

**Firebaugh Canal Water District
Water Management Plan
2011 Criteria**

**Date of first draft: November 2012
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Section I: Description of the District

District Name: Firebaugh Canal Water District (FCWD)
 Contact Name: Jeff Bryant
 Title: General Manager
 Telephone: 559-655-4761
 E-mail: bryant_jeff@sbcglobal.net
 Web Address N/A

A. History

1. Date district formed: 1912 Date of first Reclamation contract: September 14, 1939
 Original size (acres): 22,600 Current year (last complete calendar year): 2011

2. Current size, population, and irrigated acres.

	2011
Size (acres)	21,761
Population served (urban connections)	N/A
Irrigated acres	21,761

3. Water supplies received in current year.

Water Source	AF
Federal urban water (Tbl 1)	0
Federal agricultural water (Tbl 1)	85,232
State water (Tbl 1)	0
Other Wholesaler (define) (Tbl 1)	0
Local surface water (Tbl 1)	0
Upslope drain water (Tbl 1)	0
District groundwater (Tbl 2)	0
Banked water (Tbl 1)	0
Transferred water (Tbl 1)	0
Recycled water (Tbl 3)	0
Other (define) (Tbl 1) Re-used tailwater	3,088
Total	88,320

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

	AF	Source	Contract #	Availability period(s)
Reclamation Urban AF/Y	N/A			
Reclamation Agriculture AF/Y	85,000	USBR	Exchange Contract - I1r-1144	January – December (12 Months)
Other AF/Y	12,000	Farm units*	N/A	Unreliable source

*On-farm wells – pumping groundwater for credit.

5. Anticipated land-use changes. For Ag contractors, also include changes in irrigated acres.

None anticipated or planned by the FCWD.

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 (1993)		Previous Plan (2003)		Current Plan	
Crop Name	Acres	Crop Name	Acres	Crop Name	Acres
Unavailable		Cotton	10,835	Cotton	7,895
		Alfalfa	1,335	Alfalfa	4,376
		Tomato	1,830	Tomato	3,035
		Sugar Beets	1,405	Trees	2,155
				Melons	895
Other (<5%)		Other (<5%)		Other (<5%)	3,405
Total		Total	15,405	Total	21,761

(See Planner, Chapter 3, Addendum D for list of crop names)

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

Original Plan (1993)		Previous Plan (2003)		Current Plan	
Irrigation Method	Acres	Irrigation Method	Acres	Irrigation Method	Acres
Level Basin		Level Basin		Level Basin	
Furrow/Flood	Unk	Furrow/Flood	10,910	Furrow/Flood	1,835
Sprinkler	Unk	Sprinkler	5,600	Sprinkler	300
Low-volume	Unk	Low-volume-drip	1,650	Low-volume-drip	15,250
Multiple	Unk	Multiple-flood	3,600	Multiple-flood	4,375
Other		Other		Other	
Total		Total	21,760	Total	21,760

B. Location and Facilities

See Attachment A for maps containing the following: incoming flow locations, turnouts (internal flow), and outflow (spill) points, conveyance system, storage facilities, operational loss recovery system, district wells and lift pumps, water quality monitoring locations, and groundwater facilities.

1. Incoming flow locations and measurement methods

<i>Location Name</i>	<i>Physical Location</i>	<i>Type of Measurement Device</i>	<i>Accuracy</i>
DMC107 DMC 109	DMC at Mile Posts: 107.86 & 109.45	Propeller Meter	+/- 2%

2. Current year Agricultural Conveyance System

<i>Miles Unlined - Canal</i>	<i>Miles Lined - Canal</i>	<i>Miles Piped</i>	<i>Miles - Other</i>
21.5	19.5	7.5	0

3. Current year Urban Distribution System N/A

<i>Miles AC Pipe</i>	<i>Miles Steel Pipe</i>	<i>Miles Cast Iron Pipe</i>	<i>Miles - Other</i>

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

FCWD'S system has no surface storage facilities at this time.

<i>Name</i>	<i>Type</i>	<i>Capacity (AF)</i>	<i>Distribution or Spill</i>
N/A			

5. Description of the agricultural spill recovery system and outflow points.

FCWD has several collection points for tailwater and subsurface waters. These waters are recycled back into delivery system through re-lift facilities. Recent modernization allows FCWD to monitor the canal elevations and flow rate using SCADA technology.

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

<i>Scheduled</i>	<i>Rotation</i>	<i>Other (describe)</i>
X		

7. Restrictions on water source(s).

<i>Source</i>	<i>Restriction</i>	<i>Cause of Restriction</i>	<i>Effect on Operations</i>
Surface Water	Summer month flow maximums	Exchange Contract	Water not available at optimum times

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

FCWD will continue to implement source control measures such as lining earth conveyance channels throughout the service area.

C. Topography and Soils

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

Generally flat, alluvial fans. There is some subsidence in the north end of the area. Contours run northwest to southeast and have approximately a 2' drop across the District.

2. *District soil association map (Agricultural only).*

See FCWD's Soils Classification map - Attachment B. Most soils have slow percolation, saline, and high in sodium.

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

<i>Soil Problem</i>	<i>Estimated Acres</i>	<i>Effect on Water Operations and Management</i>
Heavy Clay	15,000	Slow percolation
Sodic soils	8,000	Poor infiltration

D. Climate

1. *General climate of the district service area.*

FCWD has hot summers, mild fall, and foggy, cool, winters. Light winds from the northwest. Rainfall is moderate, averaging 5-10 inches per year.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Avg. Precip. (1)	1.70	1.50	1.60	0.95	0.44	0.08	0.01	0.01	0.21	0.57	0.93	1.40	9.40
Avg. Temp. (2)	45	50	54	60	67	75	81	79	72	62	52	45	62
Max Temp. (2)	73	84	87	101	110	112	115	113	111	100	86	76	97
Min. Temp. (2)	17	24	28	34	38	42	50	51	42	36	27	23	34

(1) Teles CIMIS Weather Station (Station #7) Firebaugh, January 1971 - December 2001.

(2) The Weather channel
(<http://www.weather.com/weather/wxclimatology/monthly/93640>).

(3) CIMIS Climatic Zone #15.

Predominant wind direction: Northwest @ 4 mph
Average annual frost-free days: 290

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

Microclimatic zones that could significantly affect cropping or water management in FCWD are not present.

E. Natural and Cultural Resources

1. *Natural resource areas within the service area.*

<i>Name</i>	<i>Estimated Acres</i>	<i>Description</i>
None		

2. *Description of district management of these resources in the past or present.* N/A

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

<i>Name</i>	<i>Estimated Acres</i>	<i>Description</i>
None		

F. Operating Rules and Regulations

1. *Operating rules and regulations.*

See Attachment C, FCWD Rules and Regulations, Governing Operations of District, Facilities and Sale of Water

2. *Water allocation policy (Agricultural only).*

See Attachment C, Rule 4: Distribution of Water.

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

Water orders are required to be made 24 hours in advance, both for on request and also for off request.

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

See Attachment C, Rule 8, Drain Water. FCWD also participates in the Grassland Bypass Drainage project. Project outline and report is attached.

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

See Attachment D, Firebaugh Canal Water District Water Transfer Policy.

G. Water Measurement, Pricing, and Billing

1. Agricultural Customers

Refer to BMP A.1. Information on water measurement for agricultural contractors is completed under BMP A.1 on page 4-20. Documentation verifying the accuracy of measurement devices is included in Attachment G.

2. Urban Customers: N/A

- a. Total number of connections _____
- b. Total number of metered connections _____
- c. Total number of connections not billed by quantity _____
- d. Percentage of water that was measured at delivery point _____
- e. Percentage of delivered water that was billed by quantity _____
- f. 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 1/2"					
2"					
3"					
4"					
6"					
8"					
10"					
Compound					
Turbo					
Other (define)					
Total					

3. Agricultural and Urban Rates

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

\$18.00 – 0-1 acft/acre

\$20.00 – 1-2/acft/acre

\$25.00 – 2-3 acft/acre

\$30.00 – 3 or more acft/acre

b. Annual charges collected from agricultural customers.

<i>Fixed Charges</i>			
<i>Charges (\$ unit)</i>	<i>Charge units \$/acre, etc.</i>	<i>Units billed during year acres, etc.</i>	<i>\$ collected (\$ times units)</i>
None	\$/acre		

<i>Volumetric charges</i>			
<i>Charges (\$ unit)</i>	<i>Charge units \$/AF, etc.</i>	<i>Units billed during year AF, etc.</i>	<i>\$ collected (\$ times units)</i>
Acre Feet	\$18, \$20, \$25, \$30 – Tiered	Monthly	

Annual charges collected from urban customers

<i>Fixed Charges</i>			
<i>Charges (\$ unit)</i>	<i>Charge units (\$/meter size) etc.</i>	<i>Units billed during year (by meter size) etc.</i>	<i>\$ collected (\$ times units)</i>
N/A			

<i>Volumetric charges</i>			
<i>Charges (\$ unit)</i>	<i>Charge units (\$/HCF), etc.</i>	<i>Units billed during year HCF, Kgal, etc.</i>	<i>\$ collected (\$ times units)</i>
N/A			

c. Describe the contractor's record management system.

FCWD uses the H2o Pro water accounting program. Records are maintained at the FCWD office and are available for water user review at any time.

H. Water Shortage Allocation Policies

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

See Attachment C, Rule 10: Shortage of Water

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

See Attachment C, Rule 9: Waste of Water

I. Evaluate Policies of Regulatory Agencies Affecting the Contractor and Identify Policies that Inhibit Good Water Management.

The District has an efficient water delivery system and continues to improve their facilities to conserve irrigation water. There are not any regulatory agency policies that currently affect Firebaugh’s water management.

Section II: Inventory of Water Resources

A. Surface Water Supply

- 1. *Surface water supplies in acre feet, imported and originating within the service area, by month (Table 1).*

(Enter in Table 1)

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

(Enter in Table 8)

B. Groundwater Supply

- 1. *Groundwater extracted by the district and delivered, by month (Table 2).*

(Enter in Table 2)

- 2. *Groundwater basin(s) that underlies the service area.*

<i>Name</i>	<i>Size (Square Miles)</i>	<i>Usable Capacity (AF)</i>	<i>Safe Yield (AF/Y)</i>
No useable groundwater exists			
Under FCWD’s lands			

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

Saline sink area – no recharge in district.

- 4. *Description of conjunctive use of surface and groundwater.*

No conjunctive use of surface and groundwater.

- 5. *Groundwater Management Plan. N/A*

- 6. *Groundwater Banking Plan. N/A*

C. Other Water Supplies

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

FCWD re-circulates co-mingled, surface and subsurface drain water back into the delivery system. This "other" water amounts to approximately 3,088 acre feet per year.

D. Source Water Quality Monitoring Practices

1. Potable Water Quality (Urban only.) N/A

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

FCWD is subject to water quality standards as set forth in the Exchange Contract. If those standards are met by delivered water to the FCWD, no problems exist. During periods of allowed groundwater pump-in by others, water quality can become a concern if standards are allowed to be exceeded.

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

The District participates through the Exchange Contractors' Watermaster in measuring water quality (EC and Boron) on all in-flows monthly to confirm compliance of the Exchange Contract water delivery standards. In addition, the District annually measures Ag suitability constituents for all deep wells that pump into the system. The District utilizes an in-house laboratory to test EC and Boron in key locations within the conveyance system on a weekly basis.

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

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>
Total Dissolved Solids**	Hourly	0-800 TDS	350 TDS

**Continuous TDS recorders have been installed at the delivery source for FCWD contract water. These recorders operate 24 hours/day during the irrigation season.

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

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>
Ag Suitability	Annually	300 – 1,400 TDS	500 TDS

E. Water Uses within the District

1. Agricultural

See Section V, Water Inventory Tables, Table 5 - Crop Water Needs

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

<i>Crop name</i>	<i>Total Acres</i>	<i>Level Basin - acres</i>	<i>Furrow - acres</i>	<i>Sprinkler - acres</i>	<i>Low Volume - acres</i>	<i>Multiple methods - acres</i>
Cotton	7,895		1,835		6,060	
Alfalfa	4,375					4,375
Tomatoes	3,035				3,035	
Trees	2,155				2,155	
Melons	895				895	
Other	3,405			300	3,105	
TOTAL	21,760		1,835	300	15,250	4,375

3. Urban use by customer type in current year. N/A

<i>Customer Type</i>	<i>Number of Connections</i>	<i>AF</i>
<i>Single-family</i>		
<i>Multi-family</i>		
<i>Commercial</i>		
<i>Industrial</i>		
<i>Institutional</i>		
<i>Landscape irrigation</i>		
<i>Wholesale</i>		
<i>Recycled</i>		
<i>Other (specify)</i>		
<i>Other (specify)</i>		
<i>Other (specify)</i>		
<i>Unaccounted for</i>		
Total		

4. Urban Wastewater Collection/Treatment Systems serving the service area. N/A

<i>Treatment Plant</i>	<i>Treatment Level (1, 2, 3)</i>	<i>AF</i>	<i>Disposal to / uses</i>
	Total		
Total discharged to ocean and/or saline sink			

5. Groundwater recharge in current year). NONE

Recharge Area	Method of Recharge	AF	Method of Retrieval
	Total		

6a. Transfers and exchanges **into** the service area in current year – (Table 1).

From Whom	To Whom	AF	Use
NONE			
	Total		

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

From Whom	To Whom	AF	Use
FCWD	USBR	6,198	Wildlife Refuge
FCWD	Ag Districts*	4,564	Irrigation
	Total	10,762	

*Westlands Water District, San Luis Water District, Panoche Water District

7. Wheeling, or other transactions in and out of the district boundaries – (Table 6).

From Whom	To Whom	AF	Use
None			
	Total		

8. Other uses of water.

Other Uses	AF
None	

F. Outflow from the District (Agricultural only)

1. Surface and subsurface drain/outflow:

Outflow point	Location description	AF	Type of measurement	Accuracy (%)	% of total outflow	Acres drained
	Various throughout FCWD (See map) Tab 4	2400	Propeller Meters	+/- 2%	100	6000

<i>Outflow point</i>	<i>Where the outflow goes (drain, river or other location)</i>	<i>Type Reuse (if known)</i>
	San Joaquin River	Irrigation

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

FCWD samples subsurface and surface waters as they co-mingle on a quarterly basis during the irrigation season.

3. *Outflow (surface drainage & spill) Quality Testing Program.*

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>	<i>Reuse limitation?</i>
EC, B, Se	As Needed	0-1000		

- Outflow (subsurface drainage) Quality Testing Program.*

<i>Analyses Performed</i>	<i>Frequency</i>	<i>Concentration Range</i>	<i>Average</i>	<i>Reuse limitation?</i>
EC, B, Se	Annual			

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. **The District is a member of the Grassland Basin Drainers which has a Waste Discharge Permit.***

Districts included in the drainage problem area, as identified in "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990)," should also complete Water Inventory Table 7 and Addendum C (include in plan as Attachment J)

G. Water Accounting (Inventory)

Tables 1 through 8 are included in Section V.

Section III: 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%*

Propeller meters are used within FCWD. All locations should be converted to propeller meters within 10 years. Measured (meter) gates (submerged orifices) are also used within the District. These require two measuring wells for an upstream head and a downstream head measurement. (See attached description sheet.) Upstream Pool levels are maintained by installation of SCADA systems at the control structures. FCWD has been converting open, dirt lined canals with concrete-lined canals within the past five years and will continue to line canals as funds become available. AS a reach of canal system is lined, SCADA controls are installed as a method of control and assurance that delivery readings remain accurate. FCWD expects the delivery system will be lined and SCADA installed at all headwords within 10 years. District will apply to Cal Poly for a rapid appraisal which will assist in documenting the measurement system currently in place.

a. <i>Number of delivery points (turnouts and connections)</i>	<u>188</u>
b. <i>Number of delivery points serving more than one farm</i>	<u>26*</u>

**FCWD has installed staff gauges at each multi-delivery site on each of its community laterals. These gauges insure that when more than one delivery is being made on a turnout, the grower will continue to receive his original water delivery volume. No more than two deliveries will be made simultaneously from any single lateral delivery measurement point – unless any additional deliveries have their own individual flow meters. For example, down a ditch, one farmer may have a flow meter on a drip system. Two other deliveries could therefore be made simultaneously from the same ditch.*

FCWD will establish a written protocol regarding complaints from individual farmers regarding billing. This protocol must include:

- i. Documentation of all such complaints.
- ii. Documentation of what was done to resolve each complaint.

In the case of a dispute with the volume of water charged, the water conservation specialist measures the flow rate using the conventional USGS mid-section current-meter method. A current meter Model 2000 is used to determine the point velocity measurements across sections of the farm ditches downstream of the delivery meter gate at both farmers' delivery points.

At the delivery points serving more than one farm, the ditchtender verifies who is taking water at any given time. The ditchtender verifies with the two farmers taking water how much water each one is delivering to their respective farms. From the total flow measured at the meter gate, the ditchtender determines and verifies with the two irrigators on how much water each is diverting. The irrigators usually use siphon pipe counts to check their deliveries against the ditchtender's charges.

- c. Number of measured delivery points (meters and measurement devices) 188
- d. Percentage of delivered water that was measured at a delivery point 100%
- e. Total number of delivery points not billed by quantity 0
- f. Delivery point measurement device table

Measurement Type	Number	Accuracy* (+/- %)	Reading Frequency (Days)	Calibration Frequency (Months)	Maintenance Frequency (Months)
Orifices					
Propeller meter	96	+/- 2%	Daily – in Season*	Annual	Annual
Weirs					
Flumes					
Venturi					
Metered gates	92	+/- 6%	Daily – in Season*	Annual	Annual
Acoustic doppler					
Other (Headgates)					
Total	188				

*Water season – February thru October

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

Name: Jeff Bryant Title: General Manager

Address: P.O. Box 97, Mendota, CA 93640

Telephone: 559-655-4761 E-mail: bryant_jeff@sbcglobal.net

FCWD does not have a job description for this position and water conservation activities are managed by FCWD's General Manager.

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

FCWD supports the use of outside water management services by its water users. Those services are readily available to FCWD farms by contact from private firms. FCWD supports those services and encourages its water users to use them whenever possible. FCWD bulletins and billing attachments notify growers of available services. Quarterly Newsletters also have articles on water management.

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 2 nd yr in future
Irrigated acres	21,760	500	300	1,000	1,000
Number of farms	97	3	2	5	5

*Prepared by Cal Poly ITRC

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

FCWD provides this information to each water user on its monthly water bill. Year-end summaries are also produced for each turnout.

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

The district provides weather station data and promotes the use of CIMIS data. Firebaugh informs the growers about the availability of the data at the District’s office.

The district also promotes the use and assists the interested growers by walking them through irrigation scheduling techniques with the ITRC California Crop and soil Evapotranspiration website at www.itrc.org/reports/californiacrop.htm and CIT’s Waterright web site at www.waterright.org.

Firebaugh provides technical assistance to all the farmers on accessing and using the evapotranspiration information from the CIMIS website www.cimis.water.ca.gov/cimis.

Information is also included on the San Joaquin River Exchange Contractors’ website at www.sjrecwa.net. In addition to this practice, some growers subscribe to professional irrigation scheduling services.

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

FCWD makes available water quality and quantity data to its water users at the District office. Quantity is reported on monthly bills and may be reviewed with FCWD’s staff, quality reports from local labs are also available as results are returned to FCWD.

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

<i>Program</i>	<i>Co-Funders (If Any)</i>	<i>Yearly Targets</i>
Newsletter	Exchange Contractors	All Water Users
District Newsletters		All Water Users
Center for Irrigation Technology	Fresno State	All Water Users

See Attachment H for samples of provided materials and notices

e. Other None

***4. Pricing structure - based at least in part on quantity delivered.
Adopt a water pricing structure based on the measured quantity delivered.***

All water is charged by amounts delivered at the turnout. Tiered prices in affect.

5. Evaluate and improve efficiencies of district pumps.

Describe the program to evaluate and improve the efficiencies of the contractor's pumps.

District's low-lift pumps are maintained on an annual basis by district maintenance personnel.

	Total in district	# surveyed last year	# surveyed in current year	# projected for next year
Wells	0	0	0	0
Lift pumps	40	0	0	10

B. Exemptible BMPs for Agricultural Contractors

(See Planner, Chapter 2, Addendum B for examples of exemptible conditions)

1. Facilitate alternative land use

Drainage Characteristic	Acreage	Potential Alternate Uses
High water table (<5 feet)	N/A	
Poor drainage	N/A	
Groundwater Selenium concentration > 50 ppb	N/A	
Poor productivity	N/A	

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

2. Facilitate use of available recycled urban wastewater.

Sources of Recycled Urban Waste Water	AF/Y Available	AF/Y Currently Used in District
N/A		

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

Program	Description
Water Conservation Loan Program	See Attachment "Guidelines for Conservation Loan Program"

4. Incentive pricing.

Describe incentive rate structure and purpose.

See FCWD's water rate schedule on page 4-8.

5. a) *Line or pipe ditches and canals Update for past five years – 2005 – 2011*

<i>Canal/Lateral (Reach)</i>	<i>Type of Improvement</i>	<i>Number of Miles in Reach</i>	<i>Estimated Seepage (AF/Y)</i>	<i>Accomplished/Planned Date</i>
1 st Lift Canal	Concrete Line	2.6	360	1/31/12
2 nd Lift Canal	Concrete Line	4.8	345	1/31/11
3 rd Lift Canal	Concrete Line	3.3	390	1/31/07
Misc. Pipelines	Pipeline	1.5	120	1/31/12
Future Canal Lining*	Concrete	10-30	Unknown	2014 thru 2024

*FCWD has no formal plan for continued lining of its canals. If the District has acquired grant funding and/or has funds available for these projects, lining of District canals will continue. In reference to the benefit to the District for canal lining, since the entire District is in a saline sink, all water conserved is a benefit to the perched groundwater and regulatory issues associated with the discharge of such water.

b) *Construct/line regulatory reservoirs.*

<i>Reservoir Name</i>	<i>Location</i>	<i>Describe improved operational flexibility and AF savings</i>
None anticipated		

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

FCWD will allow for early water order shut-off if the system operator can work it into the schedule and not affect other delivery operations that are on-going. A copy of a sample bill and water order is attached as Attachment F.

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

FCWD has managed spill from the lands within the District. Subsurface and surface waters are also co-mingled within surface canal systems and reused within FCWD. Flows that are allowed to leave the District are managed under the Grasslands Basin Drainers agreement, in place with area water users. See Section 7 for Drainage Area Plan.

<i>Distribution System Lateral</i>	<i>Annual Spill (AF/Y)</i>	<i>Quantity Recovered and reused (AF/Y)</i>
Total		

<i>Drainage System Lateral</i>	<i>Annual Drainage Outflow (AF/Y)</i>	<i>Quantity Recovered and reused (AF/Y)</i>
Various Surface Drains	2,400	
Total	2,400	1,800

Describe facilities that resulted in reduced spill and tailwater. Tile sump meters, all metered; read bi-monthly.

8. *Plan to measure outflow.*

Total # of outflow (surface) locations/points 34

Total # of outflow (subsurface) locations/points _____

Total # of measured outflow points _____

Percentage of total outflow (volume) measured during report year 100%

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

Location & Priority	Estimated cost (in \$1,000s)				
	Year 1	Year 2	Year 3	Year 4	Year 5

9. *Optimize conjunctive use of surface and groundwater. N/A*

10. *Automate distribution and/or drainage system structures.*

Identify locations where automation would increase delivery flexibility and reduce spill and losses.

Describe program to achieve these benefits and estimate the annual water savings.

FCWD has added a SCADA system, pump recapture #3/2: MP 107, on the Delta Mendota Canal during 2011. This was installed to recapture drain waters and reduce operational spills. Drain water discharge was reduced by installing this system and using the water inside the distribution system. System delivery flexibility and water amounts were increased by this installation.

11. *Facilitate or promote water customer pump testing and evaluation.*

FCWD has joined the San Luis & Delta-Mendota Water Authority’s Pump testing program. This membership allows district water users to have pumps tested by a local pump testing company, retained by the Authority to provide the service to all member Districts. The Authority publishes a monthly newsletter, sent to each member, and updates pump testing opportunities as often as possible.

12. *Mapping*

GIS maps	Estimated cost (in \$1,000s)				
	Year 1	Year 2	Year 3	Year 5	Year 6
<i>Layer 1 – Distribution system</i>	X	Completed - \$15,000			
<i>Layer 2 – Drainage system</i>	X	Completed			
<i>Suggested layers:</i>					
<i>Layer 3 – Groundwater information</i>	X	Completed			
<i>Layer 4 – Soils map</i>	X	Completed			
<i>Layer 5 – Natural & cultural resources</i>	X	Completed			
<i>Layer 6 – Problem areas</i>					

C. Provide a 3-Year Budget for Implementing BMPs

1. Amount actually spent during current year.

Year <u>2012</u> or <u>Year 1</u>		Actual Expenditure	Staff Hours
BMP #	BMP Name	(not including staff time)	
A 1	Measurement (Ditch tenders)	\$25000	400
2	Conservation staff (Manager time)	\$5000	500
3	On-farm evaluation /water delivery info	\$500	0
	Irrigation Scheduling	\$0	0
	Water quality (Lab analysis)	\$7500	200
	Agricultural Education Program	\$0	0
4	Quantity pricing	\$5000	0
5	Contractor's pumps (Annual maintenance)	\$10000	250
B 1	Alternative land use	\$0	0
2	Urban recycled water use	\$0	0
3	Financing of on-farm improvements	\$175000	200
4	Incentive pricing	\$500	25
5	Line or pipe canals/install reservoirs	\$25000	0
6	Increase delivery flexibility	\$7500	0
7	District spill/tailwater recovery systems	\$50000	300
8	Measure outflow	\$2500	0
9	Optimize conjunctive use	\$2500	0
10	Automate canal structures	\$200000	0
11	Customer pump testing	\$0	0
12	Mapping (GIS)	\$3000	200
<i>Total</i>		\$519,000	2075

2. Projected budget summary for the next year.

Year <u>2013</u> or <u>Year 2</u>		Budgeted Expenditure	Staff Hours
BMP #	BMP Name	(not including staff time)	
A 1	Measurement (Ditch tenders)	\$25000	400
2	Conservation staff (Manager time)	\$5000	500
3	On-farm evaluations/water delivery info	\$500	0
	Irrigation Scheduling	\$0	0
	Water quality (Lab analysis)	\$7500	200
	Agricultural Education Program	\$0	0
4	Quantity pricing	\$5000	0
5	Contractor's pumps (Annual maintenance)	\$25000	250
B 1	Alternative land use	\$0	0
2	Urban recycled water use	\$0	0
3	Financing of on-farm improvements	\$375000	200
4	Incentive pricing	\$500	25
5	Line or pipe canals/install reservoirs	\$350000	0

6	<i>Increase delivery flexibility</i>	\$7500	0
7	<i>District spill/tailwater recovery systems</i>	\$425000	300
8	<i>Measure outflow</i>	\$5000	0
9	<i>Optimize conjunctive use</i>	\$2500	0
10	<i>Automate canal structures</i>	\$100000	0
11	<i>Customer pump testing</i>	\$0	0
12	<i>Mapping</i>	\$3000	200
	<i>Total</i>	<i>\$1,336,500</i>	<i>2075</i>

3. *Projected budget summary for 3rd year.*

<i>Year 2014 or Year 3</i>		<i>Budgeted Expenditure</i>	
<i>BMP #</i>	<i>BMP Name</i>	<i>(not including staff time)</i>	<i>Staff Hours</i>
A 1	<i>Measurement (Ditch tenders)</i>	\$25000	400
2	<i>Conservation staff (Manager time)</i>	\$5000	500
3	<i>On-farm evaluations/water delivery info</i>	\$500	0
	<i>Irrigation Scheduling</i>	\$0	0
	<i>Water quality(Lab analysis)</i>	\$7500	200
	<i>Agricultural Education Program</i>	\$0	0
4	<i>Quantity pricing</i>	\$5000	0
5	<i>Contractor's pumps (Annual maintenance)</i>	\$25000	250
B 1	<i>Alternative land use</i>	\$0	0
2	<i>Urban recycled water use</i>	\$0	0
3	<i>Financing of on-farm improvements</i>	\$375000	200
4	<i>Incentive pricing</i>	\$500	25
5	<i>Line or pipe canals/install reservoirs</i>	\$500000	0
6	<i>Increase delivery flexibility</i>	\$7500	0
7	<i>District spill/tailwater recovery systems</i>	\$50000	300
8	<i>Measure outflow</i>	\$5000	0
9	<i>Optimize conjunctive use</i>	\$2500	0
10	<i>Automate canal structures</i>	\$100000	0
11	<i>Customer pump testing</i>	\$0	0
12	<i>Mapping</i>	\$3000	200
	<i>Total</i>	<i>\$1,111,500</i>	<i>2075</i>

Section IV: Best Management Practices for Urban Contractors

A. Urban BMPs: N/A

Section V: District Water Inventory Tables

This Section includes the 2011 water inventory tables for FCWD as follows:

- Table 1 Surface Water Supply
- Table 2 Groundwater Pumping
- Table 3 Total Water Supply
- Table 4 Agricultural Distribution System
- Table 5 Crop Water Needs
- Table 6 2011 District Water Inventory
- Table 7 Influence on Groundwater and Saline Sink
- Table 8 Annual Water Quantities Delivered Under Each Right or Contract

Year of Data Enter data year here

Table 1

Surface Water Supply

2011 Month	Federal Ag Water (acre-feet)	Federal non- Ag Water. (acre-feet)	State Water (acre-feet)	Local Water (Tailwater) (acre-feet)	Other Water (acre-feet)	Transfers into District (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
Method								
January	63	0	0	109	0	0	0	172
February	4146	0	0	75	0	0	0	4,221
March	789	0	0	260	0	0	0	1,049
April	7519	0	0	190	0	0	0	7,709
May	8034	0	0	210	0	0	0	8,244
June	22347	0	0	540	0	0	0	22,887
July	15223	0	0	820	0	0	0	16,043
August	13696	0	0	740	0	0	0	14,436
September	4360	0	0	105	0	0	0	4,465
October	6823	0	0	20	0	0	0	6,843
November	1000	0	0	12	0	0	0	1,012
December	1232	0	0	7	0	0	0	1,239
TOTAL	85232	0	0	3088	0	0	0	88,320

Table 2

Groundwater Pumping

2011 Month	District	
	Groundwater (acre-feet)	Private Agric *(acre-feet)
Method		
January	0	0
February	0	0
March	0	0
April	239	115
May	1059	139
June	1100	224
July	607	285
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0
TOTAL	3005	763

*normally estimated

Table 3

Total Water Supply

2011 Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Recycled M&I (acre-feet)	Total District (acre-feet)
Method				
January	172	0	0	172
February	4,221	0	0	4,221
March	1,049	0	0	1,049
April	7,709	239	0	7,948
May	8,244	1,059	0	9,303
June	22,887	1,100	0	23,987
July	16,043	607	0	16,650
August	14,436	0	0	14,436
September	4,465	0	0	4,465
October	6,843	0	0	6,843
November	0	0	0	0
December	1,239	0	0	1,239
TOTAL	87,308	3,005	0	90,313

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

2011 Precipitation Worksheet					2011 Evaporation Worksheet				
	inches precip	ft precip	acres	AF/Year	inches evap	ft evap	acres		
Jan	0.85	0.07	0.00	0.00	0.85	0.07	0.00		
Feb	1.43	0.12	0.00	0.00	2.30	0.19	0.00		
Mar	2.04	0.17	0.00	0.00	4.20	0.35	0.00		
Apr	0.27	0.02	0.00	0.00	5.90	0.49	0.00		
May	0.01	0.00	0.00	0.00	8.30	0.69	0.00		
Jun	0.80	0.07	0.00	0.00	9.60	0.80	0.00		
Jul	0.00	0.00	0.00	0.00	10.00	0.83	0.00		
Aug	0.00	0.00	0.00	0.00	8.50	0.71	0.00		
Sept	0.00	0.00	0.00	0.00	6.30	0.53	0.00		
Oct	0.44	0.04	0.00	0.00	4.40	0.37	0.00		
Nov	0.74	0.06	0.00	0.00	0.74	0.06	0.00		
Dec	0.07	0.01	0.00	0.00	0.07	0.01	0.00		
TOTAL	6.65	0.55		0.00	61.16	5.10			

Table 4

Agricultural Distribution System

2011										
Canal, Pipeline, Lateral, Reservoir	Length (feet)	Width (feet)	Surface Area (square feet)	Perception (acre-feet)	Evaporation (acre-feet)	Spillage (acre-feet)	Seepage (acre-feet)	Total (acre-feet)		
1-2A Ditch	16,085		112	0	2.00	0	0	0		2
Fourchy Lateral	11,616		81	0	1.80	0	0	0		2
Comfort Lateral	8,976		62	0	1.60	0	0	0		2
Lorenzetti Lateral	11,616		81	0	1.80	0	0	0		2
Main System	14.6 mi.		535	0	15	0	543	558		0
										0
										0
										0
										0
TOTAL				0	22.20	0	543	566		

Table 6

2011 District Water Inventory

Water Supply	Table 3			85,000
Riparian ET	(Distribution and Drain)	minus		0
Groundwater recharge	intentional - ponds, injection	minus		5,000
Seepage	Table 4	minus		543
Evaporation - Precipitation	Table 4	minus		22
Spillage	Table 4	minus		0
Transfers out of District		minus		10,000
Water Available for sale to customers				69,435
Actual Agricultural Water Sales	2011	From District Sales Records		62,223
Private Groundwater		Table 2	plus	763
Crop Water Needs		Table 5	minus	58,637
Drainwater outflow	(tail and tile, not recycled)		minus	0
Percolation from Agricultural Land	(calculated)			4,349
Unaccounted for Water	(calculated)			7,212

Table 7
Influence on Groundwater and Saline Sink

2011

Agric Land Deep Perc + Seepage + Recharge - Groundwater Pumping = District Influence	21,801
Estimated actual change in ground water storage, including natural recharge)	0
Irrigated Acres (from Table 5)	21,761
Irrigated acres over a perched water table	11,210
Irrigated acres draining to a saline sink	3,110
Portion of percolation from agri seeping to a perched water table	8,798
Portion of percolation from agri seeping to a saline sink	2,441
Portion of On-Farm Drain water flowing to a perched water table/saline sink	2,500
Portion of Dist. Sys. seep/leaks/spills to perched water table/saline sink	100
Total (AF) flowing to a perched water table and saline sink	13,839

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 (Tailwater) (acre-feet)	Water Tailwater (acre-feet)	Transfers into District (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
2002	68,980	0	0	0	13,800	0	0	82,780
2003	70,412	0	0	0	12,500	0	0	82,912
2004	73,269	0	0	0	10,254	0	0	83,523
2005	69,637	0	0	0	0	0	0	69,637
2006	75,000	0	0	0	0	0	0	75,000
2007	74,772	0	0	0	0	0	0	74,772
2008	70,786	0	0	0	0	0	0	70,786
2009	68,204	0	0	0	0	0	0	68,204
2010	72,141	0	0	0	0	0	0	72,141
2011	85,232	0	0	3,088	0	0	0	88,320
Total	728,433	0	0	3,088	36,554	0	0	768,075
Average	72,843	0	0	309	3,655	0	0	76,808