) water quality testing program and the role of each participant in the program

NA

3. Outflow (surface drainage and spill) Quality Testing Program

Analyses Performed	*Frequency*	*Concentration Range*	*Average*	*Reuse limitation?*
NA				

Outflow (subsurface drainage) Quality Testing Program

Analyses Performed	*Frequency*	*Concentration Range*	*Average*	*Reuse limitation?*
NA				

4. Provide a brief discussion of the District's involvement in Central Valley Regional Water Quality Control Board programs or requirements for remediating or monitoring any contaminants that would significantly degrade water quality in the receiving surface waters.

SEWD is not currently involved in a remediation or monitoring program in conjunction with the Central Valley Regional Water Quality Control Board.

G. Water Accounting (Inventory)

1. *Water Supplies Quantified*

    a. *Surface water supplies, imported and originating within the service area, by month (Table 1)*
    b. *Ground water extracted by the district, by month (Table 2)*
    c. *Effective precipitation by crop (Table 5)*
    d. *Estimated annual ground water extracted by non-district parties (Table 2)*
    e. *Recycled urban wastewater, by month (Table 3)*
    f. *Other supplies, by month (Table 1)*

2. *Water Used Quantified*

    a. *Agricultural conveyance losses, including seepage, evaporation, and operational spills in canal systems (Table 4) or*
    Urban leaks, breaks and flushing/fire uses in piped systems (Table 4)

The source for the precipitation data presented in Table 4 is the Stockton airport station (048558), Western Regional Climate Center (period of record: September 1996 to December 2008).

The source for the evaporation data presented in Table 4 is the New Melones Dam HQ station (period of record: 1992-2005).

    b. *Consumptive use by riparian vegetation or environmental use (Table 6)*
    c. *Applied irrigation water - crop ET, water used for leaching/cultural practices (e.g., frost protection, soil reclamation, etc.) (Table 5)*
    d. *Urban water use (Table 6)*
    e. *Ground water recharge (Table 6)*
    f. *Water exchanges and transfers and out-of-district banking (Table 6)*
    g. *Estimated deep percolation within the service area (Table 6)*
    h. *Flows to perched water table or saline sink (Table 7)*
    i. *Outflow water leaving the district (Table 6)*
    j. *Other*

3. *Overall Water Inventory*

    a. *Table 6*

H. Assess Quantifiable Objectives:

Identify the Quantifiable Objectives that apply to the District (Planner, chapter 10) and provide a short narrative describing past, present and future plans that address the CALFED Water Use Efficiency Program goals identified for the District.

The following five (5) quantifiable objectives (QOs) have been identified by SEWD to apply to the district:

1. Reduce native constituents (selenium, boron, molybdenum, organic carbon) to enhance and maintain beneficial use of water.
2. Reduce nutrients to enhance and maintain beneficial use of water.
3. Reduce pesticides to enhance and maintain beneficial use of water.
4. Reduce salinity to enhance and maintain beneficial use of water.
5. Reduce temperatures to enhance and maintain beneficial use of water.

SEWD is a member of the San Joaquin County and Delta Water Quality Coalition (Coalition). This Coalition was formed to address the Agricultural Waiver Program through the RWQCB. Many constituents are being monitored by the Coalition. The Coalition seeks funding for its efforts from all possible sources.

QO #	*QO Description*	*Past, Present & Future Plans*
1	Reduce native constituents (selenium, boron, molybdenum, organic carbon) to enhance and maintain beneficial uses of water.	Currently SEWD has not detected a level of these constituents (selenium, boron, molybdenum, organic carbon) that is of concern.
2	Reduce nutrients to enhance and maintain beneficial uses of water.	Nutrients are among the constituents being monitored by the Coalition.
3	Reduce pesticides to enhance and maintain beneficial uses of water.	Pesticides are among the constituents being monitored by the Coalition.
4	Reduce salinity to enhance and maintain beneficial uses of water.	SEWD is concerned about saline waters contaminating fresh groundwater due to groundwater overdraft. SEWD currently seeks Federal, State and local funding to support its Farmington Groundwater Recharge and Seasonal Habitat Program. SEWD is also active in efforts to reduce saline contamination to surface waters upstream of Vernalis on the San Joaquin River.
5	Reduce temperatures to enhance and maintain aquatic species populations.	Temperature is one of the constituents being monitored by the Coalition.

Section 3: Best Management Practices (BMPs) for Agricultural Contractors

A. Critical Agricultural BMPs

1. *Measure the volume of water delivered by the district to each turnout with devices that are operated and maintained to a reasonable degree of accuracy, under most conditions, to +/- 6%*

Number of turnouts that are unmeasured or do not meet the standards listed above: 5[a]
Number of measurement devices installed last year: 6
Number of measurement devices installed this year: 5
Number of measurement devices to be installed next year: 7[b]

[a] Recent field investigations have concluded that meters can be installed on these 5 delivery points. SEWD will install meters on these delivery points in 2013.
[b] In 2012, five measurement devices were installed on new turnouts, and two meters were installed on previously unmeasured turnouts.

Types of Measurement Devices Being Installed	*Accuracy*	*Total Installed During Current Year*
McCrometer or Water Specialties	+/- 6%[a]	5

[a] The water meters will henceforth bbe tested on a 10-year cycle. A budget and schedule is provided in Attachment Q, Efficient Water Management Practices.

2. *Designate a water conservation coordinator to develop and implement the Plan and develop progress reports*

Name: John E. Morley *Title:* Water Quality Control Analyst
Address: 6767 East Main Street, Stockton, CA 95207
Telephone: (209) 948-0537 *E-mail:* emorley@sewd.net

3. *Provide or support the availability of water management services to water users*

a. On-Farm Evaluations

1) On farm irrigation and drainage system evaluations using a mobile lab type assessment

	Total in district	*# surveyed last year*	*# surveyed in current year*	*# projected for next year*	*# projected 2nd yr in future*
Irrigated acres	45,511	12	285	70	100
Number of farms	179	3	3	3	3

Using grant funding from USBR, SEWD has provided irrigation evaluations free to its customers since 1999. The evaluations have been promoted through SEWD's annual newsletter, the District Advisory Committee (comprised of stakeholders representing the urban and agricultural areas of SEWD), and through District field personnel. The irrigation evaluation program is voluntary, but

is encouraged and supported by SEWD. SEWD will continue to offer this service free to its customers.

The actual cost of an irrigation evaluation is $2500. Offering this evaluation free to customers represents greater than a 25 percent discount on the cost of the evaluation, thereby complying with the USBR's example of an adequate program per the USBR Water Management Plan 2008 Guidebook: Offer to district water users a rebate/discount of 25 percent off the fair market price of an evaluation.

2) Timely field and crop-specific water delivery information to the water user

Meter readings are collected monthly. SEWD prepares an Annual Crop Report on water use per crop, method of irrigation, estimated water use and metered use. This report is posted at the SEWD office.

b. Real-time and normal irrigation scheduling and crop ET information

SEWD has provided daily and seven-day-average ET information from the Lodi West Station 166 and Manteca Station 70 through its CIMIS Hotline (209-942-4647) since January 1998. From 1998 to 2004 there were no inquiries; therefore, the hotline was discontinued. SEWD now provides a link to the CIMIS web site on the home page of SEWD's web site. There is also signage at SEWD's office directing customers to the CIMIS web site to obtain ET information. SEWD's spring and fall newsletters, which are delivered to all of SEWD's customers, also provide the link to the CIMIS website. Although the CIMIS website does not provide crop-specific information, growers can calculate the ET for their crop based on information available on the CIMIS website, including applying crop coefficients for the particular crop, and entering the age of their crop.

c. Surface, ground, and drainage water quantity and quality data provided to water users

SEWD began irrigation water quality monitoring for surface water at seven key points in the irrigation distribution system in 1997. The results are displayed on SEWD's web site and Water Conservation Information table at the SEWD office. Results for 2010 are presented in Attachment M.

d. Agricultural water management educational programs and materials for farmers, staff, and the public

Program	*Co-Funders (If Any)*	*Yearly Targets*
Ag Water Report	SEWD Advisory Committee	6,500 accounts
Chamber of Commerce State of the City	City of Stockton/San Joaquin County	2,000 attendees

e. Other

Agricultural BMPs are incorporated into SEWD's daily operations.

4. *Pricing structure - based at least in part on quantity delivered*
   Describe the quantity-based water pricing structure, the cost per acre-foot, and when it became effective.

SEWD's surface water pricing structure is based on the quantity of water delivered and is charged at a rate of $20.00/ac-ft. In most cases quantity of water delivered is based on water meters. In cases where installation of a water meter would require capital improvements to the private owner's water pumping system, water quantity is determined using pump tests and hour meters.

Groundwater users are charged a flat rate of $37.50 for a private domestic well. There is no water conservation pricing structure because SEWD is not selling the water, but assessing for the use of a well.

Municipal groundwater users are assessed on the quantity of water used at $3.60/ac-ft, with a rate equalization charge of $160.71/ac-ft.

Agricultural groundwater users are assessed $4.58/ac-ft.

5. *Evaluate and describe the need for changes in policies of the institutions to which the district is subject*

SEWD has three water contracts all with different contract years. For ease of scheduling and providing the most economical water for our customers, SEWD continues to negotiate for a standard contract year. Staff hours and money spent has not been determined at this time.

6. *Evaluate and improve efficiencies of district pumps*
   Describe the program to evaluate and improve the efficiencies of the contractor's pumps.

SEWD owns two pumps which can pump water from the Calaveras River into Potter Creek for irrigation. In 2001, modifications were made to SEWD's Bellota Pipeline, which allowed for gravity flow from the SEWD pipeline to Potter Creek. Since no SEWD pumping has been required to supply irrigation water to Potter Creek since 2001, the cost savings realized are comparable to those of 2001 expenses, approximately $30,000. This practice can only be used when there is an adequate water supply from both the New Melones and New Hogan water contracts. The pipeline is dedicated to M&I use only when SEWD is relying 100 percent on the New Hogan water supply.

B. Exemptible BMPs for Agricultural Contractors

1. *Facilitate alternative land use*

Drainage Characteristic	*Acreage*	*Potential Alternative Uses*
High water table (<5 feet)	0	
Poor drainage	0	
Groundwater selenium	0	

concentration > 50 ppb		
Poor productivity	[a]	

[a] SEWD is not aware of significant acreage within the district that is subject to poor productivity.

Describe how the contractor encourages customers to participate in these programs.

No programs have been developed to encourage alternative land uses because SEWD does not include lands that have these chronic issues.

2. *Facilitate use of available recycled urban wastewater that otherwise would not be used beneficially, meets all health and safety criteria, and does not cause harm to crops or soils*

Sources of Recycled Urban Waste Water	*Wastewater Available, acre-feet/year*	*Recycled Urban Waste Water Currently Used in District, ac-ft/yr*
Not applicable		

SEWD's agricultural area is primarily upstream of available urban recycled wastewater and considerable pumping would be required to provide recycled water to SEWD customers. Recycled urban waste water use was investigated in a 1995 study by the City of Stockton, which operates the wastewater treatment facility. Until recently the City did provide some water to a farmer located near the wastewater treatment plant, but the discharge permit was not renewed and no wastewater is being recycled at this time. SEWD supports the City of Stockton's recycling efforts.

3. *Facilitate the financing of capital improvements for on-farm irrigation systems*

Funding Source Programs	*How provide assistance*
Surface Water Incentive Program	Encourage use of surface water through water pricing incentives (see below)

SEWD currently offers a Surface Water Incentive Program. This program encourages the conversion to surface from groundwater through water pricing. The owner of the pumping facility is charged the groundwater assessment rate for water until the capital costs of the facility have been amortized. This program is noticed in SEWD's Ag Newsletter and on its web page. One irrigator has taken advantage of this program to date.

In 1996, SEWD provided zero interest loans for a pumping facility to customers who switched from groundwater use to surface water use. SEWD provided $1.3 million in loans. Funding sources for these loans were the subject of a lawsuit between SEWD and the urban contractors. In 1999, the zero percent loan program was discontinued. SEWD continues to provide information to its customers on other loan programs as they become available.

4. Incentive pricing

Structure of incentive pricing	*Related goal*
Not applicable	

SEWD's enabling legislation limits its ability to offer pricing incentives for water (see Attachment N).

5. a) Line or pipe ditches and canals

Canal/Lateral (Reach)	*Type of Improvement*	*Number of Miles in Reach*	*Estimated Seepage (ac-ft/yr)*	*Accomplished/ Planned Date*
See below				

SEWD has two canal systems, Upper Farmington Canal and Lower Farmington Canal, which are part of the New Melones Conveyance System. SEWD utilizes natural creeks, sloughs, and rivers to distribute water. Percolation from these natural water ways provides natural recharge to the groundwater basin. In 1999, SEWD collected data to verify percolation from its unlined canals: Upper Farmington Canal and Lower Farmington Canal. Percolation from both canals was found to be minimal (less than 5 percent). Percolation was addressed in an Environmental Impact Report for the canal system. SEWD and CSJWCD, which also uses the Upper Farmington Canal for transport of New Melones water, are situated over the Eastern San Joaquin Groundwater Basin, which is critically overdrafted. Percolation is reclaimed through groundwater pumping as a component of SEWD's conjunctive use plan. This BMP is complete.

b) Construct regulatory reservoirs

Reservoir Name	*Annual Spill in Section (ac-ft/yr)*	*Estimated Spill Recovery (ac-ft/yr)*	*Accomplished/ Planned Date*
See below			

The reservoirs surrounding the treatment plant act as buffers during storm events and percolate water, recharging the aquifer at the treatment plant. Reservoir maintenance and groundwater monitoring are ongoing.

Construction of an additional regulatory/percolation pond is in the planning stages. Monies are being sought from the USACE (via stimulus money) and also local funds.

6. *Increase flexibility in water ordering by, and delivery to, water users*

SEWD operates an on-demand system. SEWD asks customers to call or email 24 hours in advance. This advance notice helps SEWD manage its irrigation supplies more efficiently. There is no penalty for not calling in advance. This system has flexibility in water ordering and delivery to the water user. The overall system is working well; however, SEWD is having problems with the SCADA system and is reviewing new software programs to improve the system.

7. *Construct and operate district spill and tailwater recovery systems*

Distribution System Lateral	*Annual Spill (ac-ft/yr)*	*Quantity Recovered and reused (ac-ft/yr)*
See below		
Total		

Drainage System Lateral	*Annual Drainage Outflow (ac-ft/yr)*	*Quantity Recovered and reused (ac-ft/yr)*
See below		
Total		

USBR grant funds are utilized for this BMP. SEWD will continue to apply for these grants as they become available. In 2005, SEWD applied for and was awarded a Challenge Grant in the amount of $150,255 over two years to implement a SCADA system. SEWD's contribution was $154,553. Although SCADA is not a spill or tail water recovery system, it allows enhanced surface water management abilities which should minimize already limited system losses. The equipment was installed in 2006; however, SEWD is still adjusting the SCADA system for optimum performance.

There is no plan to pump the limited system losses upstream. SEWD would need to build the costly facilities to pump this relatively small volume of water over 20 miles upstream. Currently, this water flows downstream and is put to beneficial use either by other growers or by flowing into the San Joaquin River. A cost-benefit analysis is provided in Attachment P.

8. *Plan to measure outflow.*

Total # of outflow (surface) locations/points 3
Total # of outflow (subsurface) locations/points 0
Total # of measured outflow points 3
Percentage of total outflow (volume) measured during report year 80*

* Percent of total outflow is estimated. There are no accurate measurements at this time. Over the next five years, SEWD will be installing measuring devices to determine how much water leaves the district.

Identify locations, prioritize, determine best measurement method/cost, submit funding proposal

Location and Priority	*Estimated cost (in $1,000s)*				
	2009	*2010*	*2011**	*2012**	*2013**
First priority: Main Street, SCADA	2	2			
Second priority: McAllen on Calaveras, SCADA	2	2			
Third priority: Leffler on Mosher, SCADA	2	2			

*Measurement devices and SCADA equipment are installed along with new installations.

9. Optimize conjunctive use of surface and ground water

SEWD's goal is to optimize conjunctive management of surface and groundwater. SEWD secures and provides supplemental water to protect the District's only reliable water supply, groundwater. SEWD is looking for more recharge sites. See Section 3 for more information.

10. Automate canal structures

This BMP is being implemented in conjunction with BMP B7.

11. Facilitate or promote water customer pump testing and evaluation

SEWD promotes its own pump testing program for its customers. SEWD has received USBR grant funding and offered free pump tests and irrigation evaluations to its customers. In 2010 SEWD completed 3 pump tests, and five are planned for 2011. The pump tests are promoted in SEWD's twice annual newsletter, at Stockton East Advisory meetings and through SEWD field personnel communication with customers.

For meter installation on existing surface water pumps that require major capital costs, SEWD offers pump hour meter installation in conjunction a with a free pump test to quantify water use.

12. Mapping

GIS maps	*Estimated cost (in $1,000s)*				
	2009	*2010*	*2011*	*2012*	*2013*
Layer 1 – Distribution system	$0	$1,000	$0	$12,000	$10,000

C. Provide a 3-Year Budget for Implementing BMPs

1. *Amount actually spent during current year.*

BMP #		BMP Name	Actual Expenditure (not including staff time)	Staff Hours
A	1	Measurement	$6,227	10.5
	2	Conservation staff	$3,000	40
	3a	On-farm evaluation/water delivery info	$4,200	2
	3b	Irrigation Scheduling	$50	1
	3c	Water quality	$950	8
	3d	Agricultural Education Program	$600	25
	4	Quantity pricing	$0	0
	5	Policy changes	$0	0
	6	Contractor's pumps	$0	0
B	1	Alternative land use	$0	0
	2	Urban recycled water use	$0	0
	3	Financing of on-farm improvements	$850	8
	4	Incentive pricing	$0	0
	5	Line or pipe canals/install reservoirs	$110,000	700
	6	Increase delivery flexibility	$0	40
	7	District spill/tailwater recovery systems	$0	0
	8	Measure outflow	$6,000	0
	9	Optimize conjunctive use	$1,200	24
	10	Automate canal structures	$0	0
	11	Customer pump testing	$675	8
	12	Mapping	$1,000	0
		Total	$134,752	866.5

2. *Projected budget summary for the next year.*

BMP #		BMP Name	Budgeted Expenditure (not including staff time)	Staff Hours
A	1	Measurement	$10,000	30
	2	Conservation staff	$7,000	75
	3a	On-farm evaluations/water delivery info	$4,000	2
	3b	Irrigation Scheduling	$50	1
	3c	Water quality	$1,000	8
	3d	Agricultural Education Program	$1,000	40
	4	Quantity pricing	$0	0
	5	Policy changes	$0	0
	6	Contractor's pumps	$0	0
B	1	Alternative land use	$0	0
	2	Urban recycled water use	$0	0
	3	Financing of on-farm improvements	$25,000	8
	4	Incentive pricing	$0	0

5	*Line or pipe canals/install reservoirs*	$750,000	800
6	*Increase delivery flexibility*	$2,000	40
7	*District spill/tailwater recovery systems*	$0	0
8	*Measure outflow*	$0	0
9	*Optimize conjunctive use*	$1,000	8
10	*Automate canal structures*	$2,000	40
11	*Customer pump testing*	$1,125	8
12	*Mapping*	$0	0
	Total	$810,175	1,060

3. Projected budget summary for 3rd year.

BMP #		*BMP Name*	*Budgeted Expenditure (not including staff time)*	*Staff Hours*
A	*1*	*Measurement*	$10,500	30
	2	*Conservation staff*	$7,350	75
	3a	*On-farm evaluations/water delivery info*	$4,200	2
	3b	*Irrigation Scheduling*	$53	1
	3c	*Water quality*	$1,050	8
	3d	*Agricultural Education Program*	$1,050	40
	4	*Quantity pricing*	$0	0
	5	*Policy changes*	$0	0
	6	*Contractor's pumps*	$0	0
B	*1*	*Alternative land use*	$0	0
	2	*Urban recycled water use*	$0	0
	3	*Financing of on-farm improvements*	$26,250	8
	4	*Incentive pricing*	$0	0
	5	*Line or pipe canals/install reservoirs*	$0	800
	6	*Increase delivery flexibility*	$2,100	40
	7	*District spill/tailwater recovery systems*	$0	0
	8	*Measure outflow*	$0	0
	9	*Optimize conjunctive use*	$1,050	8
	10	*Automate canal structures*	$2,100	40
	11	*Customer pump testing*	$1,181	8
	12	*Mapping*	$12,000	0
		Total	$68,884	1,060

(This page left blank intentionally.)

Section 4: Best Management Practices for Urban Contractors

A. Urban BMPs

1. Utilities Operations

1.1 Operations Practices

SEWD supplies wholesale treated drinking water that is retailed to Stockton area customers by the California Water Service Company, the City of Stockton, and San Joaquin County. SEWD has developed a program that addresses operations practices in its service area. Implementation is ongoing.

SEWD does not own or operate an urban distribution system.

1.2 Pricing

SEWD uses conservation pricing for surface water by charging per acre-foot of use. SEWD also uses volumetric pricing for municipal groundwater use. The mission of SEWD is to protect groundwater by offering a surface water alternative. Discouraging the use of surface water via pricing disincentives would discourage farmers from using surface water, and result in their pumping groundwater. This strategy would be contrary to SEWD's primary institutional mandate.

SEWD does not sell agricultural groundwater to its customers; SEWD assesses the use of the wells, based on acreage, as part of the District's mandate to protect the groundwater supply. SEWD does not sell domestic groundwater to its customers; SEWD assesses a charge per well. Therefore, SEWD cannot use conservation pricing for domestic or agricultural groundwater use.

1.3 Metering

SEWD meters the connections to its three urban contractors (the City of Stockton, California Water Service Company, and San Joaquin County).

1.4 Water Loss Control

SEWD conducts water audits for the DJWWTP. SEWD measures their diversions, the amount treated at the DJWWTP, and the amount delivered to its urban customers. Any discrepancies are immediately investigated, and repairs made as necessary.

2. Education

2.1 Public Information Programs

SEWD participates in the Stockton Area Water Suppliers (SAWS), which jointly funds the Water Conservation Education Program in the Stockton urban area. The SAWS Water Education

Program participates in and supplies hand-outs and outreach materials for numerous community gatherings and other special activities and events in Stockton. In 2011, SAWS participated in the following events:

- **San Joaquin County AgVenture:** The SAWS Water Education Program generally staffs a booth at three AgVenture events in Stockton, Lodi, and in the South County. Every third grader in San Joaquin County is invited to enjoy a day of fun while learning about the vast diversity of local agriculture through this dynamic program sponsored by San Joaquin Select. SAWS participation in AgVenture promotes SAWS-sponsored in-class, after school, and assembly programs while sharing the message of water awareness and conservation with thousands of third grade students and their teachers. SAWS is also a funding contributor to the annual events. Each AgVenture event hosts between 2,500 and 4,000 third graders; the SAWS activity booths hosted an approximate combined total of 4,500 students at the three events in 2011.
- **San Joaquin County Science Fair:** The SAWS Coordinator participates in exhibit judging at the annual San Joaquin County Science Fair. The SAWS Coordinator judged approximately 45 K-8 exhibits at this event.
- **Stockton's Earth Day Festival:** SAWS sponsors a booth featuring water themed activities for children, such as color-your-own water saver button, at Stockton's annual Earth Day event at Victory Park. The SAWS activities at this event reach approximately 1,500 community members.
- **KWIN/KAT Country's Promo at Stockton Car Wash:** The SAWS Water Education Program joins the City of Stockton and California Water Service Company staff in hosting a booth at this promotional event, which features giveaways and handouts of conservation materials. Outreach at this event reaches approximately 150 community members.
- **"May is Water Awareness Month":** In May 2011, the SAWS Coordinator attended a meeting of the Stockton City Council to participate in the acceptance of a "May is Water Awareness Month" proclamation in recognition of water conservation efforts by SAWS member agencies. Presentation of the proclamation was made in front of the Stockton City Council Members and approximately 100 community members.
- **Children and Youth Day at Pixie Woods:** The SAWS Water Education Program hosts an activity booth at this event, which is sponsored by the Stockton Family Resource and Referral Center. Children and their families enjoy free admission to Pixie Woods and are able to engage in a variety of crafts and activities throughout the day. Those visiting the SAWS activity booth made color-your-own conservation themed buttons and participated in water "experiments" designed to spark interest in water science. The SAWS activities at this event reach approximately 1,000 people.
- **Project WET Workshops:** In June 2011, Mrs. Coon and Mrs. Webster attended a special Project WET workshop at the San Joaquin County Office of Education, hosted by Brian Brown of the Water Education Foundation. The workshop focused on hands-on water science activities and included an update on the California Environmental Education Initiative. The workshop included approximately 50 participants, mostly teachers, from San

Joaquin County. SAWS participation in this event provided an opportunity to promote conservation and SAWS programs to local teachers.

- **San Joaquin Delta College "Kid's College":** The SAWS Water Education Program hosted a "Wonders of Water" workshop for 12 students during this summer program.
- **Project WET Facilitator Workshop, October 5, 2011:** The SAWS Water Education Program staff conducted a Project WET Facilitator Workshop in the SEWD Boardroom that focused on training Project WET facilitators to host teacher workshops. Approximately 20 facilitator-trainees attended. SAWS participation in this event provided an opportunity to promote conservation and our programs to regional facilitators, who will in turn promote conservation and water awareness among local teachers.
- **Water Treatment Plant Tours:** The SAWS Water Education Program and SEWD staff host water treatment plant tours. Tours for classrooms require one adult chaperone for every five students attending. Public tours of the Dr. Joe Waidhofer Drinking Water Treatment Plant, arranged by the Friends of the Lower Calaveras River advocacy group, are also conducted. SEWD hosts tours for over 100 students and community members annually.
- **Community Based Programs:** SAWS visits and supplies water conservation materials for Special Day classrooms at Stagg High School, First Five, Head Start and regional preschool programs, SUSD's "Project Live" programs for developmentally disabled adults, and other community programs requesting materials and resources.
- **Water Educator Training:** The SAWS Coordinator meets with and shares ideas and resources with other Northern California water agencies.
- **DWR Water Education Committee:** The SAWS Coordinator attends bi-annual meetings of the DWR Water Education Committee, joining water educators from all over California to share resources and ideas for water conservation education and outreach.
- **Children's Museum Benefit Bocce Challenge:** Each year, SAWS donates to and participates in the Children's Museum Annual Bocce Challenge, an event that raises thousands of dollars for the Children's Museum of Stockton.
- **Delta College "Reading for Science" classes:** During each school session, the SAWS Coordinator makes presentations on the water cycle, water treatment and distribution, and the Sacramento San Joaquin Delta for SJDC's Reading for Science classes. Instructors at SJDC use SAWS presentations to teach incoming community college students how to listen to a guest speaker, take notes and ask meaningful questions.

2.2 School Education

The Stockton Area Water Suppliers (SAWS), a partnership between SEWD, California Water Service Company, the City of Stockton and San Joaquin County, are dedicated to providing quality water education programs for our youth. To this end, the SAWS partners offer stimulating, age appropriate water education presentations for public and private school classrooms within the Stockton Metropolitan Area. Special event presentations are also

available. The SAWS water education programs align with the California Content Standards and are designed to coordinate with teachers' lesson plans.

Through these programs, the SAWS partners are seeking to reach out to our youth to promote an understanding of the scientific and social principles related to water resource conservation. It is SEWD's hope that this outreach effort will build a progressive knowledge base within the community that will promote sound water resource decisions in the future.

Specific programs include:

- **Lincoln USD "Window on Your Future":** SAWS educators participate in mock job interviews designed to prepare Lincoln High School students for entry into the job market. This event presents an opportunity for SAWS to share career path outreach with potential job seekers. SAWS Educators reach approximately 40 Lincoln High School juniors and seniors at this event.
- **Don Riggio Elementary School's "Delta Experience":** The SAWS Water Education Program participates in this lower elementary school event that focuses on the Sacramento/San Joaquin Delta. The SAWS activities at this event reach approximately 150 students and their teachers.
- **Manteca Unified School District's Farm Days:** SAWS sponsors an activity booth (H2Olympics) at each of the three Weston Ranch elementary schools' annual Farm Day events. The SAWS activity booth hosts an approximate combined total of 1,500 students at the three events.

Kristin Coon, Water Conservation Coordinator
Stockton East Water District
(209) 444-3126
kcoon@sewd.net

3. Residential

The City of Stockton and California Water Service Company have each developed a residential plumbing retrofit program in their respective service areas. Implementation is ongoing.

SEWD does not have urban customers and, therefore, cannot retrofit residential plumbing.

4. CII

Under SB 610, water assessments must be furnished to local governments for inclusion in environmental documentation for certain projects subject to the California Environmental Quality Act. To that end, water suppliers are notified about any new projects within their service area. Therefore, upon notification of a proposed project, SEWD, California Water Service Company and the City of Stockton comment on the project's available water supply.

As retail agencies, the City of Stockton and California Water Service Company have each developed programs that address this BMP in their respective service areas. Implementation is ongoing.

5. Landscape

The City of Stockton and California Water Service Company have each developed programs that address this BMP in their respective service areas. Implementation is ongoing.

SEWD does not have urban customers and, therefore, cannot directly encourage water-saving landscaping changes; however, SEWD supports the efforts of their three urban contractors.

B. Provide a 3-Year Budget for Expenditures and Staff Effort for BMPs

1. Amount actually spent during current year.

Year 2010 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
	1.1 Operations Practices	$0	0
	1.2 Pricing	$0	0
	1.3 Metering	$0	0
	1.4 Water Loss Control	$0	0
2.	Education		
	2.1 Public Information Programs	$19,533	250
	2.2 School Education	$169,500	1,830
3.	Residential	$0	0
4.	CII	$0	0
5.	Landscape	$0	0
	Total	$189,033	2,080

2. Projected budget summary for 2nd year.

Year 2011 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
	1.1 Operations Practices	$0	0
	1.2 Pricing	$0	0
	1.3 Metering	$0	0
	1.4 Water Loss Control	$0	0

2. Education		
2.1 Public Information Programs	$20,500	250
2.2 School Education	$178,000	1,830
3. Residential	$0	0
4. CII	$0	0
5. Landscape	$0	0
Total	$198,500	2,080

3. Projected budget summary for 3rd year.

Year 2012 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1. Utilities Operations			
1.1 Operations Practices		$0	0
1.2 Pricing		$0	0
1.3 Metering		$0	0
1.4 Water Loss Control		$0	0
2. Education			
2.1 Public Information Programs		$21,500	250
2.2 School Education		$187,000	1,830
3. Residential		$0	0
4. CII		$0	0
5. Landscape		$0	0
	Total	$208,500	2,080

Section 5: District Water Inventory Tables

The Water Inventory Tables are presented on the following pages.

(This page left blank intentionally.)

Year of Data	2010	Enter data year here

Table 1

Surface Water Supply

2010 Month	Federal Ag Water (acre-feet)	Federal non-Ag Water. (acre-feet)	State Water (acre-feet)	Local Water (acre-feet)	Other Water (transfer) (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
Method							
January	0	4000	0	0	0	0	4,000
February	0	3676	0	0	0	0	3,676
March	243	2026	0	0	2113	0	4,382
April	1532	312	0	0	3510	0	5,355
May	6688	565	0	0	4900	0	12,152
June	10953	2067	0	0	4700	0	17,720
July	11859	2147	0	0	5077	0	19,083
August	10328	3557	0	0	3700	0	17,586
September	7658	4230	0	0	2900	0	14,788
October	2068	7443	0	0	0	0	9,511
November	13	6088	0	0	0	0	6,101
December	198	3664	0	0	0	0	3,862
TOTAL	51,540	39,776	0	0	26,900	0	118,216

Table 2

Ground Water Supply

2010 Month	District Groundwate (acre-feet)	Private Urban *(acre-feet)	Private Agric *(acre-feet)
Method			
January	0	611	0
February	0	476	0
March	0	623	8,387
April	0	396	16,775
May	0	787	16,775
June	0	1,896	16,775
July	0	2,371	16,775
August	0	1,942	16,775
September	0	1,387	16,775
October	0	686	8,387
November	0	454	0
December	0	749	0
TOTAL	0	12,378	117,424

*normally estimated

Table 3

Total Water Supply

2010 Month	Surface Water Total (acre-feet)	District Groundwate (acre-feet)	Recycled M&I (acre-feet)	Total District (acre-feet)
Method				
January	4,000	0	0	4,000
February	3,676	0	0	3,676
March	4,382	0	0	4,382
April	5,355	0	0	5,355
May	12,152	0	0	12,152
June	17,720	0	0	17,720
July	19,083	0	0	19,083
August	17,586	0	0	17,586
September	14,788	0	0	14,788
October	9,511	0	0	9,511
November	6,101	0	0	6,101
December	3,862	0	0	3,862
TOTAL	118,216	0	0	118,216

*Recycled M&I Wastewater is treated urban wastewater that is used for agriculture.

Table 4

Agricultural Distribution System

2010 Canal, Pipeline, Lateral, Reservoir	Length (feet)	Width (feet)	Surface Area (square feet)	Precipitatio (acre-feet)	Evaporation (acre-feet)	Spillage (acre-feet)	Seepage (acre-feet)	Total (acre-feet)
Calaveras River	168,960	85	14,361,600	488.2	1,826.8	0	2,728	(4,067)
Mormon Slough	102,960	85	8,751,600	297.5	1,113.2	0	6,612	(7,428)
Potter Creek	70,752	35	2,476,320	84.2	315.0	0	6,612	(6,843)
Mosher Slough	101,904	35	3,566,640	121.2	453.7	0	9,092	(9,424)
New Melones C.S.	150,480	52	7,824,960	266.0	995.3	0	4,408	(5,138)
	0	0	0	0.0	0.0	0	0	0
	0	0	0	0.0	0.0	0	0	0
	0	0	0	0.0	0.0	0	0	0
	0	0	0	0.0	0.0	0	0	0
	0	0	0	0.0	0.0	0	0	0
	0	0	0	0.0	0.0	0	0	0
TOTAL				1,257.2	4,704.0	0	29,452	(32,899)

Urban Distribution System

2010 Area or Line	Length (feet)	Leaks (acre-feet)	Breaks (acre-feet)	Flushing/Fire (acre-feet)	Total (acre-feet)
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
	0	0	0	0	0
TOTAL	0	0	0	0	0

Table 5

Crop Water Needs

2010 Crop Name	Area (crop acres)	Crop ET (AF/Ac)	Leaching Requiremen (AF/Ac)	Cultural Practices (AF/Ac)	Effective Precipitatio (AF/Ac)	Appl. Crop Water Use (acre-feet)
Walnuts	22,743	3.30	0.0	0.0	0.47	64,401
Cherries	10,290	2.99	0.0	0.0	0.48	25,794
Tomatoes	2,192	1.66	0.0	0.0	0.52	2,510
Vineyard	4,264	2.50	0.0	0.0	0.00	10,678
Other cereal	2,147	2.12	0.0	0.0	0.47	3,550
Other forage	2,265	3.63	0.0	0.0	0.47	7,173
Other field	0	1.84	0.0	0.0	0.48	0
Other vegetables	2,234	1.13	0.0	0.0	0.53	1,357
Other fruits	4,170	2.99	0.0	0.0	0.48	10,453
Other nuts	88	2.64	0.0	0.0	0.48	190
All other crops	588	2.97	0.0	0.0	0.47	1,470
	0	0.00	0.0	0.0	0.0	0
	0	0.00	0.0	0.0	0.0	0
	0	0.00	0.0	0.0	0.0	0
	0	0.00	0.0	0.0	0.0	0
	0	0.00	0.0	0.0	0.0	0
	0	0.0	0.0	0.0	0.0	0
	0	0.0	0.0	0.0	0.0	0
	0	0.0	0.0	0.0	0.0	0
	0	0.0	0.0	0.0	0.0	0
	0	0.0	0.0	0.0	0.0	0
	0	0.0	0.0	0.0	0.0	0
	0	0.0	0.0	0.0	0.0	0
Crop Acres	50,981					127,575

Total Irrig. Acres 50,981 (If this number is larger than your known total, it may be due to double cropping)

Table 6

2010 District Water Inventory

Water Supply	Table 3		118,216
Riparian ET	(Distribution and Drain)	minus	1,000
Groundwater recharge	(intentional - ponds, injection)	minus	4,960
Seepage	Table 4	minus	29,452
Evaporation - Precipitation	Table 4	minus	3,447
Spillage	Table 4	minus	0
Leaks, Breaks, Flushing / Fire	Table 4	minus	0
Transfers/trades/wheeling		**plus/minus**	0
Water Available for sale to customers			79,357
2005 Actual Agricultural Water Sales	From District Sales Records		23,116
Private Groundwater	Table 2	plus	117,424
Crop Water Needs	Table 5	minus	127,575
Drainwater outflow	(tail and tile not recycled)	minus	0
Percolation from Agricultural Land	(calculated)		12,965
M&I Actual Water Sales	From District Records		52,388
Inside Use	Feb urban use x 12		44,111
Landscape / Outside Use	(calculated)		8,277

Table 7

Influence on Groundwater and Saline Sink

2010

Agric Land Deep Perc + Seepage + Recharge - Groundwater Pumping = District Influence	34,412
Estimated actual change in ground water storage, including natural recharge)	0
Irrigated Acres (from Table 5)	50,981
Irrigated acres over a perched water table	0
Irrigated acres draining to a saline sink	0
Portion of percolation from agri seeping to a perched water table	0
Portion of percolation from agri seeping to a saline sink	0
Portion of On-Farm Drain water flowing to a perched water table/saline sink	0
Portion of Dist. Sys. seep/leaks/spills to perched water table/saline sink	0
Total (AF) flowing to a perched water table and saline sink	0

Table 8

Annual Water Quantities Delivered Under Each Right or Contract

Year	Federal Ag Water (acre-feet)	Federal non-Ag Water. (acre-feet)	State Water (acre-feet)	Local Water (acre-feet)	Other Water (transfer) (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
2001	55,183	33,222	0	0	23,523	0	111,928
2002	50,893	19,011	0	0	34,168	0	104,072
2003	51,553	27,189	0	0	29,715	0	108,457
2004	51,578	27,228	0	0	29,470	0	108,276
2005	85,839	27,621	0	0	33,401	0	146,861
2006	60,988	38,294	0	0	22,260	0	121,542
2007	59,677	37,227	0	0	34,629	0	131,533
2008	50,969	36,753	0	0	29,986	0	117,708
2009	44,854	35,133	0	0	32,913	0	112,900
2010	51,540	39,776	0	0	26,900	0	118,216
Total	563,074	321,454	0	0	296,965	0	1,181,493
Average	56,307	32,145	0	0	29,697	0	118,149

References

California Irrgation Management Information System. 2010. Accessed October 2011. Website: http://wwwcimis.water.ca.gov/cimis/data.jsp

City of Stockton. 2007. Background Report; Stockton General Plan 2035. December 2007.

County of San Joaquin. 1992. San Joaquin County General Plan 2010. July 29, 1992.

Irrigation Training and Research Center, California Polytechnic State University. 2003. California Crop and Soil Evapotranspiration for Water Balances and Irrigation Scheduling/Design. Funded by CalFed, the California Department of Water Resources and the U.S. Bureau of Reclamation. January 2003.

Personal Communication. 2011. Mr. Larry Parlin, Stockton Regional Control Facility. September 2011.

Western Regional Climate Center. Accessed October 2011. Website: http://www.wrcc.dri.edu/CLIMATEDATA.html

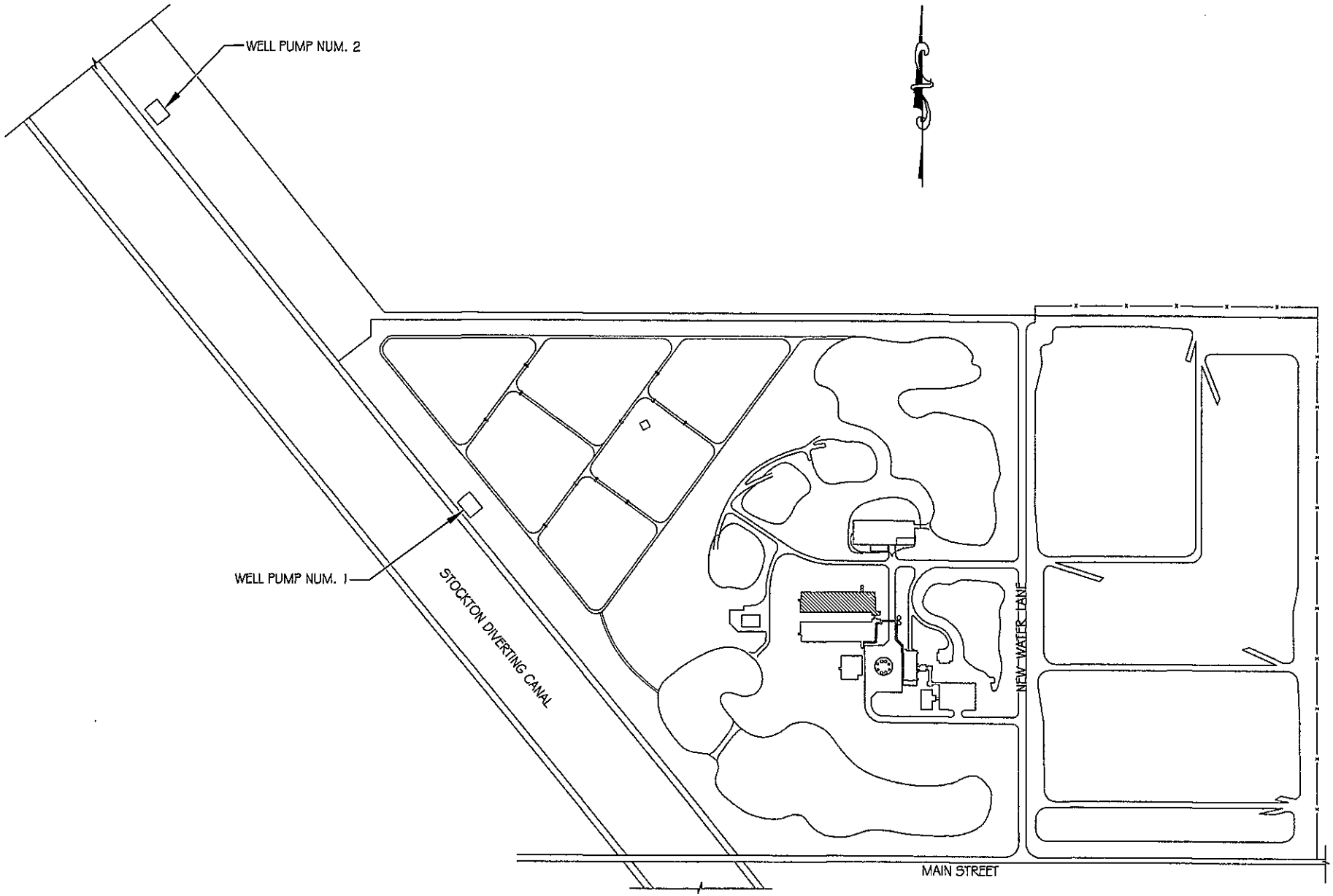
Western Regional Climate Center. New Melones Dam HQ Station 2010 Evaporation Data. Assembled by WRCC. October 2011.

(This page left blank intentionally.)

ATTACHMENT K

District Map of Groundwater Facilities

(This page left blank intentionally.)


WELL PUMP NUM. 2
WELL PUMP NUM. 1
STOCKTON DIVERTING CANAL
NEW WATER LANE
MAIN STREET

STOCKTON EAST WATER DISTRICT
6757 EAST MAIN ST.
STOCKTON CA

Stockton East Water District
Farmington Recharge Project
Well Locations

DRAWN BY: C. Solario
DESIGNED BY:
APPROVED BY:
SCALE: 1"=1,000'
DWG. CURRENT AS OF: 8/28/08
PROJECT NO. 2004-015

SHEET 1 OF 1

ATTACHMENT L

Groundwater Banking Plan

(This page left blank intentionally.)

Farmington
Groundwater Recharge Program

Summer 2007 Newsletter

Program Awaits Federal Funding Support

Launched in 2003, the **Farmington Groundwater Recharge & Seasonal Habitat Program** (Program) is a 10-year, $33.5 million effort to begin restoration of the Eastern San Joaquin Groundwater Basin (Basin), a Central California water resource in a state of critical overdraft and threatened by saline intrusion from under the Delta.

The Program is led by Stockton East Water District (SEWD), in partnership with other local water interests, and the Sacramento District of the U.S. Army Corps of Engineers. An award-winning effort, the Program works by partnering with local water interests and landowners to implement conjunctive management strategies for the utilization of available water resources.

When surface water supplies are abundant, the Program's objective is to recharge the Basin through in-lieu irrigation and partnerships with growers who rotate direct recharge activities with other land-uses via short- and long-term agreements.

Since its inception, the Program has evaluated and/or tested more than a dozen candidate recharge sites within the service boundaries of SEWD, North San Joaquin Water Conservation District and Central San Joaquin Water Conservation District.

Direct recharge facilities developed through the Program, and its preceding studies, now contribute more than 11,000 acre-feet per year towards the Program's original recharge goal of 35,000 acre-feet annually.

To date, the Program has been maintained through approximately $1.75 million in allocated Federal funds and more than $10 million in local and State funds. A schedule of continued Federal funding through 2013 was submitted to Congress in February, 2007.

With additional Federal appropriations, Program partners plan to advance selected candidate sites to demonstration facilities; begin evaluation of additional candidate sites; and resume active recruitment and outreach of Program participants.

In This Issue

Farmington Groundwater Recharge & Seasonal Habitat Program *(cover story)*

About the Farmington Program *(page 2)*

Recharge Facilities *(page 4)*

Recharge Site Profiles *(page 4)*

Stakeholder Outreach: Tapping Into Established Awareness *(page 8)*

STOCKTON EAST WATER DISTRICT

US Army Corps of Engineers

Program Contacts:

Kevin Kauffman
SEWD General Manager
(209) 948-0333

Patrick Dwyer
USACE Program Manager
(916) 557-7802

www.farmingtonprogram.org

© Joyce Gross

About the Farmington Program

Faced with limited surface water availability in Eastern San Joaquin County, growers, cities, rural neighborhoods and industries have relied heavily on mining water from underground aquifers. Groundwater use now exceeds nature's ability to self-replenish the aquifer by approximately 150,000 acre-feet per year. The cumulative effects:

- Groundwater is now up to 80 feet below mean sea level
- Intrusion of saline-tainted water from the west
- Municipal and rural wells have closed or failed
- Continually higher groundwater pumping costs
- Accumulated overdraft of more than two million acre-feet

To address this trend, Stockton East Water District (SEWD), with other local water interests, took a lead role in 1996 to work with the U.S. Army Corps of Engineers (Corps) to develop a conjunctive management strategy for Eastern San Joaquin County. The result is the Farmington Groundwater Recharge & Seasonal Habitat Program (Program).

The Program's goal is to provide average annual recharge of 35,000 acre-feet of water through spreading of water on agricultural fields and other recharge facilities, and increasing surface water deliveries in-lieu of groundwater pumping. Each tactic seeks to reduce overdraft and reduce the potential for further saline water intrusion.

For direct groundwater recharge activities, the Program seeks to enroll 25 to 30 parcels totaling up to 1,200 acres in short- and long-term agreements with landowners. Each would be compensated at

Eastern San Joaquin County and the Farmington Groundwater

Report / Action	Report Conclusion
Eastern San Joaquin County Groundwater Study	1985 — Concluded that the groundwater basin is overdrafted, saline water intrusion is a problem, and additional surface water supplies are needed
American River Water Resources Investigation	1995 — Considered extending the Folsom South Canal to deliver American River water in eastern San Joaquin County and reduce groundwater overdraft
Mokelumne Aquifer Recharge and Storage Project	1996 — Considered recharge and recovery of Mokelumne River water supplies to support Bay Area needs and reduce groundwater overdraft
Stockton Metropolitan Area, California Reconnaissance Report	1997 — Recommended study of Farmington Dam for conjunctive use purpose
Conjunctive Use Study	1998 — Concluded that groundwater recharge is the most cost-effective approach to reducing overdraft
Congressional Action	2000 — Congress authorized Program and Farmington Groundwater Recharge
Farmington Groundwater and Seasonal Habitat Study	2001 — Described Program components and general implementat approach

market rates for the use of their land.

The recharge method of choice is field-flooding, a practice where a small perimeter levee is built around fallow farmland to allow winter flooding to a depth of up to 18 inches. In addition to groundwater recharge, this method often provides varying water depths that are ideal for a wide range of migratory waterfowl.

Lands can be cycled in and out of the Program with other traditional land uses, thereby making water a cash crop for enrolled landowners.

For in-lieu recharge, the Program seeks to expand surface water deliveries to the urban area, farms and other major groundwater users via existing and future transmission and distribution systems.

The Program is also investigating the feasibility of conducting direct groundwater recharge via flooding of vineyards when the plant is dormant. Early indications are that this type of field-flooding is an effective pest control for root-damaging nematodes, and has the potential of over 20,000 acre-feet per year of recharge in the region.

FOUR GROUNDWATER RECHARGE METHODS ARE FEATURED IN THE FARMINGTON GROUNDWATER RECHARGE PROGRAM:

Flooded Field

Often the lowest cost to design, engineer, and construct, a flooded field recharge involves pushing up two- to four-foot-tall berms and flooding to a depth of one to three feet. Such facilities can provide temporary habitat for migrating water fowl.

Spreading Basin

Longer lasting and developed to a higher level of design, engineering, and construction, the spreading basin method features a two- to six-foot-deep excavation to a field and berms up to 15 feet high. Water depths range from three to nine feet. To enhance percolation rates and minimize maintenance, SEWD is experimenting with a combination of ridges and furrows graded into the basin bottoms.

Pit Facility

This recharge methods features excavations with minimal to no side slope in the basin. This method is often employed in order to bypass a confining, hardpan or low-permeability soil layer.

In-Lieu

Rather than construct a recharge facility, in-lieu recharge features replacement of groundwater pumping with the delivery of surface water. Such practices reduce pumping stress on the basin and allow groundwater levels to rise through natural replenishment.

Recharge Program Milestones:

Program Cost Sharing

STOCKTON EAST WATER DISTRICT

US Army Corps of Engineers

2002

Project Cooperation Agreement sets Federal cost shares at 75 percent. $800,000 in Federal funding.

Recharge Facility Constructed

2003

Farmington Groundwater Recharge Program initiated. 7,000 AF direct recharge facility built at SEWD. $1 million in Federal funding.

Candidate Sites Identified

2004

12 candidate sites identified for evaluation, $1 million in Federal funding.

Demonstration Testing

2005

Demonstration-level testing at six candidate sites. $500,000 in Federal funding.

Peters Pipeline Completed

2006

Peters Pipeline Project complete, 1,488 acres of farmland gain access to surface water (in-lieu recharge of approx. 4,000 AF).

Farmington Groundwater Recharge Program

2007

Farmington Program's Federal actions on-hold pending further funding

Recharge Facilities

	SITE	ACRES	POTENTIAL		STATUS
			Observations	Recharge Volume [1] (acre-feet per year)	
1	Detention Basin No. 2 (Morada Lane)	15	Extensive hardpan and clay soils not suitable for groundwater recharge.	NA	Eliminated from consideration.
2	Pettit	20	Ideal for excavated pit recharge basin facility, with integrate wetlands and aquatic habitat.	4,800	Pending additional study for water supply and site studies.
3	Togninali		Low permeability of soils and remote location away from surface water source.	NA	Eliminated from consideration.
4	Filipelli	15	Limited size and existing land use limits groundwater recharge opportunities.	NA	Eliminated from consideration.
5	Hansen	50	Undulating topography and location well to the east of primary recharge target area.	NA	Eliminated from continued consideration due to site location.
6	Rajkavich		Low permeable soils suggest that groundwater recharge would not be favorable.		Eliminated from consideration.
7	BNSF	60	Deepening of three stormwater retention ponds could enhance recharge potential.	3,600	On-hold pending further dialog with BNSF officers.
8	Mariposa Lakes (Creek Partners LP)	Approx. 200	Soils data provided by candidate indicate some areas suitable for various recharge techniques.	12,000	On-hold pending site evaluation, water supply, and other studies.
9	Hammer	17	Medium to high capacity surface soils, with good percolation rates.	2,000	Site has been pursued by North San Joaquin Water Conservation District.
10	Kautz	25	Medium to high capacity surface soil encountered with good percolation rates.	2,100	Pending - Potential future in-lieu site.
11	Micke Grove Park/ Golf Course	160	In-lieu recharge via supplemental supplies of surface water for irrigation.	610	Pending approval for construction, planning and facility design.
12	Micke Grove Trust	200	Field flooding of vineyards during dormancy for groundwater recharge and pest control.	12,000	Pending further dialog with landowner.
13	SEWD Spreading Basin Facility	60	Three spreading basins filled with Calaveras and/or Stanislaus River water supplies.	7,000 [2]	Completed in 2002.
14	SEWD Northwest	30	Soils suitable for flooded field and spreading basin techniques.	3,000 [2]	Construction pending.
	Peters Pipeline	1,488	Surface water conveyance for agricultural and municipal use.	4,100 [3]	Completed in 2006, with turnouts to 1,488 acres of farmland for in-lieu use.
Total Potential Recharge Volume (acre-feet per year)				52,210 [4]	

[1] Unless noted otherwise, potential recharge volumes based on test data or professional judgement.
[2] Figures represent recharge capacity based on water supplies available four of every seven years through Bellota and Peters Pipelines.
[3] Assumes surface waters available five of every seven years.
[4] Of this potential yearly recharge volume, approximately 11,000 acre-feet per year can be recharged via facilities at SEWD and agricultural lands supplied by Peters Pipeline.

1 Detention Basin No. 2 Site

Highway 99, east of Mosher Dr. Morada, Calif.

Parcel size: 15 acres
Zone: Stockton East Water District
Water: Mosher Creek
Tests (results): Flooded Field (.07 to .1 feet/day)
Findings: Significant layer of hardpan and extensive clay layers contributed to poor infiltration for flooded fields.
Recommendation: Soils at site are not conducive for groundwater recharge.
Status: Eliminated from continued consideration.

2 Petitt Site

East of South Kaiser Road and north of the South Fork of Littlejohns Creek, San Joaquin County, Calif.

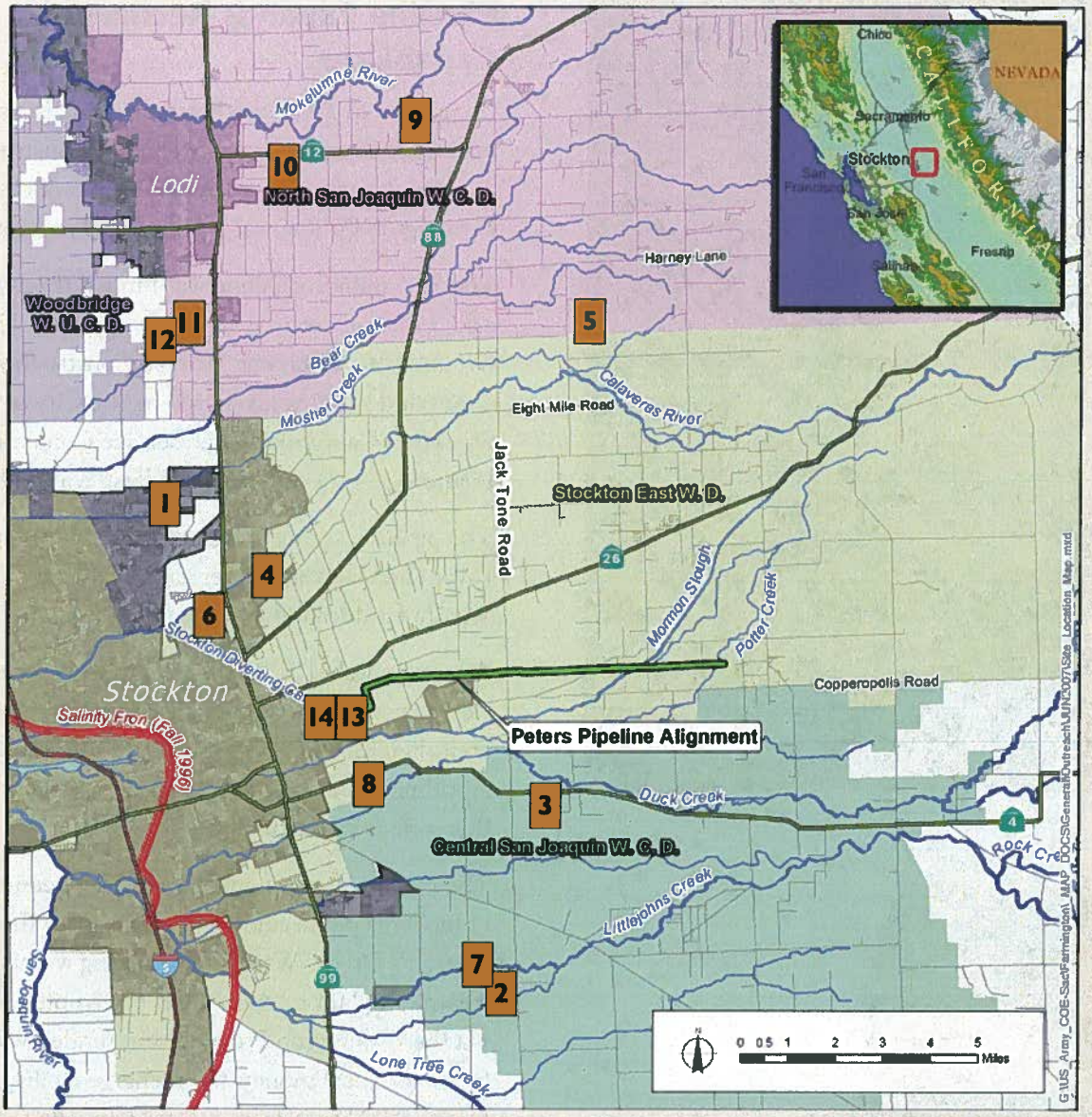
Parcel size: 20 acres
Zone: Central San Joaquin Water Conservation District
Water: South Fork Littlejohns Creek
Tests (results): Flooded Field (.1 to .5 feet/day) and Excavated Pit (10 to 19.2 feet/day)
Findings: Significant layer of hardpan and clay contributed to poor infiltration for flooded fields; however, recharge rates exceeded 10 feet/day when this layer was excavated.
Recommendation: Full-scale, excavated recharge basin facility; opportunity to integrate wetlands and aquatic habitat.
Status: Pending additional study for water supply, site acquisition, and construction cost issues.

10 Kautz Site

Southeas Highway Tree Rd. Lodi, Ca

Parcel size: 25 acres
Zone: North San Joaquin Water Cons
Water: Mokelumne River
Tests (results): Flooded Field (.2 to 7 average)
Findings: Medium quality to high pe site; comparable performance to oth
Recommendation: Advance to Demo Testing
Status: Pending - Potentia e i

Recharge Site Profiles



t Corner of
12 and Locust

lif.

ervation District

.4 feet/day; .7 feet/day

rforming surface for this
er sites in the area.
nstration-Scale Recharge

te.

11 Mickey Grove Park and Golf Course

11793 N Micke Grove Rd.
Lodi, Calif.

Parcel size: 160 acres
Zone: North San Joaquin Water Conservation District
Water: Mokelumne River via Pixley Slough, with backup supply from Woodbridge Irrigation District and/or City of Lodi
Tests (results): In-lieu recharge through construction of a dual groundwater-surface-water system featuring a three-acre park pond.
Findings: Up to 610 acre-feet/year recharge and $23,180/year in energy savings through avoidance of groundwater pumping.
Recommendation: Construct project, including planning, facility design and implementation.
Status: Pending approval

14 SEWD Northwest Site

East Main Street, two miles east of Hwy 99,
Stockton, Calif.

Parcel size: 30 acres
Zone: Stockton East Water District
Water: Calaveras River or Stanislaus River
Tests (results): Flooded Field (.36 feet/day average); Spreading basin (.62 feet/day average)
Findings: Recharge rates for both methods are good. Flooded field the most feasible on a cost per unit basis.
Recommendation: Advance to Demonstration-Scale Recharge Testing for flooded field
Status: Construction pending. A component of an adjacent 60-acre facility named the Water/Environment Project of the Year, 2003, by the American Society of Civil Engineers, Sacramento Section.

Pipeline Expands Recharge Capabilities

Completed in 2006, the Peters Pipeline is a six-mile long, 60-inch diameter pipeline constructed as a direct and in-lieu recharge facility of the Farmington Groundwater Recharge Program.

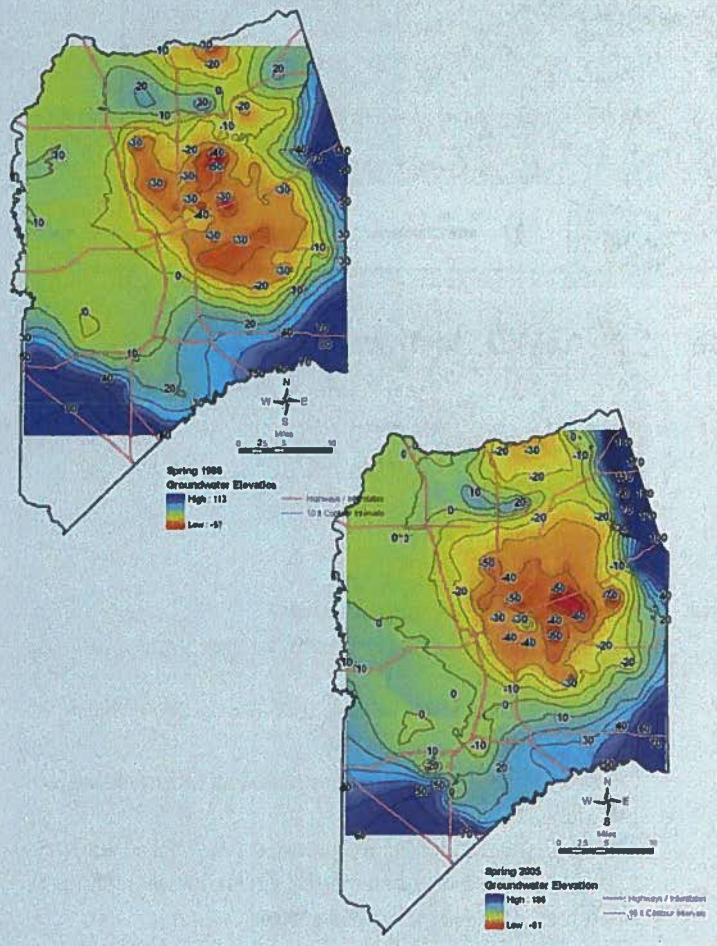
The $7.5 million pipeline was funded through a $3.7 million award from the Proposition 13 Groundwater Recharge Storage Construction Grant and bond funds shared by the City of Stockton, California Water Service Company, San Joaquin County and Stockton East Water District.

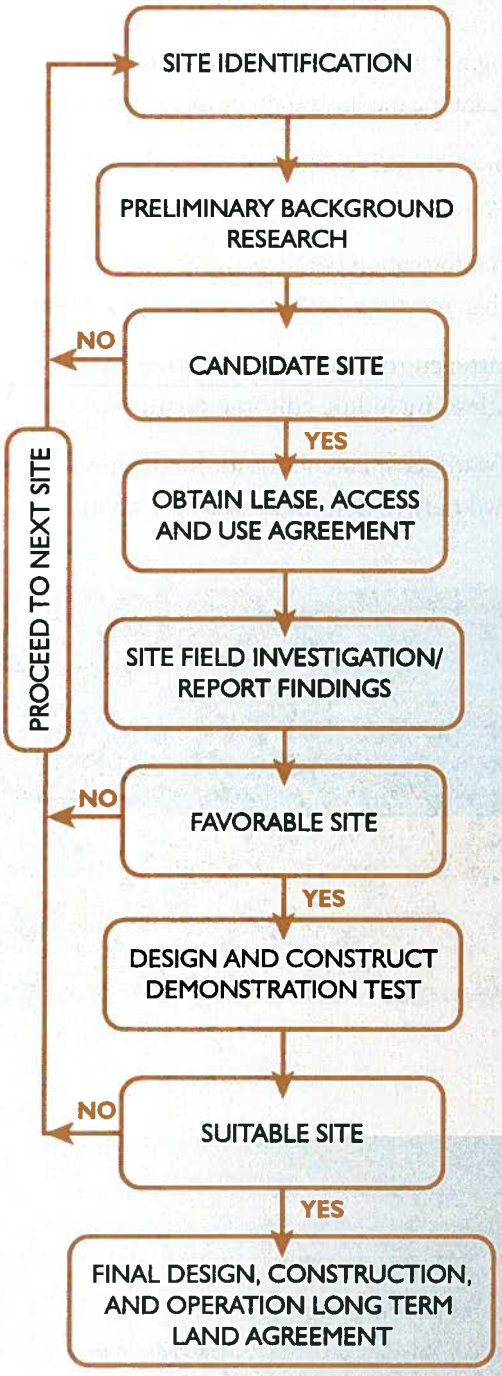
The pipeline carries water from the Stanislaus River and Calaveras River to the District's Dr. Joe Waidhofer drinking water treatment plant.

Approximately 1,500 acres of farmland receive wet year surface water supplies from the pipeline, an in-lieu recharge benefit of 4,000 acre-feet. Another 8,500 acres of farmland are eligible for this surface water supply.

The pipeline further enables a 60-acre complex of recharge ponds and fields adjacent to the District's Dr. Joe Waidhofer drinking water treatment plant to operate un-interrupted. Built via the Farmington Program, but funded with State and local money, the recharge facility returns up to 10,000 acre-feet of water annually to the groundwater tables. This stored water can be drawn and delivered to municipal and industrial customers during dry years.

The spreading basins component was awarded the American Society of Civil Engineers Water/ Environmental Project of the Year in 2003, Sacramento Chapter, and the San Joaquin Council of Government Regional Excellence award in 2004.





STAGE 1:
SITE SCREENING

- Is location appropriate for program objectives?
- Are soils appropriate for recharge?
- Are land uses compatible?
- Are water supplies available?
- Is property available?
- Are environmental impact mitigable?

STAGE 2:
FIELD INVESTIGATION

- Geology and soils data collection
- Land use/water conveyance - field confirmation
- Habitat issues - field inspection
- Aerial photo interpretation
- Groundwater conditions
- Confirm site history
- Confirm site suitability for recharge

STAGE 3:
SITE TESTING

- Monitoring well drilling and construction
- Baseline soil and water quality testing
- Site preparation
- Groundwater level monitoring
- Groundwater quality monitoring
- Conveyance water quality monitoring

STAGE 4:
LONG-TERM OPERATION & MAINTENANCE

- Continued management of recharge basins to maximize percolation

Stakeholder Outreach: Tapping Into Established Awareness

For many rural and family farmers in Eastern San Joaquin County, a reminder that groundwater levels continue to inch lower and lower arrives from PG&E.

Contained within the monthly electric bill, customers can track a well's energy consumption. If groundwater pumping hasn't changed, but the bill went up, then the water level must have dropped.

Tapping into this pocket-book reality has been a component of a proactive stakeholder outreach and involvement program conducted by the Program partners.

The main focus of outreach is to support communication among landowners to the issue of overdraft and rising pumping costs, and offer the Program as a viable solution. A particular focus has been to involve respected landowners in outreach activities.

Elements supporting this grassroots-oriented effort include:

- A comprehensive Program website (www.farmingtonprogram.org), including current and historical information, testimonials, and news articles.
- Informational materials distributed by mail, on-line and public counters.
- Program information kit tailored to participants, legislators, media and other interested parties.
- Comprehensive database of lands 20 acres and larger.
- An information booth at the Stockton Ag Expo, public meetings, and an active speakers bureau.
- Outreach to consumer and trade media outlets, including editorial board briefings.
- A water cost calculator for landowners (www.sewd.net) to determine the cost savings

November 2003 ribbon cutting ceremony for SEWD Recharge Basins

Farmington
Groundwater Recharge Program

A Program of

United States Army Core of Engineers

Stockton East Water District

Program Supporters

California Water Service Company
Central and South Delta Water Agencies
Central San Joaquin Water Conservation District
City of Lodi
City of Stockton
Ducks Unlimited
Natural Heritage Institute
North San Joaquin Water Conservation District
San Joaquin County
San Joaquin County Flood Control and Water Conservation District
San Joaquin Farm Bureau Federation
Woodbridge Irrigation District