District Example Report

This report has been prepared as an example of a typical water district in the Central Valley of California. The information on the district is laid out following the sample template made for the "Evaluation of the Municipal and Domestic Supply (MUN) Beneficial use in Ag Dominated Surface Waters" project. This example is intended to give the user an idea of the detail and format expected in reports submitted to the Central Valley Regional Water Quality Control Board.

This report has been prepared as an example and does not necessarily represent current field conditions within an existing district. Maps are referenced but not shown in this example report.

Grandview Water District (fictional)

Most of the information for the report is contained in the following tables and figures.

Tables

Figures

I. General

1. Grandview Water District
   6900 N. Fairfar Avenue
   P.O. Box 97
   Firefox, CA 96622

2. David Smith, Manager
   (555) 683-1234
   dsmith@grandviewwd.com

3. 9515 Acres

4. Attached (Map #1)
   GIS file attachments – supply.shp, drainage.shp

5. Federal Water Contract – Delta Mendota Canal imported freshwater through a Federal contract, Delta-Mendota Canal, beginning in 1957. Freshwater replaced deep well water for irrigation. Wells have been abandoned.

II. Municipal and Domestic Supply (MUN) use

1. No known existing State Water Rights information pertaining to MUN use for surface water system

2. No known use of the surface water system for MUN use since 1975

3. Not applicable

III. Water Supply Sources

1. Maps:
   a. Attached (Map #2)
   b. No deep wells
   c. Attached (Map #2)
   d. Attached (Map #2), Attached Table #1

2. Average Annual Inflow, Delta Mendota Canal:

Month	Inflow (Acre Feet)
January	1278
February	1324
March	1697

April	1884
May	3119
June	3915
July	3998
August	2553
September	745
October	1796
November	1884
December	1179
Total	**25,369**

3. Attached (Table #1)

IV. Layout of Surface Drainage Systems

1. Tailwater from farms was collected by the district in open drains flowing to the north. Water was lifted back up at Needle Pump Station into Grandview's Main Canal to be 100% recirculated.

    a. Attached (Map #3)
    b. Attached (Map #3)
    c. Attached Table 2
    d. Attached (Map#3)
    e. Not available
    f. None
    g. Attached (Map#3)

2. Tiling began in early 60s and continued throughout until 1988. Almost all lands in the district have now been tiled to some degree. This tile water is pumped from on-farm sumps into the open drains and commingled with the tailwater. No tilewater from outside the district is permitted to enter the district.

    As more and more lands were tiled within the district, the quality of the drainage water deteriorated making the mandatory recirculation infeasible. Crop yields, crop diversity and land quality were all affected.

    Grandview completed over two years of negotiations with Firefox Canal Co., Mid-California Irrigation District, and the Grassarea Water district in mid -2002. The negotiations enabled Grandview to release up to 35 cfs of drainage water of a specified quality to and through Firefox Canal Water District and Mid-California Irrigation District

existing drainage facilities to Grassarea.

In return, Grandview improved Grassarea distribution and drainage facilities using a "Grassarea Master Plan" as its guide. At a cost to Grandview of around $300,000, Grandview implemented the Plan providing better drainage, flood control and a complete renovation of distribution facilities within Grassarea. Grandview also pays Grassarea a $5.00/acre/year assessment ($47,575.00/year), to enable Grassarea to maintain, monitor, or mitigate in any way it feels necessary the 35 cfs (maximum) of drainage from Grandview.

Grandview also was obligated to improve some of the drainage facilities within Firefox Canal Water District and Mid-California Irrigation District, as well as build some internal facilities for monitoring, dilution, and regulation. Total cost to Grandview for the entire project was just under $1,000,000.00.

On January 17, 2003, Grandview opened its outlet with capabilities of releasing a maximum 25 cfs of drainage water and potential of dilution up to an additional 10 cfs when necessary.

a. Attached (Map #4)
b. Attached (Map #4, Table 2)
c. Attached (Map #3)
d. None. Only tailwater enters the district (Map#3)

V. Operation of the Surface Drainage System

1. Tables
    a. Attached Table 2
    b. Attached Table 2
    c. There are no estimates by drain for water entering the district. The total inflow volume is estimated to be:

Average Annual Inflow, Surface Drainage Water (Ag Tail Water Only)

Month	Inflow (Acre Feet)
January	350
February	400
March	250
April	275
May	400
June	700

July	1000
August	850
September	100
October	100
November	25
December	250
Total	**4700**

d. All the surface drains carry a mixture of agricultural tail water and subsurface tile drainage water. The system does not receive municipal, industrial, or dairy wastewater.
e. Flow in the drains is primarily restricted to periods of irrigation. Pre-irrigation begins at the end of January with the final irrigation occurring in October. The drains remain dry during November and December unless a major storm event causes natural runoff.
f. The lateral drains are cleared of silt every other year. The Main Drain is cleaned more frequently, usually on an annual basis.
g. Attached (Table 2)

VI. Water Quality Monitoring Programs

1. Attached (Map #2, 3, and 4)

2. Attached (Table 4)

   Data is tabulated and stored in a Excel data base system by district personnel. Collected information is report to the Central Valley Regional Water Quality Control Board on an annual basis via the district's Drainage Operation Plan.

3. The current monitoring program presented in Table 4 is the most comprehensive undertaking by the district. Flow and salinity measurements have been conducted by the district at major diversion points since the 1960's. Additional monitoring has been conducted by the University of California and the San Joaquin Valley Drainage Program to study relationships between irrigation management and salt load. Monitoring has also been conducted in accordance with the Irrigated Lands Regulatory Program. Some of the information developed by these studies can be found in the reports listed in the Appendix A.

4. The California Department of Water Resources has provided funding through ARS (Agriculture Resource Stabilization) to continue the current monitoring program until 2014. The current program is designed, in part to measure groundwater movement through the district. After funding ceases, the district will statistically review the

collected data and develop a new program.

5. No aquatic life surveys have been conducted in this district

6. Since the 1960's, Grandview Water District has experienced a high groundwater table which has reduced crop yields, crop diversity, and land quality. Installing tile drainage systems effectively lowered the water table but also substantially increased the salt load in the district's drainage. By the early 2000's, Grandview Water District could no longer recycle 100% of its drainage and still maintain viable cropland. As discussed in Section IV, Part 2, in January 2003, Grandview Water District opened its outlet to the Straite Drain which eventually feeds the Main Drain which becomes a tributary of the San Joaquin River. The outlet has the capacity to release up to 25 cfs of drainage water with additional dilution of 10 cfs when necessary.

   Water quality problems within the district include:

   - Excess sediment in tailwater
   - Elevated TDS concentrations
   - Elevated Boron concentrations
   - Elevated Selenium concentrations
   - Elevated Molybdenum concentrations

   With the exception of excess sediment in tailwater, most of the district's elevated trace element concentrations are due to the discharge of subsurface drainage. Grandview Water District has instigated a number of programs to improve irrigation efficiency and thereby decrease drainage discharge and the subsequent loading of salts and trace elements. The programs include:

   - Tiered water pricing
   - Economic studies
   - Recycling drain water
   - Irrigation management workshops
   - Load, flow, and concentration studies
   - Gravity irrigation systems
   - Pre-irrigation improvements
   - Reducing cropped acreage
   - Improving water delivery systems
   - Involvement in selenium removal projects

District goals for 2013 (assuming a full water supply available) include decreasing water deliveries by 15%, decreasing subsurface drain water 25%, and reducing drain water releases by 50%.

VII. Cost of Drainage Water Management Program

1. Unknown
2. The represent monitoring program costs $500 per month for the analyses and requires a minimum of 2 staff days

Table 1. Grandview Water District Water Supply System[a]

Name	Type	Construction	Length	Water Type	Ag Dominated Water body Flowchart 1 Category	Water Quality Concerns[b]
Main Canal[c]	Constructed	Concrete	5.9	DMC	C2	-
33 Lateral	Modified	Concrete	0.5	DMC	M2	-
Puck Lateral	Natural	Earthlined	2.3	DMC	B2	-
4-1 Lateral	Constructed	Earthlined	2	DMC, ag tail	C1	2,3,4
4-3 Lateral	Constructed	Earthlined	2	DMC, ag tail	C1	2,3,4
9-1 Lateral	Constructed	Earthlined	3	DMC, ag tail	C1	2,3,4
Section 8 Lateral	Constructed	Earthlined	1.9	DMC, ag tail	C1	2,3,4
8-A Lateral	Constructed	Earthlined	0.5	DMC, ag tail	C1	2,3,4
8-B Lateral	Constructed	Earthlined	0.5	DMC, ag tail	C1	2,3,4
9-3 Lateral	Constructed	Earthlined	4	DMC, ag tail	C1	2,3,4
16-1 Lateral	Modified	Concrete	4	DMC, ag tail	M1	2,3,4
Old Lateral	Natural	Earthlined	4	DMC, ag tail	B1	2,3,4

a- Supply canals are depicted on Map 2

b- Water quality concerns for the supply lines are primarily due to the recycling of the tailwater and subsurface drainage

1 = excess sediment in tailwater
2 = elevated TDS concentrations
3 = elevated boron concentrations
4 = elevated selenium concentrations
5 = elevated molybdenum concentrations

c- 1.8 miles of the Main Canal is a 60 inch cement pipe that runs underground from the Delta Mendota Canal to the District Boundary

Table 2. Grandview Water District Water Drainage System (as depicted on Map 3).

Name	Type	Length	Construction	Ag Dominated Water body Flowchart 1 Category	Drained Acreage	Water Type	Flow Period	Maintenance	Water Quality Concerns[a]
Main Drain	Constructed Main	8	Earthlined	C1	9515	Ag tail & tile	Jan - Oct	Annual	1,2,3,4,5-
Hudman Drain	Constructed Lateral	4	Earthlined	C1	3200	Ag tail & tile	Jan - Oct	Bi-Annual	1,2,3,4,5
Gerrold Drain	Modified channel	3.4	Earthlined	M1	2420	Ag tail & tile	Jan - Oct	Bi-Annual	1,2,3,4,5
Newbrush Drain	Modified channel	2.5	Earthlined	M1	1900	Ag tail & tile	Jan - Oct	Bi-Annual	1,2,3,4,5
Doogie Drain	Natural channel	2.7	Earthlined	B1	1280	Ag tail & tile	Jan - Oct	Bi-Annual	1,2,3,4,5

a- Water quality concerns for the supply lines are primarily due to the recycling of the tailwater and subsurface drainage

1 = excess sediment in tailwater
2 = elevated TDS concentrations
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5 = elevated molybdenum concentrations

Table 3. Monthy discharge of drain water (drainage outlet) by crop year. Grandview Water District

Month	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
October	1080	369	643	555	303	0	0	87	652	1106
November	899	711	1166	738	232	0	10	506	338	953
December	1048	1153	1080	748	108	0	11	398	12	1258
January	1558	562	1031	563	476	233	7	562	95	788
February	1432	1634	1142	1195	1373	1218	215	926	808	1468
March	1356	2212	1717	1744	1005	930	634	615	1304	1969
April	1603	1517	1298	1315	785	757	326	488	1131	3007
May	1265	1354	1946	1555	1013	1475	265	416	1365	2137
June	1481	1468	1823	1244	1079	1198	29	247	442	1441
July	1663	1181	1370	1082	1114	1323	0	293	695	1672
August	1476	1433	1468	1285	1215	1356	18	326	954	1416
September	913	822	532	572	362	154	10	23	361	689
Total	**15774**	**14416**	**15216**	**12596**	**9062**	**8644**	**1524**	**4887**	**8157**	**17904**

Monthly collected subsurface Drain water by crop year within Grandview Water District

Month	**2007**	**2008**	**2009**	**2010**	**2011**
October	81	154	34	113	144
November	123	176	189	159	175
December	61	61	410	212	282
January	76	68	331	242	315
February	450	459	419	473	367
March	358	436	358	428	372
April	350	147	351	418	460
May	427	155	257	416	367
June	586	192	347	491	434
July	558	384	444	481	459
August	413	177	274	334	227
September	144	52	21	121	103
Total	**3628**	**1860**	**3464**	**3986**	**3704**

Table 4. Grandview Water District Water Monitoring (Quality and Quantity)

Water Quality			
Sampling Location	**Frequency**	**Tested for**	**Testing Method**
D-1 – D/M Canal at Pump Station 1	Daily Monthly	TDS EC, Se, Bo, Mo	Hand meter Lab
R-1 Drain Water at Outlet (surface and subsurface)	Daily Weekly Monthly Continuous	TDS EC, Se, Bo, Mo EC, Se, Bo, Mo EC	Hand meter Lab Lab Recording meter
R-1 Drain Water at Needle Station (surface and subsurface)	Daily Monthly	TDS EC, Se, Bo, Mo	Hand meter Lab
SD1, SD2, SD3, SD4 Misc. Drains@ South District Boundary	Daily (if flow)	TDS	Hand meter
Water Quantity			
Measuring Location	**Frequency**	**Measured For**	
Delivery Turnouts	Every other day 1st of Month	Volume Flow	
D1 D-M Canal Delivery Meters	Every other day 1st of Month Continuous	Volume Volume Flow (USBR)	
R-1 Needle Pump Station Meters (recycled water)	Every other day Weekly 1st of Month	Volume Volume Volume	
R-1 Drain Water @ Outlet (surface and subsurface)	Every other day Weekly 1st of Month Continuous	Volume Volume Volume Flow	
Tile Drainage Sumps (25)	Weekly Oct 1st	Volume Volume	
Groundwater – various locations	6 times a year	Depth from Ground Surface	

Grandview Water District Irrigation Management Monitoring

Irrigation deliveries recorded by field and by crop (AF and AF/Ac)

Pre-emergent irrigation deliveries (AF and AF/Ac)

Post-emergent irrigation deliveries (AF and AF/Ac)

Irrigation events by field and by crop (AF and AF/Ac)

Total deliveries for crop year by field and by crop (AF and AF/Ac)

Irrigation methods (type)

Length of irrigation runs (distance)

Irrigation patterns (every furrow versus every other furrow)

Misc. field cultural practices

Table 5. Ranges in Water Quality concentrations, Grandview Water District

Site (from Table 4)	EC (umhos/cm)	TDS (mg/L)	Boron (mg/L)	Se (ug/L)	Mo (ug/L)
D-1	450-780	300-500	.25-.40	<1-5	30
R-1	2300-5500	1500-3500	5.0-10	50-400	30-50
SD-1		500-650			
SD-2		500-650			
SD-3		500-650			
SD-4		500-650			
Tile Sumps	4800-15000	3000-9600	2.5-33	22-1400	30-80

Appendix A

Reports and Papers Concerning Drainage in Grandview Water District

Salty, Person 2011. Economic Impacts of Salinity. California Agriculture Monthly. January.

Drain, Joe 2009. Estimating the Relationship between Agricultural Drainage Flows and Salt and Selenium Loadings. California Plant and Soil Conference. American Society of Farmers. October.

Agua, Lot 2008. Potential Economic Returns to Improved Irrigation Practices. Agricultural Water Management, 16:222-305.