Westlands Water District
Water Management Plan
2017 Criteria

Prepared for:
U.S. Department of the Interior, Bureau of Reclamation
Mid-Pacific Regional Office
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Westlands Water District

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A. History

District Formation

Westlands Water District (District) was formed under California Water District Law in 1952 upon petition of landowners located within the District's proposed boundaries. Nearly all land within the current District's boundary was farmed using groundwater prior to the construction of the Central Valley Project.

Contract negotiations between the District and the United States Bureau of Reclamation (Reclamation) to provide a dependable, supplemental supply of surface water through the Reclamation's Central Valley Project (CVP) began shortly after the District's formation. At that time, the federal government was considering the development and construction of the CVP. This involved cooperation between the federal and state governments with regard to shared water storage facilities and conveyance systems.

The original District size was approximately 376,000 acres. In 1965, it merged with its western neighbor, Westplains Water Storage District, adding 210,000 acres. Additionally, lands comprising about 28,000 acres were annexed to the District after the merger in 1965 to form the current 614,000-acre District with an irrigable acreage of 568,000 acres.

1. *Date District Formed:* 1952 *Date of First Reclamation Contract*: 1963

   Original Size (acres): 376,000 *Current year (water year)*: 2016-17

2. Current size, population, and irrigated acres

	(2016)
Size (acres)	614,000
Population served (urban connections)	0
Irrigated acres	363,373

3. Water supplies delivered in 2016

Water Source	*AF*
Federal urban water (non-ag)	3,153
Federal agricultural water	11,066
State water	52,032
Other Wholesaler (define)	0
Local surface water	14,286
Upslope drain water	0
District groundwater	167,402
Banked water	0
Transferred water	164,777
Recycled water	0
Other	0
Total	412,716

4. Annual entitlement under each right and/or contract

Reclamation Agriculture	*AF/Y*	*Source*	*Contract #*	*Availability*
Westlands WD	1.15M	Central Valley Project (CVP)	14-06-200-495A-IR14	Mar. 1, 2016 - Feb. 28, 2018
Oro Loma [1]	4,600	CVP	14-06-200-7823-LTR1	Mar. 1, 2005 - Feb. 28, 2030
Broadview WD	27,000	CVP	14-06-200-8092-IR14	Mar. 1, 2016 - Feb. 28, 2018
Widren WD	2,990	CVP	14-06-200-8018-IR14-B	Mar. 1, 2016 - Feb. 28, 2018
Centinella WD	2,500	CVP	7-07-200-8018-IR14-B	Mar. 1, 2016 - Feb. 28, 2018
Mercy Springs DD1	4,695	CVP	14-06-200-3365-IR14-B	Mar. 1, 2016 - Feb. 28, 2018
Mercy Springs DD2	4,198	CVP	14-06-200-3365-IR14-C	Mar. 1, 2016 - Feb. 28, 2018

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

The current land use is primary agriculture in the District. The District does not anticipate land use changes.

6. Cropping patterns (Agricultural only)

List of current crops (crops with 5% or less of total acreage) can be combined in the 'Other' category.

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

[1] Oro Loma and United States entered into contract for a term of Twenty-five (25) years, beginning March 1, 2005 through February 28, 2030.

Original Plan (1985)		*Previous Plan (2012)*		*Current Plan (2016)*	
Crop Name	*Acres*	*Crop Name*	*Acres*	*Crop Name*	*Acres*
Alfalfa-Hay	*10,768*	Alfalfa-Hay	*6,933*	Alfalfa-Hay	*3,355*
Alfalfa-Seed	*14,486*	Alfalfa-Seed	*2,548*	Alfalfa-Seed	*1,909*
Almonds	*7,959*	Almonds	*70,805*	Almonds	*87,912*
Apples	*18*	Apples	*111*	Apples	*110*
Apricots	*122*	Apricots	*707*	Apricots	*559*
Artichokes	-	Artichokes	*5*	Artichokes	*153*
Asparagus	*352*	Asparagus	*511*	Asparagus	*761*
Barley	*24,901*	Barley	*3,858*	Barley	*1,592*
Beans-Dry	*7,545*	Beans-Dry	*2*	Beans-Dry	*1*
Beans-Garbanzo	-	Beans-Garbanzo	*4,471*	Beans-Garbanzo	*5,219*
Beans-Green	-	Beans-Green	-	Beans-Green	-
Beans-Jojoba	-	Beans-Jojoba	*11*	Beans-Jojoba	*11*
Blueberries		Blueberries	*222*	Blueberries	*80*
Broccoli	*2,308*	Broccoli	*3,117*	Broccoli	*849*
Cabbage	-	Cabbage	*101*	Cabbage	-
Cantaloupes	*20,190*	Cantaloupes	*13,864*	Cantaloupes	*13,814*
Carrots-Bulk	*1,176*	Carrots-Bulk	*378*	Carrots-Bulk	-
Carrots-Fresh	-	Carrots-Fresh	-	Carrots-Fresh	-
Cauliflower	-	Cauliflower	-	Cauliflower	-
Celery	-	Celery	-	Celery	-
Cherries	-	Cherries	*652*	Cherries	*794*
Corn-Field	*7,153*	Corn-Field	*647*	Corn-Field	*162*
Corn-Sweet	*871*	Corn-Sweet	*7,971*	Corn-Sweet	*3,387*
Corn-Nuts	-	Corn-Nuts	-	Corn-Nuts	-
Cotton-Lint-Acala	*286,169*	Cotton-Lint-Acala	*13,416*	Cotton-Lint-Acala	*1,335*
Cotton-Lint-Pima	-	Cotton-Lint-Pima	*85,097*	Cotton-Lint-Pima	*22.118*
Cucumbers	-	Cucumbers	*57*	Cucumbers	-
Flowers	-	Flowers	-	Flowers	*54*
Garlic	*8,670*	Garlic	*14,039*	Garlic	*11,426*
Grains-Hay	-	Grains-Hay	*37,424*	Grains-Hay	*16,774*
Grains-Sorghum	-	Grains-Sorghum	*405*	Grains-Sorghum	*191*
Grapefruit	-	Grapefruit	*20*	Grapefruit	*53*
Grapes-Raisin	-	Grapes-Raisin	-	Grapes-Raisin	*1,152*
Grapes-Table	-	Grapes-Table	*678*	Grapes-Table	*995*
Grapes-Wine	*6,633*	Grapes-Wine	*774*	Grapes-Wine	*14,704*
Honeydews	*225*	Honeydews	*2,440*	Honeydews	*1,874*
Honeydew (Casabas)	-	Honeydew (Casabas)	-	Honeydew (Casabas)	-
Lemons	-	Lemons	*406*	Lemons	*674*
Lettuce-Fall	*5,879*	Lettuce-Fall	*9,017*	Lettuce-Fall	*3,497*
Lettuce-Spring	*8,813*	Lettuce-Spring	*7,480*	Lettuce-Spring	*4,126*
Melons-Mixed	-	Melons-Mixed	-	Melons-Mixed	-
Mustard		Mustard	-	Mustard	-
Nectarines	*72*	Nectarines	*386*	Nectarines	*271*
Nursery	-	Nursery	-	Nursery	*322*
Oats	*255*	Oats	*1,206*	Oats	*593*

Original Plan (1985)		*Previous Plan (2012)*		*Current Plan (2016)*	
Olives	*423*	Olives	-	Olives	-
Onions-Dehy.	*9,954*	Onions-Dehy.	*7,699*	Onions-Dehy.	*4,379*
Onions-Fresh	-	Onions-Fresh	*7,189*	Onions-Fresh	*4,868*
Oranges	*163*	Oranges	*1,396*	Oranges	*1,598*
Parsley	-	Parsley	*432*	Parsley	*953*
Pasture	*261*	Pasture	*442*	Pasture	*590*
Peaches	*54*	Peaches	*1,119*	Peaches	*1,519*
Peas-Green	*231*	Peas-Green	*234*	Peas-Green	-
Pecans	-	Pecans	-	Pecans	-
Peppers-Misc.	*1,392*	Peppers-Misc.	*1,228*	Peppers-Misc.	*89*
Pistachios	*2,252*	Pistachios	*20,255*	Pistachios	*42,625*
Plouts	-	Plouts	-	Plouts	-
Plums	-	Plums	*549*	Plums	*228*
Pomegranates	*521*	Pomegranates	*3,489*	Pomegranates	*2,167*
Potatoes-Sweet	-	Potatoes-Sweet	-	Potatoes-Sweet	-
Prunes	-	Prunes	-	Prunes	*140*
Pumpkins	-	Pumpkins	*26*	Pumpkins	*10*
Radicchio	-	Radicchio		Radicchio	-
Rice	*37*	Rice	-	Rice	-
Safflower	*3,846*	Safflower	*1,981*	Safflower	*272*
Seed-Crop-Misc.	*434*	Seed-Crop-Misc.	*898*	Seed-Crop-Misc.	*828*
Seed-Crop-Vegetable	-	Seed-Crop-Vegetable	-	Seed-Crop-Vegetable	-
Sorghum (Milo)	-	Sorghum (Milo)	-	Sorghum (Milo)	-
Spinach	-	Spinach	*140*	Spinach	-
Squash	-	Squash	*64*	Squash	*16*
Stevia	-	Stevia	*56*	Stevia	-
Sudan Grass	-	Sudan Grass	-	Sudan Grass	-
Sugar Beets	*8,841*	Sugar Beets	*2*	Sugar Beets	*2*
Sunflower	-	Sunflower	-	Sunflower	-
Tangerines	-	Tangerines	*1,377*	Tangerines	*1,830*
Tomatoes-Fresh	*2,637*	Tomatoes-Fresh	*5,114*	Tomatoes-Fresh	*5,108*
Tomatoes-Proc.	*51,574*	Tomatoes-Proc.	*71,976*	Tomatoes-Proc.	*58,388*
Vegetable-misc.	-	Vegetable-misc.		Vegetable-misc.	-
Walnuts	*150*	Walnuts	*447*	Walnuts	*441*
Watermelons	*63*	Watermelons	*2,366*	Watermelons	*2,264*
Wheat	*49,989*	Wheat	*70,266*	Wheat	*32,210*
Wildlife Area	-	Wildlife Area	-	Wildlife Area	-
Miscellaneous		Miscellaneous	-	Miscellaneous	-
NB Trees & Vines	*558*	NB Trees & Vines	*17,451*	NB Trees & Vines	*26,433*
Fallowed	*30,579*	Fallowed	*53,068*	Fallowed	*175,901*
Non-Harvested	*3,245*	Non-Harvested	*6,446*	Non-Harvested	*3,883*
Other (<5%)		*Other (<5%)*		*Other (<5%)*	
Total	*551,190*	*Total*	*568,173*	*Total*	*567,569*

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

Original Plan (1985)		*Previous Plan (2012)*		*Current Plan (2016)*	
Irrigation Method	*Acres*	*Irrigation Method*	*Acres*	*Irrigation Method*	*Acres*
Level Basin (Border Strip)	*16,139*	*Level Basin (Border Strip)*	*8,574*	*Level Basin (Border Strip)*	*7,119*
Furrow	*322,785*	*Furrow*	*30,956*	*Furrow*	*6,885*
Sprinkler	*112,975*	*Sprinkler*	*44,979*	*Sprinkler*	*18,702*
Low-Volume	*5,380*	*Low-Volume*	*321,183*	*Low-Volume (Drip)*	*326,954*
Multiple	*80,696*	*Multiple*	*21,237*	*Multiple*	*3,713*
Other	*0*	*Other*	*0*	*Other*	*0*
Total	*537,975*	*Total*	*426,929*	*Total**	*363,373*

**Acreage estimated from on-farm irrigation system percentages. Fallowed land and approximately 28,295 acres of crops in Westlands (mostly wheat) are dry farmed, not irrigated.*

B. Location and Facilities

See Attachment A for maps containing the following: headworks turnouts (internal flow) and conveyance system, incoming flow locations, storage tank facilities, M&I locations, weather stations and delivery points.

1. Incoming flow locations and measurement methods (Figure 5)

Westlands measures and calibrates all meters used in the District. This provides a more accurate data when compared to the manufacturer's specifications. Manufacturer's data sheets are located in Attachment C.

Location Name	*Physical Location Mile Post*	*Type of Measurement Device (Meter)*	*Accuracy (Percentage)*
WWD 1R	104.18	Venturi	(+/-) 0%
WWD 1	105.22	Venturi	(+/-) 5%
WWD 2R	105.23	Venturi	(+/-) 0%
WWD 2	106.35	Venturi	(+/-) 0%
WWD 3	108.39	Venturi	(+/-) 4%
WWD 3R	108.46	Venturi	(+/-) 0%
WWD 4	110.52	Venturi	(+/-) 4%
WWD 5	111.93	Venturi	(+/-) 0%
WWD 6	113.00	Venturi	(+/-) 0%
WWD 4R	113.77	Venturi	(+/-) 0%
WWD 5R	114.90	Venturi	(+/-) 0%
WWD 7	115.43	Venturi	(+/-) 10%
WWD 6R	117.42	Venturi	(+/-) 0%
WWD 8	117.51	Venturi	(+/-) 0%
WWD 7R	118.44	Venturi	(+/-) 0%
WWD 8R	119.63	Venturi	(+/-) 0%
WWD 9	120.77	Venturi	(+/-) 0%
WWD 10	121.92	Venturi	(+/-) 0%

Location Name	Physical Location Mile Post	Type of Measurement Device (Meter)	Accuracy (Percentage)
WWD 9R	122.05	Venturi	(+/-) 0%
WWD 11	124.18	Venturi	(+/-) 0%
WWD 10R	124.19	Venturi	(+/-) 0%
WWD 12	126.65	Venturi	(+/-) 0%
WWD 11R	128.57	Venturi	(+/-) 0%
WWD 13	129.88	Venturi	(+/-) 0%
WWD 14	130.85	Venturi	(+/-) 0%
WWD 15	131.70	Venturi	(+/-) 0%
WWD 12R	132.74	Venturi	(+/-) 0%
WWD 16	132.81	Venturi	(+/-) 0%
WWD 13R	133.81	Venturi	(+/-) 0%
WWD 17	133.81	Venturi	(+/-) 0%
WWD 18	134.94	Venturi	(+/-) 0%
WWD 14R	135.96	Venturi	(+/-) 0%
WWD 19	136.05	Venturi	(+/-) 0%
WWD 15R	137.00	Venturi	(+/-) 0%
WWD 20	137.11	Venturi	(+/-) 0%
WWD 16R	138.14	Venturi	(+/-) 0%
WWD 21	138.29	Venturi	(+/-) 0%
WWD 17R	139.27	Venturi	(+/-) 0%
WWD 22	139.29	Venturi	(+/-) 0%
WWD 18R	140.48	Venturi	(+/-) 0%
WWD 23	140.57	Venturi	(+/-) 0%
WWD 19R	141.53	Venturi	(+/-) 0%
WWD 24	141.60	Venturi	(+/-) 0%
Coalinga Canal	143.16	Acoustic	(+/-) 0%
WWD 25	145.26	Venturi	(+/-) 0%
WWD 20R	145.32	Venturi	(+/-) 0%
WWD 26	147.02	Venturi	(+/-) 0%
WWD 27	149.12	Venturi	(+/-) 0%
WWD 21R	149.55	Venturi	(+/-) 0%
WWD 28	150.88	Venturi	(+/-) 0%
WWD 22R	151.19	Venturi	(+/-) 0%
WWD 29	152.39	Venturi	(+/-) 0%
WWD 30	154.11	Venturi	(+/-) 0%
WWD 23R (Huron)	156.34	Venturi	(+/-) 0%
WWD 31	156.40	Venturi	(+/-) 0%
WWD 32	158.47	Venturi	(+/-) 0%
WWD 24R	158.47	Venturi	(+/-) 0%
WWD 25R	160.45	Venturi	(+/-) 0%
WWD 33	160.45	Venturi	(+/-) 0%
WWD 34	161.61	Venturi	(+/-) 0%

Location Name	*Physical Location Mile Post*	*Type of Measurement Device (Meter)*	*Accuracy (Percentage)*
WWD 26R	161.61	Venturi	(+/-) 0%
WWD 35	162.63	Venturi	(+/-) 0%
WWD 36	163.69	Venturi	(+/-) 0%
WWD 27R	163.69	Venturi	(+/-) 0%
WWD 28R	164.79	Venturi	(+/-) 0%
WWD 37	167.04	Venturi	(+/-) 0%
WWD 29R	167.84	Venturi	(+/-) 0%
WWD 38	169.30	Venturi	(+/-) 0%
WWD 30R	171.51	Venturi	(+/-) 0%

2. Current year Agricultural Conveyance System (Figure 6)

Miles Unlined - Canal	*Miles Lined - Canal*	*Miles Piped*	*Miles - Other*
7.4	12.8	1,034	0

3. *Current year Urban Distribution System*

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

Westlands' Urban Distribution System utilizes the Agricultural Conveyance System. The District achieves dual use of the system because we do not provide potable water to our customers.

4. Storage facilities- tanks, reservoirs, regulating reservoirs (Figure 8)

Name	*Type*	*Capacity (Gals.)*	*Distribution or Spill*
6-2	Tank	558,000	Distribution
1R-2.0A	Tank	33,800	Distribution
1R-2.0B	Tank	33,800	Distribution
1R-4.0D	Tank	141,000	Distribution
1R-4.0-1.0-1.0C	Regulating Reservoir	986,200	Distribution
1R-4.0-1.0-1.0D	Regulating Reservoir	986,200	Distribution
3RA	Regulating Reservoir	437,300	Distribution
4RA	Regulating Reservoir	419,600	Distribution
7RD	Regulating Reservoir	282,000	Distribution
11RA	Regulating Reservoir	634,000	Distribution
12RA	Regulating Reservoir	463,000	Distribution
13RB	Regulating Reservoir	215,000	Distribution
14RC	Regulating Reservoir	546,000	Distribution
15RA	Regulating Reservoir	546,000	Distribution
16RC	Regulating Reservoir	978,000	Distribution
17RC	Regulating Reservoir	282,000	Distribution
18RA	Regulating Reservoir	466,000	Distribution
19RA	Regulating Reservoir	416,000	Distribution
20RA	Regulating Reservoir	435,000	Distribution
21RA	Regulating Reservoir	300,000	Distribution

Name	*Type*	*Capacity (Gals.)*	*Distribution or Spill*
22RA	Regulating Reservoir	500,000	Distribution
23RA	Regulating Reservoir	343,000	Distribution
24RA	Regulating Reservoir	700,000	Distribution
25RA	Regulating Reservoir	600,000	Distribution
26RA	Regulating Reservoir	175,000	Distribution
27RA	Regulating Reservoir	28,000	Distribution
28RB	Regulating Reservoir	400,000	Distribution
28R-1.0WB	Regulating Reservoir	37,000	Distribution
29R Surge	Surge Tank	8,000	Distribution
29RB	Regulating Reservoir	150,000	Distribution
30RA	Regulating Reservoir	300,000	Distribution
PV4P	Regulating Reservoir	400,000	Distribution
PV6P	Regulating Reservoir	183,000	Distribution

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

Agricultural spill recovery/overflow is situated on Mile Post 15.52 of the Coalinga Canal into Los Gatos Creek. This overflow structure is designed to spill into the east side of the canal 100 feet downstream of the Los Gatos siphon. When the water level encroaches the free board limits water spills into a concrete channel that conveys water into the Los Gatos Creek. The District manages the water pumped in to the Coalinga Canal to meet demands. The Los Gatos siphon is only employed during an emergency.

In addition, the District does not allow tail water outside its boundaries and Water Users are responsible for controlling tail water on their farms. Any Water User found in violation of these regulations could have their water service discontinued. (Attachment B: Article 2, Section 2.6, paragraphs G, H & I, Page 81)

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

Scheduled	*Rotation*	*Other (describe)*
Applicable		

6. Restrictions on water source(s)

Source	*Restriction*	*Cause of Restriction*	*Effect on Operations*
Federal CVP And SWP Requirement	Implementation of Central Valley Project Improvement Act	Delta salinity in compliance with the SWRCB D1641 or 2008 FWS and 2009 NMFS BiOps requirements.	A potential concern is that diversions of flow could have potential adverse effects on Delta water quality in future months and potentially increase the amount of water required from SWP and CVP reservoirs to maintain Delta salinity in compliance with the SWRCB D1641 or 2008 FWS and 2009 NMFS BiOps requirements. To address this concern, iterative analysis was done with the CalSim II and DSM2 to assess potential changes to Delta salinity and develop protective bypass flow criteria. Over many iterative simulations, a variable schedule of bypass flow criteria for the Sacramento River at Freeport was developed to minimize the potential effect of diversions to Sites Reservoir on SWP and CVP operations and Delta water quality. The bypass flow criteria specify that diversions to fill Sites Reservoir would only be allowed when a Sacramento River flow of 15,000 cfs is present at Freeport in January, 13,000 cfs in December and February through June, and 11,000 cfs in all other months.
Federal CVP	Implementation of Central Valley Project Improvement Act	Reclamation	The CVPIA reallocated 800,000 of the CVP yield from traditional uses for environmental purposes.
Federal CVP	Implementation of Endangered Species Act (ESA)	Reclamation, DFWS, Dept. of Commerce, NMFS	Due to the listing of the winter-run Chinook salmon and the Delta smelt, as well as the potential listing of several other native species, Project operations have been drastically altered to meet requirements of the ESA. Consequently, to date, both Services have chosen to sharply restrict pumping at both the state and federal pumps in the southern Delta as their only course of implementation. This has resulted not only in a reduction of water supplies, but also has created an unfair and inequitable burden on those water users south of the Delta.
Federal CVP	Court ordered reductions in pumping of CVP and SWP	U.S. District Court	The reduction in pumping ordered by the Court will result in additional water supply shortages. As a result, it will be necessary to fallow more land, with associated impacts on farm workers, Westside communities, and other public agencies.

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

Currently, the District is evaluating serval capital improvement projects with the potential to enhance water supply reliability. The proposed projects include groundwater replenishment, storage and conveyance projects. The District plans to construct a groundwater replenishment project and conveyance project with the next 5 years.

C. Topography and Soils

1. Topography of the District and its impact on water operations and management (Figure 9)

Topography of the San Joaquin Valley is a wide bedrock basin filled with thousands of feet of alluvial sediment deposited by streams and rivers flowing out of the adjacent mountains on both the east and the west. The District is located near the centerline of this basin, bordered on the east by the Fresno Slough and on the west by the Diablo Range of the California Coast Ranges.

The Diablo Range consists of complex, folded, and uplifted mountains, which are composed predominantly of sandstone and shale of marine origin. Eroded by creeks flowing from the Diablo Range, sediments form gentle sloping alluvial fans. The texture of the Diablo Range deposits depends on the relative position on the alluvial fan and ranges from coarse sand and gravel to fine silt and clay. Generally, those portions of the District lying high on the alluvial fans contain permeable, medium-textured soils. With decreasing elevation from the west to east, soil textures become finer. Fine textured soils are characterized by low permeability and increased concentrations of water-soluble solids, primarily salts and trace elements.

The Sierra Nevada on the east side of the Valley is predominately comprised of uplifted granite rock overlaid in areas by sedimentary and metamorphic rock. Sierran alluvial deposits in the District consist primarily of well-sorted sands, with minor amounts of clay. The Sierran alluvium decreases in thickness and increases in depth below the surface toward the west. These coarse-textured sediments are characterized by high permeability and a low concentration of water-soluble solids.

One of the principal subsurface geological features of the San Joaquin Valley is the Corcoran Clay formation. Formed within an ancient lakebed about 600,000 years ago, this clay layer ranges in thickness from 20 to 200 feet and underlies most of the District. Varying depths from 200 to 500 feet in the Valley through to 850 feet along the Diablo Range, the Corcoran Clay divides the groundwater system into two major aquifers; an upper and lower aquifer.

Water is distributed through 1,034 miles of buried pipe, varying in diameter from 10 to 96 inches. Gravity and pumps feed 38 lateral pipelines from the east bank of the SLC, while water is pumped into 27 laterals on the west bank. Six partially completed laterals are served from the CC. Most of the land in the District is east of the SLC and slopes gently from an elevation of about 320 feet to about 160 to 200 feet at the eastern boundary. Most of this land has gravity service from the SLC. Small re-circulating pumping plants at the headwork's of each of the gravity laterals pressurize the laterals serving lands adjacent to the SLC that are too high in elevation to be served through the gravity laterals. The lands lying west of the SLC are at higher elevations.

2. District soil association map (Agricultural only)

See Attachment A, Figure 10, District Soils Map

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

Soil Problem	*Estimated Acres*	*Effect on Water Operations and Management*
Salinity (Soil Types)		
Tachi-Armona-Gephord	1,000	These soils are deep, poorly drained, and Saline-sodic. Effective rooting depth of the crops commonly grown in the area is limited by a perched water table that is at a depth of less than 6 feet. Tachi and Gepford soils have clayey textures with a high shrink-swell potential. Armona soils have loamy textures and are stratified. Effect on water operations and management and any limitations on agriculture resulting from soil problems within the Westlands Water District. If this unit is used for irrigated crops, the main limitations are salinity and sodicity, a high perched water table, very slow permeability and flooding. Intensive management is required to reduce the salinity and maintain soil productivity. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim this soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer. Content of salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Because of the very slow permeability on the Tachi and Gepford soils and stratification on the Armona soil, the application of water should be regulated so that water does not stand on the surface and damage the crops.
Westhaven-Panoche-Excelsior	47,000	These soils are very deep, well drained and moderately well drained soils on low lying alluvial fans and low fan terraces. Because of the moderately slow permeability of these soils, the length of runs should be adjusted to permit adequate infiltration of water. Westhaven soils are stratified and have silty textures. Panoche soils have loamy textures and Excelsior soils are stratified and have coarse-loamy textures. If this unit is used for irrigated crops, the main limitations are stratification and moderately slow permeability. The Westhaven and Excelsior soils are limited by a stratified profile that restricts permeability. Because of the moderately slow permeability of these soils, the length of runs should be adjusted to permit adequate infiltration of water. Good irrigation water management on these stratified soils requires that irrigation amounts, and timing be adjusted to account for the available water capacity which can vary depending on the size, depth and texture of the strata.

Ciervo-Cerini-Lillis	72,000	These soils are very deep, moderately well drained to poorly drained, saline-sodic soils with a high perched water table on distal alluvial fans and low stream terraces. Ciervo soils have clayey textures which usually become coarser with depth. Cerini soils are stratified and have fine-loamy textures and Lillis soils are clayey with a high shrink-swell potential. If this unit is used for irrigated crops, the main limitations are salinity and sodicity, a high perched water table and slow permeability. The high shrink-swell potential on the Lillis soil should be considered before installing cement structures. High shrink-swell clay can cause cement structures to buckle. Intensive management is required to reduce the salinity and maintain soil productivity Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim this soil. The Ciervo and Lillis soils have very slow permeability. The Cerini soil is limited by a stratified profile that restricts permeability and creates a perched water table. Because of the very slow and slow permeability of these soils, the application of water should be regulated so that water does not stand on the surface and damage the crops.
Lethent-Panoche-Westhaven-Cerini	40,000	These soils are very deep, moderately well drained and well drained, saline-sodic soils on distal alluvial fans and flood plains. Westhaven and Cerini soils have slow permeability. Panoche soils have moderately slow permeability. If this unit is used for irrigated crops, the main limitations are salinity and sodicity, a high perched water table, slow permeability and stratification. Intensive management is required to reduce the salinity and maintain soil productivity. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim this soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer. Content of salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. The Ciervo and Lillis soils have very slow permeability. The Cerini soil is limited by a stratified profile that restricts permeability and creates a perched water table. Because of the very slow and slow permeability of these soils, the application of water should be regulated so that water does not stand on the surface and damage the crops.

Ciervo-Cerini-Panoche, Saline Sodic	57,000	These soils are very deep, moderately well drained, saline-sodic soils on alluvial fan and flood plains. Intensive management is required to reduce the salinity and maintain soil productivity. Ciervo soils have clayey textures which usually become coarser with depth. Cerini soils are stratified and have fine-loamy textures and Panoche soils have loamy textures. If this unit is used for irrigated crops, the main limitations are salinity and sodicity, moderately slow permeability to very slow permeability, and a high-perched water table in some areas. Intensive management is required to reduce the salinity and maintain soil productivity. Gypsum, sulfur, and sulfuric acid are among the soil amendments that can be used to reclaim this soil. If sulfur or sulfuric acid is used, lime should be present in the surface layer. Content of salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Ciervo soils have very slow permeability. Cerini soils have slow permeability. Panoche soils have moderately slow permeability. Because of the moderately slow permeability to very slow permeability of these soils, and stratification on the Cerini soils, the application of water should be regulated so that water does not stand on the surface and damage the crops.
Ciervo-Cerini-Panoche	342,000	These soils are very deep, moderately well drained and well drained soils on alluvial fans and flood plains. Ciervo soils have clayey textures, which usually become coarser with depth. Cerini soils are stratified and have fine-loamy textures and Panoche soils have loamy textures. If this unit is used for irrigated crops, the main limitations are stratification on Cerini soils and slow permeability or moderately slow permeability. Ciervo and Cerini soils have low permeability. Because of the low permeability, water should be regulated so that it does not damage the crops. Good irrigation water management on these soils requires that irrigation amounts, and timing are adjusted to account for the available water capacity which can vary depending on the size, depth and texture of strata.

Panoche- Cerini, Subsided	45,000	These soils are very deep, well-drained soils on alluvial fans and flood plains, which have subsided unevenly across the landscape due to near-surface subsidence. Panoche soils have loamy textures and Cerini soils are stratified and have fine-loamy textures. If this unit is used for irrigated crops, the main limitations are near-surface subsidence, moderate hazard of water erosion, moderately slow permeability on the Cerini soil, and occasional flooding in low-lying areas. Sprinkler or trickle irrigation is best suited where subsidence has occurred near the surface. Hollow areas caused by subsidence make furrow and border irrigation more difficult. Irrigation water needs to be applied at a rate that insures optimum production without increasing deep percolation, runoff and erosion. Because of the moderately slow permeability of the Cerini soil, the application of water should be regulated so that water does not stand on the surface and damage the crops. To avoid over-irrigating, applications of irrigation water should be adjusted to the available water capacity, the water intake rate and the crop needs. Use of pipe, ditch lining or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

**Hanford Soil Survey Office – West Fresno County SSA*
By Kerry Arroues, Supervisory Soil Scientist, 11/23/1993

D. Climate

1. General average climate of the district service area (Figures 13 and 14)

Annual precipitation in the District averages more than seven inches, the majority of which falls during the months of December through March. Summer maximum temperatures frequently exceed 100˚ F and winter temperatures occasionally fall below freezing. With a mean annual temperature of 62˚ F, the area has an average frost-free growing season over 280 days. The District monitors three climate zones: Northern, Central and Southern. The tables summarize the climate by zone, weather station location, ET station, data period and average annual frost-free days.

Northern Zone

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
Avg Precip. (in)	1.40	1.22	1.30	0.72	0.41	0.20	0.04	0.10	0.23	0.51	0.85	1.12	8.12
Avg Temp.(°F)	46	51	56	61	68	74	79	78	74	65	54	46	63
Max. Temp.(°F)	55	63	69	75	84	91	95	94	90	80	66	56	77
Min. Temp.(°F)	37	40	43	46	52	58	62	61	58	50	41	36	49

Weather station ID - CIMIS Weather Station, Murrieta Farms/Adams & Highway 33.
ET Station ID – Same as above.
Data period: 1976-2017
Average annual frost-free days: 338

Central Zone

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
Avg Precip. (in)	1.57	1.38	1.25	0.70	0.36	0.32	0.07	0.08	0.22	0.62	0.73	1.06	8.35
Avg Temp.(°F)	46	51	56	61	67	73	78	77	73	65	53	46	62
Max. Temp.(°F)	55	63	69	75	83	89	94	94	89	80	66	56	76
Min. Temp.(°F)	36	40	43	46	52	57	61	61	57	49	41	36	48

Weather station ID - CIMIS Weather Station, University of California, Westside Field Station.
ET Station ID – Same as above.
Data period: 1976-2017
Average annual frost-free days: 335

Southern Zone

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Annual*
Avg Precip.(in)	1.33	1.26	1.08	0.46	0.23	0.05	0.02	0.03	0.14	0.37	0.61	0.82	6.40
Avg Temp.(°F)	46	51	56	61	68	74	79	78	74	65	54	46	63
Max. Temp.(°F)	56	63	69	75	84	91	95	94	90	80	66	56	77
Min. Temp.(°F)	37	40	44	47	53	58	63	61	58	50	41	36	49

Weather station ID – Westlands Automated Weather Station, two miles southwest of Huron, California.
ET Station ID – Same as above.
Data period: 1982-2017
Average annual frost-free days: 337

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

The District is unaware of any impacts from micro-climates on crop production.

E. Natural and Cultural Resources

1. Natural resource areas within the District's service area

Name	*Estimated Acres*	*Description*
Mendota Wildlife Area	166[2]	Wildlife Habitat Managed by California Department of Fish and Wildlife (CDFW)
Pilibos Wildlife Area	128	Wildlife Habitat Managed CDFW, Department of Water Resources (DWR) and Reclamation

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

The natural resources areas identified in Table E.1 are not managed by the District. The District does deliver water to wildlife areas under conveyance agreements.

[2] *Mendota Wildlife Area consists of 12,425 acres with 166 acres within the District.*

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

Name	*Estimated Acres*	*Description*
Mendota Wildlife Area	166	Recreational use of the area includes hunting and fishing.
Pilibos Wildlife Area	128	Recreational use of the area includes dove hunting.

F. Operating Rules and Regulations

1. Operating Rules and Regulations

See Attachment B, Page 75, District Rules and Regulations (water related)

2. W*ater allocation policy (Agricultural only)*

See Attachment B, Page 81, Operating Rules and Regulations (Article 2)

Article 2 section 2.3 A and B., states the District's policy regarding the amount of contract water and who is entitled to receive an allocation.

Article 2 section 2.3 C., states the District's policy regarding any additional contract water in addition to the amounts stated in section 2.3 A

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

See Attachment B, Page 75, Terms and Conditions for Agricultural Water Service

The District receives water orders in person, by phone, fax or the District's website. The schedule for placing water orders is as follows: Water orders are placed twenty-four (24) hours prior to delivery, Tuesday through Saturday, between the business hours of 7:30 a.m. through 9:30 a.m. Water orders placed on the District's website are accepted until 10:00 a.m. for the following day. Water orders run continuously until ordered off or in case of verifiable emergency.

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

See Attachment B, Page 81, Operating Rules and Regulations (Article 2)

The District does not allow surface and/or subsurface drainage to leave farms. Article 2 section 2.6 G states, "Each water user shall take reasonable steps to reuse or control tail water. The failure to do so shall constitute a waste of water." The consequences of a farmer not controlling his/her tail water is stated in article 2 sections 2.6 H and I. The consequences of a farmer not controlling his/her tail water could be as severe as civil or criminal prosecution.

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

See Attachment B, Page 81, Operating Rules and Regulations (in Article 2)

Article 2 section 2.6 C., states "A water user may transfer his water to another water user in any area of the District. Such transfer shall be in writing on a form provided by the General Manager".

The District pursues transfers each year to supplement reduced contract deliveries to its customers. Water users are eligible to transfer water within the District between individual or private entities and from other water districts. Generally, transfers out of the District are not allowed and are approved on a case by case basis by the Board of Directors.

G. Water Measurement, Pricing, and Billing

1. ***Agricultural Customers***

Refer to Section III, BMP on page 32.

2. Urban Customers (2016)

a. *Total number of connections* *249*

Total number of connections excludes 11 submeters located at the same connection site.

b. Total number of metered connections *249*

c. Total number of connections not billed by quantity *0*

d. Percentage of water that was measured at delivery point *100%*

e. Percentage of delivered water that was billed by quantity *100%*

f. Measurement device table

M&I Water Meter Data

Meter Size	*Number*	*Accuracy* (percentage)*	*Reading Frequency (Days)*	*Calibration Frequency (Months)*	*Maintenance Frequency (Months*
1.0″	32	Factory[3]	30	Factory	12
1.5″	40	Factory	30	Factory	12
2.0″	89	Factory	30	Factory	12
3.0″	36	(+/-) 2%	30	60	60
4.0″	46	(+/-) 2%	30	60	60
6.0″	5	(+/-) 2%	30	60	60
8.0″	3	(+/-) 2%	30	60	60
12.0″	7	(+/-) 2%	30	60	60
14.0″	1	(+/-) 2%	30	60	60
24.0″	1	(+/-) 2%	30	60	60
Total	260				

**Accuracy of measurement devices in 2016 are submitted with Plan and included as Attachment C*

[3] Meters with diameters under 2" are sent to the factory manufacturer for calibration once a year.

3. ***Agricultural and Urban Rates***

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

See Attachment B, Page 79, for current year rate ordinance

b. A*nnual charges collected from customers with owned land in the district, both agricultural and urban.*

Fixed Charges (2016)			
Charges ($ unit)	$/acre	*Units billed during year (acres)*	*Charges collected ($ times units)*
Long Term Water Supply -Area 1 & 2	$8.4985	454,429.59	$3,861,969.91
District Water Supply Debt Service - Area 1	$10.9837	231,883.05	$2,546,933.87
District Water Supply Debt Service - Area 2	$25.59	170,272.04	$4,357,618.97
Extraordinary Pipe Repairs - Area 1 & 2	$0.8706	457,009.22	$397,872.23
Operation and Maintenance - All Lands	$5.96	484,986.22	$2,891,245.34
Operation and Maintenance - Lands with Allocation	$6.36	454,706.32	$2,891,977.68
Operation and Maintenance - Lands with System	$3.49	413,634.16	$1,445,320.48
Operation and Maintenance - Lands with both Allocation and System	$18.36	393,812.44	$7,230,160.14
Drainage Service Area	$1.7151	172,612.55	$296,047.79
Westlands Water Quality Coalition	$3.09180	459,135.09	$1,419,553.88

Volumetric charges (Interim Contract Water) 2016-17 (agricultural customers)			
Charges ($ unit)	*Charge units ($/AF)*	*Units billed during year (AF)*	*Charges collected ($)*
$274 [4]	$/AF	29,318*	$8,033,132

* Value may be different than District usage due to recoloring of water on the customer side.

Volumetric charges 2016-17 (urban customers)			
Charges ($ unit)	*Charge units ($/AF)*	*Units billed during year (AF)*	*Charges collected ($)*
$391.86	$/AF	2,313.71	$ 906,650.40
$222.67	$/AF	1,862.86*	$ 414,803.04

* Value includes 1,023 acre-feet of Table A water from the State Water Project.

See Attachment D, Page 124, District Sample Bills

[4] *"Water Rates | Westlands Water District." Westlands Water District. Accessed January 14, 2017. http://wwd.ca.gov/water-management/water-rates-2/. Total Agricultural Water Rate in 2016-17*

c. Describe the contractor's record management system

District field staff performs meter readings on all active turnouts to record the meter totalizer, time and day. Meter reading data is input to an electronic notepad application, which transfers the data into the District's billing software, Water Management Information System (WMIS). Office staff analyzes the meter reading and compare to total consumption data to identify potential errors. Meter readings are submitted by field staff twice a month and kept on file by Customer Accounting in the District's Fresno office. Agricultural water bills are mailed monthly and the majority of M&I water bills are mailed on a yearly basis to water users.

H. Water Shortage Allocation Policies

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

See Attachment E, Page 127, the District's Water Shortage Contingency Plan

The District is responsible for conserving the available water supply, protecting the integrity of water supply facilities, and implementing a contingency plan in times of drought, supply reductions, failure of water distribution systems, or emergencies. The District has developed a Water Shortage Contingency Plan (WSCP) in accordance with California Water Code Section 10632. Section 10632 states that water agencies must develop an urban water shortage contingency plan in the event of drought, water supply reductions, failure of a water distribution system, other emergencies, or regulatory statutes, rules, regulations or policies reducing water supplies by state and federal agencies with jurisdiction over the District. The contingency plan must demonstrate the ability of an agency to meet demands under a supply shortage of up to 50 percent. Emphasis is placed on protection of public health, sanitation, fire protection, and the public welfare.

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

See Attachment B, Page 81, Operating Rules and Regulations (Article 2)

Article 2, Section 2.6 I. states "The unauthorized using, taking, or wasting of water is prohibited and may subject the water user to civil or criminal prosecution." The District administers conservation and outreach programs by providing monthly Water User Notices (https://wwd.ca.gov/news-and-reports/notices/) to inform water users about preventative measures to avoid wasteful use of water.

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

Discuss possible modifications to policies and solutions for improved water management.

The District works with state, local, and federal regulatory agencies to promote and implement best water management practices. Additional changes the District implemented, incorporate the policies and legislation identified below:

1. Agricultural Water Management Measurement Regulation.
2. AB3030 Groundwater Management Plan
3. California Urban Water Conservation Council
4. USBR Agricultural Annual Updates
5. Sustainable Groundwater Management Act
6. State Water Resources Control Board Irrigated Lands Regulatory Program

The District works in conjunction with multiple agencies including DWR, Reclamation, San Luis & Delta Mendota Water Authority, Power and Water Resources Pooling Authority on projects which enhance efficiency and improve 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

See Section 5, Page 48, 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 Section 5, Page 56, Water Inventory Tables, Table 8.

B. Groundwater Supply

1. Groundwater extracted by the district and delivered, by month

See Chapter 5, Page 49, Water Inventory Tables, Table 2

2. Groundwater basin(s) that underlies the service area[5]

Name	*Size (Acres)*	*Usable Capacity (AF)*	*Sustainable Yield*
Upper Aquifer	600,000	36,500,000	TBD
Lower Aquifer	600,000	65,000,000	TBD

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

The District does not operate wells and/or manage groundwater recharge areas; however, the District anticipates recharge areas will be constructed in the future.

4. Description of conjunctive use of surface and groundwater

The District's Distribution System Integration Program (DIP) provides conveyance through District facilities of groundwater pumped into the District's distribution system. This program allows water users to use the District's water distribution system to convey groundwater to other points of use within the District. This program allows for the improved use of groundwater resources. Conjunctive use of surface and groundwater improves overall water supply reliability by making more efficient use of water that is available. In wet periods, use of surface water is encouraged to preserve groundwater supplies. In droughts, greater flexibility in the use of groundwater is facilitated to extract the maximum benefit from this resource. The District conveys and delivers credit water through its distribution system to locations which will assist the pumper meet their overall water requirements. The District coordinates all water quality testing associated with this program. Water quality compliance analysis is required bimonthly and a Triennial Analysis is required every three years. Testing groundwater wells ensures water quality standards occurs prior to injection into the distribution system for blending surface and groundwater.

5. Groundwater Management Plan

See Attachment F, Page 130, Groundwater Management Plan

6. Groundwater Banking Plan

Currently, the District does not participate in groundwater banking projects.

[5] A discussion of estimated groundwater storage capacity in San Joaquin Valley Groundwater Basin is included in *California's Groundwater Bulletin 118* by DWR (1/20/2006)

C. Other Water Supplies

1. "Other" water used as part of the water supply – Describe supply
See Chapter 5, Page 48, Water Inventory Tables, Table 1

D. Source Water Quality Monitoring Practices

1. Potable Water Quality (Urban only)

The water furnished by the District is not in a potable state and the District does not warrant the quality or potability of water so furnished. By taking delivery of water from the District, the water user assumes responsibility for the non-potability of water furnished by the District.

2. Agricultural water quality concerns: *Yes* *(X)* *No* _____

Water quality concerns, within the District, include Total Dissolved Solids (TDS), Selenium, Boron, and Nitrates particularly in areas impacted by shallow groundwater levels where high concentrations affect crop root zones.

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

Surface Water Quality analysis is performed by California Department of Water Resources (DWR). Monthly water quality analysis is required under the District's Distribution Integration Program (DIP) on groundwater wells pumping into the District's distribution system. In addition, the District monitors wells pumping water into the San Luis Canal under the District's Canal Integration Program (CIP). On the annual groundwater survey (November/December) electrical conductivity (E.C.) measurements are taken on any groundwater well pumping within the District.

4. *Current water quality monitoring programs for surface water by source (Agricultural only)*
Station Name: CA Aqueduct[6], Check 13, O'Neill Outlet 2016-17 [Constituents of Concern, COC's]

Analyses Performed	*Frequency*	*Concentration Range*	*Average*
CA Aqueduct, Check 13	*(January – December)*	*Milligram/Liter*	*Milligram/Liter*
Arsenic	Monthly	0.001 - 0.003	0.002
Boron	Monthly	0 - 0.3	0.16
Bromide	Monthly	0.07 - 0.42	0.26
Chloride	Monthly	28 - 139	88
Manganese	Monthly	0 – .021	0.005
Nitrate	Monthly	0.1 – 4.2	1.99
Selenium	Monthly	0 - 0.002	0.001
Sulfate	Monthly	14 - 56	35
TDS	Monthly	163 - 399	288

[6] *"Water Data Library - Station Group Report." Water Data Library - Station Group Report. Check 13- March 31,2016- February 28, 2017. Accessed April 11, 2018. http://www.water.ca.gov/waterdatalibrary/waterquality/station_group/select_station.cfm.*

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

Distribution Integration Program[7] (DIP) 2016-17

Analyses Performed	*Frequency*	*Concentration Range*	*Average*
(District's DIP Table 2)	*(March – November)*	Milligram/Liter	Milligram /Liter
Arsenic	Quarterly	0 - 0.01	0.002
Boron	Quarterly	0.15 - 2.1	0.76
Chloride	Quarterly	1 – 600	86.78
E.C.	Quarterly	840 – 2200 um/cm	1190 um/cm
Manganese	Quarterly	0 - 0.5	0.01
Nitrate	Quarterly	0 – 45	9.10
Selenium	Quarterly	0 – 50	6.33
Sulfate	Quarterly	0 - 600	395
TDS	Quarterly	610 – 1500	827

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

Canal Integration Program[8] (CIP) into CA Aqueduct April-July 2016

Analyses Performed	*Frequency**	*Concentration Range*	*Average*
(District's DIP Table 2)	*(July – September)*	Milligram/Liter	Milligram /Liter
Arsenic	Weekly/Monthly	0 - 0.01	0.0026
Boron	Weekly/Monthly	0 - 2	0.79
Chloride	Weekly/Monthly	2.6 - 140	52.8
E.C.	Weekly/Monthly	33 – 1700 um/cm	1173 um/cm
Manganese	Weekly/Monthly	0 - 0.22	0.02
Nitrate	Weekly/Monthly	0 - 39	7.10
Selenium	Weekly/Monthly	0 - 19	3.13
Sulfate	Weekly/Monthly	0 - 600	402.92
TDS	Weekly/Monthly	0 - 1100	780.21

** 35 wells in the CIP were sampled weekly between April and May 2016, then 31 wells monthly between June and July 2016.*

E. Water Uses within the District

1. Agricultural

See Chapter 5, Page 53, Water Inventory Tables, Table 5 - Crop Water Needs

2. Types of irrigation systems used for each crop in current crop year 2016 (All values are in whole acres)

Crop name	*Total Acres*	*Furrow/Flood*	*Sprinkler*	*Low Volume (drip)*	*Multiple methods*
Alfalfa-Hay	3,355	586	887	1,311	571
Alfalfa-Seed	1,678	115		969	594
Almonds	89,009	346	454	86,692	1,517

[7] The concentration range and average values were produced from water quality reports received for 22 groundwater wells participating in the DIP 2016-17.

[8] "Westlands Water District - CIP." Westlands Water District - CIP. Accessed January 14, 2016. 917https://cs.westlandswater.org/district_web info/wwd/cip/.

Crop name	*Total Acres*	*Furrow/Flood*	*Sprinkler*	*Low Volume (drip)*	*Multiple methods*
Apples	110			110	
Apricots	559			559	
Artichokes	153		153		
Asparagus	761			86	675
Barley	1,743	72	636		1,035
Beans-Dry	1	1			
Beans-Garbanzo	5,219	5,219			
Beans-Jojoba	11			11	
Blueberries	80			80	
Broccoli	849				849
Cantaloupes	13,814		303	1,903	11,608
Cherries	794			794	
Corn-Field	162		3		159
Corn-Sweet	3,386			144	3,242
Cotton-Acala	1,335	13	7		1,315
Cotton-Pima	21,328	596	19	8,527	12,186
Flowers	54				54
Garlic	11,426	150	156	3,920	7,200
Grain-Hay	16,774	3,871	4,782		8,121
Grains-Sorghum	191				191
Grapefruit	53				53
Grapes-Raisin	1,152			1,152	
Grapes-Table	1,507			1,507	
Grapes-Wine	16,279			15,689	590
Honeydews	1,874		206	297	1,371
Lemons	674			674	
Lettuce-Spring	4,126		152	397	3,577
Lettuce-Fall	3,497		149	200	3,148
Nectarines	271			271	
Nursery	322		28	149	145
Oats	1,019		156	156	707
Onions-Dehyd.	3,379		2,923	151	305
Onions-Fresh	4,868		10	1,219	3,639
Oranges	1,598			1,598	
Parsley	953		632	321	
Pasture	590		287		303
Peaches	1,519			1,519	
Peppers-Misc.	89			89	
Pistachios	62,128	156		60,574	1,398
Plums	228			228	
Pomegranates	2,522	606		1,382	534
Prunes	140			140	
Pumpkins	10		10		
Safflower	272	116	156		

Crop name	*Total Acres*	*Furrow/Flood*	*Sprinkler*	*Low Volume (drip)*	*Multiple methods*
Seed Crop-Misc.	828	50	154	105	519
Squish	16		16		
Sugar Beets	2			2	
Tangerines	1,830			1,818	12
Tomatoes-Fresh	5,108			4,564	544
Tomatoes-Proc	58,388	150	299	35,394	22,545
Walnuts	518			518	
Watermelons	2,264			997	1,267
Wheat	12,557	2,931	1,564	4,042	4,020
TOTAL[9]	363,373	14,978	14,142	240,259	93,994

3. *Urban use by customer type in (2016)*

Customer Type	*Number of Connections*	*AF*
Single-family		
Multi-family		
Commercial	4	196.65
Industrial	55	888.42
Institutional	7	191.68
Landscape irrigation		
Wholesale		
Recycled		
Incidental Ag	166	1,876.83
Other (specify)		
Other (specify)		
Unaccounted for		
Total	232*	3,153.58

**This number represents our active urban customers. The District has 17 connections that are inactive.*

4. Urban Wastewater Collection/Treatment Systems identified in the table below are owned and operated by Fresno County.

Treatment Plant	*Treatment Level (1, 2, 3)*	*GPD**	*Disposal to / uses*
El Porvenir (CSA 30)	Treatment Level 2	10,000	Domestic Water /Wastewater
Cantua Creek (CSA 32)	Treatment Level 2	30,000	Domestic Water /Wastewater
O'Neill Community (CSA49)	Treatment Level 1	7,500	Domestic Water
	Total	47,500	
Total discharged to ocean and/or saline sink			

**Gallons Per Day (GDP)*

[9] *The total acres exclude double crop, dryland farming, trees and vines.*

5. Groundwater recharge in 2016-17 (Table 6)

Recharge Area	*Method of Recharge*	*AF*	*Method of Retrieval*
Not Applicable			
	Total		

The District does not have direct groundwater recharge facilities within the District.

*6a. Transfers and exchanges **into** the service area in 2016 – (Table 1)*

From Whom	*To Whom*	*AF*	*Use*
SLDMWA Supplemental Pool	Westlands WD	23,432	Agricultural
2014 Yuba	Westlands WD	19,001	Agricultural
2015 OID/SSJID	Westlands WD	5,421	Agricultural
Panoche WD	Westlands WD	8,180	Agricultural
KCWA (Kern County Water Agency)	Westlands WD	4,202	Agricultural
Tulare lake Bottom Water Storage District	Westlands WD	35,193	Agricultural
Exchange Contractor/SLDMWA	Westlands WD	35,078	Agricultural
Central California ID	Westlands WD	4,845	Agricultural
Paterson ID	Westlands WD	2,825	Agricultural
West Side ID	Westlands WD	125	Agricultural
Tranquillity ID	Westlands WD	690	Agricultural
Firebaugh Canal WD	Westlands WD	2,449	Agricultural
Fresno Irrigation District / KCWA Exchange	Westlands WD	5,000	Agricultural
City of Tracy	Westlands WD	1,600	Agricultural
San Luis Canal Company	Westlands WD	3,771	Agricultural
Dudley & Indart	Westlands WD	200	Agricultural
San Luis WD	Westlands WD	765	Agricultural
Kern Tulare Water District	Westlands WD	610	Agricultural
KCWA/Semitropic/ Nickel	Westlands WD	7,553	Agricultural
Del Puerto	Westlands WD	401	Agricultural
Empire Westside ID	Westlands WD	871	Agricultural
Friant water Authority / USBR	Westlands WD	2,565	Agricultural
	Total	**164,777**	

*6b. Transfers and exchanges **out** of the service area in 2016 – (Table 6)*

From Whom	*To Whom*	*AF*	*Use*
Westlands WD	Byron Bethany ID	197	Agriculture
Westlands WD	Empire Westside ID	18	Agriculture
	Total	**215**	

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

From Whom	*To Whom*	*AF*	*Use*
Westlands WD	Ca. Dept. of Fish and Wildlife	2	Wildlife Refuge
Westlands WD	City of Coalinga	3,672	M&I
Westlands WD	City of Huron	677	M&I
Westlands WD	Lemoore Navy Air Station	1,698	M&I
	Total	6,049	

8. Other uses of water

Other Uses	*AF*
N/A	

F. Outflow from the District (Agricultural only)

1. Surface and subsurface drain/outflow

Westlands Water District does not provide or allow surface and subsurface drain/outflow.

Outflow point	*Location description*	*AF*	*Type of measurement*	*Accuracy (%)*	*% of total outflow*	*Acres drained*
N/A						

Outflow point	*Where the outflow goes (drain, river or other location)*	*Type Reuse (if known)*
N/A		

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

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

Analyses Performed	*Frequency*	*Concentration Range*	*Average*	*Reuse limitation?*
N/A				

Outflow (subsurface drainage) Quality Testing Program

Analyses Performed	*Frequency*	*Concentration Range*	*Average*	*Reuse limitation?*
N/A				

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.*

   On January 9, 2014, the Regional Water Quality Control Board (RWQCB) adopted new regulatory requirements (Western Tulare Lake Basin General Order (GO) R5-2014-0001) that applies to irrigated lands within the Water District.

   The GO outlines specific instructions for all landowners whose lands are being used for irrigated agricultural purposes. One of the requirements is for landowners to enroll their lands in the Irrigated Lands Regulatory Program (ILRP). The RWQCB requires that landowners must enroll either directly with the RWQCB or enroll with a third-party coalition.

   The District Water Quality Coalition (Coalition) has been approved by the RWQCB to serve as a third-party coalition for administering the terms and conditions of the ILRP as described in the GO. The Coalition has been formed to represent landowners and operators irrigating agricultural lands (Members) under the GO.

G. Water Accounting (Inventory)

Go to Chapter 5, Page 47, for Agricultural Water Inventory Tables.

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%*

   a. *Number of Agricultural Customers (2017)* 636

   b. *Number of delivery points (turnouts and connections)* 3,249

   c. *Number of delivery points serving more than one farm* 0

   d. *Number of measured delivery points (meters and measurement devices)* 3,249

   e. *Percentage of delivered water that was measured at a delivery point* 100%

   f. *Total number of delivery points not billed by quantity* 0

   g. *Delivery point measurement device table*

Measurement Type	*Number*	*Accuracy* (+/- %)*	*Reading Frequency[10] (Days)*	*Calibration Frequency (Months)*	*Maintenance Frequency (Months)*
Orifices					
Propeller meter	2,707	(+/-) 2%	30	60	60
Weirs					
Flumes					
Venturi	156	(+/-) 1%	30	60	60
MAG meter	31	(+/-) 0.5%	30	60	60
Acoustic Doppler					
Turbine Meter	355	(+/-) 0.5%	30	60	60
Total	3,249				

**Documentation verifying the accuracy of measurement devices in 2017 submitted with Plan and included in Attachment C.*

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

Name: Alex Young Title: Associate Resources Analyst

Address: 3130 N. Fresno St., Fresno Ca. 93703

Telephone: 559-241-6225 E-mail: ayoung@westlandswater.org

[10] All meters are read monthly, active meters are read bi-monthly.

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

See Attachment I, Page 165, Notices of District Education Programs and Services Available to Customers.

a. ***On-Farm Evaluations***

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

	Total in Distric	*# surveyed in 2016*	*# surveyed in 2017*	*# projected for 2018*	*# projected for 2019*
Irrigated acres	# 486,000[11]	6,400	4,800	4,800	4,800
Number of farms	# 700	40[12]	30	30	30

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

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

The "Irrigation Guide" is made available to the public through the District's website (https://cs.westlandswater.org/resources/wtrcon/guide/tfoawx.htm). Also available are satellite images illustrating distinct colors or photosynthesis activity using the Normalized Difference Vegetative Index (NDVI). It is known that the crop canopy reflection in red and near-infrared zones of the electromagnetic spectrum depends on its green phytomass. NDVI is widely used to quantify the vegetation condition. NDVI can also describe the vegetation density, allowing the farmers to evaluate plant germination, growth and productivity. The images are made available (1-2 images per month) to all District water users. The water user logs onto the District webpage through a secure web access to view their specific field image.

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

Surface Water Quality analysis is performed by California Department of Water Resources (DWR) and publish their findings on their website, https://water.ca.gov/Programs/State-Water-Project/Water-Quality/Discrete-Grab-Samples. Public water systems within the District perform their own water quality analysis as required by California Department of Public Health.

Monthly water quality analysis is required under the District's Distribution System Integration Program (DIP) on groundwater wells pumping into the distribution system. Along with DIP, the District will monitor wells enrolled in the Canal Integration Program (CIP). Project, DIP and CIP, water quality analysis is provided to the agencies overseeing the project. During the District's bi-annual groundwater survey (June and November/December) electrical conductivity (EC) measurements are taken if a groundwater well found pumping.

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

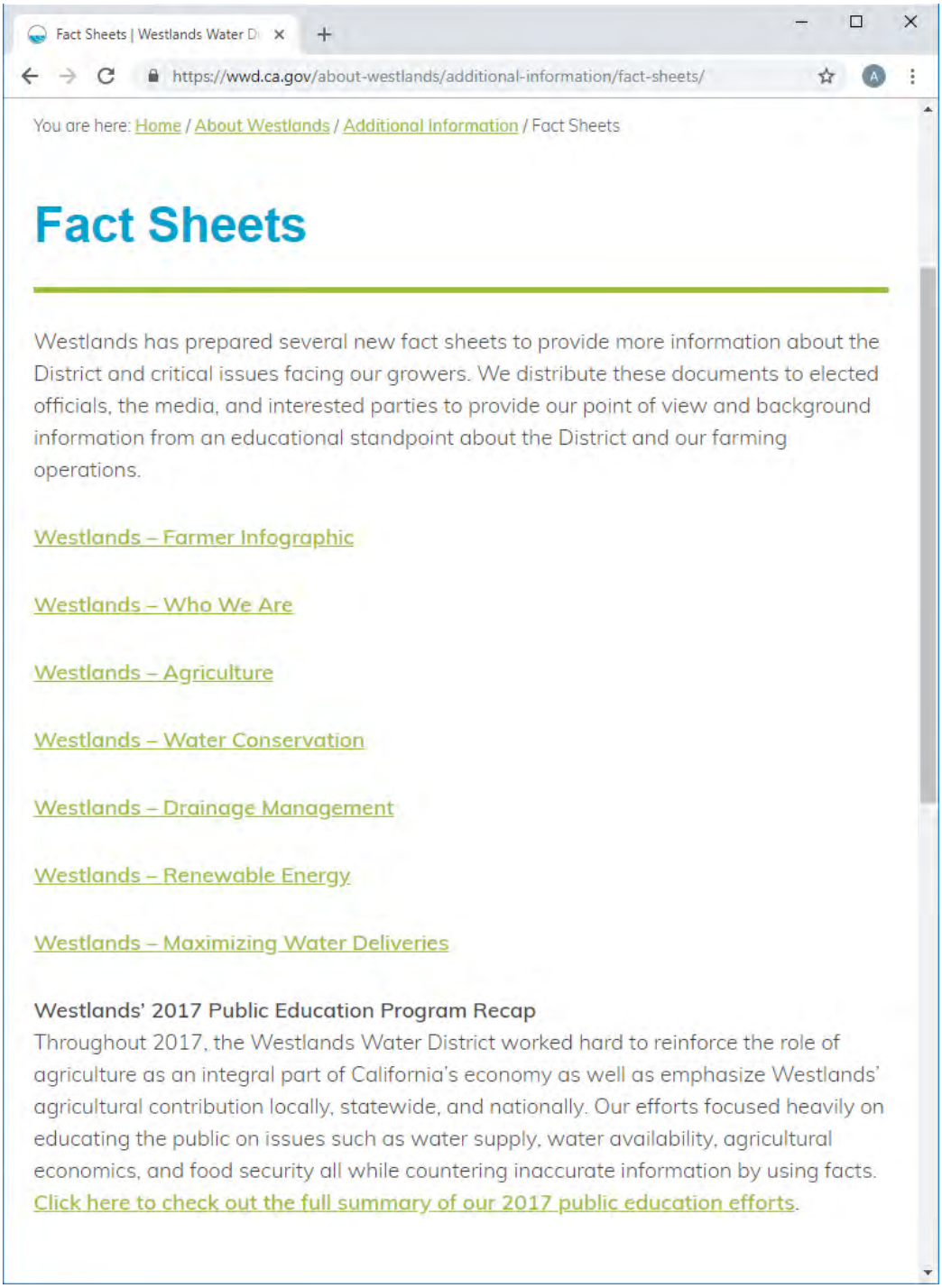
Program	*Co-Funders (If Any)*	*Yearly Targets*
See "e. other" below		

[11] Irrigated acres exclude 82,000 acres of retired land owned by the District

[12] Surveys were conducted by the Cal Poly Irrigation Training and Research Center (ITRC) with funding provided by the Department of Water Resources.

e. ***other***

Notices are produced for water users and land owners as needed, which consist of District supply information, legislative updates, District sponsored programs and community items. In addition, the District continuously updates its webpage with current topical information, resources and educational material relevant to the District.



4. Pricing structure - based at least in part on quantity delivered

Adopt a water pricing structure based on the measured quantity delivered.

The District currently prices water by volume. All deliveries are billed by volume; supplemental water is priced at market rate.

See Attachment B, Page 79, for current year rate ordinance.

5. Evaluate and improve efficiencies of district pumps

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

District pumps range in size from 15 to 700 HP and are monitored on a triennial testing program. Overhauls are scheduled when pumps test out at less than 60% efficient.

	Total in District	*# surveyed in 2016*	*# surveyed in 2017*	*# projected for 2018*
Wells	*905	83	88	90
Lift pumps	510	30	26	30

**Total Number of Privately Owned Operational Wells in 2017. Only approximately 316 wells in the Groundwater Management Program are tested for efficiencies.*

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)	7,320[13]	Dry Farm, Grazing, Solar Power
Poor drainage	90,500	Dry Farm, Grazing, Solar Power
Groundwater Selenium concentration > 50 ppb		
Poor productivity	46,000	Solar Power

The District markets drainage impaired land to solar developers.

2. Facilitate use of available recycled urban wastewater

Sources of Recycled Urban Waste Water	*AF/Y Available*	*AF/Y Currently Used in District*
None		

[13] *Depth to Water Surface acreage is calculated based on data obtained by District staff as of April 2018.*

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

Listing of program(s) offered:

Enhanced Irrigation System Improvement Program (EISIP) offers low interest loans to water users for the lease-purchase of irrigation system equipment. EISIP funds up to $130,000 towards the purchase of irrigation system equipment, and purchase of portable aluminum irrigation pipe, micro irrigation, mechanized linear move and center pivots.

4. Incentive pricing

Describe incentive rate structure and purpose.

The District does not have a formal incentive price program. The District has a de facto incentive pricing structure since supplemental water must be purchased to meet minimum crop requirements in all water years and allocation scenarios. Supplemental water is purchased at market price which is typically higher in cost than CVP Contract water.

5. a) Line or pipe ditches and canals

Canal/Lateral (Reach)	*Type of Improvement*	*Number of Miles in Reach*	*Estimated Seepage (AF/Y)*	*Accomplished/ Planned Date*
None				

Westlands Water District delivery system consists of 1,034 miles of underground pipeline with over 3,400 metered turnouts, which radiates from the San Luis Aqueduct and Coalinga Canal. In addition, the District has one unlined canal (Inlet Canal) 7.4 miles. Lining the Inlet Canal is not a priority currently due to operational frequency, low seepage losses and cost.

b) Construct/line regulatory reservoirs

Reservoir Name	*Location*	*Describe improved operational flexibility and AF savings*
None		

The District delivery system was designed and constructed with regulatory reservoirs/tanks to maintain a consistent pressure within each lateral.

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

See Attachment J, Page 166, contractor 'agricultural water order' form

7. Construct and operate district spill and tailwater recovery systems

Distribution System Lateral	*Annual Spill (AF/Y)*	*Quantity Recovered and reused (AF/Y)*
None	0	0
Total		

Drainage System Lateral	*Annual Drainage Outflow (AF/Y)*	*Quantity Recovered and reused (AF/Y)*
None	0	0
Total		

Describe facilities that resulted in reduced spill and tailwater

The District operates spill recovery/overflow situated at Mile Post 15.52 on the Coalinga Canal into Los Gatos Creek, it is an emergency overflow protection. The District does not allow the outflow of surface water from the District and all water users are responsible in controlling tail water on their farms. Any water user found in violation of these regulations will have their service discontinued. (Appendix A: Regulations of Terms and Conditions for Agriculture for Agriculture Water Services, Article 2, Section 2.6, paragraphs G, H, & I). Attachment B, Page 81.

8. *Plan to measure outflow.*

The District does not have a plan to measure tailwater and drain water outflow. The District does not allow the outflow of tailwater and drain water from the District. Article 2, Section 2.6 G. states" Each water user shall take reasonable steps to reuse or control tail water. The failure to do so shall constitute a waste of water."

Total # of outflow (surface) locations/points 0

Total # of outflow (subsurface) locations/points 0

Total # of measured outflow points 0

Percentage of total outflow (volume) measured during report year 0%

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*
N/A					

9. Optimize conjunctive use of surface and groundwater

Describe the potential for increasing conjunctive use of surface and groundwater.

When surface water allocation is reduced water users increase groundwater use. When surface water is increased groundwater use decreases. Conjunctive use means actively managing the aquifer systems as an underground reservoir. During wet years, when more surface water is available, surface water is being developed to be stored underground by recharging the aquifers with surplus Section 215 and flood water, under the Districts' Arroyo Pasajero Recharge Basin development project. The District provides low cost power under the Groundwater Management Program (GWMP). Also, under the District's Distribution Integration Program (DIP) the District allows water users to pump groundwater into a lateral with approval of all water users on that lateral if the groundwater meets minimum water quality requirement standards. Further, the District's Canal Integration Program (CIP) allows water users to pump groundwater into the San Luis Canal (California Aqueduct) and receive surface water credit.

10. Automate distribution and/or drainage system structures

The District's distribution delivery system is fully automated through closed underground pipeline that increase delivery flexibility and reduce spill and losses. Improving this system is shown in the outlined budget table in Section III C1.

11. Facilitate or promote water customer pump testing and evaluation
See Attachment I, Page 165, Notices of District Education Programs and Services Available to Customers.

12. Mapping[14]

GIS maps	*Estimated cost (in $1,000s)*				
	Year 1	*Year 2*	*Year 3*	*Year 5*	*Year 6*
Layer 1 – Agricultural conveyance system	7.5	3.6	34.4	34.4	34.4
Layer 2 – Drainage system	0	0	0	0	0
Suggested layers:	0	0	0	0	0
Layer 3 – Groundwater information	13.1	13.1	13.1	13.1	13.1
Layer 4 – Soils map	0.8	0.8	0.8	0.8	0.8
Layer 5 – Natural & cultural resources	0.5	0.5	0.5	0.5	0.5
Layer 6 – Problem areas	0	0	0	0	0
Layer 7 – Assessment management	0.5	0.5	0.5	0.5	0.5
Layer 7 – Agricultural management	3.6	3.6	3.6	3.6	3.6

[14] The District has an inventory of geographic information system (GIS) data which it updates regularly including GIS maps, distribution system, groundwater and other maps.

C. Provide a 5-Year Budget for Implementing BMPs

1. Amount actually spent during 2017 Contract Water year.

Year 2017			*Actual Expenditure*	
BMP #		*BMP Name*	*(not including staff time)*	*Staff Hours*
A	*1*	*Measurement*	*$373,348*	*4,262*
	2	*Conservation staff*	*$83,000*	*2,100*
	3	*On-farm evaluation /water delivery info*	*$700*	*20*
		Irrigation Scheduling	*$0*	*0*
		Water quality	*$15,000*	*300*
		Agricultural Education Program	*$9,600*	*63*
	4	*Quantity pricing*	*$0*	*0*
	5	*Contractor's pumps*	*$248,995*	*1,200*
B	*1*	*Alternative land use*	*$188,324*	*1,000*
	2	*Urban recycled water use*	*$0*	*0*
	3	*Financing of on-farm improvements*	*$1,774,040*	*160*
	4	*Incentive pricing*	*$15,000*	*245*
	5	*Line or pipe canals/install reservoirs*	*$0*	*0*
	6	*Increase delivery flexibility*	*$0*	*0*
	7	*District spill/tailwater recovery systems*	*$0*	*0*
	8	*Measure outflow*	*$0*	*0*
	9	*Optimize conjunctive use*	*$2,100*	*600*
	10	*Automate canal structures*	*$4,200*	*12*
	11	*Customer pump testing*	*$0*	*0*
	12	*Mapping*	*$26,082*	*400*
		Total	*$2,740,389*	*10,362*

2. Projected budget summary for 2018 Contract Water year.

Year 2018			Actual Expenditure	
BMP	#	BMP Name	(not including staff time)	Staff Hours
A	1	Measurement	$400,000	4,300
	2	Conservation staff	$83,000	2,100
	3	On-farm evaluation /water delivery info	$15,000	20
		Irrigation Scheduling	$0	0
		Water quality	$5,000	100
		Agricultural Education Program	$9,600	60
	4	Quantity pricing	$0	0
	5	Contractor's pumps	$200,000	1,700
B	1	Alternative land use	$200,000	1,000
	2	Urban recycled water use	$0	0
	3	Financing of on-farm improvements	$2,500,000	80
	4	Incentive pricing	$3,000	50
	5	Line or pipe canals/install reservoirs	$0	0
	6	Increase delivery flexibility	$0	0
	7	District spill/tailwater recovery systems	$0	0
	8	Measure outflow	$0	0
	9	Optimize conjunctive use	$2,100	600
	10	Automate canal structures	$559,000	30
	11	Customer pump testing	$300	10
	12	Mapping	$23,800	360
		Total	$4,000,800	10,410

3. Projected budget summary for 2019 Contract Water year.

Year 2019			Actual Expenditure	
BMP	#	BMP Name	(not including staff time)	Staff Hours
A	1	Measurement	$250,000	4,300
	2	Conservation staff	$83,000	2,100
	3	On-farm evaluation /water delivery info	$15,000	20
		Irrigation Scheduling	$0	0
		Water quality	$5,000	100
		Agricultural Education Program	$14,000	80
	4	Quantity pricing	$0	0
	5	Contractor's pumps	$400,000	1,700
B	1	Alternative land use	$200,000	1,000
	2	Urban recycled water use	$0	0
	3	Financing of on-farm improvements	$2,500,000	80
	4	Incentive pricing	$3,000	50
	5	Line or pipe canals/install reservoirs	$0	0
	6	Increase delivery flexibility	$0	0
	7	District spill/tailwater recovery systems	$0	0
	8	Measure outflow	$0	0
	9	Optimize conjunctive use	$2,100	600
	10	Automate canal structures	$4,000	20
	11	Customer pump testing	$300	10
	12	Mapping	$53,000	835
		Total	$3,529,400	10,895

4. Projected budget summary for 2020 Contract Water year.

Year 2020			Actual Expenditure	
BMP	#	BMP Name	(not including staff time)	Staff Hours
A	1	Measurement	$275,000	4,300
	2	Conservation staff	$83,000	2,100
	3	On-farm evaluation /water delivery info	$15,000	20
		Irrigation Scheduling	$0	0
		Water quality	$5,000	100
		Agricultural Education Program	$14,000	80
	4	Quantity pricing	$0	0
	5	Contractor's pumps	$220,000	1,700
B	1	Alternative land use	$200,000	1,000
	2	Urban recycled water use	$0	0
	3	Financing of on-farm improvements	$2,500,000	80
	4	Incentive pricing	$3,000	50
	5	Line or pipe canals/install reservoirs	$0	0
	6	Increase delivery flexibility	$0	0
	7	District spill/tailwater recovery systems	$0	0
	8	Measure outflow	$0	0
	9	Optimize conjunctive use	$2,100	600
	10	Automate canal structures	$4,000	20
	11	Customer pump testing	$300	10
	12	Mapping	$53,000	835
		Total	$3,374,400	10,895

5. Projected budget summary for 2021 Contract Water year.

Year 2021			Actual Expenditure	
BMP	#	BMP Name	(not including staff time)	Staff Hours
A	1	Measurement	$300,000	4,300
	2	Conservation staff	$83,000	2,100
	3	On-farm evaluation /water delivery info	$15,000	20
		Irrigation Scheduling	$0	0
		Water quality	$5,000	100
		Agricultural Education Program	$14,000	80
	4	Quantity pricing	$0	0
	5	Contractor's pumps	$250,000	1,700
B	1	Alternative land use	$200,000	1,000
	2	Urban recycled water use	$0	0
	3	Financing of on-farm improvements	$2,500,000	80
	4	Incentive pricing	$3,000	50
	5	Line or pipe canals/install reservoirs	$0	0
	6	Increase delivery flexibility	$0	0
	7	District spill/tailwater recovery systems	$0	0
	8	Measure outflow	$0	0
	9	Optimize conjunctive use	$2,100	600
	10	Automate canal structures	$4,000	20
	11	Customer pump testing	$300	10
	12	Mapping	$53,000	835
		Total	$3,429,400	10,895

Section IV: Best Management Practices for Urban Contractors

A. Urban BMPs

Foundational BMPs

1. Utility Operations Programs

1.1. Operations Practices

A.1) Conservation Coordinator

Contact Name: Russ Freeman, P.E.
Title: Deputy General Manager of Resources
Telephone: 559-241-6241
E-mail: rfreeman@westlandswater.org

A.2) Water waste prevention

See Attachment B, Page 81, Operating Rules and Regulations (Article 2)

Article 2, Section 2.6 I. states "The unauthorized using, taking, or wasting of water is prohibited and may subject the water user to civil or criminal prosecution."

A.3) Wholesale agency assistance programs

None

1.2. Water Loss Control

Urban and Agricultural Water is distributed through 1,034 miles of buried pipe, varying in diameter from 10 to 96 inches. The District's Delivery System is monitored for leaks by field operator and sometimes reported by water users. In 2017 there was 60 leaks repaired costing $393,158.97 in materials and labor.

1.3. Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

All customers are metered and billed by volume of use.

1.4. Retail Conservation Pricing

Customer Class	Water Rate Type	Conserving Rate?
Institutional	Uniform	Yes
Commercial	Uniform	Yes
Industrial	Uniform	Yes

2. *Education Programs*

2.1. Public Information Programs

The District also provided 120 media contacts for the production of articles or stories resulting from outreach. The District continuously updates its website (http://wwd.ca.gov/) with the current topical information, resource material and educational materials relevant to Westlands.

2.2. School Education Programs

In 2017, thirty flyers and/or brochures, bill stuffers, messages printed on bill, information packets were provided to the public.

Programmatic BMPs

Programmatic BMP is not applicable because Westlands Water District is not an urban contractor and does not provide potable water.

3. *Residential*
   - *A.1) Residential assistance program*
   - *A.2) Landscape water survey*
   - *A.3) High-efficiency clothes washers (HECWs)*
   - *A.4) Water Sense Specification (WSS) toilets*
   - *A.5) Water Sense Specifications for residential development*

4. *Commercial, Industrial, and Institutional (CII)*

5. *Landscape*

B. Provide a 5-Year Budget for Expenditures and Staff Effort for BMPs

1. Amount actually spent during current year.

Year 2016 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
1.1	Operations Practices	$0	0
1.2	Water Loss Control	$0	0
1.3	Metering	$0	0
1.4	Retail Conservation Pricing	$0	0
2.	Education Programs		
2.1	Public Information Programs	$200,000	600
2.2	School Education Programs	$12,000	80
3.	Residential	$0	0
4.	CII	$0	0
5.	Landscape	$0	0
	Total	$212,000	680

2. Projected budget summary for 2nd year.

Year 2017 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
1.1	Operations Practices	$0	0
1.2	Water Loss Control	$0	0
1.3	Metering	$0	0
1.4	Retail Conservation Pricing	$0	0
2.	Education Programs		
2.1	Public Information Programs	$700,000	2040
2.2	School Education Programs	$13,500	90
3.	Residential	$0	0
4.	CII	$0	0
5.	Landscape	$0	0
	Total	$713,500	2130

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

Year 2018 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
1.1	Operations Practices	$0	0
1.2	Water Loss Control	$0	0
1.3	Metering	$0	0
1.4	Retail Conservation Pricing	$0	0
2.	Education Programs		
2.1	Public Information Programs	$721,000	2040
2.2	School Education Programs	$13,905	90
3.	Residential	$0	0
4.	CII	$0	0
5.	Landscape	$0	0
	Total	$734,905	2130

4. *Projected budget summary for 4th year.*

Year 2019 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
1.1	Operations Practices	$0	0
1.2	Water Loss Control	$0	0
1.3	Metering	$0	0
1.4	Retail Conservation Pricing	$0	0
2.	Education Programs		
2.1	Public Information Programs	$743,000	2040
2.2	School Education Programs	$14,300	90
3.	Residential	$0	0
4.	CII	$0	0
5.	Landscape	$0	0
	Total	$757,300	2130

5. *Projected budget summary for 5th year.*

Year 2020 BMP #	BMP Name	Projected Expenditures (not including staff hours)	Staff Hours
1.	Utilities Operations		
1.1	Operations Practices	$0	0
1.2	Water Loss Control	$0	0
1.3	Metering	$0	0
1.4	Retail Conservation Pricing	$0	0
2.	Education Programs		
2.1	Public Information Programs	$765,000	2040
2.2	School Education Programs	$14,750	90
3.	Residential	$0	0
4.	CII	$0	0
5.	Landscape	$0	0
	Total	$779,750	2130

Section V: District Water Inventory Tables

Table 1

Surface Water Supply

2016 **Month**	**Federal Ag Water** (acre-feet)	**Federal non-Ag Water.** (acre-feet)	**State Water (SWP)** (acre-feet)	**Local Water (SLC,CC)** (acre-feet)	**Other Water (215-Kings)** (acre-feet)	**Transfers into District** (acre-feet)	**Upslope Drain Water** (acre-feet)	**Total** (acre-feet)
Method								
January	1,871	128	213			50	0	2,262
February	3,162	156		30		550	0	3,898
March	3,330	88	4,402	172		500	0	8,492
April	2,039	94		3,731		13,950	0	19,814
May	239	121		4,330		27,693	0	32,383
June	197	177	2,000	2,120		49,508	0	54,002
July		362	9,725	2,457		38,937	0	51,481
August		478	22,775	1,446		4,814	0	29,513
September	210	793	4,200			16,062	0	21,265
October		410	7,553			7,018	0	14,981
November	18	203	1,164			2,788	0	4,173
December		143				2,907	0	3,050
TOTAL	11,066	3,153	52,032	14,286	0	164,777	0	245,314

Table 2

Ground Water Supply

2016 Month	**District[15] Groundwater** (acre-feet)	**Private Urban Groundwater** *(acre-feet)	**Private Agric Groundwater** *(acre-feet)
Method			
January	4,155		0
February	7,912		36,399
March	13,465		0
April	18,692		0
May	20,531		120,901
June	28,274		0
July	24,035		0
August	19,315		186,757
September	11,718		0
October	8,822		0
November	5,299		106,621
December	5,184		12,634
TOTAL	167,402	0	463,435

*read quarterly; includes estimated use

[15] District Groundwater totals are from enrolled wells in the District's Groundwater Management Program.

Table 3

Total Water Supply

2016 Month	Surface Water Total (acre-feet)	District Groundwater (acre-feet)	Recycled M&I Wastewater (acre-feet)	Total District Water Supply (acre-feet)
Method				
January	2,262	4,155	0	6,417
February	3,898	7,912	0	11,810
March	8,492	13,465	0	21,957
April	19,814	18,692	0	38,506
May	32,383	20,531	0	52,914
June	54,002	28,274	0	82,276
July	51,481	24,035	0	75,516
August	29,513	19,315	0	48,828
September	21,265	11,718	0	32,983
October	14,981	8,822	0	23,803
November	4,173	5,299	0	9,472
December	3,050	5,184	0	8,234
TOTAL	245,314	167,402	0	412,716

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

2016 Precipitation Worksheet				
	inches precip	ft precip	acres	AF/Year
Jan	2.57	0.21	22.42	13.01
Feb	2.21	0.18	0.00	0.00
Mar	0.79	0.07	0.00	0.00
Apr	0.30	0.03	0.00	0.00
May	0.29	0.02	0.00	0.00
Jun	0.03	0.00	0.05	0.03
Jul	0.07	0.01	0.00	0.00
Aug	0.07	0.01	0.00	0.00
Sept	0.20	0.02	0.00	0.00
Oct	0.21	0.02	0.00	0.00
Nov	0.17	0.01	0.00	0.00
Dec	0.05	0.00		
TOTAL	**6.96**	**0.58**		

2016 Evaporation Worksheet				
	inches evap	ft evap	acres	AF/YEAR
Jan	1.17	0.10	22.42	116.25
Feb	1.79	0.15	0.00	0.00
Mar	4.19	0.35	0.00	0.00
Apr	6.00	0.50	0.00	0.00
May	8.03	0.67	0.00	0.00
Jun	9.11	0.76	0.05	0.24
Jul	9.50	0.79	0.00	0.00
Aug	8.03	0.67	0.00	0.00
Sept	6.06	0.51	0.00	0.00
Oct	4.55	0.38	0.00	0.00
Nov	2.09	0.17	0.00	0.00
Dec	1.69	0.14		
TOTAL	**62.21**	**5.18**		

Table 4

Agricultural Distribution System

2016 Canal, Pipeline, Lateral, Reservoir	Length (feet)	Width (feet)	Surface Area (square feet)	Precipitation (acre-feet)	Evaporation (acre-feet)	Spillage (acre-feet)	Seepage (acre-feet)	Total (acre-feet)
7-1 Inlet	39,072	25	976,800	13.0	13.0	0	1	(1)
31 Reg. Reservoirs	45	45	2,025	0.0	7.5	0	0	(7)
Lateral 13L	0	0	0	0.0	0.0	0.033	0	(0.03)
Lateral 15L	0	0	0	0.0	0.0	0.0066	0	(0.01)
Lateral 17L	0	0	0	0.0	0.0	0.015	0	(0.02)
Lateral 3L	0	0	0	0.0	0.0	0.01	0	(0.01)
Lateral 4L	0	0	0	0.0	0.0	0.06	0	(0.06)
Lateral 7R	0	0	0	0.0	0.0	0.009	0	(0.009)
PV3	0	0	0	0.0	0.0	0.005	0	(0.005)
PV4P	0	0	0	0.0	0.0	0.001	0	(0.001)
	0	0	0	0.0	0.0	0	0	0
TOTAL				13.0	20.5	0	1	(8)

Table 5

Crop Water Needs

2016 Crop Name	Area (crop acres)	Crop ET (AF/Ac)	Leaching Requirement (AF/Ac)	Cultural Practices (AF/Ac)	Effective Precipitation (AF/Ac)	Appl. Crop Water Use (acre-feet)
Alfalfa-Hay				0.0	0.2	
Alfalfa-Seed				0.0	0.2	
Almonds				0.0	0.1	
Barley				0.0	0.2	
Beans				0.0	0.2	
Cantaloupes				0.0	0.0	
Cotton				0.0	0.0	
Garlic				0.1	0.2	
Grapes				0.0	0.0	
Lettuce-Spring				0.1	0.1	
-				0.13	0.0	
				0.1	0.2	
				0.0	0.0	
				0.0	0.1	
				0.0	0.2	
-				0.0	0.0	
-				0.1	0.0	
				0.0	0.2	
-				0.0	0.0	
-				0.0	0.1	
-				0.0	0.1	
				0.0	0.0	

Total Irrig. Acres 391,346 (This number is larger, due to dryland farming and double cropping)

Table 6

2016 District Water Inventory

Water Supply	Table 3		412,716
Environmental Consumptive Use	(Distribution, Drain, etc.)	minus	0
Groundwater recharge	(intentional - ponds, injection)	minus	0
Seepage	Table 4	minus	1
Evaporation - Precipitation	Table 4	minus	7
Spillage	Table 4	minus	0
Leaks, Breaks, Flushing / Fire	Table 4	minus	0
Transfers out of District		minus	215
Water Available for sale to customers			412,493
Actual Agricultural Water Sales	2016	From District Sales Records	420,522
Private Groundwater	Table 2	plus	463,435
Crop Water Needs	Table 5	minus	933,429
Drainwater outflow	(tail and tile not recycled)	minus	0
Percolation from Agricultural Land	(calculated)		(49,472)
M&I Actual Water Sales	2016	From District Records	4,158
Inside Use	Feb urban use x 12		4,158
Landscape / Outside Use	(calculated)		0
Unaccounted for Water	(calculated)		(12,187)

Table 7

Influence on Groundwater and Saline Sink

2016

Agric Land Deep Perc + Seepage + Recharge - Groundwater Pumping = District Influence on Groundwater Storage	(167,401)
Estimated actual change in ground water storage, including natural recharge)	0
Irrigated Acres (from Table 5)	567,569
Irrigated acres over a perched water table	237,837
Irrigated acres draining to a saline sink	92,600
Portion of percolation from agri seeping to a perched water table	(28,117)
Portion of percolation from agri seeping to a saline sink	(10,947)
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	(39,063)

Table 8

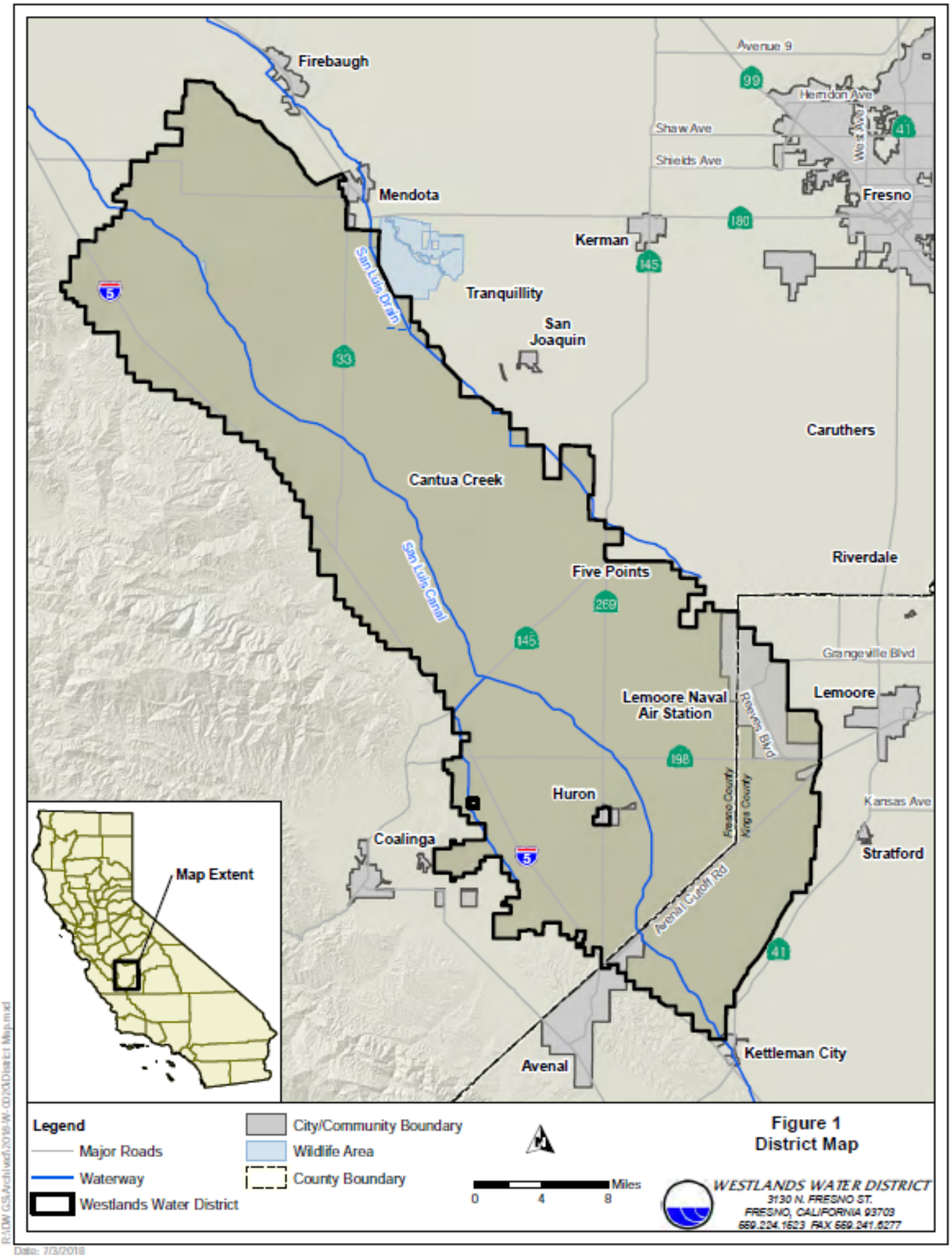
Annual Water Quantities Delivered Under Each Right or Contract

Year*	Federal Ag Water (acre-feet)	Federal non-Ag Water. (acre-feet)	State Water (SWP) (acre-feet)	Local Water (SLC,CC) (acre-feet)	Other Water (215-Kings) (acre-feet)	Transfers into District (acre-feet)	Upslope Drain Water (acre-feet)	Total (acre-feet)
2007	781,834	2,996	26,359	0	0	126,621	0	937,810
2008	364,700	3,434	15,974	527	0	167,005	0	551,640
2009	242,114	2,943	12,523	2,657	0	79,042	0	339,279
2010	448,934	3,033	4,281	1,323	0	187,631	0	645,202
2011	841,210	2,570	56,695	7,219	72,966	66,696	0	1,047,356
2012	498,382	2,527	4,263	25,618	60,000	195,221	0	786,011
2013	219,942	2,250	20,495	0	6,886	215,660	0	465,233
2014	95,954	2,438	1,277	43,400	0	86,322	0	207,748
2015	77,147	3,303	19,475	10,511	0	86,327	0	196,763
2016	11,066	3,153	52,032	14,286	0	141,946	0	222,483
Total	3,581,283	28,647	213,374	105,541	139,852	1,330,828	0	5,399,525
Average	358,128	2,865	21,337	10,554	13,985	133,083	0	539,952

* Years 2007-2011 reflect the Water Year and Years 2012-2016 reflect the Calendar Year

Attachment A: District Maps

1. District Map
2. Current Crop Map
3. Generalized Current Crop Map
4. Current Irrigation Methods
5. Incoming Flow Locations
6. Agricultural Conveyance Systems
7. M&I Locations
8. Storage Facilities
9. Topography
10. Soils Map
11. Generalized Soils Maps
12. Soils Drainage Class Map
13. Weather Stations and Climate Zones
14. Average Annual Precipitation
15. Evapo-Transpiration (ETo) Zones
16. Delivery Points


Firebaugh
Mendota
Tranquillity
San Joaquin
Kerman
Fresno
Avenue 9
Herndon Ave
Shaw Ave
Shields Ave
West Ave
Caruthers
Cantua Creek
San Luis Drain
San Luis Canal
Five Points
Riverdale
Grangeville Blvd
Lemoore Naval Air Station
Lemoore
Reserve Blvd
Huron
Coalinga
Fresno County
Kings County
Kansas Ave
Stratford
Avenal Cutoff Rd
Avenal
Kettleman City
Map Extent
Legend
Major Roads
Waterway
Westlands Water District
City/Community Boundary
Wildlife Area
County Boundary
Miles
0
4
8
Figure 1
District Map
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
R:\GIS\Archived\2018\WD\2018District Map.mxd
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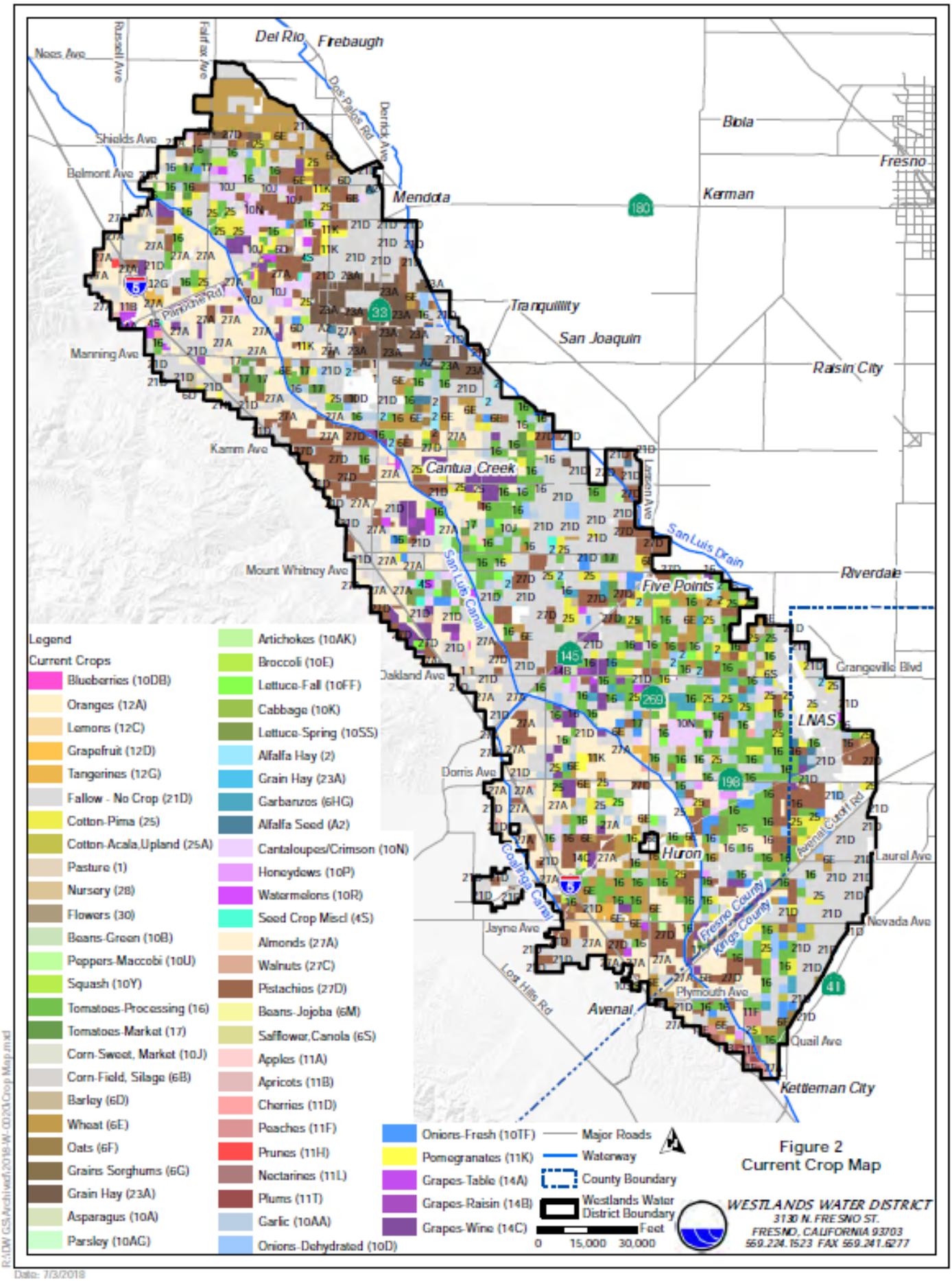
Del Rio
Firebaugh
Biola
Fresno
Kerman
Mendota
Tranquillity
San Joaquin
Raisin City
Cantua Creek
Five Points
Riverdale
Huron
Avenal
Kettleman City
LNAS
Grangeville Blvd
Laurel Ave
Nevada Ave
Quail Ave
Plymouth Ave
Jayne Ave
Dorris Ave
Oakland Ave
Mount Whitney Ave
Kamm Ave
Manning Ave
Belmont Ave
Shields Ave
Noos Ave
Russell Ave
Fairfax Ave
Dos Palos Rd
Derrick Ave
Panoche Rd
Lassen Ave
San Luis Drain
San Luis Canal
Coalinga Canal
Lost Hills Rd
Avenal Cutoff Rd
Fresno County
Kings County
Legend
Current Crops
Blueberries (10DB)
Oranges (12A)
Lemons (12C)
Grapefruit (12D)
Tangerines (12G)
Fallow - No Crop (21D)
Cotton-Pima (25)
Cotton-Acala,Upland (25A)
Pasture (1)
Nursery (28)
Flowers (30)
Beans-Green (10B)
Peppers-Maccobi (10U)
Squash (10Y)
Tomatoes-Processing (16)
Tomatoes-Market (17)
Corn-Sweet, Market (10J)
Corn-Field, Silage (6B)
Barley (6D)
Wheat (6E)
Oats (6F)
Grains Sorghums (6G)
Grain Hay (23A)
Asparagus (10A)
Parsley (10AG)
Artichokes (10AK)
Broccoli (10E)
Lettuce-Fall (10FF)
Cabbage (10K)
Lettuce-Spring (10SS)
Alfalfa Hay (2)
Grain Hay (23A)
Garbanzos (6HG)
Alfalfa Seed (A2)
Cantaloupes/Crimson (10N)
Honeydews (10P)
Watermelons (10R)
Seed Crop Miscl (4S)
Almonds (27A)
Walnuts (27C)
Pistachios (27D)
Beans-Jojoba (6M)
Safflower,Canola (6S)
Apples (11A)
Apricots (11B)
Cherries (11D)
Peaches (11F)
Prunes (11H)
Nectarines (11L)
Plums (11T)
Garlic (10AA)
Onions-Dehydrated (10D)
Onions-Fresh (10TF)
Pomegranates (11K)
Grapes-Table (14A)
Grapes-Raisin (14B)
Grapes-Wine (14C)
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Feet
0 15,000 30,000
Figure 2
Current Crop Map
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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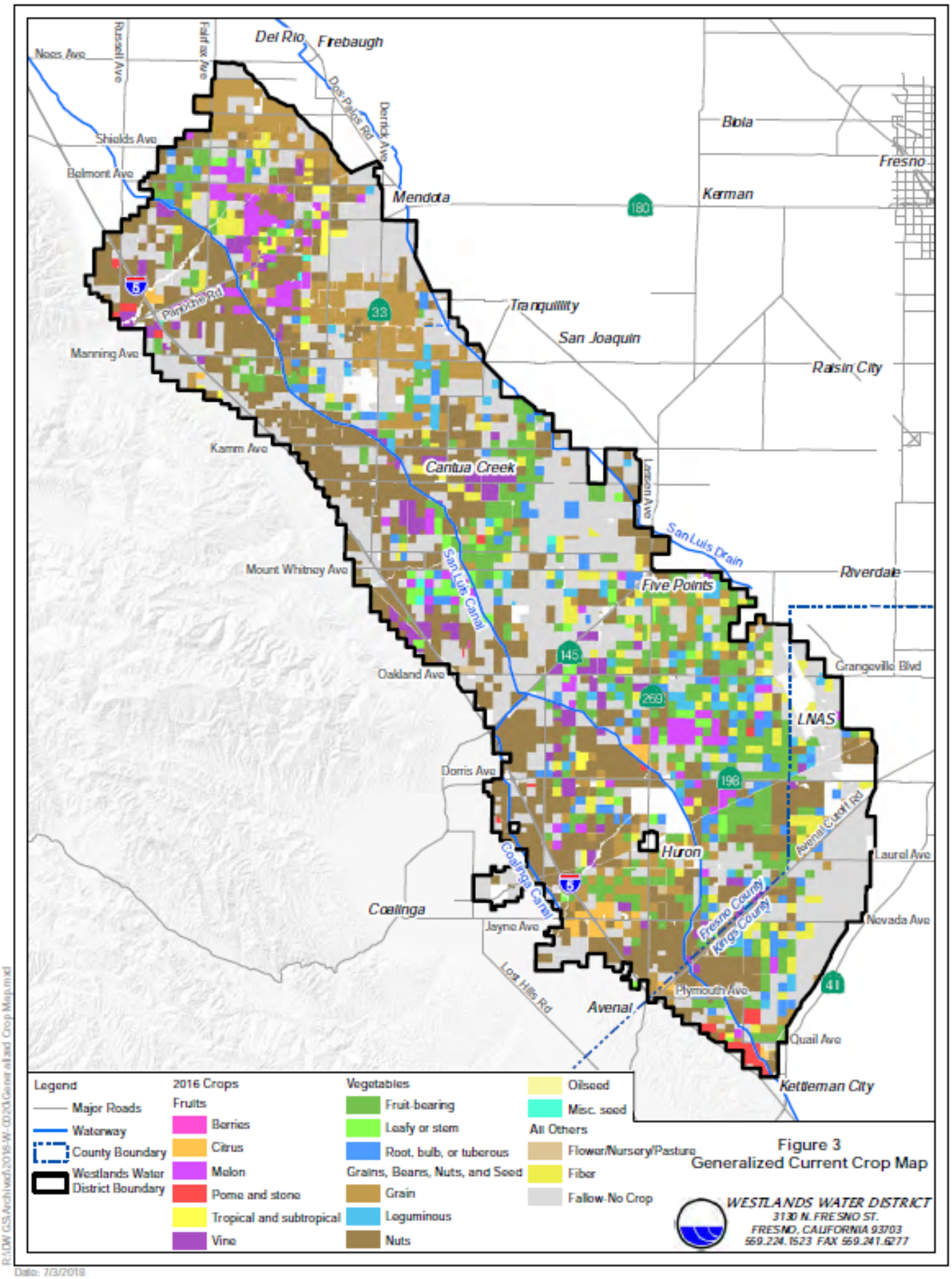
Del Rio
Firebaugh
Nees Ave
Russell Ave
Fairfax Ave
Dos Palos Rd
Derrick Ave
Shields Ave
Belmont Ave
Mendota
Biola
Fresno
Kerman
180
Panoche Rd
33
Tranquillity
San Joaquin
Raisin City
Manning Ave
Kamm Ave
Cantua Creek
Lassen Ave
San Luis Drain
Mount Whitney Ave
San Luis Canal
Five Points
Riverdale
145
Oakland Ave
Grangeville Blvd
269
LNAS
Dorris Ave
198
Huron
Laurel Ave
Coalinga Canal
Coalinga
Jayne Ave
Fresno County
Kings County
Nevada Ave
Lost Hills Rd
Plymouth Ave
41
Avenal
Quail Ave
Kettleman City
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
2016 Crops
Fruits
Berries
Citrus
Melon
Pome and stone
Tropical and subtropical
Vine
Vegetables
Fruit-bearing
Leafy or stem
Root, bulb, or tuberous
Grains, Beans, Nuts, and Seed
Grain
Leguminous
Nuts
Oilseed
Misc. seed
All Others
Flower/Nursery/Pasture
Fiber
Fallow-No Crop
Figure 3
Generalized Current Crop Map
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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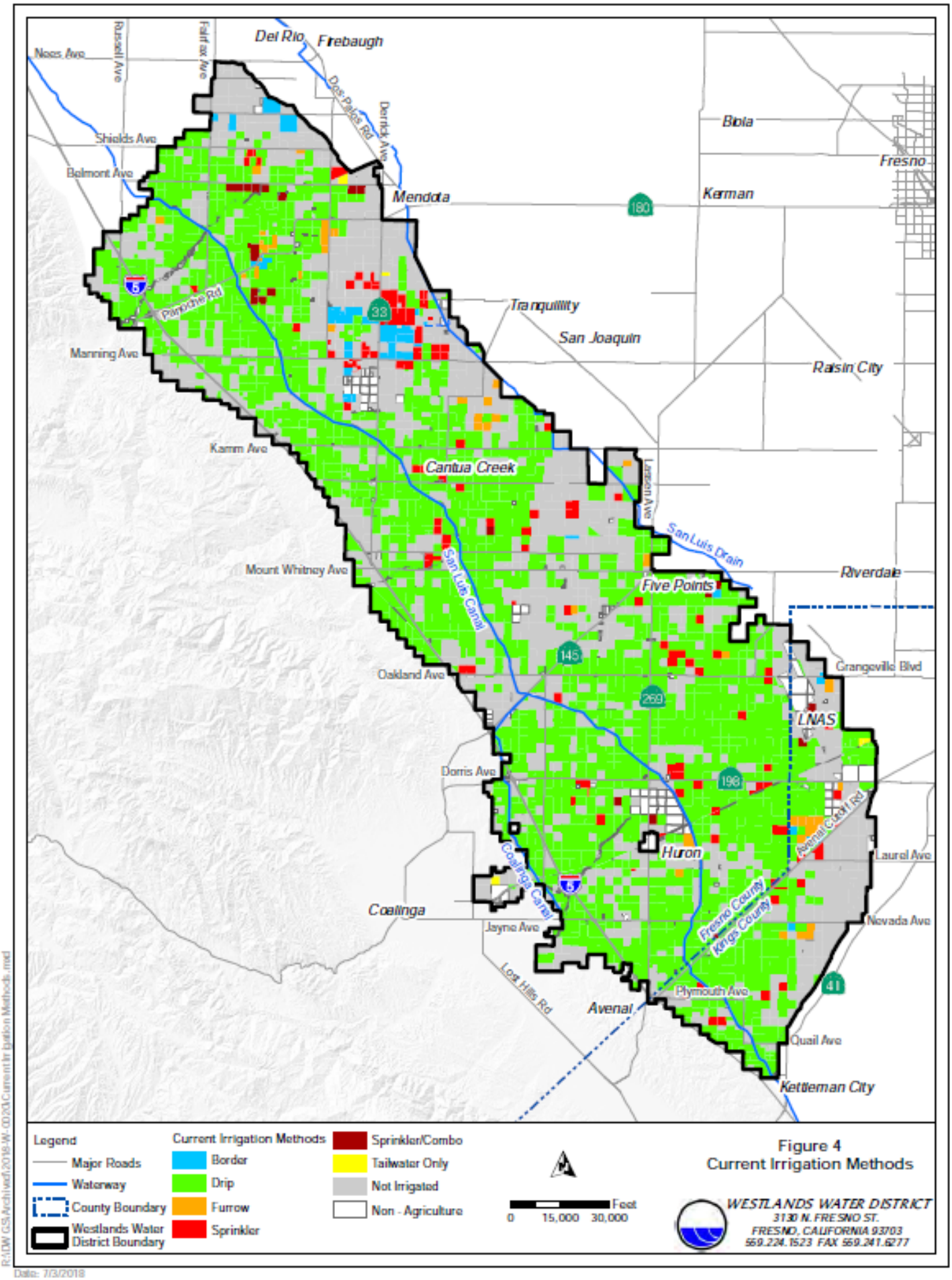
Del Rio
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Russell Ave
Fairfax Ave
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Derrick Ave
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Belmont Ave
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Biola
Fresno
Kerman
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Tranquillity
San Joaquin
Raisin City
Panoche Rd
Manning Ave
Kamm Ave
Cantua Creek
Lassen Ave
San Luis Drain
San Luis Canal
Mount Whitney Ave
Five Points
Riverdale
145
Oakland Ave
269
Grangeville Blvd
LNAS
Dorris Ave
196
Huron
Laurel Ave
Coalinga Canal
Coalinga
Jayne Ave
Fresno County
Kings County
Nevada Ave
Lost Hills Rd
Plymouth Ave
41
Avenal
Quail Ave
Kettleman City
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Current Irrigation Methods
Border
Drip
Furrow
Sprinkler
Sprinkler/Combo
Tailwater Only
Not Irrigated
Non - Agriculture
Feet
0
15,000
30,000
Figure 4
Current Irrigation Methods
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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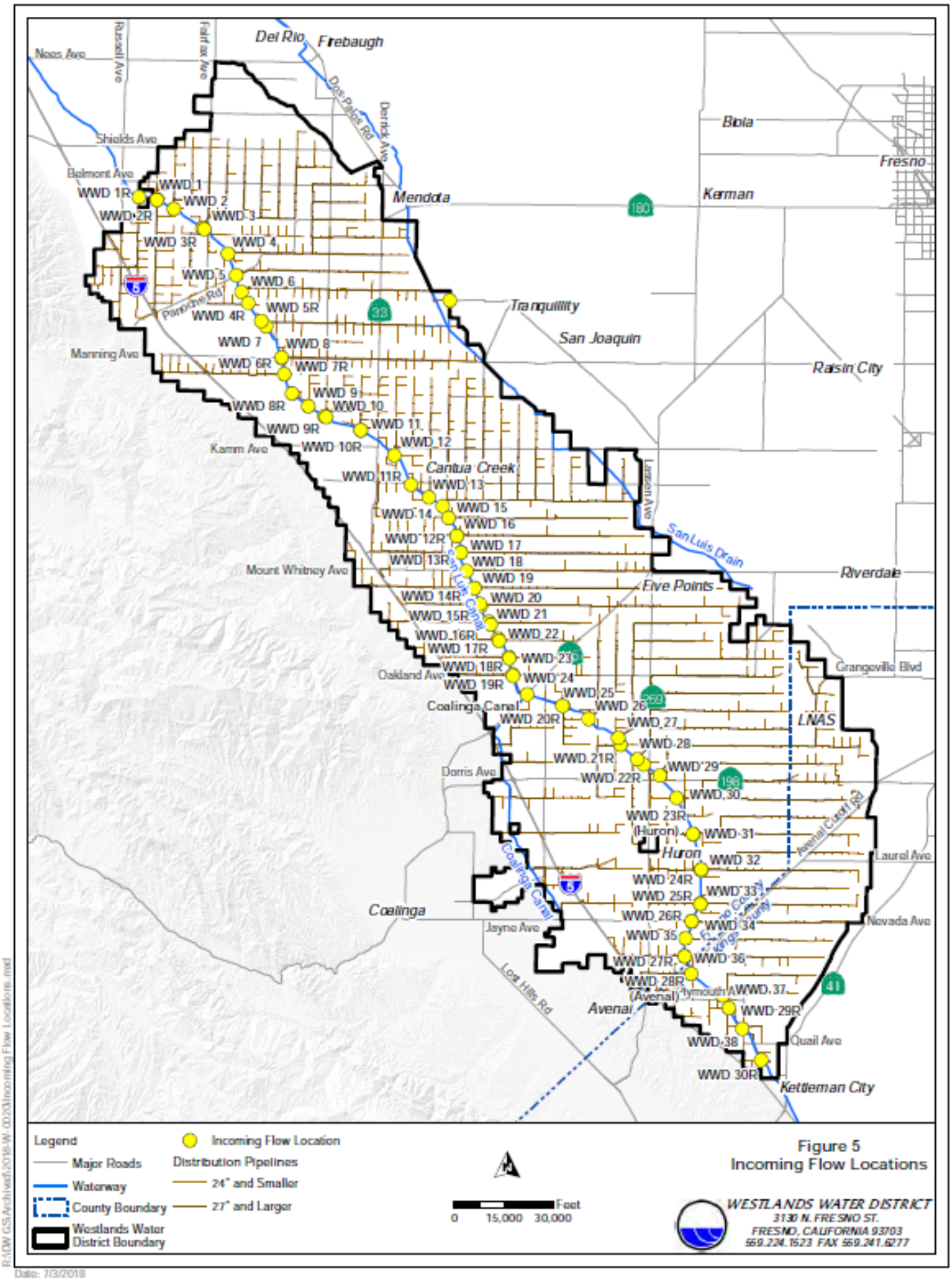
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Derrick Ave
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Biola
Fresno
Kerman
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Avenal Cutoff Rd
Coalinga
Jayne Ave
Fresno County
Kings County
Nevada Ave
Lost Hills Rd
Avenal
Plymouth Ave
Quail Ave
Kettleman City
WWD 1R
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WWD 3
WWD 3R
WWD 4
WWD 4R
WWD 5
WWD 5R
WWD 6
WWD 6R
WWD 7
WWD 7R
WWD 8
WWD 8R
WWD 9
WWD 9R
WWD 10
WWD 10R
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WWD 11R
WWD 12
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WWD 23
WWD 23R (Huron)
WWD 24
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WWD 25
WWD 25R
WWD 26
WWD 26R
WWD 27
WWD 27R
WWD 28
WWD 28R (Avenal)
WWD 29
WWD 29R
WWD 30
WWD 30R
WWD 31
WWD 32
WWD 33
WWD 34
WWD 35
WWD 36
WWD 37
WWD 38
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Incoming Flow Location
Distribution Pipelines
24" and Smaller
27" and Larger
Feet
0 15,000 30,000
Figure 5
Incoming Flow Locations
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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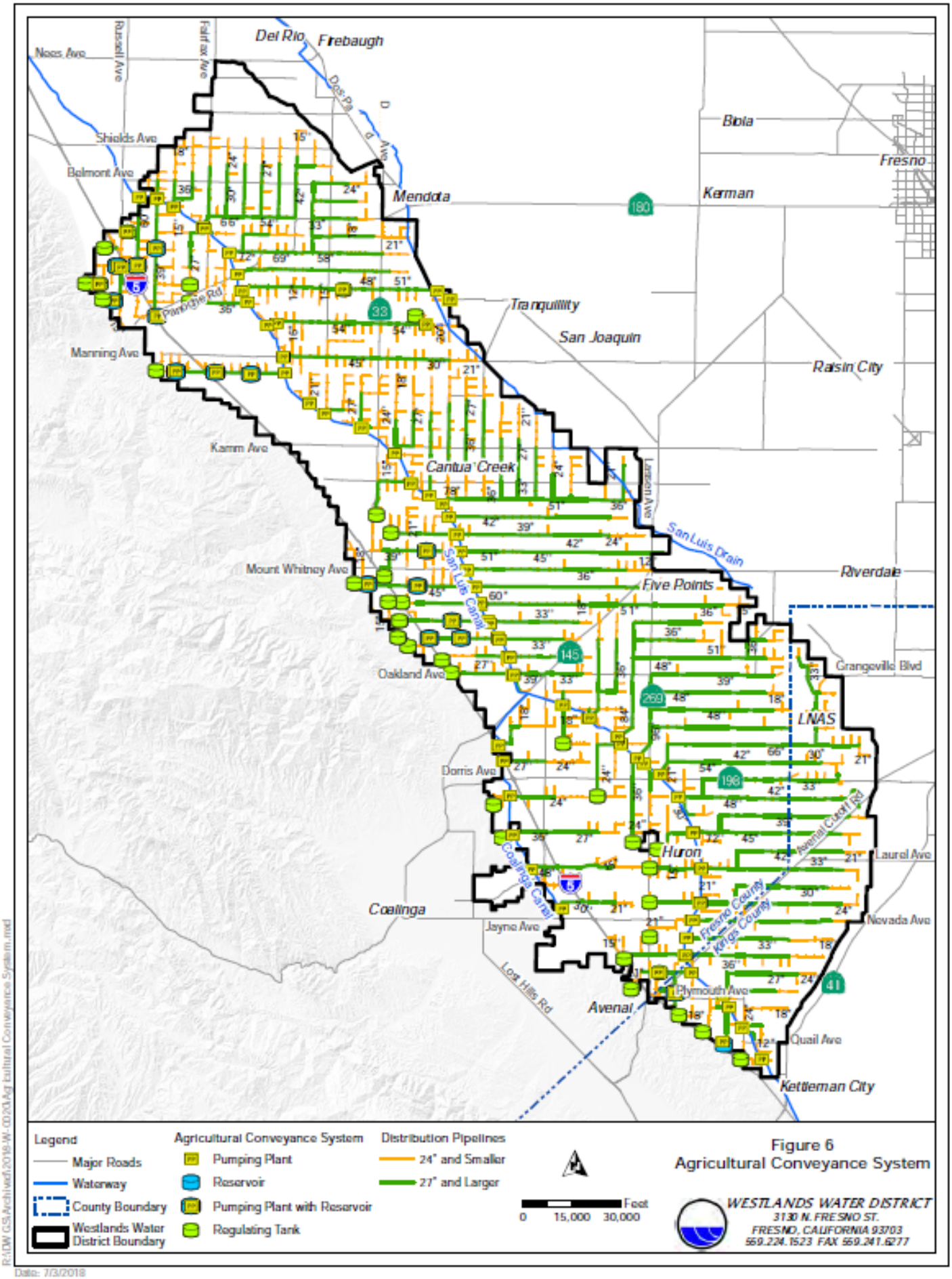
Del Rio
Firebaugh
Biola
Fresno
Kerman
Mendota
Tranquillity
San Joaquin
Raisin City
Cantua Creek
Five Points
Riverdale
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Manning Ave
Kamm Ave
Shields Ave
Belmont Ave
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Russell Ave
Fairfax Ave
Panoche Rd
Dos Palos
Lassen Ave
San Luis Drain
San Luis Canal
Coalinga Canal
Avenal Cutoff Rd
Fresno County
Kings County
Lost Hills Rd
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Agricultural Conveyance System
Pumping Plant
Reservoir
Pumping Plant with Reservoir
Regulating Tank
Distribution Pipelines
24" and Smaller
27" and Larger
Feet
0 15,000 30,000
Figure 6
Agricultural Conveyance System
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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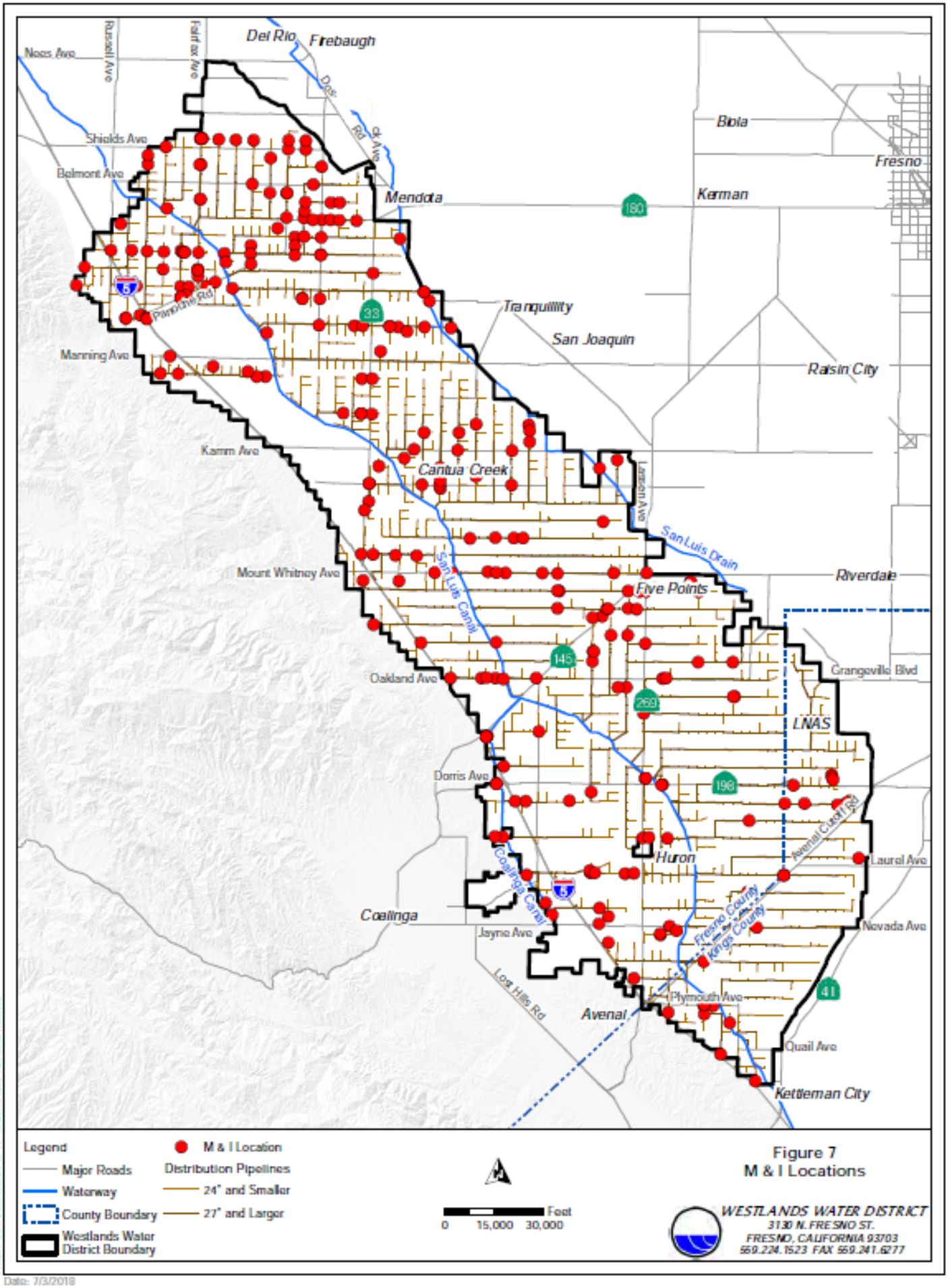
Date: 7/3/2018


Del Rio
Firebaugh
Russell Ave
Fairfax Ave
Nees Ave
Shields Ave
Belmont Ave
Mendota
Bibla
Fresno
Kerman
180
Tranquillity
San Joaquin
Raisin City
Manning Ave
Panoche Rd
Kamm Ave
Cantua Creek
Lassen Ave
San Luis Drain
San Luis Canal
Mount Whitney Ave
Five Points
Riverdale
Oakland Ave
145
269
Grangeville Blvd
LNAS
Dorris Ave
198
Avenal Cutoff Rd
Huron
Laurel Ave
Coalinga Canal
Coalinga
Jayne Ave
Fresno County
Kings County
Nevada Ave
Lost Hills Rd
Plymouth Ave
Avenal
41
Quail Ave
Kettleman City
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
M & I Location
Distribution Pipelines
24" and Smaller
27" and Larger
Feet
0 15,000 30,000
Figure 7
M & I Locations
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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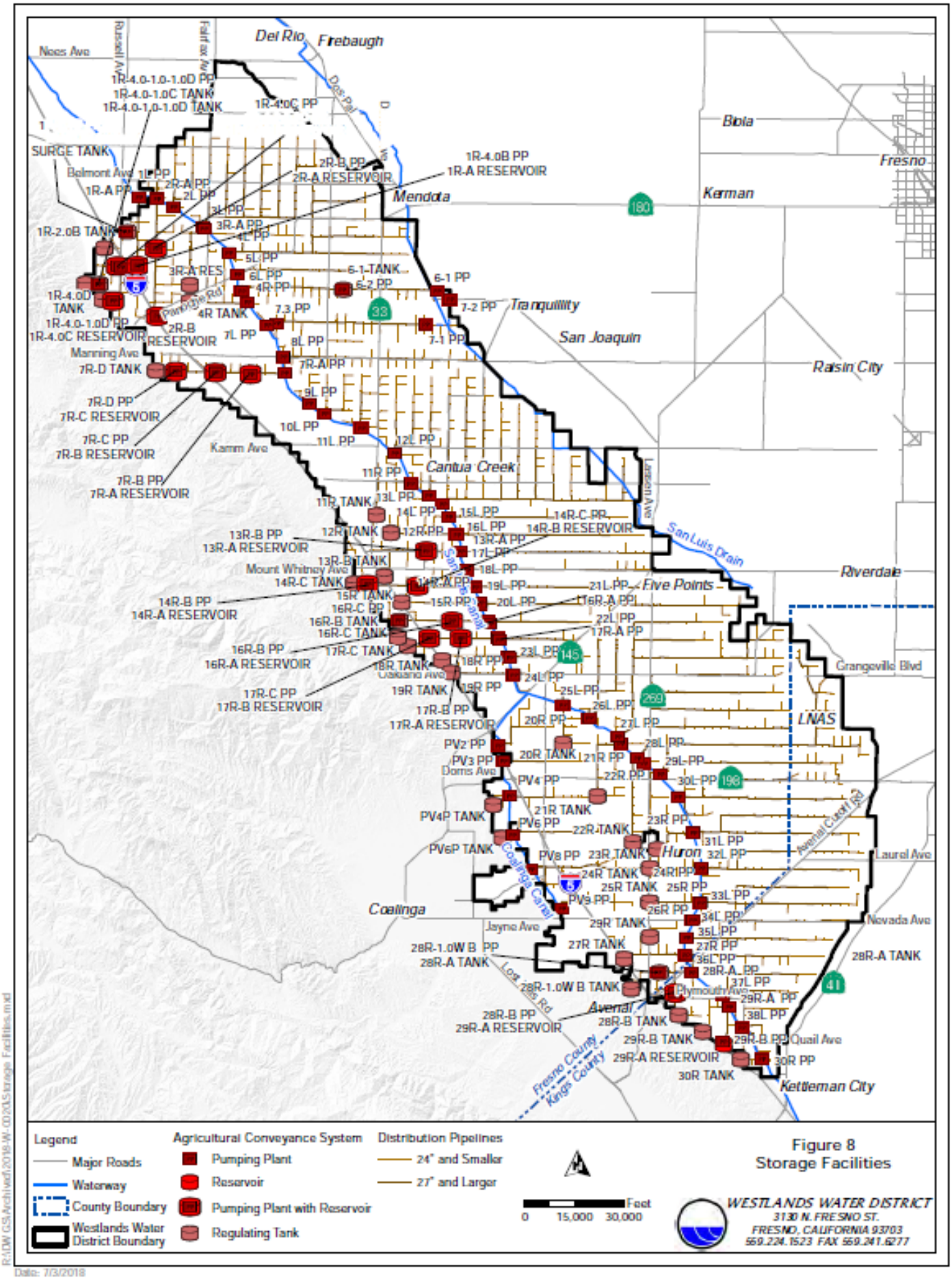
Date: 7/3/2018


Del Rio
Firebaugh
Biola
Fresno
Kerman
Mendota
Tranquillity
San Joaquin
Raisin City
Riverdale
Five Points
Huron
Coalinga
Kettleman City
LNAS
Cantua Creek
Laurel Ave
Grangeville Blvd
Nevada Ave
Quail Ave
Plymouth Ave
Jayne Ave
Doris Ave
Mount Whitney Ave
Manning Ave
Kamm Ave
Belmont Ave
Oasis Ave
Lassen Ave
Fairfax Ave
Russell Ave
Panoche Rd
Los Gatos Rd
Fresno County
Kings County
SURGE TANK
1R-4.0-1.0-1.0D PP
1R-4.0-1.0C TANK
1R-4.0-1.0-1.0D TANK
1R-4.0C PP
1R-4.0B PP
1R-A RESERVOIR
1R-A PP
1R-2.0B TANK
1R-4.0D TANK
1R-4.0-1.0D PP
1R-4.0C RESERVOIR
2R-B PP
2R-A RESERVOIR
2R-A PP
2L PP
3L PP
3R-A PP
4L PP
5L PP
3R-A RES
6L PP
4R PP
6-1 TANK
6-2 PP
6-1 PP
7-2 PP
7-3 PP
4R TANK
2R-B RESERVOIR
7L PP
8L PP
7-1 PP
7R-A PP
7R-D TANK
9L PP
7R-D PP
7R-C RESERVOIR
10L PP
11L PP
12L PP
7R-C PP
7R-B RESERVOIR
7R-B PP
7R-A RESERVOIR
11R PP
11R TANK
13L PP
14L PP
15L PP
14R-C PP
14R-B RESERVOIR
12R TANK
12R PP
16L PP
13R-A PP
13R-B PP
13R-A RESERVOIR
17L PP
13R-B TANK
18L PP
14R-C TANK
14R-A PP
19L PP
21L PP
15R TANK
15R PP
20L PP
16R-A PP
14R-B PP
14R-A RESERVOIR
16R-C PP
16R-B TANK
22L PP
16R-C TANK
17R-A PP
16R-B PP
16R-A RESERVOIR
17R-C TANK
23L PP
18R TANK
18R PP
24L PP
19R TANK
25L PP
19R PP
17R-C PP
17R-B RESERVOIR
17R-B PP
17R-A RESERVOIR
26L PP
20R PP
27L PP
PV2 PP
28L PP
20R TANK
21R PP
PV3 PP
29L PP
22R PP
PV4 PP
30L PP
21R TANK
PV4P TANK
PV6 PP
22R TANK
23R PP
PV6P TANK
31L PP
PV8 PP
23R TANK
32L PP
24R TANK
24R PP
25R TANK
25R PP
PV9 PP
33L PP
26R PP
34L PP
29R TANK
35L PP
27R TANK
27R PP
28R-1.0W B PP
28R-A TANK
36L PP
28R-A PP
37L PP
28R-1.0W B TANK
29R-A PP
28R-B PP
29R-A RESERVOIR
38L PP
28R-B TANK
29R-B TANK
29R-B PP
29R-A RESERVOIR
30R PP
30R TANK
28R-A TANK
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Agricultural Conveyance System
Pumping Plant
Reservoir
Pumping Plant with Reservoir
Regulating Tank
Distribution Pipelines
24" and Smaller
27" and Larger
Feet
0 15,000 30,000
Figure 8
Storage Facilities
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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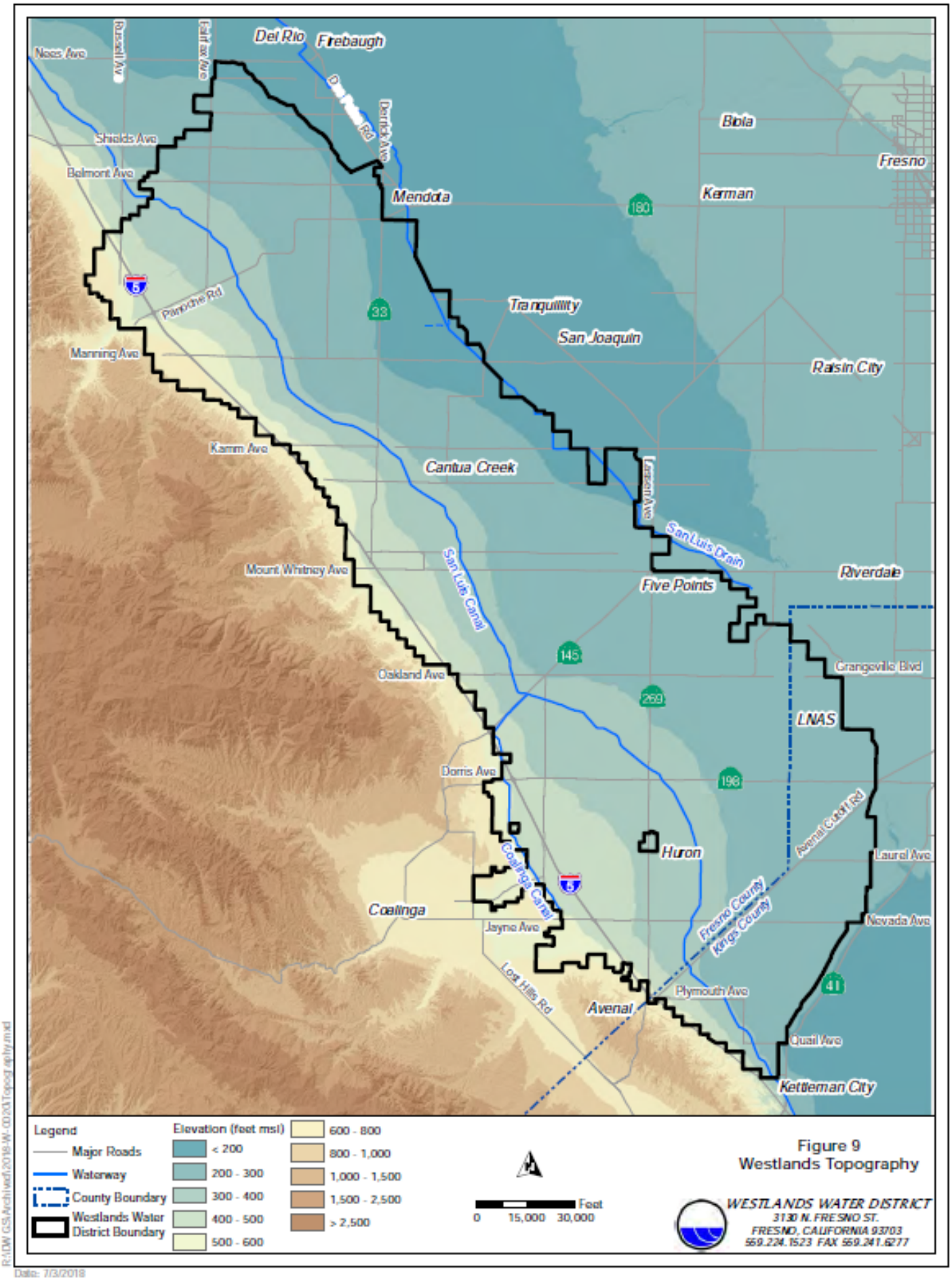
Del Rio
Firebaugh
Ness Ave
Russell Ave
Fairfax Ave
Shields Ave
Belmont Ave
Derrick Ave
Mendota
Biola
Fresno
Kerman
180
Tranquillity
33
San Joaquin
Raisin City
Panoche Rd
Manning Ave
Kamm Ave
Cantua Creek
Jamieson Ave
San Luis Drain
Mount Whitney Ave
San Luis Canal
Five Points
Riverdale
145
Grangeville Blvd
Oakland Ave
269
LNAS
Dorris Ave
198
Avenal Cutoff Rd
Huron
Laurel Ave
Coalinga Canal
Coalinga
Fresno County
Kings County
Nevada Ave
Jayne Ave
Lost Hills Rd
Plymouth Ave
41
Avenal
Quail Ave
Kettleman City
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Elevation (feet msl)
< 200
200 - 300
300 - 400
400 - 500
500 - 600
600 - 800
800 - 1,000
1,000 - 1,500
1,500 - 2,500
> 2,500
Feet
0
15,000
30,000
Figure 9
Westlands Topography
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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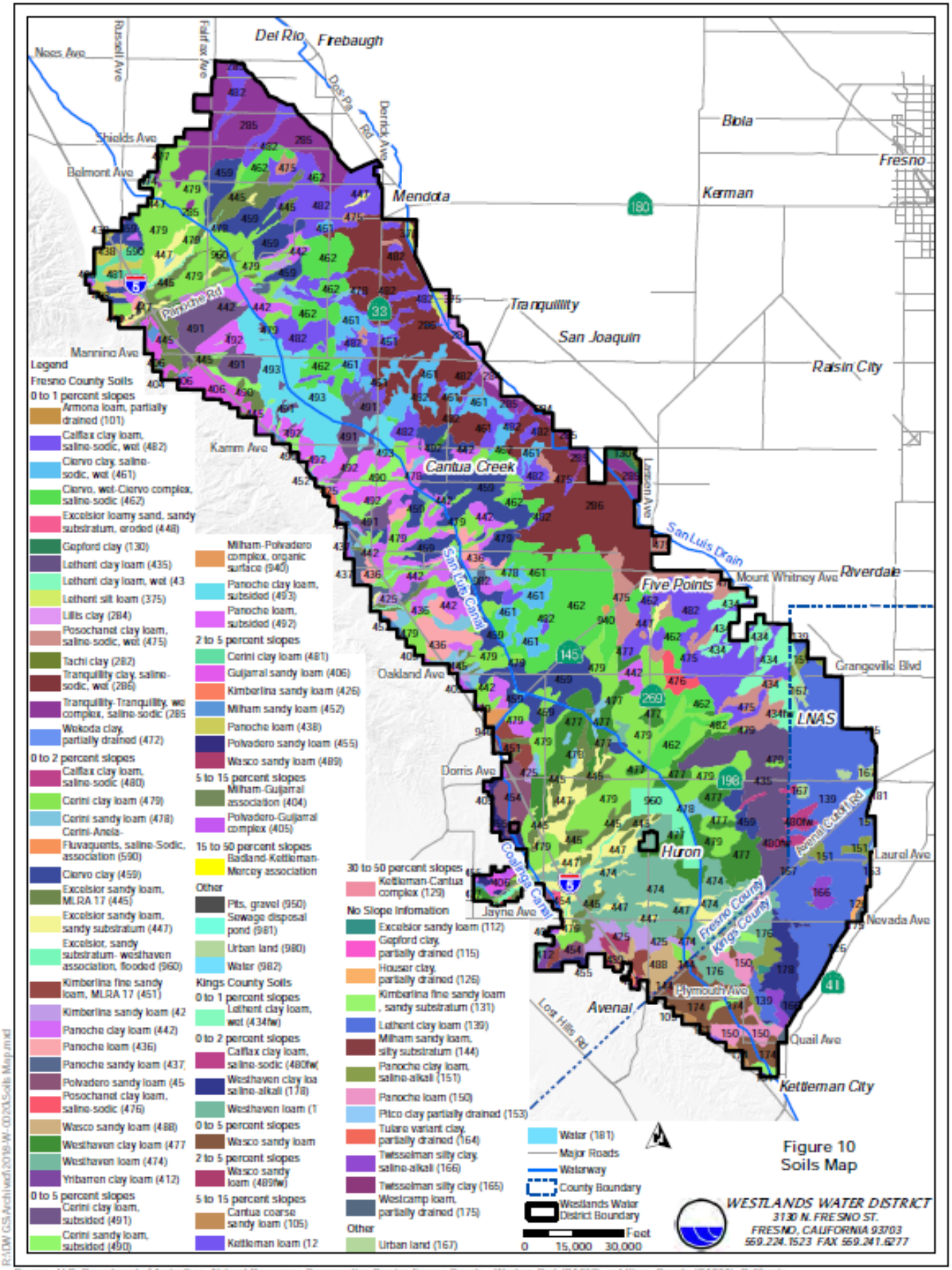
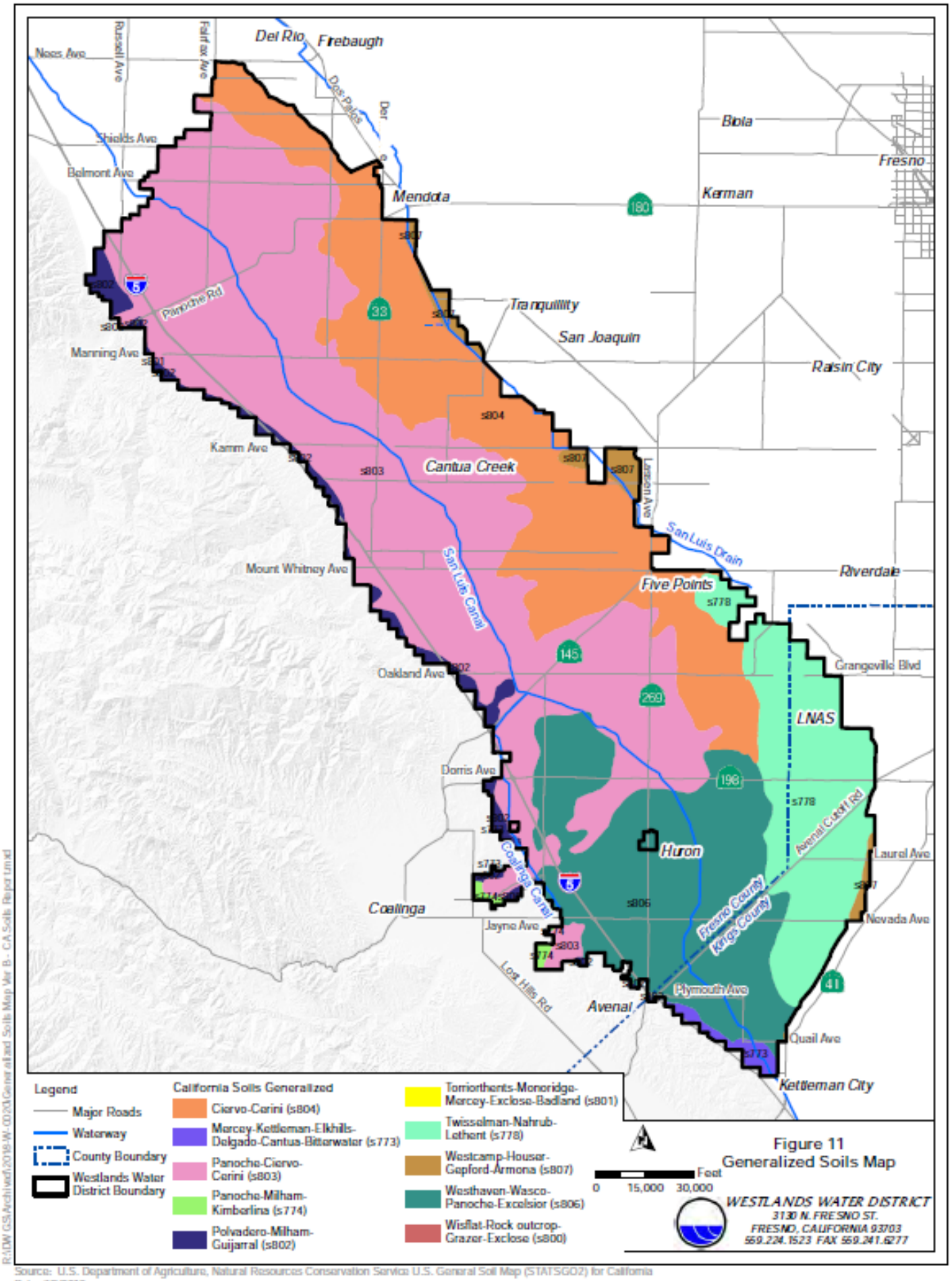

Del Rio
Firebaugh
Biola
Fresno
Kerman
Mendota
Tranquillity
San Joaquin
Raisin City
Five Points
Riverdale
Huron
Avenal
Kettleman City
LNAS
Cantua Creek
Oakland Ave
Dorris Ave
Jayne Ave
Mount Whitney Ave
Grangeville Blvd
Laurel Ave
Nevada Ave
Plymouth Ave
Quail Ave
Lost Hills Rd
Panoche Rd
Manning Ave
Kamm Ave
Shields Ave
Belmont Ave
Nees Ave
Russell Ave
Fairfax Ave
Derrick Ave
Jefferson Ave
San Luis Drain
San Luis Canal
Coalinga Canal
Fresno County
Kings County
Legend
Fresno County Soils
0 to 1 percent slopes
Armona loam, partially drained (101)
Calflax clay loam, saline-sodic, wet (482)
Ciervo clay, saline-sodic, wet (461)
Ciervo, wet-Ciervo complex, saline-sodic (462)
Excelsior loamy sand, sandy substratum, eroded (448)
Gepford clay (130)
Lethent clay loam (435)
Lethent clay loam, wet (43
Lethent silt loam (375)
Lillis clay (284)
Posochanet clay loam, saline-sodic, wet (475)
Tachi clay (282)
Tranquillity clay, saline-sodic, wet (286)
Tranquillity-Tranquillity, wet complex, saline-sodic (285
Wokoda clay, partially drained (472)
0 to 2 percent slopes
Calflax clay loam, saline-sodic (480)
Cerini clay loam (479)
Cerini sandy loam (478)
Cerini-Anela-Fluvaquents, saline-Sodic, association (590)
Ciervo clay (459)
Excelsior sandy loam, MLRA 17 (445)
Excelsior sandy loam, sandy substratum (447)
Excelsior, sandy substratum- westhaven association, flooded (960)
Kimberlina fine sandy loam, MLRA 17 (451)
Kimberlina sandy loam (42
Panoche clay loam (442)
Panoche loam (436)
Panoche sandy loam (437
Polvadero sandy loam (45
Posochanet clay loam, saline-sodic (476)
Wasco sandy loam (488)
Westhaven clay loam (477
Westhaven loam (474)
Yribarren clay loam (412)
0 to 5 percent slopes
Cerini clay loam, subsided (491)
Cerini sandy loam, subsided (490)
Milham-Polvadero complex, organic surface (940)
Panoche clay loam, subsided (493)
Panoche loam, subsided (492)
2 to 5 percent slopes
Corini clay loam (481)
Guijarral sandy loam (406)
Kimberlina sandy loam (426)
Milham sandy loam (452)
Panoche loam (438)
Polvadero sandy loam (455)
Wasco sandy loam (489)
5 to 15 percent slopes
Milham-Guijarral association (404)
Polvadero-Guijarral complex (405)
15 to 50 percent slopes
Badland-Kettleman-Mercey association
Other
Pits, gravel (950)
Sewage disposal pond (981)
Urban land (980)
Water (982)
Kings County Soils
0 to 1 percent slopes
Lethent clay loam, wet (434fw)
0 to 2 percent slopes
Calflax clay loam, saline-sodic (480fw)
Westhaven clay loa saline-alkali (178)
Westhaven loam (1
0 to 5 percent slopes
Wasco sandy loam
2 to 5 percent slopes
Wasco sandy loam (489fw)
5 to 15 percent slopes
Cantua coarse sandy loam (105)
Kettleman loam (12
30 to 50 percent slopes
Kettleman-Cantua complex (129)
No Slope Information
Excelsior sandy loam (112)
Gepford clay, partially drained (115)
Houser clay, partially drained (126)
Kimberlina fine sandy loam , sandy substratum (131)
Lethent clay loam (139)
Milham sandy loam, silty substratum (144)
Panoche clay loam, saline-alkali (151)
Panoche loam (150)
Pitco clay partially drained (153)
Tulare variant clay, partially drained (164)
Twisselman silty clay, saline-alkali (166)
Twisselman silty clay (165)
Westcamp loam, partially drained (175)
Other
Urban land (167)
Water (181)
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Feet
0 15,000 30,000
Figure 10
Soils Map
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
R:\DW GIS\Archive\2018_W_0020\Soils Map.mxd
Source: U.S. Department of Agriculture, Natural Resources Conservation Service Fresno County - Western Part (CA653) and Kings County (CA031), California
Date: 7/3/2018


Del Rio
Firebaugh
Mendota
Biola
Fresno
Kerman
Tranquillity
San Joaquin
Raisin City
Cantua Creek
Five Points
Riverdale
Huron
Coalinga
Avenal
LNAS
Kettleman City
Panoche Rd
Manning Ave
Kamm Ave
Mount Whitney Ave
Oakland Ave
Dorris Ave
Jayne Ave
Lost Hills Rd
Plymouth Ave
Quail Ave
Grangeville Blvd
Laurel Ave
Nevada Ave
Avenal Cutoff Rd
San Luis Canal
San Luis Drain
Coalinga Canal
Fresno County
Kings County
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
California Soils Generalized
Ciervo-Cerini (s804)
Mercey-Kettleman-Elkhills-Delgado-Cantua-Bitterwater (s773)
Panoche-Ciervo-Cerini (s803)
Panoche-Milham-Kimberlina (s774)
Polvadero-Milham-Guijarral (s802)
Torriorthents-Monoridge-Mercey-Exclose-Badland (s801)
Twissalman-Nahrub-Lethent (s778)
Westcamp-Houser-Gepford-Armona (s807)
Westhaven-Wasco-Panoche-Excelsior (s806)
Wisflat-Rock outcrop-Grazer-Exclose (s800)
Figure 11
Generalized Soils Map
Feet
0 15,000 30,000
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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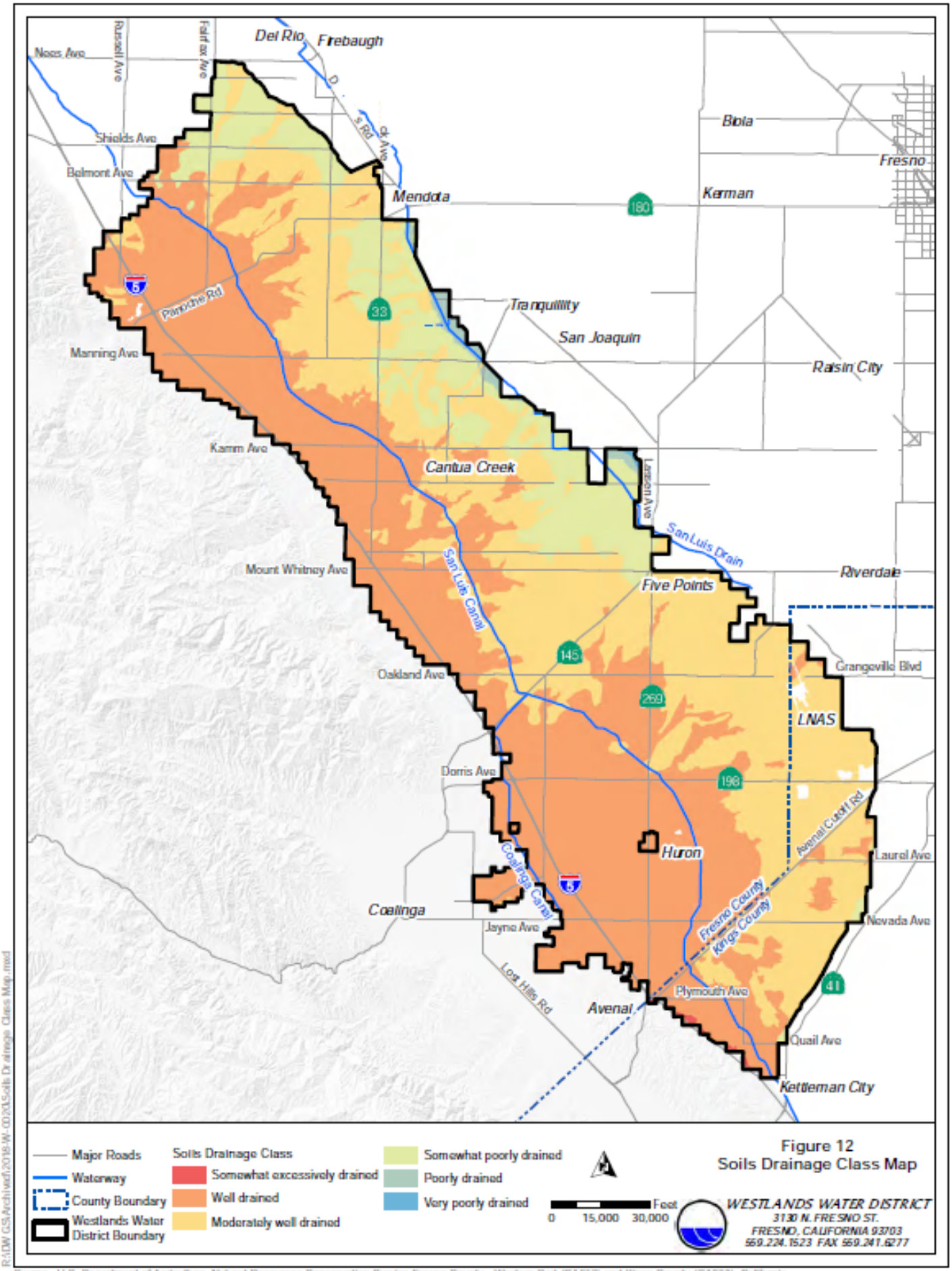
Source: U.S. Department of Agriculture, Natural Resources Conservation Service U.S. General Soil Map (STATSGO2) for California
Date: 7/3/2018



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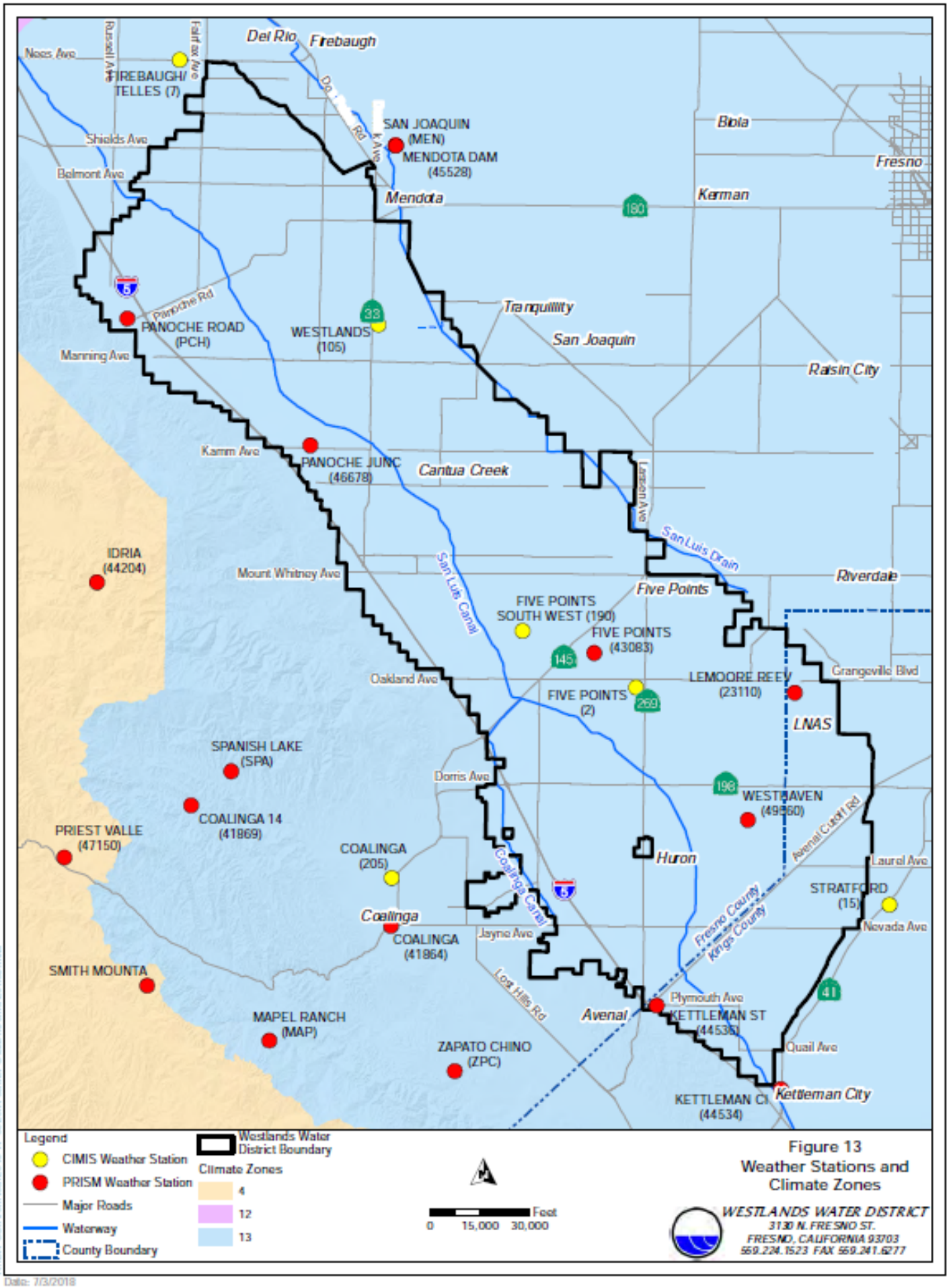
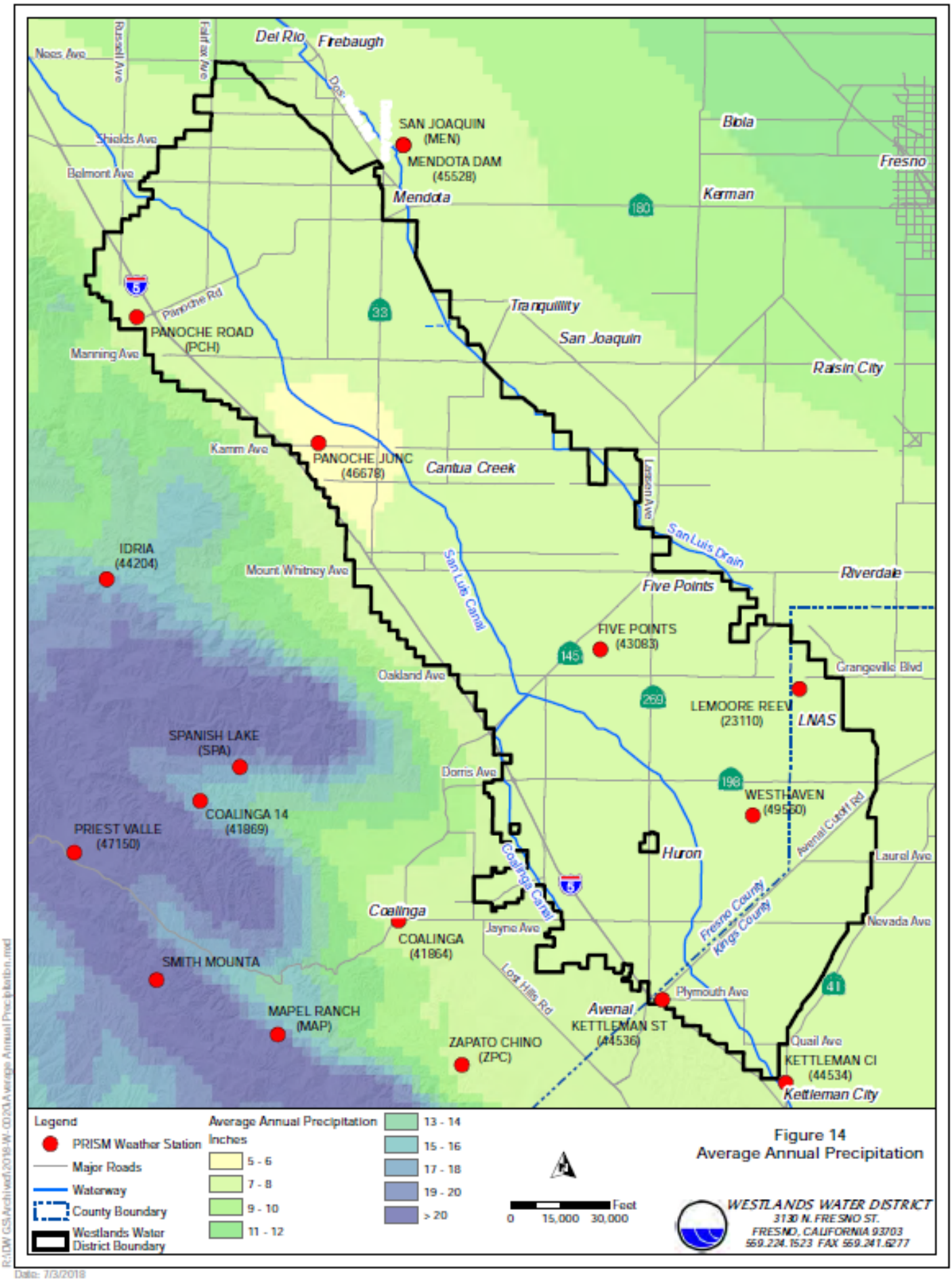
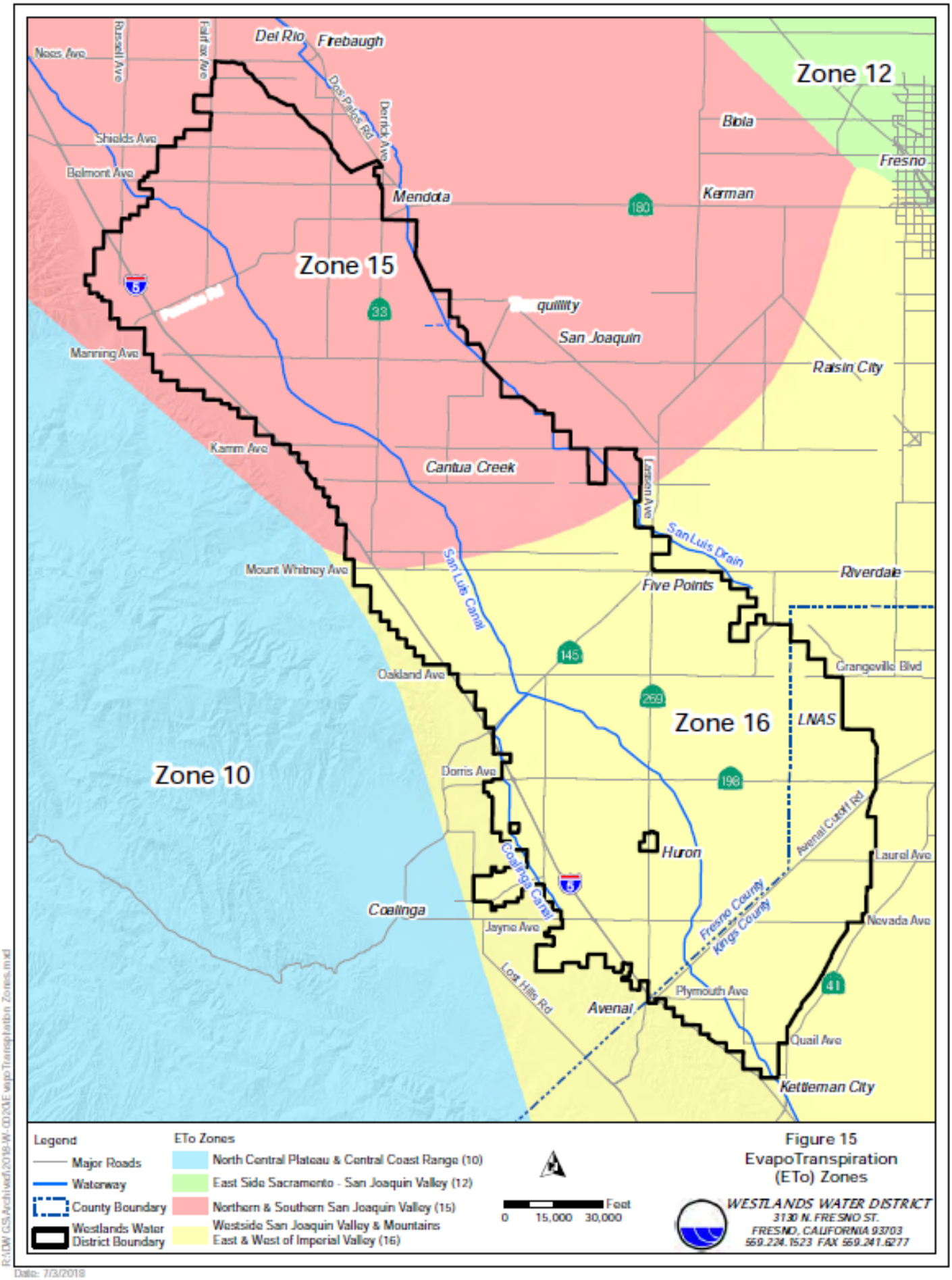
Source: U.S. Department of Agriculture, Natural Resources Conservation Service Fresno County - Western Part (CA653) and Kings County (CA031), California
Date: 7/3/2018


Del Rio
Firebaugh
Nees Ave
FIREBAUGH/ TELLES (7)
Russell Ave
Fairfax Ave
Shields Ave
Belmont Ave
SAN JOAQUIN (MEN)
MENDOTA DAM (45528)
Mendota
Biola
Fresno
Kerman
180
Panoche Rd
PANOCHE ROAD (PCH)
WESTLANDS (105)
33
Tranquillity
San Joaquin
Raisin City
Manning Ave
Kamm Ave
PANOCHE JUNC (46678)
Cantua Creek
Lassen Ave
San Luis Drain
IDRIA (44204)
Mount Whitney Ave
San Luis Canal
Five Points
Riverdale
FIVE POINTS SOUTH WEST (190)
FIVE POINTS (43083)
145
Oakland Ave
FIVE POINTS (2)
269
LEMOORE REEV (23110)
Grangeville Blvd
LNAS
SPANISH LAKE (SPA)
Dorris Ave
196
WESTHAVEN (49560)
COALINGA 14 (41969)
PRIEST VALLE (47150)
COALINGA (205)
Coalinga Canal
Huron
Avenal Cutoff Rd
Laurel Ave
STRATFORD (15)
Coalinga
COALINGA (41864)
Jayne Ave
Fresno County
Kings County
Nevada Ave
SMITH MOUNTA
Lost Hills Rd
Plymouth Ave
KETTLEMAN ST (44535)
Avenal
41
MAPEL RANCH (MAP)
ZAPATO CHINO (ZPC)
Quail Ave
KETTLEMAN CI (44534)
Kettleman City
Legend
CIMIS Weather Station
PRISM Weather Station
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Climate Zones
4
12
13
Feet
0 15,000 30,000
Figure 13
Weather Stations and Climate Zones
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
R:\DW GIS\Archived\2018-W-0020\Weather Stations and Zones.mxd
Date: 7/3/2018


Del Rio
Firebaugh
Nees Ave
Russell Ave
Fairfax Ave
Shields Ave
Belmont Ave
SAN JOAQUIN
(MEN)
MENDOTA DAM
(45528)
Mendota
Biola
Fresno
Kerman
180
Panoche Rd
PANOCHE ROAD
(PCH)
Manning Ave
33
Tranquillity
San Joaquin
Raisin City
Kamm Ave
PANOCHE JUNC
(46678)
Cantua Creek
Lassen Ave
San Luis Drain
IDRIA
(44204)
Mount Whitney Ave
San Luis Canal
Five Points
Riverdale
FIVE POINTS
(43083)
145
Oakland Ave
Grangeville Blvd
269
LEMOORE REEV
(23110)
LNAS
SPANISH LAKE
(SPA)
Dorris Ave
198
WESTHAVEN
(49530)
COALINGA 14
(41869)
PRIEST VALLE
(47150)
Huron
Avenal Cutoff Rd
Laurel Ave
Coalinga Canal
5
Coalinga
COALINGA
(41864)
Jayne Ave
Fresno County
Kings County
Nevada Ave
SMITH MOUNTA
Lost Hills Rd
Plymouth Ave
41
MAPEL RANCH
(MAP)
Avenal
KETTLEMAN ST
(44536)
ZAPATO CHINO
(ZPC)
Quail Ave
KETTLEMAN CI
(44534)
Kettleman City
Legend
PRISM Weather Station
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Average Annual Precipitation
Inches
5 - 6
7 - 8
9 - 10
11 - 12
13 - 14
15 - 16
17 - 18
19 - 20
> 20
Feet
0 15,000 30,000
Figure 14
Average Annual Precipitation
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
R:\DW GIS\Archived\2018-W-0020\Average Annual Precipitation.mxd
Date: 7/3/2018


Zone 12
Zone 15
Zone 16
Zone 10
Del Rio
Firebaugh
Mendota
Biola
Fresno
Kerman
San Joaquin
Raisin City
Cantua Creek
Five Points
Riverdale
Huron
Coalinga
Avenal
Kettleman City
Grangeville Blvd
LNAS
Laurel Ave
Nevada Ave
Plymouth Ave
Quail Ave
Jayne Ave
Dorris Ave
Oakland Ave
Mount Whitney Ave
Manning Ave
Kamm Ave
Shields Ave
Belmont Ave
Nees Ave
Russell Ave
Fairfax Ave
Dos Palos Rd
Derrick Ave
Lassen Ave
San Luis Drain
San Luis Canal
Coalinga Canal
Lost Hills Rd
Avenal Cutoff Rd
Fresno County
Kings County
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
ETo Zones
North Central Plateau & Central Coast Range (10)
East Side Sacramento - San Joaquin Valley (12)
Northern & Southern San Joaquin Valley (15)
Westside San Joaquin Valley & Mountains East & West of Imperial Valley (16)
Feet
0 15,000 30,000
Figure 15
EvapoTranspiration
(ETo) Zones
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
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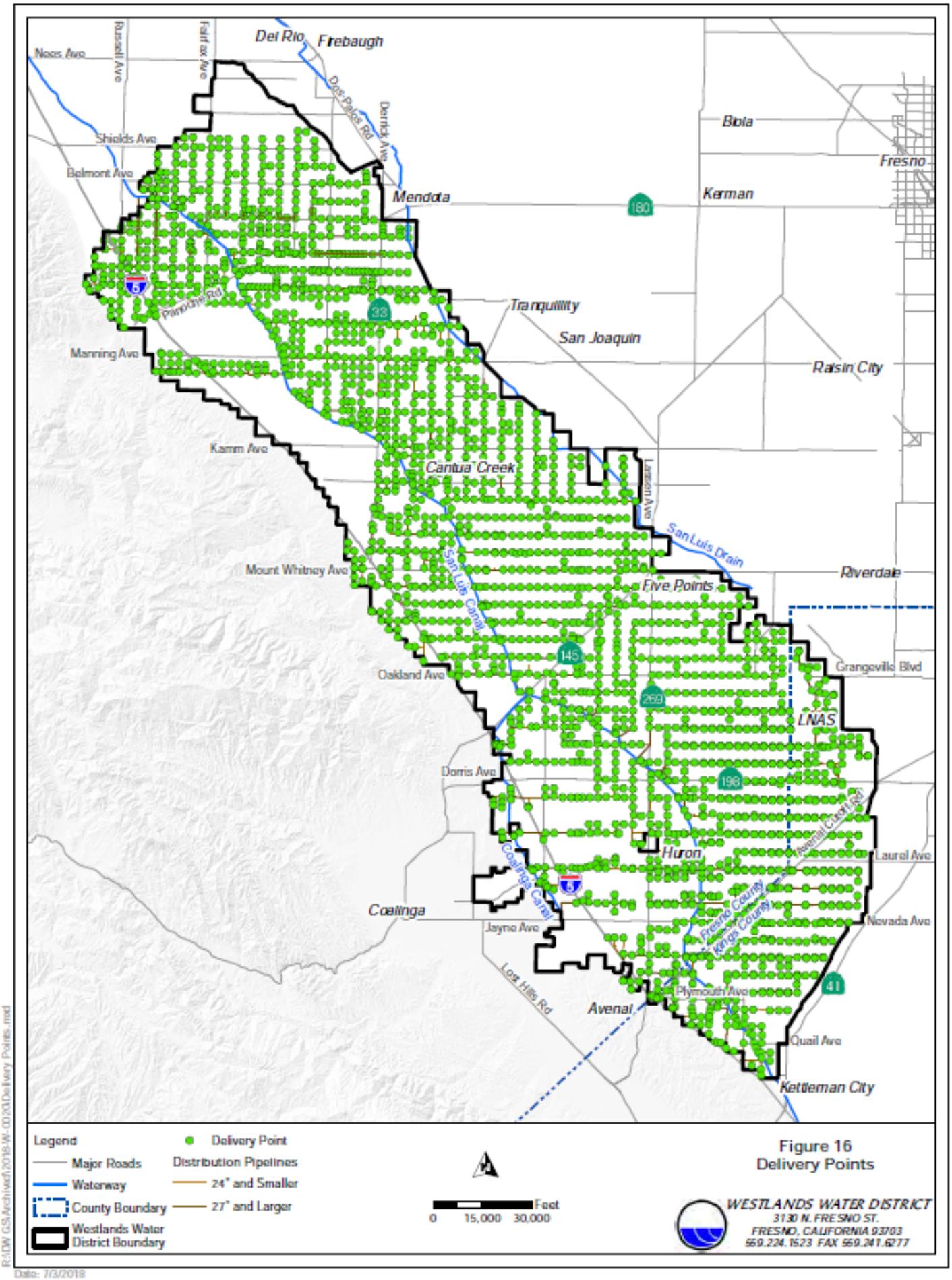
Date: 7/3/2018


Del Rio
Firebaugh
Nees Ave
Russell Ave
Fairfax Ave
Dos Palos Rd
Derrick Ave
Shields Ave
Belmont Ave
Mendota
Biola
Fresno
Kerman
180
5
33
Panoche Rd
Tranquillity
San Joaquin
Raisin City
Manning Ave
Kamm Ave
Cantua Creek
Jensen Ave
San Luis Drain
Mount Whitney Ave
San Luis Canal
Riverdale
Five Points
145
Oakland Ave
Grangeville Blvd
269
LNAS
Dorris Ave
198
Huron
Laurel Ave
Fresno Canal Rd
Coalinga Canal
5
Coalinga
Fresno County
Kings County
Jayne Ave
Novada Ave
Lost Hills Rd
Plymouth Ave
41
Avenal
Quail Ave
Kettleman City
Legend
Major Roads
Waterway
County Boundary
Westlands Water District Boundary
Delivery Point
Distribution Pipelines
24" and Smaller
27" and Larger
Feet
0 15,000 30,000
Figure 16
Delivery Points
WESTLANDS WATER DISTRICT
3130 N. FRESNO ST.
FRESNO, CALIFORNIA 93703
559.224.1523 FAX 559.241.6277
R:\DWG\S\Archived\2018-W-0020\Delivery Points.mxd
Date: 7/3/2018

Attachment B: Operating Rules and Regulations

WESTLANDS WATER DISTRICT

OFFICE--3130 N. FRESNO STREET/MAILING--P. O. BOX 6056, FRESNO, CA 93703
TELEPHONE: WATER ORDERS (559) 241-6250/OTHER (559) 224-1523/FAX (559) 241-6276

TERMS AND CONDITIONS FOR AGRICULTURAL WATER SERVICE

1. The allocation and furnishing of water shall be subject to all regulations of the Board of Directors of the District as the same may exist now or hereafter be amended or adopted. In the event of a conflict between these terms and conditions and the regulations, the latter shall be controlling.

2. All water shall be delivered pursuant to a request by the water user for the delivery of a specific flow rate to a specific parcel of land. The request shall be made within the time and in the manner prescribed by the General Manager.

3. Water will be furnished by the District subject to the terms and conditions under which it is made available to the District including, but not limited to, the requirements of federal Reclamation law. The District will use its best efforts, to the extent that it has water and capacity available and taking into account the requirements of other water users to receive water from District facilities, to provide such water in the manner and at the times requested. The District may temporarily discontinue water service or reduce the amount of water to be furnished for investigation, inspection, maintenance, repair, or replacement of any of the District's facilities. The District will give the water user notice in advance of such temporary discontinuance or reduction, except in case of emergency, in which event no notice need be given. In the event the District issues a notice to discontinue or curtail water use, and District facilities are required to be re-filled because the water user fails to discontinue or curtail such use within the prescribed time, the water user shall pay an administrative charge established by the Board of Directors for each point of delivery in violation. No liability shall accrue against the District or any of its officers, directors, or employees for damage, direct or indirect, because of the failure to provide water as a result of system malfunctions, interruptions in service necessary to properly operate and maintain the water distribution system, or other similar causes which are beyond the District's reasonable control.

4. By taking delivery of water from the District, the water user assumes responsibility for, and agrees to hold the District harmless from, all damage or claims for damage which may arise from his use of the water after it leaves the District's facilities. The water user further agrees that there are no intended third party beneficiaries established and nothing contained herein, expressed or implied, is intended to give to any person, partnership, corporation, joint venture, limited liability company or other form of organization or association any right, remedy or claim under or pursuant hereto, and any agreement or covenant required herein to be performed by or on behalf of the water user or the District shall be for the sole and exclusive benefit of the water user or the District.

5. The water furnished by the District is not in a potable state and the District does not warrant the quality or potability of water so furnished. By taking delivery of water from the District, the water user assumes responsibility for, and agrees to hold the District harmless from, damage or claims for damage arising out of the non-potability of water furnished by the District.

6. All water will be measured by the District with meters installed, maintained, and calibrated by it and such measurements shall be final and conclusive.

7. Charges for agricultural water, hereinafter referred to as "water charges," shall be established by

the Board of Directors. The water charges shall include District operation and maintenance costs and any other costs determined by the Board to be payable as part of the water charges. The water charges shall also include the applicable water rates required pursuant to the Reclamation Reform Act of 1982, the Central Valley Project Improvement Act of 1992, and the Judgment in Barcellos and Wolfsen, Inc., et al. v. Westlands Water District, et al., and Westlands Water District, et al. v. United States, et al., U.S. District Court, Eastern District of California, Nos. CV-79-106-EDP and CV-F-81-245-EDP, respectively. Water charges shall be adjusted retroactively to the extent required and authorized by federal or state law or regulations or District regulations. The General Manager may adjust the water charges as necessary and legally authorized to account for increases or decreases in the estimates used to establish the water charges.

8. Payments for water service shall be due on the 25th of each month or 15 calendar days after the date on which the monthly bill for such service is mailed, whichever is later. Payment for the "Water Allocation" component of the District's annual repayment obligation to the United States shall be due on July 25. Notwithstanding the foregoing, water users who farm on lands that are not subject to assessment by the District shall be subject to advance payment, and payment for water service for the entire water year shall be due on February 25, preceding the water year; provided, that in lieu of advance payment, the District, at its option, may accept in a form satisfactory to the General Manager a written guarantee from a recognized financial lending institution or an assignment of any and all charges to land in the District owned by the water user. When any deadline established herein falls on a Saturday, Sunday, or holiday, it shall be extended to the next working day. Payments postmarked on or before the due date shall be deemed to have been received by the due date. Charges not paid by the applicable due date shall be delinquent.

9. All payments shall be made at the District's Fresno Office.

10. Advance payment shall be required for the acquisition costs of water transferred into the District from other agencies, pump-in water, or any allocation resulting from the District being able to obtain other water, prior to the allocation of such water to water users. The advance payment will be due by a date to be established by the General Manager. Excluding those water users subject to advance payment, conveyance-related costs for such water will be billed to water users upon water use.

11. All claims for overcharges or errors must be made in writing and filed with the District at its Fresno Office within 10 working days after the date the bill is received by the water user or landowner. The General Manager, or his designee, may provide for a waiver of the 10-working day requirement in circumstances where a water user has requested a meter repair and the District’s meter was found not to be accurate with the District’s standards. In the event the water user or landowner files a timely written protest, the District's Finance & Administration Committee shall consider the protest at its next regular meeting and notify the water user or landowner in writing of its decision. The Committee's decision shall be final, unless a written appeal to the Board of Directors is filed with the Secretary of the District within 15 working days after notice of the decision. In the event of an appeal, the decision of the Board shall be final. The filing of a protest or an appeal does not nullify the payment requirement or the District's right to discontinue water service as provided in these terms and conditions. However, in the event the protest or appeal is sustained, the District will refund the amount of the overcharge and penalty, if any.

12. During any 12-month period, the penalty for a water user's first delinquent payment shall be 2 percent of the delinquent charges, except as described hereinafter. The second delinquency shall be 5 percent and the penalty for a water user's third and any subsequent delinquency shall be 10 percent, on current charges due, excluding any penalties or interest imposed on delinquent charges from a prior month. The 2 percent penalty shall not be levied with respect to a water user's first delinquency in any 12-month period if the delinquent payment is received by the District on or before the last working day of the month, but the delinquency shall continue to be the water user's first delinquency for purposes of this paragraph. Delinquent

charges shall bear interest at a monthly rate of 1½ percent. Interest shall not, however, accrue after the delinquent charges together with applicable penalties and interest have been added to, and become a part of, the annual assessment levied on the land by the District. All payments and credits shall be applied to the earliest delinquent charges.

13. At the time of filing the District's assessment book with the District Tax Collector, delinquent charges, together with applicable penalties and interest, may be added to and become part of the assessment levied by the District on the land which received the water or for which other charges were incurred. If the water was not furnished, the applicable delinquent charges may be added to the land to which the water was allocated. The District shall notify the landowner of the anticipated amount(s) prior to adding the assessment. The added amount shall be a lien on the land and impart notice thereof to all persons. If the assessment becomes delinquent, penalties and interest will be added as provided by law.

14. To supplement the procedure described in Paragraph 13, the District may elect to file and record a Certificate of Unpaid Water Charges as provided in California Water Code Section 36729. This Certificate creates a lien in the amount of delinquent charges on any land owned by the delinquent water user, or acquired by the water user before the lien's expiration, within the recording County.

15. Agricultural water service shall not be provided to, nor shall a transfer of water be permitted to or from, any water user or parcel of land for which there are delinquent charges or assessments, regardless of the source of the water user's or parcel of land's obligation to the District or the nature of the District's service for which the charges were imposed, and notwithstanding the fact that the delinquent charges, including applicable penalties and interest, have been added to the assessment(s) on the parcel(s) for which they were incurred. Water service shall be discontinued on the 1st of the month following that in which charges or assessments become delinquent, or as soon thereafter as reasonably possible; provided, that when the 1st of the month falls on a Saturday, Sunday, or holiday, such service shall be discontinued on the next working day.

16. The General Manager may require that all current charges be paid before the transfer of remaining water will be allowed.

17. If a water user's delinquent charges are delinquent for 30 days or more, or if a water user's delinquent charges are added to the annual assessments on any lands within the District, or the procedure in paragraph 14 is implemented, the General Manager shall require, as a condition of resumption of water service, that advance payment of all water charges be made for the 12-month period immediately following resumption of service, according to a schedule to be determined by the General Manager. In lieu of advance payment, the District, at its option, may accept in a form satisfactory to the General Manager a written guarantee from a recognized financial lending institution.

18. The General Manager, after consultation with and approval by the Finance & Administration Committee, may also require advance payment and/or payment by cashier's check or such other actions as he may deem necessary when a water user's account is determined, based on the payment history or other actions of the water user, to create a financial risk or hardship for the District. Circumstances which constitute the basis for such a determination include but are not limited to the following: (1) instances of a water user's checks being returned unpaid or (2) instances where a water user whose account is delinquent has, in violation of District regulations, taken water from a District delivery. In lieu of advance payment, the District, at its option, may accept in a form satisfactory to the General Manager a written guarantee from a recognized financial lending institution.

19. As used in these terms and conditions, the term "charges" includes water charges, land-based charges and payments due the District under any lease or other agreement between the District and the water

user.

20. Agricultural water service shall not be provided to any water user who has failed to file, or to any lands for which there has not been filed, the certification or reporting forms required pursuant to Reclamation law, and particularly the Reclamation Reform Act of 1982. Any water delivered in violation of this provision may be subject to charges and administrative fees pursuant to federal law or regulation.

21. Agricultural water service shall not be provided to any water user who fails to provide the District with crop information at the time(s) and in the form required by the General Manager.

22. By applying for or taking delivery of agricultural water from the District, the water user agrees to these terms and conditions of service.

23. The District may modify or terminate these terms and conditions; provided, that such modifications or terminations are prospective only and notice thereof is given prior to the effective date.

Water Costs

Westlands purchases water from the Bureau at a variety of costs depending upon the RRA status of the landowner, farmer, or irrigated land. The following are the District water rates for 2016-17 water-year.

2016-17 Water Rates

	Cost of Service	New Law Full Cost	Old Law Full Cost
AGRICULTURAL WATER RATES			
United States Bureau of Reclamation [1]			
Water Rates	$ 98.42	$ 98.70	$ 122.91
Trinity PUD Assessment	0.30	0.30	0.30
Restoration Fund	10.21	10.21	10.21
San Luis Delta Mendota Water Authority [2]			
Authority O&M	$ 73.74	$ 73.74	$ 73.74
Westlands Water District [3]			
District O&M	$ 72.50	$ 108.05	$ 108.05
Prior Years Restoration Fund	-	-	-
Water Delivered Benefit	7.46	7.46	7.46
Water Exchange Obligation [4]	-	-	-
SWRCB Water Rights Fee	-	-	-
Actual USBR O&M	-	-	-
Actual USBR O&M Credit	-	-	-
SLDMWA True-up	-	-	-
Total Ag Water Rate	$ 262.63	$ 262.63	$ 262.63

MUNICIPAL AND INDUSTRIAL WATER RATES	
Acquired Supply	$ 391.86
Acquired Supply – NASL	**$** 847.47

Notes:

[1] U S Bureau of Reclamation rates are calculated on the basis of approximately 27.17% CVP water supply.

[2] San Luis Delta Mendota Water Authority rates are calculated on the basis of 0% CVP supply and estimated water use.

[3] Westlands Water District rates are calculated on the basis of 0% CVP Supply Plus Other Water resulting in 233,000 AF Total Estimated Supply

[4] Water Exchange Obligation rate is not paid by Pre-Merger or Annexed lands.

2016-17 Charges

Land Based Charges		Amount	Unit
Long-Term Water Supply D.S. – Area 1 and Area 2	$	8.4962	AC
District Water Supply D.S. – Area 1	$	10.9837	AC
District Water Supply D.S. – Area 2	$	25.5921	AC
Extraordinary Repairs of Pipe – Area 1 and Area 2	$	.8706	AC
Operations & Maintenance Costs - All Lands	$	5.9615	AC
Operations & Maintenance Costs - Lands with Allocation	$	6.3601	AC
Operations & Maintenance Costs - Lands with System	$	3.4942	AC
Operations & Maintenance Costs - Lands with both Allocation and System	$	18.3594	AC
Drainage Service Area	$	1.7151	AC
Westlands Water Quality Coalition	$	3.0918	AC
Allocation Charges			
Water Allocation Benefit [1]	$	15.58	AF
Usage Charges			
Overuse of Water Supply	$	904.00	AF
Administrative Fee [2]	$	143.84	Mile
Distribution System Usage - Without Facilities [3]	$	0.8209	AC
Distribution System Usage - With Facilities [4]	$	4.5603	AC
Groundwater Management Program and Temporary Facilities			
Groundwater Management Program Power		Varies by Facility	AF
Temporary Facilities Power Surcharge		Varies by Facility	AF
Temporary Facility Credit [5]	$	(16.98)	AF
Account Monitoring Charges			
Overuse Monitoring	$	11,977.00	EA
Delinquent Payment Monitoring	$	170.00	EA
Advance Payment Monitoring	$	559.00	EA
Municipal and Industrial			
M&I Inspections [6]	$	39.26	EA
Acquired Supply Advance [7]	$	391.86	EA

Notes:

[1] Water Allocation Benefit charges are billed annually based on Interim Contract water allocated as of July 1

[2] Charged per mile of lateral drained for each delivery point

[3] Collected if water delivered to non-assessable land with User-installed facilities for which the repayment obligation has not been prepaid

[4] Collected if water delivered to non-assessable lands with District-installed facilities for which the repayment obligation has not been prepaid

[5] Temporary Facility Credits are billed on a per acre-foot basis for water delivered through temporary facilities

[6] M&I Backflow Inspection costs are billed annually to each non-agricultural connection

[7] Advance requirement doubles if prior year annual use is greater than one acre-foot. Based on adopted Acquired Supply rate.

ARTICLE 2. REGULATIONS FOR THE ALLOCATION AND USE OF AGRICULTURAL WATER WITHIN WESTLANDS WATER DISTRICT

2.1 PURPOSE

Westlands Water District has long-term contractual and legal entitlements with the United States for a firm supply of 1,191,185 acre-feet (AF) of Central Valley Project (CVP) water during each water year. In some years, the District may acquire additional water pursuant to its entitlements, or other water. On April 2, 2002, the District and landowner representatives executed the "Agreement for Distribution of Water, Allocation of Cost, and Settlement of Claims", thereby resolving issues and controversies relating to and providing for the allocation of CVP water to lands within the District. These Regulations establish the rules and procedures for allocation and use of agricultural water.

2.2 GLOSSARY OF TERMS AND DEFINITIONS

A. Acreage Based Cap – the per acre amount of water determined by dividing the Cap for the rescheduling period by the District's irrigable acres, net of District owned lands, as of March 1 that may be rescheduled into the subsequent Water Year.

B. Acquired Lands – lands acquired by the District, or lands for which the permanent right to its per acre entitlement has been acquired by the District, and lands acquired by the United States pursuant to an agreement with the District dated August 11, 1998.

C. Agricultural Water - water used for irrigation and other agricultural purposes directly related to the growing of crops.

D. Agricultural Water Allocation Application and Purchase Agreement (referred to as Allocation Application) - an agreement between the District and a water user which describes the land held by the water user, the amount of water requested by the water user, and which obligates the water user to accept and pay for all water supplied by the District.

E. Allocated; Allocation - amount of water ratably distributed to eligible District lands.

F. Annexed Lands - lands which became a part of Westlands Water District after July 1, 1965 (the annexed area), as shown on Westlands Water District Dwg. No. 582, dated December 21, 1976, revised November 12, 1986, entitled "Areas of Service Priority."

G. Cap Loss – amount of water remaining at year end in excess of the Cap imposed by the Bureau of Reclamation or the District on water that may be rescheduled at the end of the water year and which shall be lost.

H. Contract Water - any water obtained under the contractual and legal entitlements including additional and interim supplies.

I. Cropland - irrigable acreage as determined by U.S. Farm Service Agency (FSA or District measurements.

J. Cushion - water set aside for system losses and other uses each water year, in the amount of 1 percent of contract water or 6,000 acre-feet, whichever is greater.

K. Eligible Cropland – land that is eligible for allocation or delivery of water under Reclamation law and any applicable District Regulation.

L. Entitlements - water provided pursuant to the contractual and legal obligations between Westlands Water District and the United States for water supply and distribution.

M. Furnish - to deliver or provide. For purposes of these Regulations, water has been furnished, delivered, or provided to a water user at the time the water in question physically exits District-owned facilities, property, or infrastructure.

N. Merged Lands - lands which formed a part of the original Westplains Water Storage District on June 28, 1965 (the original Westplains area), as shown on Westlands Water District Dwg. No. 582, dated December 21, 1976, revised November 12, 1986, entitled "Areas of Water Service Priority."

O. M&I Use - the use of water for drinking, cooking, bathing, showering, dish washing, and maintaining oral hygiene or purposes of commerce, trade or industry. “M&I” is short for “Municipal and Industrial.”

P. Other Water - water other than contract water.

Q. Overuse - use in excess of available supply.

R. Per Acre Entitlement - ratable share of contract water determined by 1,191,185 AF divided by the number of Pre-Merger Lands and Merged Lands cropland acres, excluding acquired lands, for which Allocation Applications are timely received.

S. Pre-Merger Lands - lands which formed a part of Westlands Water District on June 28, 1965 (the original Westlands area), as shown on Westlands Water District Dwg. No. 582, dated December 21, 1976, revised November 1, 1986, entitled "Areas of Water Service Priority."

T. Rescheduled; Rescheduled Water – water carried over for use in the next water year.

U. Rescheduling Loss – loss of water that may occur at the end of the Rescheduling Period due to the Bureau of Reclamation’s annual rescheduling guidelines.

V. Rescheduling Period – the period of use for Rescheduled Water.

W. System Gain - an increase in water available for allocation due to the difference in relative accuracy between state operated and maintained headworks meters and District operated and maintained water delivery meters.

X. System Loss - either a direct loss or a reduction in water available for allocation because of the difference in relative accuracy between state operated and maintained headworks meters and District operated and maintained delivery meters.

Y. Transfer - assignment of water from one water user or landowner to another.

Z. Unused Water - available supply at the end of the water year.

AA. Water User - landowner or lessee of land who has submitted and executed an Allocation Application.

AB. Water Year - each 12-month period that begins on March 1 and ends on the last day of February following.

2.3 CONTRACTUAL ENTITLEMENTS

A. The entitlement of agricultural water for Pre-Merger Lands and Merged Lands is 1,191,185 AF less water set aside therefrom for M&I use, system losses, and other uses.

B. No contract water shall be allocated to Annexed Lands until the allocation of contract water for eligible cropland, excluding acquired lands, in the Pre-Merger Lands and Merged Lands areas is 2.6 AF per acre.

C. Any contract water in addition to the quantities described above will be allocated ratably on a per acre basis, excluding acquired lands, to satisfy timely applications first to eligible cropland in Pre-Merger Lands and Merged Lands areas, then to eligible cropland in the Annexed Lands area, and finally on a first-come, first-served basis to all District cropland.

D. Prior to, and in conjunction with, the calculation of the per acre entitlement in any water year, the General Manager shall set aside from the available water supply the amount of water for M&I use in accordance with Article 19 of the District's Rules and Regulations, system losses, and other uses approved by the Board of Directors. The General Manager may later allocate this water according to these Regulations if it is no longer necessary for such purposes.

E. If there is a reduction in the rate at which water can be delivered to the District because of operational or other limitations, each water user's share of the delivery rate will be equitably adjusted as determined by the General Manager.

2.4 OTHER ALLOCATION RULES AND PROCEDURES

A. Other water obtained by the District shall be made available to all eligible cropland in the District, excluding acquired lands, and shall be allocated on a per acre basis, unless otherwise directed by the Board of Directors.

B. Allocations of other water obtained shall be increased or decreased as more or less water becomes available for distribution within the District.

C. 1. System loss will be deducted first from the water set aside for such purposes, and second, from water users in direct proportion to the water used by each water user.

2. System gain shall be allocated to water users in direct proportion to the water used by each water user, excluding such use on acquired lands.

D. Other water made available to the District specifically for direct transfer to a water user shall be allocated to the water user for whom it was intended. This water may be used or transferred within or outside of the District at the discretion of the water user, subject to applicable state and federal laws and District approval, or any conditions of use placed on the water when it was first transferred into the District.

E. Notwithstanding any other provisions of the Regulations, water made available for specified purposes shall be distributed and used in accordance with such specified purposes.

F. All per acre allocations of water will be made on the basis of cropland acres as determined prior to the time of the allocation. Any changes to cropland acres will be used for future allocations only, and will not be used to adjust prior allocations.

2.5 APPLICATION FOR WATER

A. To receive an allocation of contract water for agricultural purposes in any water year, a water user must timely apply therefore by filing an Allocation Application at a designated District office annually on or before January 15. Applications received after January 15 shall not receive an allocation unless accepted by the General Manager. Applications received after January 15 that are accepted by the General Manager shall only be entitled to receive a proportionate share of contract water made available to the District after the date of such late application's acceptance.

B. The General Manager may require supplemental application(s) for additional contract water or other water made available to the District.

C. If more than one Allocation Application for the same parcel of land is received and there is a dispute between the applicants regarding who should receive the water, priority will be given to the landowner, if one of the applicants owns the land in question. If no applicant owns the land, priority will be given to the water user who can provide satisfactory evidence of the right to occupy the land and receive the water. A lease or written consent from the landowner is considered satisfactory evidence. If the dispute arises after the application period and the water has been allocated, remedy is limited to unused water.

D. No water will be allocated to any land for which water charges, assessments, land-based charges, or any other money owed to the District have been delinquent for 30 days or more at the time the water is allocated or to any land for which advance payment is required until such advance payment is received, or in lieu thereof security, in a form acceptable to the General Manager, for such payment has been provided.

2.6 USE AND TRANSFER OF WATER

A. No water may be transferred out of the District without District approval.

B. All water may be used on any eligible cropland within the District.

C. A water user may transfer his water to another water user in any area of the District. Such transfer shall be in writing on a form provided by the General Manager.

D. The District will not transfer water from a water user to another resulting from a change in ownership or lease of land. However, if land is transferred by a change in ownership or lease with the result that the water user no longer owns or leases any District land, the unused water shall be transferred to the water user to whom the ownership or leasehold of such land has passed unless a transfer of water is requested pursuant to these Regulations.

E. The General Manager may restrict or prohibit the use or transfer of water allocated to any cropland if a dispute exists among landowners regarding the allocation or use of such water.

F. Water service shall be discontinued when a water user has exhausted his available water supply.

G. Each water user shall take reasonable steps to reuse or control tail water. The failure to do so shall constitute a waste of water.

H. The General Manager is authorized, after oral or written notice to the water user, to lock the delivery facilities of, or discontinue water service to, any water user who violates these Regulations or Terms and Conditions for Agricultural Water Service.

I. The unauthorized using, taking, or wasting of water is prohibited and may subject the water user to civil or criminal prosecution.

2.7 WATER USER TRANSFERS FROM SOURCES OUTSIDE THE DISTRICT

A. Any water user may apply to the District to transfer into the District water from sources outside the District.

B. The General Manager, or his designee, shall cooperate to a reasonable extent with any water user in connection with that water user's efforts to obtain water from sources outside of the District. In so reasonably cooperating, the General Manager, or his designee, shall not devote so much time or energy as to significantly distract from his or her duties and responsibilities to the District. Furthermore, such reasonable cooperation shall not be construed so as to affect the nature of the General Manager's, or his designee's, relationship with and duties to the District; nor shall such reasonable cooperation be construed as to create a fiduciary or other obligation owed by the General Manager, or his designee, to any person or entity other than the District.

C. Subject to applicable state and federal laws and the requirements of these regulations, the General Manager or his designee shall approve a water user's application to transfer water from sources outside of the District into the District for the benefit of that water user and shall execute any agreements or other documents required to accomplish the transfer.

D. A water user's application to transfer water from sources outside of the District shall be denied if the approval of that application would reduce the quantity of other water obtained by the District or delay or otherwise negatively affect the delivery to the District of other water obtained by the District.

E. Priority to access of excess capacity of any facility required to deliver other water obtained by the District and water acquired by a water user from sources outside the District shall first be used to deliver other water obtained by the District.

F. Access to excess capacity of any facility required to deliver water by water users from sources outside the District shall be apportioned among water users seeking access to excess capacity on a per acre basis.

G. The District's administrative costs for review, approval, and other activities related to a water user's application for approval of a transfer into the District water from sources outside the District shall be borne by the water user. The General Manager, or his designee, may require a deposit of the estimated costs for such activities prior to review of an application.

2.8 PAYMENT FOR WATER OR AGREEMENTS

No water shall be made available for delivery, transfer, or any other use by a water user who fails to make required payments to the District, regardless of the source of the water user's obligation for payment. Rules for payment are set forth in the Terms and Conditions for Agricultural Water Service and other agreements, if any, between the water user and the District.

2.9 YEAR-END PROCEDURES

A. After final water use and supply accounting is completed for the water year, the District will determine the amounts of unused water or overuse for each water user.

B. Unused water may be rescheduled if such a program is available. See 2.10 RESCHEDULED WATER regarding the procedures for rescheduling water.

C. A water user with unused water that cannot be rescheduled shall pay all water costs that the District incurs, applicable San Luis & Delta Mendota Water Authority operations and maintenance rates and applicable District rates.

D. A water user with overuse will have his allocation of contract water in the following year reduced by the amount of his overuse, first from the cropland farmed by the water user in which the overuse occurred and then from any cropland farmed by the water user. If this water user is not a water user in the following year, the amount of overuse will be attributed to the cropland that had been farmed by the water user. Further, any allocation of contract water to that cropland will be reduced by the amount of overuse attributable to such cropland.

2.10 RESCHEDULED WATER

A. Subject to the program's availability, the District or a water user may reschedule water, regardless of source, from one water year to the next. The period of use for Rescheduled Water (Rescheduling Period) shall be the following, unless otherwise restricted by the Bureau of Reclamation:

1. If San Luis Reservoir fills, March 1 to date determined by Reclamation (usually about April 15); or
2. If San Luis Reservoir does not fill, to the end of the current water year.

The use of all contract water supplied by the Bureau of Reclamation, including use of the then current year's allocation, shall be counted toward the use of Rescheduled Water.

B. Unless the District is notified before the end of the water year, all water remaining in a water user's account at the end of the water year will be rescheduled on its behalf by the District.

C. So long as there is no projected impact to the future year water supply or other water supplies that are available to the District, a water user may reschedule more water than it projects it will use during the Rescheduling Period, but said water user shall bear all associated risks. To provide an equitable manner for the District to apportion water users' use of Rescheduled Water, there is a 0.5 acre-feet per irrigable acre Acreage Based Cap for Rescheduled Water, excluding District-owned lands. Unless limited pursuant to D. herein, a water user may reschedule water in excess of the Acreage Based Cap, but remaining Rescheduled Water in excess of the Acreage Based Cap shall be the first water lost pursuant to F. herein.

D. The Bureau of Reclamation or the District may limit the amount of water that may be rescheduled at the end of the water year. "Cap Loss" is the term for water remaining at year end in excess of the limit imposed by Reclamation or the District which shall be lost. In addition, loss of water may occur at the end of the Rescheduling Period, called "Rescheduling Loss", due to Reclamation's annual rescheduling guidelines.

E. Both Cap Loss and Rescheduling Loss, in that order, will be applied to a water user's account at the end of the Rescheduling Period, so that the water user has the greatest opportunity to deliver all its water supply. However, if the Rescheduling Period is extended to the end of the current water year, Cap Loss will be applied to water user accounts at the beginning of the Rescheduling Period, after adjusting such accounts for internal transfers of Rescheduled Water received and approved by the District on or before March 10. Any loss by water users will be prorated based upon acre-feet.

F. Losses will be apportioned to and in the following order and manner:

1. Any remaining Rescheduled Water in excess of the Acreage Based Cap.
2. Water rescheduled by the District.
3. Remaining Rescheduled Water.
4. Delivered Rescheduled Water in excess of the Acreage Based Cap.
5. Delivered Rescheduled Water within the Acreage Based Cap.

G. For losses, water users shall pay all water costs that the District incurs, the San Luis & Delta-Mendota Water Authority O&M rate and any applicable District rates.

2.11 MISCELLANEOUS

A. The General Manager is authorized and directed to do any and all things necessary to implement and effectuate these Regulations.

B. An appeal from any decision made pursuant to these Regulations shall be made to the Finance and Administration Committee of the Board of Directors. Such appeal shall be in writing and shall be filed with the District Secretary within 15 working days after notice of the decision. The decision of the Finance and Administration Committee may be appealed to the Board of Directors. Such appeal shall be in writing and shall be filed with the District Secretary within 15 working days after notice of the Finance and Administration Committee's decision. The decision of the Board shall be final.

C. The General Manager shall provide notice of any changes or revision to these Regulations to all District landowners and water users.

Attachment C: Measurement Device Documentation

Westlands' measurements are below with manufacturer's data sheets after.

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
1/7/2016	NEW INSERT	20152443	7085060	-0.5	-0.5
1/7/2016	NEW INSERT	20152435	7085052	-0.1	-0.1
1/7/2016	NEW INSERT	20152447	7085064	-1.0	-1.0
1/7/2016	NEW INSERT	20152429	7085046	0.5	0.5
1/8/2016	NEW INSERT	20152442	7085059	0.3	0.3
1/8/2016	NEW INSERT	20152456	7085073	-1.0	-1.0
1/8/2016	NEW INSERT	20152452	7085069	-1.3	-1.3
1/8/2016	NEW INSERT	20152424	7085041	1.0	1.0
1/8/2016	NEW INSERT	20152445	7085062	-0.4	-0.4
1/8/2016	NEW INSERT	20152419	7085036	0.5	0.5
1/8/2016	NEW INSERT	20152450	7085067	-0.5	-0.5
1/8/2016	NEW INSERT	20152422	7085039	0.9	0.9
1/8/2016	NEW INSERT	20152420	7085037	0.7	0.7
1/8/2016	NEW INSERT	20152451	7085068	-0.7	-0.7
1/11/2016	NEW INSERT	20152421	7085038	0.2	0.2
1/11/2016	NEW INSERT	20152444	7085061	-0.4	-0.4
1/13/2016	NEW INSERT	20152439	7085056	0.1	0.1
1/13/2016	NEW INSERT	20152448	7085065	-1.2	-1.2
1/13/2016	NEW INSERT	20152438	7085055	-0.7	-0.7
1/13/2016	NEW INSERT	20152449	7085066	0.1	0.1
1/13/2016	NEW INSERT	20152440	7085057	-0.4	-0.4
1/13/2016	NEW INSERT	20152453	7085070	-0.2	-0.2
1/13/2016	NEW INSERT	20152446	7085063	-0.2	-0.2
1/13/2016	NEW INSERT	20152441	7085058	0.1	0.1
1/14/2016	NEW INSERT	20152436	7085053	0.3	0.3
1/14/2016	NEW INSERT	20152454	7085071	0.6	0.6
1/14/2016	NEW INSERT	20152437	7085054	0.0	0.0
1/14/2016	NEW INSERT	20152431	7085048	-0.2	-0.2
1/14/2016	NEW INSERT	20152455	7085072	-0.5	-0.5
1/14/2016	NEW INSERT	20152430	7085047	0.1	0.1
1/15/2016	NEW INSERT	20152427	7085044	0.8	0.8
1/15/2016	NEW INSERT	20152423	7085040	0.2	0.2
1/15/2016	NEW INSERT	20152432	7085049	-0.5	-0.5
1/15/2016	NEW INSERT	20152433	7085050	-0.5	-0.5
1/15/2016	NEW INSERT	20152428	7085045	0.3	0.3
1/15/2016	NEW INSERT	20152426	7085043	0.8	0.8
1/15/2016	NEW INSERT	20152434	7085051	-0.1	-0.1
1/15/2016	NEW INSERT	20152425	7085042	-0.2	-0.2

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
1/15/2016	14R-5.7	79-10-611	7024437	1.7	1.7
1/28/2016	32-7.0S	74-14-221	7023646	1.8	1.8
1/28/2016	32-2.0-6.5S	98-6539-12	7025085	3.1	-1.4
1/28/2016	12-2.5-0.5	20013516	7084086	3.7	-1.1
1/28/2016	12R-3.3-1.0B	20041149	7084248	2.6	-0.2
1/28/2016	17R-5.6	20032673	7084223	-2.5	0.4
1/28/2016	30-10.3-0.01	77-12-233	7024257	1.7	1.7
1/28/2016	30-9.8-0.9	75-14-142	7024028	0.9	0.9
1/28/2016	P31-0.01N	75-14-230	7024114	0.7	0.7
1/28/2016	P32S-1.0S	74-12-339	7023429	3.4	1.5
1/28/2016	30-1.3-8.8S	75-12-236	7023907	1.6	1.6
1/28/2016	23-1.0S	79-14-195	7024551	-1.4	-1.4
1/28/2016	24-2.9	952247	7083722	1.3	1.3
1/29/2016	14-1.0-0.5	74-12-206	7023296	1.5	1.5
1/29/2016	15-2.0S	73-10-202	7023037	-2.8	-1.6
1/29/2016	24-3.9-0.01	74-12-283	7023373	-0.8	-0.8
1/29/2016	30-4.3S	74-12-407	7023496	1.1	1.1
1/29/2016	31-8.0S	97-5647-12	7025027	1.2	1.2
1/29/2016	1R-4.0-1.0-1.0-0.5	77-12-205	7024229	1.3	1.3
1/29/2016	4R-1.5-0.5	74-12-312	7023402	1.3	1.3
1/29/2016	1R-5.0-0.5	77-12-167	7024191	-2.6	0.6
1/29/2016	6-10.5	20013525	7084095	-1.6	-1.6
1/29/2016	P11-0.8	83-10-920	7024663	1.8	1.8
1/29/2016	15R-4.5	972306	7083792	-0.3	-0.3
2/17/2016	32-4.0S	20032668	7084218	0.7	0.7
2/17/2016	PV3-2.0B	74-12-157	7023158	0.1	0.1
2/17/2016	PV3-0.5	75-14-161	7024047	3.1	1.2
2/17/2016	PV4P-0.01N-0.25	75-12-197	7023868	-0.2	-0.2
2/17/2016	PV4-1.0B	74-10-179	7023069	-1.7	-1.7
2/18/2016	P29-0.5-1.0	20062189	7084532	1.3	1.3
2/18/2016	17R-4.4	20101947	7084707	2.8	0.8
2/18/2016	26-2.2	20011202	7084033	5.4	1.0
2/18/2016	14-7.5-2.5	993262	7083916	1.7	1.7
2/18/2016	29-8.5S	20082918	7084646	6.1	-1.0
2/19/2016	28-2.0-8.0SB	83-12-569	7024651	-1.5	-1.5
2/19/2016	28-3.0-4.0N	20013536	7084129	-0.8	-0.8
2/19/2016	P27-N-0.7-0.5	20061583	7084470	1.5	1.5
2/19/2016	35-2.5-0.5S	993336	7083970	1.4	1.4
2/19/2016	21-2.8	20051548	7084368	6.0	0.5
2/19/2016	22R-1.1	2011874	7084800	0.3	0.3
2/19/2016	28-7.0	883627	7083365	0.6	0.6
2/22/2016	19R-3.0S M&I	995637-4	7025145	-2.7	-0.6

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
2/24/2016	22R-S-1.7B	994721	7083999	1.0	1.0
2/25/2016	20-8.3	20042884	7084290	-3.5	1.3
2/25/2016	8-7.5N-0.01	722196	7033115	4.4	0.1
2/25/2016	2-0.5-1.5-0.01	20082942	7084670	5.9	1.0
2/25/2016	P23-0.1	20032671	7084221	0.9	1.7
2/25/2016	29R-0.1-1.2	200634	7084002	1.5	1.5
2/26/2016	8-8.0N-0.01	722595	7033160	3.8	-0.4
2/26/2016	18-1.0S	945076	7083690	1.8	1.8
2/26/2016	P-16-0.67	20062157	7084500	1.0	1.0
2/26/2016	P11-0.3	722092	7033057	4.1	-0.3
2/29/2016	31-1.5-3.5S	74-14-250	7023675	0.1	0.1
2/29/2016	30-9.3-0.01	77-12-254	7024278	0.9	0.9
2/29/2016	30-1.3-0.5	87-12-276	7024921	1.3	1.3
2/29/2016	22R-2.1	74-14-197	7023622	0.8	0.8
2/29/2016	31-7.5N	85-12-539	7024873	0.8	0.8
3/1/2016	28R-1.0W-3.5	98-6537-12	7025083	-0.6	-0.6
3/1/2016	P33S-1.25S	20051530	7084350	4.4	0.8
3/1/2016	30R-1.0S	20051527	7084347	1.8	1.8
3/1/2016	30R-1.0-0.5	20082943	7084671	1.8	1.8
3/4/2016	P25-1.80	20011194	7084025	0.8	0.8
3/4/2016	16R-5.2-2.2	20072705	7084563	0.4	0.4
3/4/2016	14R-7.1	945073	7083685	5.1	0.3
3/4/2016	14-5.5-2.0-0.01B	20022636	7084167	1.8	1.8
3/4/2016	19-8.0-0.01	972311	7083797	0.5	0.5
3/7/2016	28-8.5B	891176	7083496	0.8	0.8
3/7/2016	PV9-1.5E-0.01	74-14-368	7023792	-2.8	0.7
3/7/2016	19R-3.0N-0.5B	871221	7083166	1.6	1.6
3/9/2016	114.00R	871157	7083102	1.0	1.0
3/9/2016	15-2.5	74-14-331	7023756	0.9	0.9
3/9/2016	P29-0.5-0.5N	871099	7083079	-0.1	-0.1
3/9/2016	4R-4.0	77-10-233	7024126	-1.7	-1.7
3/9/2016	15-2.0	74-14-134	7023559	-0.2	-0.2
3/9/2016	14-7.5-2.0W	20013524	7084094	1.8	1.8
3/15/2016	10-3.3	20013518	7084088	4.0	-1.0
3/15/2016	P2-0.01	77-14-178	7024379	2.5	1.6
3/16/2016	NEW SADDLE	20151769	7085076	-0.1	-0.1
3/16/2016	NEW SADDLE	20151768	7085075	0.0	0.0
3/16/2016	NEW SADDLE	20151767	7085074	-0.3	-0.3
3/16/2016	33-8.0S	20013557	7084113	-1.4	-1.4
3/21/2016	P33S-0.5S	20082935	7084663	5.0	0.8
4/21/2016	6-4.0S-0.5 M&I	08-09624-04	7025229	-7.8	-0.7
4/27/2016	15-5.0	98-6542-12	7025088	1.0	1.0

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
4/27/2016	28-2.0-7.5N	20032676	7084226	0.6	0.6
4/27/2016	29-11.5-0.5N	75-12-222	7023893	1.6	1.6
4/27/2016	4-2.0	20062172	7084515	0.2	0.2
4/27/2016	31-1.5-7.5S	75-12-240	7023911	0.8	0.8
4/27/2016	PV6-5.5	74-14-226	7023651	-0.7	-0.7
4/27/2016	37-2.3S	20032674	7084224	1.4	1.4
4/27/2016	37-3.3N	77-12-226	7024250	3.8	1.2
4/28/2016	37-4.3	75-14-175	7024061	-0.5	-0.5
4/28/2016	31-1.5-3.0S	74-14-330	7023755	-1.1	-1.1
4/28/2016	5-2.0	96-2931-12	7025013	-0.2	-0.2
4/28/2016	P30-0.3-1.0	96-2958-14	7024993	-0.1	-0.1
4/28/2016	2R-6.0-E-1.5	77-12-287	7024311	0.3	0.3
4/28/2016	10-0.3-1.5	77-14-177	7024378	-0.3	-0.3
4/28/2016	2R-6.0E-0.01	77-12-291	7024315	1.5	1.5
4/28/2016	14-3.5-2.5	20042879	7084285	1.3	1.3
4/28/2016	29-10.5-3.15	75-12-199	7023870	1.2	1.2
4/28/2016	7-2.0N	96-2937-14	7024972	-0.8	-0.8
4/28/2016	12R-1.3-1.5	79-8-1444	7024410	-1.5	-1.5
5/2/2016	NEW INSERT	20160447	7085096	-1.8	-1.8
5/2/2016	NEW INSERT	20160449	7085098	-1.6	-1.6
5/2/2016	NEW INSERT	20160448	7085097	-0.4	-0.4
5/2/2016	NEW INSERT	20160450	7085099	-1.7	-1.7
5/2/2016	NEW INSERT	20160452	7085101	-1.3	-1.3
5/3/2016	NEW INSERT	20160455	7085104	1.2	1.2
5/3/2016	NEW INSERT	20160453	7085102	-1.4	-1.4
5/3/2016	NEW INSERT	20160454	7085103	-0.6	-0.6
5/2/2016	27-6.5M&I	04-01841-4	7025193	0.7	0.7
5/9/2016	NEW INSERT	20160446	7085095	-0.3	-0.3
5/9/2016	NEW INSERT	20160456	7085105	0.4	0.4
5/9/2016	NEW INSERT	20160451	7085100	-1.1	-1.1
5/9/2016	16-9.5	20013580	7084147	0.8	0.8
5/10/2016	PV3-2.5	20051582	7084402	0.1	0.1
5/17/2016	P21-0.01	79-10-625	7024451	0.2	0.2
5/17/2016	2R-6.8	77-8-277	7024144	0.3	0.3
5/17/2016	12-1.0-0.5B	891189	7083509	2.6	0.7
5/17/2016	30-7.31	74-14-353	7023777	-1.6	-1.6
5/17/2016	14-10.0	85-12-541	7024875	0.1	0.1
5/18/2016	20-12.8-0.5	74-14-109	7023534	-1.8	-1.8
5/18/2016	P33N-1.0N	20101953	7084713	3.1	0.0
5/18/2016	PV8-6.3B	73-10-135	7023034	1.7	1.7
5/18/2016	P5-0.37N	77832	7043095	-3.0	-0.8
5/18/2016	3R-4.5	75-16-131	7023864	0.3	0.3

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
5/18/2016	37-1.8S	20072770	7084575	5.6	-1.7
5/19/2016	8-11.0	20013522	7084092	3.0	0.5
5/19/2016	P33N-1.0S	993238	7083892	5.7	-1.3
5/19/2016	13-2.7-5.0	831860	7083015	0.4	0.4
5/23/2016	28-4.5	883607	7083345	3.7	1.3
5/24/2016	37-0.3-4.5	20051551	7084371	1.7	1.7
5/24/2016	34-3.5-0.01	20082945	7084673	0.3	0.3
5/24/2016	14-3.5-4.5-0.01	20102453	7084740	4.9	0.5
5/31/2016	NEW INSERT	20160429	7085078	-0.6	-0.6
5/31/2016	NEW INSERT	20160436	7085085	-0.2	-0.2
5/31/2016	NEW INSERT	20160430	7085079	-0.5	-0.5
5/31/2016	NEW INSERT	20160432	7085081	-1.8	-1.8
5/31/2016	NEW INSERT	20160435	7085084	0.1	0.1
5/31/2016	NEW INSERT	20160437	7085086	-0.9	-0.9
5/31/2016	NEW INSERT	20160433	7085082	-0.6	-0.6
5/31/2016	NEW INSERT	20160431	7085080	-0.3	-0.3
5/31/2016	NEW INSERT	20160442	7085091	0.5	0.5
5/31/2016	NEW INSERT	20160443	7085092	-0.3	-0.3
6/1/2016	NEW INSERT	20160444	7085093	-1.0	-1.0
6/1/2016	NEW INSERT	20160440	7085089	0.1	0.1
6/1/2016	NEW INSERT	20160428	7085077	-1.5	-1.5
6/1/2016	NEW INSERT	20160439	7085088	-0.7	-0.7
6/1/2016	NEW INSERT	20160445	7085094	-0.7	-0.7
6/1/2016	NEW INSERT	20160441	7085090	0.1	0.1
6/1/2016	NEW INSERT	20160434	7085083	-0.1	-0.1
6/1/2016	NEW INSERT	20160438	7085087	-0.6	-0.6
6/1/2016	5-9.5	74-14-145	7023570	-0.7	-0.7
6/1/2016	20-5.2	77-14-132	7024334	0.3	0.3
6/1/2016	20-6.3N	87-14-137	7024916	-1.7	-1.7
6/1/2016	9-1.7	20013582	7084149	-0.5	-0.5
6/1/2016	14R-1.8-1.0	77-14-175	7024376	1.2	1.2
6/1/2016	35-5.0N	892817	7083543	0.5	0.5
6/1/2016	28-2.0-3.0S	20062198	7084541	1.8	1.8
6/2/2016	26-1.7-2.5	992975	7083871	-4.1	0.3
6/2/2016	P24-0.4	885293	7033438	1.1	1.1
6/2/2016	28-10.5-0.5W	993334	7083968	2.4	0.4
6/2/2016	P16-0.2-0.01	20050430	7084339	0.5	0.5
6/2/2016	18R-3.81	83-10-922	7024665	0.5	0.5
6/2/2016	5-2.25	891642	7083452	1.8	1.8
6/2/2016	16-10.0	20042416	7084269	3.7	0.9
6/3/2016	37-0.3-4.5B	20071149	7084628	0.6	0.6
6/3/2016	37-2.3N	20072791	7084596	0.7	0.7

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
6/3/2016	19R-1.33B	871251	7083196	0.9	0.9
6/3/2016	5-1.75	20042893	7084299	0.3	0.3
6/3/2016	28-3.0-3.0NB	20023578	7084171	0.1	0.1
6/3/2016	5-0.7	871108	7083088	0.1	0.1
6/3/2016	5-3.5	934778	7083652	0.7	0.7
6/3/2016	5-3.0	831857	7083012	1.8	1.8
6/7/2016	13-3.7-3.0B	84-12-392	7024759	0.4	0.4
6/7/2016	11-1.5-0.5E	72-12-130	7023209	1.1	1.1
6/7/2016	P12-1.2	79-12-351	7024538	-0.1	-0.1
6/13/2016	26-1.7-2.0	885299	7033444	0.5	0.5
6/13/2016	P30-1.4	74-12-402	7023491	4.8	-0.8
6/13/2016	31-1.5-7.5N	75-12-269	7023940	3.6	0.8
6/13/2016	16-6.8	883604	7083342	-0.7	-0.7
6/13/2016	37-2.8N	20072773	7084578	-1.8	-1.8
6/14/2016	2R-6.0E-2.0	77-12-174	7024198	1.5	1.5
6/14/2016	11R-3.5-0.03	77-12-192	7024216	1.8	1.8
6/14/2016	4-5.0	77-12-139	7024163	3.7	1.4
6/14/2016	11R-3.5-0.02	77-12-284	7024308	3.9	0.2
6/14/2016	13R-0.5-0.01	74-12-418	7023507	1.8	1.8
6/14/2016	13-3.7-1.5-0.01B	20121106	7084808	2.9	-0.6
6/14/2016	21R-0.9	972314	7083800	4.7	1.1
6/15/2016	7R-5.0N	74-12-433	7023522	3.7	0.1
6/15/2016	13-3.7-3.5B	84-12-417	7024761	-1.0	-1.0
6/16/2016	29-1.0-5.0S	75-12-292	7023963	0.0	0.0
6/16/2016	18R-1.3-0.01	77-12-268	7024292	0.1	0.1
6/17/2016	37-0.3-2.5S	20082951	7084679	0.9	0.9
6/17/2016	37-0.3-2.0	20072778	7084583	2.8	0.7
7/6/2016	37-1.3N	20072706	7084564	0.5	0.5
7/6/2016	13-3.7-0.5B	893792	7083590	-2.3	-0.2
7/6/2016	16-7.5	20032680	7084230	0.4	0.4
7/7/2016	27-6.5	20111670	7084746	1.2	1.2
7/7/2016	2R-3.0-1.0	75-12-327	7023998	0.9	0.9
7/7/2016	10-0.3-1.0	98-6568-14	7025114	-1.8	-1.8
7/7/2016	26-5.6B	891191	7083511	-3.2	0.6
7/7/2016	18-10.0-0.25	74-14-131	7023556	0.5	0.5
7/7/2016	33-4.0B	951224	7083705	-1.0	-1.0
7/7/2016	16-2.5S	20011212	7084043	0.9	0.9
7/7/2016	33-2.0-0.75-0.25	75-10-303	7023843	-1.3	-1.3
7/7/2016	37-1.3S	20062192	7084535	1.5	1.5
7/7/2016	13-3.7-0.01B	893796	7083594	2.2	-0.8
7/8/2016	PV9-1.5S-1.27M&I	004997-3	7025149	1.5	1.5
7/8/2016	18-6.5	945225	7083697	3.1	0.3

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
7/8/2016	31-4.0N	74-12-366	7023456	3.2	1.0
7/8/2016	31-4.5N	74-12-197	7023287	1.7	1.7
7/25/2016	3-2.7-4.5M&I	03-09759-3	7025188	0.7	0.7
7/26/2016	FPSFO SPARE	20102439	7084726	-2.6	-0.1
7/26/2016	21-5.8	20082937	7084665	2.4	0.1
7/26/2016	21-4.4	993304	7083958	-3.1	-0.3
7/26/2016	14-5.3-0.27	20062144	7084487	6.7	0.5
7/26/2016	27-5.0-2.5	20062165	7084508	1.8	1.8
7/26/2016	28-2.0	20072772	7084577	1.6	1.6
7/27/2016	21-0.3	79-14-231	7024587	-1.8	-1.8
7/27/2016	32-2.0-6.0S	79-12-298	7024485	-0.3	-0.3
7/27/2016	32-6.0S	74-14-201	7023626	-1.8	-1.8
8/19/2016	14-3.5-4.0-0.01	20042894	7084300	-1.2	-1.2
8/19/2016	4-0.5-3.5-0.5	20050406	7084317	1.8	1.8
8/19/2016	4-0.5-4.0B	73-10-268	7023046	-2.9	-1.5
8/19/2016	27-5.0-5.0-0.01	902779	7083626	3.2	1.5
8/23/2016	P27N-0.7-0.01	20062143	7084486	5.9	0.3
8/23/2016	14-3.5-0.5	972319	7083805	-1.5	-1.5
8/23/2016	P26N-1.5	20032653	7084203	0.2	0.2
8/23/2016	P27N-1.7	20082913	7084641	1.5	1.5
8/29/2016	13R-4.5	20082916	7084644	0.9	0.9
8/29/2016	14-9.0-2.0	20032663	7084213	-2.9	0.7
8/30/2016	3-2.7-4.5B	892148	7083524	-0.1	-0.1
8/30/2016	27-5.0-6.5-0.01	883612	7083350	1.1	1.1
8/30/2016	12-1.5-0.25	20013546	7084080	1.1	1.1
8/30/2016	21-4.8B	991675	7083856	0.6	0.6
8/30/2016	12R-3.3-1.0	20042865	7084271	-1.7	-1.7
9/7/2016	14-2.5-0.5B	74-12-158	7023159	-0.3	-0.3
9/8/2016	4-0.5-1.0-0.5	831859	7083014	5.6	0.8
9/8/2016	16-3.5	892860	7083586	-1.0	-1.0
9/8/2016	22-3.3B	991673	7083854	4.5	-0.7
9/9/2016	4-5.5-0.5	883624	7083362	-1.8	-1.8
9/19/2016	118.49R	970911	7083760	1.4	1.4
9/19/2016	12R-3.3-0.01	20130946	7084880	1.3	1.3
9/28/2016	12R-4.8B	20041148	7084247	1.9	1.9
9/28/2016	PV2-2.7	20011221	7084051	-1.4	-1.4
9/28/2016	PV8-3.8-0.5	20072786	7084591	0.8	0.8
9/28/2016	20-6.3-0.5B	970910	7083759	1.7	1.7
9/28/2016	PV3-4.5	20072787	7084592	1.1	1.1
9/28/2016	22-1.3	20111876	7084802	-1.8	-1.8
9/28/2016	6-3.5S-0.01	20072785	7084590	1.9	1.9
9/29/2016	P33S-0.01	74-12-273	7023363	1.6	1.6

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
9/29/2016	33-2.0-4.0N	20051559	7084379	1.4	1.4
9/29/2016	1R-5.0-0.5	74-12-387	7023477	1.2	1.2
9/29/2016	PV8-6.3	20111871	7084797	-0.8	-0.8
9/30/2016	7-4.5S-0.5	83-12-339	7024683	-0.7	-0.7
9/30/2016	14-3.0B	20061035	7084428	5.0	-0.2
10/4/2016	4-3.5N	74-14-310	7023735	-5.6	0.7
10/4/2016	14-13.0N	97-5643-12	7025023	4.3	0.8
10/4/2016	13R-1.0-0.5N	75-12-322	7023993	1.2	1.2
10/4/2016	4-0.5-4.0	74-14-225	7023650	0.1	0.1
10/4/2016	22R-5.1	75-12-251	7023922	-4.9	-1.6
10/4/2016	13R-2.5	97-5652-14	7025033	4.2	-0.1
10/13/2016	13R-5.0-0.4	83-8-3039	7024655	0.9	0.9
10/13/2016	13R-4.0-1.5B	84-12-330	7024750	1.0	1.0
10/13/2016	12R-4.3B	74-10-175	7023065	1.7	1.7
10/17/2016	30-1.3-1.0B	20072560	7084558	-1.7	-1.7
10/17/2016	7-9.0N-0.5W	77-10-231	7024124	1.6	1.6
10/17/2016	5-2.5	79-12-331	7024518	1.8	1.8
10/17/2016	17-0.5	970913	7083762	3.2	0.0
10/17/2016	14-6.5-3.0	77-14-199	7024399	4.2	1.2
10/18/2016	26-4.4B	872144	7083218	1.8	1.8
10/20/2016	27-5.0-3.5	74-12-431	7023520	1.9	1.9
10/20/2016	27-5.0-6.0	87-14-141	7024917	-1.8	-1.8
10/24/2016	CC2.94A	20161629	7085108	1.3	1.3
10/24/2016	CC2.94B	20161630	7085109	1.6	1.6
10/24/2016	CC2.94C	20161631	7085110	0.5	0.5
10/27/2016	4-7.5-2.0	20032692	7084193	0.4	0.4
10/27/2016	7-9.0N-0.5N	20013519	7084089	1.8	1.8
10/27/2016	5-1.5N-0.01	75-14-184	7024069	0.1	0.1
10/27/2016	13-2.7-3.0	20042868	7084274	1.8	1.8
10/27/2016	16T-119.56RB	85-12-327	7024852	0.7	0.7
10/27/2016	2R-6.3E	75-14-131	7024017	-0.2	-0.2
10/27/2016	4-6.5-0.5	853416	7083033	1.4	1.4
10/27/2016	37-0.3-4.5B	20071149	7084627	1.4	1.4
10/28/2016	35-4.5S	972313	7083799	1.2	1.2
10/28/2016	P30-0.3-1.5	20042867	7084273	-0.9	-0.9
10/28/2016	PV3-4.0B	871172	7083117	2.8	-0.2
11/4/2016	FPSFO SPARE	20051591	7084411	0.1	0.1
11/4/2016	TFO SPARE	892822	7083548	1.2	1.2
11/7/2016	TFO SPARE	20042893	7084299	1.3	1.3
11/7/2016	HFO SPARE	891652	7083462	-0.2	-0.2
11/7/2016	HFO SPARE	871110	7083090	1.0	1.0
11/7/2016	TFO SPARE	20013582	7084149	-0.9	-0.9

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
11/9/2016	HFO SPARE	885030	7083431	0.6	0.6
11/9/2016	FPSFO SPARE	20013541	7084134	1.9	1.9
11/9/2016	HFO SPARE	20072770	7084575	1.8	1.8
11/9/2016	HFO SPARE	945082	7083696	-1.6	-1.6
11/14/2016	FPSFO SPARE	20011204	7084035	1.1	1.1
11/14/2016	FPSFO SPARE	992975	7083871	-1.8	-1.8
11/14/2016	HFO SPARE	883591	7083329	0.8	0.8
11/14/2016	HFO SPARE	873568	7083265	0.1	0.1
11/14/2016	TFO SPARE	883609	7083347	1.8	1.8
11/14/2016	TFO SPARE	883631	7083369	0.8	0.8
11/14/2016	TFO SPARE	20051528	7084348	0.8	0.8
11/14/2016	TFO SPARE	885035	7083436	-1.0	-1.0
11/14/2016	FPSFO SPARE	20011202	7084033	0.0	0.0
11/14/2016	HFO SPARE	993348	7083982	0.7	0.7
11/14/2016	FPSFO SPARE	973921	7083819	1.9	1.9
11/14/2016	FPSFO SPARE	993356	7083990	0.6	0.6
11/14/2016	FPSFO SPARE	871102	7083082	1.6	1.6
11/14/2016	TFO SPARE	892854	7083580	-1.0	-1.0
11/17/2016	PV2-1.5-0.25	74-12-220	7023310	5.8	1.4
11/18/2016	27-5.0-9.0-0.01	75-14-193	7024078	-1.5	-1.5
11/18/2016	20R-2.8	74-10-235	7023265	-1.9	-1.9
11/18/2016	CC11.58RA	72-10-240	7023019	1.9	1.9
11/18/2016	27-8.5	75-14-199	7024084	-1.8	-1.8
11/18/2016	20R-1.3-0.5	79-10-613	7024439	0.8	0.8
11/18/2016	22-3.8-0.5	77-12-189	7024213	5.5	-0.4
11/18/2016	4-7.0	20082959	7084687	0.3	0.3
11/18/2016	P4-0.01B	872002	7083214	-0.3	-0.3
11/18/2016	3-2.7-4.5	952241	7083716	-0.9	-0.9
11/18/2016	22-3.3	20013578	7084145	5.6	-0.3
11/21/2016	26-3.7B	872147	7083221	1.7	1.7
11/22/2016	HFO SPARE	86-12-380	7024890	5.6	-1.5
11/22/2016	17-1.5N	20042415	7084268	-1.7	-1.7
11/22/2016	17-1.0N	993285	7083939	1.9	1.9
11/23/2016	16-5.0-0.01	20072775	7084580	7.3	1.9
11/23/2016	17-11.5	934791	7083665	0.1	0.1
11/28/2016	16-6.5	20042873	7084279	0.1	0.1
11/28/2016	35-4.51N	993338	7083972	0.1	0.1
11/29/2016	30-1.3-1.0	20111835	7084761	-0.8	-0.8
11/29/2016	P33N-1.5S	993331	7083965	1.3	1.3
11/30/2016	PV3-3.5B	71-12-128	7023107	1.0	1.0
11/30/2016	33-2.0-3.0N	993291	7083945	1.5	1.5
11/30/2016	5-1.5-N-0.5	20051563	7084383	0.8	0.8

TEST DATE	LOCATION	SERIAL NUMBER	WWD NUMBER	BEGINNING ERROR	EXIT ERROR
11/30/2016	8-1.0S-1.0	722188	7033107	0.5	0.5
11/30/2016	3-2.2	883610	7083348	2.8	1.7
11/30/2016	P6-S-0.01	20032660	7084210	1.8	1.8
11/30/2016	26R-3.0	74-12-396	7023486	1.2	1.2
11/30/2016	4-8.5	77-14-135	7024337	0.7	0.7
12/19/2016	118.49R	891974	7083518	1.0	1.0
12/19/2016	30-1.3-8.8N	98-6508-8	7025054	1.5	1.5
12/19/2016	30-1.3-8.3N-0.5	77-10-239	7024132	1.4	1.4
12/19/2016	17-9.5-0.01	993260	7083914	0.6	0.6
12/19/2016	P30-2.3-0.5	75-14-191	7024076	1.2	1.2
12/20/2016	P30-2.3-0.01	20051556	7084376	1.0	1.0
12/20/2016	30-1.3-6.0-0.01	20051574	7084394	1.5	1.5
12/20/2016	30-1.3-2.5N	993305	7083959	0.6	0.6
12/20/2016	30-1.3-8.3S-0.1	20101951	7084711	0.7	0.7
12/21/2016	2-0.5-0.5S	993224	7083878	0.9	0.9
12/21/2016	27-10.5-0.5	20050420	7084329	0.9	0.9
12/21/2016	7R-4.6	20032683	7084233	0.4	0.4
12/21/2016	19R-0.5B	871253	7083198	0.8	0.8
12/21/2016	7-1.5S-0.5	883605	7083343	0.7	0.7
12/21/2016	19R-1.83B	871209	7083154	-1.1	-1.1
12/21/2016	7R-4.3	993226	7083880	0.3	0.3

Irrigation & Agriculture

Model WMR - Water Meter

The ample space around the core of the in-line helical axial turbine allows foreign matter to pass through the meter without clogging.

- **Applications**
  For main supply lines, agriculture and industry
- **Available Sizes**
  2" (50mm)
- **Standards**
  EEC (based on ISO 4064:1993)

Features:

- Minimum head loss
- High accuracy
- Hermetically sealed register with glass
- Optional electrical output: EV (volume
  EF (rate of flow) or DIALOG
- Not sensitive to dirt

Technical Specifications

Maximum Working Pressure	16 bar
Maximum Liquid Temperature	55°C
Body	Iron, polyester coated
Connection	2" BSP coupling

WMR type dial

Irrigation & Agriculture

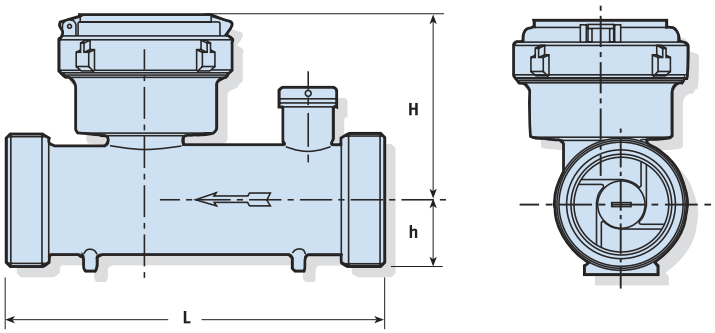
Model WMR - Water Meter

ARAD

Water Works

Dimensions

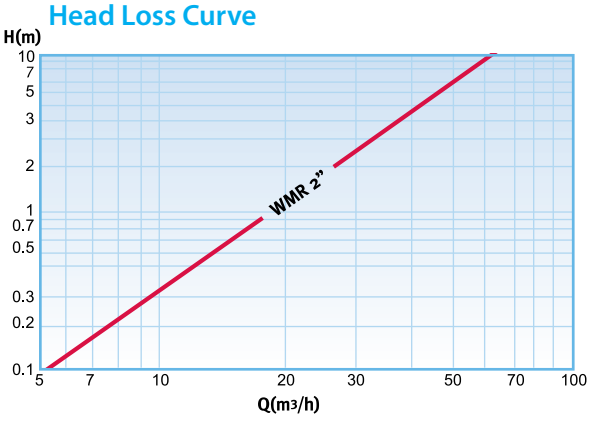
Model		WMR
Nominal size	(mm)	50
	(inch)	2
L – Length without couplings (mm)		200
H – Height (mm)		98
h – Height (mm)		40
Weight (kg)		2.3
Weight with couplings (kg)		3.7



Performance data:

Model WMR / **Nominal size** (mm)	**Nominal size** (inch)	**Qmax** Maximum flowrate (m3/h)	**Qn** ISO 4064 (m3/h)	**Qn** Nominal Flowrate (m3/h)	**Qt** Transitional Flowrate (m3/h)	**Qmin** Minimum Flowrate (m3/h)	**Starting Flow** (m3/h)	**Maximum** register capacity (m3)	**Smallest readable unit** (liter)	**Accuracy between Qmax & Qt**	**Accuracy between Qt & Qmin**
50	2	40	15	20	2	0.45	0.15	10^6	1	±2%	±5%

Head Loss Curve



Installation Requirements

- The water meter may be installed in any position. For non-horizontal position the flow shall be upwards.
- The meter shall be full of water while operating.
- Prior to installation of a meter the pipeline shall be thoroughly flushed.
- Straight pipe section of the same diameter D as the meter, having lengths of 10D and 5D shall be installed upstream and downstream of the meter respectively.

ARAD **Arad Ltd.**
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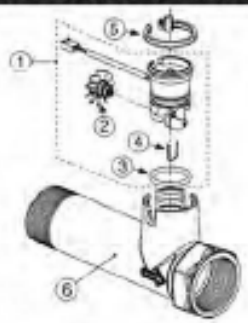
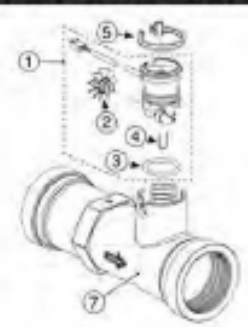
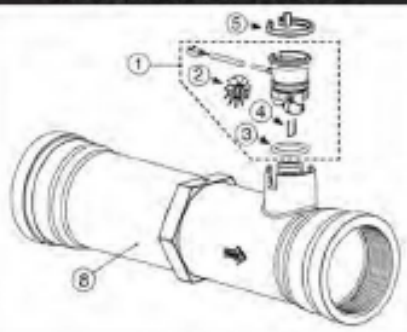
ARADGROUP Integrated Metering Technologies

Inline Flow Meters NPT or BSPT

V3040-15 or V3040BSPT-15 1.5” Meter	V3050 or V3050BSPT 2” Meter	V3075 or V3075BSPT 3” Meter
		
• 1.5” Inline meter suited for commercial/ industrial applications • Lead Free Brass construction • Service flow range 0.5 to 60 gpm • Meter accuracy ±5% • Reliable and proven turbine design • 15-foot cable included • 1½” male x female pipe NPT or BSPT connections	• 2” Inline meter suited for commercial/ industrial applications • Stainless Steel construction • Service flow range 1.5 to 150 gpm • Meter accuracy ±5% • Reliable and proven turbine design • 15-foot cable included • 2” female x female pipe connection or 2½” groove lock coupling	• 3” Inline meter suited for commercial/ industrial applications • Stainless Steel construction • Service flow range 3.5 to 350 gpm • Meter accuracy ±5% • Reliable and proven turbine design • 15-foot cable included • 3” female x female pipe connection or 3½” groove lock coupling

Inline Flow Meters NPT or BSPT

WS1.5 Meter Assembly Order No: V3040-15 or V3040BSPT-15	WS2 Meter Assembly Order No: V3050 or V3050BSPT	WS3 Meter Assembly Order No: V3075 or V3075BSPT
		

Drawing No.	Order No.	Description	Quantity
		Common Parts	
1	V3221	WS Remote Meter Asy 15 Ft Cord (includes V3118-03, V3501 and V3105)	1
2	V3118-03	WS1.5/2 Turbine Asy	1
3	V3105	O-Ring 215	1
4	V3501	WS1.5/2 Turbine Clip	1
5	V3632	WS1.5/2/3 Meter Retaining Clip	1
		WS1.5 Meter Assembly Parts	
6	V3401-01	WS1.5 Meter Housing NPT	1
	V3401BSPT-01	WS1.5 Meter Housing BSPT	
Not Shown	V3437	WS1.5 Flow Straightener (located inside meter housing)	1
		WS2 Meter Assembly Parts	
7	V3222-01	WS2 Meter NPT Housing	1
	V3222BSPT-01	WS2 Meter BSPT Housing	
Not Shown	V3488	WS2 Flow Straightener (located inside meter housing)	1
		WS3 Meter Assembly Parts	
8	V3601-01	WS3 Meter NPT Housing	1
	V3601BSPT-01	WS3 Meter BSPT Housing	
Not Shown	V3602	WS3 Flow Straightener (located inside meter housing)	1

Installation

Installation of the V3040-15 WS1.5 Meter NPT Assembly can be accomplished using 1.5" NPT pipe and fittings.
For V3040BSPT-15 WS1.5 Meter BSPT use 1.5" BSPT pipe and fittings.

Installation of the V3050 WS2 Meter NPT Assembly can be accomplished with 2" NPT pipe or by using a 2½" groove lock coupling.
For V3050BSPT WS2 Meter BSPT Assembly use 2" BSPT pipe or 2½" groove lock coupling.

Installation of the V3075 WS3 Meter NPT Assembly can be accomplished with 3" NPT pipe or by using a 3½" groove lock coupling.
For V3075BSPT WS3 Meter BSPT Assembly use 3" BSPT pipe or 3½" groove lock coupling.

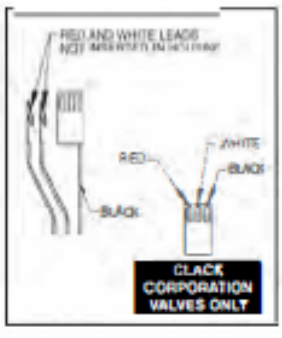
WHEN INSTALLING THE METER, MAKE SURE THE ARROW ON THE METER BODY IS GOING THE SAME DIRECTION AS THE WATER FLOW.
THE METER ASSEMBLIES MUST BE INSTALLED IN A HORIZONTAL POSITION.

THIS WATER METER SHOULD NOT BE USED AS THE PRIMARY MONITORING DEVICE FOR CRITICAL HEALTH EFFECT APPLICATIONS.

OPERATING PRESSURES: 20 PSI MINIMUM / 125 PSI MAXIMUM - OPERATING TEMPERATURES: 40°F MINIMUM / 110°F MAXIMUM

The 22 gauge wire crimp terminals are Molex Series 41572 or 40445. The housing connector is Molex Series 2695 White Housing, P/N 22-01-3037.
The housing connector diagram shows the proper installation of the RED, WHITE and BLACK wires for CLACK CORPORATION CONTROL VALVES. When connecting to other manufacturers control valves please contact your original equipment manufacturer for proper wiring instructions.

Wiring:
- The meter must be supplied with a DC voltage between 4 and 24 volts
- The RED wire is positive
- The BLACK wire is negative
- The WHITE wire is the meter output



Calibration Instructions for WS1.5 Meters:
- For WS1.5" valves select 1.5 if valve software records in gallons and 38 if valve software records in cubic meters.
- The calibration factor for the Meter Assembly is 37 pulses per gallon when used on applications other than WS1.5" valves.
- The meter flow range is 0.5-60 gpm + 5% (output signal 0.4 Hz to 47.5 Hz). NOTE: Not all flow monitors will register accurately at either the low or high flow range of this meter. Contact your flow monitor manufacturer for limitations.
- Pressure drop at 75 gpm is 2.7 PSI

Calibration Instructions for WS2 Meters:
- For WS2 valves select 2.0 if valve software records in gallons and 50 if valve software records in cubic meters.
- For WS2L valves select 2.0L if valve software records in gallons and 50L if valve software records in cubic meters.
- The calibration factor for the WS2 Meter Assembly is 20 pulses per gallon when used on applications other than WS2 or WS2L valves.
- The meter flow range is 1.5-150 gpm + 5% (output signal 0.4 Hz to 47.5 Hz). NOTE: Not all flow monitors will register accurately at either the low or high flow range of this meter. Contact your flow monitor manufacturer for limitations.
- Pressure drop at 150 gpm is 3.6 PSI

Calibration Instructions for WS3 Meters:
- For WS2H valves select 8 pulses if valve software records in gallons and 2.1 if valve software records in liters.
- The calibration factor for the WS3 Meter Assembly is 8 pulses per gallon when used on applications other than WS2H valves.
- The meter flow range is 3.5-350 gpm + 5% (output signal 0.46 Hz to 46.6 Hz). NOTE: Not all flow monitors will register accurately at either the low or high flow range of this meter. Contact your flow monitor manufacturer for limitations.
- Pressure drop at 350 gpm is 7.3 PSI

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SPARLING INSTRUMENTS, INC.

PRODUCT DATA SHEET

SERIES 100 METERS AND ACCESSORIES

Series 190 Totalizers, Indicators and Transmitters for Mechanical Drive Propeller Flowmeters FT190, FT191, FT193

PDS-190
Issue Date: Feb. 1995
Supercedes: Nov. 1993

DESCRIPTION

The Series 190, 191 and 193 are used in combination with and mounted on Sparling propeller flowmeters to provide mechanical totalization (registration), mechanical indication and a variety of pulse and/or 4-20 mA outputs.

FT190—(Formerly Model 245)
Provides mechanical totalization (registration), mechanical rate indication.

FT191—(Formerly Model 249)
Provides mechanical totalization (registration).

FT193
Provides mechanical totalization and both a true two-wire 4-20 mA output and a true two-wire scaled electronic pulse output.

TABLE 1
READOUT AND OUTPUT CAPABILITIES

Type	Mechanical Totalization	Mechanical Rate Indication	Outputs	4-20 mA (Two Wire) ①	Scaled Electronic Pulse Rate	Approx. Shipping Weight
FT190 (FORMERLY MODEL 245)	YES	YES	NO	NO	NO	20 lbs.
FT191 (FORMERLY MODEL 249)	YES	NO	NO	NO	NO	15 lbs.
FT193	YES	NO	YES	Standard	Standard	20 lbs.

① Full scale flow rate for 100% signal output must occur at full scale flow rate shown in Table 4 or greater flow rate
② Available in optional "P", "B" and "E" switch outputs.

Sparling Instruments, Inc.
4097 N. Temple City Blvd. • El Monte, CA 91731-1089 USA
Phone (626) 444-0571 • Fax (626) 444-2314

SPECIFICATIONS:

MECHANICAL RATE INDICATOR
- Scale Length ..... 6 inches
- Accuracy ..... 5% full scale
- Available Scales ..... See Table 4

MECHANICAL TOTALIZER
- Number of digits 6
- Accuracy ..... ±2% actual flow
- Units of registration ..... See table 2
- Test Hand ..... One full rotation per least significant digit of totalizer.

4-20 mA OUTPUT (FT193 ONLY):
- True two-wire requiring external power supply
- External Power Supply ..... 18 to 30 Vdc
- Output Load Capability ..... See power supply vs. output load curve
- Reverse polarity protection ..... 35 Vdc (max.)
- Accuracy ..... 0.5% of full scale

SCALED ELECTRONIC PULSE RATE (FT193 ONLY)
- Two-wire isolated solid state switch (photocoupled)
- External power supply ..... 10 Vdc to 30 Vdc
- Pulse amplitude ..... 0 Vdc (off) to external supply voltage minus 3 Vdc (on)
- Output load ..... 4 watts maximum
- Pulse on time 100ms
- Pulse output registration ..... Equal to mechanical totalizer least significant digit
- Accuracy ..... 2% actual flow

ALL OUTPUT CONNECTIONS:
Pigtail leads through 1/2 NPT grommeted or potted sealed conduit connection.

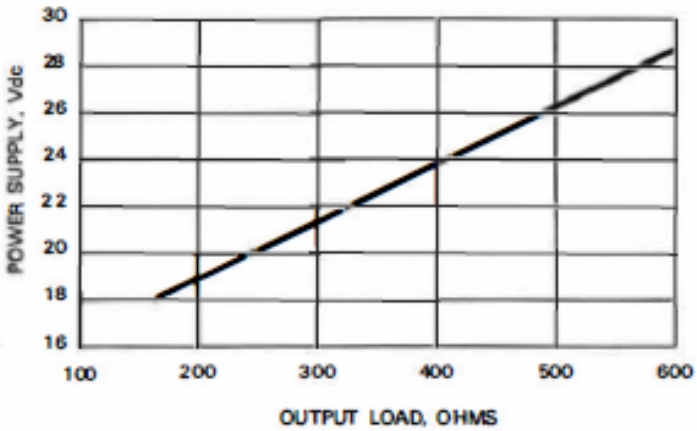
MATERIAL OF CONSTRUCTION:
Painted Die Cast Aluminum

ENCLOSURE RATING ..... NEMA 3R

ELECTRICAL RATING ..... General Purpose

AMBIENT TEMPERATURE LIMITS:
+30F (-1C) to +130F (+55C)—FT193

4 to 20mA OUTPUT
POWER SUPPLY VS. OUTPUT LOAD



SERIES 190 PROPELLER FLOWMETER TRANSMITTERS
MODEL NUMBER SCHEDULE

Table 1 - Base Model Number	
FT190 -	Mechanical Flow Totalizer and Indicator
FT191 -	Mechanical Flow Totalizer
FT193 -	Mechanical Flow Totalizer with 4-20 mA and Scaled Pulse Output

Table 2 - Outputs	
000 -	No Outputs (FT190 and F191 Only)
111 -	4-20 mA and Scaled Pulse Rate (FT 193 Only)

Table 3 - Mounting	
2	For Mounting on Meterhead on Same Order
3	Replacement for Existing Meterheads

FT19__-___-__

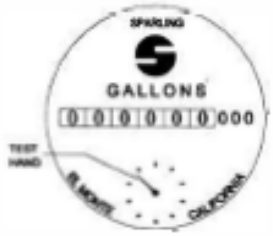
ORDERING INFORMATION

1. Construct model number by selecting one code for each category.
2. If ordered with new meter-head, state base model number and size of meter-head. If replacement for existing meterhead, state serial number of existing meterhead.
3. Provide following information from Tables 2 & 3.
   a. Mechanical indicator scale and units.
   b. Mechanical totalizer registration and units.

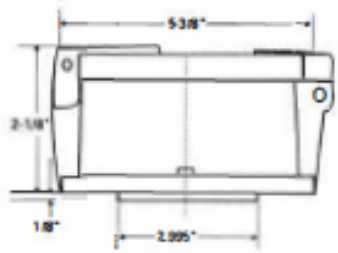
FT190 (Formerly 245)
Indicator/Totalizer

No Outputs

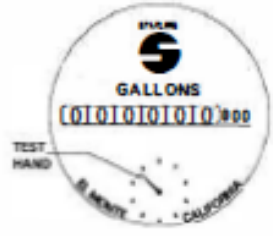
FT191 (Formerly 249)
Totalizer

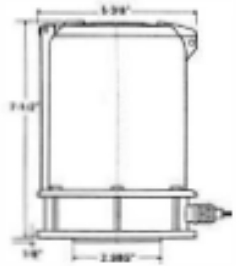


No Outputs



FT193
Transmitter/Totalizer





WATERFLUX 3070

IP68 Compact & remote
Battery powered electromagnetic water meter

- Battery power or optional mains power & battery backup with the FlexPower
- Easy installation without straight inlet or outlet lengths
- Integrated pressure and temperature sensor

Measurements

Measuring units	**Volume**
	Default setting: m^3
	Selectable: liter, gallon, imperial gallons, cubic feet, acre inch, acre feet
	Flow rate
	Default setting: m^3 / hr
	Selectable: liter/sec, gallon/min, imperial gallon/min, cubic feet/hour, acre inch/day, acre feet/day
Measurement interval Battery power	Default setting: 15s
	Selectable: 5s, 10s, 15s, 20s
Measurement interval FlexPower	Default setting: 5s
Empty pipe detection	Optional: display shows - EP - in case of empty pipe detection
Low flow cut off	Measurements below this value are neglected
	Default setting: 10 mm/s
	Selectable: 0 mm/s, 5 mm/s, 10 mm/s

Measuring accuracy

Reference conditions	Medium: water
	Temperature: +10...30°C / +50...86°F
	Operating pressure: 1 bar / 14,5 psi
	Inlet section: 3 DN / Outlet section: 1 DN
Maximum measuring error	DN25...300; down to 0.2% of the measured value ± 1 mm/s DN350...600; down to 0.4% of the measured value ± 1 mm/s
	The maximum measuring error depends on the installation conditions.
	For detailed information refer to *Measurement accuracy* on page 26.
Repeatability	DN 25...300; ±0.1% (v >0.5 m/s / 1.5 ft/s) DN350...600; ±0.2% (v >0.5 m/s / 1.5 ft/s)
Calibration / Verification	**Standard:**
	2 Point calibration by a direct volume comparison.
	Optional: for DN25...600
	Verification to Measurement Instrument Directive (MID), Annex MI-001. Standard: Verification at Ratio (Q3/Q1) = 80 Optional: Verification at Ratio (Q3/Q1) > 80
MID Annex III (MI-001) (Directive 2014/32/EU)	**EC-Type examination certificate to MID Annex III (MI-001)**
	Diameter: DN25...600
	Minimum straight inlet flow: 0 DN
	Minimum straight outlet flow: 0 DN
	Forward and reverse (bi-directional) flow
	Orientation: any
	Ratio (Q3/Q1): up to630
	Liquid temperature range: +0.1°C / 50°C
	Maximum operating pressure: ≤ DN200: 16 bar, ≥ DN250: 10 bar
	For detailed information refer to *Legal metrology* on page 20.

2.3 Measurement accuracy

Each water meter is standard wet calibrated under reference conditions by direct volume comparison. The performance of the water meter is defined and documented in an individual water meter calibration certificate.

Reference conditions

- Medium: water
- Temperature: +10...+30°C / +50...+86°F
- Pressure: 1 bar / 14.5 psi
- Inlet section: ≥ 3 DN
- Outlet section: ≥ 1 DN

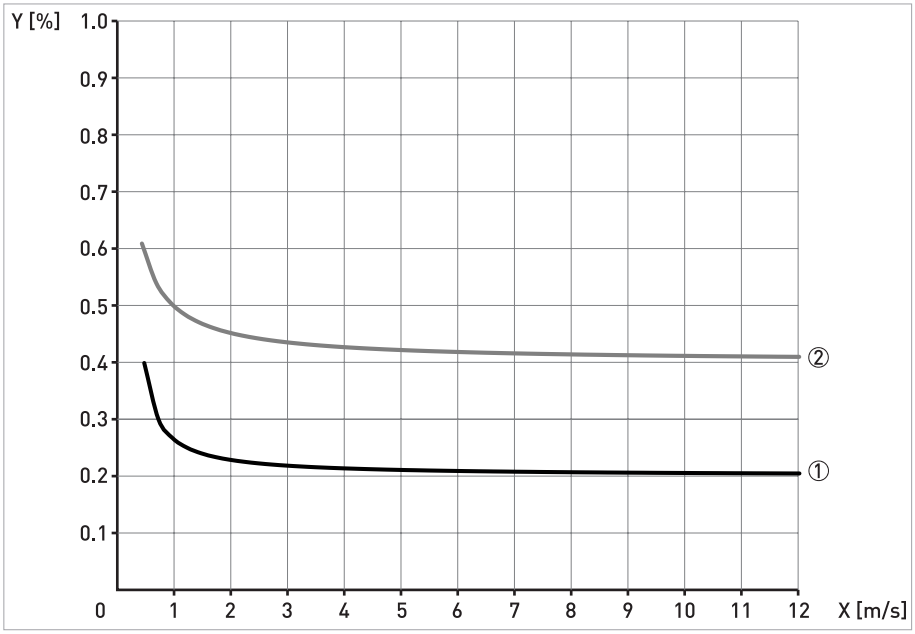


Figure 2-3: Measuring accuracy
X [m/s]: Flow velocity; Y [%]: Maximum measuring error

Accuracy with signal converter IFC 070

	Inlet	Outlet	Accuracy	Curve
DN25...300 / 1...12"	3 DN	1 DN	0.2% + 1 mm/s	①
DN350...600 / 14...24"	3 DN	1 DN	0.4% + 1 mm/s	②

MASTER METER WT TURBINE

2" TO 12"

MORE REVENUE FROM LESS SPACE.

WT provides a cost effective, compact epoxy-coated cast iron body for our ruggedized field proven turbine measuring element. For 2" to 12" high volume applications too cramped to accomodate a standard length turbine meter, the Master Meter WT Turbine Meter delivers superior accuracy in a design that is 20 to 33 percent shorter than most turbines. This shorter laying length enables accurate measurement without replumbing, customer inconvenience, and allows for a spool mounted test port per AWWA M6 Manual.

WT Turbine Meters provide uncompromised accuracy that meet or excede AWWA C-701 Class II Turbine standards inspite of its compact length. The WT's epoxy-coated cast iron main case reduces meter cost while providing tough durability and superior corrosion resistance. Nylon inlet flow conditioners and polypropylene rotors insure enduring high accuracy and long service life for optimal revenue generation for years to come.

FEATURES & BENEFITS:

- Sustained accuracy for maximum revenue over time
- Meets or exceeds AWWA C-701 Class II Turbine; most recent revision
- Ruggedized epoxy-coating for superior corrosion resistance
- Easily adapted for use with AMR/AMI Data Platforms
- Precision engineered for efficient flow patterns with minimal head loss
- Turbine and Chamber Constructed from Non-Hydrolyzing, Wear Resistant Polymer
- Wide Range of Flow for Maximum Accountability of Usage

REGISTER OPTIONS:

- Accu*Linx*™ 8 Wheel Absolute Encoder (*also available with integrated DIALOG 3G AMR*)
- DIALOG 3G Odometer Interpreter
- DIALOG 3G LCD Interpreter™
- Electrical Output Register
- Rate-of-Flow
- Direct Read

READING OPTIONS:

- Fixed*Linx*™ Meter Data Management Solution - Utilizes the 3G technology backbone with simultaneous Mobile AMR and Fixed Network AMI data collection capabilities
- Mobile Drive-By AMR - 3G
- Proximity/Wand Read - 2G
- Direct Read/Manual

SIZES AVAILABLE: 2" - 12"

Sustained Accuracy | Low Head Loss | AMR/AMI Migratable with 3G | Wide Flow Range

TECHNICAL SPECIFICATIONS:

Description - AWWA Class II Turbine Meter

AWWA Standard - Meets or exceeds the performance required by AWWA Standard C701, most recent revision, for Class II Turbine Meters

Main Case - 2" - 12" constructed of epoxy-coated cast iron, with flanged ends. Bronze register retaining ring and lid are standard

Measuring Chamber - Meter chamber assembly and turbine are constucted of durable, engineering plastics for extended service life

Magnetic Drive - A reliable, direct magnetic drive provides linkage between measurement element and register. No intermediate spur gearing is required; no gearing is exposed to water

Register - Standard direct read, DIALOG® Meter Reading System, Accu*Linx*, Electrical Output, Interpreter, and Rate-of-Flow are available. A six-wheel odometer is standard. Registration is available in gallons,cubic feet or cubic meters.

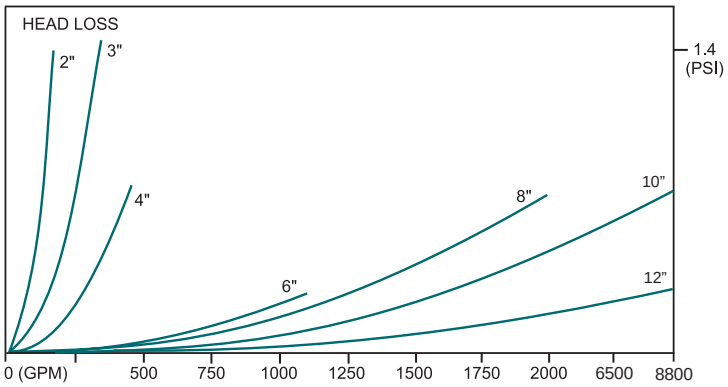
Register Sealing - Direct read, Accu*Linx* and DIALOG® System registers are permanently sealed, with a tempered glass lens, stainless steel base and wrap-around gasket to prevent intusion of dirt or moisture

Test Circle - Most registers have large center sweep hand with 100 clearly indicated graduations per minimum registration unit, with each tenth marked

Low Flow Detector - Most registers have center-mounted indicator with high sensitivity resulting from direct, geared linkage to the measuring element

WT EPOXY-COATED CAST IRON TURBINES 2" - 12"

METER OPERATING CHARACTERISTIC/DIMENSION	2"	3"	4"	6"	8"	10"	12"
Normal Operating Range [± 1 - 1/2%] (gpm)	4.4–175	6–330	9–1320	35–1150	37–2000	60–6500	180–8800
Continuous Operatin Range (gpm)	4.4–175	6–330	6.5–1000	35–1150	37–2000	60–3300	180–4400
Low Flow [95%] (gpm)	2.5	4.5	6.5	19	30	44	50
Maximum Intermittent Flow (gpm)	285	485	1320	1800	3200	6500	8800
Maximum Working Pressure (psi)	175	175	175	175	175	175	175
Maximum Working Temperature (°F)	120	120	120	120	120	120	120
Length	7.9"	9.1"	9.9"	11.7"	13.7"	18"	20"
Height	8.5"	9.2"	9.9"	12.3"	13.5"	17.5"	18.6"
Height, bottom to center line	2.8"	3.6"	4.3"	5.4"	6.6"	8.1"	9.2"
Width	6.5"	7.9"	8.6"	11.1"	13.4"	16.2"	18.4"
Weight (lbs.)	27	35	43	78	105	167	211
Register Capacity [millions] (U.S. Gallons)	100	100	1000	1000	10000	10000	10000
Register Capacity [millions] (Cubic Feet)	10	10	100	100	1000	1000	1000
Epoxy-Coated Maincase Base Metal	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron
Flanges/End Connections	Round	Round	Round	Round	Round	Round	Round



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MASTERMETER.COM

Mc Mag 3000™

SPECIFICATION SHEET
BATTERY POWERED
ELECTROMAGNETIC FLOW METER

DESCRIPTION

McCrometer's award-winning Mc Mag$^{3000™}$ provides growers and irrigators with a new alternative for flow measurement. With a 5-year expected battery life (3-year battery warranty) and saddle mount design, the Mc Mag^{3000} delivers the dependability and ease-of-installation McCrometer has provided to the agricultural market for nearly 60 years. The electromagnetic sensor offers accuracy as good as ±1% while being designed to naturally shed debris.

The meter is available to fit a common range of agricultural line sizes, from 4" to 12" diameter pipe.

The innovative design of the Mc Mag^{3000} saddle mount meter features a multi-point angled sensor that sheds debris, making it ideal for use in surface water, livestock waste lagoons, and other dirty water applications.

Using electromagnetic technology to measure the water flow, the Mc Mag^{3000}'s precision sensor corrects for shifting velocity in the pipe by constantly obtaining the mean velocity from its multiple electrodes. The result is a highly accurate (as low as +/- 1%) flow meter.

The meter combines an innovative saddle, precision sensor, and a battery powered integrated electronic converter package with data logging capability to provide accurate flow measurement for full-pipe flow monitoring applications.

The integrated electronic converter is secured with tamper resistant screws to protect against unauthorized access. The meter offers flow rate and total water used and a 5-year expected battery life (3-year battery warranty). The Mc Mag^{3000} features three 3.6V lithium-thionyl chloride (Li-$SOCl_2$) D size batteries, with one serving as back-up power. The main power batteries are easily replaced in the field. Pulse and 4-20mA output are available for remote meter reading or SCADA. The Mc Mag^{3000} is McCrometer CONNECT wireless system compatible, which allows users to access flow data by simply logging on to the Internet. This eliminates costly manual meter reading.

INSTALLATION

The Mc Mag^{3000} offers hassle-free installation, even in tight spaces. No flanges or costly welding is involved. Users simply cut a 3" diameter hole in the top of their pipe and slide the sensor into the hole, and then cinch the meter onto the pipe using the Factory provided U-straps.

The meter can be mounted in a horizontal or vertical position with a full pipe of water. A minimum of three pipe diameters upstream of a flow disturber and one pipe diameter downstream from the meter are required to ensure optimal accuracy of ±2%. A ±1% accuracy is available with a Factory consultation prior to order.

APPLICATIONS

- **Irrigation**
- **Center Pivot Systems**
- **Well Monitoring**
- **Water Distribution**
- **Chemigation**
- **Livestock Waste Lagoons**
- **Surface Water**
- **Golf Courses and Park Management**

McCROMETER
www.mccrometer.com

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Printed In The U.S.A.
Lit. # 30121-41, Rev. 1.8 / 4-2-18

Description and Operating Specifications	
Pipe Sizes	4", 6", 8", 10", 12"
Body Style	Saddle mount
Pressure	150 psi (10.3 bar) working pressure
Accuracy	± 2% with default calibration ± 1% with custom Factory calibration
Conductivity	Minimum conductivity of 50µS/cm, for lower conductive fluid consult Factory.
Empty Pipe Detection	Hardware/Software, conductivity-based (optional)
Electrical connects	Optional shielded cable for 10-32VDC/4-20 mA output Optional shielded cable for pulse out
Pipe Run Requirements	3D Upstream / 1D Downstream
Display and Measurement	
Display	2-Line LCD display (no backlight), 16 characters per line • Non-volatile memory • Anti-reverse totalizer (standard) • Total (to 9 digits of precision) • Flow Rate and Velocity (to 5 digits of precision) • Two alarms: low battery and empty pipe (optional) To preserve battery life, a push-button on the housing activates the display.
Digits	5 Rate, 9 Total
Units	US gallons, US gallons x1000, US gallons x1,000,000, cubic inches, cubic feet, cubic feet x1000, cubic centimeters, cubic decimeters, milliliters, liters, deciliters, hectoliters, kiloliters, megaliters, cubic meters, cubic meters x1000, acre feet, acre inches, imperial gallons, imperial gallons x1000, imperial gallons x1,000,000, standard barrels, oil barrels, and miner inch days. Rate scales: seconds, minutes, hours, and days.
Power	
Battery	Standard: three 3.6V lithium-thionyl chloride ($Li\text{-}SOCl_2$) D size batteries. Batteries are field replaceable
DC Power	Linear power supply 10-35VDC, 2.4W
Battery Life	Five-year expected battery life (three-year battery warranty)
Environmental	
Operating Temperature	-4° to 140°F (-20° to 60°C) sensor
Storage Temperature	-40° to 149°F (-40° to 65°C) **Note:** During freezing conditions and when meter is not in use, sensor must be removed from pipe and stored in dry conditions. ***NOTE: Damage to the sensor caused by allowing the sensor freeze in the pipe is not covered by the warranty.***
Operating Pressure	150 PSI
Water Impermeability	IP68 (submersible sensor)
Outputs	
Pulse Output	Digital pulse (open collector) output for volumetric and/or alarm • Battery power only: 1 pulse output maximum • DC powered version: 2 pulse outputs available
Analog Output	4-20mA (not galvanically separated from the power supply). DC powered option only.
Options and Accessories	
	• Data Logger - included as standard with five years of data storage at default (12hr) interval. (Cable sold separately) • Epoxy coated carbon steel flanged spool piece • DC power w/battery backup: (Pulse & 4 20mA Out) • Annual verification / calibration • Stainless Steel ID tag
Materials	
Sensor Body	Fusion bonded epoxy coated stainless steel (316)
Electrodes	Stainless steel (316)
Saddle Mount	Stainless steel (304)
Saddle Hardware	Stainless steel (304)
Electronic Housing	IP-67 Certified diecast aluminum, powder coated enclosure w/ tamper resistant seal, 6½″ x 6½″ x 4⅜″ tall
O-Ring	SBR rubber D-ring
Boot Cover	EPDM rubber

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Printed In The U.S.A.
Lit. # 30121-41, Rev. 1.8 / 4-2-18

MODEL UM06 AND UM08

ULTRA MAG® ELECTROMAGNETIC FLOW METER

150 PSI FLANGED TUBE METER, SIZES 2" thru 48"
300 PSI FLANGED TUBE METER, SIZES 2" thru 48"

UltraLiner TECHNOLOGY

Ultra Mag And SIGNAL CONVERTER

DESCRIPTION

MODELS UM06 AND UM08 FLANGED TUBE ULTRA MAG® meters are manufactured to the highest standard available for magmeters. They incorporate microprocessor technology to offer very low flows and broad range ability. The flanged end tube design permits use in a wide range of applications with up to 300 PSI working pressure. Flanged ends are:

- Steel AWWA Class "D" flat face flanges (150 PSI) for UM06
- Steel AWWA Class "F" raised face flanges (300 PSI) for UM08 (2", 3", and ≥14")
- Steel ANSI 300 lb. Raised Face Flanges for UM08 (4" - 12")

The fabricated tube is stainless steel with steel or stainless steel flanges and is lined with UltraLiner™, an NSF approved, fusion bonded epoxy material.

INSTALLATION is made similar to placing a short length of flanged end pipe in the line. The meter can be installed vertically, horizontally, or inclined on suction or discharge lines. The meter must have a full pipe of liquid for proper operation. Fluid must be grounded to the downstream flange of the sensor either via internal grounding electrodes (4 - 12") or using McCrometer 316 SS Grounding Rings. For best performance, grounding rings are recommended for all sizes. Any 90 or 45 degree elbows, valves, partially opened valves, etc. should not be placed closer than one pipe diameters upstream and zero pipe diameters downstream. All blending and chemical injection should be done early enough so the flow media is thoroughly mixed prior to entering the measurement area.

SIGNAL CONVERTER: The signal converter is the reporting, input and output control device for the sensor. The converter allows the measurements, functional programming, control of the sensor and data recording to be communicated through the display and inputs/outputs. The microprocessor-based signal converter has a curve-fitting algorithm to improve accuracy, dual 4-20mA analog outputs, an optional RS485 communication port, an 8 line graphical backlit LCD display with 3-key touch programming, and a rugged enclosure that meets IP67. In addition to a menu-driven self-diagnostic test mode, the converter continually monitors the microprocessor's functionality. The converter will output rate of flow and total volume. The converter also comes standard with password protection and many more features.

ISOLATED POWER AND SIGNAL: The power and signal between the converter and sensor are isolated and placed in separate cables giving superior resistance to electrical signal noise compared to single cable designs. An added benefit from the dual cable design is a maximum cable length of up to 500ft.

OPTIONAL:

DC powered converter (10-35 VDC, 21 W)
Meter mounted converter
Extended warranty
Hastelloy® electrodes
ANSI or DIN flanges
Quick Connect cable fittings
Special lay lengths, including ISO standard lay lengths
Converter sun shield
Modbus Protocol RS485 converter; HART® Converter; Profibus Converter (No Dual 4-20mA on HART & Profibus); Smart Output™ (Sensus or Itron compatible); Panel mount converter (Not CSA approved); Battery or battery-solar powered converter (Not CSA approved, ±1% accuracy)

SPECIFICATIONS

WARRANTY: 2 Years

ACCURACY TESTS: 5-point wet flow calibration of every complete flow tube with its signal converter. If desired, the tests can be witnessed by the customer. The McCrometer test facilities are traceable to the National Institute of Standards & Technology. Uncertainty relative to flow is ±0.15%

ACCURACY: Plus or minus 0.5% of actual flow (battery powered is ±1% of flow)

IMPORTANT NOTICE ON FLOW METER ACCURACY: The flow meter, the cable and the electronics are factory calibrated for accuracy as a single unit. Changing the cable length with the Splice Kit changes the accuracy of the meter and invalidates the calibration certificate.

REPEATABILITY: ±0.05% or ±.0008ft/s (±0.25mm/s), whichever is greater

HEAD LOSS: None. No obstruction in line and no moving parts

PRESSURE RANGE: 150 PSI maximum working pressure (UM06); 300 PSI maximum working pressure (UM08)

TEMPERATURE RANGE:
Sensor Operating: -10 to 60°C (14 to 140°F)
Sensor Storage: -15 to 60°C (5 to 140° F)
Electronics: Operating and storage temperature: -20° to 60° C (-4° to 140° F)

VELOCITY RANGE: .2 to 32 FPS

BI-DIRECTIONAL FLOW: Forward and reverse flow indication and forward, reverse, net totalization are standard with all meters

CONDUCTIVITY: 5 µs/cm

LINER: UltraLiner NSF approved, fusion bonded epoxy

ELECTRODES: Type 316 stainless steel, others optional

POWER SUPPLY: AC: 100-240VAC/45-66 Hz (20W/25VA), DC: 10-35VDC (21W), battery (four lithium D cell batteries), five-year estimated life, solar (5W panel). AC, DC, battery, or battery & solar must be specified at time of ordering.

OUTPUTS: Dual 4-20mA Outputs (Not available for Profibus, HART, or battery converters): Galvanically isolated and fully programmable for zero and full scale (0-22mA).

Four separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.

- Volumetric Pulse
- Flow Rate (Frequency)
- Directional Indication
- High/Low Flow Alarms
- Hardware Alarm
- Empty Pipe
- Range Indication

SENSOR CABLE LENGTHS:
Standard: 25' McCrometer supplied submersible cable with each remote mount unit.
Optional: Up to 500 feet, or 50 feet max for battery powered.
Quick connect: Available in standard cable lengths: 25', 50', 75', 100', 125', 150', 175, 200', and 500'. Custom cable lengths at additional cost.

CONVERTER/SENSOR SEPARATION: ≤ 500 feet; for longer lengths consult factory

EMPTY PIPE SENSING: Zero return when electrodes are uncovered

ALARMS: Programmable alarm outputs

DIGITAL TOTALIZER: Cubic Meter; Cubic Centimeter; Milliliter; Liter; Cubic Decimeter; Decaliter; Hectoliter; Cubic Inches; US Gallons; Imperial Gallons; Cubic Feet; Kilo Cubic Feet; Standard Barrel; Oil Barrel; US Kilogallon; Ten Thousands of Gallons; Imperial Kilogallon; Acre Feet; Megagallon; Imperial Megagallon; Hundred Cubic Feet, Megaliters

IP RATINGS:
Metering Tube: NEMA 6P/IP68 with remote converter
Die cast aluminum converter: IP67
Panel mount converter: IP65

SENSOR SUBMERSIBILITY DEPTH:

With standard strain relief cable:	9 m (30 ft.)
With optional quick connect:	1.8 m (6 ft.)

CERTIFICATIONS:

- CE Certified (Converter only)
- Listed by CSA to 61010-1: Certified by CSA to UL 61010-1 and CSA C22.2 No.61010-1-04
- ISO 9001:2015 certified quality management system

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WATER SPECIALTIES PROPELLER METER™

PROPELLER METERS
ACCURACY AND HEAD LOSS CURVES

McCROMETER
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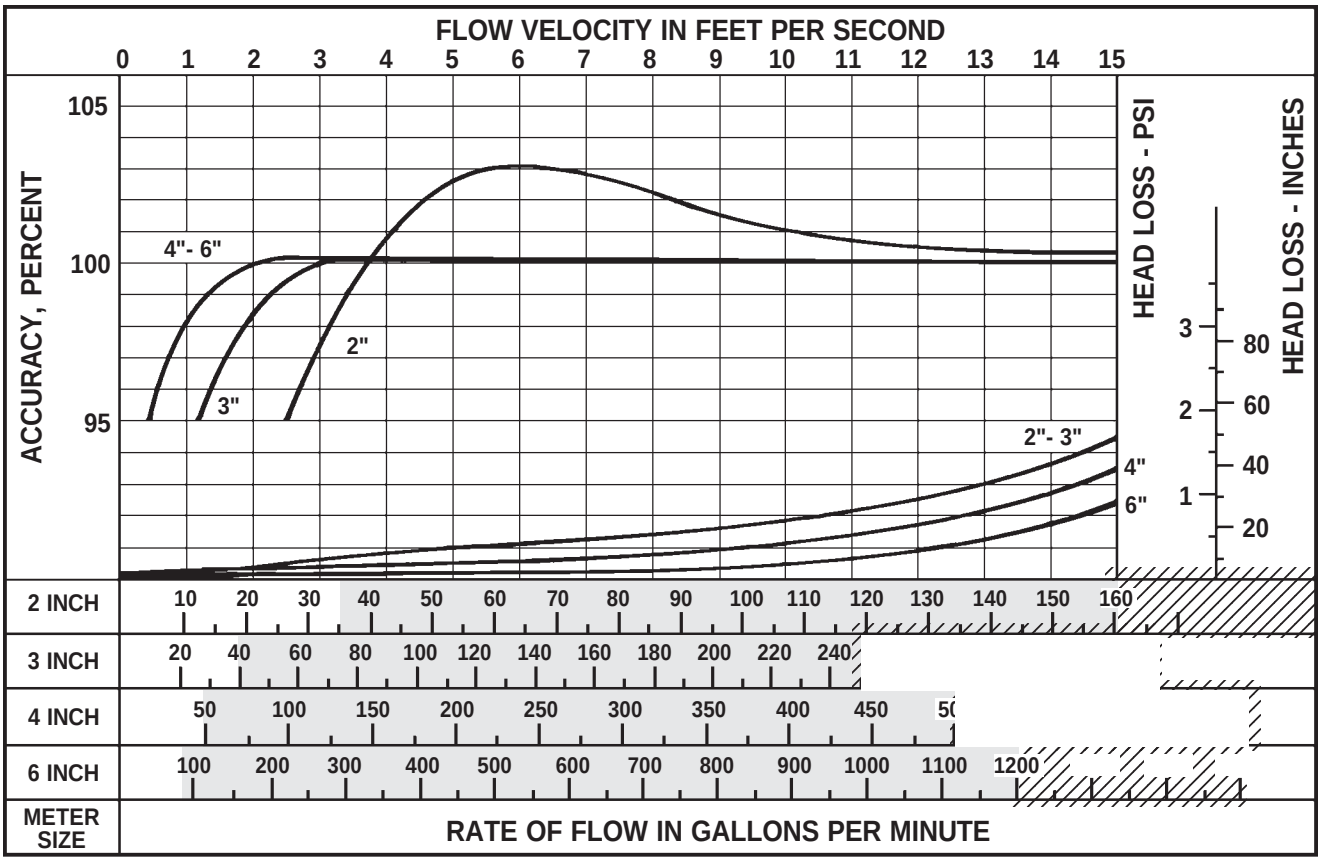
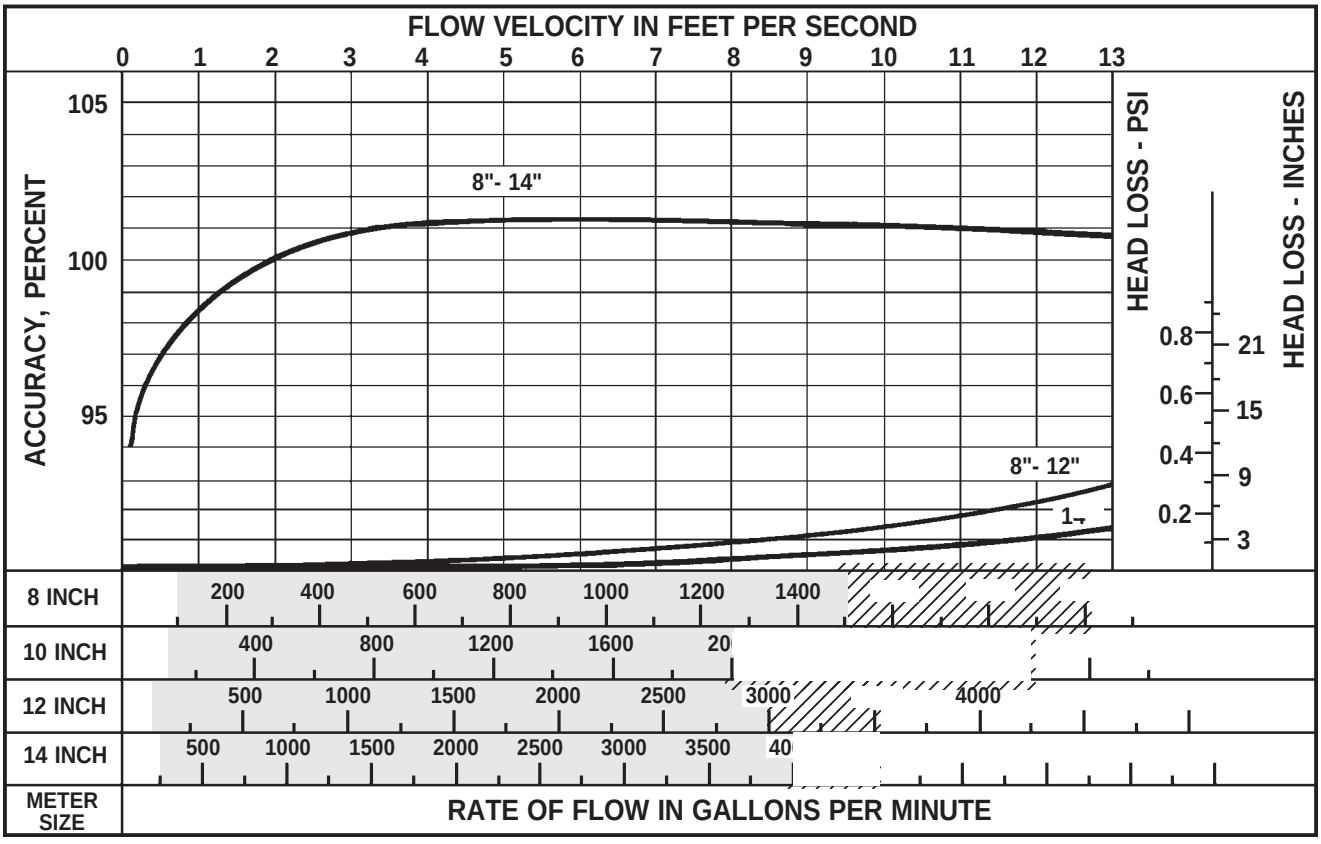
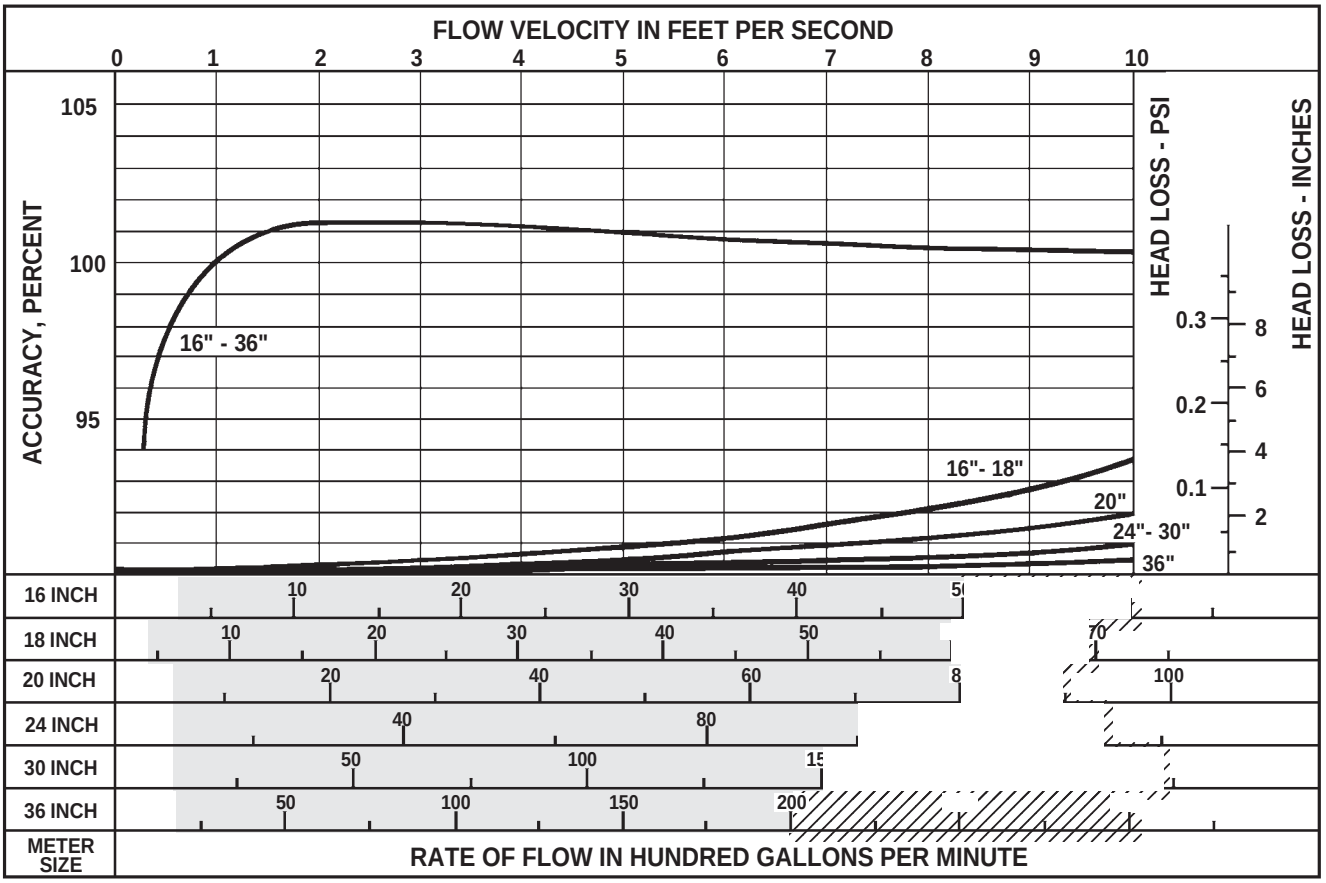
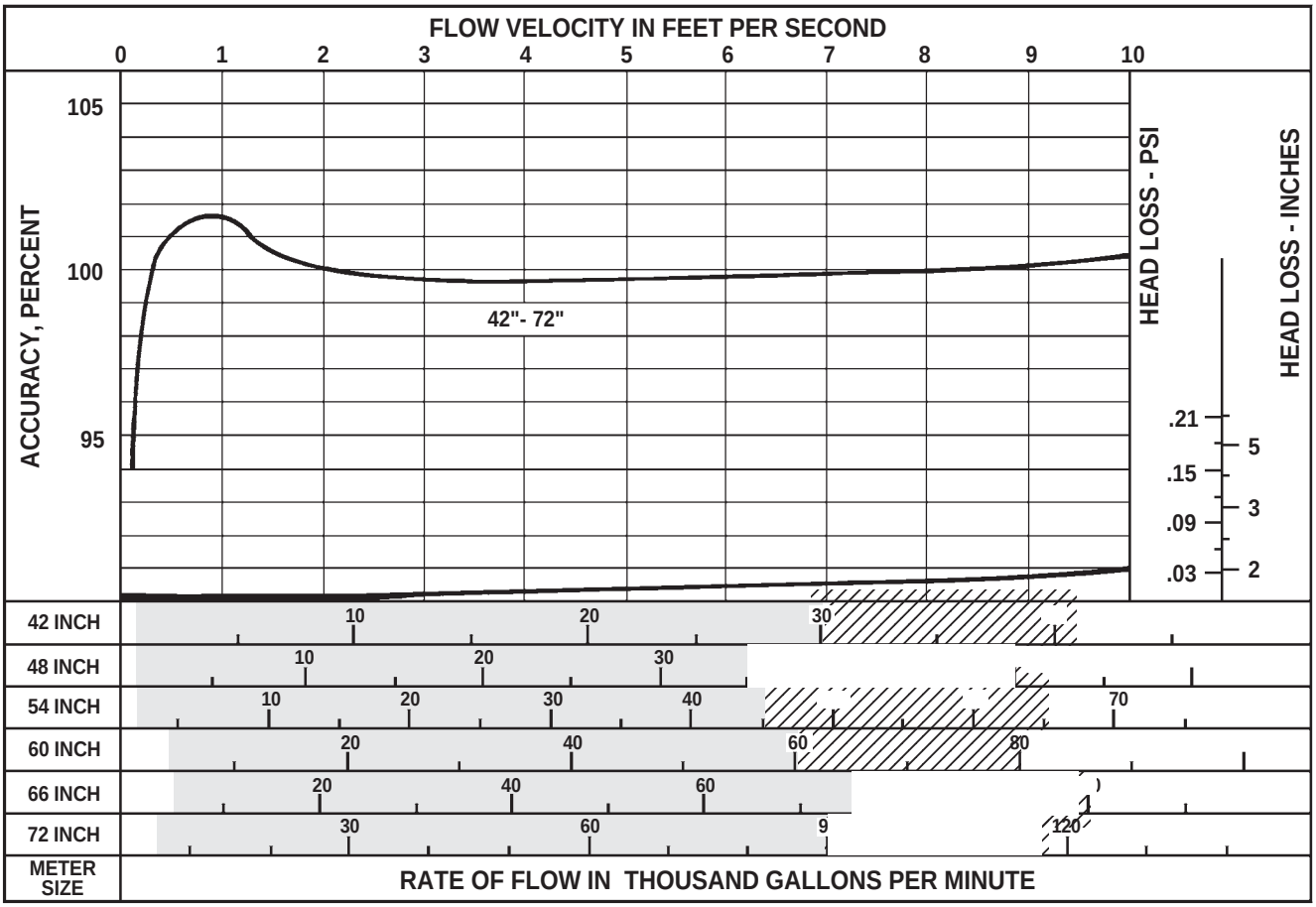
Visit our Website: www.mccrometer.com









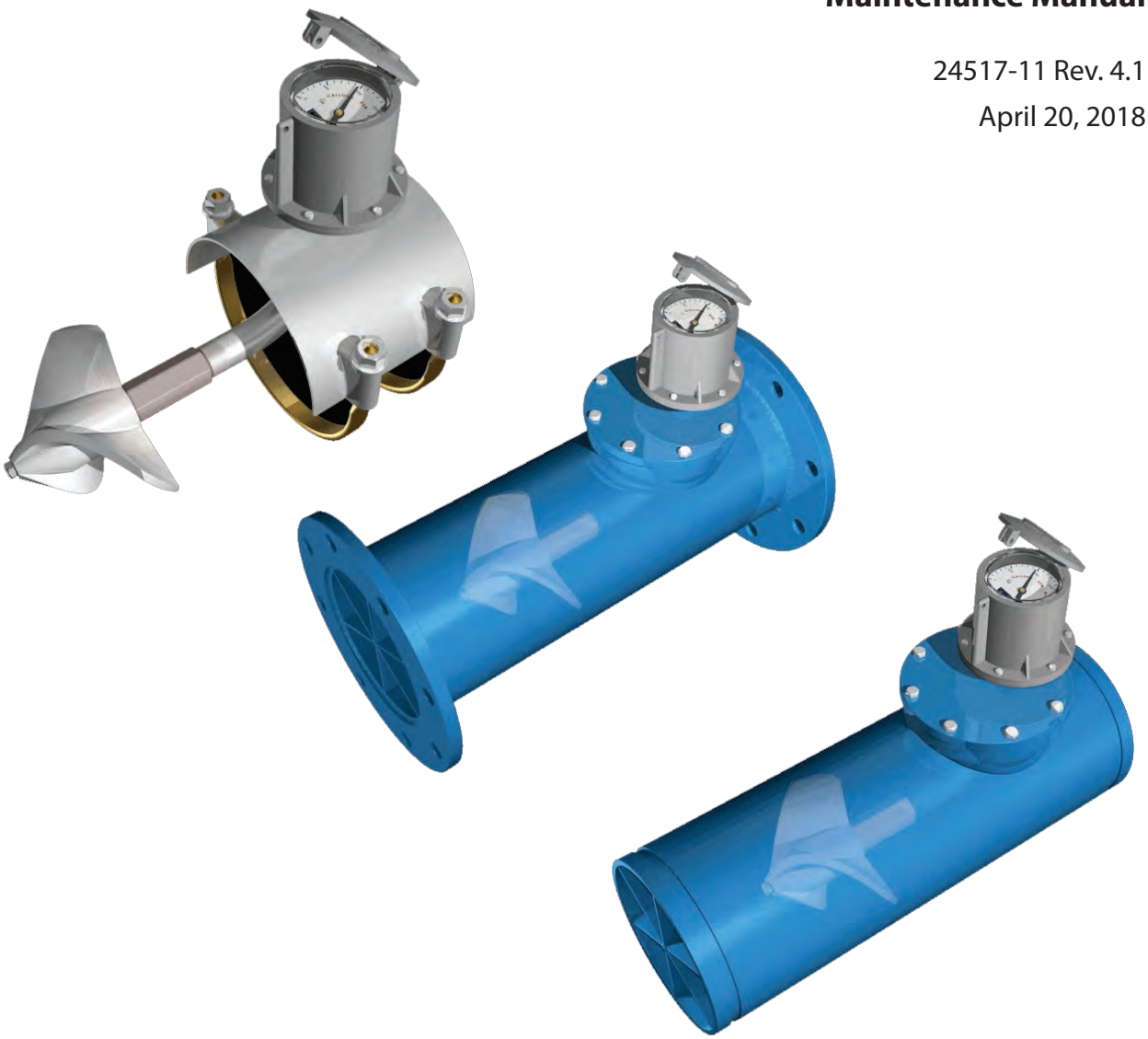
MAXIMUM AND MINIMUM FLOWS

Propeller Meter

Mc Propeller Flowmeters

Installation, Operation And Maintenance Manual

24517-11 Rev. 4.1
April 20, 2018



McCROMETER

2.0 SPECIFICATIONS

The measuring element of a propeller flowmeter consists of a rotating device, called a rotor or propeller. Positioned in the center of the flowstream, the propeller rotates at a rate proportional to the velocity of the fluid through the flowmeter. This rotation can be transmitted mechanically to a register assembly and the fluid's volumetric flowrate and accumulated volume can then be displayed.

2.1 General Specifications

SIZES AVAILABLE	2" to 96"
FLOWRATES AVAILABLE	40 to 75,000 GPM
TURNDOWN	up to 15:1
ACCURACY	±2%
REPEATABILITY	±0.25%
RATED PRESSURE	150 PSI to 300 PSI
RATED TEMPERATURE	160° F to 180° F

DESCRIPTIONS:

TURNDOWN: Propeller meters are specified to work within a certain range of flowrates. Turndown is the ratio of the maximum flowrate to the minimum flowrate of the meter. A typical turndown of an 8" meter is 15:1. (e.g., max. flow = 1500 gpm to min. flow = 100 gpm)

ACCURACY: Accuracy is the relation between the volume shown on the meter's totalizer and the actual volume of fluid which has passed through the meter. McCrometer guarantees that the meter will report within ±2% of the actual flow if it is normally operated between its minimum and maximum rates of flow.

REPEATABILITY: Flowmeter repeatability is the ability of a meter to reproduce a measurement under similar conditions. This is not by itself a measure of accuracy, but rather a component of the meter's total accuracy. McCrometer propeller meters have a repeatability of ±0.25%.

PRESSURE: The pressure rating for standard propeller meters is 150 PSI. This pressure rating refers to the constant line pressure in the pipe. Some models can be rated up to 300 PSI. Higher pressures are available on special request.

TEMPERATURE: The temperature rating for standard propeller meters is 160° F constant temperature. This temperature rating refers to fluid temperature. Most standard models can be upgraded to 180° F constant temperature on special request.

McCROMETER
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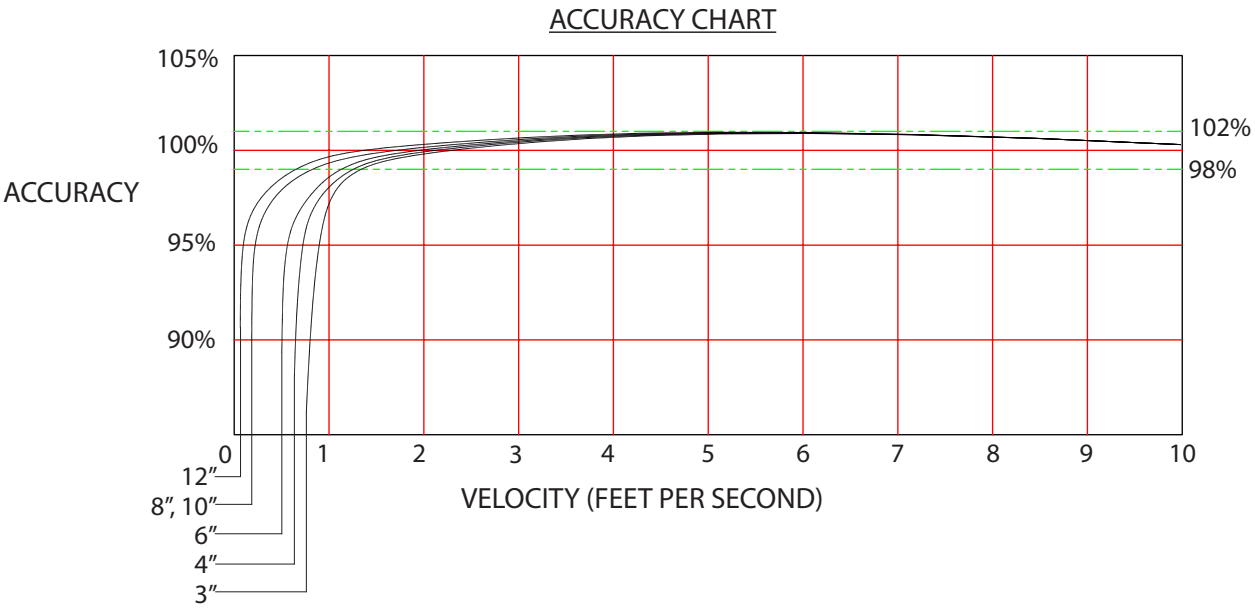
Printed In the U.S.A.
Lit. # 24517-11, Rev. 4.1 / 4-20-18

2.4 Accuracy

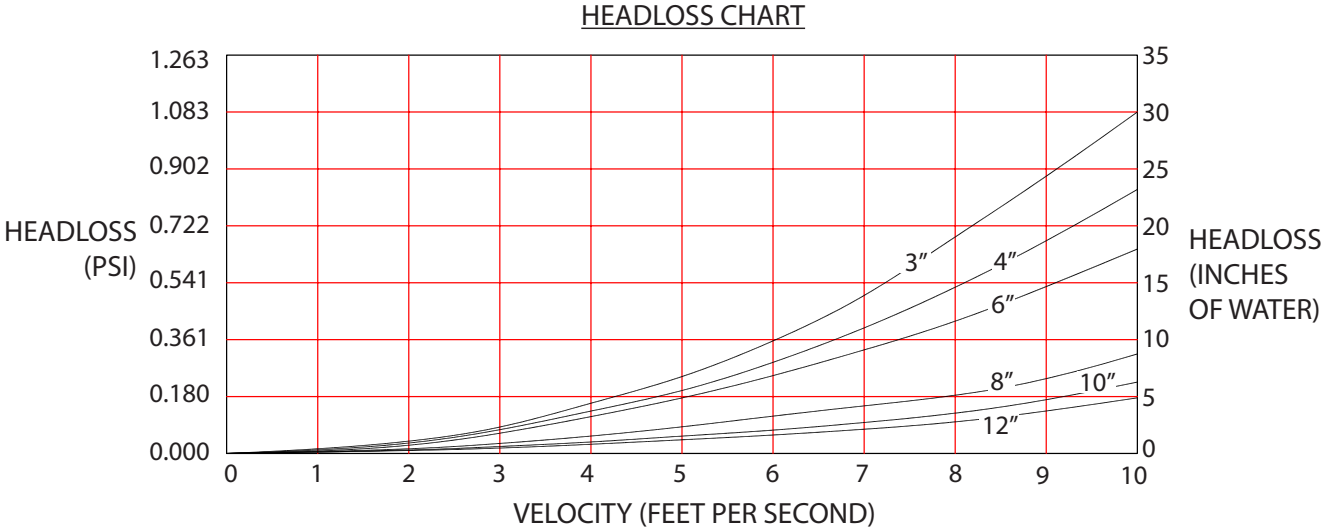


Standard flowrates for McCrometer propeller meters are shown below. Readings are guaranteed accurate within ±2% in these flowrates. Please note that over 80 percent of the meter's flow range, the accuracy is better than ±1%.

Nominal Meter Size	2″	2.5″	3″	4″	6″	8″	10″	12″	14″	16″	18″	20″	24″
Minimum Flow(U.S.GPM)	40	40	40	50	90	100	125	150	250	275	400	475	700
Maximum Flow(U.S.GPM)	250	250	250	600	1200	1500	1800	2500	3000	4000	5000	6000	8500
Dial Face Range	250	250	250	800	1300	2500	3000	4000	6000	8000	10000	10000	15000

2.5 Headloss

Headloss refers to the fluid pressure lost due to the meter. Propeller meters have very low permanent headloss as seen in the chart below.



Nominal Meter Size	3″	4″	6″	8″	10″	12″	14″	16″	18″	20″	24″
Max. Headloss (in. H_20 column)	30	23	17	7	4	3	2	2	2	1	1

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Overview

Benefits

- IP68/NEMA 6P rating with tamper proof
- Flexible power supply - internal or external battery pack or mains power supply with battery back-up possibilities
- No moving parts in a robust construction means less wear and tear
- Up to 8 years maintenance-free operation in typical application
- Connectable to AMR systems
- Adaptor for conduit installation to provide a clean, protected pathway for device cables

Technical specifications

Meter	
Accuracy	± 0.8 % ± 2.5 mm/s ± 0.4 % ± 2.5 mm/s NMI (class 2.5)
Low flow cut-off (default)	1.0 %
Media conductivity	Clean water > 20 µs/cm
Temperature	
Ambient	-20 ... +60 °C (-4 ... +140 °F)
Media	0 ... 70 °C (32 ... 158 °F)
Storage	-40 ... +70 °C (-40 ... +158 °F)
Enclosure rating	
Remote sensor	IP68 to EN 60529/NEMA 6P; 10 mH_2O cont.
Compact version	IP68 to EN 60529/NEMA 6P; 3 mH_2O for six months
Approvals	
Drinking water approvals	• ANSI/NSF 61[1] (cold water) USA • WRAS (BS 6920 cold water) UK
Custody transfer approval	NMI10 Australia
Sensor material	Carbon steel ASTM A 105, with corrosion resistant two-component epoxy coating (150 µm/300 µm) Corrosivity category C4, according to ISO 12944-2
Conformity	IEC/EN 61326
Flanges	
EN 1092-1 (DIN 2501) PN 10 drilled pattern	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
ANSI 16.5 Class 150 drilled pattern	2" ... 24" (max. pressure 7 bar (101.5 psi))
AS 2091-1 Table D drilled pattern	DN 50 ... 600 (2" ... 24") (max. pressure 7 bar (101.5 psi))
AS 2129	DN 25, DN 40, DN 125 (1", 1½", 5")
AS 4087 PN 16	DN 50 ... DN 1200 (2" ... 48")
Excitation frequency	
Battery-powered	DN 50 ... 600 (2" ... 24"): 1/15 Hz DN 700 ... 1200 (28" ... 48"): 1/60 Hz
Mains-powered	DN 50 ... 600 (2" ... 24"): 3.125 Hz DN 700 ... 1200 (28" ... 48"): 1.5625 Hz
Liner	Ebonite
Electrodes	Stainless steel

[1] Including Annex G

SPARLING INSTRUMENTS, INC.

PRODUCT DATA SHEET

SERIES 100 METERS AND ACCESSORIES

Series 190 Totalizers, Indicators and Transmitters for Mechanical Drive Propeller Flowmeters FT190, FT191, FT193

PDS-190
Issue Date: Feb. 1995
Supercedes: Nov. 1993

DESCRIPTION

The Series 190, 191 and 193 are used in combination with and mounted on Sparling propeller flowmeters to provide mechanical totalization (registration), mechanical indication and a variety of pulse and/or 4-20 mA outputs.

FT190—(Formerly Model 245)
Provides mechanical totalization (registration), mechanical rate indication.

FT191—(Formerly Model 249)
Provides mechanical totalization (registration).

FT193
Provides mechanical totalization and both a true two-wire 4-20 mA output and a true two-wire scaled electronic pulse output.

TABLE 1
READOUT AND OUTPUT CAPABILITIES

Type	Mechanical Totalization	Mechanical Rate Indication	Outputs	4-20 mA (Two Wire) ①	Scaled Electronic Pulse Rate	Approx. Shipping Weight
FT190-(FORMERLY MODEL 245)	YES	YES	NO	NO	NO	20 lbs.
FT191-(FORMERLY MODEL 249)	YES	NO	NO	NO	NO	15 lbs.
FT193	YES	NO	YES	Standard	Standard	20 lbs.

① Full scale flow rate for 100% signal output must occur at full scale flow rate shown in Table 4 or greater flow rate
② Available in optional "P", "B" and "E" switch outputs.

Sparling Instruments, Inc.
4097 N. Temple City Blvd. • El Monte, CA 91731-1089 USA
Phone (626) 444-0571 • Fax (626) 444-2314

SPECIFICATIONS:

MECHANICAL RATE INDICATOR
- Scale Length ..... 6 inches
- Accuracy ..... 5% full scale
- Available Scales ..... See Table 4

MECHANICAL TOTALIZER
- Number of digits 6
- Accuracy ..... ±2% actual flow
- Units of registration ..... See table 2
- Test Hand ..... One full rotation per least significant digit of totalizer.

4-20 mA OUTPUT (FT193 ONLY):
- True two-wire requiring external power supply
- External Power Supply ..... 18 to 30 Vdc
- Output Load Capability ..... See power supply vs. output load curve
- Reverse polarity protection ..... 35 Vdc (max.)
- Accuracy ..... 0.5% of full scale

SCALED ELECTRONIC PULSE RATE (FT193 ONLY)
- Two-wire isolated solid state switch (photocoupled)
- External power supply ..... 10 Vdc to 30 Vdc
- Pulse amplitude ..... 0 Vdc (off) to external supply voltage minus 3 Vdc (on)
- Output load ..... 4 watts maximum
- Pulse on time 100ms
- Pulse output registration ..... Equal to mechanical totalizer least significant digit
- Accuracy ..... 2% actual flow

ALL OUTPUT CONNECTIONS:
Pigtail leads through 1/2 NPT grommeted or potted sealed conduit connection.

MATERIAL OF CONSTRUCTION:
Painted Die Cast Aluminum

ENCLOSURE RATING ..... NEMA 3R

ELECTRICAL RATING ..... General Purpose

AMBIENT TEMPERATURE LIMITS:
+30F (-1C) to +130F (+55C)—FT193

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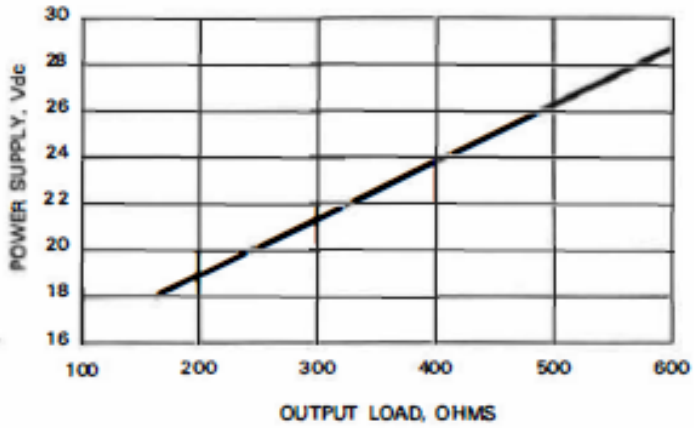
4 to 20mA OUTPUT
POWER SUPPLY VS. OUTPUT LOAD



SERIES 190 PROPELLER FLOWMETER TRANSMITTERS
MODEL NUMBER SCHEDULE

Table 1 - Base Model Number	
FT190-	Mechanical Flow Totalizer and Indicator
FT191 -	Mechanical Flow Totalizer
FT193 -	Mechanical Flow Totalizer with 4-20 mA and Scaled Pulse Output

Table 2 - Outputs	
000 -	No Outputs (FT190 and F191 Only)
111 -	4-20 mA and Scaled Pulse Rate (FT193 Only)

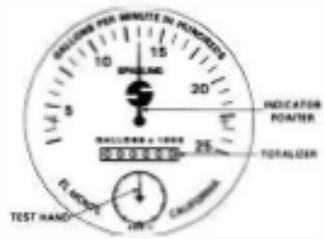
Table 3 - Mounting	
2	For Mounting on Meterhead on Same Order
3	Replacement for Existing Meterheads

FT19__-___-__

ORDERING INFORMATION

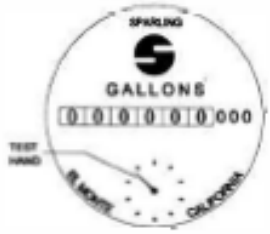
1. Construct model number by selecting one code for each category.
2. If ordered with new meter-head, state base model number and size of meter-head. If replacement for existing meterhead, state serial number of existing meterhead.
3. Provide following information from Tables 2 & 3.
   a. Mechanical indicator scale and units.
   b. Mechanical totalizer registration and units.

FT190 (Formerly 245)
Indicator/Totalizer

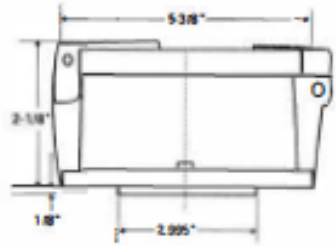


No Outputs

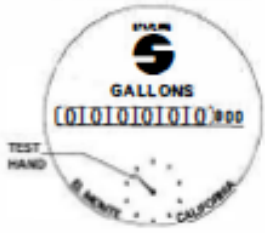
FT191 (Formerly 249)
Totalizer

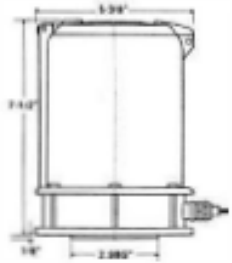


No Outputs



FT193
Transmitter/Totalizer





WaterMaster optimized full-bore meter (FEV) / full-bore meters (FEF, FEW) flow performance – m^3/h

			Standard Calibration – 0.4 % Class 2			High Accuracy Calibration – 0.2 % Class 1		
DN	Q4	Q3	$Q_{0.4\%}$	Q2	Q1	$Q_{0.2\%}$	Q2	Q1
10	3.1	2.5	0.167	0.013	0.008	0.31	0.02	0.012
15	7.88	6.3	0.42	0.032	0.02	0.79	0.05	0.03
20	12.5	10	0.67	0.05	0.032	1.25	0.08	0.05
25	20	16	1.1	0.08	0.05	2	0.13	0.08
32	31.25	25	1.67	0.13	0.08	3	0.20	0.13
40*	50	40	4.2	0.2	0.13	6	0.32	0.2
50*	79	63	4.2	0.32	0.20	7.9	0.5	0.32
65*	125	100	6.7	0.5	0.32	12.5	0.8	0.5
80*	200	160	10.7	0.81	0.51	16	1.3	0.8
100*	313	250	16.7	1.3	0.79	25	2	1.25
125*	313	250	16.7	1.3	0.79	25	2	1.25
150*	788	630	42	3.2	2.0	63	5	3.2
200*	1,250	1,000	67	5.1	3.2	100	8	5
250	2,000	1,600	107	8.1	5.1	160	13	8
300	3,125	2,500	167	12.7	7.9	250	20	12.5
350	5,000	4,000	267	20.3	12.7	400	32	20
400	5,000	4,000	267	20.3	12.7	400	32	20
450	7,875	6,300	420	32	20	630	50	32
500	7,875	6,300	420	32	20	630	50	32
600	12,500	10,000	667	51	32	1000	80	50
700	20,000	16,000	1600	102	64	1600	160	100
750	20,000	16,000	1600	102	64	1600	160	100
30 in (750)	20,000	16,000	1600	102	64	1600	160	100
800	20,000	16,000	1600	102	64	1600	160	100
900	31,250	25,000	2500	160	100	2500	250	156
1000	31,250	25,000	2500	160	100	2500	250	156
42 in	31,250	25,000	2500	160	100	2500	250	156
1100	31,250	25,000	2500	160	100	2500	250	156
1200	50,000	40,000	4000	256	160	4000	400	250
1350	78,750	63,000	6300	403	252	6300	630	394
1400	78,750	63,000	6300	403	252	6300	630	394
1500	78,750	63,000	6300	403	252	6300	630	394
60 in (1500)	78,750	63,000	6300	403	252	6300	630	394
1600	78,750	63,000	6300	403	252	6300	630	394
1650	78,750	63,000	6300	403	252	6300	630	394
1800	125,000	100,000	10000	640	400	10000	1000	625
1950	125,000	100,000	10000	640	400	10000	1000	625
2000	125,000	100,000	10000	640	400	10000	1000	625
2200	200,000	160,000	16000	1024	640	16000	1600	1000
2400	200,000	160,000	16000	1024	640	16000	1600	1000

* OIML R49 Certificate of Conformance to Class 1 and Class 2, with OIML R49 and MID versions available.

Note. OIML R49–1 allow Class 1 only for meters with $Q_3 \geq 100$ m^3/h. Meters outside this range have been tested and conform to Class 1.

WaterMaster optimized full-bore meter (FEV) / full-bore meters (FEF, FEW) flow performance – gal/min

			Standard Calibration 0.4 % Class 2			High Accuracy Calibration 0.2 % Class 1		
NPS/NB (DN)	Q4	Q3	$Q_{0.4\%}$	Q2	Q1	$Q_{0.2\%}$	Q2	Q1
3/8 (10)	13.8	11	0.73	0.06	0.035	1.38	0.09	0.053
1/2 (15)	34.7	27.7	1.85	0.14	0.09	3.48	0.22	0.14
3/4 (20)	55	44	2.94	0.22	0.14	5.5	0.35	0.22
1 (25)	88	70.4	4.7	0.35	0.22	8.8	0.57	0.35
1 1/4 (32)	137.6	110	7.3	0.57	0.35	13.2	0.88	0.57
1 1/2 (40)	220	176	18.5	0.89	0.56	26.4	1.41	0.88
2 (50)	347	277	18.5	1.41	0.88	34.7	2.22	1.39
2 1/2 (65)	550	440	29.4	2.24	1.40	55.0	3.52	2.20
3 (80)	881	704	47.0	3.58	2.24	70.4	5.64	3.52
4 (100)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
5 (125)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
6 (150)	3,467	2,774	185	14.1	8.81	277	22.2	13.9
8 (200)	5,504	4,403	294	22.4	14.0	440	35.2	22.0
10 (250)	8,806	7,045	470	35.8	22.4	704	56.4	35.2
12 (300)	13,759	11,007	734	55.9	34.9	1,101	88.1	55.0
14 (350)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
16 (400)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
18 (450)	34,673	27,738	1,849	141	88.1	2,774	222	139
20 (500)	34,673	27,738	1,849	141	88.1	2,774	222	139
24 (600)	55,036	44,029	2,935	224	140	4,403	352	220
27/28* (700)	88,057	70,446	7,045	451	282	7,045	704	440
30 (750)	88,057	70,446	7,045	451	282	7,045	704	440
32 (800)	88,057	70,446	7,045	451	282	7,045	704	440
36 (900)	137,590	110,072	11,007	704	440	11,007	1,100	688
39/40* (1000)	137,590	110,072	11,007	704	440	11,007	1,100	688
42 (1050)	137,590	110,072	11,007	704	440	11,007	1,100	688
44 (1100)	137,590	110,072	11,007	704	440	11,007	1,100	688
48 (1200)	220,143	176,115	17,611	1,127	704	17,611	1,761	1,101
52 (1350)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
54 (1400)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
60 (1500)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
66 (1600)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
68 (1650)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
77 (1800)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
77 (1950)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
78 (2000)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
78 (2000)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
84 (2200)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403
96 (2400)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403

*Size is dependent on flange specification

WaterMaster reduced-bore meter (FER) flow performance – m^3/h (gal/min)

				Class 2 specification				Class 1 specification			
Size		Q_4	Q_3	$Q_{0.4\ \%}$	Q_2	Q_1	R	$Q_{0.2\ \%}$	Q_2	Q_1	R
mm	in.	m^3 / h (Ugal / min)	m^3 / h (Ugal / min)	m^3 / h (Ugal / min)	m^3 / h (Ugal / min)	m^3 / h (Ugal / min)		m^3 / h (Ugal / min)	m^3 / h (Ugal / min)	m^3 / h (Ugal / min)	
40	1 1/2	31 (138)	25 (110)	0.83 (1.05)	0.063 (0.28)	0.04 (0.18)	630	1.7 (7.48)	0.1 (0.44)	0.063 (0.28)	400
50	2	50 (220)	40 (176)	1.0 (4.40)	0.1 (0.44)	0.063 (0.28)	630	2.0 (8.8)	0.16 (0.7)	0.1 (0.44)	400
65	2 1/2	79 (347)	63 (277)	1.6 (7.04)	0.16 (0.7)	0.1 (0.44)	630	3.2 (10.56)	0.25 (1.1)	0.16 (0.7)	400
80	3	125 (550)	100 (440)	2.0 (8.80)	0.25 (1.1)	0.16 (0.7)	630	4.0 (17.6)	0.4 (1.76)	0.25 (1.1)	400
100	4	200 (880)	160 (704)	3.2 (10.56)	0.41 (1.8)	0.25 (1.1)	630	6.4 (28)	0.64 (2.8)	0.4 (1.76)	400
125	5	200 (880)	160 (704)	3.2 (10.56)	0.41 (1.8)	0.25 (1.1)	630	6.4 (28)	0.64 (2.8)	0.4 (1.76)	400
150	6	500 (2200)	400 (1760)	8.0 (35.20)	1.0 (4.4)	0.63 (2.77)	630	16 (70.4)	1.6 (7)	1.0 (4.4)	400
200	8	788 (3470)	630 (2770)	13.0 (57.2)	1.6 (7.04)	1.0 (4.4)	630	25 (110)	2.5 (11)	1.6 (7)	400
250	10	1250 (5500)	1000 (4400)	20 (88)	2.5 (11.01)	1.6 (7)	630	40 (176)	4.0 (17.6)	2.5 (11)	400
300	12	2000 (8810)	1600 (7045)	32 (140.8)	4.1 (18.05)	2.5 (11)	630	64 (281.6)	6.4 (28)	4.0 (17.6)	200
350	14	2000 (8810)	1600 (7045)	32 (140.8)	6.4 (28.18)	4.0 (17.6)	400	64 (281.6)	12.8 (56)	8.0 (35.2)	200
375	15	2000 (8810)	1600 (7045)	32 (140.8)	6.4 (28.18)	4.0 (17.6)	400	64 (281.6)	12.8 (56)	8.0 (35.2)	200
400	16	3125 (13760)	2500 (11007)	50 (220)	10 (44)	6.3 (27.7)	400	100 (440)	20 (88)	12.5 (55)	200
450	18	3125 (13760)	2500 (11007)	50 (220)	10 (44)	6.3 (27.7)	400	100 (440)	20 (88)	12.5 (55)	200
500	20	5000 (22014)	4000 (17610)	80 (352)	16 (70.45)	10 (44)	400	160 (70.4)	32 (141)	20 (88)	200
600	24	7875 (34670)	6300 (27740)	126 (554.4)	25.2 (110.9)	15.8 (70)	400	252 (1108)	50.4 (222)	31.5 (138.7)	200

Attachment D: District Sample Bill

Westlands Water District

PO Box 6056, 3130 N Fresno St
Fresno CA 93703
Telephone: Customer Accounting Dept. (559) 241-6250
FAX: (559) 241-6276

Statement of Account
December 1, 2016 - December 31, 2016

Payments received after December 31, 2016 will not appear on this statement.

Example Farms
1001 Main Street
Westlands CA 99999

Account :	5280
Prior Balance:	57,983.60
Payments:	-57,983.60
Other Payment Activity:	0.00
Charges:	80,719.76
Amount Due:	80,719.76

Please return this portion with your payment - Do Not Staple

Payment is Delinquent after January 27,2017

Delivery Number	Open Date	Close Date	Open Reading	Close Reading	Meter Adjust	Description	Quantity	Unit	Rate	Charges
						Supplemental Project 2014-15 Adv	111	ACFT	682.16	75,719.76
3185						SLDMWA Rate Adj Mar - Nov 2014	-22	ACFT	82.51	-1,815.22
3185						SLDMWA Rate Adj Mar - Nov 2014	22	ACFT	99.57	2,190.54
3185						SLDMWA Rate Adj Mar - Nov 2014	-112	ACFT	82.51	-9,241.12
3185						SLDMWA Rate Adj Mar - Nov 2014	112	ACFT	99.57	11,151.84
3185						Wtr Del Benefit Rate Adj Mar-Nov 14	-22	ACFT	6.40	-140.80
3185						Wtr Del Benefit Rate Adj Mar-Nov 14	22	ACFT	7.17	157.74
3185						Wtr Del Benefit Rate Adj Mar-Nov 14	-112	ACFT	6.40	-716.80
3185						Wtr Del Benefit Rate Adj Mar-Nov 14	112	ACFT	7.17	803.04
3185						WWD O&M Rate Adj Mar - Nov 2014	-22	ACFT	60.33	-1,327.26
3185						WWD O&M Rate Adj Mar - Nov 2014	22	ACFT	67.30	1,480.60
3185						WWD O&M Rate Adj Mar - Nov 2014	-112	ACFT	60.33	-6,756.96
3185						WWD O&M Rate Adj Mar - Nov 2014	112	ACFT	67.30	7,537.60
3185						WWD O&M Res Rate Adj Mar - Nov 2014	-22	ACFT	1.73	-38.06
3185						WWD O&M Res Rate Adj Mar - Nov 2014	22	ACFT	1.93	42.46
3185						WWD O&M Res Rate Adj Mar - Nov 2014	-112	ACFT	1.73	-193.76
3185						WWD O&M Res Rate Adj Mar - Nov 2014	112	ACFT	1.93	216.16
3195						SLDMWA Rate Adj Mar - Nov 2014	-22	ACFT	82.51	-1,815.22
3195						SLDMWA Rate Adj Mar - Nov 2014	22	ACFT	99.57	2,190.54
3195						Wtr Del Benefit Rate Adj Mar-Nov 14	-22	ACFT	6.40	-140.80
3195						Wtr Del Benefit Rate Adj Mar-Nov 14	22	ACFT	7.17	157.74
3195						WWD O&M Rate Adj Mar - Nov 2014	-22	ACFT	60.33	-1,327.26
3195						WWD O&M Rate Adj Mar - Nov 2014	22	ACFT	67.30	1,480.60
3195						WWD O&M Res Rate Adj Mar - Nov 2014	-22	ACFT	1.73	-38.06
3195						WWD O&M Res Rate Adj Mar - Nov 2014	22	ACFT	1.93	42.46
3275						SLDMWA Rate Adj Mar - Nov 2014	-6	ACFT	82.51	-495.06
3275						SLDMWA Rate Adj Mar - Nov 2014	6	ACFT	99.57	597.42
3275						SLDMWA Rate Adj Mar - Nov 2014	-34	ACFT	82.51	-2,805.34
3275						SLDMWA Rate Adj Mar - Nov 2014	34	ACFT	99.57	3,385.38
3275						Wtr Del Benefit Rate Adj Mar-Nov 14	-6	ACFT	6.40	-38.40
3275						Wtr Del Benefit Rate Adj Mar-Nov 14	6	ACFT	7.17	43.02
3275						Wtr Del Benefit Rate Adj Mar-Nov 14	-34	ACFT	6.40	-217.60
3275						Wtr Del Benefit Rate Adj Mar-Nov 14	34	ACFT	7.17	243.78
3275						WWD O&M Rate Adj Mar - Nov 2014	-6	ACFT	60.33	-361.98
3275						WWD O&M Rate Adj Mar - Nov 2014	6	ACFT	67.30	403.80
3275						WWD O&M Rate Adj Mar - Nov 2014	-34	ACFT	60.33	-2,051.22
3275						WWD O&M Rate Adj Mar - Nov 2014	34	ACFT	67.30	2,288.20
3275						WWD O&M Res Rate Adj Mar - Nov 2014	-6	ACFT	1.73	-10.38

Delivery Number	Open Date	Close Date	Open Reading	Close Reading	Meter Adjust	Description	Quantity	Unit	Rate	Charges
3275						WWD O&M Res Rate Adj Mar - Nov 2014	6	ACFT	1.93	11.58
3275						WWD O&M Res Rate Adj Mar - Nov 2014	-34	ACFT	1.73	-58.82
3275						WWD O&M Res Rate Adj Mar - Nov 2014	34	ACFT	1.93	65.62
4120						SLDMWA Rate Adj Mar - Nov 2014	-4	ACFT	82.51	-330.04
4120						SLDMWA Rate Adj Mar - Nov 2014	4	ACFT	99.57	398.28
4120						Wtr Del Benefit Rate Adj Mar-Nov 14	-4	ACFT	6.40	-25.60
4120						Wtr Del Benefit Rate Adj Mar-Nov 14	4	ACFT	7.17	28.68
4120						WWD O&M Rate Adj Mar - Nov 2014	-4	ACFT	60.33	-241.32
4120						WWD O&M Rate Adj Mar - Nov 2014	4	ACFT	67.30	269.20
4120						WWD O&M Res Rate Adj Mar - Nov 2014	-4	ACFT	1.73	-6.92
4120						WWD O&M Res Rate Adj Mar - Nov 2014	4	ACFT	1.93	7.72

Summary

Example Farms

Account: 5280

Date	Description	Amount
12/01/2016	Prior Balance	57,983.60
12/26/2016	Payment	-57,983.60
12/31/2016	Charges Detailed Above	80,719.76
01/27/2017	Amount Due	80,719.76

Attachment E: Water Shortage Contingency Plan

Water Shortage Contingency Plan

Westlands delivers small quantities of untreated, non-potable CVP water which is ultimately used for municipal and industrial (M&I) purposes by Lemoore Naval Air Station and by various rural commercial and residential customers located within the District boundaries. Westlands also conveys raw water to the Cities of Huron and Coalinga, which have separate water supply contracts with the USBR. No water is treated prior to delivery. Westlands has no treatment facilities to provide potable water supplies to these incidental non-agricultural customers.

Westlands suffers under a water short situation even when 100% of the contract amount is available. Allocation and shortage procedures for agricultural water are presented in the Ag Water Management Plan for details on this topic. Even though M&I water supplies have been allocated under the agricultural contract and are currently last to be curtailed in a severe water shortage situation, discussions have occurred recently that propose the possibility of an M&I shortage provision.

The highest level of annual non-agricultural water deliveries has been approximately 6,500 AF. Given the reductions in Westlands' CVP water supplies due to federal regulatory restrictions, it is likely that future non-agricultural water deliveries will be reduced even with modest population increases in the area. This is because reduced agricultural water supplies from the federal government will lead to a reduction in processing-related uses and in the farm labor population living in Westlands.

Estimates of water demand for the next 12, 24, and 36 months should be similar to the non-agricultural water use in an average water year, about 5,000 AF. The "worst case" water supply estimates for the next 12, 24, and 36 months are zero. Currently all non-agricultural water is part of the CVP contract supply. Since the extent of the additional regulatory restrictions is unknown at this time, this possibility cannot be ruled out. However, it has been the policy of the USBR to deliver a minimum of 75 percent of historical M&I use, even when agricultural allocations are considerably less than that. Other supplies from internal groundwater transfers are possible but because of uncertainty that groundwater can meet Title 22 standards and the lack of proximity to District distribution facilities, these supplies cannot be guaranteed.

The CVP allocation to Westlands is shared between agricultural, incidental agricultural and incidental non-agricultural water users. The District's Regulations for the "Allocation of Agricultural Water Within the Westlands Water District" (Appendix A) state "The District's General Manager is authorized to set aside from the total entitlement whether they be from the District's basic contract supply or some other general source of water, for each area of the District the amount of water needed for M&I purposes…." Historically, when the overall water supply has been reduced, the non-agricultural water allocation may not be reduced a similar percentage. In certain cases of severe reduction, it is likely that the District would receive CVP hardship water for health and safety purposes based on the statement of need.

Westlands believes that although there have been no mandatory reductions imposed on the District's non-agricultural customers, water conservation has occurred during periods of reduced supply. This is apparent when comparing non-agricultural water use in full and reduced water supply years (in 2008 and 2011 water use was less than above average in each year). In the unlikely event, that the CVP allocates no water to Delta export water-service contractors and the allocation for M&I use is less than 75 percent of historical use, the District will purchase water from other sources including an Emergency Drought Water Bank. Mandatory rationing will be imposed to the extent that sufficient water cannot be purchased.

The District's General Manager is authorized by the Board of Directors to prohibit the wasteful use of water in Westlands. Westlands' Allocation Regulations state, "The unauthorized using, taking, or wasting of water may subject the water user to civil or criminal prosecution. The General Manager is authorized, after oral or written notice to the water user, if in his judgment, it is advisable and in the best interest of the District, to lock the delivery facilities of, or discontinue water service to, any water user." Additionally, the Westlands' board may adopt a resolution on the use of non-agricultural water.

Each non-agricultural customer is metered according to AWWA standards, according to customer type. The price of non-agricultural water is set at the beginning of each year, based on the anticipated supply, but changes can occur later. District revenues from the sale of incidental non-agricultural water vary annually between one and two percent of the District's overall revenues and have little influence on the District's overall financial resources.

Plan of Action

The General Manager has the authority to discontinue water service if, in his judgment, water is being wasted. Additionally, the Board adopted a resolution prohibiting the waste of M&I water. The District is encouraging other water suppliers (Cities of Huron and Coalinga, and Lemoore Naval Air Station) which receive water through Westlands' distribution system to develop water conservation plans and water shortage contingency plans. Westlands will continue to read all meters in the District on a monthly basis.

Attachment F: Groundwater Management Plan

Westlands Water District

Groundwater Management Plan

1996

TABLE OF CONTENTS

WESTLANDS WATER DISTRICT

GROUNDWATER MANAGEMENT PLAN

INTRODUCTION

It is the mission of Westlands Water District to provide a timely, reliable, and affordable water supply to its landowners and water users, and to provide drainage service to those lands that need it. To this end, Westlands is committed to the preservation of its federal contract, which includes water and drainage service, and to the acquisition of additional water necessary to meet the needs of its landowners and water users.

In recognition of the vital nature of the District's groundwater resources as part of the total water supply available to landowners and water users, and in light of federal, state, and local issues impacting, or potentially impacting, those resources, the District's Board of Directors has authorized by Resolution (attached hereto as Appendix A), the preparation of a Groundwater Management Plan (Plan).

AUTHORITY

AB 3030, the Groundwater Management Act, authored by Assemblyman Jim Costa, became law on January 1, 1993, and was codified as Part 2.75, commencing with Section 10750 of Division 6 of the Water Code. AB 3030 permits local agencies to adopt programs to manage groundwater. The Central Valley Project Improvement Act's criteria for evaluating water conservation plans, require all water suppliers overlying a usable groundwater basin to initiate development of a groundwater management plan pursuant to AB 3030.

AB 3030 allows any local public agency which provides water service to all or a portion of its service area and whose service area includes all or a portion of a groundwater basin to adopt a groundwater management program. The law contains 12 components which may be included in a groundwater management plan. Each component may play some role in evaluating or operating a groundwater basin so that groundwater can be managed to maximize the total water supply while protecting groundwater quality.

The District is authorized to adopt rules and regulations to implement and enforce the Groundwater Management Program. The District may not limit or suspend extractions unless the District has determined through study and investigation that groundwater replenishment programs or other alternative sources of water supply have proved insufficient or infeasible to lessen groundwater demand. In adopting the rules and regulations, the District must consider the potential impact of those rules and regulations on business activities, including agricultural operations. In addition, to the extent practicable and consistent with groundwater resource protection, the District must minimize any adverse impacts on these business activities.

Before the District may levy a water management assessment or otherwise fix and collect fees for the replenishment or extraction of groundwater the District must hold an election on the proposition of whether or not the District shall be authorized to levy a groundwater management assessment or fix and collect fees for the replenishment or extraction of groundwater. The District shall be so authorized if a majority of the votes cast at the election is in favor of the proposition.

PLAN OBJECTIVE AND GOALS

The District's farmers, being good stewards of their land, are concerned about managing and protecting their resources, including groundwater. Therefore, the objective of this Plan is to preserve and enhance the long-term viability of the groundwater resources within the District with respect to both quantity and quality. To accomplish this objective the District intends to evaluate and/or implement programs which are consistent with the mission statement of the District and will meet the following goals:

Primary Goals

- Preserve and enhance the reliability of groundwater resources of the District.
- Ensure the long-term availability of high quality groundwater.
- Maintain local control of groundwater resources within the District.
- Minimize the cost and impacts of groundwater use.

Secondary Goals

- Prohibit unrestricted export of groundwater from the District and use of groundwater to replace surface water removed from the District as a result of a transfer.
- Minimize impacts of groundwater pumping, including subsidence, overdraft, and soil productivity.
- Prevent unnecessary restrictions on the private use of the District's groundwater resources.
- Ensure coordination between District, local, and regional groundwater management activities.
- Optimize use of groundwater storage conjunctively with surface water.
- Ensure efficient use of the District's groundwater resources and minimize deep percolation and its contribution to the shallow groundwater problem through use of an effective water conservation and management program.
- Ensure that District water users understand the steps they can take to protect and enhance their groundwater supply.

AREA TO BE INCLUDED IN THE GROUNDWATER MANAGEMENT PLAN

The Groundwater Program shall be effective throughout the entire District. It shall be the District's policy to work cooperatively with all other agencies within the Westside Basin in order to facilitate protection and enhancement of the groundwater resources within the District and to avoid whenever possible duplicative or inconsistent groundwater management efforts. To that end, as a part of its Program, the District may enter into joint powers agreements or memoranda of understanding with public or private entities overlying all or a portion of the same groundwater basins as the District's service area for the purpose of implementing or coordinating groundwater management activities.

Excluded from this Program will be the small domestic wells within the District boundaries which pump groundwater for single-unit residences.

DISTRICT BACKGROUND

Westlands consists of nearly 1,000 square miles of prime farmland between the Diablo Range of the California Coast Range mountains and the trough, or lowest point, of the San Joaquin Valley in western Fresno and Kings Counties. Westlands averages 15 miles in width and stretches 70 miles from Mendota on the north to Kettleman City on the south. Figure 1

shows the general location of Westlands. Figure 2 is a map of Westlands in the western portion of the San Joaquin Valley.

Westlands was formed under California Water District Law in 1952 upon petition of landowners located within the District's proposed boundaries. Nearly all land within the current Westlands' boundaries was at one time farmed using groundwater.

Negotiations between Westlands and the U.S. Bureau of Reclamation began on a contract to provide a dependable, supplemental supply of surface water through the Bureau's Central Valley Project (CVP) shortly after the District's formation. At that time, the federal government was considering the development and construction of the CVP's San Luis Unit (SLU). This involved cooperation between the federal and state governments with regard to shared water storage facilities and conveyance systems.

When the original Westlands was organized, it included approximately 376,000 acres. In 1965 it merged with its western neighbor, Westplains Water Storage District, adding 210,000 acres. Additionally, lands comprising about 18,000 acres were annexed to the District after the merger to form the current 604,000-acre District. The original Westlands is referred to as Priority Area I and Westplains is referred to as Priority Area II, each under a separate CVP agricultural water service contract with the Bureau. Priority Area III currently does not have a firm surface water supply and receives water only when available from other sources including surplus CVP water transfers from within and outside the District.

Climate

Annual precipitation in Westlands averages about seven inches, the majority of which falls during the months of December through March. Summer maximum temperatures frequently exceed 100 degrees F and winter temperatures occasionally fall below freezing. With a mean annual temperature of 62 degrees F, the area has an average frost-free growing season of 280 days.

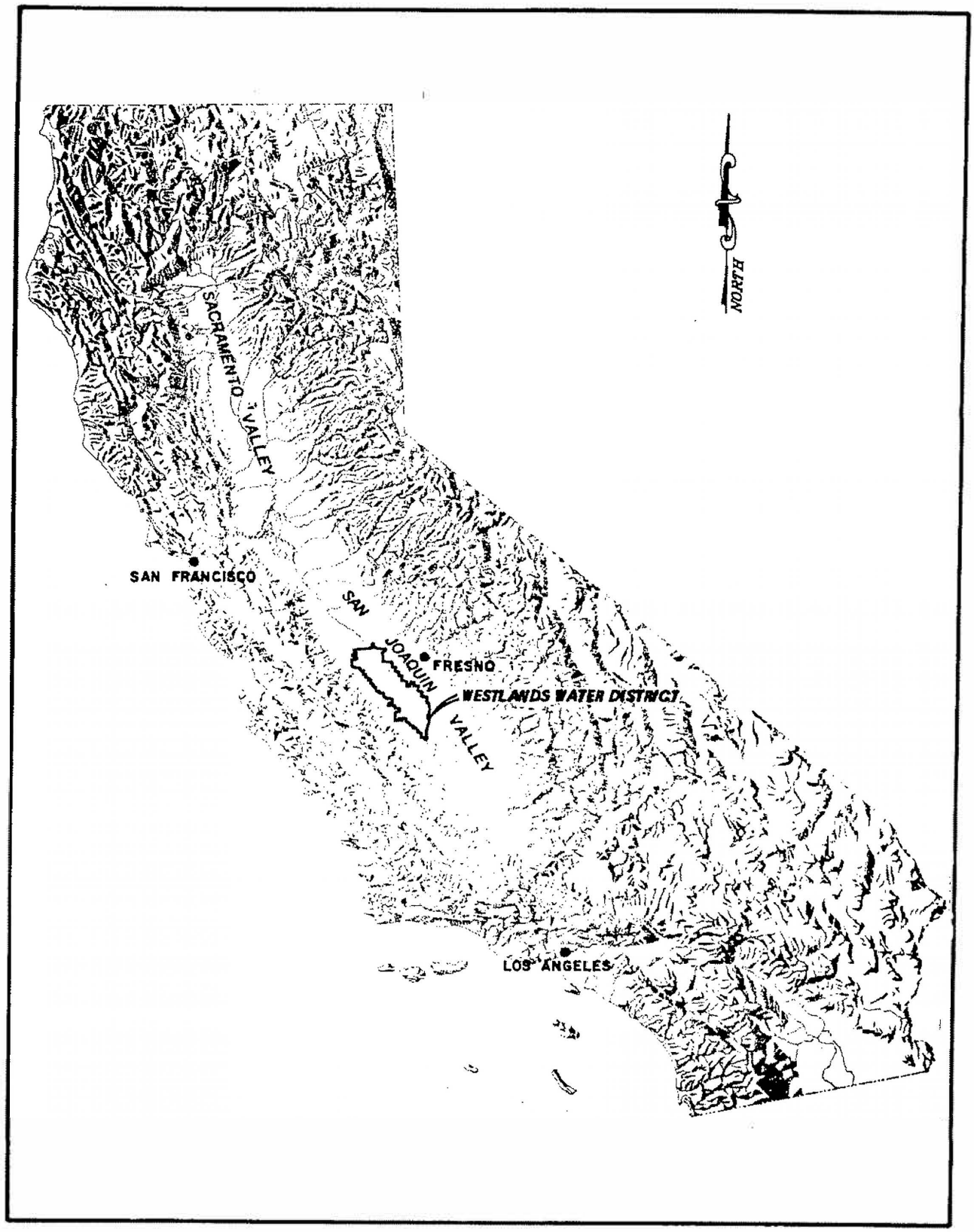


Figure 1. Location of Westlands Water District in California

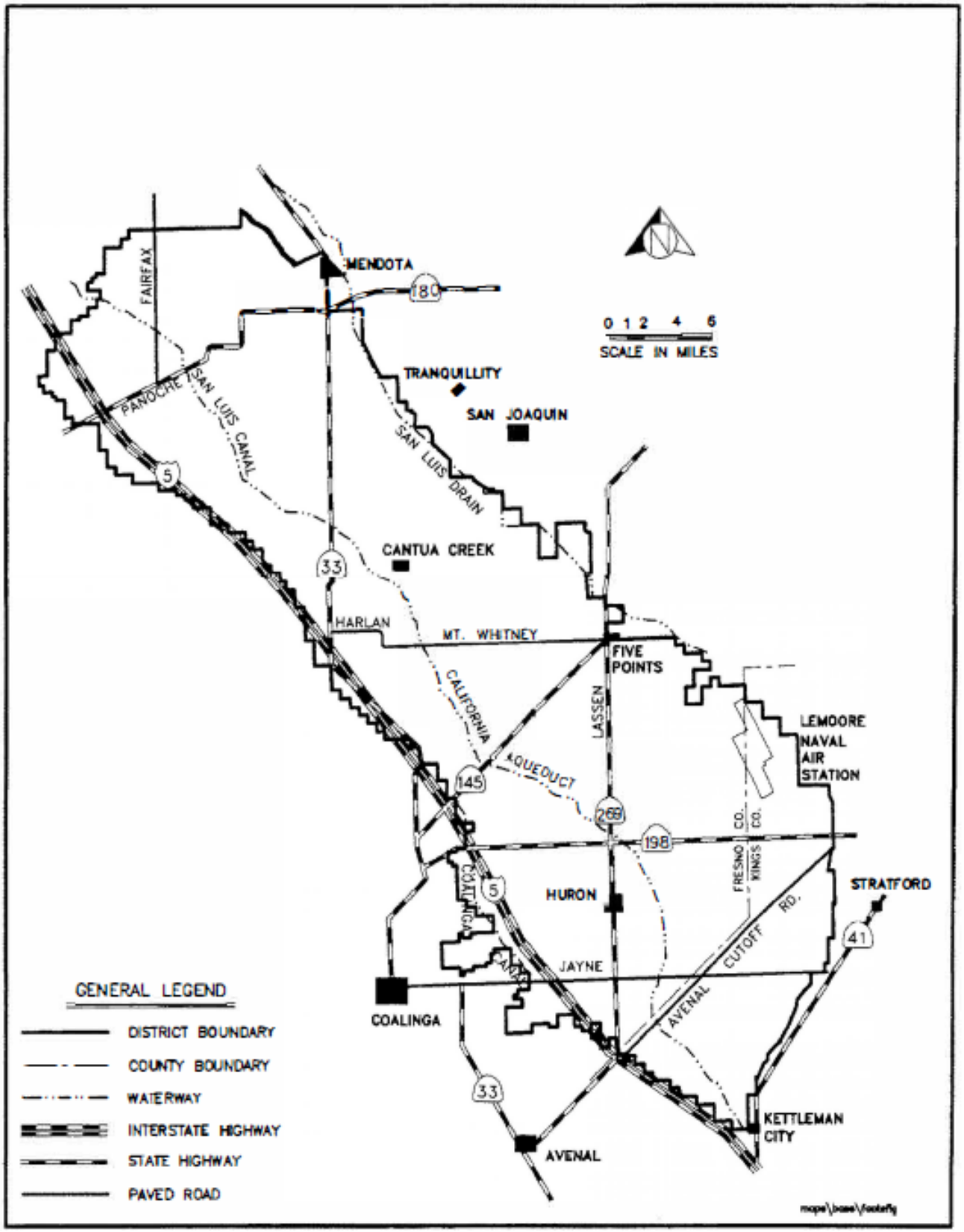


Figure 2. Westlands Water District

Geology

The San Joaquin Valley is a wide bedrock basin filled with thousands of feet of alluvial sediment deposited by streams and rivers flowing out of the adjacent mountains on both the east and the west. Westlands is located near the centerline of this basin, bordered on the east by the Fresno Slough and on the west by the Diablo Range of the California Coast Ranges.

The Diablo Range consists of complex, folded, and uplifted mountains which are composed predominantly of sandstones and shales of marine origin. Eroded by creeks flowing from the Diablo Range, sediments form gentle sloping alluvial fans. The texture of the Diablo Range deposits depends on the relative position on the alluvial fan and ranges from coarse sand and gravel to fine silt and clay. Generally, those portions of Westlands lying high on the alluvial fans have permeable, medium-textured soils. With decreasing elevation from the west to east, soil textures become finer. These fine textured soils are characterized by low permeability and increased concentrations of water soluble solids, primarily salts and trace elements.

The Sierra Nevada on the east side of the Valley is predominately comprised of uplifted granitic rock overlaid in areas by sedimentary and metamorphic rock. Sierran alluvial deposits in the District consist primarily of well-sorted sands, with minor amounts of clay. The Sierran alluvium decreases in thickness and increases in depth below the surface toward the west. These coarse-textured sediments are characterized by high permeability and a low concentration of water soluble solids.

One of the principal subsurface geological features of the San Joaquin Valley is the Corcoran Clay formation. Formed as a lake bed about 600,000 years ago, this clay layer ranges in thickness from 20 to 200 feet and underlies most of the District. Varying in depths from 200 to 500 feet in the Valley trough to 850 feet along the Diablo Range, the Corcoran Clay divides the groundwater system into two major aquifers--a confined aquifer below and a semiconfined system above.

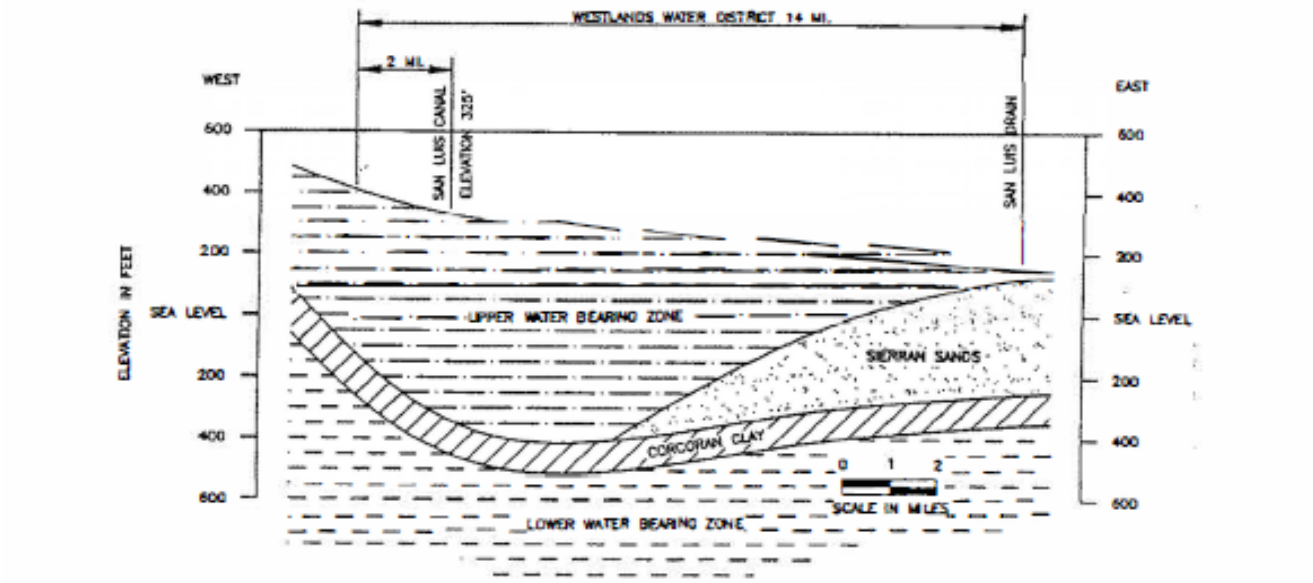


Figure 3. Generalized Hydrogeological Cross Section of Westlands

WESTSIDE GROUNDWATER BASIN

The groundwater basin underlying Westlands is comprised generally of two water-bearing zones: (1) an upper zone above a nearly impervious Corcoran Clay layer containing the Coastal and Sierran aquifers and (2) a lower zone below the Corcoran Clay containing the Sub-Corcoran aquifer. These water-bearing zones are recharged by subsurface inflow from the east and northeast, percolation of groundwater, and imported and local surface water. A generalized cross section of the District depicting the location of the Corcoran Clay and these water-bearing zones is shown in Figure 3.

The Corcoran Clay separates the upper and lower water-bearing zones in the majority of the District. The Corcoran Clay is not continuous west of Huron. The elevation of the base of the Corcoran Clay is shown in Figure 4.

Groundwater quality in the lower water-bearing zone varies throughout the District as shown in Figure 5. Typically, water quality varies with depth; the poorest quality occurring at the upper and lower limits of the aquifer and the optimum quality somewhere between. The upper limit of the aquifer is the base of the Corcoran Clay. The USGS identified the lower limit as the base of the fresh groundwater. The quality of the groundwater below the base of fresh water exceeds 2,000 parts per million total dissolved solids. The elevation of the base of the fresh groundwater is shown in Figure 6.

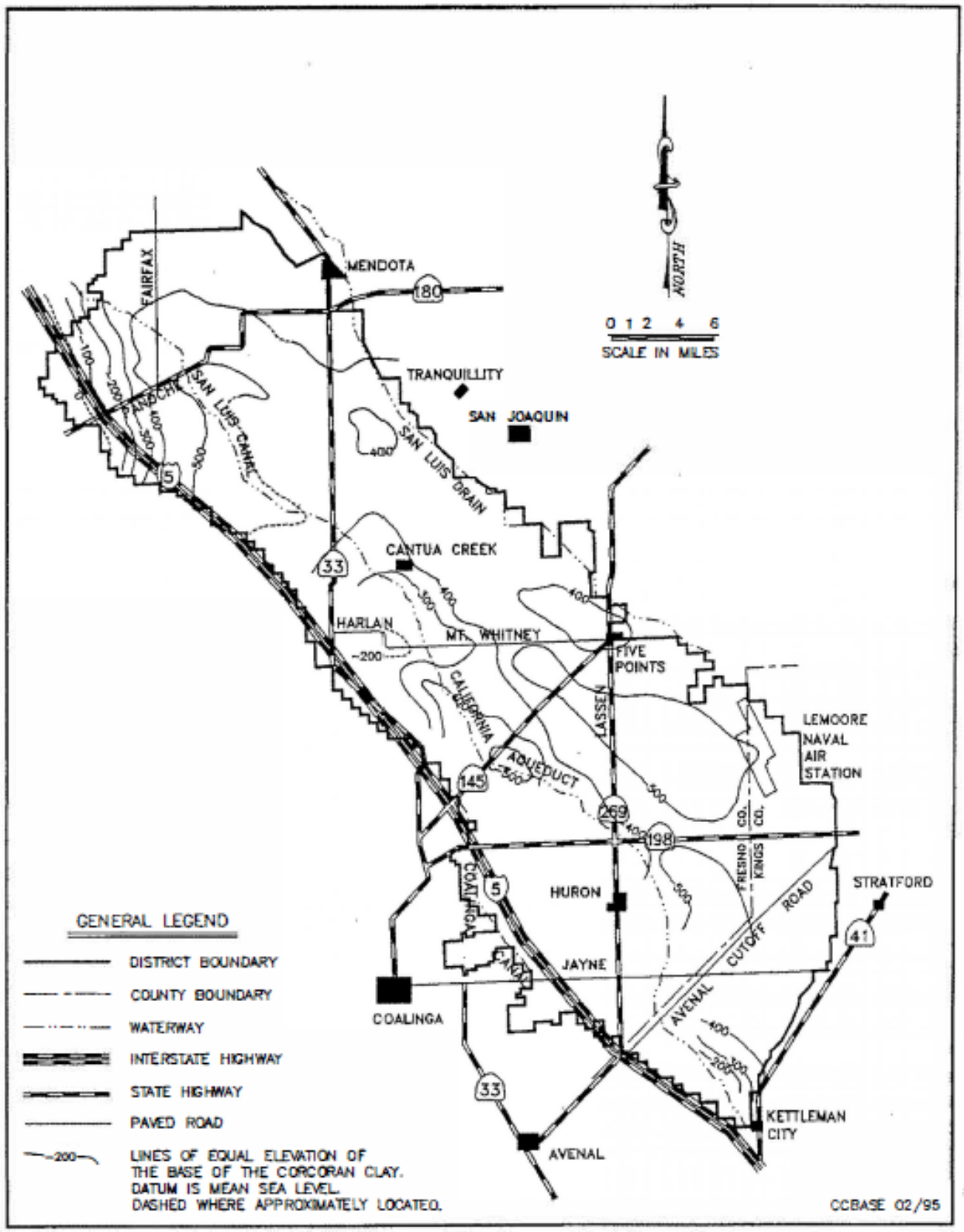


Figure 4. Elevation of Base of the Corcoran Clay

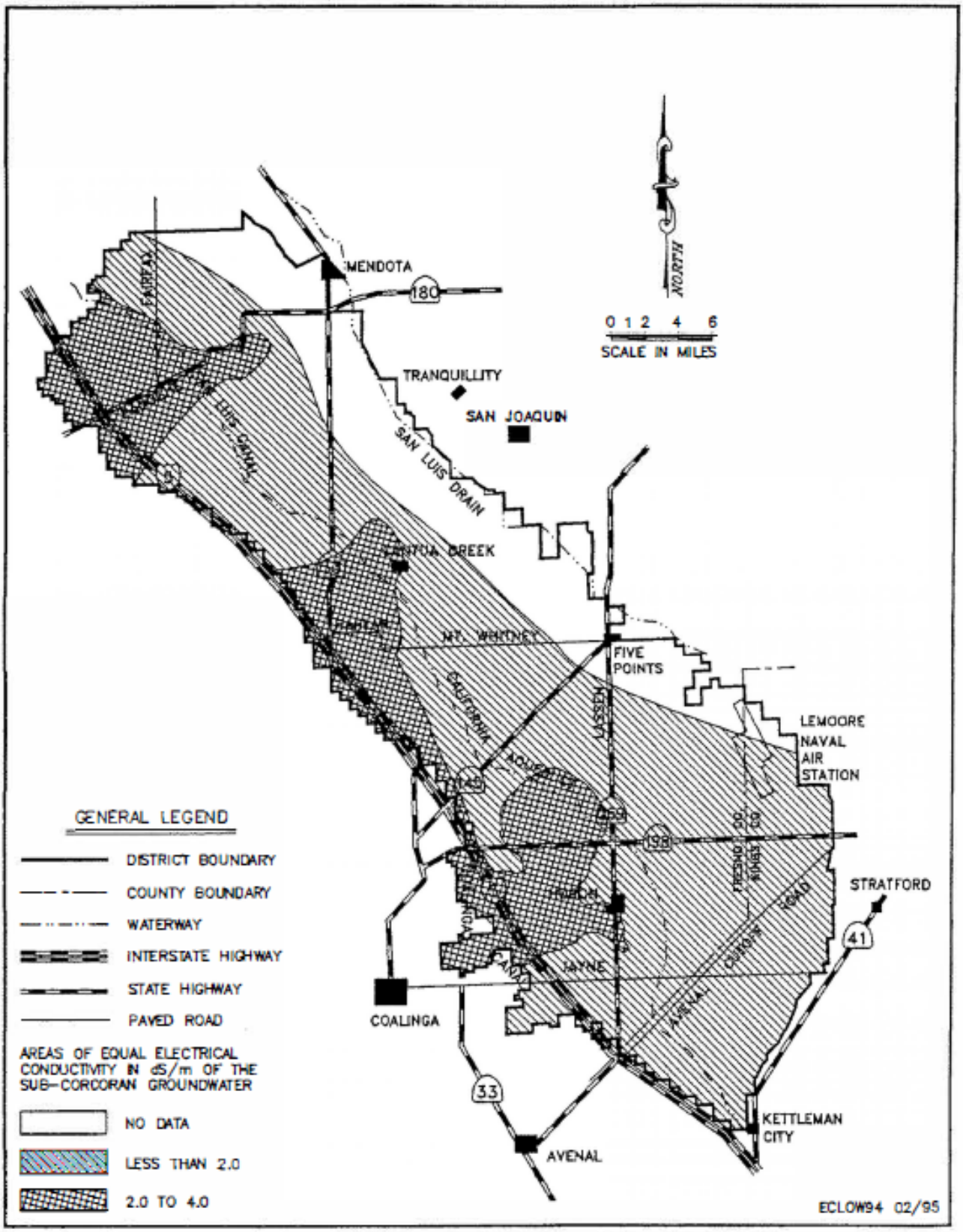


Figure 5. Electrical Conductivity of Sub-Corcoran Groundwater, December 1994

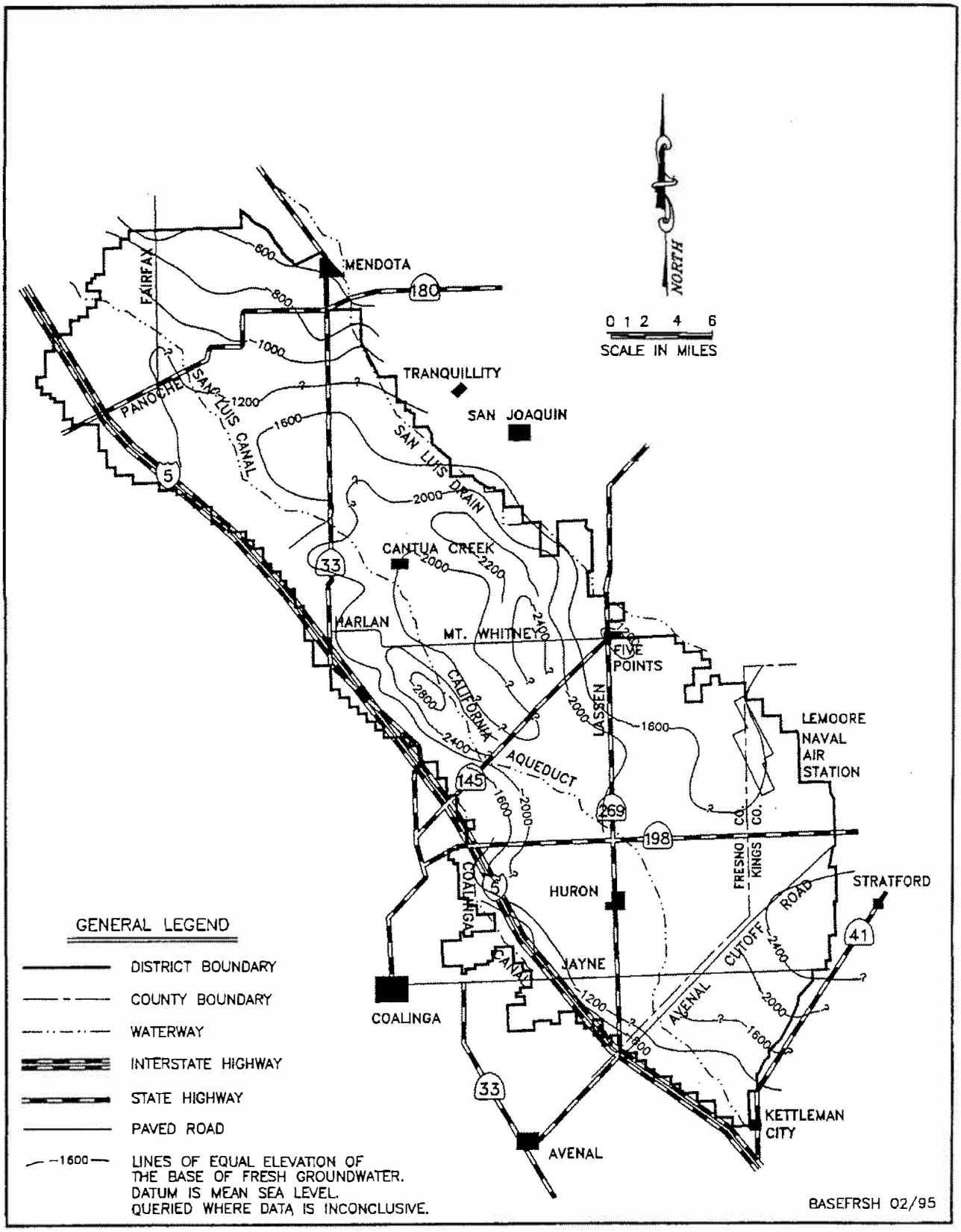


Figure 6. Elevation of Base of Fresh Groundwater

GROUNDWATER MONITORING PROGRAM

Project water supplies are carefully allocated and all surface deliveries are metered, yielding accurate water use data with which to manage the supply and recoup water delivery costs. Surface water quality is monitored by state and federal agencies and the District. On the other hand, pumping from private wells is at the discretion of the landowners.

Groundwater measurement and quality testing have proved useful to individual farmers to help them better manage water supplies, facilitate more accurate irrigation scheduling, monitor pump efficiency, and participate in District groundwater programs. Such measurement and testing also enable the District to better monitor groundwater supplies, calculate drought effects, and determine water needs.

The shortage of Project water since 1990 has necessitated the construction of many new wells so that groundwater could be used to help supplement surface supplies. More than 150 wells were drilled during the 1990-1995 period, bringing the total number of operational wells within the District to about 750. About 60 percent of the operational wells were metered in 1995. Many farmers participated in District Groundwater Exchange and Integration Programs during the 1990-94 period. These programs were implemented to increase the District's available water supply and enhance the flexibility in the use of groundwater in terms of timing and location.

Groundwater monitoring is an essential part of managing any conjunctive use program. This information is vital to determine the effect of groundwater pumping on (1) groundwater overdraft, (2) water quality, (3) pumping costs, and (4) subsidence. Without effective monitoring, the short- and long-term impacts of conjunctive use programs cannot be assessed.

The wells in Westlands are monitored annually for water level and quality by District staff. This is done by sounding each well while in a static condition and measuring the electrical conductivity of the water while the well is operating. The results appear in various District reports and maps. This information enables the District to monitor groundwater trends, report the results to farmers, and estimate District-wide pumped groundwater quantities. This also enables the District to calculate seasonal application efficiency more accurately.

GROUNDWATER CONDITIONS

Prior to the delivery of CVP water to Westlands, the annual groundwater pumpage ranged from 800,000 to 1,000,000 acre-feet (AF) during the period of 1950-1968. The majority of this pumping was from the aquifer below the Corcoran Clay causing the sub-Corcoran piezometric groundwater surface to reach the lowest recorded average elevation of more than 150 feet below mean sea level by 1968. The large quantity of groundwater pumped prior to delivery of CVP water compacted water bearing sediments and caused land subsidence which ranged from 1 to 24 feet between 1926 and 1970 (U.S. Geological Survey, 1988).

With the beginning of CVP water deliveries in 1968, the groundwater surface rose steadily until reaching 89 feet above mean sea level in 1987, the highest average elevation of record dating back to the early 1940s. The only exception during this period was the increase in pumping and accompanying drop in the groundwater surface elevation due to the 1977 drought and reduced CVP water supply. An increase in pumping to approximately 472,000 AF during 1977 caused a dramatic drop in the groundwater surface elevation of approximately 97 feet.

During the 1990s, groundwater pumpage quantities have increased tremendously because of the reduced CVP water supplies caused by the extended drought and regulatory actions related to the Central Valley Project Improvement Act, the Endangered Species Act, and Bay/Delta water quality. Groundwater pumpage quantities are estimated to have reached 600,000 AF annually during 1991 and 1992 when the District received only 25 percent of its contractual entitlement of CVP water. This increased pumping caused the groundwater surface to decline to 62 feet below mean sea level, the lowest elevation since 1977.

An abundant surface water supply due to record precipitation in 1995 reduced the estimated quantity of groundwater pumped to 150,000 AF, allowing the average groundwater surface elevation to increase 78 feet to an average elevation of 27 feet above mean sea level. Overall, due to the mostly water-short years since 1990, the average piezometric water surface elevation has declined approximately 36 feet from December 1989 to December 1995. Another impact of reduced surface water deliveries is an increase in subsidence in areas of the Central

Valley. The Department of Water Resources estimates the amount of subsidence since 1983 has been up to two feet in some areas of the District with the majority occurring since 1989. The estimated amount of groundwater pumpage from 1976 through 1995 is shown in Table 1. Table 1 also shows the average elevation of the groundwater in the lower water bearing zone and the average change in elevation from the prior year.

The average elevation of the Sub-Corcoran piezometric groundwater surface and the estimated amount of groundwater pumped in Westlands are shown in Figure 7.

Table 1
Groundwater Pumpage

Crop Year[1/]	Pumpage AF	Elevation FT	Elevation Change FT	Crop Year[1/]	Pumpage AF	Elevation FT	Elevation Change FT
1976	97,000	-2	9	1986	145,000	71	8
1977	472,000	-99	-97	1987	159,000	89	18
1978	159,000	-4	95	1988	160,000[2/]	64	-25
1979	140,000	-13	-9	1989	175,000[2/]	63	-1
1980	106,000	4	17	1990	300,000[2/]	9	-54
1981	99,000	11	7	1991	600,000[2/]	-32	-41
1982	105,000	32	21	1992	600,000[2/]	-62	-30
1983	31,000	56	24	1993	225,000[2/]	1	63
1984	73,000	61	5	1994	325,000[2/]	-51	-52
1985	228,000	63	2	1995	150,000[2/]	27	78

[1/] October 1 to September 30
[2/] District Estimate

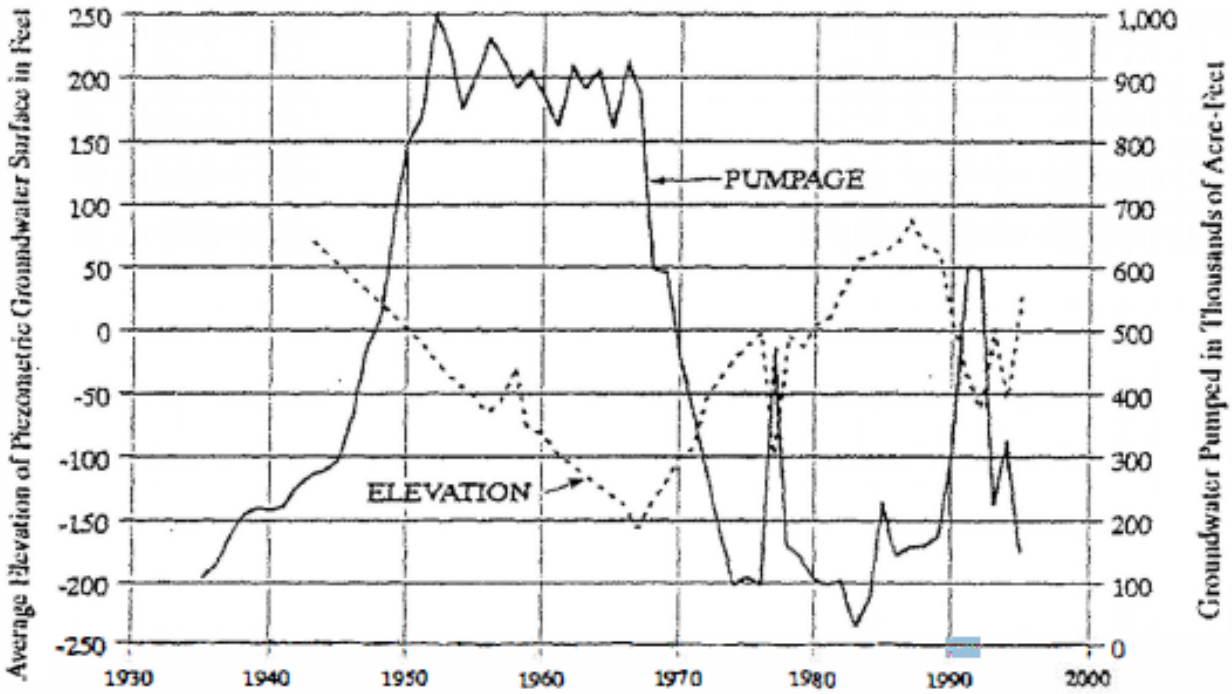


Figure 7. Historical Average Elevation of Sub-Corcoran Piezometric Groundwater Surface and Groundwater Pumpage

The depth to the piezometric groundwater surface in the lower water-bearing zone during December 1989, December 1994, and December 1995 is shown in Figures 8, 9, and 10 respectively. The change in depth to the piezometric groundwater surface from December 1989 to December 1994 is shown in Figure 11. The change in depth to the piezometric groundwater surface from December 1994 to December 1995 is shown in Figure 12.

In addition to monitoring the water levels of wells pumping from the lower aquifer, the wells pumping from the upper aquifer are also monitored. The majority of the wells pumping from the upper aquifer had groundwater surface levels 100 to 200 feet below ground surface during December 1995 as shown in Figure 13.

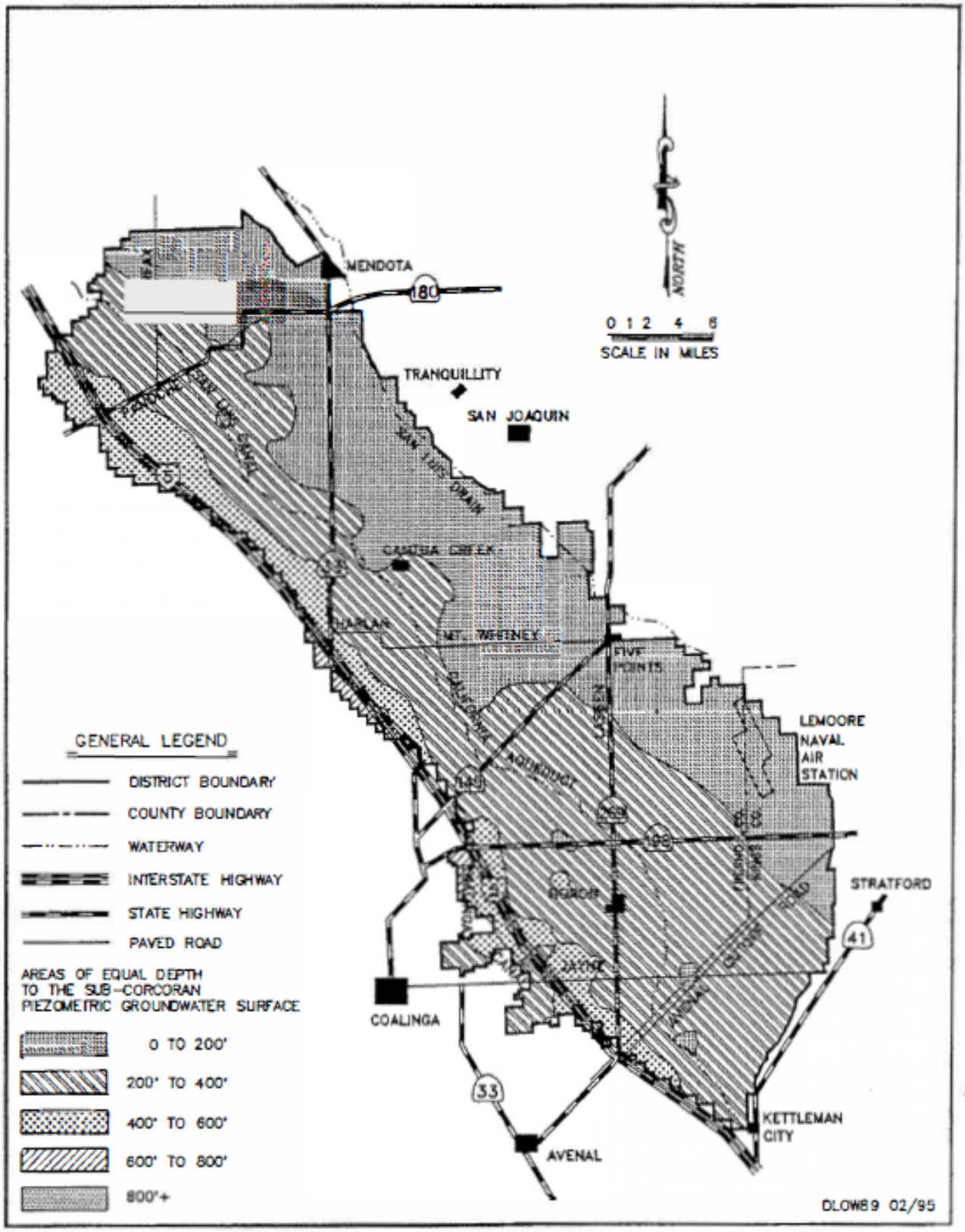


Figure 8. Depth to Sub-Corcoran Piezometric Groundwater Surface, December 1989

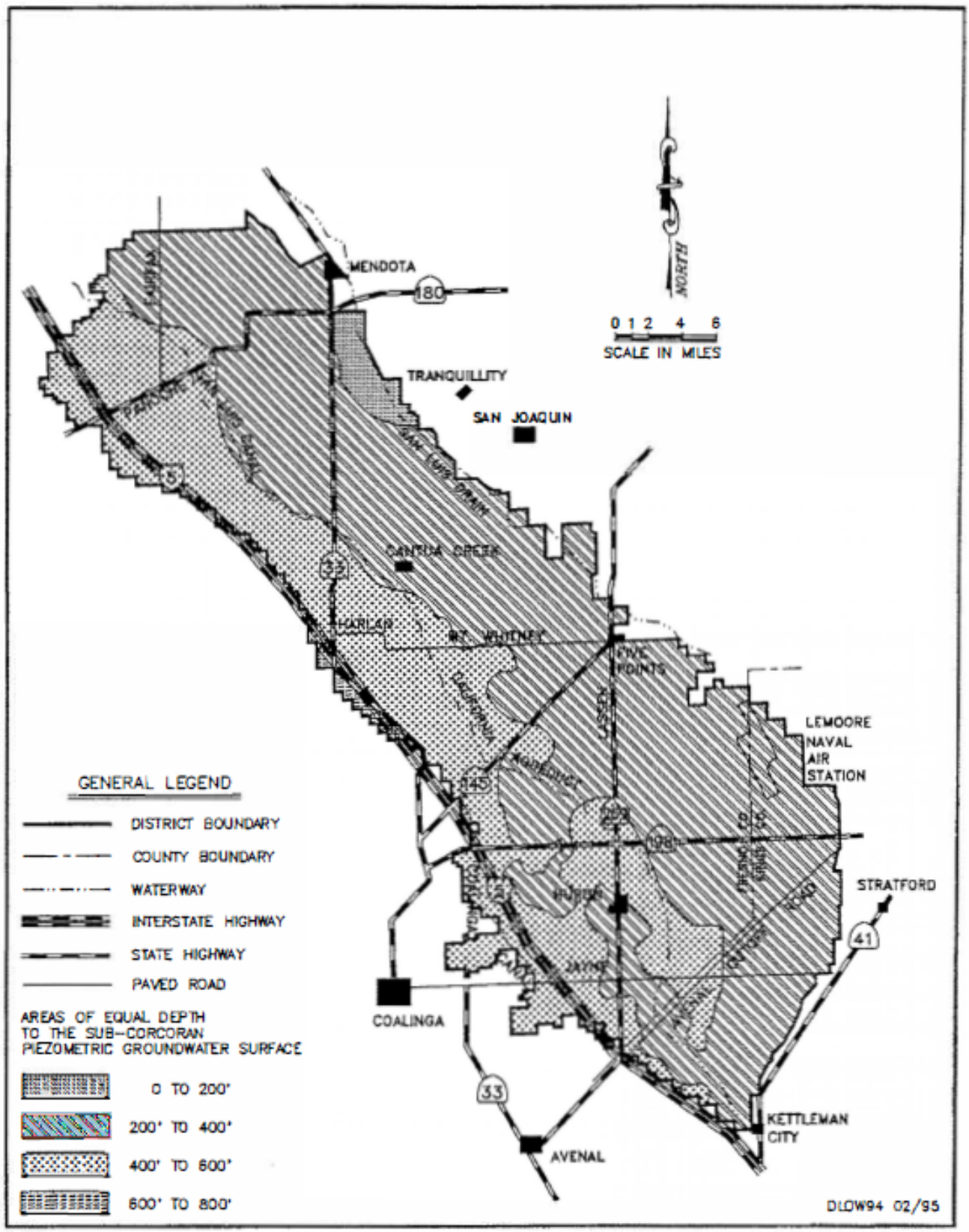


Figure 9. Depth to Sub-Corcoran Piezometric Groundwater Surface, December 1994

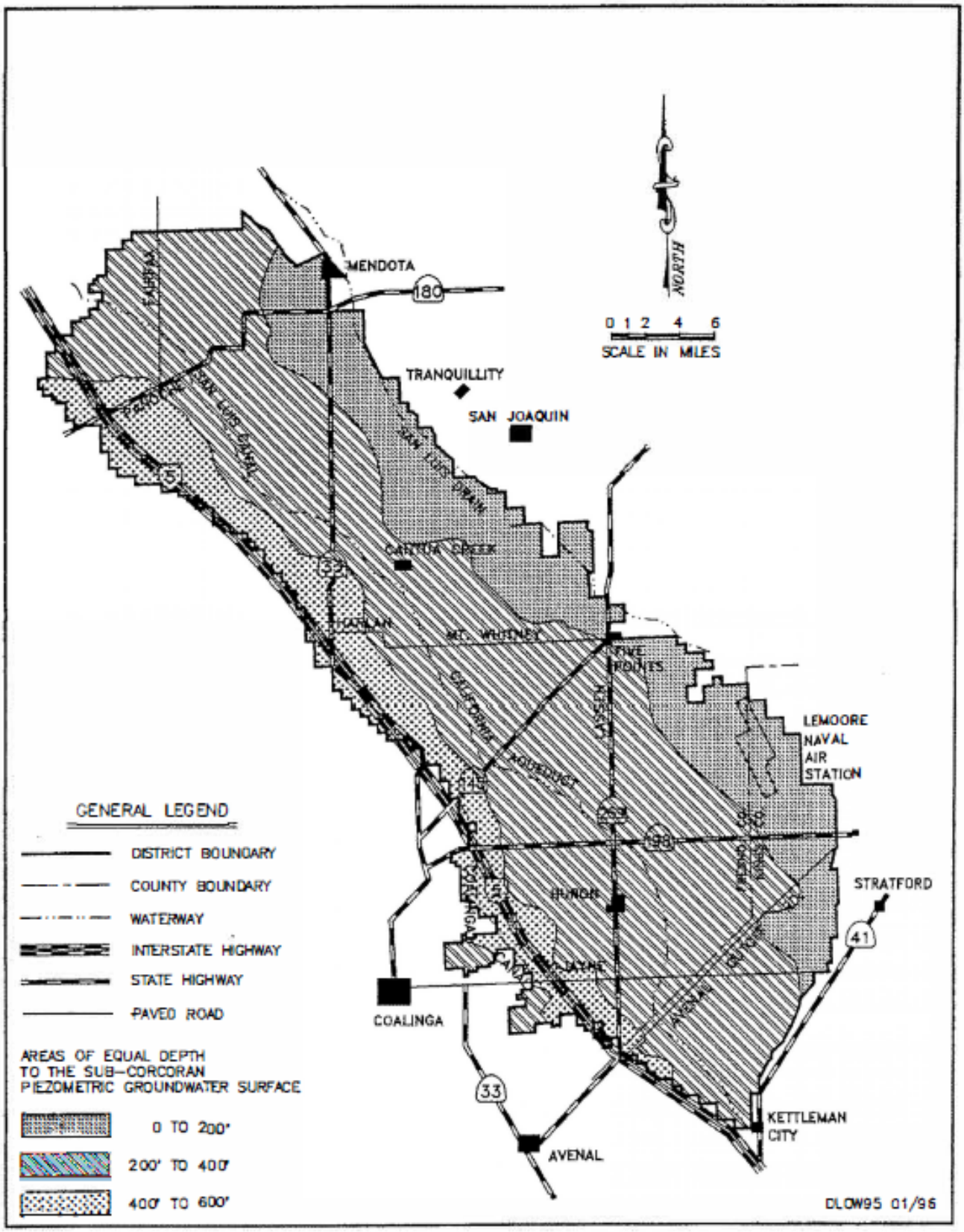


Figure 10. Depth to Sub-Corcoran Piezometric Groundwater Surface, December 1995

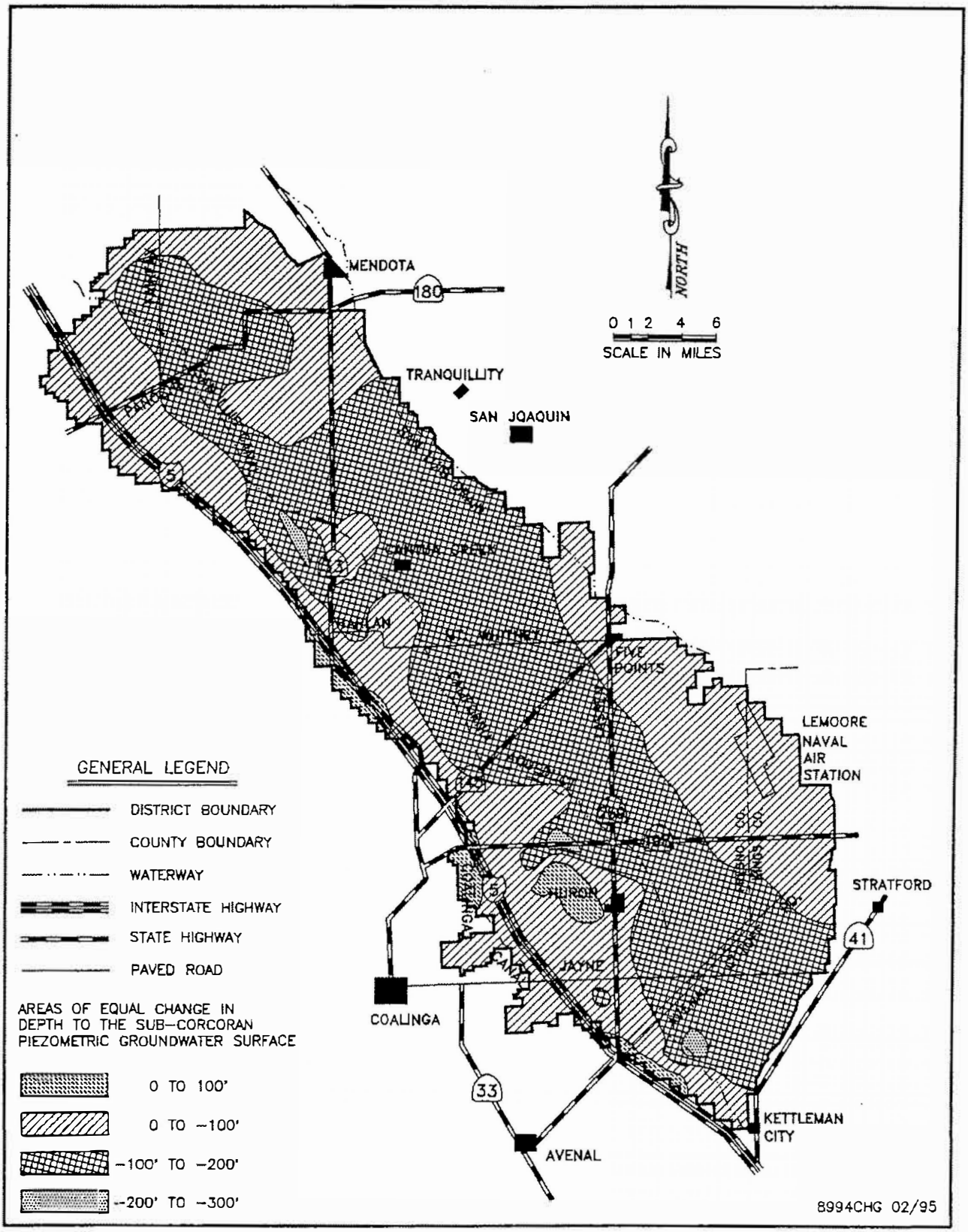


Figure 11. Change in Depth to Sub-Corcoran Groundwater, December 1989 to December 1994

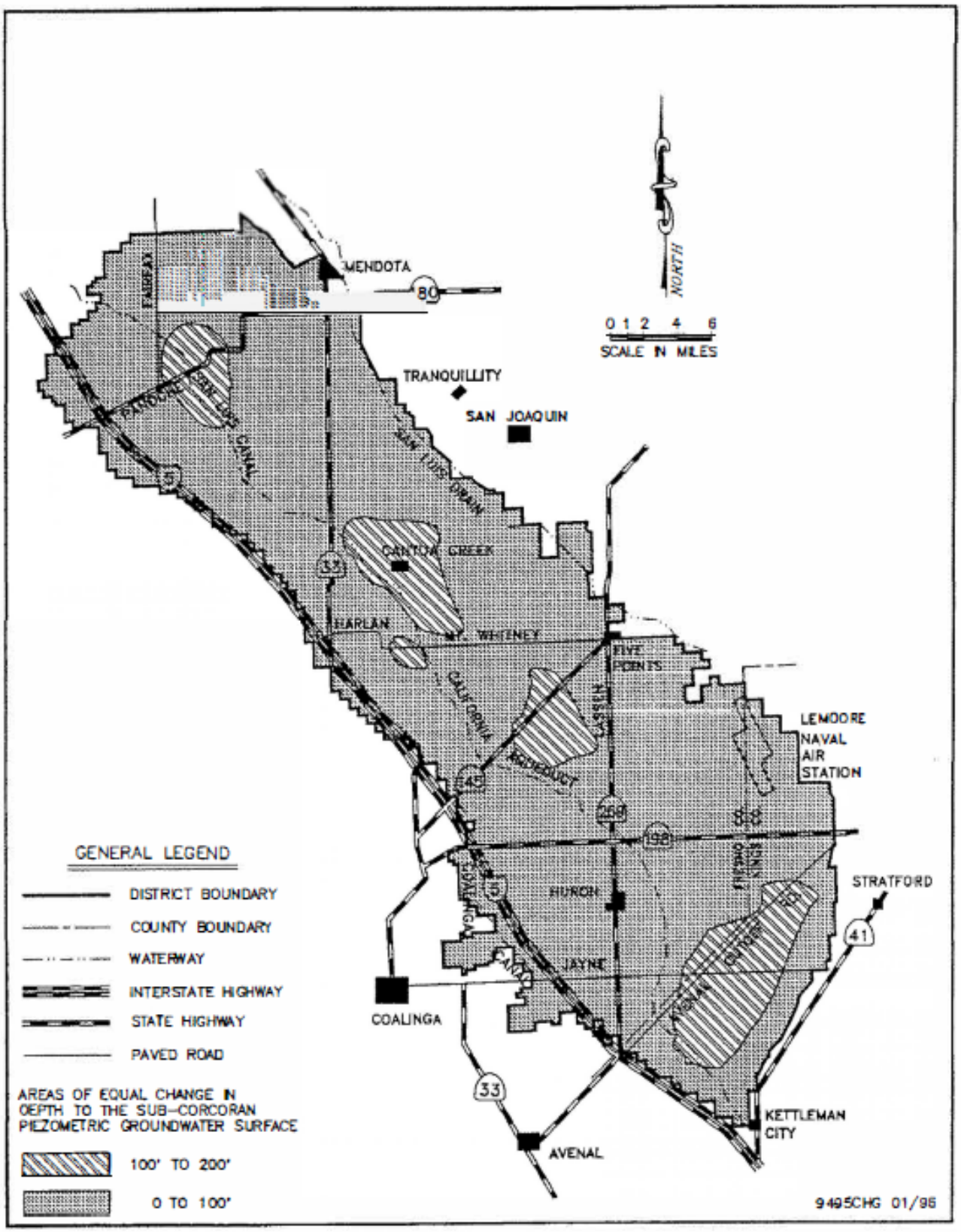


Figure 12. Change in Depth to Sub-Corcoran Groundwater, December 1994 to December 1995

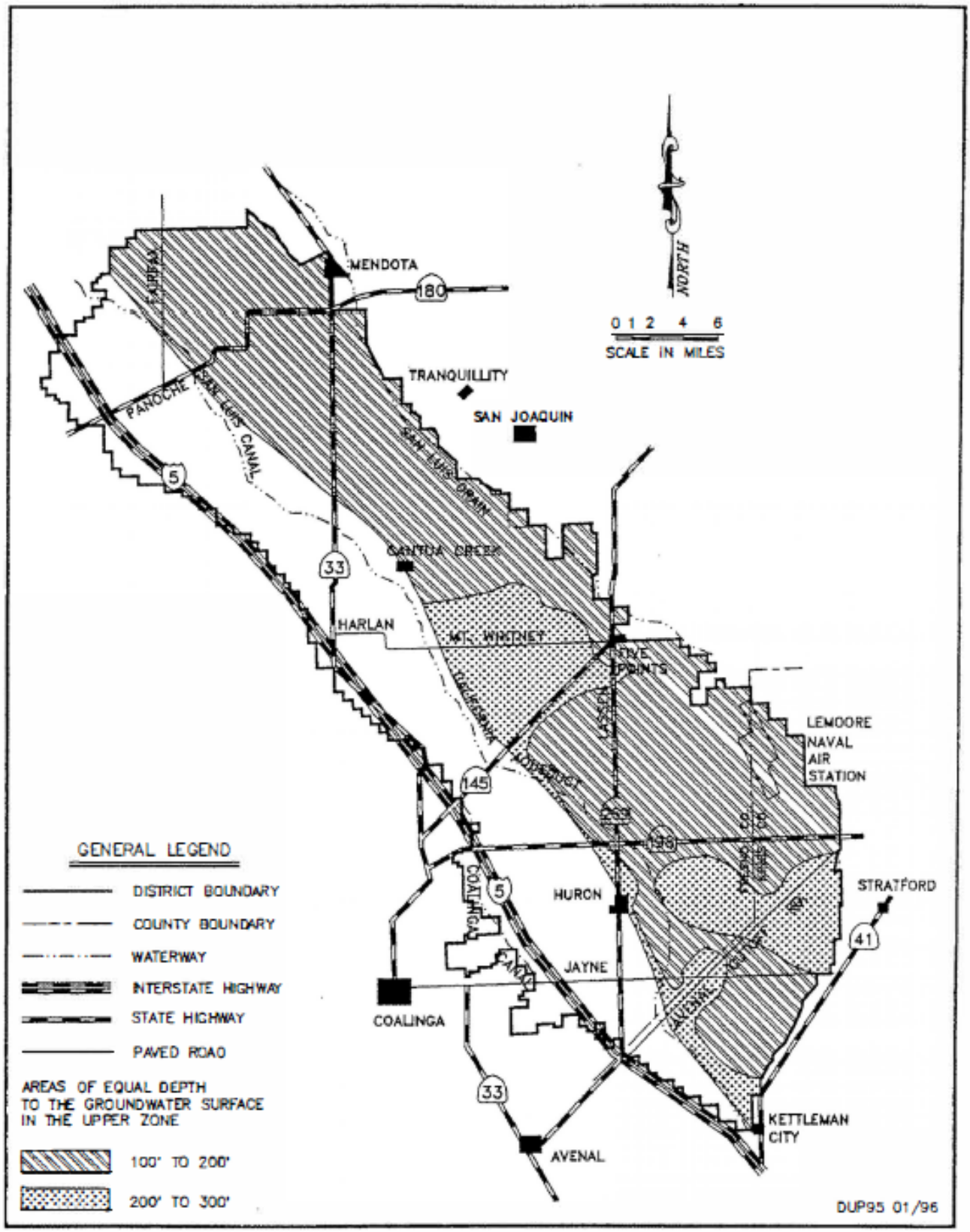


Figure 13. Depth to Groundwater in the Upper Zone, December 1995

SAFE YIELD

Safe yield or current perennial yield is the maximum quantity of water that can be annually withdrawn from a groundwater basin over a long period of time (during which water supply conditions approximate average conditions) without developing an overdraft condition. Annual amounts of water extracted will vary below and above the prennial yield with water levels declining during times of increased pumping due to poor water supply conditions and water levels increasing or recovering during periods of decreased pumping, above normal precipitation, and good water supply conditions.

Current perennial yield can be estimated by plotting the amount of groundwater pumped in one year versus the average change in groundwater level in the basin for that year. Data for 1974 to present were plotted and a "best fit line" was drawn. The intersection of the best fit line with the line showing zero groundwater level change as shown in Figure 14 indicates the current perennial yield of groundwater to be approximately 200,000 AF.

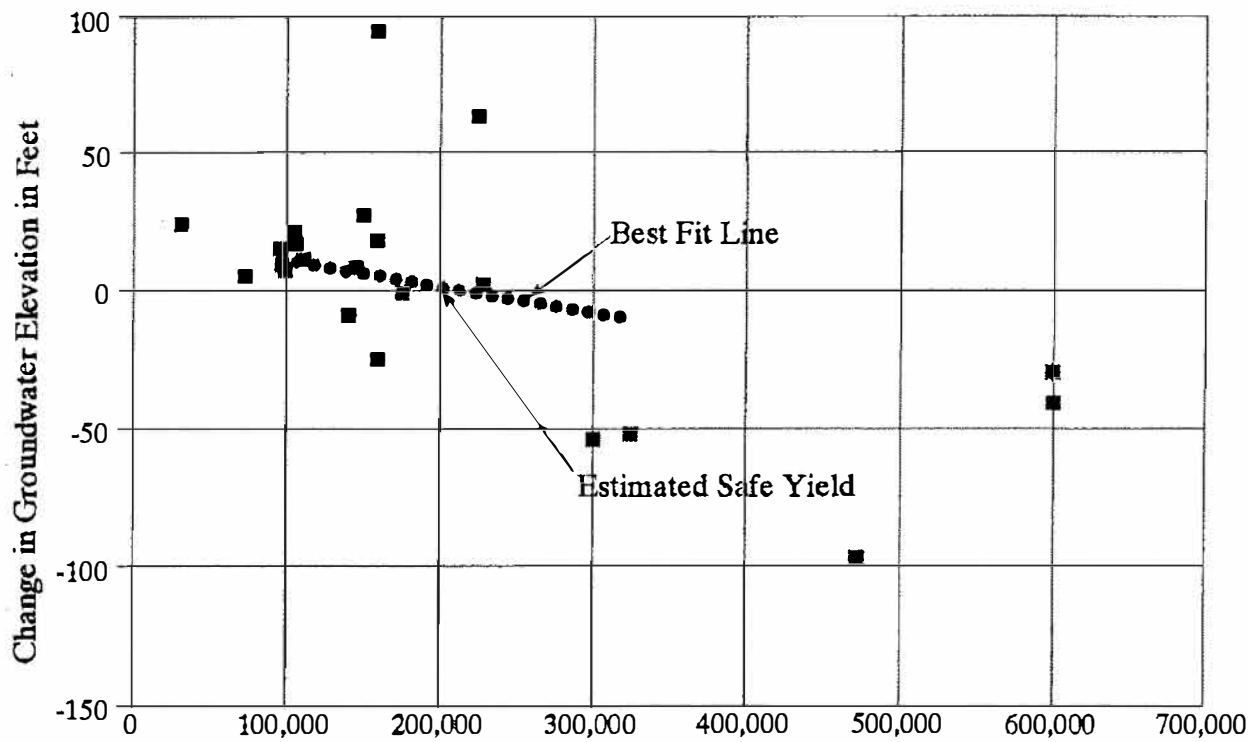


Figure 14. Change in Groundwater Elevation Versus Pumpage - Estimate of Safe Yield

PROPOSED PROGRAMS

Westlands Water District's Groundwater Management Plan includes, but is not limited to, the following items. Each item below contains a brief description of past and present District programs and potential future policies and projects.

1.e Monitoring and Analysis: The District has monitored groundwater conditions for overe 20 years. District staff will continue to monitor and analyze groundwater conditions in Westlands. Water user wells will be monitored each winter to determine static groundwater elevations and salinity monitoring will be performed during the periods of high groundwater pumpage to ensure a representative sampling. The data will be analyzed by District staff to determine trends in groundwater elevation and quality. In addition, pumping estimates will be made along with estimates of the change in groundwater storage. Also, the District will recommend to the landowners and water users that all new wells be equipped with an access tube to accommodate sounding of the well to monitor groundwater elevations.

2.e Development and Importation of New Surface Supplies: Westlands will continue toe explore opportunities to increase the importation of surface water to stabilize water supplies and reduce the demand for water users to pump groundwater to satisfy their irrigation needs. District staff will seek both short-term and long-term agreements with other agencies which have temporary or sustainable surpluses in water supply. This includes exploring opportunities to negotiate exchange agreements with other agricultural and urban water suppliers in which the District would provide a portion of its allocation during drought years in exchange for a like or greater amount of surface water in normal or wet years.

Finally, Westlands will continue to encourage and facilitate wherever possible the importation of surface water by District water users. The District realizes that in addition to benefiting the individual water user, transfers into the District will reduce the need for groundwater extractions.

3.e Restriction in the Exportation of Groundwater: The District will oppose increasede levels of groundwater exportation from the District unless the exportation is mitigated by the importation of an equal or greater amount of non-Project water into the District. Those water

users who have historically exported pumped groundwater outside the District's boundaries shall within two years of the adoption of this plan, submit an operational plan to the District. This plan shall include the location of the water user's existing wells in Westlands and an estimate of the amount of groundwater which the water user has exported outside the District boundaries from 1986-1995. The water user shall also identify any non-Project surface water supplies which they have imported into the District during that time. Also, the District will oppose any export of surface water from the District which will result in a net increase in the amount of groundwater pumped.

4.o Water Conservation: Westlands will continue to have an active water conservationo program designed to maximize efficient use of water in the District. District staff will continue to provide District specific information that water users need to effectively manage their irrigations.

This includes providing real-time crop water use information and information on water management techniques such as irrigation scheduling and evaluations. The District's water conservation coordinator will continue to be available to provide water users with technical assistance to meet their irrigation needs.

In addition, the District will continue to maintain its distribution system through preventive maintenance of District pumping facilities, pipelines, and water meters. The District will also maintain a flexible water ordering system to ensure that water users can best manage their water resources.

Westlands implemented the Irrigation System Improvement Program which provided low interest loans to District water users for irrigation system improvements. Funds for this program were provided by the State Water Resources Control Board. This program is intended to reduce the amount of deep percolation losses in the District by increasing irrigation efficiencies. The District will evaluate the Program to determine whether or not to provide funding for additional irrigation system improvements.

5.o Water Management Information Program: The District will continue to conduct ao program to provide water users with information on groundwater conditions and conservation

activities. This information will be contained in the *Irrigator* newsletter through special reports and through water user workshops.

The District's Water Conservation Department developed an Irrigation Handbook in 1985 and continues to distribute copies to new District water users. Water Conservation staff also will continue to make available to District water users an in-house computer with irrigation management software. This software provides water users with an opportunity to explore various irrigation practices and schedules to learn their effects on irrigation efficiency and timing.

In addition, maps and reports on groundwater conditions and trends will continue to be made available to District water users. Workshops will also be conducted periodically to inform District water users on changes in the groundwater conditions and the status of the Groundwater Management Program.

6.o Cooperation with Other Agencies: Westlands will work with other state and localo agencies to better identify groundwater conditions and to exchange information. Data collected through the District's monitoring efforts will be provided to others so that conditions in the basin and other basins can be tracked. The District will also facilitate studies by agency and university personnel to model groundwater conditions in the basin. District will continue to participate on local and state committees which focus on groundwater conditions, issues, and policies which oversee local groundwater modeling efforts.

In addition, the District will work with other state and local agencies to more precisely identify the location and magnitude of subsidence. To the extent possible, the District will determine if specific actions in addition to those identified in this plan would have positive impacts on subsidence.

7.o Groundwater Meters: The District will recommend to landowners and water userso that all groundwater wells extracting groundwater within the District boundaries be equipped with a water meter. The District may develop and implement a program to maintain groundwater meters similar to the program which already exists for the District's surface water meters.

8.e Well Construction and Abandonment: The administration of a well construction ande well abandonment or destruction program has been delegated to the Counties by the California State Legislature. Fresno and Kings Counties have adopted programs consistent with Department of Water Resources Bulletin 74-81 and administer permit programs to assure proper construction, abandonment, or destruction of groundwater wells within the Counties. The District will continue to support Fresno and Kings Counties' policies regarding construction and abandonment of groundwater wells. The District will continue to work with these counties to make information on well construction and abandonment policies available to its water users.

9.e Conjunctive Use: The District will explore potential conjunctive use projects withine and outside of Westlands. This may include identifying possible recharge sites within the District boundaries or purchasing or leasing lands adjacent to the District. Other options may include entering into a long-term arrangement to bank water with another agency or district which would be extracted during times of water shortages.

In addition, the District will continue to operate its Distribution System Integration Program (DIP). This program allows water users to use the District's water distribution system to convey groundwater to other points of use within the District. This program allows for the improved use of groundwater resources.

Westlands will continue to work with local, state, and federal authorities to provide for the long-term use of the San Luis Canal/California Aqueduct to store and transport ground-water pumped from within and outside the District. This program has been authorized on a year-to-year basis in the past by the state as a drought relief measure. As with the DIP program, this program would allow for much greater flexibility in both the timing and location of groundwater use.

APPENDIX A

RESOLUTION NO. 107-95

WESTLANDS WATER DISTRICT

INTENT TO PREPARE A GROUNDWATER MANAGEMENT PLAN

WHEREAS, groundwater resources are an important component of the District's overall water supply and vital to the viability of farming in Westlands Water district; and

WHEREAS, California Water Code Sections 10753, et seq., (AB 3030) provide that any local agency whose service area includes a groundwater management pursuant to other provisions of law or a court judgment or decree, may be ordinance or by resolution adopt and implement a groundwater management plan for all or a portion of its service area; and

WHEREAS, the U.S. Bureau of Reclamation has developed and adopted "Criteria for Evaluating Water Conservation Plans," pursuant to Public Law 102-575 Section 3405(e) which require districts receiving federal water in California to develop a groundwater management plan pursuant to California Water Code Section 10750 (AB 3030): and

WHEREAS, to satisfy this requirement, Westlands Water District in its Water Conservation Plan Update, December 1993, has committed to the development of a groundwater management plan subject to the landowners' decision on whether to adopt such a plan; and

WHEREAS, there has been no public objection to the District preparing a groundwater management plan for approval by the Board of directors.

NOW, THEREFORE BE IT AND IT IS HEREBY RESOLVED that Westlands Water District intends to prepare a groundwater management plan for the purpose of implementing the plan and establishing a groundwater management program, in accordance with Water Code Section 10750, et seq., subject to final approval by the Board of Directors and the landowner protest provision of Water Code Section 10753.6.

AYES: Directors Dingle, Borba, Coelho, Devine, Errotabere, Gardner, Hurlbutt, Schmiederer, and Souza

NOES:

ABSENT:

ADOPTED: March 20, 1995

APPENDIX B

RESOLUTION NO. 112-96

WESTLANDS WATER DISTRICT

ADOPTION OF GROUNDWATER MANAGEMENT PLAN

WHEREAS, the Board of Directors adopted a resolution of intent to prepare a groundwater management plan on March 20, 1995; and

WHEREAS, the District has prepared a draft groundwater management plan entitled "Westlands Water District Groundwater Management Plan;" and

WHEREAS, the District has made copies of the plan available to the public and notice of the public hearing on whether to adopt the draft Groundwater Management Plan was given in the manner prescribed by law; and

WHEREAS, all persons desiring to be heard at the public hearing were given the opportunity to present their views to the Board of Directors and any written communications received by the District concerning adoption of the plan were publicly presented at the public hearing; and

WHEREAS, the District has considered all protests to the adoption of the plan and has determined that a majority protest under Section 10753.6 of the Water Code does not exist.

NOW, THEREFORE, BE IT AND IT IS HEREBY RESOLVED by the Board of Directors of Westlands Water District that it is in the best interest of the District to adopt the Groundwater Management Plan pursuant to Part 2.75 (commencing with Section 10750) of Division 6 of the Water Code and that the General Manager is authorized to take all actions reasonably necessary to carry out the intent of Westlands Water District Groundwater Management Plan.

AYES: Directors Dingle, Borba, Coelho, Devine, Errotabere, Gardner, Hurlbutt, Schmiederer, and Souza

NOES: None

ABSENT: None ADOPTED: September 16, 1996

Attachment G: Groundwater Banking Plan

The District does not have a Groundwater Banking Plan. District Farmers have made investments in Semitropic Water Storage District (SWSD) groundwater bank and water transfers into/out are facilitated by the District. District growers may bank their District CVP allocation in SWSD; the District as contracting party under water service contracts with USBR seeks USBR approval. This is done on an as needed basis when CVP allocations are high enough to justify the banking activity.

Attachment H: Annual Potable Water Quality Report - Urban

The District does not monitor potable water quality for urban use. The District depends upon water for irrigation purposes and provides limited quantities of untreated, non-potable water used for municipal and industrial purposes in the District.

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Attachment I: Notices of District Education Programs and Services

The District's Notices of District Education Program is available on the District's Website:
https://wwd.ca.gov/news-and-reports/media-center/education-outreach/

Attachment J: District Agricultural Water Order Form

WESTLANDS WATER DISTRICT

2016-2017 AGRICULTURAL WATER ALLOCATION APPLICATION AND PURCHASE AGREEMENT

This Agricultural Water Allocation Application and Purchase Agreement must be received by January 15, 2016, in the District's Fresno or Five Points Offices. Postmarks will not be accepted.

_____, herein referred to as "Water User," hereby applies for agricultural water for the March 2016 – February 2017 Water Year and agrees, as a condition of the allocation and furnishing of any agricultural water during that water year and in accordance with the District's Regulations, policies, and applicable agreements, as follows:

1. To accept, if and when provided by the District, the total amount of: a) CVP contract water requested on the application form(s); b) the allocation of Long-Term Water acquired by the District; c) other water acquired by the District; and d) Water User's unused water rescheduled from a prior water year, unless Water User provides written notice to the District before the last day of the water year that Water User will not reschedule such water. Notwithstanding the foregoing, the District will not allocate or reschedule water to land for which charges or assessments have been delinquent for 30 days or more at March 1 or the time water is allocated.

2. To make all payments by the due dates specified in the District's Terms and Conditions for Agricultural Water Service.

3. Except as otherwise provided by the District, to remain liable to the District for any unused portion of the water unless the District is able to sell the water to another water user or the water has been transferred to another water user.

4. To comply with the Terms and Conditions for Agricultural Water Service and the Regulations for the Allocation of Agricultural Water, copies of which will be furnished upon request, both of which are incorporated herein as though set forth at length.

5. Allocation calculations will be based on irrigable acres as determined by U. S. Consolidated Farm Service Agency measurements.

6. The District will notify Water User as to the amounts of water allocated to him and maintain a record of the revisions, if any, of his allocated water supply.

7. Water User recognizes that, upon his application for agricultural water and the District's allocation of water to him, he is liable for all such water allocated to him except as otherwise provided by the District.

8. The District may use any funds held for the benefit of or on behalf of Water User to pay or offset any monetary obligation Water User has to the District.

9. Water User hereby further agrees that there are no intended third party beneficiaries to this Agreement and nothing contained herein, expressed or implied, is intended to give to any person, partnership, corporation, joint venture, limited liability company or other form of organization or association any right, remedy or claim under or pursuant hereto, and any agreement or covenant required herein to be performed by or on behalf of Water User or the District shall be for the sole and exclusive benefit of Water User or the District.

_____ _____

Date *Print Name*

_____

Signature

_____

Title

WESTLANDS WATER DISTRICT

2016-2017 AGRICULTURAL WATER ALLOCATION
APPLICATION AND PURCHASE AGREEMENT

WATER USER: _____ *PREPARED BY:* _____ _____
(Please Print)

ADDRESS: _____

_____ _____
(Signature)

_____

TELEPHONE: (____) _____-_____

ACCOUNT NO: _____ *FAX: (____) _____-_____*

*EMAIL ADDRESS:*_____

_____

LAND DESCRIPTION	*FIELD NO.*	*CFSA ACRES*	*FALLOWED ACRES [1]*	*ACRE-FEET REQUESTED [2]*	*DISTRICT USE ONLY*

TOTAL ACRES: _____
TOTAL FALLOWED ACRES: _____

TOTAL AMOUNT OF CENTRAL VALLEY PROJECT CONTRACT WATER REQUESTED *ACRE-FEET*

[1] WESTLANDS IS REQUESTING AN ESTIMATE ON THE NUMBER OF ACRES YOU EXPECT TO FALLOW. PROVIDING THIS INFORMATION WILL NOT IMPACT YOUR REQUEST FOR A WATER SUPPLY ALLOCATION. THIS INFORMATION WILL ONLY BE USED TO EDUCATE THE PUBLIC ON HOW THE CONTINUED LACK OF WATER SUPPLY IS IMPACTING OUR WATER USERS.

[2] PLEASE ENTER ACRE-FEET REQUESTED FOR EACH FIELD USING WHOLE ACRE FEET

PLEASE SIGN AGREEMENT ON THE REVERSE

Attachment K: Drainage Problem Area Report

Westlands Water District is identified as a drainage problem area in the report titled "A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990)"

Addendum C

Information Required of Districts Located in a Drainage Problem Area
Westlands Water District (WWD) is 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). Described below are the recommendations prescribed in "*A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (September 1990)"* that WWD incorporated in its water conservation programs to improve conditions in drainage problem areas.

These recommendations include:

1. Source Control

Source Control in the District consists of on-farm improvements in the application of irrigation methods to reduce deep percolation past the root zone. "Problem Water", is a term used in the Report to describe the volume of near-surface groundwater that, if reduced by source control or removed from plant root zones each year, would reduce drainage-related impediment to agriculture productivity.

Achieving the recommendations in Source Control to address drainage related problem, the District implemented the Expanded Irrigation System Improvement Program (EISIP) to provide funding assistance, through low interest equipment leases, to growers interested in installing high efficiency irrigation systems. The irrigation systems include drip, micro-spray, linear move and center pivot sprinklers, and aluminum pipe.

Growers are incentivized to convert from flood irrigation method to high efficiency irrigation technology that allow for reduction of surface runoff and minimize this impact which contributes to deep percolation. The District has 159,300 acres affected by drainage identified in the Report. If improvements to irrigation methods are applied, then the water application rate is reduced by 0.4 acre-feet per acre. The average deep percolation for irrigated lands District-wide from 1978 to 2017 was 0.45 af/acre. The data suggests that lands with drainage problems are improving average percolation throughout the District.

2. Land Retirement

In 1998, the District began purchasing drainage impaired land through various land acquisition programs removing the purchased lands water allocation and reallocation to none impaired lands. As of August 2018, the District has retired approximately 90,258.56 acres from irrigation and 5,037 acres sold for solar development within Westlands, a total of 95,295 acres deemed non-irrigable, the District actively pursues to retire 100,000 acres of land within its boundaries under the District's Land Purchase Program and record a non-irrigation covenant on the title of all such retired lands.

3. Drainage Water Treatment

The District is currently evaluating a set of immediate, short-term, and long-term actions that provide potential water treatment and pre-treatment options for removing TDS and other constituents from shallow groundwater underneath drainage impaired lands. The options include Reverse Osmosis (RO), Electrodialysis Reversal and Electrostatic Deionization. The option treatment processes are being evaluated for technical feasibility.

4. Drainage Water Reuse

Integrated On-Farm Drainage Management (IFDM) is an agricultural irrigation drainage water and salt management system that provides for drainage water reuse to improve water availability for crop production and to minimize salt and selenium risks to water quality and the environment. Once irrigation systems have been optimized to maximize water use efficiency and to minimize the production of subsurface drainage water, an IFDM system can be designed to enable a landowner to process the resulting drainage water on-farm. A landowner's manual for developing IFDM systems was written by the Westside Resource Conservation District (in conjunction with the Center for Irrigation Technology at Fresno State) for the State Water Resources Control Board. The following are excerpts from the IFDM manual.

Providing drainage service will take a longer planning and implementation process. The actions proposed here will continue to build upon the innovative and effective on-farm drainage management actions growers and district staff have developed over time that will provide immediate drainage benefits, while concurrently initiating activities to put in place a comprehensive regional plan for drainage service in the District.

5. Shallow Groundwater Pumping

There are currently no shallow ground water pumping activities in the District.

6. Evaporation Ponds

There are no evaporation ponds within the District's service area.

Attachment L: San Joaquin Valley Groundwater Basin (DWR)

San Joaquin Valley Groundwater Basin
Westside Subbasin

- Groundwater Subbasin Number: 5-22.09
- County: Fresno, Kings
- Surface Area: 640,000 acres (1,000 square miles)

Basin Boundaries and Hydrology

The San Joaquin Valley is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The northern portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes.

The Westside Subbasin consists mainly of the lands in Westlands Water District. It is located between the Coast Range foothills on the west and the San Joaquin River drainage and Fresno Slough on the east. The subbasin is bordered on the southwest by the Pleasant Valley Groundwater Subbasin and on the west by Tertiary marine sediments of the Coast Ranges, on the north and northeast by the Delta-Mendota Groundwater Subbasin, and on the east and southeast by the Kings and Tulare Lake Groundwater Subbasins. Average annual precipitation varies across the subbasin from 7 inches in the south to 9 inches in the north.

Hydrogeologic Information

Water Bearing Formations

The aquifer system comprising the Westside Subbasin consists of unconsolidated continental deposits of Tertiary and Quaternary age. These deposits form an unconfined to semi-confined upper aquifer and a confined lower aquifer. These aquifers are separated by an aquitard named the Corcoran Clay (E-Clay) member of the Tulare Formation.

The unconfined to semi-confined aquifer (upper zone) above the Corcoran Clay includes younger alluvium, older alluvium, and part of the Tulare Formation. These deposits consist of highly lenticular, poorly sorted clay, silt, and sand intercalated with occasional beds of well-sorted fine to medium grained sand. The depth to the top of the Corcoran Clay varies from approximately 500 feet to 850 feet (DWR 1981).

The confined aquifer (lower zone) consists of the lower part of the Tulare Formation and possibly the uppermost part of the San Joaquin Formation. This unit is composed of lenticular beds of silty clay, clay, silt, and sand interbedded with occasional strata of well-sorted sand. Brackish or saline water underlies the usable groundwater in the lower zone.

Unpublished DWR (San Joaquin District) information indicates specific yield ranges from 5.1 to 17.8 percent to a depth of 300 feet. The highest

specific yields are associated with coarser sediments distributed along the eastern portion of the subbasin from the Sierra Nevada Mountains. The USGS (Williamson and others 1989) used a subbasin average specific yield of 10.3 percent for groundwater modeling purposes. Earlier USGS work estimated an average specific yield of 9 percent from a depth of 10 to 200 feet (Davis and others 1959).

Restrictive Structures

Flood basin deposits along the eastern subbasin have caused near surface soils to drain poorly thus restricting the downward movement of percolating water. This causes agriculturally applied water to buildup as shallow water in the near surface zone. Areas prone to this buildup are often referred to as drainage problem areas.

The Corcoran Clay is a lacustrine diatomaceous clay unit that underlies much of the subbasin. Within the subbasin it varies in thickness from 20 to 120 feet (Belitz and Heimes 1990). Prior to groundwater development, the Corcoran Clay effectively separated the upper and lower zones. Numerous wells penetrate the clay and have allowed partial interaction between the zones.

Recharge Areas

Primary recharge to the aquifer system is from the seepage of Coast Range streams along the west side of the subbasin and the deep percolation of surface irrigation. Davis and Poland (1957) indicated that secondary recharge to the upper and lower aquifers occurred from areas to the east and northeast as subsurface flows.

Groundwater Level Trends

Groundwater levels were generally at their lowest levels in the late 1960s, prior to importation of surface water. The Central Valley Project began delivering surface water to the San Luis Unit in 1967-68. Water levels gradually increased to a maximum in about 1987-88, falling briefly during the 1976-77 drought. Water levels began dropping again during the 1987-92 drought with water levels showing the effects until 1994. Through a series of wet years, after the drought, 1998 water levels recovered nearly to 1987-88 levels.

Groundwater Storage

Groundwater Storage Capacity. Davis and others (1959) estimated the groundwater storage capacity at 10,940,000 af in the depth zone from 10 to 200 feet of the Mendota-Huron storage unit. This was over an area of 639,000 acres and a specific yield varying from 8.0 to 9.6 percent. This occupies a portion of the upper aquifer.

Using an average thickness of 675 feet (ground surface to top of Corcoran Clay), specific yield of 9 percent, over an area of 600,000 acres; the storage capacity of the upper aquifer is approximately 36,500,000 af.

Using a thickness of 1,200 feet from the average base of the Corcoran Clay to the average base of fresh groundwater, a specific yield of 9 percent, over

600,000 acres; the storage capacity of the lower aquifer is approximately 65,000,000 af.

Groundwater in Storage. The USGS estimated the water in storage in 1961 was 52,000,000 af (Williamson 1989). This estimate was to a depth of less than or equal to 1,000 feet.
Using an average depth to water in October 1984 of 111 feet, a specific yield of 9 percent, over an area of 600,000 acres; the available storage is estimated to be 6,000,000 af.

Groundwater Budget (Type C)

Davis and Poland (1957) estimated seepage from west side streams amounted to 30,000-40,000 af per year. For 1951, secondary recharge from the east into the upper aquifer was 20,000-30,000 af and was 150,000-200,000 af into the lower aquifer (Davis and Poland 1957).

Westlands Water District (1999) estimated the average deep percolation between 1978 and 1996 was 244,000 af per year. The District (1998) also estimated the average applied groundwater between 1978 and 1997 was 193,000 af per year.

Groundwater Quality

Characterization. Groundwaters of the west side of the San Joaquin Valley are generally of the sulfate or bicarbonate type (Davis and others 1959).

The waters of the upper aquifer, generally, are high in calcium and magnesium sulfate (Davis and Poland 1957). Groundwater below 300 feet and above the Corcoran Clay shows a tendency of decreased dissolved solids with increased depth. Most of the groundwater of the lower aquifer is of the sodium sulfate type (Davis and Poland 1957). The difference in quality between the upper and lower aquifers is that the confined zone contains less dissolved solids (Davis and others 1959). Groundwater in western Fresno County can have an upper range between 2,000 and 3,000 mg/L (Davis and others 1959).

DHS data indicates an average TDS of 520 mg/L in the subbasin with a range from 220 mg/L to 1,300 mg/L based on the analyses of six Title 22 monitoring wells.

Dubrovsky and others (1993) indicated dissolved solids in shallow groundwater can be greater than 10,000 mg/L at some locations in the lower fan areas. One sample had a TDS of 35,000 mg/L.

Impairments. High total dissolved solids is one impairment of groundwater in the subbasin. Groundwaters at certain locations contain selenium and boron that may affect usability.

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	2	0
Radiological	1	0
Nitrates	2	0
Pesticides	2	0
VOCs and SVOCs	2	0
Inorganics – Secondary	2	2

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range: – 560-2,000	Average: 1,100 (Davis and Poland 1957)
	Total depths (ft)	
Domestic	Range: - Not determined	Average: Not determined
Municipal/Irrigation	Range: - 120-3,000	Average: 600-1,800 varies by type and location

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
Westlands Water District	Groundwater levels	960 Annually and may vary
Westlands Water District	Miscellaneous water quality	Varies
Department of Health Services and cooperators	Title 22 water quality	50 Varies

Basin Management

Groundwater management:	AB 3030 Plan adopted by Westlands Water District
Water agencies	
Public	Westlands Water District
Private	

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Errata

Updated groundwater management information and added hotlinks to applicable websites. (1/20/06)