CITY OF TULARE

2010 Urban Water Management Plan

June 2011

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City of Tulare
2010 Urban Water Management Plan
CONTACT SHEET

Date plan submitted to the Department of Water Resources: July 29, 2011

Name of person(s) preparing this plan:

Mark Kielty, Planning and Building Director
Phone: (559) 684-4217
Fax: (559) 685-2339
Email: mkielty@ci.tulare.ca.us

Tommy Greci, Project Manager
Carollo Engineers
Phone: (559) 436-6616
Fax: (559) 436-1191
Email: tgreci@carollo.com

The Water supplier is a: **Municipality**

The Water supplier is a: **Retailer**

Utility services provided by the water supplier include: **Water, Sewer, Recycled Water**

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **No**

June 15, 2011

City of Tulare
411 East Kern Avenue
Tulare, CA 93274

Attention: Mr. Mark Kielty

Subject: 2010 Urban Water Management Plan

Dear Mr. Kielty:

We are pleased to submit the City of Tulare (City) 2010 Urban Water Management Plan (UWMP). The 2010 UWMP was prepared in accordance with the Urban Water Management Planning Act (UWMPA) of 1983 and subsequent amendments, as well as other applicable regulations. The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during water drought conditions.

The report is organized according to the recommended format established by the California Department of Water Resources (DWR) as follows:

Chapter 1 – Plan Preparation
Chapter 2 – System Description
Chapter 3 – System Demands
Chapter 4 – System Supplies
Chapter 5 – Water Supply Reliability and Water Shortage Contingency Planning
Chapter 6 – Demand Management Measures
Chapter 7 – Completed Urban Water Management Plan Checklist

We would like to extend our thanks to you, Mr. Lewis Nelson, Mr. Mike Whitlock, Ms. Bonnie Simoes, and other City Staff whose courtesy and cooperation were valuable components in completing this plan.

Sincerely,

CAROLLO ENGINEERS, INC.

David L. Stringfield, P.E.
Vice President

Tommy A. Greci, P.E.
Project Manager

Enclosures: 2010 Urban Water Management Plan

7580 N. Ingram Avenue, Suite. 112, Fresno, California 93711
P. 559.436.6616 F. 559.436.1191
carollo.com

City of Tulare

411 East Kern Avenue
Tulare, CA 93274
(559) 685-2300

2010 URBAN WATER MANAGEMENT PLAN

June 2011

Prepared By

Carollo Engineers, Inc.
7580 North Ingram Avenue, Suite 112
Fresno, CA 93720
559.436.6616

City of Tulare

2010 Urban Water Management Report

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LIST OF ABBREVIATIONS

Abbreviation	Definition
mg/L	Milligrams per Liter
AB	Assembly Bill
ADD	Average Day Demand
AF	Acre Feet
AFY	Acre-feet per year
bgs	Below Ground Surface
BMP	Best Management Practice
Basin	San Joaquin Valley Groundwater Basin
CalWater	California Water Service Company
CCR	Consumer Confidence Report
CDEC	California Data Exchange Center
CII	Commercial, Industrial, Institutional
City	City of Tulare
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DMM	Demand Management Measure
DOF	Department of Finance
DPH	Department of Public Health
DWR	Department of Water Resources
DWWTP	Domestic Wastewater Treatment Plant
EPA	U.S. Environmental Protection Agency
ETo	Evapotranspiration
ft	Feet
Fugro	Fugro West Inc.
gpcd	Gallons Per Capita Per Day
GPM	Gallons Per Minute
Guidebook	Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan
GWMP	Groundwater Management Plan
GWR	Ground Water Rule

Abbreviation	Definition
IWWTP	Industrial Wastewater Treatment Plant
KDWCD	Kaweah Delta Water Conservation District
LAFCO	Local Area Formation Commission
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MFR	Multi-Family Residential
MG	Million Gallons
MGD	Million Gallons Per Day
MHI	Median Household Income
MOU	Memorandum Of Understanding
msl	Mean Sea Level
PHD	Peak Hour Demand
PHG	Public Health Goal
SB	Senate Bill
SBx7-7	Water Conservation Act of 2009
SDWA	Safe Drinking Water Act
SFR	Single-Family Residential
Subbasin	Kaweah Groundwater Subbasin
TID	Tulare Irrigation District
UDB	Urban Development Boundary
ULFT	Ultra Low Flush Toilets
UWMPA	Urban Water Management Planning Act
UWMP	Urban Water Management Plan
Water Master Plan	Water System Master Plan
WWTP	Wastewater Treatment Plant

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Chapter 1

PLAN PREPARATION

1.1 PURPOSE

The California Water Code requires urban water suppliers within the state to prepare and adopt Urban Water Management Plans (UWMPs) for submission to the California Department of Water Resources (DWR). The UWMPs, which must be filed every five years, must satisfy the requirements of the Urban Water Management Planning Act (UWMPA) of 1983 including amendments that have been made to the Act and other applicable regulations. The UWMPA requires urban water suppliers servicing 3,000 or more connections, or supplying more than 3,000 acre-feet (AF) of water annually, to prepare an UWMP.

The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during water drought conditions. This report, which was prepared in compliance with the California Water Code, and as set forth in the 2010 guidelines and format established by the DWR, constitutes the City of Tulare (City) 2010 UWMP.

The City did not participate in an area, regional, watershed, or basin wide UWMP.

1.2 BACKGROUND

1.2.1 Urban Water Management Planning Act

In 1983, State Assembly Bill (AB) 797 modified the California Water Code Division 6, by creating the UWMPA. Several amendments to the original UWMPA, which were introduced since 1983, have increased the data requirements and planning elements to be included in the 2005 and 2010 UWMPs.

Initial amendments to the UWMPA required that total projected water use be compared to water supply sources over the next 20 years, in 5-year increments. Recent DWR guidelines also suggest projecting through a 25-year planning horizon to maintain a 20-year timeframe until the next UWMP update has been completed.

Other amendments require that UWMPs include provisions for recycled water use, demand management measures, and a water shortage contingency plan. The UWMPA requires inclusion of a water shortage contingency plan, which meets the specifications set forth therein. Recycled water was added in the reporting requirements for water usage and figures prominently in the requirements for evaluation of alternative water supplies, when future projections predict the need for additional water supplies. Each urban water purveyor must coordinate the preparation of the water shortage contingency plan with other urban

water purveyors in the area, to the extent practicable. Each water supplier must also describe their water demand management measures that are being implemented, or scheduled for implementation.

In addition to the UWMPA and its amendments, there are several other regulations that are related to the content of the UWMP. In summary, the key relevant regulations are:

- **AB 1420:** Requires implementation of demand management measures (DMMs)/best management practices (BMPs) and meeting the 20x2020 targets to qualify for water management grants or loans.
- **AB 1465:** Requires water suppliers to describe opportunities related to recycled water use and stormwater recapture to offset potable water use.
- **Amendments Senate Bill (SB) 610 (Costa, 2001), and AB 901 (Daucher, 2001):** Effective beginning January 1, 2002, require counties and cities to consider information relating to the availability of water to supply new large developments by mandating the preparation of further water supply planning (Daucher) and Water Supply Assessments (Costa).
- **SB 1087:** Requires water suppliers to report single-family residential (SFR) and multi-family residential (MFR) projected water use for lower income areas separately.
- **Amendment SB 318 (Alpert, 2004):** Requires the UWMP to describe the opportunities for development of desalinated water, including but not limited to, ocean water, brackish water, and groundwater, as long-term supply .
- **AB 105 (Wiggins, 2004):** Requires urban water suppliers to submit their UWMPs to the California State Library.
- **SBx7-7:** Requires development and use of new methodologies for reporting population growth estimates, base per capita use, and water conservation. This water bill also extended the 2010 UWMP submittal deadline for retail agencies to July 1, 2011. DWR is still finalizing two of the four new methodologies that an agency can choose from to establish their intermediate (2015) and year 2020 water conservation targets.
- **SB 1478:** This bill was signed on September 23rd and extends the 2010 UWMP deadline for wholesale agencies to July 1, 2011, as SBx7-7 did for retail agencies.

1.2.2 Previous Urban Water Management Plans

Pursuant to the UWMPA, the City previously prepared an UWMP in 2005, which was formally adopted by the City Council on December 2, 2007. The Board of Public Utilities approved the 2005 UWMP on December 6, 2010. This 2010 UWMP report serves as an update to the 2005 UWMP and pulls substantially from that document.

1.3 COORDINATION

The UWMPA requires that the UWMP identify the water agency's coordination with appropriate nearby agencies.

Law

> *10620 (d) (2). Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.*
>
> *10621 (b). Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.*
>
> *10635 (b). The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.*
>
> *10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.*
>
> *10642. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.*

The City's 2010 UWMP is intended to address those aspects of the Act, which are under the control of the City, specifically water supply and water use. While preparing the 2010 UWMP, the City coordinated its efforts with relevant agencies to ensure that the data and issues are presented accurately.

DWR was contacted to discuss the requirements of the UWMPA and obtain electronic workbooks, checklists, and other developed guidelines to prepare this report.

On April 27, 2011, City staff met with the Tulare Irrigation District (TID) as well as the Kaweah Delta Water Conservation District (KDWCD) during the preparation of this plan in order to provide these agencies with a chance to voice their concerns and to coordinate efforts related to the plan.

Table 1.1 summarizes how the UWMP preparation was coordinated. Appendix A contains copies of outreach documents.

Table 1.1	Coordination with Appropriate Agencies (Guidebook Table 1) 2010 Urban Water Management Plan City of Tulare						
Coordinating Agencies	**Participated in Developing the Plan**	**Commented on the Draft**	**Attended Public Meetings**	**Was Contacted for Assistance**	**Was Sent a Copy of the Draft Plan**	**Was Sent a Notice of Intention to Adopt**	**Not Involved / No Information**
Tulare County		☑			☑	☑	
Tulare Irrigation District	☑	☑		☑	☑	☑	
Kaweah Delta Water Conservation District	☑	☑		☑	☑	☑	
Tulare County LAFCO		☑			☑	☑	
General Public		☑	☑			☑	
Department of Water Resources				☑			

Notes:

1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

The City also provided formal written notification to Tulare County, TID, KDWCD, and the Tulare County Local Area Formation Commission (LAFCO) that the City's UWMP was being updated for 2010. In accordance with the UWMPA, this notification was provided to Tulare County at least 60 days prior to the public hearing of the plan. Copies of the final UWMP will be provided to Tulare County no later than 30 days after its submission to DWR.

The City is committed to encourage the active involvement of diverse social, cultural, and economic elements of its citizenry. On June 23, 2011 and June 30, 2011, the City placed a notice in the local newspaper stating that its UWMP was being updated and that a public hearing would be conducted to address comments and concerns from members of the community. The notice stated that a public review and comment period would be held through July 12, 2011. A copy of this notification is included in Appendix B. The Draft 2010 UWMP was made available for public inspection at the City of Tulare City Hall, located at 411 East Kern Avenue. In addition, the City also posted a copy of the public review draft UWMP on its website (www.ci.tulare.ca.us).

The City held a public hearing on July 19, 2011 at the Tulare Public Library & Council Chambers, located at 491 North "M" Street. The hearing provided an opportunity for the City's customers, residents, and employees to learn and ask questions about the current and future water supply of the City.

1.4 PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Pursuant to the requirements of the UWMPA, this section summarizes the adoption, submittal, and implementation of the City's 2010 UWMP.

Law

> *10621 (c). The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640)*
>
> *10642. After the hearing, the plan shall be adopted as prepared or as modified after the hearing.*
>
> *10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.*
>
> *10644 (a). An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.*
>
> *10645. Not later than 30 days after filing a copy of its plan with the department, the urban water supplier, and the department shall make the plan available for public review during normal business hours.*

1.4.1 Plan Adoption

The City prepared the 2010 UWMP during the spring and summer of 2011. The plan was updated after the public hearing and adopted by its City Council on July 19, 2011. A copy of the adopting resolution is provided in Appendix C.

1.4.2 Plan Submittal

The City submitted the UWMP to the DWR on July 29, 2011. Within 30 days of submitting the UWMP to DWR, the adopted UWMP was made available for public review during normal business hours at the locations specified for the viewing of the Draft 2010 UWMP and copies of the UWMP were submitted to the California State Library and Tulare County. Appendix D provides verification that the adopted UWMP was submitted to the agencies listed above within the required timeline.

If major changes are made to this 2010 UWMP, the City will hold an additional public hearing and City Council will readopt the plan.

1.4.3 Plan Implementation

As part of this UWMP, the City intends to implement on-going/future action items. Timelines for the anticipated implementation schedule of specific activities/programs are presented in the body of the report as the activities/programs are discussed.

1.5 REPORT ORGANIZATION

This report is organized according to the recommended format provided in DWR's Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan (Guidebook). The UWMP contains seven chapters, followed by appendices that provide supporting documentation for the information presented in the report. The chapters are outlined below:

- Chapter 1 – Plan Preparation
- Chapter 2 – System Description
- Chapter 3 – System Demands
- Chapter 4 – System Supplies
- Chapter 5 – Water Supply Reliability and Water Shortage Contingency Planning
- Chapter 6 – Demand Management Measures
- Chapter 7 – Completed Urban Water Management Plan Checklist

Additionally, the chapters are preceded by an UWMP Contact Sheet.

1.6 CLIMATE CHANGE

DWR guidelines suggest that urban water suppliers consider the potential effects related to climate change in their 2010 UWMPs. However, there are currently no specific climate change requirements in the UWMPA or in the Water Conservation Bill of 2009. Therefore, it is left to each supplier's discretion as to whether or not to account for the potential effects of climate change in their 2010 UWMP.

For the purposes of this 2010 UWMP, the City has opted not to include information or analysis related to climate change. If there are specific requirements for addressing climate change in UWMPs in the future, the City will incorporate these in their 2015 UWMP.

1.7 ABBREVIATIONS

To conserve space and improve readability, this report includes many abbreviations. The abbreviations are spelled out in the text the first time they are used and are subsequently identified by abbreviation only. A summary of the abbreviations used in this report is provided in the report Table of Contents.

1.8 ACKNOWLEDGEMENTS

Carollo Engineers wishes to acknowledge and thank the following City Staff:

Lewis Nelson, P.E. Public Works Director

Mike Whitlock, P.E.	City Engineer
Mark Keilty, A.I.C.P.	Planning and Building Director
Bonnie Simoes	Principal Planner

Their cooperation and courtesy in obtaining a variety of necessary information were valuable components in completing and producing this report.

The following staff of Carollo Engineers was primarily involved in the preparation of this plan:

David Stringfield, P.E.	Principal-in-Charge
Tommy Greci, P.E.	Project Manager
Ryan Orgill, P.E.	Project Engineer
Maggie Herzog, E.I.T.	Staff Engineer
Debra Dunn	GIS/Graphics

Chapter 2

SYSTEM DESCRIPTION

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) include a description of the water purveyor's service area and various aspects of the area served including climate, population, and other demographic factors.

Law

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631. (a). Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.*

2.1 SERVICE AREA PHYSICAL DESCRIPTION

The City of Tulare (City) is located along Highway 99 in Tulare County within the Central San Joaquin Valley of California, approximately 45 miles south of Fresno and 60 miles north of Bakersfield (Figure 2.1).

Tulare was founded in 1872 by the Southern Pacific Railroad, and incorporated in 1888. Agriculture is a major component of the City's economy, due to its highly productive farmland. Tulare is attractive to food processors and distributors because of its central location and abundance of locally grown products.

The City is in the process of updating its General Plan. The City limits and Urban Development Boundary (UDB), as established from the City's Land Use Diagram (Updated December 2007), are 19 square miles (12,281 acres) and 37 square miles (23,608 acres), respectively. The current City limits and UDB are shown on Figure 2.2.

Table 2.1 summarizes the land use designations, along with gross acreages, for the City limits and UDB[1]. The land use classifications are consistent with the Land Use Diagram and Standards described in the City's General Plan Update (Figure 2.3). Not all land within the City is developed. Table 2.1 also tabulates the existing developed land within the current City limits.

The existing land uses include 5,056 acres of residential, 1,598 acres of commercial, 1,781 acres of industrial, 340 acres of Parks and Recreation, and 1,625 acres of Public facilities.

[1] Source: City of Tulare Water System Master Plan, July 2009

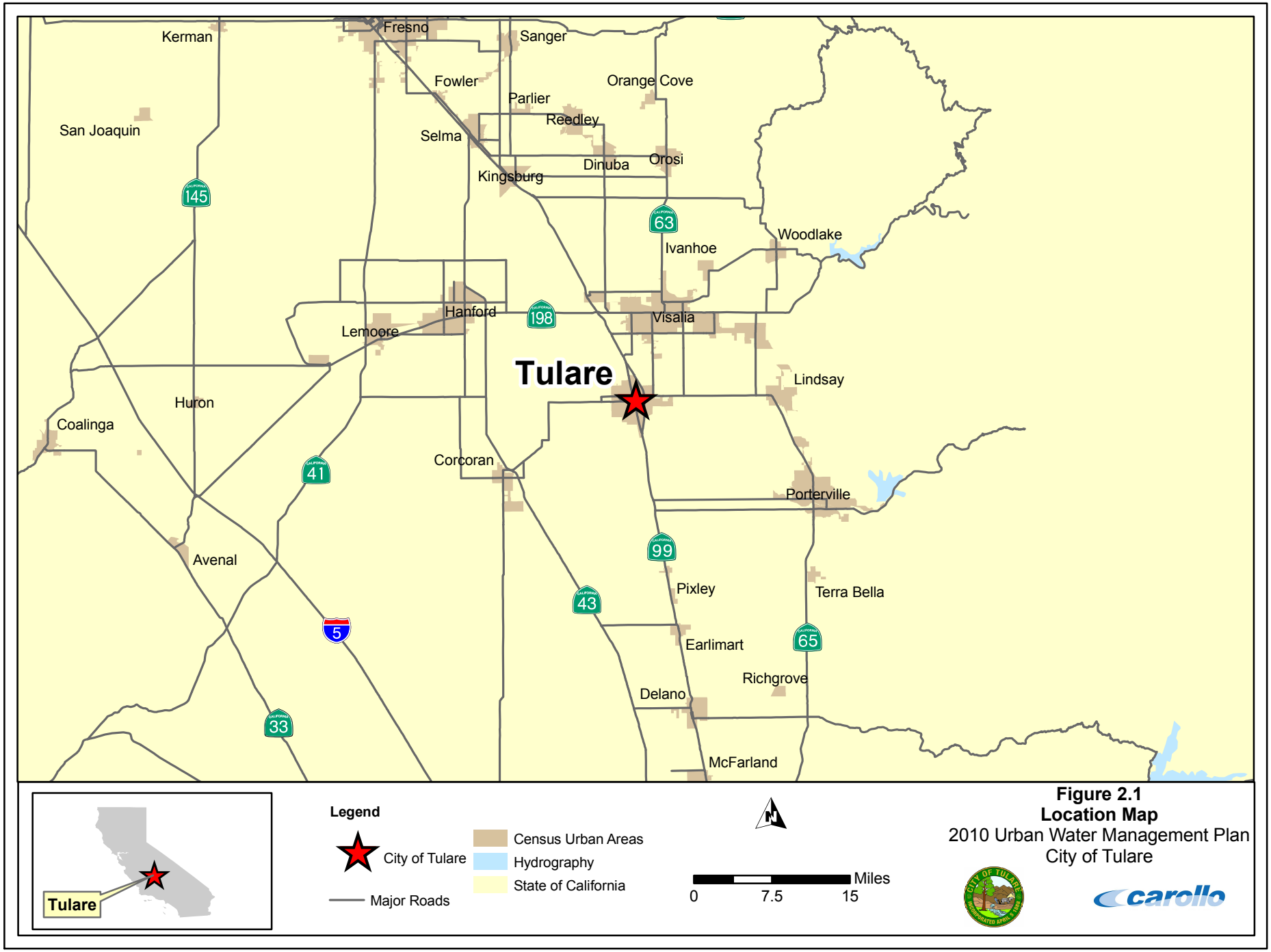


Figure 2.1
Location Map
2010 Urban Water Management Plan
City of Tulare

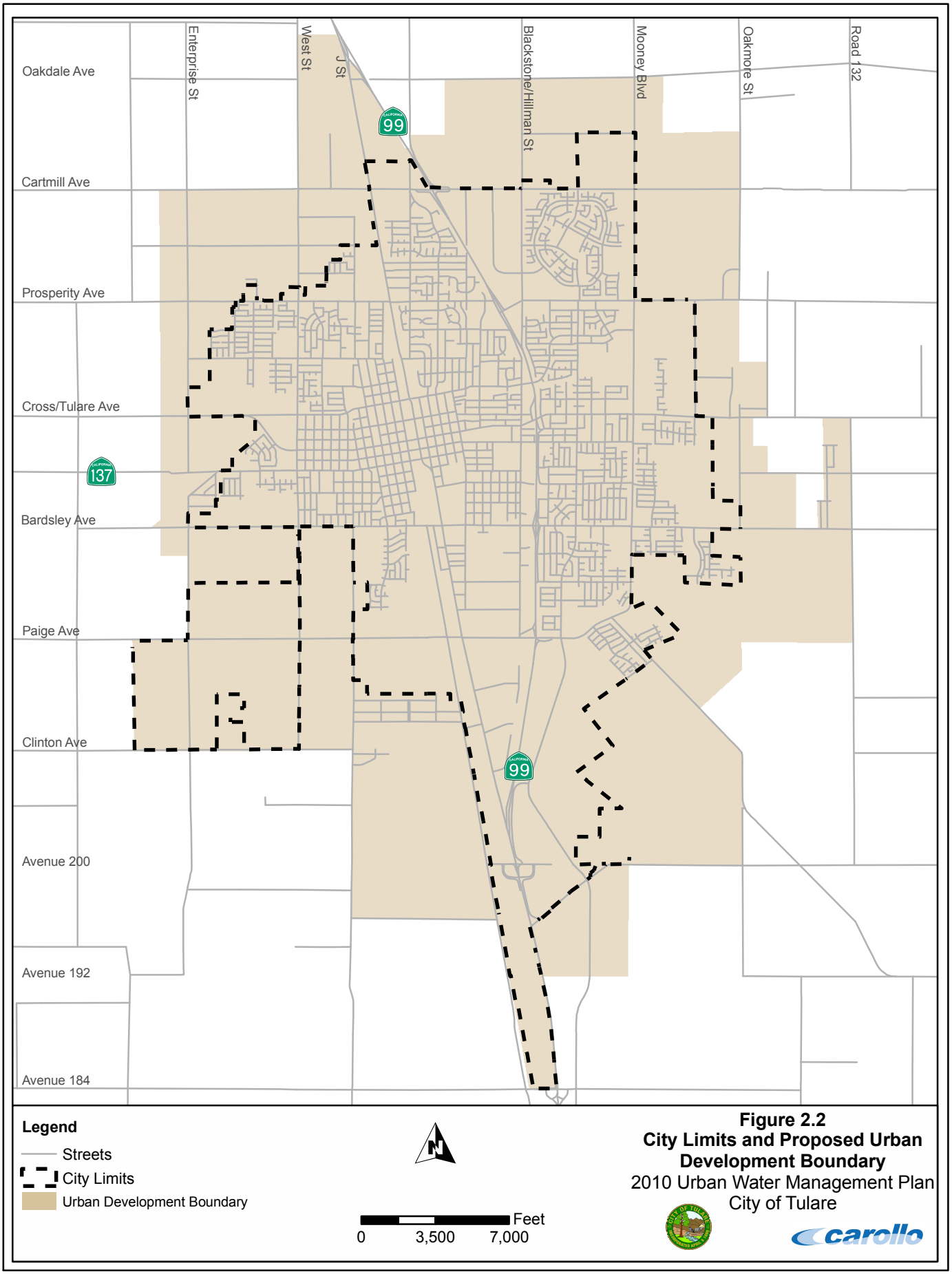


Figure 2.2
City Limits and Proposed Urban Development Boundary
2010 Urban Water Management Plan
City of Tulare

Table 2.1 Land Use and Vacant Area
2010 Urban Water Management Plan
City of Tulare

Land Use Designation	Code	City Limits				Urban Development Boundary
		2006 Total (gr. Ac.)	2006 Vacant (gr. Ac.)	2006 Developed (gr. Ac.)	Vacant (%)	2030 Total (gr. Ac.)
Residential Designations						
Rural Residential	R-RR	30	29	1	0%	813
Rural Estate	R-RE	90	79	11	1%	623
Low Density Residential	R-LDR	4,257	1,739	2,518	14%	5,612
Medium Density Residential	R-MDR	614	206	408	2%	735
High Density Residential	R-HDR	66	19	47	0%	66
Commercial Designations						
Neighborhood Commercial	C-NC	13	6	7	0%	18
Community Commercial	C-CC	856	610	246	5%	894
Regional Commercial	C-RC	76	76	0	1%	280
Service Commercial	C-SC	506	103	403	1%	577
Central Business District	CBD	130	10	120	0%	130
Entertainment Commercial	C-EC	0	0	0	0%	937
Office Commercial	C-OC	16	14	2	0%	35
Industrial Designations						
Light Industrial	I-LI	561	202	359	2%	1,966
Heavy Industrial	I-HI	1,219	501	719	4%	3,106

Table 2.1 Land Use and Vacant Area
2010 Urban Water Management Plan
City of Tulare

		City Limits				Urban Development Boundary
Land Use Designation	**Code**	**2006 Total (gr. Ac.)**	**2006 Vacant (gr. Ac.)**	**2006 Developed (gr. Ac.)**	**Vacant (%)**	**2030 Total (gr. Ac.)**
Other Designations						
Public/Quasi-Public	PUB	1,625	149	1,476	1%	2,306
Parks and Recreation	PRK	340	47	293	0%	394
Open Space	OS/AG	13	0	13	0%	386
Roadways and Railroads	--	1,864	0	1,864	0%	2,322
Reserve Designations						
Village	NC	5	0	5	0%	2,272
Residential Reserve	UR-R	0	0	0	0%	0
Commercial Reserve	UR-C	0	0	0	0%	0
Industrial	UR-I	0	0	0	0%	136
Total		**12,281**	**3,788**	**8,492**	**31%**	**23,608**

Source: 2009 Water System Master Plan; table developed based on data provided from the Draft General Plan Update (Matrix Design Group)

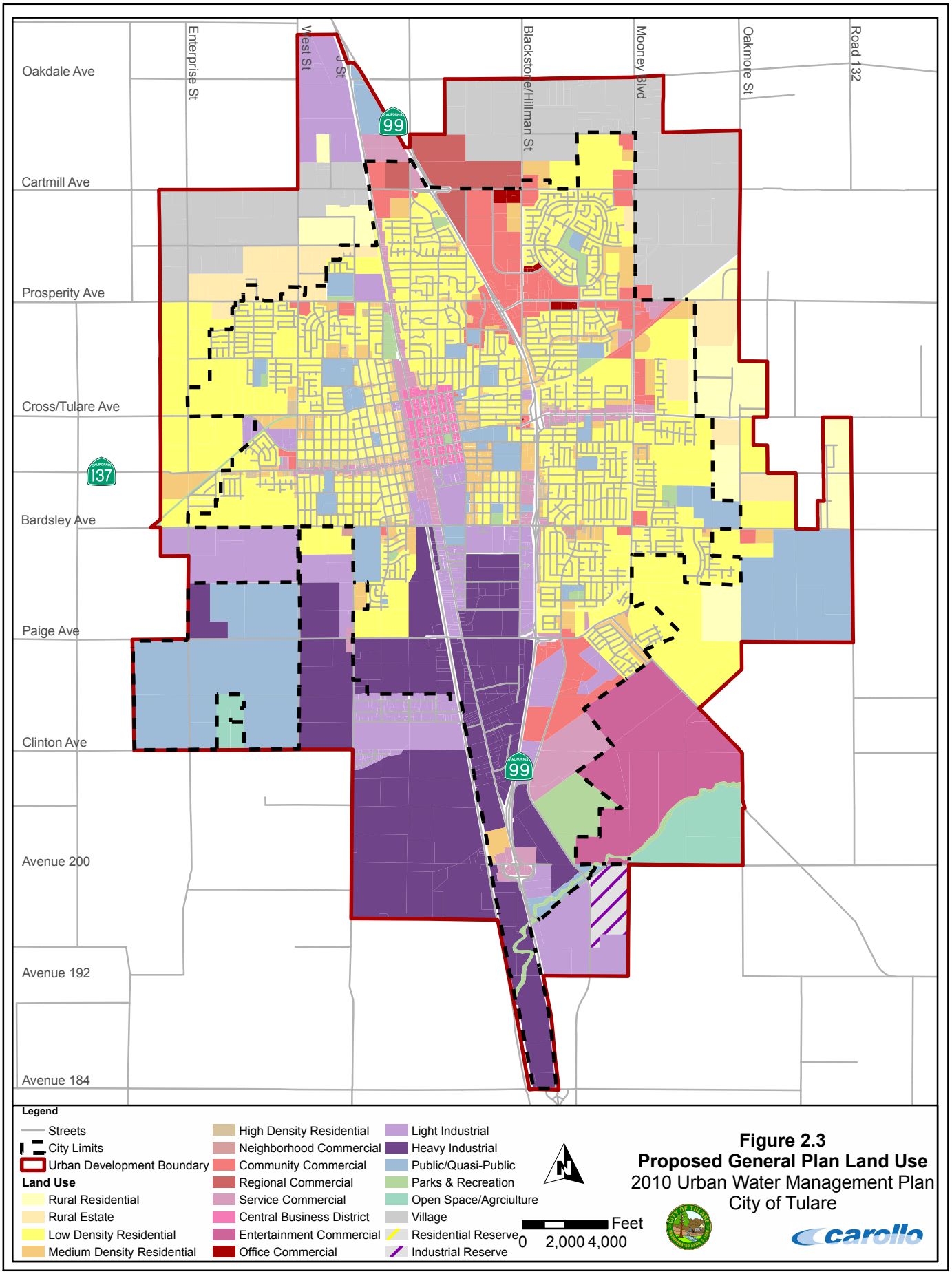


Figure 2.3
Proposed General Plan Land Use
2010 Urban Water Management Plan
City of Tulare

The City operates under the Council-Manager form of government, and provides the following services that are subject to a municipal service review: public safety (police and fire protection); domestic water; wastewater collection, treatment, and disposal; solid waste collection; and streets and roads.

2.1.1 Service Area Climate

The climate in the City can be classified a Mediterranean-type climate. Summers are hot and dry, and winters are cool with an average precipitation of about 10.2-inches per year. The area is subject to significant variations in annual precipitation. Most of the annual precipitation occurs during the period from November through April. Table 2.2 summarizes monthly average evapotranspiration (ETo) rates, rainfall and temperature. The average monthly precipitation and average monthly temperatures are also shown on Figure 2.4

Table 2.2 Climate
2010 Urban Water Management Plan
City of Tulare

Month	Average ETo[1] (inches)	Average Rainfall[2] (inches)	Average Min. Temperature[2] (°F)	Average Max. Temperature[2] (°F)	Average Temperature[2] (°F)
January	0.87	1.99	36.9	55.9	46.4
February	1.67	1.85	40.8	62.6	51.7
March	3.34	1.72	43.7	68.1	55.9
April	5.13	0.97	47.5	74.7	61.1
May	6.78	0.37	53.0	82.6	67.8
June	7.67	0.08	59.0	91.2	75.1
July	7.86	0.01	63.4	97.6	80.5
August	6.91	0.01	61.5	96.2	78.9
September	4.93	0.14	57.2	90.1	73.7
October	3.23	0.49	50.1	80.2	65.2
November	1.51	0.98	41.6	67.3	54.5
December	0.83	1.54	36.7	56.8	46.8
Annual	**50.73**	**10.15**	**49.3**	**76.9**	**63.1**

Notes:
1. Source: California Irrigation Management Information System (CIMIS), Station No. 33 Visalia (period of record 1983-2007).
2. Source: Western Regional Climate Center, Station No. 049367: Visalia (period of record 1897-2010).

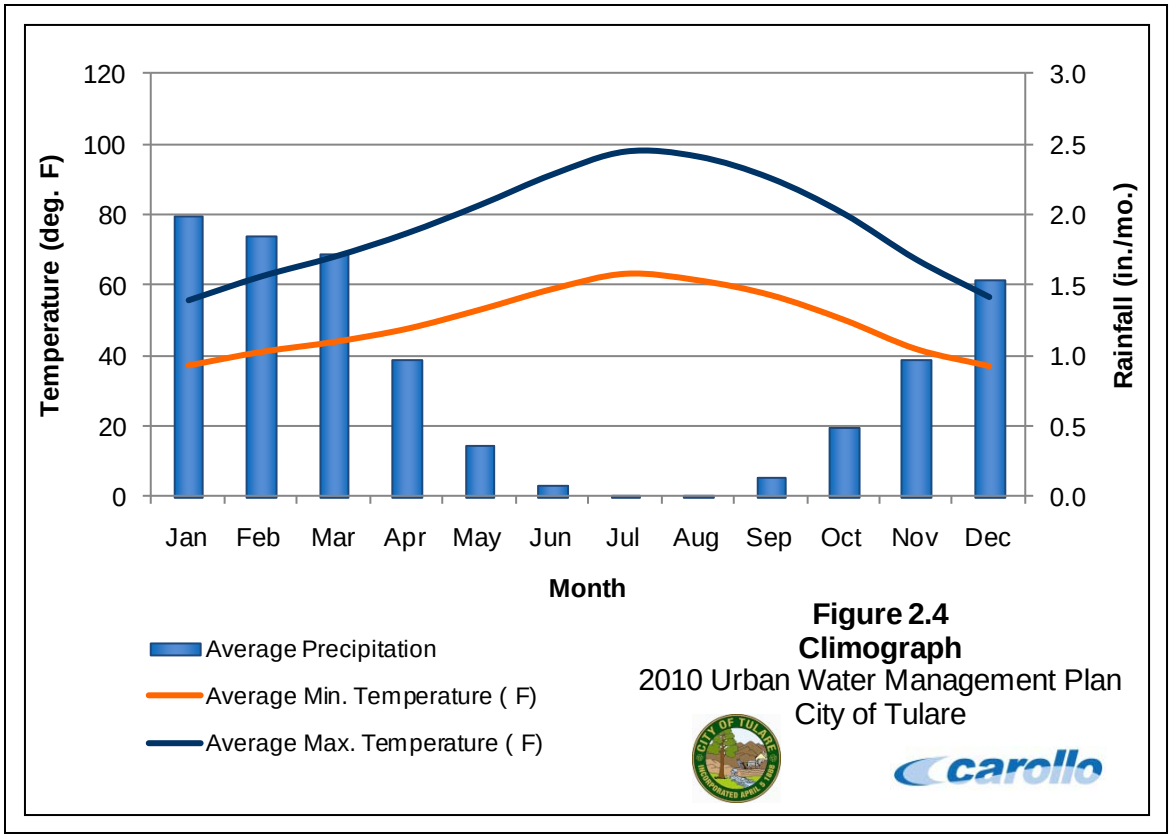


Figure 2.4
Climograph
2010 Urban Water Management Plan
City of Tulare

The average annual temperature is 63.1 degrees Fahrenheit (°F), although it is not unusual for summer readings to reach well over 100°F. According to Western Regional Climate Center (WRCC), the monthly average mean temperature in July is 80.5°F, with an average maximum of 97.6°F and an average minimum of 63.4°F. Extreme winter lows can reach into the teens.

The City's annual humidity at 4:00 PM averages 49 percent[2]. Average humidity in January and July is approximately 80 percent and 40 percent, respectively. Winds are prevailing out of the northwest and average six miles per hour.

2.2 SERVICE AREA POPULATION

According to data collected from the California Department of Finance (DOF), the City's population for the year 2010 was approximately 59,535. This corresponds to an increase in population of approximately 19,400 from 1995 to 2010.

The General Plan Update projects a population of 130,975 people by the year 2030. In order for this to happen, the City's population would need to increase by 4 percent per year. Extending this growth rate out to 2035 yields a projected population of 159,726, as shown

[2] www.ci.tulare.ca.us

in Table 2.3. Figure 2.5 shows the historical and projected population trends from 1995 to 2030.

Table 2.3 Population - Current and Projected (Guidebook Table 2)
2010 Urban Water Management Plan
City of Tulare

	Years						
	2010	**2015**	**2020**	**2025**	**2030**	**2035**	**Data Source**
Service Area Population[2]	59,535	73,000	89,000	108,000	130,975	159,726	Source[3],[4]

Notes:

1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare of 2010 Urban Water Management Plan" by DWR.
2. Service area population is defined as the population served by the distribution system.
3. 2010 population data source: California DOF.
4. Projected population data source: City of Tulare General Plan Update. A 4.0% annual growth rate through 2030 was used based on projections provided in the draft General Plan Update.

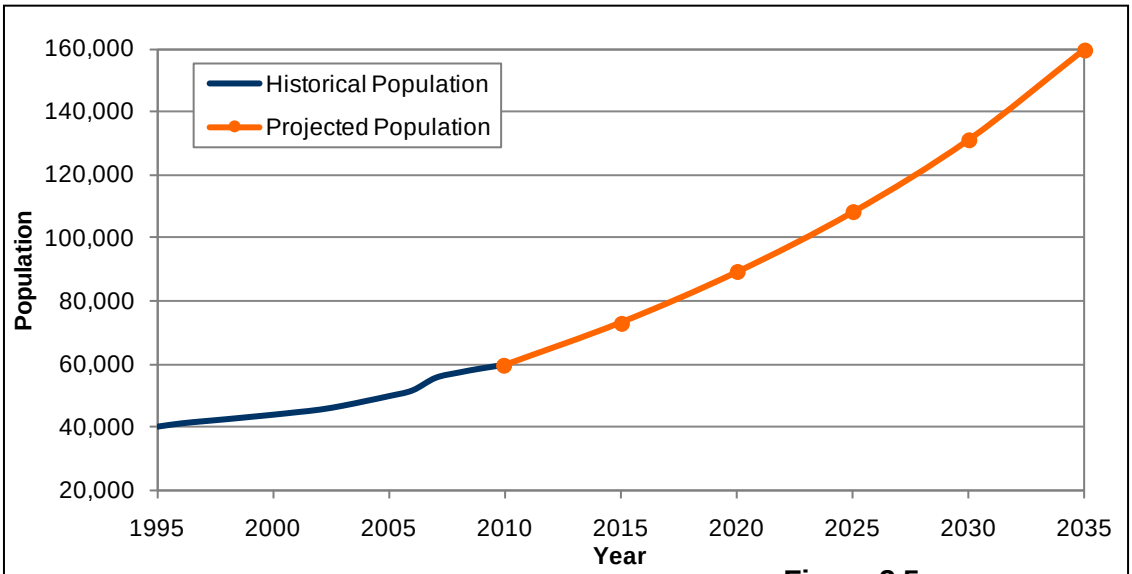


Figure 2.5
Historical and Projected Population
2010 Urban Water Management Plan
City of Tulare

According to 2000 Census figures, the City's Median Household Income (MHI) in year 2000 was $33,637. The State defines a disadvantaged community as a community with an annual MHI that is less than 80% of the statewide MHI. Using U.S. Census 2000 data,

80 percent of the statewide annual MHI is $37,994. Therefore, the City can be described as a “disadvantaged community.”

2.3 EXPANSION PROJECTS

The UWMPA requires that the UWMP identify the major developments within the agency’s service area that would require water supply planning.

Law

> *10910. (a) Any city or county that determines that a project, as defined in section 10912, is subject to the California Environmental Quality…*
>
> *10912. For the purpose of this part, the following terms have the following meanings:*
>
> *10912 (a) “Project” means any of the following:*
> *(1) A proposed residential development of more than 500 dwelling units.*
> *(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*
> *(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*
> *(4) A proposed hotel or motel, or both, having more than 500 rooms.*
> *(5) A proposed industrial, manufacturing or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.*
> *(6) A mixed-use project that includes one or more of the projects specified in this subdivision.*
> (7) *A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.*

The City is not currently considering any large expansion projects that would need to be accounted for in this UWMP.

SYSTEM DEMANDS

This chapter describes the baseline (base daily per capita) water use, the interim and urban water use targets, water system demands, water demand projections, and the water use reduction plan.

3.1 BASELINES AND TARGETS

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) identify a baseline water demand, urban water use target, and interim urban water use target for the City of Tulare (City).

Law

> *10608.20 (e). An urban retail water supplier shall include in its urban water management plan. . . due in 2010 the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data*

The base daily per capita use is the first step in determining the City's various urban water use targets over the planning horizon. The current per capita use sets the "baseline" on which the urban and interim water use targets are determined. These targets are necessary to judge compliance with the 2020 use reductions set forth in the Water Conservation Bill of 2009.

The baselines targets summarized in this section apply specifically to the City. The California Department of Water Resources (DWR) allows agencies to participate in regional alliances in which water use baselines and targets are determined regionally, provided certain criteria are met. The City has elected not to participate in such an alliance.

3.1.1 Baseline Water Use

The first step in developing the baseline water use for the City is determining the applicable range and years for which the baseline average will be calculated. The UWMPA stipulates an agency may use either a 10 or 15-year average to determine their baseline. If 10 percent or more of total urban retail water deliveries in 2008 were from recycled water, then the agency can use a 15-year average baseline if it chooses. Although the City does recycle its wastewater effluent on City-owned land and through contracts with local farmers, the City does not currently use recycled water to offset urban retail water use. For this reason, a 10-year average was used for baseline determination. In addition to the 10-year baseline, a 5-year baseline is also calculated, which is used to establish the minimum criteria for the City's use reduction targets. A summary of the 2008 total and recycled water deliveries, 10-year baseline range, and 5-year baseline range is included in Table 3.1.

Table 3.1	Base Daily Per Capita Water Use: 10 to 15-Year Range (Guidebook Table 13) 2010 Urban Water Management Plan City of Tulare		
Base	**Parameter**	**Value**	**Units**
10- to 15-Year Base Period	2008 total water deliveries	18,664	AFY
	2008 total volume of delivered recycled water	0	AFY
	2008 recycled water as a percent of total deliveries	0.0	percent
	Number of years in base period(1)	10	years
	Year beginning base period range	2001	
	Year ending base period range(2)	2010	
5-Year Base Period	Number of years in base period	5	years
	Year beginning base period range	2003	
	Year ending base period range(3)	2007	

Notes:
1. If the 2008 recycled water percent is less than 10 percent, then the first base period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first base period is a continuous 10- to 15-year period.
2. The ending year must be between December 31, 2004 and December 31, 2010.
3. The ending year must be between December 31, 2007 and December 31, 2010.

The data used to calculate the 10-year baseline is included in Table 3.2. The UWMPA requires a continuous range ending between December 31, 2004 and December 31, 2010 be used for the baseline determination. As shown in Table 3.2, the City's selected 10-year base period begins in year 2001 and ends in year 2010.

The data used to calculate the 5-year baseline is included in Table 3.3. The UWMPA requires a continuous range ending between December 31, 2007 and December 31, 2010 be used for baseline determination. As shown in Table 3.3, the City's selected 5-year base period begins in year 2003 and ends in year 2007.

The City's historical water consumption for the period 1995 through 2010 is shown in Figure 3.1. This figure also depicts the selected 5-year and 10-year baseline values.

Table 3.2 Base Daily Per Capita Water Use: 10-Year Range (Guidebook Table 14)
2010 Urban Water Management Plan
City of Tulare

Base Period Year[2]		Distribution System Population	Daily System Gross Water Use (mgd)	Annual Daily Per Capita Water Use (gpcd)
Sequence	**Calendar Year**			
1	2001	44,621	12.99	291
2	2002	45,439	14.13	311
3	2003	46,672	14.57	312
4	2004	48,160	15.86	329
5	2005	49,703	15.46	311
6	2006	51,477	15.86	308
7	2007	55,435	16.85	304
8	2008	57,089	16.62	291
9	2009	58,414	16.49	282
10	2010	59,535	15.59	262
		Base Daily Per Capita Water Use		**300**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Based on calendar year.

Table 3.3	Base Daily Per Capita Water Use: 5-Year Range (Guidebook Table 15) 2010 Urban Water Management Plan City of Tulare			
Base Period Year[2]		Distribution System Population	Daily System Gross Water Use (gpd)	Annual Daily Per Capita Water Use (gpcd)
Sequence	Calendar Year			
1	2003	46,672	14.57	312
2	2004	48,160	15.86	329
3	2005	49,703	15.46	311
4	2006	51,477	15.86	308
5	2007	55,435	16.85	304
		Base Daily Per Capita Water Use		**313**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Based on calendar year.

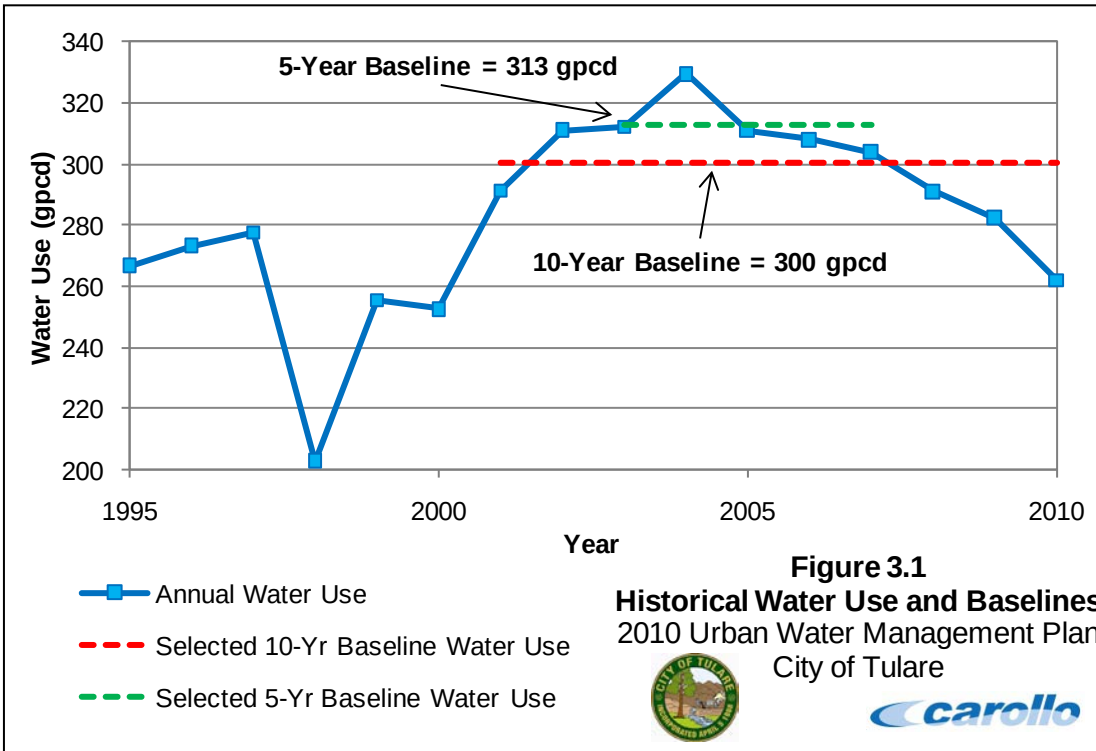


Figure 3.1
Historical Water Use and Baselines
2010 Urban Water Management Plan
City of Tulare

3.1.2 Target Water Use

The Water Conservation Act of 2009 (SBx7-7) is the new law governing water conservation in California that was enacted November 2009. This law requires that all water suppliers increase water use efficiency with the overall goal to decrease per-capita consumption within the state by 20 percent. The bill required DWR to develop certain criteria, methods, and standard reporting forms through a public process that can be used by water suppliers to establish their baseline water use and determine their water conservation targets (the UWMPA requires urban water suppliers to determine the urban and interim water use targets for 2020 and 2015, respectively). DWR provided four different methods to establish water conservation targets. These four methods are summarized in this section.

3.1.2.1 Method 1 - Baseline Reduction Method

The 2020 water conservation target of Method 1 is defined as a 20 percent reduction of average per-capita demand during the 10-year continuous baseline period. Based on the daily per capita use of 300 gallons per capita per day (gpcd) determined previously (Table 3.2), the target use for Method 1 is 240 gpcd. The 2015 interim water use target is simply the average of the baseline and the 2020 water conservation target, or 270 gpcd for Method 1 in the City's case.

3.1.2.2 Method 2 - Efficiency Standard Method

The 2020 water conservation target of this method is determined by calculating efficiency standards for indoor use separately from outdoor use for residential sectors, and an overall reduction of 10 percent for commercial, industrial, and institutional (CII) sectors. The aggregated total of the efficiency standards in each area is then used to create a conservation target.

Very few agencies within the State have the data necessary to determine a target water use using Method 2. For this reason, it is not feasible for the City to use this methodology. Specifically, the City lacks the detailed landscaped area estimates to calculate the landscaped area water use.

3.1.2.3 Method 3 - Hydrologic Region Method

This method uses the ten regional urban water use targets for the state. Based on the water supplier's location within one of these regions, a static water use conservation target for 2020 is assigned.

A map showing the California hydrologic regions and 2020 conservation goals is included in the final 2010 UWMP Guidebook, and is shown on Figure 3.1. In order to determine the target using Method 3, 95 percent of the region-specific conservation goal is calculated. Based on a 2020 target of 188 gpcd for the Tulare Lake region, the City's Method 3 target is 179 gpcd for 2020. The City's 2015 interim water use target for Method 3 is then calculated to be 240 gpcd.

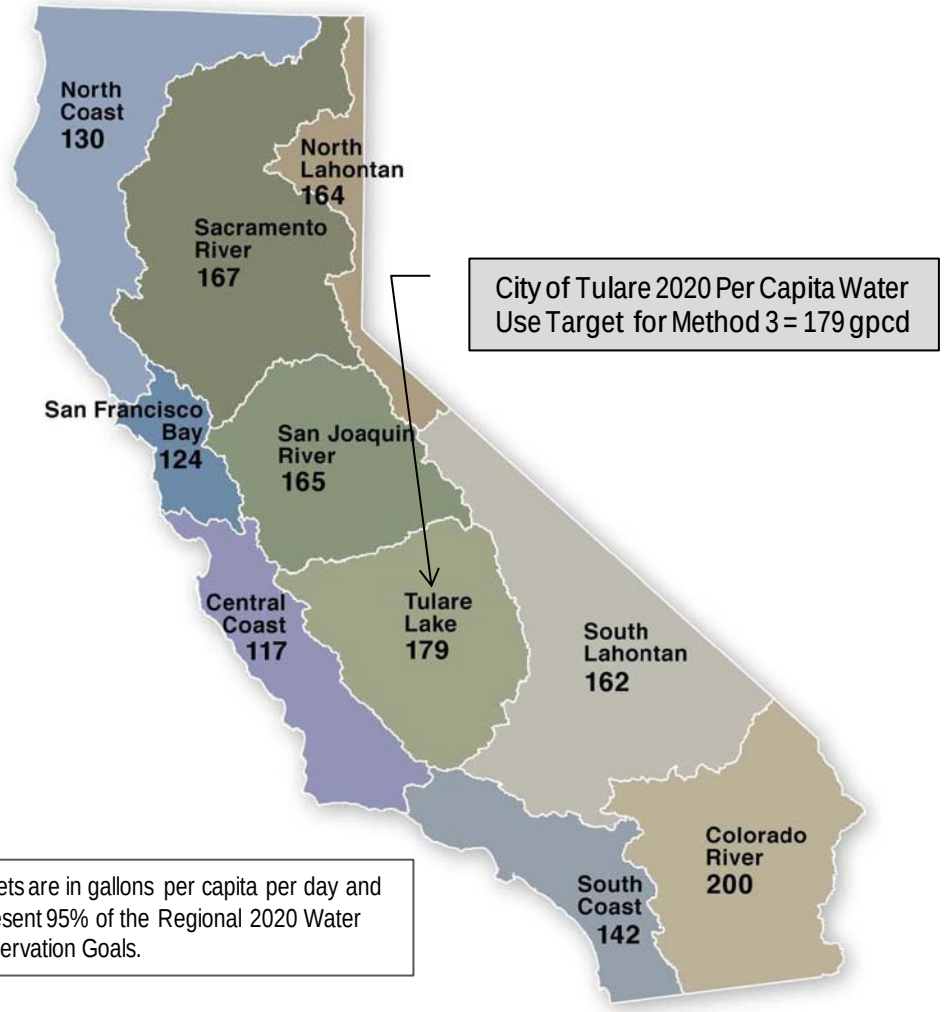


Figure 3.2
Method 3 Target Per Capita Water Use
2010 Urban Water Management Plan
City of Tulare

3.1.2.4 Method 4 - BMP Based Method

Method 4 identifies water savings obtained through identified practices and subtracts them from the base daily per capita water use value identified for the water supplier. The water savings identified that can be used to reduce the base daily per capita water use value include:

- Indoor residential use savings;
- Commercial, industrial, and institutional (CII) savings;

- Landscape and water loss savings; and
- Metered savings.

The City lacks sufficient historical water use data to perform target per capita use analysis using Method 4. Specifically, the City did not have accurate historical water consumption data separated by customer classification for years 1995 through 2007, except for the year 2001. Because of this, a 10-year baseline for any of the City's residential, CII, landscape/water loss, or metered savings could not be established. For this reason, it is not feasible for the City to use this methodology to determine its 2020 water use targets.

3.1.2.5 Minimum Water Use Reduction Requirement

The final step in determining the applicability of the water use target for the City is to confirm the water use targets meet the minimum reduction requirements as defined by DWR. In order to meet the minimum criteria, the chosen 2020 target per capita use must fall below 95 percent of the 5-year baseline, which for the City is 297 gpcd.

3.1.3 Summary of Baseline and Water Use Targets

Based on the water use targets calculated using the developed methodology, the City's selected water use target for 2020 is 240 gpcd. Based on the 10-year baseline of 300 gpcd, the 2015 interim water use target is 270 gpcd. This target was determined using Method 1 (Section 3.1.2). According to the DWR guidelines, this target is valid since it is less than the target confirmation criteria of 297 gpcd (Section 3.1.2.5).

A summary of the baselines, use targets determined based on the four methods, and the selected use target and interim target are summarized in Table 3.4.

Table 3.4 Baseline and Targets Summary
2010 Urban Water Management Plan
City of Tulare

Baselines (gpcd)		Target Determination Methods (gpcd)				Minimum Reduction Requirement[4] (gpcd)	Target[5] (gpcd)	Interim Target[6] (gpcd)
10-Year[1]	5-Year[2]	1	2	3	4[3]			
300	313	240	n/a	179	n/a	297	240	270

Notes:
1. 10-Year Baseline Years: 2001 to 2010
2. 5-Year Baseline Years: 2003 to 2007
3. Not enough information available to perform Method 4 analysis.
4. Minimum criterion for the Urban Water Use Target is defined as the 95 of the 5-year base daily per capita water use (0.95*313 gpcd).
5. Urban Water Use Target determined using Method 1.
6. Interim Urban Water Use Target defined as the average of the 10-year base per capita water use and Urban Water Use Target.

DWR allows for agencies to modify their baseline water use and 2020 per capita water conservation targets as part of the 2015 round of UWMPs. Therefore, during the preparation of the 2015 UWMP, the City may revisit its baseline water use as well as the selected 2020 per capita water use target. At this time, consideration can be given to the benefits of any water use exemptions (e.g., industrial process water), as well as the potential for use of alternative target methods (e.g., Method 2, Method 4) as appropriate.

3.2 WATER DEMANDS

The UWMPA requires that the UWMP identify the quantity of water supplied to the agency's customers including a breakdown by user classification.

Law

> *10631 (e) (1). Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors including, but not necessarily limited to, all of the- following uses: (A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.*
>
> *10631 (e) (2). The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.*
>
> *10631.1 (a). The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.*

The City's water customers include residential, commercial, institutional, and industrial groups. Effective September 1, 2009, the City passed Resolution No. 09-01 that described updated water rates and meter installation requirements. The resolution states that minimum one inch metered service will be installed to all multi-family, commercial, or industrial lots, and to single-family residences constructed after January 1, 1992. The City had only 42 unmetered service connections for the year 2010[1]. However, according to the City, all service connections were metered by the end of the 2010 year with the exception of City parks. For water demand and service connection projections, therefore, it was assumed that the City will be fully metered from 2015 and beyond. The City also meters all commercial and industrial users. Figure 3.3 shows the current year 2010 distribution of users along with the distribution of water use.

[1] Source: DWR Public Water System Statistics for the City of Tulare, year 2010.

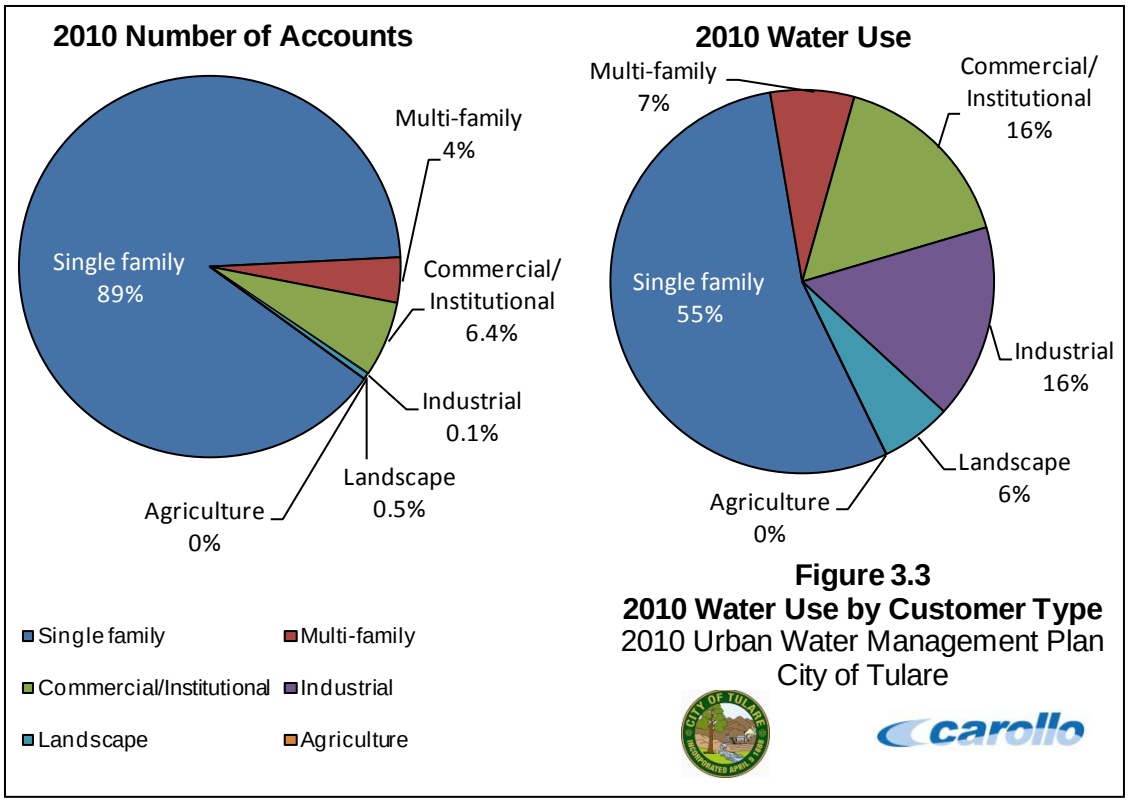


Figure 3.3
2010 Water Use by Customer Type
2010 Urban Water Management Plan
City of Tulare

3.2.1 Historical Water Use

The City provides potable water service to its residential, commercial, institutional, and industrial customers within its service area. In 2010, the City produced 5,690 million gallons or 17,461 acre-feet (AF), which is equivalent to 15.6 million gallons per day (mgd) of water servicing a population of approximately 59,535. Table 3.5 lists the historical water production from 1995 to 2010. Table 3.6 and Table 3.7 summarize the historical number of connections and associated annual water use by customer type for year 2005 and 2010, respectively.

The historical 2005 water use data are based on information presented in the City's previous 2005 UWMP. There was insufficient data available to provide a breakdown between metered and unmetered water use for year 2005. Water use data for 2010 is based on the City's 2010 DWR Public Water Systems Statistics sheet. Unmetered water uses for 2010 were estimated assuming the water use per connection of the metered connections, increased by 20 percent to account for the decreased water use associated with water meters.

In 2010, the City still had several unmetered landscape service connections to City-owned parks. The City does not meter connections internally, so the volume of water delivered to

these connections was estimated in the City's 2005 UWMP to be 684 AFY.[2] For the purpose of this plan, deliveries to unmetered City park areas were assumed to be 684 AFY, consistent with the 2005 UWMP. It is assumed that the City will meter all of its service connections by 2015.

Table 3.5 Historic Annual Production (1995 - 2010)
2010 Urban Water Management Plan
City of Tulare

	Annual Water Production			Population	
Year	Total Annual (AF)	Total Annual (MG)	Daily Average (mgd)	Population(1)	Per Capita Consumption (gpcd)
1995	11,975	3,902	10.7	40,100	267
1996	12,616	4,111	11.2	41,100	273
1997	12,995	4,234	11.6	41,800	278
1998	9,644	3,142	8.6	42,450	203
1999	12,349	4,024	11.0	43,150	255
2000	12,441	4,054	11.1	43,850	253
2001	14,551	4,741	13.0	44,621	291
2002	15,829	5,158	14.1	45,439	311
2003	16,319	5,318	14.6	46,672	312
2004	17,819	5,806	15.9	48,160	329
2005	17,313	5,641	15.5	49,703	311
2006	17,763	5,788	15.9	51,477	308
2007	18,870	6,149	16.8	55,435	304
2008	18,663	6,081	16.6	57,089	291
2009	18,469	6,018	16.5	58,414	282
2010	17,461	5,690	15.6	59,535	262

Notes:
1. Source: California Department of Finance Population Estimates.

[2] Source: City of Tulare Urban Water Management Plan, 2005

Table 3.6 Water Deliveries – Actual, 2005 (Guidebook Table 3) 2010 Urban Water Management Plan City of Tulare	
	2005
Water Use Sectors	**Estimated Water Deliveries[(2)] (AFY)**
General and Residential	10,702
Commercial	2,796
Industrial	2265
Landscape/Parks	684
Total	**16,447**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR. The format of this table differs from the Guidebook table. The reason for this is that there was not sufficient data to compile this table in the format recommended by DWR.
2. City of Tulare 2005 Urban Water Management Plan.

3.2.2 Per Capita Consumption

The per capita consumption rate, coupled with the population forecasts provided in Chapter 2, is used for estimating the City's future water requirements, evaluating the adequacy of the supply source, and determining storage needs. The consumption rate is applied to the projected population to yield future water requirements.

From 1995 to 2010, the consumption rate in the City has ranged between a low of 203 gpcd in 1998 and a high of 329 gpcd in 2004. As noted in Section 3.1.1, the City's selected 10-year baseline water use was calculated to be 300 gpcd. Figure 3.4 illustrates the projected per capita water use reduction to meet the City's 2020 water use target.

Table 3.7	Water Deliveries – Actual, 2010 (Guidebook Table 4) 2010 Urban Water Management Plan City of Tulare				
	2010				
	Metered		Not Metered		Total Deliveries[2] (AFY)
Water Use Sectors	# of accounts[2]	Deliveries[2] (AFY)	# of accounts[2]	Deliveries[3] (AFY)	
Single Family Residential	14,616	8,347	3	2	8,350
Multi-Family Residential	625	1,076	2	4	1,080
Commercial/Institutional	1,010	2,353	37	103	2,457
Industrial[4]	17	2,509	0	0	2,509
Landscape[4],[5]	75	228	0	684	912
Agriculture	0	0	0	0	0
Other	0	0	0	0	0
Total	**16,343**	**14,513**	**42**	**794**	**15,307**

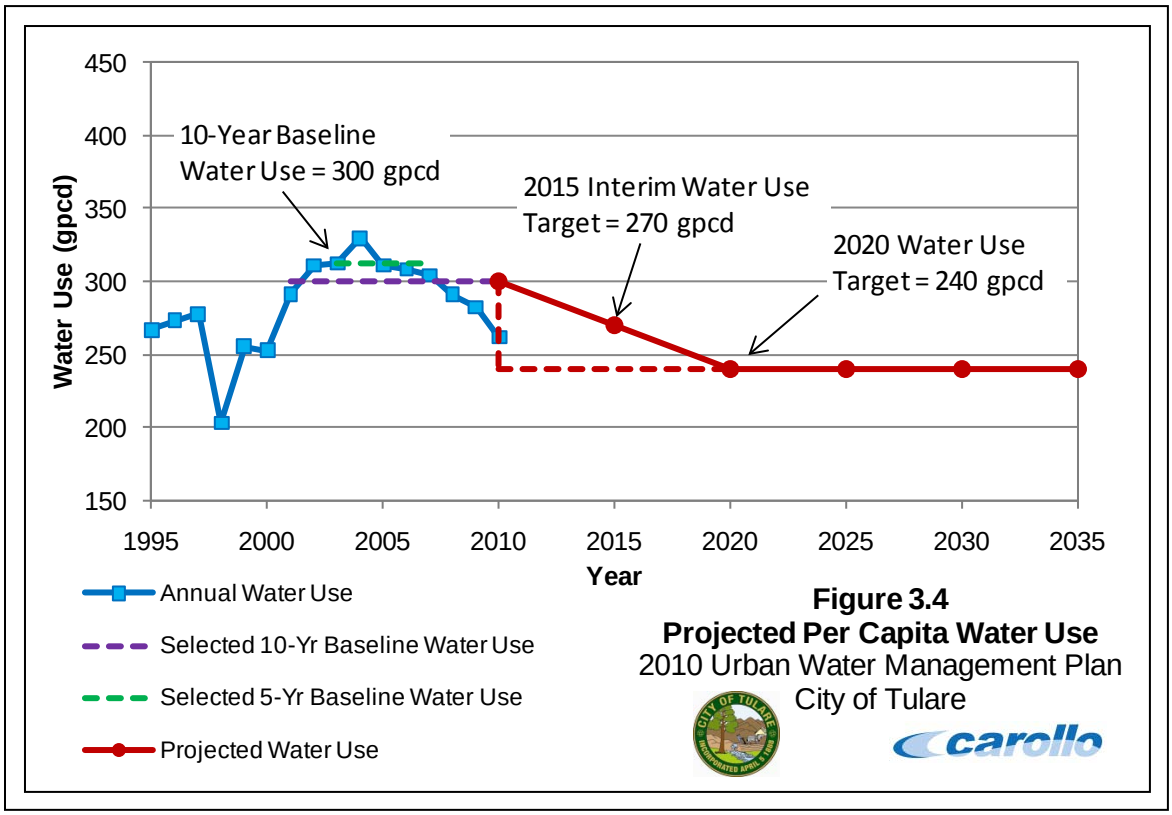
Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Source: 2010 DWR Public Water System Statistics.
3. Unmetered water uses were estimated based on the water use per connection for metered connections, and increased by 20% to account for the decreased water use from metered connections.
4. The number of 2010 number of metered accounts for the industrial and landscape sectors were not available. Since there was a measured consumption from these sectors, the number of accounts in 2010 for the industrial and landscape sectors were assumed to be the same as in 2009.
5. As of 2010, the City still had several unmetered landscape service connections associated with parks. While the number of connections was unavailable, the volume of unmetered water was estimated in the City's 2005 UWMP to be approximately 684 AFY.

3.2.3 Water Demand Projections

The projected annual water demands for year 2015 were developed by multiplying the projected 2015 population by the City's 2015 interim water use target (270 gpcd). The projected annual water demands for year 2020 and beyond were developed by multiplying the projected population by the City's 2020 water use target (240 gpcd).

Table 3.8 summarizes the projected water demands to meet the City's 2020 water use target. Also included for reference in Table 3.8 are the projected water demands based on the selected 10-year baseline water use, representing future water use without conservation. As shown in this table, by meeting its target per capita water use, the City could reduce its year 2035 water use from 47.9 mgd (53,705 AFY) to 38.4 mgd

(42,964 AFY), or almost 20 percent. Figure 3.5 provides a graphical representation of the information presented in Table 3.8.



The projected connections and water demands for each sector from years 2015 to 2035 are summarized in Table 3.9, Table 3.10, and Table 3.11. To project the number of connections per sector, it was assumed that the number of connections will grow consistently with the projected water demands, and that the City water service will be completely metered by 2015.

Table 3.8 Projected Water Demands
2010 Urban Water Management Plan
City of Tulare

Year	Distribution System Population[1]	Projected Water Use (mgd)			
		w/ Conservation[2]		w/o Conservation[3]	
		(mgd)	(AFY)	(mgd)	(AFY)
2015	73,000	19.7	22,091	21.9	24,545
2020	89,000	21.4	23,940	26.7	29,925
2025	108,000	25.9	29,051	32.4	36,313
2030	130,975	31.5	35,231	39.3	44,038
2035	159,726	38.4	42,964	47.9	53,705

Notes:
1. Distribution system population projections were taken from the City's Water Master Plan.
2. Demand projections with conservation are based on the City's per capita interim and final water use targets for 2015 and 2020.
3. Demand projections without conservation are based on the City's selected 10-year baseline water use.

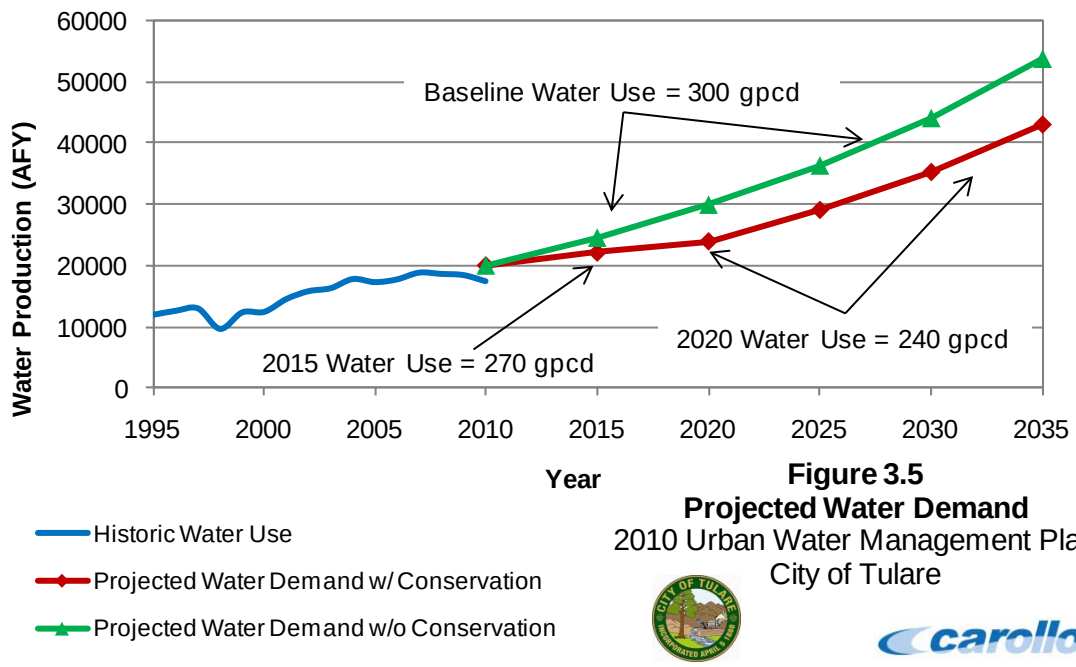


Figure 3.5
Projected Water Demand
2010 Urban Water Management Plan
City of Tulare

Table 3.9	Water Deliveries – Projected, 2015 (Guidebook Table 5) 2010 Urban Water Management Plan City of Tulare				
	2015				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Deliveries[2] (AFY)	# of accounts	Deliveries[2] (AFY)	Deliveries[2] (AFY)
Single family	17,925	10,563	0	0	10,563
Multi-family	769	1,366	0	0	1,366
Commercial/Institutional	1,284	3,108	0	0	3,108
Industrial	21	3,174	0	0	3,174
Landscape	92	1,838	0	0	1,838
Agriculture	0	0	0	0	0
Other	0	0	0	0	0
Total	**20,091**	**19,365**	**0**	**0**	**19,365**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Water delivery projections do not include system losses.

Table 3.10	Water Deliveries – Projected, 2020 (Guidebook Table 6) 2010 Urban Water Management Plan City of Tulare				
	2020				
	Metered		Not Metered		Total
Water Use Sectors	# of accounts	Deliveries[2] (AFY)	# of accounts	Deliveries[2] (AFY)	Deliveries[2] (AFY)
Single family	21,854	11,448	0	0	11,448
Multi-family	937	1,480	0	0	1,480
Commercial/Institutional	1,565	3,368	0	0	3,368
Industrial	25	3,440	0	0	3,440
Landscape	112	1,934	0	0	1,934
Agriculture	0	0	0	0	0
Other	0	0	0	0	0
Total	**24,494**	**20,987**	**0**	**0**	**20,987**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Water delivery projections do not include system losses.

Table 3.11	Water Deliveries – Projected 2025, 2030, 2035 (Guidebook Table 7) 2010 Urban Water Management Plan City of Tulare					
	2025 Metered		2030 Metered		2035 Metered	
Water Use Sectors	# of accounts	Deliveries[(2)] (AFY)	# of accounts	Deliveries[(2)] (AFY)	# of accounts	Deliveries[(2)] (AFY)
Single family	26,520	13,891	32,161	16,847	39,221	20,545
Multi-family	1,137	1,796	1,379	2,178	1,682	2,657
Commercial/ Institutional	1,899	4,087	2,303	4,957	2,809	6,045
Industrial	31	4,175	37	5,063	46	6,174
Landscape	136	2,201	165	2,524	201	2,928
Agriculture	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total	**29,723**	**25,467**	**36,046**	**30,884**	**43,959**	**37,664**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Water delivery projections do not include system losses.

3.2.3.1 Sales to Other Agencies

To date, the City has made no sales to other agencies, nor does the City anticipate any in the future (Table 3.12).

Table 3.12	Sales to Other Water Agencies (Guidebook Table 9) 2010 Urban Water Management Plan City of Tulare						
	Water Use (AFY)						
Agency	2005	2010	2015	2020	2025	2030	2035
None	0	0	0	0	0	0	0
Total, AFY	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare of 2010 Urban Water Management Plan" by DWR.

3.2.3.2 Other Water Demands

Additional water uses and losses in the City's service area are presented in Table 3.13 below. According to the City's 2005 UWMP, system losses are estimated to account for roughly 3 to 6 percent of the City's total water production based on results from a leak

detection survey performed in 1997 by Utility Services Associates. Analysis of the metered water use and the estimated unmetered water use for 2010 indicate that losses account for roughly 12 percent of the City's total production. This percent loss is a reasonable value compared to losses typically observed in distribution infrastructure. For the purposes of this UWMP, therefore, it has been assumed that system losses will account for roughly 12 percent of total production from 2015 to 2035. The City currently has included an additional leak detection survey in its budget for the 2011 fiscal year. Following completion of this survey, and once water meters are installed for City park connections, the City will be able to develop a more accurate estimate of system losses.

Table 3.13 Additional Water Uses and Losses (Guidebook Table 10)
2010 Urban Water Management Plan
City of Tulare

Water Use[2]	2005	2010	2015	2020	2025	2030	2035
Saline Barriers	0	0	0	0	0	0	0
Groundwater Recharge	0	0	0	0	0	0	0
Conjunctive Use	0	0	0	0	0	0	0
Raw Water	0	0	0	0	0	0	0
Recycled Water	0	0	0	0	0	0	0
System Losses[3]	866	2,154	2,725	2,953	3,584	4,346	5,300
Other	0	0	0	0	0	0	0
Total, AFY	**866**	**2,154**	**2,725**	**2,953**	**3,584**	**4,346**	**5,300**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare of 2010 Urban Water Management Plan" by DWR.
2. Any water accounted for in Guidebook Tables 3 through 7 is not included in this table.
3. System losses for 2005 are based on data provided in the City's 2005 UWMP. 2010 and projected system losses are estimated to be roughly 12 percent of the total production, based on data provided in the City's 2010 DRW Public Water System Statistics sheet.

The City does have a recycled water program with its treated wastewater treatment plant (WWTP) effluent and a groundwater recharge program with the Tulare Irrigation District (TID). However, neither of these water programs offset municipal water use. Therefore, recycled water and water used for groundwater recharge are not included in Table 3.14.

A description of City's recycled water activities and groundwater recharge programs are in Chapter 4 of this UWMP.

3.2.3.3 Total Water Demand Projections

The City's total average annual demands are presented in Table 3.14 below. The City does not have an interest in delivering urban water for uses other than municipal uses (i.e.,

residential, commercial, industrial, landscaping, etc.). Currently, the projected water uses in Table 3.14 are technically and economically feasible for the City.

Table 3.14 Total Water Use (Guidebook Table 11)
2010 Urban Water Management Plan
City of Tulare

Water Use	Water Use (AFY)						
	2005	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Total water deliveries	16,447	15,307	19,365	20,987	25,467	30,884	37,664
Sales to other water agencies	0	0	0	0	0	0	0
Additional water uses and losses	866	2,154	2,725	2,953	3,584	4,346	5,300
Total, AFY	**17,313**	**17,461**	**22,091**	**23,940**	**29,051**	**35,231**	**42,964**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare of 2010 Urban Water Management Plan" by DWR.

If the City were to decide to expand its recycled water and recharge programs, new or rehabilitation/repair infrastructure projects might be required. The City could consider, if funding were available, upgrading its WWTP to provide tertiary treatment for a portion of its effluent. The tertiary-treated water could (after agreement adoption with TID) be discharged into TID's main irrigation canal for downstream use in exchange for fresh water for the City's groundwater recharge basins. Currently, however, the City is not pursuing this recycled water opportunity due to budget limitations.

3.2.4 Wholesale Water Demand Projections

The UWMP requires retail water agencies that receive wholesale water to report the projected water demand data that was sent to each wholesale agency from which it receives water.

Law

> *10631 (k). Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).*

The City does not currently receive water from a wholesale water agency, nor does it have any plans to do so in the future (Table 3.15).

Table 3.15	Retail Agency Demand Projections Provided to Wholesale Suppliers (Guidebook Table 12) 2010 Urban Water Management Plan City of Tulare						
		Water Use (AFY)					
Wholesaler	Contracted Volume (AFY)	2010	2015	2020	2025	2030	2035
None	N/A	0	0	0	0	0	0
Total	**N/A**	**0**	**0**	**0**	**0**	**0**	**0**

Notes:
1. Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare of 2010 Urban Water Management Plan" by DWR.

3.2.5 Lower Income Water Demand Projections

Section 10631.1 (a) of the California Water Code requires that retail urban water suppliers include projected water use for lower income single family and multifamily households. Section 50079.5 of the Health and Safety Code defines lower income households as 80 percent of the median income, adjusted for family size.

Table 3.16 projects water demands associated with lower income water users through year 2035. These estimates were generated based on the 2009 Update of the Tulare County Housing Element, which includes lower income household information for the City of Tulare, and are the City's best estimate of lower income water use at this point. It should be noted that the lower income demand projections presented in Table 3.16 are included in the total water use projections provided in Table 3.9 through Table 3.14.

Table 3.16	Low Income Projected Water Demands (Guidebook Table 8) 2010 Urban Water Management Plan City of Tulare				
	Water Use (AFY)				
Low Income Water Demands	2015	2020	2025	2030	2035
Single Family Residential	3,851	4,173	5,064	6,141	7,489
Multi-Family Residential	498	540	655	794	968
Total, AFY	**4,348**	**4,712**	**5,719**	**6,935**	**8,457**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare of 2010 Urban Water Management Plan" by DWR.

3.3 WATER USE REDUCTION PLAN

The UWMPA requires that retail water agencies develop an implementation plan for compliance with the SBx7-7 water use targets. In addition, retail water suppliers are required to discuss the economic impacts of the implementation plan, and ensure that particular customer sectors are not disproportionately affected by the water reduction plan.

Law

> *10608.36. Urban wholesale water suppliers shall include in the urban water management plans . . . an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.*
>
> *10608.26. Urban retail water suppliers are to prepare a plan for implementing the Water Conservation Bill of 2009 requirements and conduct a public meeting which includes consideration of economic impacts.*

The City has committed to taking appropriate steps to reduce its water consumption to meet 2020 per capita water use target of 240 gpcd. Primary methods of the City's water reduction plans are included in the discussion of Demand Management Measures, discussed in Chapter 6 of this UWMP.

In particular, the City has already established the following programs to reduce overall water use:

- In September of 2009, the City passed Resolution No. 09-01 to establish structured water rates and metering requirements for all water users, including single- and multi-family residences, commercial, industrial, and landscape irrigation. Service and metered rates include specifications of minimum baseline water use, with additional fees for water used in excess of baseline amounts. In addition, the City is in the process of establishing "conservation pricing" to encourage large volume consumers to reduce their overall use.
- The City completed metering of all user accounts in 2010, with the exception of parks. The City is in the process of replacing all of its residential meters from hand-read to radio meters. Installation of park meters will occur after the current change-out program.
- The City has developed and intends to develop incentive and rebate programs for water users to reduce consumption. Specifically, programs include residential plumbing retrofits, high efficiency washing machine appliance incentives, and replacement of high-flow toilets with ultra low flush fixtures.
- To reduce per capita water use, the City has invested in public education programs on water conservation practices. The City has a conservation coordinator that manages conservation efforts for residential, industrial, and commercial users.
- In 2001, the City established a prohibition on water waste (City Municipal Code, Section 7.32.050) that defined specific actions as "waste[s] of water," and prohibited

those actions in an effort to conserve water resources. This ordinance established responsible water use as a priority for the City.

The current and future water conservation efforts of the City do not place a disproportionate economic burden on specific customer types. For single- and multi-family residences (comprising 62 percent of the 2010 water use), programs are either in place or are being developed by the City to give residents the opportunity to decrease water use by replacing inefficient fixtures and through education. Commercial, institutional, and industrial users that decrease their water consumption are also eligible for “conservation” water rate pricing. Users with large landscaping water draws are also encourage and required (through the Municipal Code) to implement conservation practices.

The aforementioned water conservation efforts of the City have successfully reduced per capita water consumption. Reduction in water use is evident by the City’s decrease in per capita use from a high of 311 gpcd in 2002 to its 2010 value of 262 gpcd (nearly 16 percent reduction). Based on these historical values, the City has already achieved its interim 2015 water use target of less than or equal to 270 gpcd. However, the City will continue to implement demand reduction measures until the 2020 target is reached.

Because the Water Conservation Bill of 2009 requires that interim and final water use targets be reached by 2015 and 2020, respectively, the City intends to implement its water use reduction measures over the course of the next 5 to 10 years.

SYSTEM SUPPLIES

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) include a description of the agency's existing and future water supply sources for the next 20 years. The description of water supplies must include detailed information on the groundwater basin such as water rights, determination if the basin is in overdraft, adjudication decree, and other information from the groundwater management plan.

Law

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (b). Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a) [to 20 years or as far as data is available]. If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:*
>
> *10631 (b) (1). (Provide a) copy of any groundwater management plan adopted by the urban water supplier…*
>
> *10631 (b) (2). (Provide a) description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or board has adjudicated the rights to pump groundwater, (provide) a copy of the order or decree adopted by the court or by the board…(Provide) a description of the amount of groundwater the urban water supplier has the legal right to pump under the decree…For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.*
>
> *10631 (b) (3). (Provide a) detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic records.*
>
> *10631 (b) (4). (Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonable available, including, but not limited to, historic use records.*

4.1 WATER SUPPLY SOURCES

This section summarizes the existing and projected water supply sources for the City of Tulare (City).

4.1.1 Water Supply Facilities

The City currently utilizes local groundwater as its sole source of water supply. The City's municipal water system extracts its groundwater supply from 30 active groundwater wells scattered throughout the community (Figure 4.1). The City first began pumping groundwater for beneficial use in the 1880s. Over the last 20 years, groundwater use has increased from 8,547 AFY in 1985 to 17,461 AFY in 2010. The pumping capacities of the City wells are shown on Table 4.1.

4.1.2 Distribution System and Storage

Groundwater from the City's wells is pumped directly into the distribution system of over 200 miles of pipelines ranging from 2-inches to 16-inches in diameter. The topography of the City is generally flat, ranging from 255 feet (ft) to 310 ft above mean sea level (msl) within its Urban Development Boundary (UDB)[1]. Due to the relatively minor variations in ground elevation throughout the UDB, the City's water distribution system consists of only one pressure zone.

The City currently operates one elevated water storage tank with a capacity of approximately 150,000 gallons.

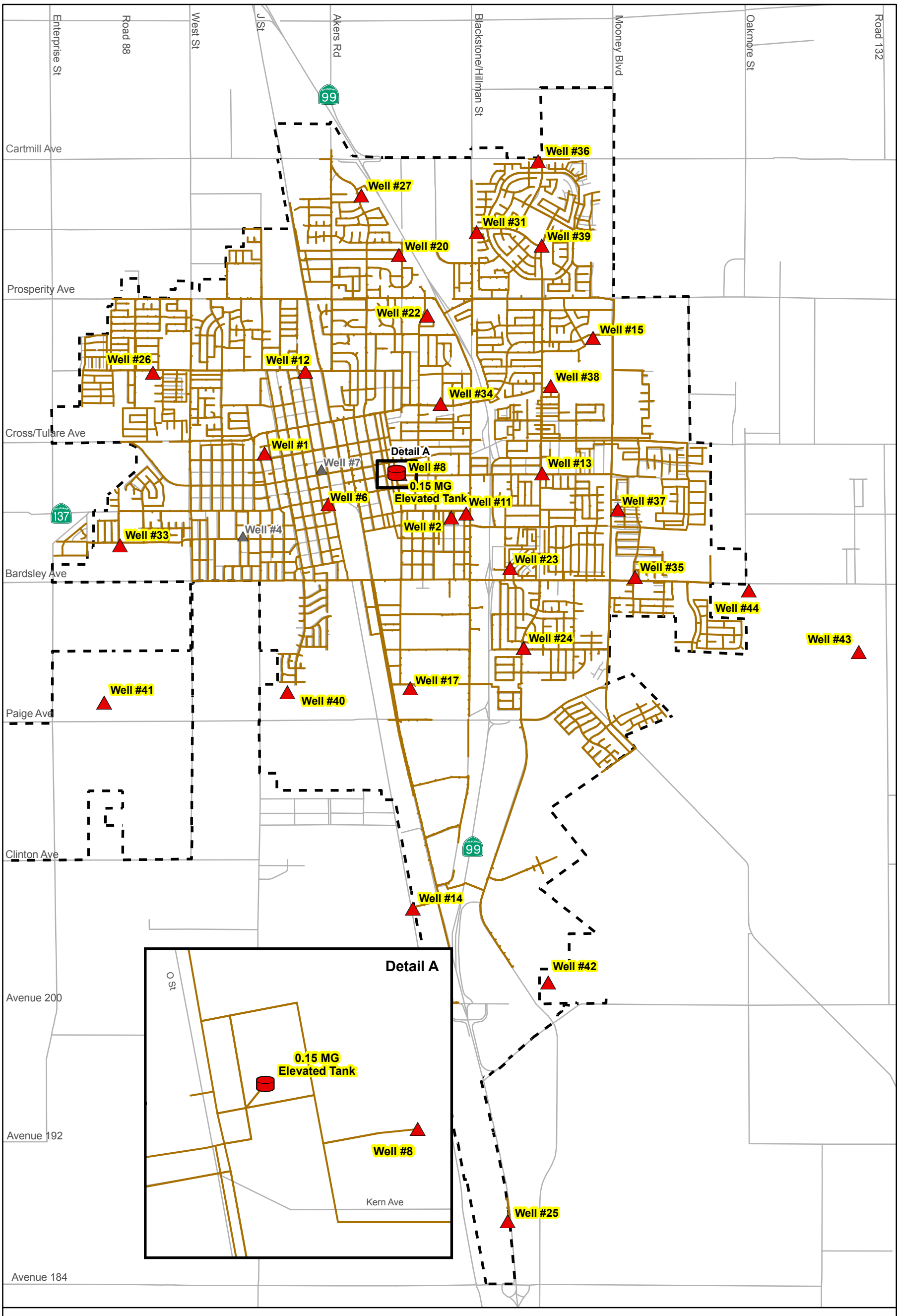
4.1.3 Current and Projected Water Supply Sources

As shown in Table 4.2, the City plans to utilize local groundwater as its sole source of supply for the foreseeable future. Table 4.2 summarizes the current and projected water supply sources for the City.

Although the City does use its treated wastewater effluent as recycled water for use on non-food crop irrigation and groundwater recharge, the City does not currently use its recycled water to offset water needed for municipal use. In addition, the recycled water stream is not treated to meet Title 22 standards. For these reasons, recycled water is not accounted for as a water supply source in Table 4.2.

The groundwater basin from which the City pumps its water has not been adjudicated. Due to the groundwater basin's non-adjudicated status, the State of California cannot create limitations on groundwater extractions made for beneficial use. As a municipal water supplier, the City acts on behalf of the landowners overlying the groundwater basin and subsequently may draw groundwater for the landowners' beneficial use.

[1] City of Tulare Water System Master Plan (2009).



Legend

Existing Water Distribution System*

- Groundwater Supply Well
- Storage Tank
- Abandoned Groundwater Supply Well
- Pipelines
- Streets
- City Limits

Feet: 0 – 2,500 – 5,000

Figure 4.1
Water Supply and Distribution System Facilities
2010 Urban Water Management Plan
City of Tulare

*As of January 2009

Table 4.1 Water Supply Wells
2010 Urban Water Management Plan
City of Tulare

Well Number	Status[2]	Date Drilled	Well Depth (ft)	Horse Power	Well Capacity (gpm)
1	AU	1950	610	125	1,131
2	AU	1947	355	50	394
6	AT	1952	600	125	1,113
8	AU	1925	460	40	317
11	AT	1955	756	150	885
12	AU	1960	718	150	1,441
13	AU	1964	740	60	508
14	AT	1970	720	125	1,100
15	AT	1972	700	100	795
17	AU	1974	696	200	1,675
20	AU	1959	200	25	206
22	AT	1976	715	125	1,000
23	AU	1961	430	50	433
24	AU	1970	284	75	695
25	AT	1988	715	150	1,032
26	AT	1991	735	200	1,310
27	AT	1992	720	200	1,163
31	AU	1996	720	50	373
33	AT	2001	770	200	625
34	AT	2001	766	200	1,652
35	AT	2004	780	200	1,132
36	AT	2004	620	200	1,051
37	AT	2005	710	200	1,527
38	AT	2005	680	200	1,463
39	AT	2005	620	125	781
40	AT	2009	745	200	1,667
41	AT	2009	785	200	1,766
42	AT	2008	720	200	1,414
43	AT	2009	550	200	1,475
44	AT	2009	570	200	1,420
		Total Active Well Capacity (gpm)			**31,544**
		Total Active Well Capacity (mgd)			**45.5**

Notes:
1. Source: City staff records.
2. AU = active untreated, AT = active treated

Table 4.2	Water Supplies - Current and Projected (Guidebook Table 16) 2010 Urban Water Management Plan City of Tulare						
Water Supply Sources		**Projected Water Supply (AFY)**					
Water purchased from:	**Wholesale Supplied Volume**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Wholesale Agencies (None)	N/A	0	0	0	0	0	0
Supplier-Produced Groundwater(2)	No	17,461	22,091	23,940	29,051	35,231	42,964
Supplier-Produced Surface Water	N/A	0	0	0	0	0	0
Transfers In	N/A	0	0	0	0	0	0
Exchanges In	N/A	0	0	0	0	0	0
Recycled Water	N/A	0	0	0	0	0	0
Desalinated Water	N/A	0	0	0	0	0	0
Other	N/A	0	0	0	0	0	0
Total		**17,461**	**22,091**	**23,940**	**29,051**	**35,231**	**42,964**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. The water quantities listed represent the amount of water the City projects to acquire from groundwater for municipal use.

4.1.4 Wholesale Supplies

As indicated on Table 4.3, the City does not receive wholesale water, nor does it plan to in the foreseeable future.

Table 4.3	Wholesale Supplies – Existing and Planned Sources of Water (Guidebook Table 17) 2010 Urban Water Management Plan City of Tulare					
	Contracted Volume (AFY)	**Projected Water Supply (AFY)**				
Wholesale Sources		**2015**	**2020**	**2025**	**2030**	**2035**
None	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

4.2 GROUNDWATER BASIN

For planning purposes, the Department of Water Resources (DWR) has subdivided the State of California into ten separate hydrologic regions, corresponding to the State's major drainage basins. The City is located within the Tulare Lake Hydrologic Region.

Groundwater within the State is divided into distinct groundwater basins, some of which are further divided into smaller interconnected subbasins. This section summarizes the groundwater basin underlying the City.

4.2.1 Groundwater Basin Description

The groundwater underlying the City is located within the larger San Joaquin Valley Groundwater Basin (Basin), specifically located within the Kaweah Groundwater Subbasin (Subbasin; Figure 4.2). The Basin contains multiple interconnected subbasins that transmit, filter, and store water, including the Kings, Kern County, Kaweah, Tulare Lake, Tule, Pleasant Valley, and Westside groundwater subbasins. The Subbasin lies between the Kings Groundwater Subbasin to the north, Tule Groundwater Subbasin to the south, crystalline bedrock of the Sierra Nevada foothills to the east, and Tulare Lake Groundwater Subbasin to the west.

According to the DWR Bulletin 118, the Subbasin (Groundwater Subbasin Number 5-22.11) has a surface area of approximately 446,000 acres (696 square miles) in Tulare County and Kings County. The Subbasin generally comprises the land within the Kaweah Delta Water Conservation District (KDWCD). The two major rivers overlying the Subbasin are the Kaweah and St. Johns Rivers, with the Kaweah River being the primary source of natural recharge to the area. The hydrogeology of the Subbasin is derived from the marine and continental sediments of the San Joaquin Valley. The trough structure of the valley creates the depositional axis around which a series of rivers, lakes, sloughs, and marshes are located. The valley structure also marks the current and historic surface drainage in the San Joaquin Valley. Groundwater flow is generally southwestward.

According to DWR, the groundwater in the Basin is generally of a calcium carbonate type. Total dissolved solids (TDS) values range from 35 to 1,000 mg/L, with a typical range of 300 to 600 mg/L. The Subbasin does have localized water quality impairments, including high nitrate pollution on the eastern side of the Basin. High saline water is also an issue between Lindsay and Exeter.

The Kaweah Groundwater Subbasin is not an adjudicated groundwater basin. DWR has assigned the subbasin a 'Type B' groundwater budget, which means that enough data is available to estimate groundwater extraction to meet local water needs, but not enough data is available to characterize the groundwater budget.

4.2.1.1 Water Storage

DWR estimated the total storage capacity of the Subbasin and the amount of water in storage as of 1995 using an estimated specific yield of 10.8 percent and historic water level measurements. Based on these 1995 calculations, the total storage capacity of the Subbasin is estimated to be 15,400,000 acre-feet (AF) to a depth of 300 feet (ft) and 107,000,000 AF to the base of fresh groundwater. These same calculations give an estimate of 11,600,000 AF of groundwater to a depth of 300 ft stored the Subbasin as of 1995. A 1961 estimate of the water storage in the Subbasin was 34,000,000 AF to a depth of less than 1,000 ft.

In its 2010 update to its GWMP, the Tulare Irrigation District (TID) estimated that for its 72,000-acre service area (which includes the City), there is 8,900,000 AF of storage capacity between the groundwater table and a depth of 20 ft below ground surface. This is based on an average specific yield of about 10 percent and an assumed average groundwater depth of about 135 ft.

4.2.2 Groundwater Management Plan

The City itself has not prepared a groundwater management plan (GWMP). However, two groundwater management stakeholders, whose boundaries surround the City, do maintain current ground water management plans. These water agencies are the Tulare Irrigation District (TID) and the Kaweah Delta Water Conservation District (KDWCD). Maps of these district and water service boundaries are included in Appendix E. The groundwater management plans of both agencies share common goals and discussions. While the KDWCD GWMP focuses on regional groundwater issues, TID's GWMP focuses on groundwater issues unique to the district service area. Both GWMPs are important resources in the groundwater management of the region.

Recognizing their common interests, the TID and KDWCD signed a Memorandum of Understanding (MOU) regarding groundwater management in the areas of overlap between the agency boundaries. In the case of a groundwater management disagreement between the two districts, TID maintains sole authority to manage the groundwater in TID and the City of Tulare.

4.2.2.1 Kaweah Delta Water Conservation District

The KDWCD is a regional water management agency that covers 340,000 acres, including lands in both Tulare County and Kings County, and all of TID. The KDWCD was formed under the provisions of the Water Conservation District Act of 1927. The KDWCD GWMP was originally prepared and implemented in response to 1992 state legislation AB 3030, and was updated in 2006 in response to SB 1938, more recent Water Code interpretation, and discussion within DWR's Bulletin 118. The KDWCD GWMP covers all land within its boundaries, except for land within the boundaries of a local agency that elects to not be included.

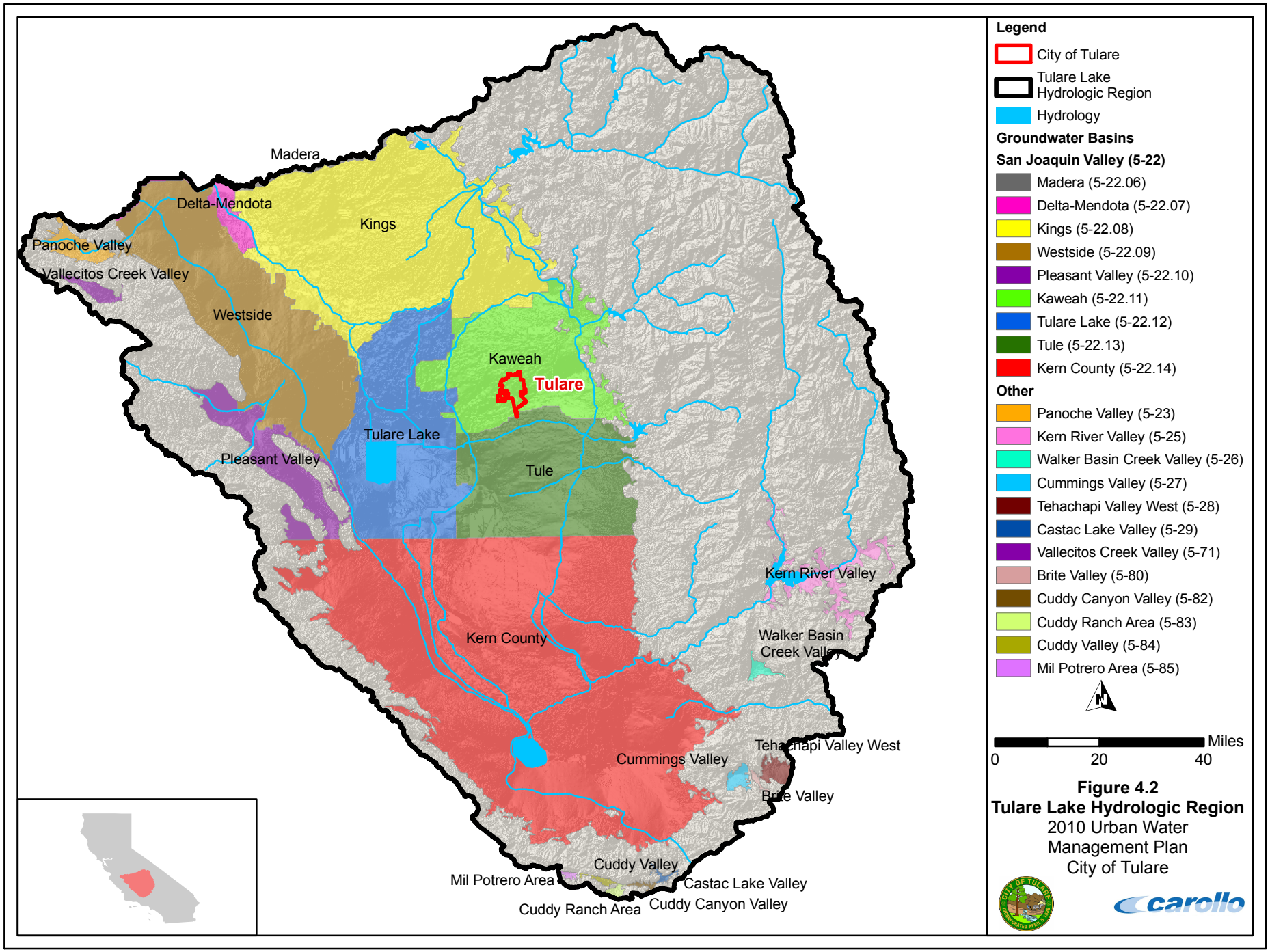


Figure 4.2
Tulare Lake Hydrologic Region
2010 Urban Water Management Plan
City of Tulare

KDWCD's GWMP recognizes that continued conjunctive management of water supplies within its area is a vital element in achieving hydrologic equilibrium. Therefore, the purpose of the GWMP is to develop supply management strategies that will retain existing surface and groundwater supplies within the district's area for future beneficial use.

A copy of the KDWCD's 2006 GWMP Update is included as a CD in Appendix F.

4.2.2.2 Tulare Irrigation District

TID is a political subdivision of the State of California operating under the California Water Code. The district was formed in 1889 as a conjunctive use district to manage, supply, and deliver water to growers within TID. TID has conjunctively utilized Kaweah River waters and groundwater since the early 1940s. TID's imported water contract supply includes a large quantity of Class 2 entitlement, a supplemental supply used largely for groundwater recharge within the Friant Unit service area.

TID surrounds but does not contain the City. The City's growth has accounted for exclusions of land from the TID due to conversion of farmland to developed urban area. TID and the City have an agreement that requires the City to pay TID tax assessments on any land space removed from TID by the City. As the City continues to grow into the district, these areas will convert from agricultural land to urban space, and will not be served by TID.

The groundwater information presented in this plan is based on the information presented in the TID 2010 GWMP. Because of TID's focus on groundwater management of the area directly surround the City, the City's groundwater management strategies should be in line with those presented in the TID GWMP. As two responsible agencies for the sustainable planning of the Subbasin's groundwater resources, the City and TID must have common and cohesive goals.

TID's GWMP documents the existing groundwater management efforts of TID and planned efforts to improve groundwater management. In addition, the GWMP identifies primary goals and objectives which were developed by TID to address specific groundwater needs and challenges. These include:

- Address potential changes in local hydrology.
- Preclude surface water or groundwater exports that would reduce long-term reliability of groundwater.
- Maintain local management of groundwater resources.
- Implement a groundwater monitoring program to indicate future water supply issues.
- Stabilize groundwater levels.
- Develop groundwater storage facilities.

- Maximize use of surface water sources.
- Minimize future land subsidence.
- Prevent groundwater degradation.

TID maintains an active conjunctive use program. According to TID, the most viable methods of maintaining the district's groundwater basin is through a continuation of their "in-lieu" recharge program. The in-lieu method of recharge relies on the maximum use of available surface water so that minimum extraction of groundwater occurs. For this reason, TID is contracted for Class 1 and Class 2 water supply on the Friant Unit of the Central Valley Project (CVP). Between CVP and local surface water supplies, TID has attempted to maintain a relatively stable depth to groundwater in the area. Drought conditions, however, typically result in increased depths to groundwater in spite of TID's extensive groundwater recharge activities.

A copy of TID's 2010 GWMP is included as a CD in Appendix G.

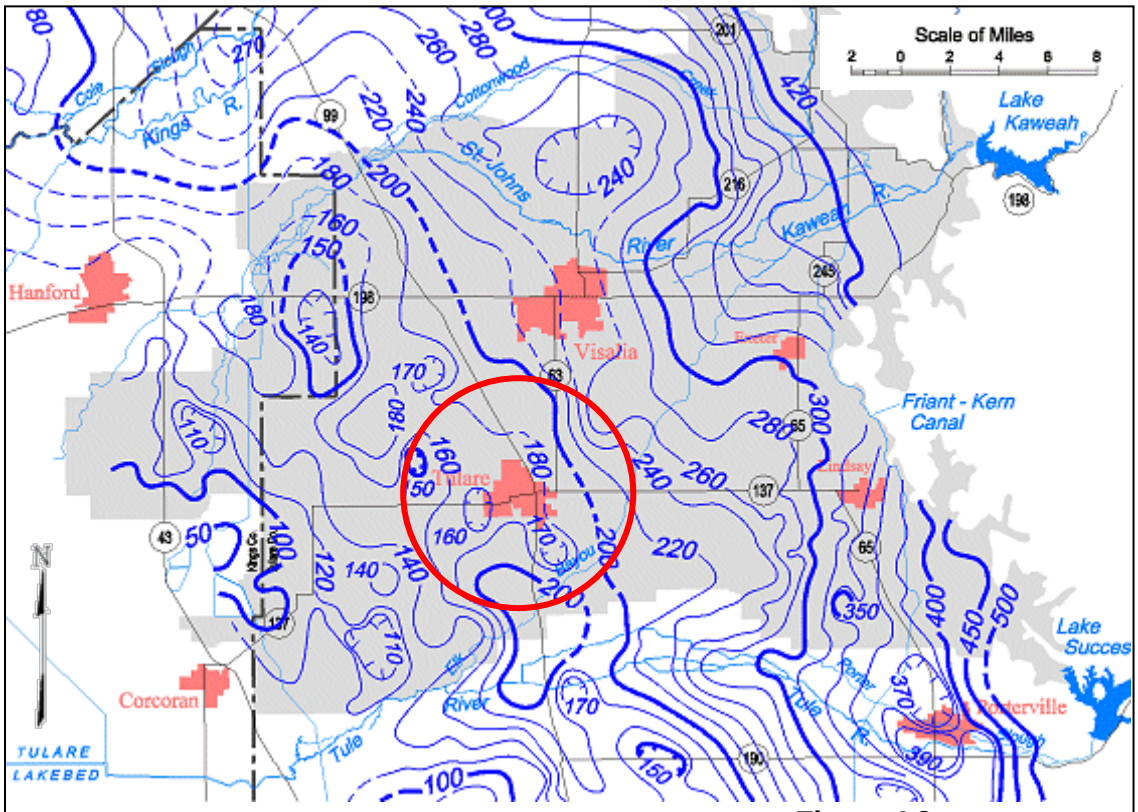
4.2.3 Groundwater Levels and Historical Trends

According to the KDWCD 2008 Groundwater Annual Report, groundwater levels in each of the six monitored hydrologic zones were relatively stable prior to 1986. Since then, levels have maintained a general downward trend, but have fluctuated in response to drought and flood years. The depth to groundwater characteristically responds to the water year with groundwater elevation generally dropping in dryer years and rising in wetter years. Overall, the average depth to groundwater in the KDWCD is dropping based on trend analysis of available since 1956. The overall result is a long-term overdraft condition. A graph of average annual groundwater depths (Fall measurements) from 1970 through 2008 are in Appendix H.

Information obtained from DWR indicates that on average, the Subbasin water levels have declined nearly 12 feet (ft) from 1970 to 2000. The period from 1970 through 1978 showed steep declines totaling about 12 ft. The ten-year period from 1978 to 1988 saw stabilization and rebound of about 50 ft, bringing water level 25 feet above the 1970 water level. 1988 through 1995 again showed steep declines, bottoming out in 1995 at nearly 35 ft below the 1970 level. From 1996 to 2000, water levels rose about 22 feet, bringing the water levels to about 12 ft below the 1970 water levels.

Groundwater level information obtained from the KDWCD 2008 Groundwater Annual Report corresponds with the DWR estimates. The high water year percentage (217 percent) of 1998 brought groundwater levels back to the 1970 depths. From 1998 until 2004, the Subbasin saw very steep declines to about 40 ft below 1970 levels. The high water years of 2005 and 2006 allowed for some groundwater level recovery, but groundwater levels have since continued to decline lower than 1970 estimates.

Based on current and historical groundwater elevation maps (Appendix I), horizontal groundwater barriers do not appear to exist in the Subbasin. Water level maps obtained from DWR indicate water levels similar to those reported by the KDWCD. In Spring 2006, groundwater was between 170 ft above mean sea level, which is 120 ft below the ground surface (Figure 4.3).



Source: www.water.ca.gov/groundwater/

Figure 4.3
Groundwater Elevation Contours - Spring 2006
2010 Urban Water Management Plan
City of Tulare

4.2.4 Groundwater Overdraft

The 2003 update to DWR Bulletin 118 identifies eleven groundwater basins in a critical state of overdraft. These eleven groundwater basins were originally identified as overdrafted by DWR in the 1980 publication of DWR Bulletin 118. No additional analysis was performed to update the status of the eleven groundwater basins for the 2003 update to DWR Bulletin 118, or to identify additional groundwater basins in a state of critical overdraft.

The Kaweah Subbasin is identified as one of the eleven groundwater basins in a critical state of overdraft by DWR Bulletin 118. According to the TID GWMP, several factors have contributed to the Subbasin's current overdraft condition: (1) planting of high water use crops, (2) double cropping, (3) dairy development, (4) urban development, (5) high groundwater pumping rates in neighboring areas, and (6) decreased surface water availability.

4.2.5 Safe Yield

The safe yield of a groundwater basin indentifies the volume of groundwater that can be pumped from the basin, over time, without producing an undesirable result. Undesirable results include depletion of groundwater reserves, deterioration of water quality, unreasonable and uneconomic pumping lifts, creation of water rights conflicts, land subsidence, and depletion of stream flow by induced infiltration[2].

In 2003 (revised in 2007), Fugro West, Inc. (Fugro) performed a study and prepared the subsequent report *Water Resources Investigation of the Kaweah Delta Water Conservation District* for the KDWCD. The purpose of the study was to conduct detailed geologic and hydrogeologic analysis to evaluate the safe yield within the KDWCD. Of the hydrologic units studied, TID and the City of Tulare were included in Hydrologic Unit No. 5, which is roughly equivalent to the TID surface area.

Based on the results of the Fugro study, the safe yield for the Hydrologic Unit No. 5 ranges between 126,000 AFY to 141,000 AFY. This "safe yield" value does not, however, represent the amount of water that the City specifically can pump from the groundwater aquifer. The City recognizes that there is a limit on the amount of groundwater that is can safely draw from the groundwater subbasin. Determination of a safe yield value specific to the City would require a detailed hydrogeologic analysis, which is beyond the scope of this study.

To address the long-term overdraft condition of the City's groundwater supply, the City issued a groundwater recharge ordinance and has developed a recharge program in collaboration with TID, described in the following section. Long-term sustainable use of groundwater is discussed in Chapter 5 of this report.

4.2.6 Groundwater Recharge

The City's groundwater recharge policy (Ordinance 06-2008) is designed to assess development impact fees for the purpose of acquiring land and developing new groundwater recharge basins (Ordinance 07-19). In addition, the recharge policy assesses the collection of funds from an increase in monthly water user rate for the purpose of acquiring surface water, when available, to recharge through the basins.

[2] Tulare Irrigation District. (2010). Groundwater Management Plan.

Currently, the City's goal is to recharge an average of 10,000-15,000 AFY in an effort to minimize overdraft from the Subbasin.

In 2008, the City and TID ratified an "Agreement Regarding Delivery of Water to Certain Groundwater Recharge Facilities." The Agreement describes the groundwater recharge operations performed by TID into recharge facilities agreed upon by the City and TID (Appendix J). In exchange for surface water for recharge, the City will pay TID a unit water charge equal to the water charge paid by the District for its Central Valley Project Class 2 contract supply. The Agreement also outlines a "credited water balance" policy to account for dry and wet water years. The purpose of the credited water balance is to ensure that a total of 10,000 AF of water is delivered to the City's recharge basins on a rolling five-year average annual basis.

TID prepared an annual report for the 2010 recharge operations performed for the City (Appendix K). Of the total 124,500 AF that was percolated to groundwater basins throughout TID's service area, 25,400 AF was percolated into the agreed-upon recharge facilities described in the Agreement, providing a direct benefit to groundwater levels under the City. Table 4.4 shows historic recharge amounts by TID and subsequent credited water balance for the City.

According to the average annual recharge quantity, the City recharges an amount equal to 34 percent of its overall groundwater production, annually, through the Agreement with TID. The average annual recharge quantity is calculated using a formula described in Exhibit B of the City's 2008 recharge agreement with TID (Appendix J).

Table 4.4 Recharge Amount and Credited Water Balance
2010 Urban Water Management Plan
City of Tulare

Year	City Groundwater Production[2] (AF)	Average Annual Quantity[3][4] (AF)	Recharge per Agreement (AF)	Difference[5]	Credited Water Balance (AF)
2006	17,313	10,000	32,300	22,300	22,300
2007	17,763	11,694	3,400	-8,294	14,006
2008	18,870	12,393	4,200	-8,193	5,813
2009	18,664	12,352	13,035	683	6,496
2010	18,470	12,169	25,434	13,265	19,761

Notes:
1. This table adapted from Tulare Irrigation District's Report on 2010 Water Management Operations for the City of Tulare.
2. Values listed for these years represent those current for the end of the prior year.
3. Average annual quantity was calculated by TID, using the formula described in Exhibit B of the 2008 Agreement between the City and TID.
4. Average annual quantity was assumed to be 10,000 acre-feet for 2006.
5. Difference = Recharge per Agreement – Average Annual Quantity.

Although the City does have its recharge program in place, additional supplies may need to be pursued at some point in the future. Long-term sustainable use of groundwater supplies is discussed in Chapter 5 of this report. Due to the City's location in the Central Valley, alternative sources of water may include but are not limited to artificial recharge, surface water diversions, water transfers, and use of recycled water. Of these, the City is currently developing its recycled water program. Although the City does not currently use recycled water to offset municipal use, it is an alternative source option for the future. More information about the City's recycled water programs are described in Section 4.5.2 of this report.

4.3 EXISTING AND PROJECTED GROUNDWATER PUMPING

The City's current sole source of supply is groundwater, which is extracted from underground aquifers via 30 active groundwater wells (Figure 4.1).

The historical volume of groundwater pumped by the City over the past five years is provided in Table 4.5. As shown in Table 4.5, the City's water supplies are entirely obtained from the Kaweah Groundwater Subbasin. The City's groundwater has historically been capable of reliably meeting the City's water demands.

The projected amount of groundwater anticipated to be pumped through year 2030 is included in Table 4.6. As shown in Table 4.6, the City anticipates it will supply all of its water demands from the Kaweah Groundwater Subbasin through the year 2035.

Table 4.5 Historic Groundwater Pumping (Guidebook Table 18)
2010 Urban Water Management Plan
City of Tulare

Basin Name	Metered or Unmetered[3]	Historic Pumping Rates (AFY)				
		2006	2007	2008	2009	2010
Kaweah Subbasin[2]	Metered	17,763	18,870	18,663	18,469	17,461
Total Groundwater Pumped		**17,763**	**18,870**	**18,663**	**18,469**	**17,461**
Groundwater as Percent of Total Water Supply		**100%**	**100%**	**100%**	**100%**	**100%**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. The City receives its groundwater from the Kaweah Subbasin, which is part of the San Joaquin Valley Groundwater Basin.
3. The City has meters on its production wells to quantify the total groundwater pumped.

Table 4.6 Projected Groundwater Pumping (Guidebook Table 19) 2010 Urban Water Management Plan City of Tulare					
	Projected Pumping Rates (AFY)				
Basin Name	**2015**	**2020**	**2025**	**2030**	**2035**
Kaweah Subbasin(2)	22,091	23,940	29,051	35,231	42,964
Total Groundwater Pumped	**22,091**	**23,940**	**29,051**	**35,231**	**42,964**
Groundwater as Percent of Total Water Supply	**100%**	**100%**	**100%**	**100%**	**100%**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. The City receives its groundwater from the Kaweah Subbasin, which is part of the San Joaquin Valley Groundwater Basin.

4.4 TRANSFER AND EXCHANGE OPPORTUNITIES

The UWMPA requires that the UWMP address the opportunities for transfers or exchanges.

Law

> *10631 (d). Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.*

Currently, no long-term contracts or formal agreements for specific exchanges or transfers are in place.

However, the City has purchased water from the TID during wetter years when surplus water is available, including during 1996. In addition, the City and TID have an existing agreement related to TID's use of a City-owned portion of Kaweah Ditch Pipeline and the City's use of TID canals for storm drain purposes. The agreement is attached as Appendix L. The agreement also provides for the joint development of projects to which the City and TID may contribute resources for joint benefit including but not limited to development of groundwater recharge facilities, acquisition of local water rights for imported supplies to provide mutual benefits, potential delivery of treated wastewater in the TID water delivery system and development of a program for surface water supplies to be delivered by TID to the City for municipal use. However, there are no short- or long-term plans to create transfer or exchange agreements with TID at this time (Table 4.7).

Table 4.7 Transfer and Exchange Opportunities (Guidebook Table 20) 2010 Urban Water Management Plan City of Tulare			
Transfer Agency	**Transfer or Exchange**	**Short Term or Long Term**	**Proposed Volume (AFY)**
None	N/A	N/A	0
Total	**N/A**	**N/A**	**0**

Notes:

1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

4.5 DESALINATED WATER OPPORTUNITIES

The UWMPA requires that the UWMP address the opportunities for development of desalinated water, including ocean water, brackish water and groundwater.

Law

> *10631 (i). Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long term supply.*

4.5.1 Brackish Water and/or Groundwater Desalination

As summarized in Table 4.8, the groundwater that underlies the City is not brackish in nature and does not require desalination. However, the City could provide financial assistance to other purveyors in exchange for water supplies. Should the need arise, the City could consider this option.

Table 4.8 Opportunities for Desalinated Water 2010 Urban Water Management Plan City of Tulare	
Sources of Water	**Opportunities for Desalinated Water**
Ocean Water	None
Brackish Ocean Water	None
Brackish Groundwater	None
Other	None

4.5.2 Seawater Desalination

Because the City is not located in a coastal area, it is not practical nor economically feasible to implement a seawater desalination program (Table 4.8). However, the City could provide financial assistance to other purveyors in exchange for water supplies. Should the need arise, the City could consider this option.

4.6 RECYCLED WATER OPPORTUNITIES

The UWMPA requires that the UWMP address the opportunities for development of recycled water, including the description of existing recycled water applications, quantities of wastewater currently being treated to recycled water standards, limitations on the use of available recycled water, an estimate of projected recycled water use, the feasibility of said projected uses, and practices to encourage the use of recycled water.

Law

10633. Provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.

10633 (a). (Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

10633 (b). (Describe) the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

10633 (c). (Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

10633 (d). (Describe and quantify) the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

10633 (e). (Describe) the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

10633 (f). (Describe the) actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

10633 (g). (Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

4.6.1 Wastewater Treatment Facilities

The City's wastewater management system is comprised of two separate collection systems and treatment trains, including one for domestic wastewater flow and another for industrial wastewater flow. The Industrial Wastewater Treatment Plant (IWWTP) and Domestic Wastewater Treatment Plant (DWWTP) have a combined effluent flow of about 11 MGD (based on 2010 monitoring reports). The City recently completed an expansion

project for the IWWTP, and is currently in the process of expanding the DWWTP. Treated effluent is sent to evaporation/percolation ponds or to farmland for irrigation of crops.

All of the City's wastewater is considered undisinfected secondary-treated water, and does not meet California Code of Regulations Title 22 (Title 22) requirements for disinfected secondary or tertiary-treated water.

4.6.2 Water Recycling Facilities

After treatment, the City's treated wastewater effluent is distributed to either evaporation/percolation ponds or to nearby farmland for irrigation of food and non-food crops. Although the water used for irrigation does not offset water that would be used by the City for municipal use, it does reduce the amount of water used by farmers in the area that would otherwise come from surface water and/or groundwater sources. For the purposes of this UWMP, only the wastewater flow used for irrigation is considered "recycled water."

4.6.3 Wastewater Generation

A summary of the City's historical and projected future wastewater flow volume is provided in Table 4.9. The quantity of effluent that meets or will meet recycled water standards is also included in this table. All of the City's effluent is treated to undisinfected secondary Title 22 standards.

Table 4.9 Recycled Water – Wastewater Collection and Treatment (Guidebook Table 21)
2010 Urban Water Management Plan
City of Tulare

	Volume (AFY)						
Type of Wastewater	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Wastewater Collected and Treated in Service Area[(2)]	12,395	12,558	15,555	19,269	23,871	29,572	36,634
Volume that meets recycled water standard[(3)]	12,395	12,558	15,555	19,269	23,871	29,572	36,634

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. 2005 flows and projected flows are from the City's Sewer System Master Plan, dated July 2009. 2010 flows are from monthly irrigation monitoring reports prepared by Carollo on behalf of the City. Projected flows are based on estimated 4% flow growth from the City's Sewer System Master Plan.
3. The City's WWTP provides undisinfected secondary-treated effluent.

All of the City's water that is not distributed to farmland for recycled water use is evaporated or percolated in the City's effluent ponds (Table 4.10). The amount of water evaporated or percolated in the ponds is estimated based on the difference between the volume of total wastewater effluent and the metered volume delivered for agricultural irrigation. Projected

non-recycled wastewater disposal values are proportional to the percent of wastewater flow applied to the ponds in 2010.

Table 4.10 Recycled Water – Non-Recycled Wastewater Disposal (Guidebook Table 22)
2010 Urban Water Management Plan
City of Tulare

Method of Disposal	Treatment Level	Volume (AFY)					
		2010	2015	2020	2025	2030	2035
Evaporation/Percolation Ponds(2)	Undisinfected Secondary	3,949	4,892	6,060	7,507	9,300	11,521
Total		**3,949**	**4,892**	**6,060**	**7,507**	**9,300**	**11,521**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. The amount of water sent to the ponds is estimated based on the difference between total effluent volume and metered volume delivered for agricultural irrigation.

4.6.4 Current Recycled Water Use

Table 4.11 summarizes the 2010 recycled water deliveries from the City's WWTP. For comparison, the projected recycled water flow volumes presented in the City's 2005 UWMP are also presented in this table. The difference in the actual 2010 recycled water use and the 2005 UWMP projected recycled water use is due to the fact that wastewater flows to the City's WWTP did not grow at the rate projected in the 2005 UWMP. This is due in part to the recent economic recession, which has led to reduced wastewater flows in many agencies in the state. The volume of recycled water estimated for agricultural irrigation in the 2005 UWMP represents the total wastewater effluent flows and is not separated from storage pond application.

4.6.5 Projected Recycled Water Use

The two primary future recycled water opportunities for the City will continue to be irrigation of surround farmland and application to the City's percolation ponds. All of the parcels that currently use recycled water also use some volume of fresh water which is not metered. Therefore, the City's recycled water irrigation program has the potential for expansion as the farmers use progressively more treated effluent in lieu of fresh groundwater, or as more farms develop irrigation agreements with the City.

Table 4.11 2010 Recycled Water Use Compared to 2005 UWMP Use Projections (Guidebook Table 24) 2010 Urban Water Management Plan City of Tulare		
	Volume (AFY)	
User Type	**2010 Actual**	**2005 Projection for 2010[(2)]**
Agricultural Irrigation	8,609	14,210
Landscape Irrigation	0	0
Commercial Irrigation	0	0
Golf Course Irrigation	0	0
Wildlife Habitat	0	0
Wetlands	0	0
Industrial Reuse	0	0
Groundwater Recharge	0	0
Seawater Barrier	0	0
Geothermal Energy	0	0
Indirect Potable Reuse	0	0
Total	**8,609**	**14,210**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Source: 2005 UWMP, December 2007.

Use of recycled water for irrigation is expected to increase as more farmland is included in the City's recycled water irrigation agreement. The total projected recycled water use represents the projected volume that will be required for agricultural application (Table 4.12). Projected values are based on the percentage of recycled water application for irrigation in 2010 (approximately 70 percent of total treated effluent flow).

The City is not currently considering expansion of the recycled water system to include distribution of recycled water to serve its municipal customers. In the future, however, the City may decide to reevaluate the need for or desirability of constructing a recycled water (purple pipe) distribution system to offset some of its municipal water use.

The City has had discussions with TID on the prospect of using wastewater effluent for crop irrigation on farms that are under the jurisdiction of TID. The farmers that use treated effluent from the City currently are adjacent to the plant and can receive flows directly from the WWTP. TID has been reluctant towards accepting recycled water from the City for delivery directly into its distribution system because the effluent is not treated to a tertiary level (including disinfection). There are no plans for the City to expand any portion of its

recycled water treatment system to include tertiary treatment. Therefore, a recycled water delivery arrangement with TID is not expected at this time.

Table 4.12 Recycled Water – Potential Future Use (Guidebook Table 23)
2010 Urban Water Management Plan
City of Tulare

User Type	Description	Feasible?	Volume (AFY) 2015	2020	2025	2030	2035
Agricultural Irrigation	Irrigation of Contracted Farmland	Yes	10,663	13,209	16,364	20,272	25,113
Landscape Irrigation	N/A	N/A	0	0	0	0	0
Commercial Irrigation	N/A	N/A	0	0	0	0	0
Golf Course Irrigation	N/A	N/A	0	0	0	0	0
Wildlife Habitat	N/A	N/A	0	0	0	0	0
Wetlands	N/A	N/A	0	0	0	0	0
Industrial Reuse	N/A	N/A	0	0	0	0	0
Groundwater Recharge	N/A	N/A	0	0	0	0	0
Seawater Barrier	N/A	N/A	0	0	0	0	0
Geothermal Energy	N/A	N/A	0	0	0	0	0
Indirect Potable Reuse	N/A	N/A	0	0	0	0	0
Total			**10,663**	**13,209**	**16,364**	**20,272**	**25,113**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

4.6.6 Encouraging Recycled Water Use

The most economically and technically feasible method for the City to recycle its WWTP effluent is through the existing and potential future contracts with farmland surround the treatment plant. In addition, the City already has available storage pond capacity to dispose of recycled water that isn't allocated for irrigation. Additional measures taken by the City, such as future financial incentives, would likely not result in additional recycled water use, as summarized in Table 4.13.

Table 4.13 Methods to Encourage Recycled Water Use (Guidebook Table 25) 2010 Urban Water Management Plan City of Tulare						
	Projected Volume (AFY)					
Actions	2010	2015	2020	2025	2030	2035
Financial Incentives	0	0	0	0	0	0
Other	0	0	0	0	0	0

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

4.6.7 Recycled Water Use Optimization Plan

Because the City should be capable of recycling all projected wastewater flows through year 2035 on contracted farmland or through application to its percolation ponds, a plan for optimizing the use of recycled water in the City's service area would not result in any additional use of recycled water.

Should it become necessary or desirable in the future, the City will consider actions to facilitate the use of recycled water, such as integrating dual distribution systems in new development.

4.7 FUTURE WATER PROJECTS

The UWMPA requires that suppliers describe water supply projects and programs may be undertaken to meet the projected water demands.

Law

> *10631 (h). (Describe) all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.*

As previously noted, the City intends to meet its projected future water demands through the continued use of groundwater alone. As such, no specific future water supply projects are planned at this time (Table 4.14). The City will continue to periodically drill new supply wells in the future. Should the need arise, the City may consider pursuing an alternate source of supply to meet the growing demands of the community (e.g., surface water supply, urban recycled water use, etc.).

Table 4.14 Future Water Supply Projects (Guidebook Table 26)
2010 Urban Water Management Plan
City of Tulare

Project Name	Projected Start Date	Projected Completion Date	Potential Project Constraints	Projected Annual Supply (AFY)				
				Normal Year	Single Dry Year	Multiple Dry Year First Year	Multiple Dry Year Second Year	Multiple Dry Year Third Year
None	2010	2035	None	N/A	N/A	N/A	N/A	N/A
Total				**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

Chapter 5

WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING

This chapter describes the reliability of the City of Tulare's (City's) water supplies, including a discussion of the City's water shortage contingency plan, as well as potential supply disruptions associated with water quality issues and drought.

5.1 WATER SUPPLY RELIABILITY

The Urban Water Management Planning Act (UWMPA) requires that the Urban Water Management Plan (UWMP) address the reliability of the agency's water supplies. This includes a description of supplies that are vulnerable to seasonal or climatic variations.

Law

> *10631 (f). An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.*
>
> *10631 (c) (2). For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.*

5.1.1 Resource Maximization/Import Minimization

The City recognizes the importance of maintaining a high quality, reliable water supply. Although water is a renewable resource, there is a limit on the amount of water that can be sustainably drawn from a given supply source (e.g., groundwater basins, surface water sources). But because of the City's location in the Central Valley and proximity to other available supply sources, the use of groundwater as a primary water supply source is expected to continue through 2035.

Determining the supply reliability for the City is difficult because of the complex factors that accompany groundwater use in general. The City's wells currently draw water from a non-adjudicated groundwater basin (Kaweah Subbasin) with no limits on pumping and that has been labeled as being in a critical state of overdraft. Therefore, reliability of the groundwater supply will depend on the long-term balance between groundwater extraction and recharge for the Subbasin as a whole.

To minimize its contribution to groundwater depletion, sustainable use of groundwater supply sources is the primary focus of the City's urban water management activities extending into the future. Consequently, a main focus for the City is to maximize the efficient use of water and to promote conservation. This will be accomplished through the implementation of demand management measures (DMMs) that have not been

implemented by the City, continued implementation of DMMs that have currently been implemented by the City, and other conservation activities.

Additionally, the City has actively pursued supplemental programs. The programs include:

- **Groundwater Recharge.** The City maintains a groundwater recharge agreement with the Tulare Irrigation District (TID), described in Chapter 4 of this UWMP. This agreement directly benefits the available groundwater supply beneath the City and extends by nature into the rest of the Subbasin. To reduce the effect of drought years on groundwater supply, the City recharges surplus surface water above the contracted amount when available through TID in wet water years. The City also applies treated wastewater effluent to land for agricultural irrigation or into percolation ponds for direct recharge. The City's groundwater recharge activities are described in Chapter 4 of this UWMP.
- **Recycled Water.** A portion of the City's treated wastewater is applied to farmland. This recycled water stream does not offset municipal use because the City does not have any agricultural customers, but it does offset additional groundwater use by some of the farmers that receive the effluent, who would otherwise use groundwater to irrigate their fields.
- **Transfer/Exchanges.** Although there are no long-term contracts or formal agreements for specific exchanges or transfers are in place, the City has purchased water from TID when surplus water is available. The City and TID have an existing agreement that provides for the potential joint development of acquisition of local water rights for imported supplies to provide mutual benefits, delivery of treated wastewater in the TID water delivery system, and development of a program for surface water supplies to be delivered by TID to the City for municipal use.

5.1.2 Factors Affecting Supply Reliability

There are a variety of factors that can impact water supply reliability. Factors impacting the City's supply sources are indicated with a "Yes" or "No" as appropriate in Table 5.1. A brief discussion on each of these factors is provided below.

A fundamental factor that affects water supply reliability is the hydraulic capacity of supply and distribution system facilities (e.g., groundwater wells, treatment facilities, transmission mains). As the City continues to grow, it will construct the additional supply and distribution system facilities necessary to accommodate the increased water demands associated with this growth. For this reason, the physical capacity of the City's supply facilities is assumed to not be a limiting factor affecting the reliability of the City's supply in the future, as is not listed in Table 5.1. In 2009, the City adopted a Water System Master Plan, which details plans for water and wastewater facilities expansion and capital improvement projects through 2030.

Table 5.1 Factors Resulting in Inconsistency of Supply (Guidebook Table 29)
2010 Urban Water Management Plan
City of Tulare

Water Supply Sources	Specific Source Name	Limitation Quantification	Legal	Environmental	Water Quality	Climatic	Additional Information
Wholesale Agencies (None)	No Sources	--	--	--	--	--	--
Supplier-Produced Groundwater	City Groundwater Wells	None	No	No	No	No	No Inconsistent Supplies
Supplier-Produced Surface Water	No Sources	--	--	--	--	--	--
Transfers In	No Sources	--	--	--	--	--	--
Exchanges In	No Sources	--	--	--	--	--	--
Recycled Water	No Sources(2)	--	--	--	--	--	--
Desalinated Water	No Sources	--	--	--	--	--	--
Other	No Sources	--	--	--	--	--	--

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Recycled water is not used to offset potable water demand in the City, but is used for agricultural irrigation. See Chapter 4 for more information.

5.1.2.1 Legal Factors

Legal factors, such as pumping limitations in adjudicated groundwater basins and surface water contracts, are capable of affecting the reliability of a water distribution system. As noted in Chapter 4, however, the Kaweah Subbasin (the City's sole source of supply) is not an adjudicated groundwater basin. Therefore, there are no legal limitations on the amount of groundwater that the City can extract from this subbasin.

5.1.2.2 Environmental Factors

There is a heightened awareness of the impact on the California ecosystem from a variety of projects. As such, environmental concerns often arise during the water planning process. These concerns can, in turn, cause a lack of supply due to the enforcement of environmental legislation. The recent legal actions involving the Endangered Species Act in the Delta are an example of the clash between environmental concerns and water supply.

The City currently relies on groundwater to meet its customers' demands. It is not expected that the City's groundwater supply will be limited due to environmental concerns in the future.

5.1.2.3 Water Quality Factors

The quality of water obtained from a surface water or groundwater source can be a limiting factor on the amount of water that can be obtained from that source. Water quality considerations specific to Tulare are summarized in detail in Section 5.3. As noted in this section, the City's current groundwater supply is capable of reliably meeting City demands and does not have any groundwater quality concerns.

In the future, the City will take the steps necessary to comply with all existing and future groundwater quality regulations and to continue to provide reliable water service to its residents.

5.1.2.4 Climatic Factors

Climatic factors affecting the reliability of a given water supply system generally are a function of seasonal precipitation and runoff characteristics. Systems that rely primarily on surface water are particularly vulnerable to seasonal runoff. The City relies on groundwater to meet system demands. Therefore, the City is not vulnerable to supply reductions due to decreased runoff.

Not all dry years lead to water supply shortages and groundwater overdraft. In an average or wet year, the water supply sources exceed the water needs. During extended drought periods, groundwater levels generally decline and will require more aggressive demand management practices. Overall, however, the reliability and vulnerability of the City's groundwater supply to seasonal or climatic shortages remains constant. Therefore, the annual quantity of groundwater available to the City is not expected to vary significantly in

relation to wet or dry years. The City's projected supply and demands associated with drought periods are discussed in greater detail in Section 5.4.

Groundwater pumping in the Tulare Lake Hydrologic Region continues to increase in response to growing urban and agricultural demands. Long-term groundwater overdraft can result in land subsidence, which also results in a loss of storage space. This has caused some damage to canals, utilities, pipelines, and roads in the region. However, some agencies within the Tulare Lake Hydrologic Region have adopted groundwater replenishment programs to ensure groundwater will continue to be a viable water supply. For this reason, climatic concerns are not expected to significantly impact the City's current or future supply reliability.

5.2 WATER SHORTAGE CONTINGENCY PLANNING

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses specified issues.

Law

10632 (a). (Describe) stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

10632 (c). Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

10632 (d). Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

10632 (e). Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

10632 (f). Penalties or charges for excessive use, where applicable.

10632 (g). An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

10632 (h). A draft water shortage contingency resolution or ordinance.

10632 (i). (Provide) a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

5.2.1 Stages of Action and Reduction Objectives

Water agencies relying solely on groundwater, such as the City, are much less likely to experience water shortages than those agencies relying primarily on surface water. However, this reliability is not guaranteed and water supply shortages or interruptions can occur due to extended periods of drought or unexpected well failures, regional power outages, earthquakes, etc. The following contingency plan was developed to ensure that the City is adequately prepared for a water shortage emergency.

The City has developed a four-stage rationing plan that will be invoked during declared water shortages. This water conservation plan is described in the City's Municipal Code (§7.32.060). Each stage includes a water reduction objective, in percent of normal water demands. The rationing plan includes voluntary and mandatory conservation measures that are dependent on the cause, severity and anticipated duration of the water supply shortage. A combination of voluntary and mandatory water conservation measures would be used to reduce water usage in the event of water shortages. Table 5.2 outlines the stages of action.

Table 5.2 Water Shortage Contingency - Rationing Stages (Guidebook Table 35)
2010 Urban Water Management Plan
City of Tulare

Stage	Condition	Type of Compliance	Reduction Objective
I	Water Alert	Voluntary	Minimize water waste at all times.
II	Water Warning	Mandatory	Approximately 10-20% reduction
III	Water Emergency	Mandatory	Approximately 20-35% reduction
IV	Extreme Emergency	Mandatory	Up to 50% reduction

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

The water restriction stages are described in more detail, below.

Stage I - Water Alert. Stage I represents a voluntary compliance measure. The City maintains a Stage I status year-round, which applies to all of its water customers (exceptions are noted in the Municipal Code), unless removed by publication of notice of Stage II or Stage III. Upon removal of Stage II or Stage III water restrictions, Stage I will be in effect.

1. Irrigation of lawn, gardens, landscaped areas, trees, shrubs, or other plants is prohibited between the hours of 10:00 AM and 6:00 PM April 1 through September 30, and then from 10:00 AM and 2:00 PM October 1 through March 31. This applies to irrigation using permanently installed automatic sprinkler systems. Irrigation of lawns, gardens, landscaped areas, trees, shrubs, or other plants is permitted at any time if:
    a. A hand-held faucet filled bucket of five gallons or less is used or,

b. A drip irrigation system is used.

2. Irrigation utilizing individual sprinklers not on automatic timing devices may be used between the hours of 6:00 AM and 10:00 AM and .or between the hours of 6:00 PM and 10:00 PM (Exception: Commercial nurseries, commercial sod farms, and public parks are exempt from Stage I irrigation restrictions, but will be requested to curtail all nonessential water use.).

3. The washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment is permitted only when using a hand-held hose equipped with a positive shutoff nozzle for quick rinses.

4. The refilling or adding of water to swimming pools, wading pools and/or spas is permitted only between the hours of 7:00 PM and 10:00 AM.

5. The operation of any ornamental fountain or other structure making similar use of water is prohibited unless the fountain uses a recycling system, such as an electric pump.

6. The washing of sidewalks, driveways, parking areas, courts, patios, or other paved areas is only permitted when using a hose equipped with a positive shutoff nozzle.

7. All restaurants are requested to serve water to customers only when specifically requested by the customers.

Stage II - Water Warning. Stage II represents a mandatory compliance measure. Upon implementation by the City Manager and/or the Water Superintendent and publications of notice, the following restrictions apply to all persons. All elements of Stage I remain in effect in Stage II except that:

1. All outdoor irrigation of vegetation shall occur only between the hours of 6:00 PM and 10:00 PM on designated days.

2. Dwellings or establishments with even-numbered street addresses may water only on Wednesday, Friday, and Sunday, subject to the time restrictions set forth above.

3. Dwellings or establishments with odd-numbered street addresses may water only on Tuesday, Thursday, and Saturday subject to the time restrictions set forth above.

4. Monday is a non-watering day unless an exemption is on file with the water department.

5. The washing of sidewalks, driveways, parking areas, courts, patios, or other paved area is absolutely prohibited.

6. The use of water for irrigation of golf greens and tees is permitted on designated irrigation days between the hours of 8:00 PM and 10:00 AM.

Stage III - Water Emergency. Stage III represents a mandatory compliance measure. Upon implementation by the City Manager and/or the Water Superintendent and

publications of notice, the following restrictions apply to all persons. All elements of Stage II remain in effect in Stage III except that:

1. All outdoor irrigation of vegetation shall be allowed only between the hours of 8:00 PM and 7:00 AM on designated days.
2. The washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment not occurring upon the immediate premises of commercial car washes and commercial service stations and not in the immediate interest of the public health, safety, and welfare is prohibited.
3. The washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment not occurring upon the immediate premises of commercial managed and supervised hand car washes or in the immediate interest of the public health, safety, and welfare, may occur only between the hours of 6:00 AM and 1:00 PM.
4. The washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment not occurring upon the immediate premises of commercial non-managed car washes (hand-held nozzle type) and commercial service stations or in the immediate interest of the public health, safety, and welfare, may occur only between the hours of 7:00 PM and 8:00 AM.
5. The watering of golf course tee areas is prohibited.
6. Use of water from fire hydrants is limited to fire fighting and/or other activities immediately necessary to maintaining the health, safety, and welfare of the citizens of the City.
7. Commercial nurseries, commercial sod farms, and similar establishments may water only on designated days between the hours of 10:00 AM and 6:00 PM and may use only hand-held hoses, drip irrigation systems, or hand-held buckets.
8. The filling, refilling, or adding of water to swimming pools, wading pools, and/or spas is prohibited.
9. Exception: City parks may water during the hours of 8:00 AM to 6:00 PM to protect the investment in public parks.

Stage IV - Extreme Emergency. Stage IV represents a mandatory compliance measure. Upon implementation by the City Manager and/or Water Superintendent and publication of notice, the following restrictions apply to all persons. All elements of Stage II and Stage III remain in effect in Stage IV except that:

1. No outdoor irrigation of vegetation. There is no watering outdoors until Stage IV emergency restrictions is over.
2. No washing of automobiles, trucks, trailers, boats, airplanes, or other types of mobile equipment until Stage IV emergency restriction is over.

3. Exceptions:

   a. Outdoor water use in the interest of public health, safety, and welfare is allowed by permit only, after review and approval by the Water Superintendent.

   b. City parks, schools, golf courses, commercial nurseries, and similar establishments may water once per week by permit only, after review and approval by the Water Superintendent.

The Public Works Department will monitor the projected water supply and demand within the City and recommend to the City Manager and Water Superintendent the extent of the conservation action required. Then, the City Manager, and/or the Water Superintendent as directed by administrative policies, may order the appropriate phase of water conservation to be implemented or terminated in accordance with applicable notice provisions. The notice will be published in a newspaper of general circulation within the City at least once prior to its effective date. The declaration will remain in effect until the Water Superintendent determines that the conditions that generated the need for the declaration no longer existence.

5.2.1.1 Administration of Water Shortage Program

The administration of a water shortage program would involve coordination among a number of City departments. The City Manager and Water Superintendent would have primary responsibilities in managing a water shortage program efforts.

5.2.2 Actions During a Catastrophic Interruption

In the event of a water supply shortage, interruption, or catastrophic event, the City Council may declare a water shortage emergency and implement the appropriate measures to offset the supply shortage. Depending on the severity of the shortage, the City may implement voluntary or mandatory measures as described in Section 5.2.1.

Development of temporary supplemental water supplies may also offset catastrophic water supply shortages. Possible supplemental supplies included banked groundwater and temporary purchases from the Tulare Irrigation District for recharge purposes.

5.2.3 Mandatory Prohibitions on Water Wasting

Mandatory compliance measures enacted during a water shortage are more severe than voluntary measures, produce greater savings, and are less costly to the utility. The principal drawback to these measures is the customer resentment if the measures are not seen as equitable. Therefore, such measures need to be accompanied by a good public relations campaign.

Mandatory measures may include:

- Ordinances making water waste illegal
- Ordinances controlling landscape irrigation

- Ordinances restricting non-irrigation outdoor water uses
- Prohibitions on new connections or the incorporation of new areas
- Rationing

Prohibitions on new development may conflict with other policies and needs. However, if existing customers are called upon to make sacrifices during a drought period, they may feel that water agencies should concentrate on fulfilling current obligations rather than taking on new customers. Such prohibitions may need to be considered in the event of a critical shortage, such as the 50 percent reduction program. If necessary, an offset program might be considered whereby developers demonstrate that they will implement measures to conserve at least as much water in the existing community as their new project will use. In some cases, a two to one offset may be required of the new development.

The City currently enforces Municipal Code Section 7.32.050 (Appendix E). This code specifies certain water use prohibitions described in Table 5.3. In addition, the City may implement additional consumption reduction methods during Water Conservation Stages I, II, III, and IV, as summarized in Section 5.2.4.

5.2.4 Consumption Reduction Methods in Most Restrictive Stage

In order to achieve a 50 percent reduction in water use during the most restrictive stage of a water supply emergency, the City will implement and enforce the water prohibitions described in Section 5.2.1 as well as Section 5.2.3. Table 5.4 provides examples of consumption reduction methods described in those sections and the stage when the method becomes effective.

5.2.5 Excessive Use Penalties

According to the City's Municipal Code (§ 7.32.080), "Any person violating any provision of this chapter shall be guilty of an infraction and upon conviction thereof shall be subject to the general penalty provisions of § 1.12.010 of this code. A person shall be deemed guilty of a separate offense for each day during any portion of which a violation of this title is committed, continued or permitted by the person and shall be punishable, as herein provided. All remedies provided for herein shall be cumulative and not exclusive."

Customers violating the regulations and restrictions on water use set forth in the Municipal Code shall receive actions by the City, as summarized in Table 5.5.

Table 5.3	**Water Shortage Contingency - Mandatory Prohibitions (Guidebook Table 36) 2010 Urban Water Management Plan City of Tulare**
Prohibitions	**Stage When Prohibition Becomes Mandatory**
The use of water which allows any amount of water to run off to a gutter, ditch, or drain. Every water user is deemed to have his or her water distribution lines and facilities under his or her control at all times and to know the manner and extent of his or her water use and excess run-off.	Stages I, II, III, and IV
The excessive use, loss, or escape of water through breaks, leaks, or malfunctions in the water user's plumbing or distribution facilities for any period of time after the escape of water should reasonably have been discovered and corrected. It shall be presumed that a period of 48 hours after discovery is a reasonable time within which to correct the leak or break.	Stages I, II, III, and IV
The washing of vehicles, building exteriors, sidewalks, driveways, parking areas, tennis courts, patios or other paved areas without the use of a positive shut-off nozzle on the hose, which results in excessive run-off, except where necessary to dispose of liquids or substances that would endanger the public's health and safety.	Stages I, II, III, and IV
The watering of lawns, ground cover, and shrubbery shall be prohibited between the hours of 10:00 a.m. and 6:00 p.m. from April 1, or earlier as determined by the prior winter water conditions, and shall remain in effect through September 30. Restrictions may be extended beyond September 30, depending on actual water conditions. Exception: Commercial nurseries, commercial sod farms, golf courses and public parks are exempt from the restriction in this division (D), but will be requested to minimize water waste at all times.	Stages I, II, III, and IV

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

Table 5.4	Water Shortage Contingency - Consumption Reduction Methods (Guidebook Table 37) 2010 Urban Water Management Plan City of Tulare	
Reduction Method Description	**Stage When Method Takes Effect(2)**	**Projected Reduction(3) (%)**
Demand reduction program	Stages I - IV	Up to 50
Restrict water use for only priority uses	Stages I - IV	Up to 50
Use prohibitions	Stages I - IV	Up to 50
Education program	Stages I - IV	Up to 50
Restrict outdoor watering	Stages III, IV	Up to 50
Restrict automobile washing	Stages III, IV	Up to 50

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Consumption reduction measures will be implemented by the City as appropriate given the nature of the water supply shortage.
3. Projected reductions, when implemented in concert, should be capable of achieving a system wide reduction of 50%.

Table 5.5	Water Shortage Contingency - Penalties and Charges (Guidebook Table 38) 2010 Urban Water Management Plan City of Tulare
Penalty/Charge	**Stage When Penalty Takes Effect**
A fine not exceeding $100 for a first violation.	Stages I - IV
A fine not exceeding $200 for a second violation of the same ordinance within 12 months.	Stages I - IV
A fine not exceeding $500 for each additional violation of the same ordinance within 12 months.	Stages I - IV

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

5.2.6 Revenue and Expenditure Impacts/Measures to Overcome Impacts

The majority of operating costs for most water agencies are fixed rather than a function of the amount of water sold. As a result, when significant conservation programs are undertaken, it is frequently necessary to raise water rates because the revenue generated is based on lower total consumption while the revenue required is basically fixed. Table 5.6 provides a general guide for the City to adjust water rates in the event of a water shortage

emergency. Actual rate adjustments during such an emergency may vary from those listed in Table 5.6 depending on the actual revenue impacts experienced during the emergency.

Table 5.6 General Guide for Rate Adjustment
2005 Urban Water Management Plan
City of Tulare

Stage	Rate Adjustment
I	Established rates, no percent increase
II	25 percent increase over pre-shortage rates
III	50 percent increase over pre-shortage rates
IV	100 percent increase over pre-shortage rates
End of Water Shortage Emergency	15 percent increase over pre-shortage rates. This rate increase is implemented based on historical information from communities that experienced water shortage and found that consumption rate (gpcd) does not return to pre-shortage levels. In anticipation of reduced sales, the City rates should be set for one year at 115 percent of the pre-shortage rates. This rate increase should be re-evaluated every two years.

5.2.7 Water Conservation Ordinance

The City adopted its water shortage contingency plan in 2002. A copy of the adopting resolution is included in Appendix M.

5.2.8 Reduction Measuring Mechanism

The City's water system is supplied by the groundwater wells. Each well includes a device that records the amount of water entering the City's distribution system. The City will use these devices to monitor the citywide actual reductions in water use.

5.3 WATER QUALITY

The UWMPA requires that the UWMP include a discussion of the water quality impacts on an agency's supply reliability.

Law

> *10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.*

The Safe Drinking Water Act (SDWA) was created by congress in an effort to begin implementing national drinking water standards and is overseen by the Environmental Protection Agency (EPA). The City monitors its water system in compliance with both EPA standards and Title 22 regulations to ensure that only the most pristine and suitable water is

delivered to its customers. Potential contaminants that are routinely monitored by the City include: microbial contaminants, inorganic contaminants, pesticides and herbicides, organic chemical contaminants, radioactive contaminants. Primary and secondary maximum contaminant levels (MCLs) are the highest level of a substance allowed in drinking water, and are established by Federal and State regulatory agencies. According to the City's Annual Water Quality Reports, regulated substances detected in the City's drinking water have had concentrations below the MCLs since 2000 (the earliest available reporting year), with the exception of total coliform in 2001. No fecal coliform bacteria were detected and all repeat and subsequent sampling yielded negative results. Copies of the Annual Reports for years 2000 through 2010 are included in Appendix N.

The drinking water standard for arsenic was reduced from 50 micrograms per liter (µg/L) to 10 µg/L, effective January 23, 2006. The City water supply currently meets the arsenic MCL of 10 µg/L. DHS is required to set a constituent's MCL at a level as close as practicable to its public health goal (PHG). The PHG for arsenic is currently 0.004 µg/L (EPA, 2004). If the arsenic MCL is reduced to close to the PHG limit, arsenic could potentially be a future water quality concern for the City. As there are no immediate plans to further reduce the arsenic drinking water limitation, arsenic does not pose a threat to the City groundwater supply.

Water quality influences the City's water management strategies and its efforts to comply with federal and State drinking water regulations. These regulations require rigorous water quality testing, source assessments, and treatment compliance. No other special water management strategies due to water quality effects are necessary. It is anticipated that the City will continue to depend on groundwater as a reliable water supply. Water supply changes due to water quality are not expected.

The City's water supplies are periodically chlorinated to provide a disinfectant residual that is required by federal and state regulations and helps maintain a safe drinking water supply throughout the distribution system. This treatment process has proven sufficient to meet federal and state primary and secondary drinking water regulations. Hence, the quality of groundwater is not considered an impediment to water supply reliability at this time.

5.3.1 Water Quality Impacts Summary

Based on the information presented in this section, the City has not identified any specific water quality issues that will affect the City's ability to reliably provide high quality water to its residents. For this reason, the potential supply impacts listed in Table 5.7 are listed as "0."

Table 5.7	Water Quality - Current and Projected Water Supply Impacts (Guidebook Table 30) 2010 Urban Water Management Plan City of Tulare						
		Potential Supply Impacts (AFY)					
Water Source	Description of Condition	2010	2015	2020	2025	2030	2035
Supplier-Produced Groundwater	None	0	0	0	0	0	0

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

5.4 DROUGHT PLANNING

The UWMPA requires that an UWMP include water supply and demand projections for normal, single-dry year, and multiple-dry years.

Law

> *10631 (c) (1). Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) an average water year, (B) a single dry water year, (C) multiple dry water years.*
>
> *10632 (b). (Provide) an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.*
>
> *10635 (a). Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.*

This section considers the City's water supply reliability during three climate-related water scenarios: normal water year, single dry water year, and multiple dry water years. These scenarios are defined as follows:

- **Normal Year**: The normal year is a year in the historical sequence that most closely represents median runoff levels and patterns. The supply quantities for this condition are derived from historical average yields.
- **Single Dry Year**: This is defined as the year with the minimum useable supply. The supply quantities for this condition are derived from the minimum historical annual yield.

- **Multiple Dry Years**: This is defined as the three consecutive years with the minimum useable supply. Water systems are more vulnerable to these droughts of long duration, because they deplete water storage reserves in local and state reservoirs and in groundwater basins. The supply quantities for this condition are derived from the minimum of historical three-year running average yields.

The City's water supply consists solely of groundwater.

5.4.1 Basis of Water Year Data

Historical rainfall data available for Visalia from the California Department of Water Resources' (DWR) California Data Exchange Center (CDEC)[1] were examined to establish a basis of water year for normal, single dry, and multiple dry years. As shown in Table 5.8, for the purposes of this report, the year 1997 is classified as a "normal" year, the year 1989 is classified as a "single dry" year, and the years 1988 to 1990 are classified as "multiple dry" years.

Table 5.8 Basis of Water Year Data (Guidebook Table 27)
2005 Urban Water Management Plan
City of Tulare

Water Year Type	Base Year(s)
Average Water Year	1997
Single Dry Water Year	1989
Multiple Dry Water Years	1988-1990

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Source: Historic rainfall records for Visalia station from California Data Exchange Center (CDEC) website.

5.4.2 Supply Reliability - Historic and Current Conditions

During drought years, water use patterns will typically change. Outdoor water use will typically increase as irrigation is used as a replacement for decreased rainfall. However, this increase can be offset, at least in part, by increased conservation measures. To determine the impact of drought years on the City's annual demands, the City's historical per capita water usage was evaluated. By normalizing water consumption with population and thus expressing consumption in gpcd, the increase in demands due to growth is eliminated. The historical per capita consumption in the period 2000 through 2010 is shown in Figure 5.1.

[1] Source: http://cdec.water.ca.gov/. Data was examined for the Visalia (VSL) Station (period of record: 1905 - 2010).

As shown in Figure 5.1, the per-capita demand has been variable, with a recent downward trend since 2004. Overall, there was an increase in per capita consumption from 2000 through 2004, and a gradual decrease since that time. A linear fit trend line was developed to represent the historical per capita consumption since 2000. As shown, the per capita consumption in 2004 was about 11 percent above the linear trend. This year is considered indicative of the maximum potential variation in water demands on an annual basis. For conservative planning purposes, it is appropriate to increase water demands by this percentage for the single dry and multiple dry hydrologic years.

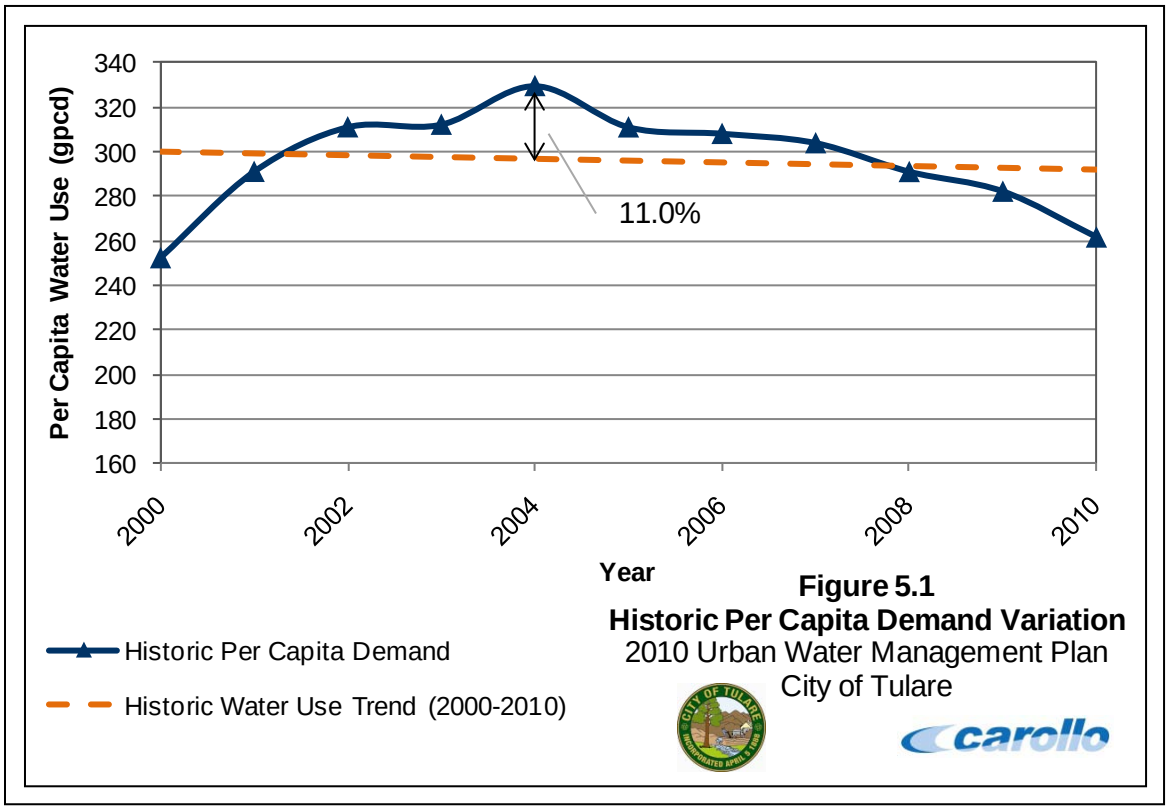


Figure 5.1
Historic Per Capita Demand Variation
2010 Urban Water Management Plan
City of Tulare

Table 5.9 presents calculations showing the percentage of supply available for the hydrologic years shown in Table 5.8. The percentages provided in Table 5.9 were developed by comparing the actual per capita demand to the per capita demand trend. Because the City relies solely on groundwater to meet its customers' demands, the available "supply" drawn from the groundwater aquifer in any year is essentially equal to the system-wide water demand for that year. As such, the variation in per capita water use from the historic trend does not necessarily coincide with "dry" or "wet" years. Factors such as conservation efforts and economic conditions also play a role in the per capita demand. For this reason, the supply percentages in Table 5.9 should not be interpreted to be a "surplus" or "deficit" in supply for those years. The percentages are simply the deviation from the historical per capita trend lines.

Table 5.9 Supply Reliability - Historical Conditions (Guidebook Table 28) 2005 Urban Water Management Plan City of Tulare					
	Average/ Normal Year (1997)	Single Dry Year (1989)	Multiple Dry Years		
Supply Source			1988	1989	1990
Kaweah Subbasin	12,995	9,369	9,983	9,369	10,207
Percent of Normal	**109**	**98**	**109**	**98**	**100**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

Based on conservative planning assumptions, the City's current supply reliability is summarized in Table 5.10. The "Normal Year" water use for Table 5.10 was calculated by multiplying the City's 2010 population (59,535) by the City's baseline per capita water use of 300 gpcd. This equates to an annual volume of 20,018 AFY for a "normal" condition. Note that the City's actual 2010 water use was somewhat less than this value (17,461 AFY) because this estimated value is based on the calculated baseline per capita water use. Single and multiple dry year water consumptions are 11 percent more than the normal water use of 20,018 AFY, or 22,229 AFY.

Table 5.10 Supply Reliability - Current Water Source (Guidebook Table 31) 2005 Urban Water Management Plan City of Tulare					
	Water Use (AFY)				
	Average/ Normal Year(2)	Single Dry Year	Multiple Dry Years		
Supply Source			Year 1	Year 2	Year 3
Kaweah Groundwater Subbasin	20,018	22,229	22,229	22,229	22,229
Percent of Normal	**100**	**111**	**111**	**111**	**111**

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.
2. Normal Year based on 2010 population (59,535) and 10-year baseline use of 300 gpcd.

5.4.3 Projected Normal Year Supply/Demand

The normal year water demands through 2035 are estimated based on the per capita water use targets summarized in Chapter 3 and populations presented in Chapter 2. The projected normal water year water supply and demand projections are provided in Table 5.11. As shown in Table 5.11, the projected supplies and demands are equal, because the City's supply source is groundwater.

Table 5.11 Supply and Demand Comparison - Normal Year (Guidebook Table 32) 2005 Urban Water Management Plan City of Tulare					
	Projected Supply/Demand (AFY)				
Supply/Demand Condition	**2015**	**2020**	**2025**	**2030**	**2035**
Supply Totals (from Guidebook Table 16)	22,091	23,940	29,051	35,231	42,964
Demand totals (From Guidebook Table 11)	22,091	23,940	29,051	35,231	42,964
Percent of Normal Demand	100	100	100	100	100
Supply and Demand Difference	0	0	0	0	0
Difference as Percent of Supply	0	0	0	0	0
Difference as Percent of Demand	0	0	0	0	0

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

5.4.4 Projected Single Dry Year Supply/Demand

The projected single dry year water demands through 2035 are estimated based on the normal year demands, the anticipated demand and supply increase (11 percent). The projected single dry water year supplies and demands are presented in Table 5.12. As shown in Table 5.12, the projected supplies and demands are equal, because the City's supply source is groundwater.

Table 5.12 Supply and Demand Comparison - Single Dry Year (Guidebook Table 33) 2005 Urban Water Management Plan City of Tulare					
	Projected Supply/Demand (AFY)				
Supply/Demand Condition	**2015**	**2020**	**2025**	**2030**	**2035**
Supply Totals (from Guidebook Table 16)	24,531	26,584	32,260	39,122	47,710
Demand totals (From Guidebook Table 11)	24,531	26,584	32,260	39,122	47,710
Percent of Normal Demand	111	111	111	111	111
Supply and Demand Difference	0	0	0	0	0
Difference as Percent of Supply	0	0	0	0	0
Difference as Percent of Demand	0	0	0	0	0

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

5.4.5 Projected Multiple Dry Year Supply/Demand

The projected multiple dry year water demands through 2035 are estimated based on the normal year demands and the anticipated demand and supply increase (11 percent). The projected multiple dry water year supplies and demands are presented in Table 5.13. As shown in Table 5.13, the projected supplies and demands are equal, because the City's supply source is groundwater.

Table 5.13 Supply and Demand Comparison - Multiple Dry Year Events (Guidebook Table 34)
2005 Urban Water Management Plan
City of Tulare

Year		Supply/Demand Condition	Projected Supply/Demand (AFY)				
			2015	2020	2025	2030	2035
Multiple-Dry Year	1st Year Supply	Supply Totals	24,531	26,584	32,260	39,122	47,710
		Demand totals	24,531	26,584	32,260	39,122	47,710
		Percent of Normal Demand	111	111	111	111	111
		Supply and Demand Difference	0	0	0	0	0
		Difference as Percent of Supply	0	0	0	0	0
		Difference as Percent of Demand	0	0	0	0	0
	2nd Year Supply	Supply Totals	24,531	26,584	32,260	39,122	47,710
		Demand totals	24,531	26,584	32,260	39,122	47,710
		Percent of Normal Demand	111	111	111	111	111
		Supply and Demand Difference	0	0	0	0	0
		Difference as Percent of Supply	0	0	0	0	0
		Difference as Percent of Demand	0	0	0	0	0
	3rd Year Supply	Supply Totals	24,531	26,584	32,260	39,122	47,710
		Demand totals	24,531	26,584	32,260	39,122	47,710
		Percent of Normal Demand	111	111	111	111	111
		Supply and Demand Difference	0	0	0	0	0
		Difference as Percent of Supply	0	0	0	0	0
		Difference as Percent of Demand	0	0	0	0	0

Notes:
1. "Guidebook Table X" refers to a specific table in the "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan" by DWR.

DEMAND MANAGEMENT MEASURES

The Urban Stormwater Management Act (UWMPA) identifies 14 Demand Management Measures (DMM) for urban water suppliers to address. These measures are derived from the original Best Management Practices (BMPs) established in the UWMPA and the 1991 Memorandum of Understanding (MOU).

Law

> *10631 (f) (1) and (2). (Describe and provide a schedule of implementation for) each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following: (A) water survey programs for single-family residential and multifamily residential customers; (B) residential plumbing retrofit; (C) system water audits, leak detection, and repair; (D) metering with commodity rates for all new connections and retrofit of existing connections; (E) large landscape conservation programs and incentives; (F) high-efficiency washing machine rebate programs; (G) public information programs; (H) school education programs; (I) conservation programs for commercial, industrial, and institutional accounts; (J) wholesale agency programs; (K) conservation pricing; (L) water conservation coordinator; (M) water waste prohibition; (N) residential ultra-low flush toilet replacement programs.*
>
> *10631 (f) (3). (Provide) a description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.*
>
> *10631 (f) (4). (Provide) an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.*
>
> *10631 (g). (Provide) an evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following: (1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors; (2) Include a cost-benefit analysis, identifying total benefits and total costs; (3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost; (4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.*

In 1991 (amended September 16, 1999), an MOU regarding urban water conservation in California was made that formalizes an agreement between Department of Water Resources (DWR), water utilities, environmental organizations, and other interested groups to implement DMMs and make a cooperative effort to reduce the consumption of California's water resources. This MOU is administered by the California Urban Water Conservation Council (CUWCC). The City of Tulare (City) is not currently a signatory of the MOU and is therefore not a member of CUWCC. The City may consider becoming a member of the CUWCC in the future.

However, the City realizes the importance of the BMPs to ensure a reliable future water supply. The City is committed to implementing water conservation and water recycling programs to maximize sustainability in meeting future water needs for its customers. Due to the continued effective water conservation measures implemented by the City, the 2010 per capita water use has dropped to roughly 262 gallons per capita per day (gpcd) from 329 gpcd in 2004.

The DWR has assigned an enhanced terminology to the BMPs. Accordingly, this chapter will refer to them as DMMs. The DMMs described hereafter fall into one of four categories (Table 6.1). Of the thirteen DMMs applicable to the City, twelve have been implemented or are planning to be implemented, and one has not yet been implemented, but has undergone a cost effectiveness analysis. For the DMMs that have already been implemented or that are in their planning stages, the City will continually assess the success of the programs and make changes to the organization and/or operation of the conservation measures as appropriate.

6.1 DMM 1 - WATER SURVEY PROGRAMS FOR SINGLE-FAMILY RESIDENTIAL AND MULTIFAMILY RESIDENTIAL CUSTOMERS

This program consists of offering water audits to residential customers. Audit components include reviewing water usage history with the customer, identifying leaks inside and outside, recommending improvements, and meter-reading, when appropriate.

6.1.1 Implementation Status

Based on an evaluation performed for this DMM in the City's 2005 UWMP, the City has decided not to pursue this measure. The cost savings and benefits were not great enough for the City to implement a formal water survey program. However, the City does provide auditing services on a demand basis. For example, the City will assist homeowners in finding leaks that have resulted in unusually high water bills. In addition, the City will instruct users on how to read their own meters when requested.

6.1.2 Cost Benefit Analysis

The City is not currently implementing this DMM with a formal survey program. An economic analysis was performed on this DMM and is included in Appendix O, which is summarized for this DMM in Table 6.2. Details regarding the cost of water and calculated water savings associated with this DMM are included in Appendix O.

Table 6.1	Demand Management Measures 2005 Urban Water Management Plan City of Tulare			
Demand Management Measure	**Implemented**	**Planning to Implement**	**Cost Effective Analysis Completed**	**Not Applicable**
DMM 1 - Water Survey Programs			☑	
DMM 2 - Residential Plumbing Retrofit	☑			
DMM 3 - Water System Audits	☑			
DMM 4 - Metering with Commodity Rates	☑			
DMM 5 - Landscape Irrigation Programs	☑			
DMM 6 - Washing Machine Rebate Program		☑		
DMM 7 - Public Information	☑			
DMM 8 - School Education	☑			
DMM 9 - Commercial, Industrial & Institutional Programs	☑			
DMM 10 - Wholesale Agency Programs				☑
DMM 11 - Conservation Pricing		☑		
DMM 12 - Water Conservation Coordinator	☑			
DMM 13 - Water Waste Prohibition	☑			
DMM 14 - Ultra Low Flush Toilet Replacement		☑		

Table 6.2	Cost Benefit Analysis, DMM 1 2010 Urban Water Management Plan City of Tulare
Cost Effectiveness Summary	
Total Costs	$59,213
Total Benefits	$10,473
Benefit/Cost Ratio	0.18

As shown in Table 6.2, the benefit/cost ratio for this DMM is 0.18. This indicates that full-scale implementation of this conservation measure is not justified from a cost perspective, and that the City will likely not consider its implementation in the near future.

6.1.3 Economic/Non-Economic Factors

There are certain advantages that could be realized by performing residential water audits, including a reduction in the amount of groundwater pumped by the City and an opportunity to characterized water use practices by City residents. However, implementation of this DMM would require staff time and resources to be allocated to a program that would likely provide little benefit to the City on a cost basis.

6.1.4 Legal Authority

This DMM is a survey program that could be implemented by the City. The City has the legal authority to implement this DMM; however, it has chosen not to.

6.2 DMM 2 - RESIDENTIAL PLUMBING RETROFIT

This program consists of installing physical devices to reduce the amount of water used or to limit the amount of water, which can be served to the customer. In accordance with State Law, low flow fixtures have been required on all new construction since 1978. In addition, State legislation enacted in 1990 requires all new buildings after January 1, 1992 to install Ultra-Low Flush Toilets (ULFT).

Several studies suggest that savings resulting from miscellaneous interior retrofit fixtures can range between 25 and 65 gallons per day (gpd) per housing unit. The studies also suggest that installation of retrofit fixtures in older single-family homes tend to produce more savings, while newer multi-family homes tend to produce fewer saving per housing unit.

The City does not have an enforceable ordinance in effect requiring replacement of high-flow showerheads and other water use fixtures with low-flow fixtures; therefore, the City does not have the legal authority to require that these fixtures be installed.

6.2.1 Implementation Status

The City has implemented this DMM. Based on the projected total amount saved from the cost/benefit analysis from the City's 2005 UWMP, the City has started to develop their residential plumbing retrofit program.

6.2.2 Steps Necessary to Implement

To implement this program, the City will make available to its water customers water conserving fixtures such as showerheads and sink aerators. Through marketing efforts

directed at its customers, the City will establish the importance of water conservation and encourage participation in the plumbing retrofit program.

6.2.3 Implementation Schedule

Program implementation will take place year-round, as long as plumbing retrofit kits are available and are still being requested by customers.

6.2.4 Methods to Evaluate Program Effectiveness

The City will monitor the effectiveness of this program by recording the number and types of plumbing retrofit kits given to its customers.

6.2.5 Conservation Savings

The City has not tracked reductions in water use related to this DMM. The City could track water savings associated with this DMM in the future in conjunction with DMM 1, as these two DMMs are somewhat related.

6.3 DMM 3 - SYSTEM WATER AUDITS, LEAK DETECTION, AND REPAIR

A water audit is a process of accounting for water use throughout a water system in order to quantify the unaccounted-for water. Unaccounted-for water is the difference between metered production and metered consumption on a system-wide basis. A leak detection program typically consists of both visual inspection as well as audible inspection. Visual inspection includes the inspection of distribution system appurtenances (e.g., fire hydrants, valves, meters, etc.) to identify obvious signs of leakage. To perform audible leak detection, specialized electronic listening equipment is used to detect the sounds associated with distribution system leakage. This process allows the agency to pinpoint the location of suspected leaks.

6.3.1 Implementation Status

This DMM has been implemented by the City. This DMM has recently become more feasible for continued successful implementation because the City was fully metered by the end of 2010, with the exception of parks. The City is in the process of replacing all residential hand-read meters with radio meters. Following this change-out program, installation of park meters will be completed. The City will likely be completely metered, parks included, by 2015. With fully-metered service, the City can compare the water produced to water delivered and make more accurate water loss approximations. Additionally, the City Municipal Code includes guidelines and penalties to encourage customers to repair leaks.

According to the 2005 UWMP, the City hired an outside contractor to determine the existence and extent of subsurface leaks within the distribution. The contractor determined

that the entire system contained only minimal leaks and that the City's overall maintenance programs have served well in preserving the integrity of the system. If the City suspects that new leaks are occurring in the system, the City will take appropriate steps to perform a system audit.

6.3.2 Steps Needed to Implement

To continue to implement this DMM, the City will perform audits on its water distribution system, as appropriate, depending on when and where leaks are suspected to occur. The City will have trained staff that is prepared to manage a system-wide audit.

6.3.3 Implementation Schedule

This DMM will continue to be implemented on an ongoing, as-needed basis.

6.3.4 Methods to Evaluate Program Effectiveness

The City will evaluate its water system auditing program based on the successful identification of system leaks and unauthorized uses, and the subsequent repair, replacement, or prevention of such leaks or uses.

6.3.5 Conservation Savings

The City has not historically tracked actual water savings associated with the implementation of this DMM. The City's recent subsurface leak audit did not result in considerable water savings because it was determined that there were only minimal leaks in the system. If substantial system losses were found, the City would have taken measures to correct those losses. If, in the future, the City finds that there is a considerable amount of unaccounted-for water leaving the system and makes repairs based on a system audit, conservation savings may be assessed at that point.

6.4 DMM 4 - METERING WITH COMMODITY RATES FOR ALL NEW CONNECTIONS AND RETROFIT OF EXISTING CONNECTIONS

This DMM requires water meters for all new constructions and billing by volume of use, as well as establishing a program for retrofitting any existing unmetered connections.

6.4.1 Implementation Status

The City has implemented this DMM. In 2009 the City passed Resolution No. 09-01 (updated from 2003), which establishes commodity water rates for all connections and mandatory installation of a water meters on new water connection services (Appendix P). The resolution provides meter monthly service rates with designated baseline allowances dependent on meter size. In addition, the City provides a contingency rate for all water used

in excess of the baseline allowances of $0.584 per 1,000 gallons. Table 6.3 describes the rates for water utility service.

Table 6.3 Meter Service Connection Rates
2010 Urban Water Management Plan
City of Tulare

Meter Size (inches)	Baseline (gallons)	Monthly Rate
3/4	10,000	$9.39
1[(2)]	10,000	$10.07
1	10,000	$10.35
1-1/2	20,000	$17.48
2	40,000	$32.70
3	70,000	$76.32
4	110,000	$109.35
6	160,000	$161.11
8	220,000	$221.94
10	290,000	$295.04
Water in Excess of Baseline = $0.584 per 1,000 gallons		

Notes:
1. Source: City of Tulare. Resolution No. 09-01, effective September 1, 2009.
2. Residential-only metered service.

6.4.2 Steps Necessary to Implement

To continue to implement this DMM, the City coordinates with the Planning and Building Department to ensure that meters are installed on all new service connections.

6.4.3 Implementation Schedule

This DMM will continue to be implemented on an ongoing, year-round basis.

6.4.4 Methods to Evaluate Program Effectiveness

The City has not established a method to evaluate the effectiveness of this DMM.

6.4.5 Conservation Savings

The City has not historically tracked actual water savings associated with the implementation of this DMM. Therefore, estimates of existing conservation savings related to this DMM are not available. When all service connections are metered and are subject to the City's rate structure, future conservation savings may be determined by comparing existing metered water use to future water use.

6.5 DMM 5 - LARGE LANDSCAPE CONSERVATION PROGRAMS AND INCENTIVES

This DMM calls for agencies to commence assigning reference evapotranspiration (ETo) based water budgets to accounts with dedicated irrigation meters and provide water-use large landscape water audits to commercial, industrial, and institutional (CII) customers with mixed-use meters.

6.5.1 Implementation Status

The City has implemented this DMM. Chapter 10.196 of the City's Municipal Code is dedicated to providing landscape provisions for the design, installation, maintenance, and management of landscapes so that they are water efficient. The relevant code contains language that applies to existing landscapes and to new or rehabilitated landscape projects.

The landscape ordinance applies to all existing landscapes, installed before January 1, 2010, that have metered service and are over one acre in size. All landscapes in the City are subject to, if the City requires, irrigation surveys, irrigation water use analysis, and irrigation audits "to evaluate water use and provide recommendations as necessary to reduce landscape water use to a level that does not exceed the maximum allowance for existing landscapes" (§10.196.089[A]). The maximum applied water allowance for existing landscapes is calculated based on the site's landscaped area and ETo rate.

New construction and rehabilitation landscape projects are also subject to requirements of the landscape ordinance of the City's Municipal Code. In particular, any project equal to or greater than 2,500 square feet that requires a building or landscape permit, plan check, or design review must complete the Landscape Documentation Package. The Landscape Documentation Package includes project information and a Water Efficient Landscape Worksheet, with which proposed developers must perform water budget and maximum water allowance calculations.

In addition, the City has adopted a Prohibition on Water Waste in which water conservation practices are encouraged and required (Appendix M).

The City's Planning and Building Department reviews and approves or denies, as appropriate, landscape projects in the City according the requirements of the City Municipal Code. In 2009, the City had 75 metered landscape service accounts and no unmetered landscape accounts[1], which comprised less than one and a half percent of the City's measured delivered water for the year. However, the City's landscape requirements apply to all customer sectors, thereby maximizing the influence of large landscape conservation requirements.

[1] Department of Water Resources Public Water System Statistics Sheet (2009).

6.5.2 Steps Necessary to Implement

To continue to implement this DMM, the City will continue to enforce the landscape planning and document requirements in the City's Municipal Code. Planning and Building Department staff will be trained on how to review the Landscape Documentation Package and incorporated Water Efficient Landscape Use Worksheet. When appropriate, City staff will perform water use audits for small and large landscape customers alike.

6.5.3 Implementation Schedule

This DMM will be implemented on an on-going, year-round basis.

6.5.4 Methods to Evaluate Program Effectiveness

Now that most of the City's landscape accounts are metered, the City can monitor the water use of large landscape water users and encourage them to reduce their water consumption if necessary. However, the City has not established a method to evaluate the effectiveness of this DMM.

6.5.5 Conservation Savings

The City has not historically tracked actual water savings associated with the implementation of this DMM. Therefore, estimates of existing conservation savings related to this DMM are not available.

6.6 DMM 6 - HIGH-EFFICIENCY WASHING MACHINE REBATE PROGRAM

This program generally provides a financial incentive (rebate offer) to qualifying customers who install a high efficiency washing machine in their home. Other regional municipalities that performed an economic analysis on this program concluded that it would have a low benefit-to-cost ratio.

6.6.1 Implementation Status

This program is currently planned for implementation by the City. Several years ago, the City applied for a matching grant program to implement a rebate program but was not able to secure funding. However, the City intends to develop its own high-efficiency washing machine rebate program in the future.

6.6.2 Steps Necessary to Implement

To implement this DMM, the City will need to establish a rebate protocol to determine the parameters required for a washing machine rebate. With this, the City will determine the type of data and method of data storage required to evaluate the success of this DMM in the future. The City will need to train staff on how to allocate the washing machine rebates

appropriately among its water customers. In addition, the City will need to develop an advertising campaign to inform users of the availability of the rebate program (through bill inserts, the City's website, and other means).

The implementation of this DMM will require City staff time and resources. To completely characterize the relative benefits of this program, the City may collect and store water savings and cost information for analysis.

6.6.3 Implementation Schedule

The City intends to implement this DMM at future date, currently undecided. The City will begin development of this program as funding and staff resources become available, potentially over the next five years.

6.6.4 Methods of Evaluate Program Effectiveness

Because this DMM has not yet been implemented, the City does not currently have a method established to evaluate program effectiveness. After implementation, the City may evaluate the effectiveness of this program using collected water and cost savings from its users. A comprehensive data collection system associated with the washing machine rebates will allow the City to evaluate the overall success of the program.

6.6.5 Conservation Savings

This DMM is still in its planning stages. After implementation, the City may collect water and cost savings associated with this DMM. Collection and analysis of this data will provide a comprehensive assessment of the success of the program.

6.7 DMM 7 - PUBLIC INFORMATION PROGRAMS

This program consists of distributing information to the public through a variety of methods including brochures, radio and television, school presentations and videos, and web sites.

6.7.1 Implementation Status

The City has implemented this DMM. The City posts its water conservation schedules online and includes conservation information in its annually-distributed Consumer Confidence Report (CCR). Yearly CCRs are available on the City's website.[2]

6.7.2 Steps Necessary to Implement

To continue to implement this DMM, the City will include water conservation information available to the public in a variety of its published materials. City staff, particularly the City's Department of Public Works, will have staff whose responsibilities include providing conservation information to the public when appropriate.

[2] http://www.ci.tulare.ca.us/local_government/departments/public_works/water.htm

6.7.3 Implementation Schedule

This DMM will be implemented on an on-going, year-round basis.

6.7.4 Methods to Evaluate Program Effectiveness

The City has not established a method to evaluate the effectiveness of this DMM.

6.7.5 Conservation Savings

The City has not historically tracked actual water savings associated with the implementation of this DMM, as these savings are difficult to accurately quantify. Therefore, estimates of existing conservation savings related to this DMM are not available.

6.8 DMM 8 - SCHOOL EDUCATION PROGRAM

This DMM requires water suppliers to implement a school education program that includes providing educational materials and instructional assistance.

6.8.1 Implementation Status

The City has implemented this DMM. The City organizations and performs presentations in schools on topics including water conservation and recycling, and has booths at school events. Additionally, the City has partnered with the Tulare Irrigation District (TID) to present a water cycle model in classroom presentations and school events; the City is a funding partner of the water cycle model.

6.8.2 Steps Necessary to Implement

To implement this DMM, the City will continue to be present at school events and in classroom activities or presentations, when appropriate. City staff will need to allocate time and monetary resources to develop and maintain the program. In addition, the City will keep its presentation materials on water conservation current to represent existing conditions and accepted practices to encourage good water conservation practices.

6.8.3 Implementation Schedule

This DMM will be implemented on an on-going, year-round basis as school events and classroom activities are available to the City.

6.8.4 Methods to Evaluate Program Effectiveness

The City has not established a method of evaluate the effectiveness of this DMM.

6.8.5 Conservation Savings

The City has not historically tracked actual water savings associated with the implementation of this DMM, as these savings are difficult to accurately quantify. Therefore, estimates of existing conservation savings related to this DMM are not available.

6.9 DMM 9 - CONSERVATION PROGRAMS FOR COMMERCIAL, INDUSTRIAL, AND INSTITUTIONAL ACCOUNTS

With this DMM, the City would develop a conservation program for CII accounts that includes water audits targeted to the top water users. This program would include surveys of past program participants to determine if audit recommendations were implemented. This program would also include incentives related to the use of efficient water-use technologies.

6.9.1 Implementation status

The City has implemented this DMM. In 2009, the City had a total of 1,007 metered CII accounts and 32 unmetered CII accounts, and comprised approximately 41% of the total water delivered by the City in 2010. Now that all City CII accounts are metered, the City can monitor the consumption of their CII accounts on a regular basis and recommend conservation measures to reduce consumption. Primarily, the City is in the process of developing a tiered rate structure to encourage their CII customers to implement water conservation measures.

6.9.2 Steps Necessary to Implement

To continue implement this DMM, the City will perform annual surveys on a portion of its CII accounts. These annual audits will give the City an opportunity to recommend conservation measures specific to the account and its water consuming processes. The annual surveys will be performed in addition to the monthly meter readings. Additional steps necessary to implement this DMM include training City staff to perform CII account surveys, develop an advertising strategy to inform CII water users about potential conservation programs, and record participation in the conservation programs to determine long-term effectiveness.

6.9.3 Implementation Schedule

This DMM will be implemented on an on-going, year-round basis.

6.9.4 Methods to Evaluate Program Effectiveness

Program effectiveness will be evaluated based on participation in the City's CII water conservation programs. As the City provides feedback to individual CII customers based on their annual surveys, the City will be able track participation in the surveys. If needed, the City may also be able to quantify the effectiveness of this DMM through decreases in the measured consumption of individual CII accounts based on meter readings.

6.9.5 Conservation Savings

The City has not historically tracked the conservation savings associated with this DMM. Conservation savings can be assessed in the future once long-term data has been recorded on participation in conservation programs and decreased water consumption.

6.10 DMM 10 - WHOLESALE AGENCY PROGRAMS

This DMM applies to wholesale agencies and defines a wholesaler's role in terms of financial, technical, and programmatic assistance to its retail agencies implementing DMMs. The City is not a water wholesaler.

6.11 DMM 11 - CONSERVATION PRICING

Conservation pricing requires that water rates encourage conservative water use by all customers.

6.11.1 Implementation status

The City is in the process of developing this DMM. The City completed the installation of meters on all of its service connections at the end of 2010, with the exception of parks, which will likely be metered by 2015. The City's baseline water rate structure (Resolution No. 09-01, described in DMM 4) is applicable to all of its water customers. The resolution does state that any water use over the baseline, which is depended on meter size, costs an extra fee of $0.584 cents per 1,000 gallons.

However, the City recognizes that the implementation of a tiered rate structure based primarily on water consumption will likely result in decreased water use across all customer sectors over time. Therefore, the City is in the process of developing a tiered rate structure for implementation in lieu of the current baseline rate structure.

6.11.2 Steps Necessary to Implement

To implement this DMM, the City will continue to develop its proposed tiered rate structure to serve as conservation pricing. Once the tiered structure is approved by the City Council, the rate structure will be enforced and applied to appropriate service connections to encourage water conservation. While industrial and some commercial accounts may remain at the highest tier due to their invariable water-consuming processes, the tiered structure will be entirely appropriate to the City's residential customer base. Ultimately, applying the tiered rate structure to as many customer sectors as possible will encourage water conservation to a high degree.

Additional steps needed to implement this DMM include training of City staff and educating the public on the mechanics of the proposed new rate structure. Implementation will also likely include providing additional public education to customers on water conservation

measures to minimize their monthly water use. Implementation of this DMM should be coordinated with the public education efforts planned for DMM 7.

6.11.3 Implementation Schedule

This DMM will be implemented on an on-going, year-round basis. The tiered rate structure will be applied to all customers for every billing cycle.

6.11.4 Methods to Evaluate Program Effectiveness

The effectiveness of conservation pricing can be directly quantified by comparing water consumption of metered connections before and after the tiered rate structure has been implemented.

6.11.5 Conservation Savings

Because this DMM is still in its planning stages, the City has not yet tracked the conservation savings associated with this DMM. Conservation savings can be assessed in the future once long-term data has been recorded on decreased water consumption.

6.12 DMM 12 - WATER CONSERVATION COORDINATOR

A conservation coordinator is an ongoing component of a City's water conservation program. The conservation coordinator would be responsible for implementing and monitoring the City's water conservation activities.

6.12.1 Implementation status

The City has implemented this DMM. Conservation coordination is carried out by the City's Water Manager in the Public Works Department, Dan Boggs, along with the Department Assistant, Sheri Metz.

6.12.2 Steps Necessary to Implement

To implement this DMM, the City's conservation coordinator will manage all efforts associated with water conservation in the City. Water conservation efforts may include, but are not limited to, promoting public education, developing marketing campaigns, implementing of conservation programs, and providing information to other City departments on water conservation opportunities.

6.12.3 Implementation Schedule

Water conservation coordination will be implemented on an on-going, year-round basis.

6.12.4 Methods to Evaluate Program Effectiveness

The City has not developed a method to evaluate the effectiveness of the conservation coordinator.

6.12.5 Conservation Savings

The City has not historically tracked the conservation savings associated with this DMM. Water savings are difficult to quantify for this program. The City expects that through the existence of the conservation coordinator and associated conservation programs and opportunities that some water savings will occur.

6.13 DMM 13 - WATER WASTE PROHIBITION

Water waste prohibition will require the City to adopt its own set of water conservation regulations.

6.13.1 Implementation status

The City has implemented this DMM. The City's water waste prohibition is detailed in the City's Municipal Code (§ 7.32.010).The prohibition includes definitions of "wastes of water" as the following:

(A) The use of water that allows any amount of water to run off into a gutter, ditch, or drain.

(B) The excessive use, loss, or escape of water through breaks, leaks, or malfunctions in the water user's plumbing or distribution facilities for any period of time after the escape of water should be reasonably discovered and corrected (within 48 hours).

(C) The washing of vehicles, building exteriors, sidewalks, driveways, parking lots, tennis courts, patios, or other paved areas without the use of a positive shut-off nozzle on the hose that results in excessive run-off.

(D) The watering of lawns, ground cover, and shrubbery between the hours of 10:00 AM and 6:00 PM from April 1 through September 30 (dates subject to change based on winter water conditions). Exceptions to this subdivision (D) are commercial nurseries, commercial sod farms, golf course, and public parks, but will still be requested to minimize water waste at all times.

Each of the above wastes of water is prohibited. Any person using water from the City water system in violation of any provision of the City Municipal Code shall pay, upon demand by the City, a penalty charge in an amount, which shall be determined by City Council Resolution.

6.13.2 Steps Necessary to Implement

To implement this DMM, the City Municipal Code will be enforced by the Water Conservation Coordinator (described in DMM 12). Additional steps necessary to implement this DMM include City staff efforts to determine when and where violations of the prohibition occur. Appropriate fines will be issued for a violation of the water waste prohibition

ordinance. City staff may follow-up on violations with public education and recommendations for water conservation measures if appropriate.

6.13.3 Implementation Schedule

This DMM will be implemented on an on-going, year-round basis as this DMM is related to a current Municipal Code.

6.13.4 Methods to Evaluate Program Effectiveness

The City has not developed a method to evaluate the effectiveness of the water waste prohibition.

6.13.5 Conservation Savings

The City has not historically tracked the conservation savings associated with this DMM. DMM. Therefore, estimates of existing conservation savings related to this DMM are not available.

6.14 DMM 14 - RESIDENTIAL ULTRA-LOW-FLUSH TOILET REPLACEMENT PROGRAMS

State legislation requires the installation of efficient plumbing in new construction, and, effective in 1994, requires that only ULFTs be sold in California. ULFTs include toilets that use 1.6 gallons per flush or less.

6.14.1 Implementation Status

This program is currently planned for implementation by the City. The City intends to develop an ULFT replacement program in the future.

6.14.2 Steps Necessary to Implement

To implement this DMM, the City will need to establish a protocol for issuing ULFT toilet replacement packages or rebates. Included in program development will be the determination type of data and method of data storage required to evaluate the success of this DMM in the future. The City will need to train staff and other involved vendors on how to appropriately manage the ULFT replacement program options for its customers. In addition, the City will need to develop an advertising campaign to inform users of the availability of the program (through bill inserts, the City's website, and other means).

6.14.3 Implementation Schedule

The City intends to implement this DMM at future date, currently undecided. The City will begin development of this program as funding and staff resources become available, potentially over the next five years.

6.14.4 Methods of Evaluate Program Effectiveness

Because this DMM has not yet been implemented, the City does not currently have a method established to evaluate program effectiveness. After implementation, the City may evaluate the effectiveness of this program using collected water and cost savings from its users. A comprehensive data collection system associated with the ULFT replacement program will allow the City to evaluate the overall success of the program.

6.14.5 Conservation Savings

This DMM is still in its planning stages. After implementation, the City may collect water and cost savings associated with this DMM. Collection and analysis of this data will provide a comprehensive assessment of the success of the program.

6.15 PLANNED WATER SUPPLIES

The City does not plan to implement any water supply projects that would provide water at a higher unit cost than was accounted for in the cost benefit analyses summarized in Appendix O.

COMPLETED UWMP CHECKLIST

7.1 UWMP CHECKLIST

In order to expedite the review of the 2010 Urban Water Management Plans (UWMPs), the California Department of Water Resources (DWR) has developed a "Completed UWMP Checklist" that may be completed by urban water suppliers and included in their UWMPs. DWR offers two separate checklists with identical content, but which are organized differently. One version of the checklist is organized according to the Water Code legislative order. The other checklist is organized by topic, similar to the organization of DWR's Guidebook to Assist Urban Water Suppliers to Prepare a 2010 UWMP. Because the City of Tulare's (City's) 2010 UWMP is organized according to the recommended guidebook format, the completed UWMP checklist (Table 7.1) presented on the following pages is organized by topic. Values in ***blue italics*** represent values input for the City's 2010 UWMP in the standardized DWR table.

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
PLAN PREPARATION				
4	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	10620(d)(2)		*Ch. 1, Sec. 1.3 (pg. 1-3 to 1-4) & Table 1.1*
6	Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Any city or county receiving the notice may be consulted and provide comments.	10621(b)		*Ch 1, Sec 1.3 (pg. 1-4)*
7	Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq.	10621(c)		*Ch. 1, Sec. 1.4.1 (pg. 1-5) & App. C*
54	Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan.	10635(b)		*Ch. 1, Sec. 1.4.2 (pg. 1-5) & App. D*
55	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	10642		*Ch. 1, Sec. 1.3 (pg. 1-4) & Table 1.1*
56	Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area.	10642		*Ch. 1, Sec. 1.3 (pg. 1-4) & App. B*
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		*Ch. 1, Sec. 1.4.1 (pg. 1-5) & App. C*
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		*Ch. 1, Sec. 1.4.3 (pg. 1-5)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
59	Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to the California State Library and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. This also includes amendments or changes.	10644(a)		*Ch. 1, Sec. 1.4.2 (pg. 1-5) & App. D*
60	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours	10645		*Ch. 1, Sec. 1.4.2 (pg. 1-5)*
SYSTEM DESCRIPTION				
8	Describe the water supplier service area.	10631(a)		*Ch. 2, Sec. 2.1 & 2.2 (pg. 2-1 to 2-7)*
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		*Ch. 2, Sec. 2.1.1 (pg. 2-7 to 2-8)*
10	Indicate the current population of the service area	10631(a)	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	*Ch. 2, Sec. 2.2 (pg. 2-8 to 2-10)*
11	Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections.	10631(a)	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	*Ch. 2, Sec. 2.2 (pg. 2-9)*
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		*Ch. 2, Sec. 2.2 (pg. 2-9 to 2-10)*
SYSTEM DEMANDS				
1	Provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	10608.20(e)		*Ch. 3, Sec. 3.1 (pg. 3-1 to 3-8)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	Retailers and wholesalers have slightly different requirements	***Ch. 3, Sec. 3.2.4 (pg. 3-18 to 3-19)***
3	Report progress in meeting urban water use targets using the standardized form.	10608.40		***Not Applicable until 2015 UWMP***
25	Quantify past, current, and projected water use, identifying the uses among water use sectors, for the following: (A) single-family residential, (B) multifamily, (C) commercial, (D) industrial, (E) institutional and governmental, (F) landscape, (G) sales to other agencies, (H) saline water intrusion barriers, groundwater recharge, conjunctive use, and (I) agriculture.	10631(e)(1)	Consider 'past' to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	***Ch. 3, Sec 3.2 (pg. 3-8 to 3-19)***
33	Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types	10631(k)	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	***Not Applicable***
34	Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)		***Ch.3, Sec. 3.2.5 (pg. 3-19)***
SYSTEM SUPPLIES				
13	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030.	10631(b)	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided.	***Ch. 4, Section 4.1.3 (pg. 4-4)***

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
14	Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column.	10631(b)	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	*Ch. 4, Sec. 4.1.1 (pg. 4-2) & Sec. 4.2 (pg. 4-6 to 4-14)*
15	Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	10631(b)(1)		*Ch. 4, Sec. 4.2.2 (pg. 4-7)*
16	Describe the groundwater basin.	10631(b)(2)		*Ch. 4, Sec. 4.2.1 (pg. 4-6 to 4-7)*
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		*Ch. 4, Sec. 4.2.1 (pg. 4-6)*
18	Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate "not applicable" in the UWMP location column.	10631(b)(2)		*Not Applicable*
19	For groundwater basins that are not adjudicated, provide information as to whether DWR has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. If the basin is adjudicated, indicate "not applicable" in the UWMP location column.	10631(b)(2)		*Ch.4, Sec. 4.2.4 (pg. 4-11 to 4-14)*
20	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	10631(b)(3)		*Ch. 4, Sec. 4.3 (pg. 4-14 to 4-15)*
21	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	10631(b)(4)	Provide projections for 2015, 2020, 2025, and 2030.	*Ch. 4, Sec. 4.3 (pg. 4-14 to 4-15)*
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		*Ch. 4, Sec. 4.4 (pg. 4-15 to 4-16)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
30	Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project.	10631(h)		*Ch. 4, Sec. 4.7 (pg. 4-22 to 4-23)*
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		*Ch. 4, Sec. 4.5 (pg. 4-16)*
44	Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	10633		*Ch. 4, Sec. 4.6 (pg. 4-17 to 4-22)*
45	Describe the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	10633(a)		*Ch. 4, Sec. 4.6.1 to 4.6.4 (pg. 4-17 to 4-19)*
46	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	10633(b)		*Ch. 4, Sec. 4.6.3 (pg. 4-18 to 4-19)*
47	Describe the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)		*Ch. 4, Sec. 4.6.4 (pg. 4-19)*
48	Describe and quantify the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.	10633(d)		*Ch. 4, Sec. 4.6.5 (pg. 4-19 to 4-21)*
49	The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	10633(e)		*Ch. 4, Sec. 4.6.4 (pg. 4-19) & Sec. 4.6.5 (pg. 4-19 to 4-21)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
50	Describe the actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.	10633(f)		*Ch. 4, Sec. 4.6.6 (pg. 4-21 to 4-22)*
51	Provide a plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.	10633(g)		*Ch. 4, Sec. 4.6.7 (pg. 4-22)*
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING				
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		*Ch. 5, Sec. 5.1.1 (pg. 5-1 to 5-2)*
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years.	10631(c)(1)		*Ch. 5, Sec. 5-4 (pg. 5-15 to 5-20)*
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)		*Ch. 5, Sec. 5.1.2 (pg. 5-2 to 5-5)*
35	Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50-percent water supply reduction, and an outline of specific water supply conditions at each stage	10632(a)		*Ch. 5, Sec. 5.2.1 (pg. 5-6 to 5-9)*
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)		*Ch. 5, Sec. 5.4.2. (pg. 5-16 to 5-18)*
37	Identify actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)		*Ch. 5, Sec. 5.2.2 (pg. 5-9)*
38	Identify additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)		*Ch. 5, Sec. 5.2.3 & 5.2.4 (pg. 5-9 to 5-10)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
39	Specify consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)		*Ch. 5, Sec. 5.2.4 (pg. 5-10)*
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		*Ch. 5, Sec. 5.2.5 (pg. 5-10 to 5-12)*
41	Provide an analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)		*Ch. 5, Sec. 5.2.6 (pg. 5-12 to 5-13)*
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		*Ch. 5, Sec. 5.2.7 (pg. 5-13) & App. M*
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		*Ch. 5, Sec. 5.2.8 (pg. 5-13)*
52	Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability	10634	For years 2010, 2015, 2020, 2025, and 2030	*Ch. 5. Sec. 5.3 (pg. 5-13 to 5-15)*
53	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)		*Ch. 5, Sec. 5.4.3 to 5.4.5 (pg. 5-18 to 5-20)*

Table 7.1 Completed UWMP Checklist, Organized by Topic
2010 Urban Water Management Plan
City of Tulare

No.	UWMP Requirement [(1),(2)]	Calif. Water Code Reference	Additional Clarification	UWMP Location
DEMAND MANAGEMENT MEASURES				
26	Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided.	10631(f)(1)	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-17)***
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-17)***
28	Provide an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the ability to further reduce demand.	10631(f)(4)		***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-17)***
29	Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work.	10631(g)	See 10631(g) for additional wording.	***Ch. 6, Sec. 6.1 to 6.14 (pg. 6-1 to 6-17)***
32	Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	***Not Applicable***

Notes:
1. The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.
2. The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review.

APPENDIX A – COORDINATION WITH RELEVANT AGENCIES

Received
MAR 25 2011
Engineers FNO

Planning and Building Department

March 23, 2011

Resource Management Agency, Jake Raper
Tulare County CAO, Jean Rousseau
T.I.D., Paul Hendrix
Kaweah Delta Water Conservation District
Tulare County LAFCO

Subject: **Notice of Preparation of the 2010 City of Tulare Urban Water Management Plan (UWMP)**

To whom it may concern:

Pursuant to the requirements of the California Water Code, Division 6, Part 2.6 Urban Water Management Planning, Section 10621 (b), every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify your agency that the City of Tulare (City) is in process of preparing the 2010 UWMP. Based on the City's current schedule, we expect to have a public review draft of the 2010 UWMP completed by June 2011, at which point your agency will receive a notification letter that the draft UWMP is available for public review.

If your agency would like to submit comments or provide input to the City in anticipation of the development of the 2010 UWMP, please submit written copies to:

Mark S. Kielty, A.I.C.P.
Planning and Building Director
City of Tulare
411 East Kern Avenue
Tulare, CA 93274

Sincerely,

CITY OF TULARE

Mark Kielty
Planning and Buidling Director

cc: Tommy Greci, Carollo Engineers, Inc.
Mike Whitlock, City Engineer

Building and Planning Department

June 8, 2011

Tulare County RMA
Tulare County LAFCO
Tulare Irrigation District
Kaweah Delta Water RD

Re: 2010 Urban Water Management Plan

Gentlemen:

Attached please find the 2010 Urban Water Management Plan for the City of Tulare. Please submit any comments by July 1, 2011 and transmit them to:

City of Tulare
Mark S. Kielty, AICP
411 E. Kern Avenue
Tulare, CA 93274

An adoption hearing is scheduled for July 19, in the City Council Chambers, 491 North "M" Street, Tulare, CA.

Should you have any questions please do not hesitate to contact me at 559-684-4217.

Very Truly Yours,

MARK S. KIELTY, AICP
Planning & Building Director

C: Tommy A. Greci, P.E.
Lew Nelson, Public Works Director

APPENDIX B – NOTIFICATION OF PUBLIC REVIEW FOR DRAFT UWMP

Visalia Newspapers, Inc.
P.O. Box 31, Visalia, CA 93279
559-735-3200 / Fax 559-735-3210

Certificate of Publication

State Of California ss:
County of Tulare

Advertiser: CITY OF TULARE-PLANNING
411 E KERN AVE
TULARE , CA 93274

0000185483

NOTICE OF PUBLIC HEARING
ADOPTION OF 2010 URBAN WATER
MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that pursuant to the California Water Code section 10642 and 10608, the City Council of the City of Tulare will conduct a Public Hearing to take testimony regarding the adoption of the updated 2010 Urban Water Management Plan for the City of Tulare. The hearing is scheduled for Tuesday, July 19, 2011 at 7:00 p.m. in the Tulare Public Library & Council Chambers, located at 491 North "M" Street.

A copy of the 2010 Urban Water Management Plan can be reviewed at the City of Tulare City Hall, located at 411 East Kern Avenue, or accessed off the City's web site at www.ci.tulare.ca.us (Departments/Planning).

Written comments should be sent to the Planning and Building Department by July, 12, 2011.

MARK S. KIELTY, Secretary
City of Tulare Planning Commission
Publish: June 23, June 30 #185483

RE: NOTICE OF PUBLIC HEARING ADOPTION OF 201

I, Carolyn Lutts, Accounting Clerk, for the below mentioned newspaper(s), am over the age of 18 years old, a citizen of the United States and not a party to, or have interest in this matter. I hereby certify that the attached advertisement appeared in said newspaper on the following dates:

Newspaper: **Tulare Adv-Register**

6/23/2011 6/30/2011

I acknowledge that I am a principal clerk of said paper which is printed and published in the City of Visalia, County of Tulare, State of California. The Visalia Times Delta was adjudicated a newspaper of general circulation on July 25, 2001 by Tulare County Superior Court Order No. 41-20576. The Tulare Advance Register was adjudicated a newspaper of general circulation on July 25, 2001 by Superior Court Order No. 52-43225.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 30th day of June, 2011 in Visalia, California.

Carolyn Lutts

Declarant

APPENDIX C – RESOLUTION TO ADOPT THE 2010 URBAN WATER MANAGEMENT PLAN

RESOLUTION 11-55

A RESOLUTION OF THE COUNCIL OF THE CITY OF TULARE ADOPTION OF THE 2010 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Council of the City of Tulare finds that the 2010 Urban Water Management Plan complies with Water Code section 10620, 10621 and 10631; and,

WHEREAS, the Council of the City of Tulare finds that a public hearing notice was published on June 23 and June 30 regarding the availability of the 2010 Urban Water Management Plan; and,

WHEREAS, the Council of the City of Tulare finds that the 2010 Urban Management Plan was made available to the public through the Tulare Public Library and the city's web site; and,

WHEREAS, the Council of the City of Tulare finds that Urban Water Management Plans are exempt from the California Environmental Quality Act pursuant to Water Code section 10652; and

NOW, THEREFORE, BE IT RESOLVED that the Council of the City of Tulare adopts the 2010 Urban Water Management Plan and hereby directs the City Clerk to transmit a copy of said plan and resolution to the State Department of Water Resources.

PASSED, APPROVED, AND ADOPTED this 19th day of July 2011.

President of the Council and Ex-Officio
Mayor of the City of Tulare

ATTEST:

STATE OF CALIFORNIA)
COUNTY OF TULARE) ss.
CITY OF TULARE)

I, Daniel L. Meinert, Interim City Clerk of the City of Tulare, certify the foregoing is the full and true Resolution 11-55 passed and adopted by the Council of the City of Tulare at a regular meeting held on July 19, 2011, by the following vote:

Aye(s) Craig Vejvoda, Mark Wattle, Skip Barwick, Craig Vejvoda
Noe(s) N/A Abstention(s) David Macedo
Absent

Dated: 7/19/11

DANIEL L. MEINERT, INTERIM CITY CLERK

By Roxanne Yoder, Chief Deputy

APPENDIX D – VERIFICATION OF UWMP SUBMITTAL TO APPROPRIATE AGENCIES

Commitment to Distribute the 2010 Urban Water Management Plan

The documentation currently included in this appendix satisfies California Water Code parts 10621(b) and 10642.

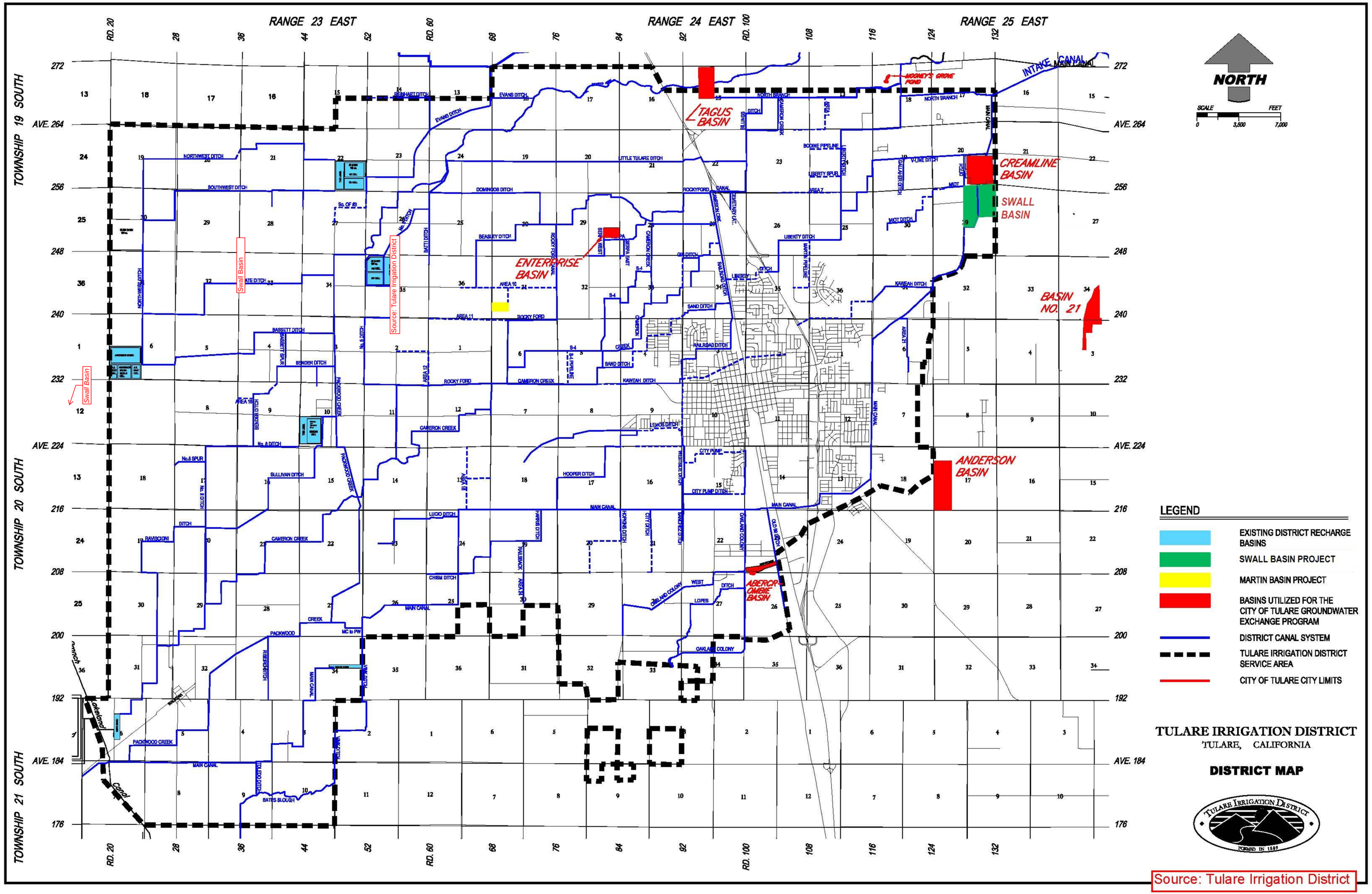
Two other sections of the California Water Code specify UWMP documentation that must take place after the submission of the supplier's UWMP to the DWR. These parts are as follows:

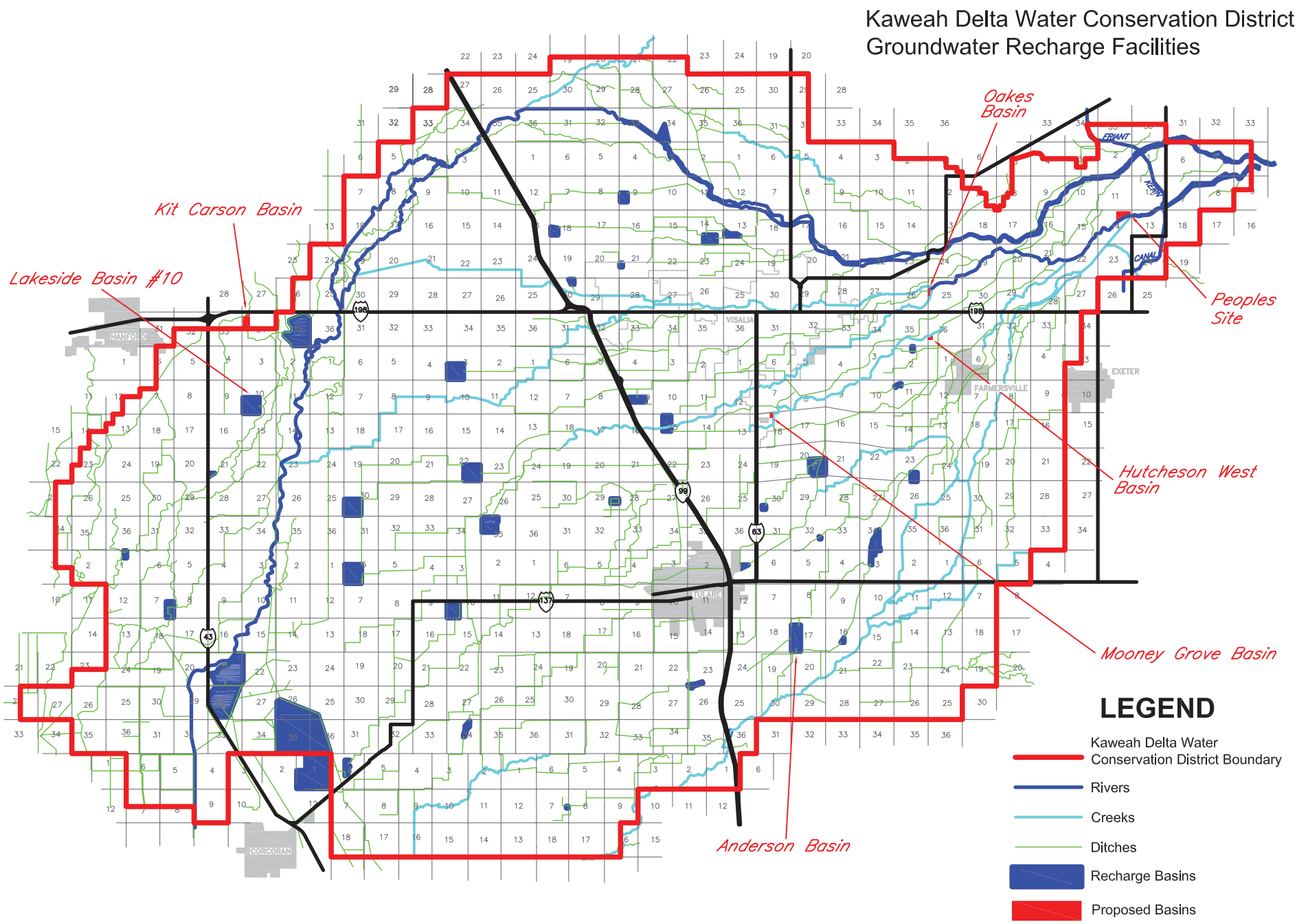
- Part 10644(a), requiring documentation that within 30 days of submitting the UWMP to DWR, the adopted UWMP has been or will be submitted to the California State Library and any city or county to which the supplier provides water.
- Part 10645, requiring documentation that the supplier will make the UWMP available for public review no later than 30 days after submission to DWR.

In order to satisfy these requirements, the City will perform the following actions:

- The City will submit its 2010 UWMP to the California DWR on **July 29, 2011**.
- The City will send a printed and/or electronic copy of its 2010 UWMP to the California State Library and to the cities and counties within which it provides water. The City will do this no later than **August 28, 2011** (30 days from filing with the DWR).
- The City will make their 2010 UWMP available for public review no later than **August 28, 2011** (30 days from filing with the DWR).

APPENDIX E – TID AND KDWCD WATER SERVICE AREA BOUNDARIES

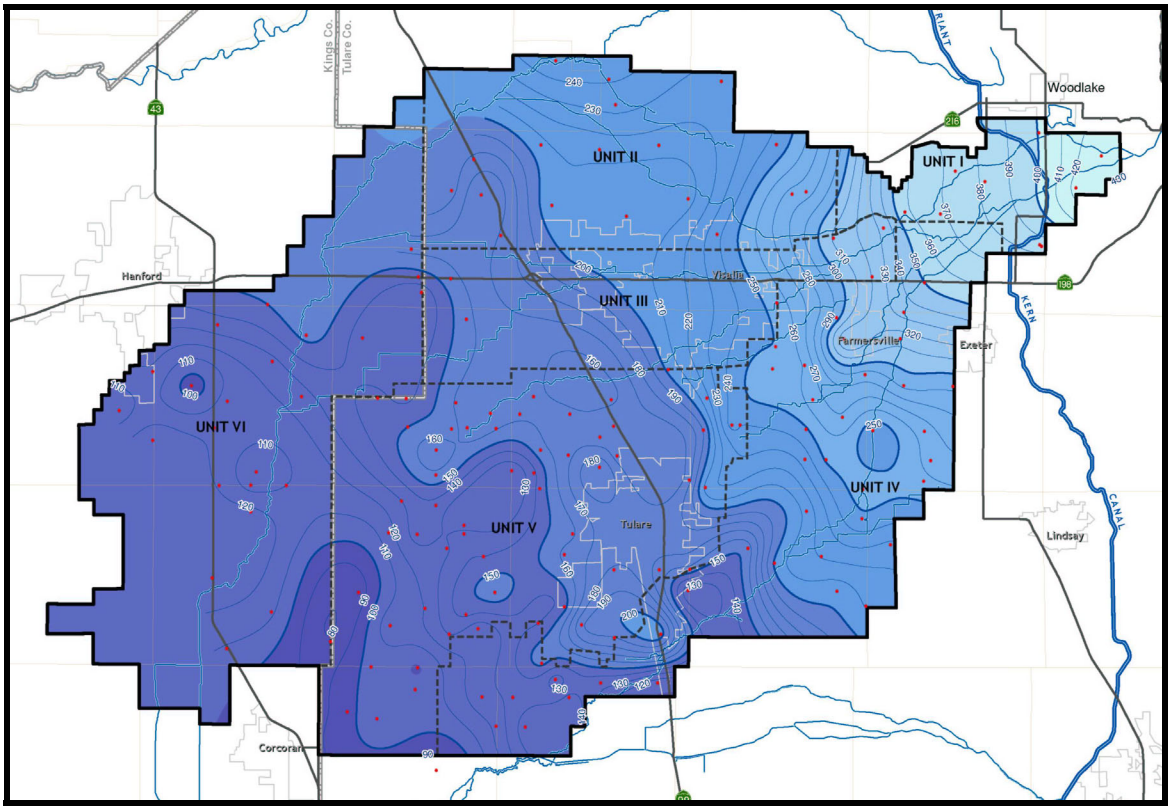

RANGE 23 EAST
RANGE 24 EAST
RANGE 25 EAST
TOWNSHIP 19 SOUTH
TOWNSHIP 20 SOUTH
TOWNSHIP 21 SOUTH
AVE. 264
AVE. 256
AVE. 248
AVE. 240
AVE. 232
AVE. 224
AVE. 216
AVE. 208
AVE. 200
AVE. 192
AVE. 184
AVE. 176
RD. 20
RD. 60
RD. 100
NORTH
SCALE
FEET
0
3,500
7,000
TAGUS BASIN
MOONEY'S GROVE POND
INTAKE CANAL
CREAMLINE BASIN
SWALL BASIN
ENTERPRISE BASIN
BASIN NO. 21
ANDERSON BASIN
ABERCROMBIE BASIN
Swall Basin
Source: Tulare Irrigation District
LEGEND
EXISTING DISTRICT RECHARGE BASINS
SWALL BASIN PROJECT
MARTIN BASIN PROJECT
BASINS UTILIZED FOR THE CITY OF TULARE GROUNDWATER EXCHANGE PROGRAM
DISTRICT CANAL SYSTEM
TULARE IRRIGATION DISTRICT SERVICE AREA
CITY OF TULARE CITY LIMITS
TULARE IRRIGATION DISTRICT
TULARE, CALIFORNIA
DISTRICT MAP
TULARE IRRIGATION DISTRICT
FORMED IN 1889
Source: Tulare Irrigation District



Source: Kaweah Delta Water Conservation District 2008 Annual Report on the Groundwater Management Plan

APPENDIX F – KDWCD GROUNDWATER MANAGEMENT PLAN (2006 UPDATE) (CD)

KAWEAH DELTA
Water Conservation
DISTRICT



GROUNDWATER MANAGEMENT PLAN

(Updated: November 7, 2006)

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SECTION 1: INTRODUCTION

1.1 Overview

On July 5, 1995, the Kaweah Delta Water Conservation District (District) formally adopted the District's Groundwater Management Plan (Plan). The Plan allows the District to manage groundwater on a local basis in lieu of a mandated plan administered by the State of California Department of Water Resources. The District has long recognized groundwater as an important resource to the area and the Plan gives the District the authority to engage in specific activities, which are beneficial to the groundwater basin within the Plan area.

The Plan was originally prepared and implemented by the District in response to 1992 state legislation AB 3030. Since the establishment of the District's Plan, more recent state legislation SB 1938, current California Water Code interpretation and discussions within the Department of Water Resource's Bulletin 118 led the District to reevaluate the Plan and its components. This document, therefore, is an update of the Kaweah Delta Water Conservation District's 1995 Groundwater Management Plan.

1.2 Plan Authority

The District is an authorized groundwater management agency within the meaning of California Water Code (CWC) § 10753[1](b) and by the establishment of the Plan. The Plan does not conflict with existing groundwater ordinances and groundwater management plans and the District continues to endeavor to coordinate Plan elements with other local agencies that have adopted rules and regulations to implement and enforce their own AB255, or AB 3030 plans as required by CWC § 10753.9(a).

1.3 Background

AB 3030 provided an opportunity for the District to prepare and implement a Groundwater Management Plan. While the legislation allows for separate plans to be developed by each public agency with jurisdiction over water, a well-conceived Plan covering the entire District offers improved management and benefit capabilities for all agencies within the plan area.

The availability of groundwater to serve community and agricultural needs can be impacted by activities that take place a considerable distance beyond local boundaries. There is considerable common use of the

[1] CWC § 10753(b). Any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, that is not subject to groundwater management pursuant to other provisions of law or a court order, judgment, or decree, may, by ordinance, or by resolution if the local agency is not authorized to act by ordinance, adopt and implement a groundwater management plan pursuant to this part within all or a portion of its service area.

groundwater resource and this coordinated Plan has been and will continue being a benefit to competing interests using the groundwater resource. This coordination is accomplished through the development of a Memorandum of Understanding (MOU) between the District and other local agencies within the plan area along with a periodic meeting of the MOU participants.

The Plan covers all of the land within the boundary of the District. Any local agency, as that term is defined by Government Code section 10752(g), can exclude the land within its boundary from being covered by the Plan by choosing not to be included in the Plan. Accordingly, the Plan covers all land within the boundary of the District, less that land within the boundaries of local agencies which elect not to participate in the Plan or which may opt out of the Plan (hereinafter the "Plan Area").

1.4 Purpose and Goals

The Plan recognizes that the conjunctive management of water supplies within the Plan Area must be continued. Achieving hydrologic equilibrium requires the management of both surface and groundwater supplies. Maintaining this balance will be the principal benefit to be derived from the Plan. Retaining all existing surface and groundwater supplies within the Plan Area is critical to maintaining this delicate balance.

The Groundwater Management Plan is also a vital element within the District's Integrated Regional Water Management Plan (IRWMP). The Plan provides the organizational foundation for the operation of the IRWMP. Many of the Plan's primary elements are used in carrying out the purpose of the IRWMP. Shared elements between the Plan and IRWMP include;

- ✓ Participation
- ✓ Regional Coverage
- ✓ Regional Objectives
- ✓ Water Management Strategies
- ✓ Integration
- ✓ Project Prioritization

The principal actions called for by the Plan will be gathering and evaluating data concerning the quantity of groundwater. Actions have been and will continue to be developed to enhance the valuable groundwater resource by promoting those measures necessary to reduce the long-term groundwater level decline in the Plan Area. Many of the actions identified are currently being conducted. Other actions will require further study prior to implementation.

Adherence to Plan objectives and procedures will avoid and reduce duplication of activities by local jurisdictions. Additionally, plan elements can be utilized by all the agencies within the Plan Area in long-term planning activities. The Plan is designed to be flexible, allowing updates to be made as needed, based principally on the additional information that is gathered through the monitoring programs.

1.5 Plan Area

The District is located on the alluvial fan of the Kaweah River. This alluvial fan extends approximately 40 miles in a southwesterly direction, commencing in the foothills of the Sierra Nevada range on the east and continuing to near the central axis of the San Joaquin Valley in the vicinity of the east bed edge of Tulare Lake. The north and the northwest boundaries of the District generally abut the service area of the Kings River. The south boundary of the District generally abuts the service area of the Tule River.

The District's Plan includes those areas overlying the groundwater basin or associated groundwater sub-basins within the District. Those areas of the San Joaquin Valley Groundwater Basin resources located within the District include portions of the Kaweah, Kings, Tule and Tulare Lake groundwater sub-basins. These sub-basins are shown on Plate 1.

The District's Plan Area is presented on Plate 2. Areas managed under existing Groundwater Management Plans by local agencies that are excluded by agreement from this Plan include areas within the borders of the Corcoran Irrigation District and specific lands managed under the Tulare Lake Bed Coordinated Groundwater Management Plan (TLBCGMP).

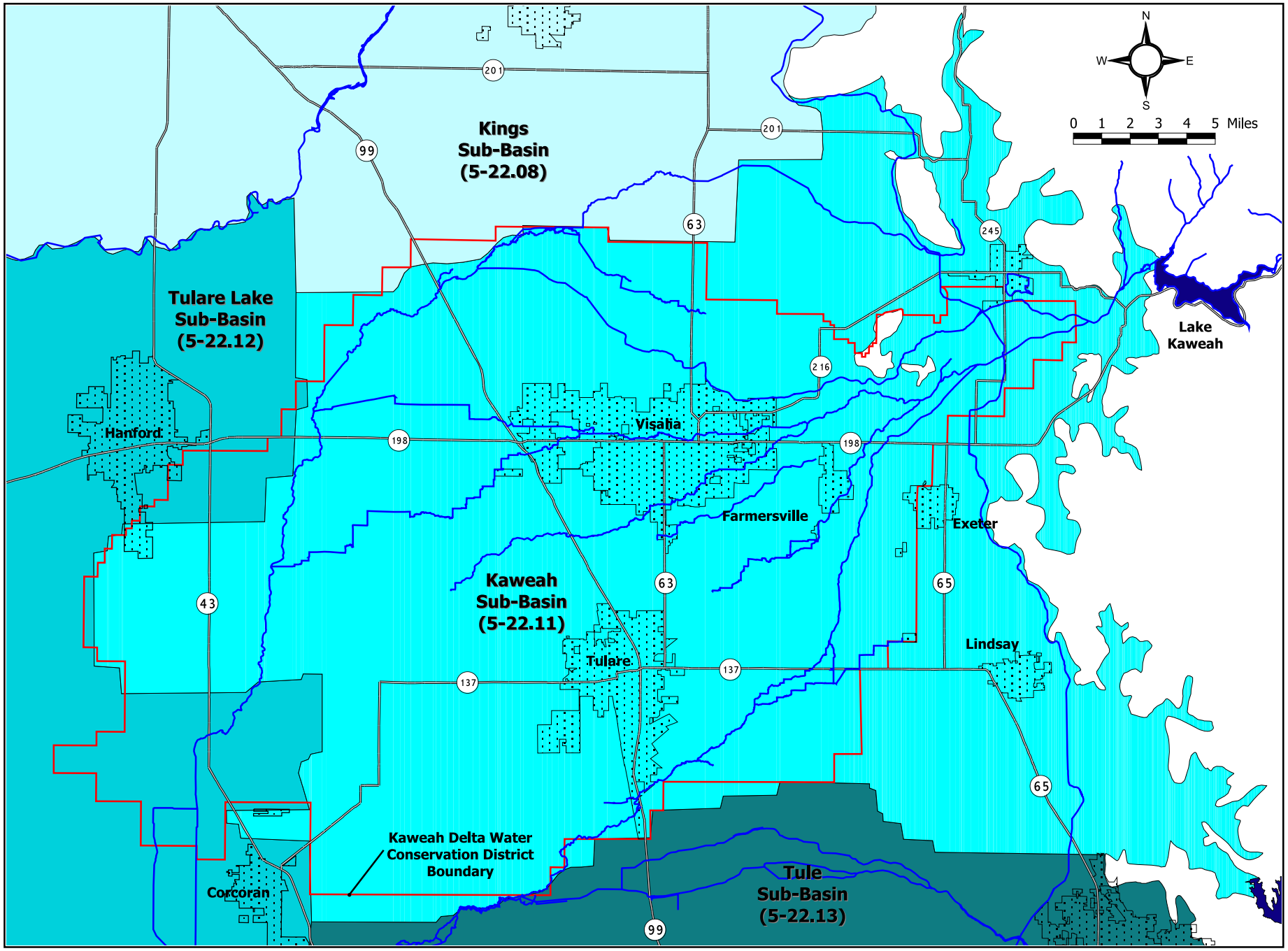


Plate No. 1 : Groundwater Sub-Basins

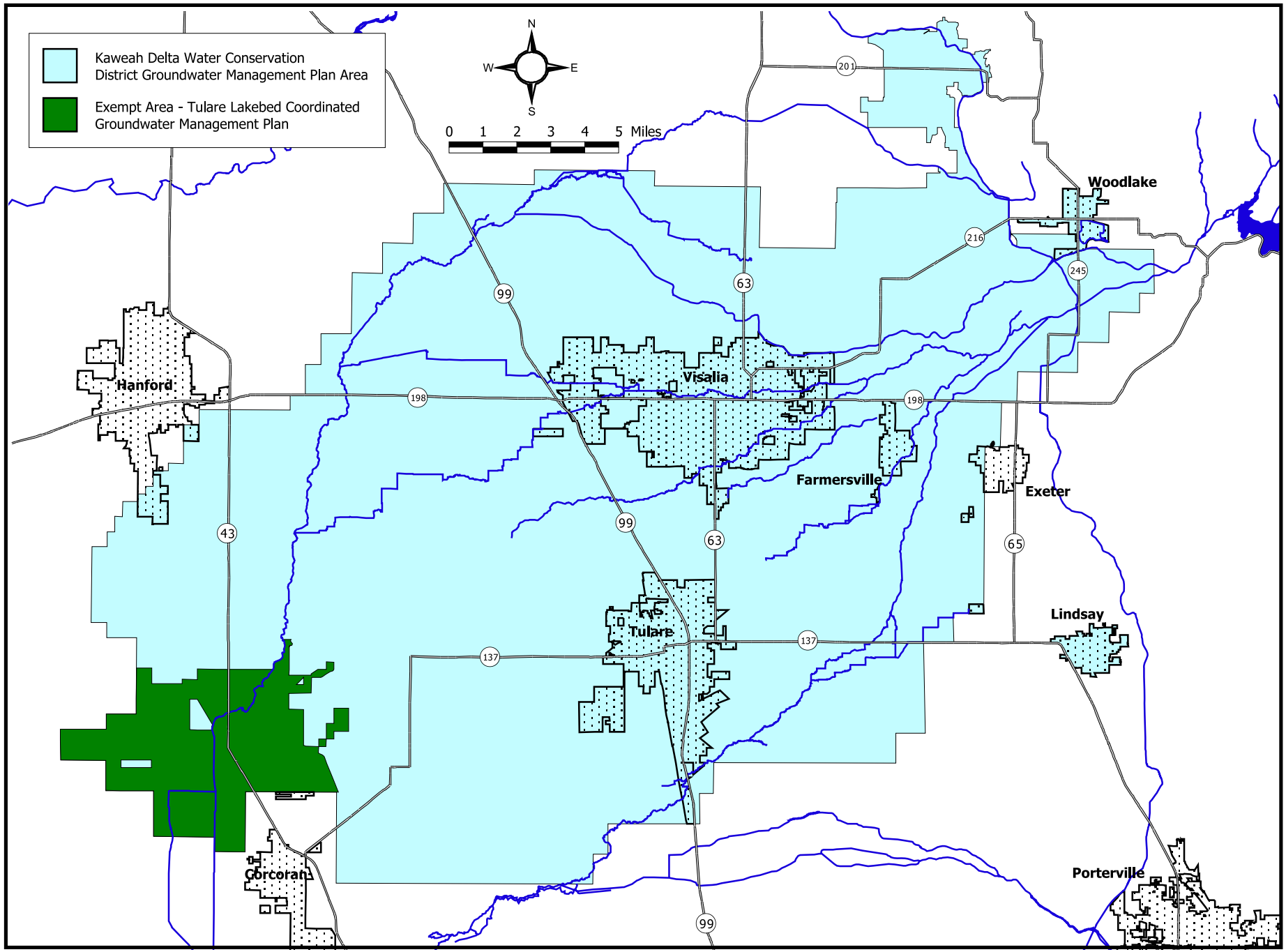


Plate No. 2 : Groundwater Management Plan Area

The District's Plan Area contains multiple local agencies that provide various types of water services. Those local agencies that have been included as stakeholders through the execution of a *Memorandum of Understanding (MOU)* are shown on Plate 3. The list of current stakeholders covered under a MOU is provided below in Table 1.

TABLE 1
PLAN STAKEHOLDERS

California Water Service Company	Kings County Water District (*AB 3030 Plan*)
City of Farmersville	Lakeside Ditch Company
City of Lindsay	Lakeside Irrigation Water District
City of Tulare	St. Johns Water District
City of Visalia	Stone Corral Irrigation District
City of Woodlake	Tulare Irrigation District (*AB 255 Plan*)
Consolidated Peoples Ditch Company	Ivanhoe Irrigation District

1.6 Management Plan Components

The District's Plan includes the following required and recommended components:

- ✓ CWC § 10753.7 (four mandatory components). Recent amendments to the CWC at § 10750 et seq. require a Groundwater Management Plans (GMP) to include several components to be eligible for award of funding administered by the Department of Water Resources (DWR) for the implementation of groundwater related studies, construction of groundwater projects and groundwater quality projects. These amendments to the CWC were included in Senate Bill 1938, effective January 1, 2003.
- ✓ CWC § 10753.8 (12 optional components). CWC § 10753.8 includes 12 specific technical issues that could be addressed in GMPs to manage the basin optimally and protect against adverse conditions.
- ✓ DWR Bulletin 118-2003, Appendix C (six recommended components). The recent 2003 update to the Department of Water Resource's Bulletin 118, *California's Groundwater*, includes discussion of required and recommended components of Local Groundwater Management Plans. Review of the material results in identifying components that are not included in CWC § 10750 et seq.

Table 2 summarizes the required and recommended components of an AB 3030 plan developed pursuant to current State guidance and the appropriate section of the District's Plan where each component is addressed.

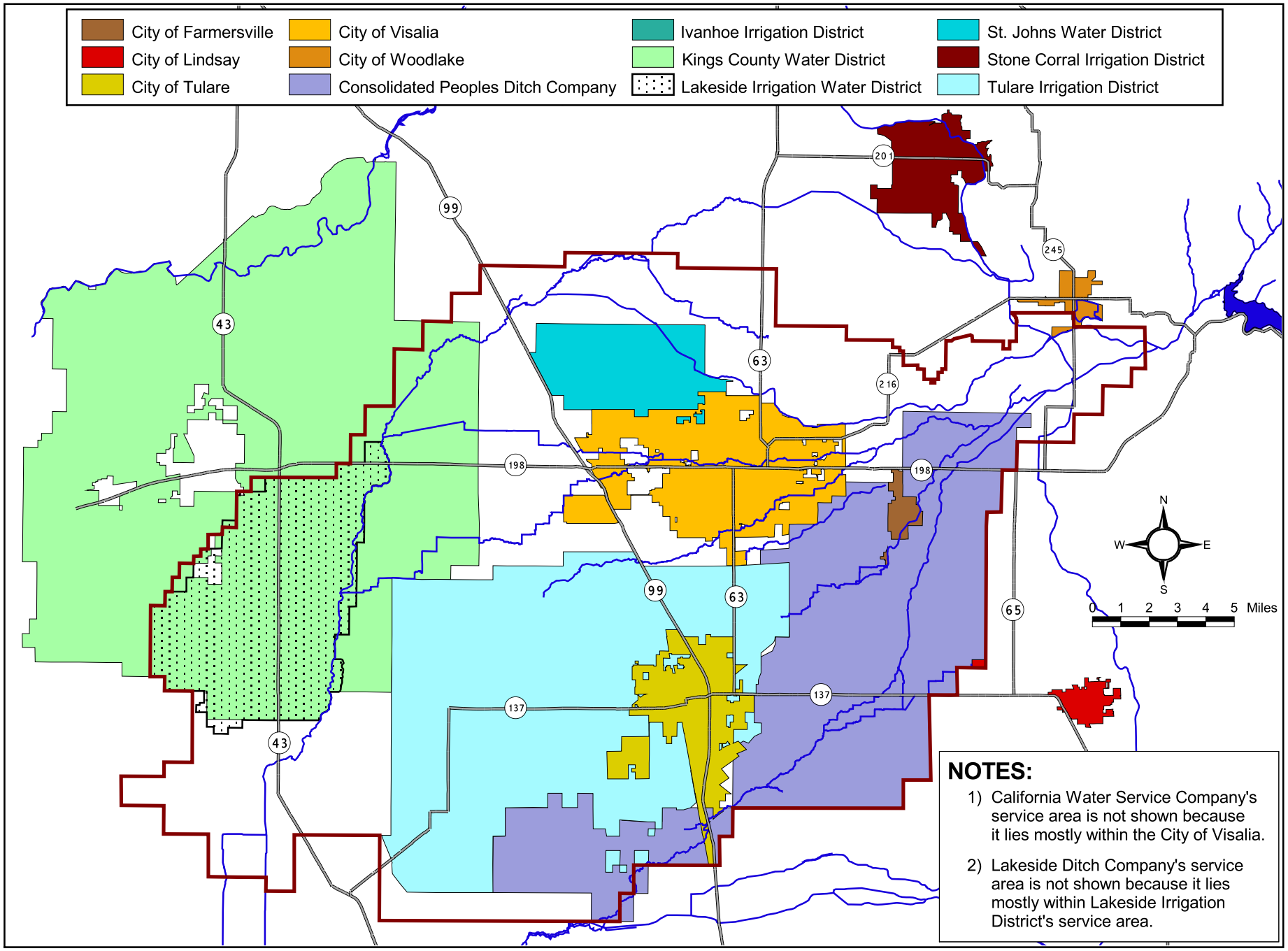


Plate No. 3 : Plan Participants

TABLE 2
GROUNDWATER MANAGEMENT PLAN COMPONENTS

Plan Component Description	District Plan Section
Mandatory Plan Components (CWC § 10753.7(a))	
(1) Basin Management Objectives	3.2
(2) Other Agency Involvement	3.6
(3) Plan Map	1.4
(4) Monitoring Protocols	3.3.5
Optional Plan Components (CWC § 10753.8)	
(a) Saline Water Intrusion	3.4.3
(b) Wellhead Protection	3.4.2
(c) Migration of Contaminated Water	3.4.4
(d) Well Abandonment	3.4.1
(e) Overdraft Mitigation	3.5.2
(f) Groundwater Replenishment	3.5.1
(g) Groundwater Monitoring	3.3.1
(h) Conjunctive Use	3.5.3
(i) Well Construction Policies	3.4.5
(j) Operation of Facilities	3.5.1.4
(k) Relationships with other agencies	3.6.3
(l) Land Use Planning	3.7.1
Recommended Plan Components (BU 118-2003, Appendix C)	
✓ Stakeholder Advisory Committee	3.6.2
✓ Plan Area Description	2.1 – 2.7
✓ Management Objectives Contributions	3.2
✓ Monitoring Program Description	3.3
✓ Periodic Groundwater Reports	3.7.3
✓ Periodic Plan Re-evaluation	3.7.4

SECTION 2: BASIN CONDITIONS

2.1 The District

The District was formed under the provisions of the Water Conservation District Act of 1927 for the purpose of doing those things authorized by the Act. The District, includes lands in both Tulare County and Kings County. The boundary is shown on Plate 4, which also shows hydrologic units established in the District. The total area of the District is about 340,000 acres, with approximately 257,000 acres located in the westerly portion of Tulare County and the balance, or about 83,000 acres, in the northeasterly corner of Kings County.

The lands within the District are used for agricultural purposes, although the cities of Visalia and Tulare constitute significant areas of urbanization. Other communities include Farmersville, Exeter, Goshen, Ivanhoe, Waukena and Guernsey.

2.2 Climate

The area is semi-arid with mild winters and hot, dry summers. The average rainfall, based on District records, is approximately 11 inches per year. Distribution of such rainfall varies from 13 inches on the eastern portions of the District to 7 inches on the western portions. The majority of this rainfall occurs from November through April. With the long, hot summers that normally occur in the valley, there is a potential for about five feet of water that evaporates per year, with the majority of that evaporation occurring during the period from April through October.

Rainfall in the District occurs primarily in the winter months, with virtually no rainfall in the summer months. Annual crop use per acre averages several times the amount of average precipitation. As a result, agricultural crops grown within the District are heavily dependent upon irrigation from surface water deliveries and groundwater pumping, with water needs only partially satisfied by rainfall.

2.3 Land Use

The cropping patterns within the District vary with changes in agricultural economics. In 1981, approximately 77% of the irrigated land was planted in row crops, 20% in permanent plantings and 3% in pasture. In 1999, approximately 71% of the irrigated land was in row crops, 28 % in permanent plantings and 1% in pasture. A tabulation of the land utilization for 1981 and 1999 as compiled in the Final Report (2003) of Water Resources Investigation of the Kaweah Delta Water Conservation District is presented in Table 3.

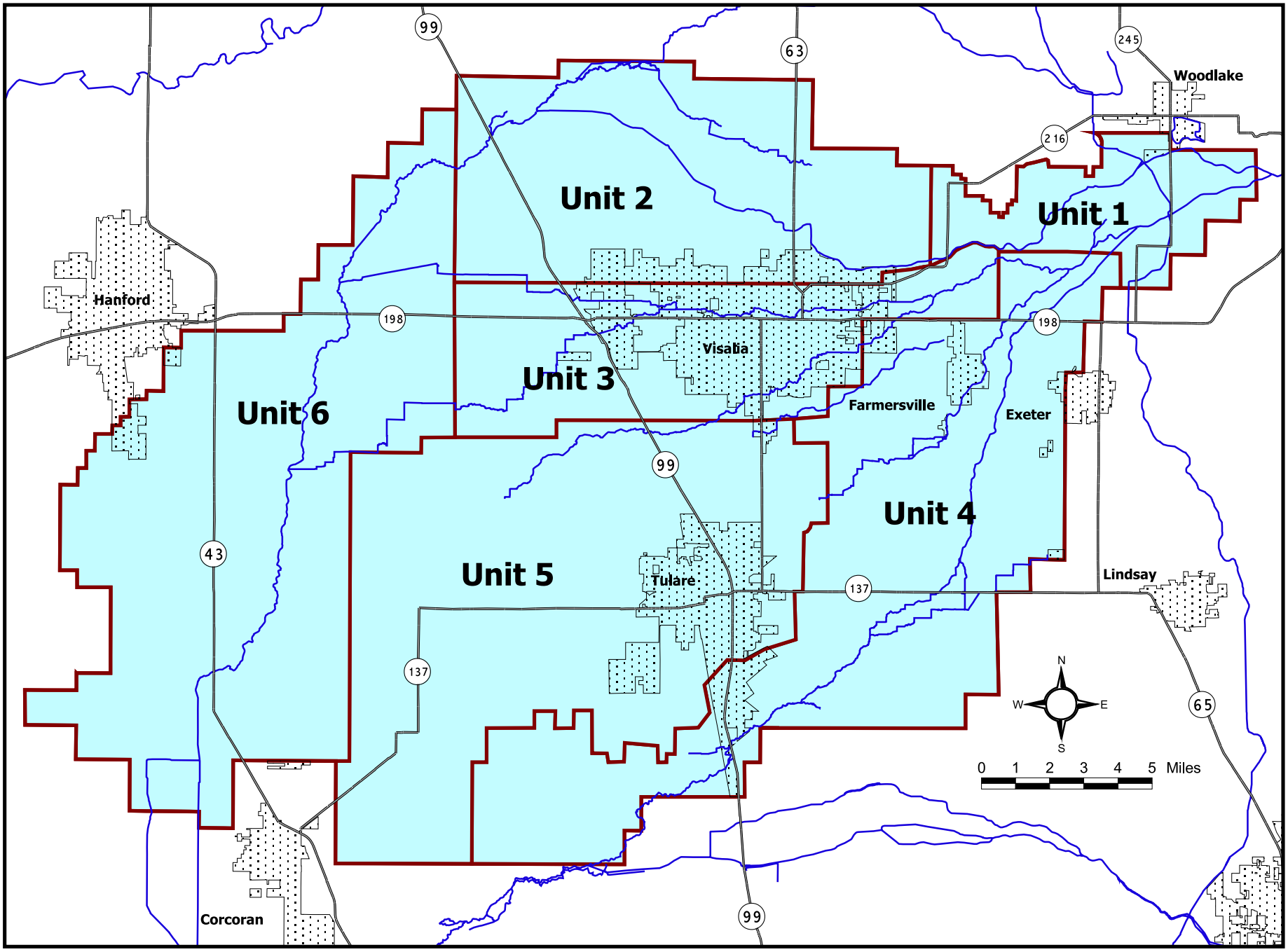


Plate No. 4 : Hydrologic Units

TABLE 3
DISTRICT SUMMARY OF LAND UTILIZATION

(Values in Acres)

Category of Land Use	1981	1990	1999
Irrigated			
Cotton	94,229	93,765	62,295
Alfalfa	33,977	41,257	38,923
Grain	65,062	65,960	87,927
Deciduous and Nuts	36,502	39,262	44,540
Pasture	8,873	4,005	2,954
Miscellaneous Field	2,911	1,053	510
Sugar Beets	1,869	1,100	900
Grapes	9,187	7,492	29,796
Citrus	6,337	6,587	7,184
Rice	313	31	0
Truck	3,995	5,494	10,872
Subtotal, Irrigated	**263,255**	**266,006**	**285,901**
Nonirrigated			
Farmsteads, Dairies, Feed Lots	21,352	29,797	29,508
Urban, Commercial and Industrial	10,397	10,156	13,136
Idle (Fallow)	13,923	7,634	6,958
Roads, Channel and Canals	2,045	3,386	2,433
Undeveloped	28,833	23,047	2,115
Unknown	246	25	0
Sub-total, Nonirrigated	**76,796**	**74,045**	**54,150**
TOTAL	**340,051**	**340,051**	**340,051**

Reference: Water Resources Investigation of the Kaweah Delta Water Conservation District (Final Report 2003)

2.4 Surface Water Hydrology

The majority of the watershed area for the Kaweah River is in the high Sierra Nevada Mountains, which experiences heavy snowfall during most winter months. During the spring and summer months, the snow melts to form tributaries of the Kaweah River. In normal years, the Kaweah River does not reach its highest stage until the middle of May or early June. For the last fifty years, the average annual runoff for the Kaweah River has been 454,295 acre-feet. Average runoff is not the runoff experienced every year. There are great variations in the flows of the Kaweah River, not only from year to year, but also from month to month. Historically, there have been alternating periods of flood and drought in the discharge

area of the Kaweah River, which have been greatly curtailed since 1961 with the completion and operation of Terminus Dam.

In addition to the Kaweah River runoff and rainfall, water enters the District by of way canals from the Kings River and smaller tributary streams such as Dry Creek and Yokohl Creek. Water is also often imported into the District from the Central Valley Project.

At McKay Point, a significant geographical feature immediately to the east of the eastern District boundary and about 1 ½ miles west of the community of Lemon Cove, the Kaweah River divides into the St. Johns River and Lower Kaweah River. Water then enters the District in these two channels. Within the District, these branches continue to divide into both natural and manmade distributaries forming the Kaweah Delta. Included in Section 3.3 of this Plan is Plate No. 16 “Kaweah Watercourses” that displays the extent of the surface water conveyance systems throughout the District.

Numerous public and private entities within the District divert surface water from the Kaweah River and its distributaries. About 250,000 acres within the District have access to surface water supplies from the rivers system. Because of the erratic nature of flows in the Kaweah River, which vary substantially in magnitude from month to month and year to year, nearly all these lands must satisfy supplemental water needs from groundwater. Note that all municipal and industrial uses within the District are supplied exclusively from groundwater.

Terminus Dam and Reservoir, located on the Kaweah River about 3 ½ miles to the east of the District, was completed in 1962 by the U.S. Army Corps of Engineers. This project was constructed mainly for flood control purposes and to provide storage for irrigation waters. The dam is an earth fill structure with a controlled outlet capacity of up to 8,900 cfs. The reservoir space available for conservation and irrigation re-regulation is about 183,000 acre-feet. The District presently has contracts with the United States for the repayment of operation and maintenance costs allocated to flood control and irrigation re-regulation space purposes. The District is the sole entity that holds the contracts for all the conservation and irrigation storage space in the reservoir.

The Friant-Kern Canal, a feature of the Federal Central Valley Project (hereinafter "CVP"), traverses the easterly portion of the District. San Joaquin River water is delivered to certain lands within the Plan Area via this facility. Both the Tulare Irrigation District and Ivanhoe Irrigation District which lie entirely within the Plan Area, obtain water from the Friant-Kern Canal as they have a long-term contract with the Bureau of Reclamation for CVP water. Although the Tulare Irrigation District and Ivanhoe Irrigation District are

the only entities fully within the Plan Area with such a Friant Division contract, the District itself, as well as other entities therein, has historically received substantial quantities of CVP water from time to time through temporary and surplus water service contracts. This water was either percolated or used to offset groundwater extraction. Other special districts located partially within or adjacent to the Plan Area, such as Exeter Irrigation District and Lindmore Irrigation District, also have long-term Friant Division contracts for CVP water.

In common with other areas along the east side of the San Joaquin Valley, the District historically has experienced the anomaly of flood control problems coupled with water deficiency. From time to time, flows in the Kaweah River have reached damaging levels, with substantial volumes of water escaping their channel banks to flood valuable agricultural lands within the District. Even with capture of some of the water associated with these high flood flow events, water supplies are insufficient to meet demands. This is demonstrated in groundwater level declines in all but the eastern portions of the District.

2.5 Hydrogeology

Most of the lands in the District are contained within the Kaweah subbasin of the San Joaquin Valley Groundwater Basin. The San Joaquin Valley Groundwater Basin is surrounded on the west by the Coast Range, 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 utilizing the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne and Stanislaus Rivers. The Kings, Kaweah, Tule and Kern Rivers that flow toward the trough of the Tulare drainage basin, which includes the beds of the former Tulare, Buena Vista and Kern Lakes, internally drain the southern portion of the valley.

The Kaweah subbasin lies between the Kings Groundwater Subbasin on the north, the Tule Groundwater Subbasin on the south, crystalline bedrock of the Sierra Nevada foothills on the east and the Tulare Lake subbasin on the west. The subbasin is generally comprised of lands in the Kaweah Delta Water Conservation District. Major rivers and streams in the subbasin include the Lower Kaweah and St. Johns Rivers. The Kaweah River is considered a primary surface water source for groundwater recharge to the area.

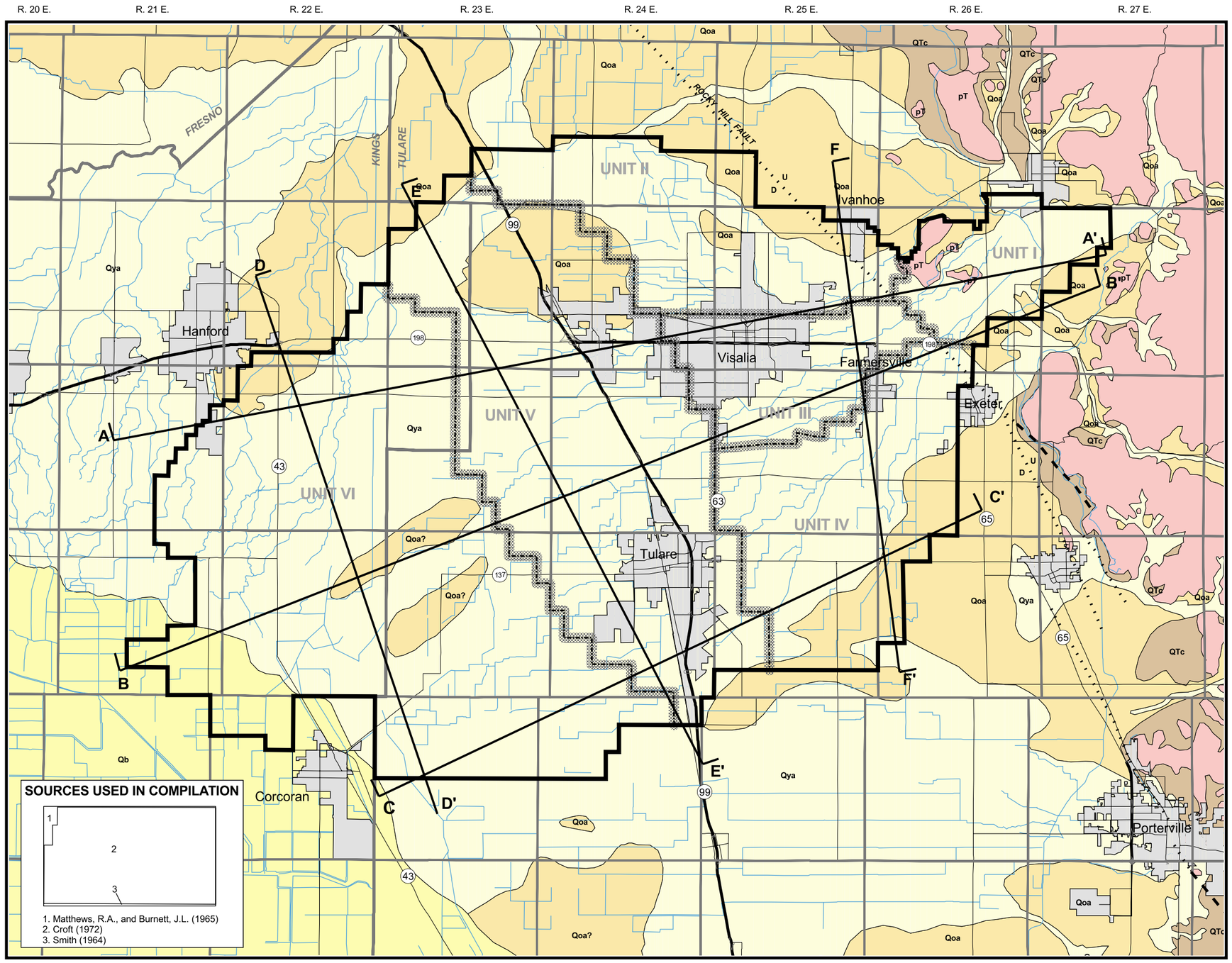
The sediments that comprise the Kaweah Subbasin aquifers are unconsolidated deposits of Pliocene, Pleistocene and Holocene age. On the east side of the subbasin, these deposits consist of arkosic material derived from the Sierra Nevada and are divided into three stratigraphic units: continental deposits, older alluvium and younger alluvium. In the western portion of the subbasin, near Tulare Lake bed,

unconsolidated deposits consisting of flood-subbasin and lacustrine and marsh deposits interfinger with east-side deposits.

The continental deposits of Pliocene and Pleistocene age are divided into oxidized and reduced deposits based on depositional environment. The oxidized deposits, which crop out along the eastern margin of the valley, consist of deeply weathered, poorly permeable, reddish-brown sandy silt and clay with well-developed soil profiles. The reduced deposits are moderately permeable and consist of micaceous sand, silt and clay that extend across the trough in the subsurface to the west side of the valley.

Older alluvium, which overlies the continental deposits, is moderately to highly permeable and is the major aquifer in the subbasin. Younger alluvium consists of arkosic beds, moderately to highly permeable consisting of sand and silty sand. Flood-basin deposits consist of poorly permeable silt, clay and fine sand. Groundwater in the flood-basin deposits is often of poor quality. Lacustrine and marsh deposits consist of blue, green, or gray silty clay and fine sand and underlie the flood-subbasin deposits. Clay beds of the lacustrine and marsh deposits form aquitards that control the vertical and lateral movement of groundwater. The most prominent clay bed is the Corcoran Clay, which underlies the western half of the Kaweah Subbasin at depths ranging from about 200 to 500 feet (DWR 1981). In the eastern portion of the subbasin, groundwater occurs under unconfined and semi-confined conditions. In the western half of the subbasin, where the Corcoran Clay is present, groundwater is primarily confined below the Corcoran Clay.

The geology of the District and surrounding areas is depicted on Plate 5. The associated geologic legend is depicted in Plate 12. Plates 6 through 11 illustrate this geology in cross section.



Legend

- District Boundary
- Hydrologic Unit Boundary
- Cross Section Location
- County Line
- Township and Range Lines
- Streams
- Urban Areas
- Fault--dashed where inferred, dotted where concealed; U, upthrown side; D, downthrown side

Projection: California State Plane, Zone 4. NAD83, Feet

UNCONSOLIDATED DEPOSITS

WEST SIDE (Coast Ranges Provenance)

- QTa Alluvium, undifferentiated (Pliocene to Holocene)

EAST SIDE (Sierra Nevada Provenance)

- Qb Flood basin deposits (Holocene)
- Qya Younger alluvium (Holocene)
- Qoa Older alluvium (Pleistocene and Holocene (?))
- QTl Lacustrine and marsh deposits (Pliocene and Pleistocene)
- QTc Continental deposits (Pliocene and Pleistocene(?))

CONSOLIDATED ROCKS

- pT Basement complex (gabbro, diorite, granodiorite, and metamorphic rocks) (pre-Tertiary)

N

SCALE = 1:250,000

4 0 4 Miles

Plate No. 5
Regional Geologic Map

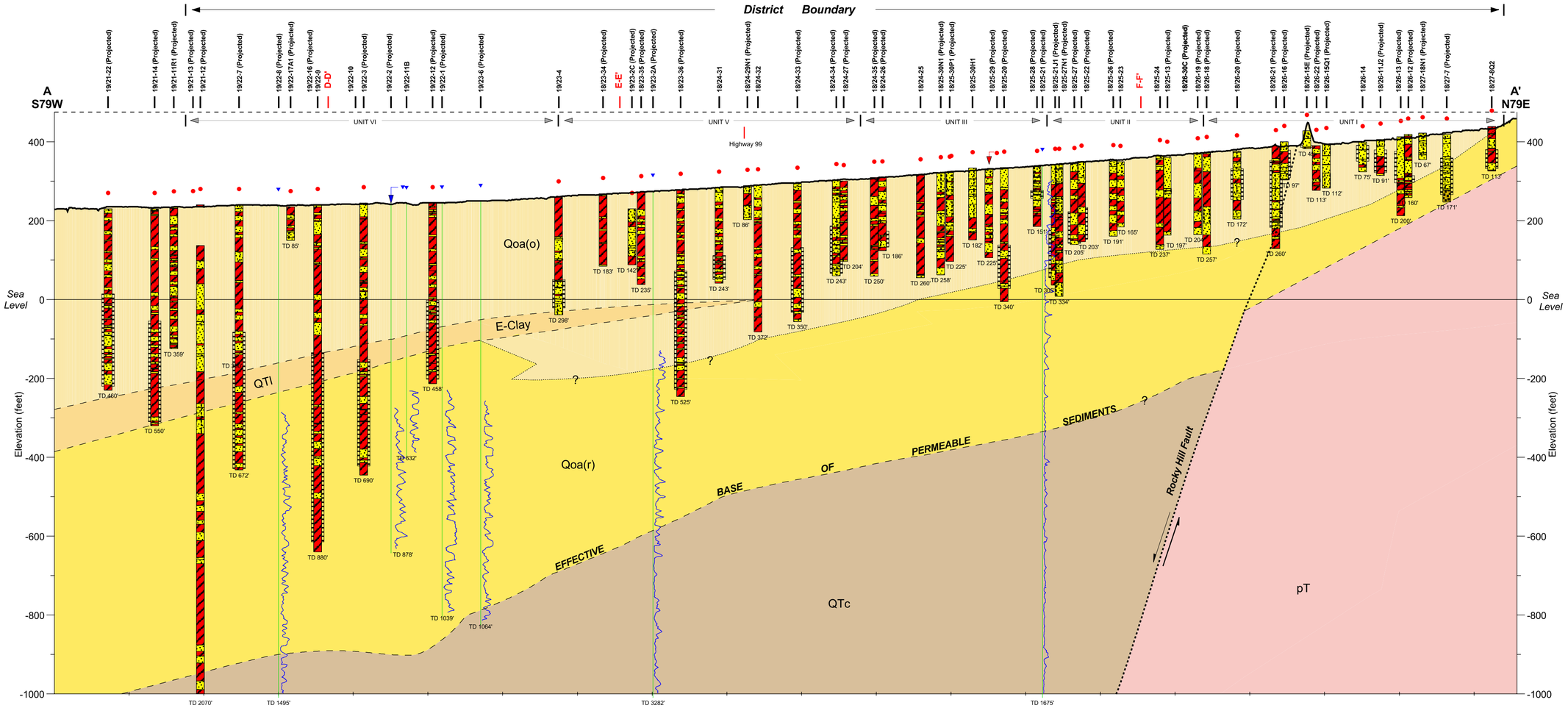


Plate No. 6:
Hydrogeologic Section A-A'
Kaweah Delta Water Conservation District
Kings and Tulare Counties

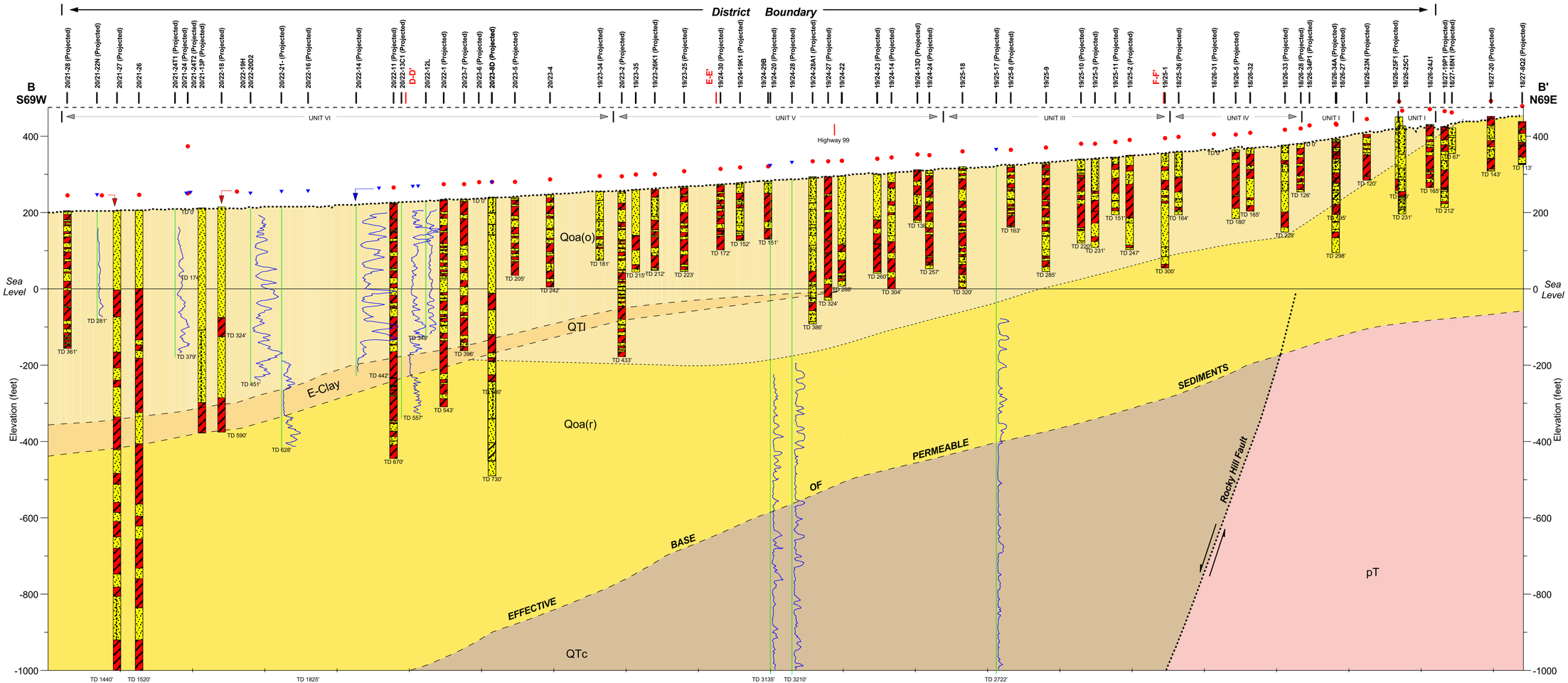


Plate No. 7:
Hydrogeologic Section B-B'
Kaweah Delta Water Conservation District
Kings and Tulare Counties

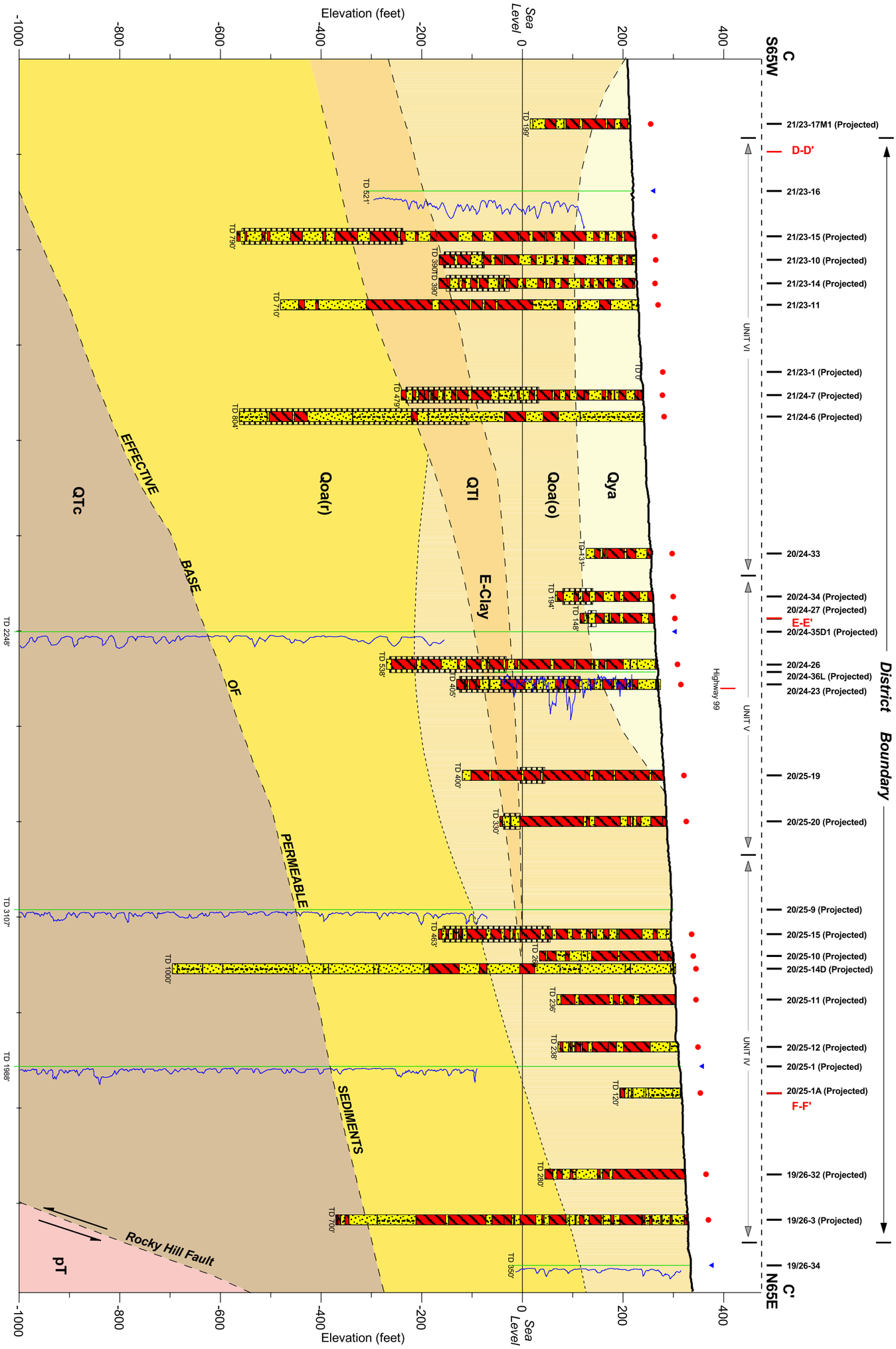


Plate No. 8:
Hydrogeologic Section C-C'

Kaweah Delta Water Conservation District
Kings and Tulare Counties

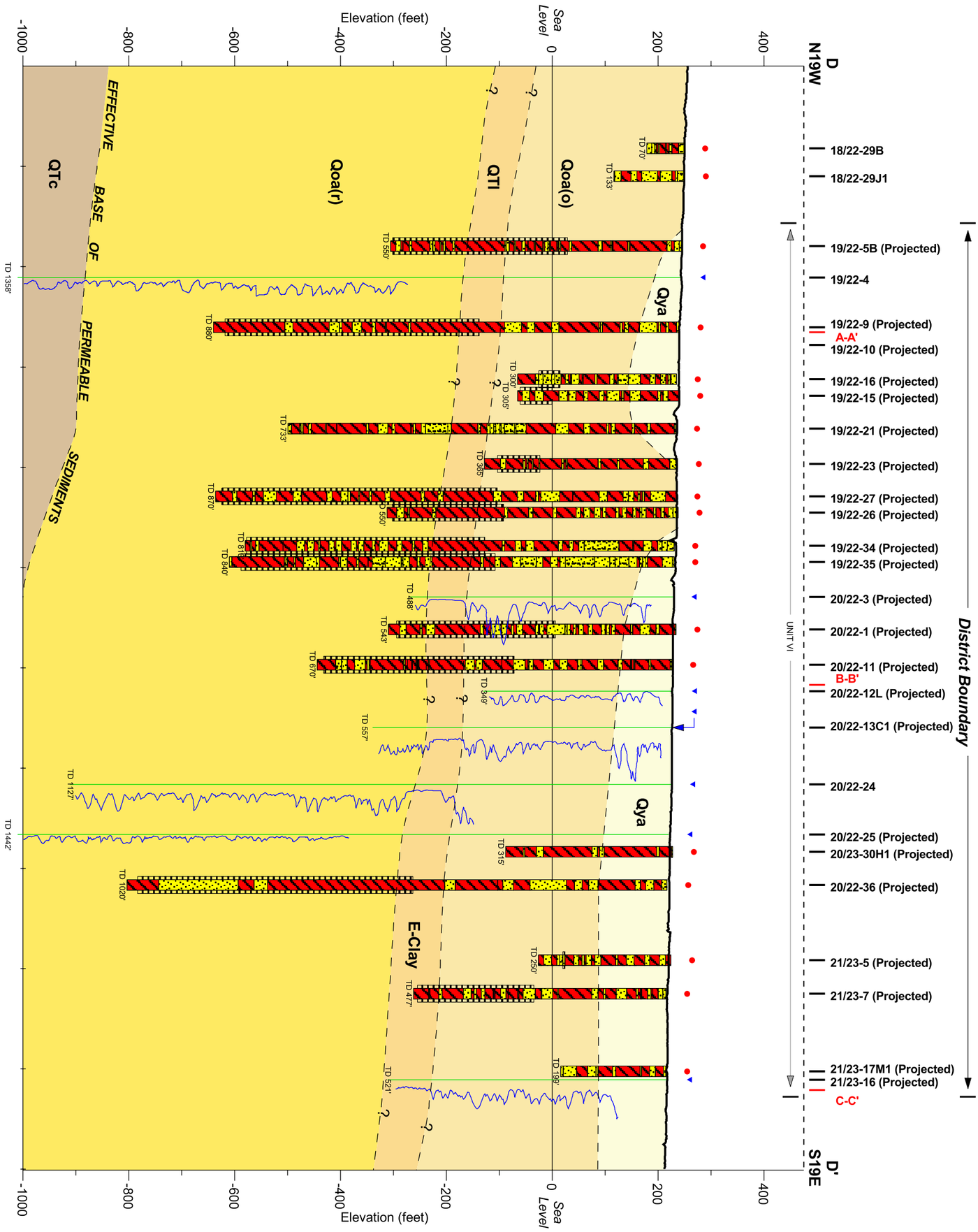


Plate No. 9:
Hydrogeologic Section D-D'
Kaweah Delta Water Conservation District
Kings and Tulare Counties

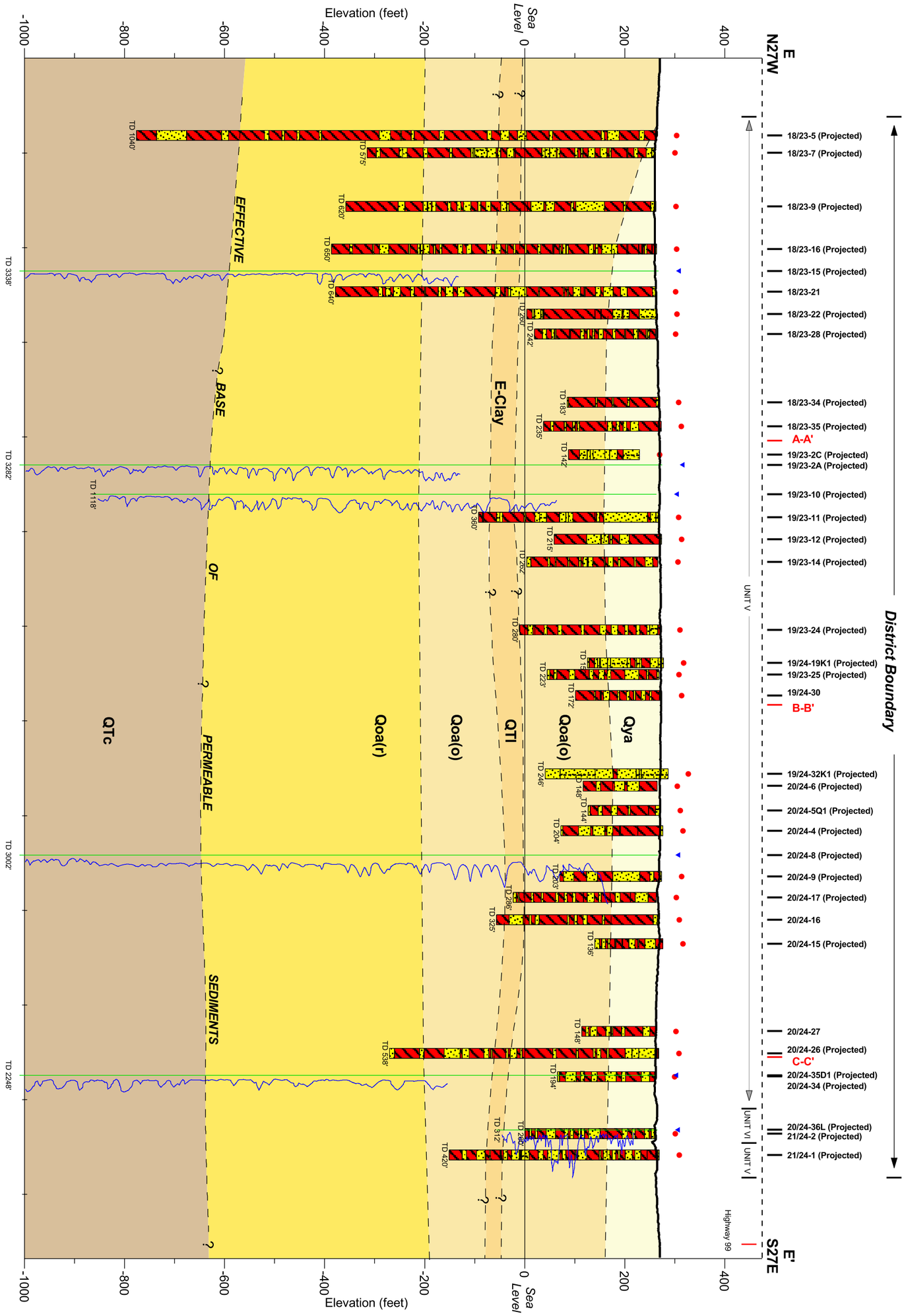


Plate No. 10:
Hydrogeologic Section E-E'
Kaweah Delta Water Conservation District
Kings and Tulare Counties

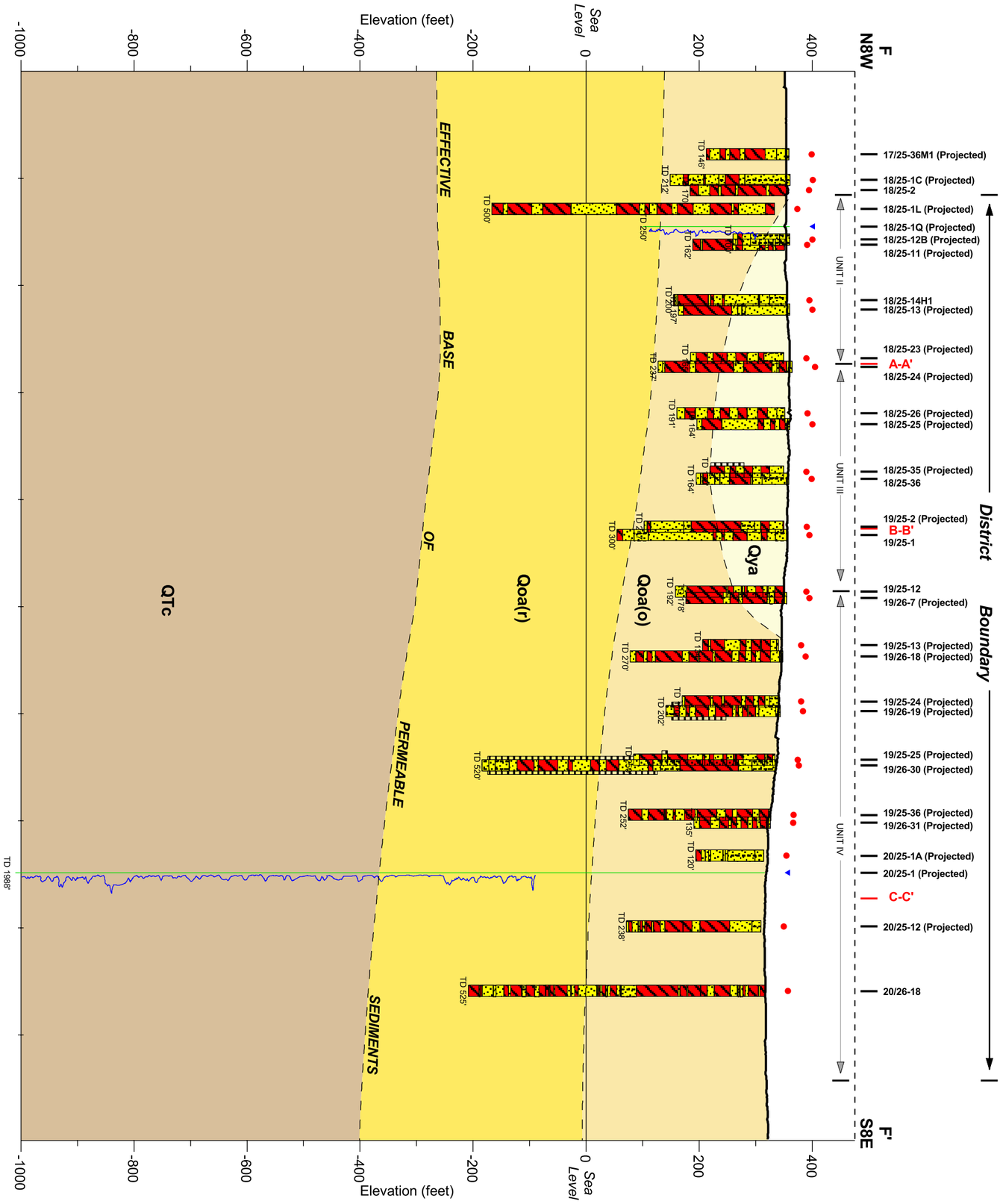


Plate No. 11:
Hydrogeologic Section F-F'
Kaweah Delta Water Conservation District
Kings and Tulare Counties

SOIL TYPES

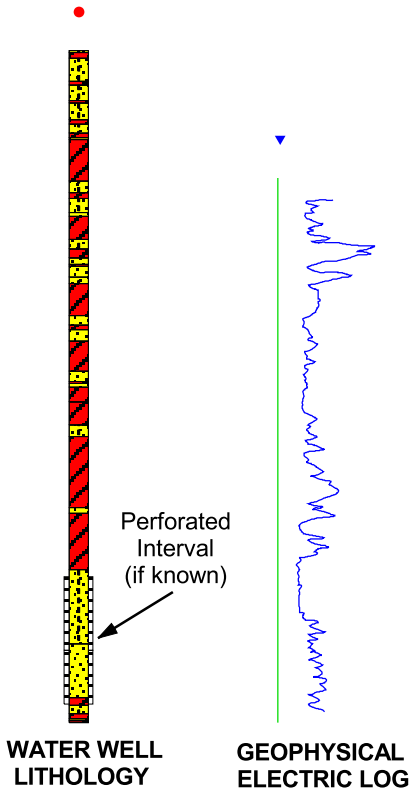
- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy Fat CLAY (CH)
- Lean CLAY (CL)
- Sandy Lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)

UNCONSOLIDATED DEPOSITS

WEST SIDE			EAST SIDE	
Coast Range Provenance			Sierra Nevada Provenance	
Pliocene to Recent	Recent	Qb Flood basin deposits	Qya Younger alluvium	QUATERNARY
	Pliocene and Holocene (?)		Qoao	
			Qoar Older alluvium	
QTa Alluvium, undifferentiated	Pliocene and Pleistocene	QTl Lacustrine and marsh deposits	Pliocene and Pleistocene (?) QTc Continental deposits	TERTIARY and QUATERNARY

CONSOLIDATED ROCKS

pT
Basement complex



- Ground Elevation
- Lithologic Contact (queried where evidence is not conclusive)
- Inferred Fault (arrows indicate direction of movement)
- Contact between oxidized (O) and reduced (R) deposits

Plate No. 12 : Geologic Legend

2.6 Groundwater

Historically, much of the land within the District had a groundwater table close to the land surface. In the early part of the 20th century, the distance from the ground surface to the groundwater table may have averaged less than fifty feet. Over the last fifty years, each successive drought period has resulted in an increase in groundwater pumping that has caused the water table to drop significantly. It is anticipated that as agricultural land is converted to urban uses and industry grows, the competition for water resources among agricultural, urban, industrial and environmental interests will continue to increase.

Groundwater is the most dependable water supply for the Basin's agricultural, industrial and domestic water users who regularly draw upon this valuable resource from individually owned wells. The continued pumping of groundwater has resulted in an overdraft of the groundwater basin, that is, more water has been pumped from the basin than has been recharged into the basin on a long-term basis. Even though over 3 million acre-feet of surface water has been imported into the District over the past 30 years in an effort to supplement local surface water supply and reduce dependence on groundwater, the average depth to groundwater within the Plan Area has continued to drop.

The District has been monitoring groundwater levels since the 1950's. This is accomplished through groundwater level measurements taken in the late fall and early spring. Based on the water level readings, there is an overall trend of declining groundwater levels within the Basin. A graphical analysis of historical groundwater levels reveals the areal extent of overdraft throughout the District and is presented on Plate No. 13, "Contours of Equal Difference in Water Levels, 1952 to 1999". It is important to note that the Basin does have the ability to respond to positive conditions and this is demonstrated during years of above-average precipitation when the decline has been periodically interrupted by short-term groundwater recovery.

The condition of overdraft results in additional pumping costs to accommodate increased lift. As the water table continues to drop, pumping must occur from deeper levels of the aquifer which often have lower porosity and specific yield characteristics than those found in the upper levels of the unconfined aquifer. The long-term impact is a further reduction in the available groundwater supply in storage. Using the collected historical data and the transmissivity factors of the aquifers, a determination can be made of the estimated quantity of inflow and/or outflow of groundwater within the Plan Area. This data allows the District to identify and evaluate areas that could be more severely impacted during periods of sustained drought due to low yield of wells and the limited depths of the aquifers. This important water management tool is useful to the District in developing long-term planning decisions.

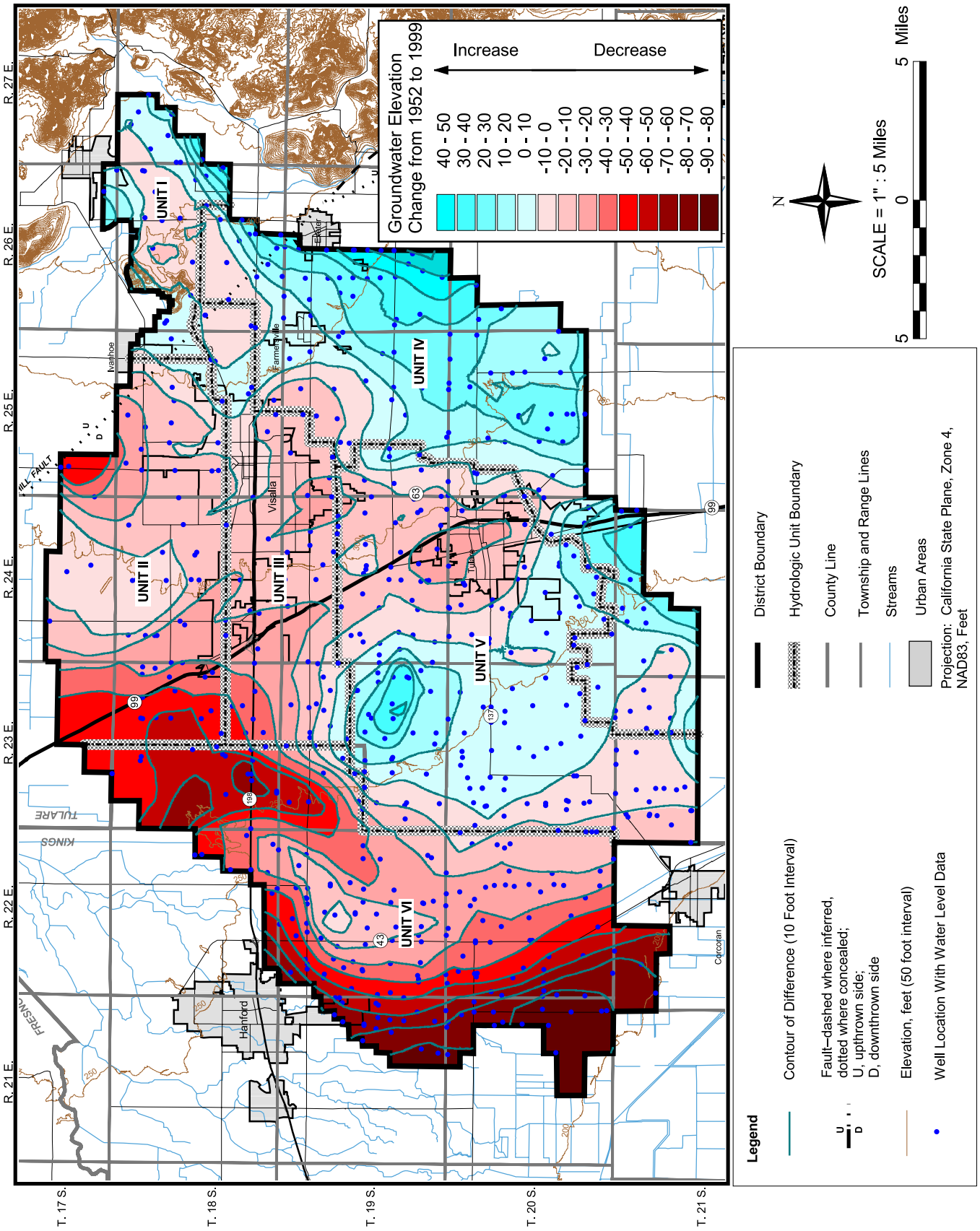


Plate No. 13

Contours of Equal Difference in Water Levels, 1952 to 1999

Kaweah Delta Water Conservation District

2.7 Water Demand and Supply

The dominant use of water within the District occurs from irrigated agricultural. Average annual applied water demand for crops grown in the District is approximately 3.7 acre-feet per acre. The applied water demand ranges from 1.9 acre-feet per acre for truck crops to 6.5 acre-feet per acre for pasture. A summary tabulation of estimated annual water demands for crops grown in the District for the years 1981, 1990 and 1999 is set forth in Table 5 on the following page. Uses outside of irrigated agriculture commonly include municipal, industrial and domestic applications. Table 4 presents a summary of water demands within the District that are not classified as irrigated agricultural.

TABLE 4
ESTIMATED M&I WATER DEMAND IN THE DISTRICT

(Values in Acre-Feet)

Use Classification	**1981**	**1990**	**1999**
Urban Water Demand	24,167	32,947	42,457
Public Water System Demand	5,739	7,222	8,242
Rural Domestic Water Demand	1,876	1,876	1,876
Dairy and Related Water Demand	4,169	10,846	16,255
TOTAL	**35,951**	**52,891**	**68,830**

Reference: Water Resources Investigation of the Kaweah Delta Water Conservation District (Final Report 2003)

The District receives approximately 80% of its average annual surface water supply from the Kaweah River System and approximately 20% of its average surface water supply through imported water. Water demands that are not met from the supply of surface water are pumped from the groundwater basin. Since 1962, records show that over 5 million acre-feet of water has been imported into the District. The annual imported supply is variable and is dependent on available CVP supply. Kings River water is also diverted into the District. The annual imported surface water supply and deliveries (1963 through 2005) are presented in Table 6, Kaweah Delta Water Supply Inventory.

Notable changes that have affected water supplies to the District include the following:

- ✓ Central Valley Project (1950's)
- ✓ Terminus Project (Lake Kaweah: 1962)
- ✓ State Water Project (Tulare Lake Basin Water Storage District: 1968)
- ✓ Terminus Project (Lake Kaweah Enlargement: 2004)

TABLE 5
ESTIMATED APPLICATION OF IRRIGATED WATER TO CROPS IN THE DISTRICT

Category of Land Use	Average Water Demand (Feet)	1981		1990		1999	
		Net Irrigated Area (Acres)	Total Application (Acre-Feet)	Net Irrigated Area (Acres)	Total Application (Acre-Feet)	Net Irrigated Area (Acres)	Total Application (Acre-Feet)
Cotton	3.9	94,229	367,493	93,765	365,684	62,295	242,951
Alfalfa	5.0	33,977	169,885	41,257	206,285	38,923	194,615
Grain	2.8	65,062	182,174	65,960	184,688	87,927	246,196
Deciduous and Nuts	4.0	36,502	146,008	39,262	157,048	44,540	178,160
Pasture	6.5	8,873	57,675	4,005	26,033	2,954	19,201
Miscellaneous Field	3.0	2,911	8,733	1,053	3,159	510	1,530
Sugar Beets	4.0	1,869	7,476	1,100	4,400	900	3,600
Grapes	3.8	9,187	34,911	7,492	28,470	29,796	113,225
Citrus	2.9	6,337	18,377	6,587	19,102	7,184	20,834
Rice	6.0	313	1,878	31	186	0	0
Truck	1.9	3,995	7,591	5,494	10,439	10,872	20,657
	TOTAL	**263,255**	**1,002,200**	**266,006**	**1,005,493**	**285,901**	**1,040,967**

Note: Total annual crop demand obtained from DWR Bulletin 113 or information from California Department of Water Resources for DAU242

TABLE 6
KAWEAH DELTA WATER SUPPLY INVENTORY

(Values in Acre-Feet)

Water Year	SURFACE WATER INFLOW					SURFACE WATER OUTFLOW		
	Terminus Flows	Creek Flows	CVP Imports	Kings River	TOTAL	Spills	Friant-Kern Pumping	TOTAL
1962-63	474,120	10,604	285,741	0	**770,465**	14,027	0	**14,027**
1963-64	228,099	3,703	105,736	0	**337,538**	1,190	0	**1,190**
1964-65	481,989	19,044	276,516	0	**777,548**	5,399	0	**5,399**
1965-66	246,551	1,648	117,175	0	**365,375**	2,900	0	**2,900**
1966-67	1,000,713	79,997	282,316	8,481	**1,371,506**	104,794	0	**104,794**
1967-68	231,545	2,168	134,922	0	**368,635**	3,775	0	**3,775**
1968-69	1,185,412	141,336	186,749	0	**1,513,497**	418,092	0	**418,092**
1969-70	429,185	13,329	113,373	26,468	**582,355**	17,586	0	**17,586**
1970-71	287,302	5,353	113,044	17,294	**422,993**	0	0	**0**
1971-72	163,243	1,835	42,014	0	**207,092**	0	0	**0**
1972-73	609,878	40,565	172,628	28,961	**852,032**	34,229	0	**34,229**
1973-74	485,551	27,093	260,418	19,785	**792,847**	29,566	0	**29,566**
1974-75	376,310	13,916	162,649	20,168	**573,043**	7,589	0	**7,589**
1975-76	135,927	1,505	36,782	1,753	**175,968**	202	0	**202**
1976-77	96,161	196	109	0	**96,467**	0	0	**0**
1977-78	814,317	99,802	122,348	9,037	**1,045,504**	44,863	9,112	**53,975**
1978-79	420,353	19,246	287,179	7,716	**734,494**	13,885	0	**13,885**
1979-80	874,598	62,371	209,303	1,087	**1,147,359**	97,785	5,096	**102,880**
1980-81	246,907	5,697	66,293	11,118	**330,014**	1,956	0	**1,956**
1981-82	742,680	41,983	241,594	3,217	**1,029,474**	58,035	29,532	**87,568**
1982-83	1,398,397	171,130	62,601	0	**1,632,129**	459,619	148,197	**607,816**
1983-84	528,171	37,214	121,468	42,685	**729,538**	79,973	0	**79,973**
1984-85	328,718	6,553	92,348	3,207	**430,827**	367	0	**367**
1985-86	808,032	51,337	163,909	18,068	**1,041,345**	63,660	92,739	**156,399**
1986-87	180,551	3,160	30,671	2,430	**216,812**	0	0	**0**
1987-88	182,282	2,747	99,058	1,995	**286,082**	0	0	**0**
1988-89	207,723	2,269	39,612	1,000	**250,604**	0	0	**0**
1989-90	134,201	859	0	0	**135,060**	0	0	**0**
1990-91	246,485	4,741	7,716	0	**258,942**	0	0	**0**
1991-92	146,744	1,787	17,639	1,226	**167,397**	0	0	**0**
1992-93	545,966	26,420	145,690	7,093	**725,169**	0	0	**0**
1993-94	188,055	2,535	27,777	1,392	**219,760**	0	0	**0**
1994-95	854,667	58,872	125,682	13,383	**1,052,604**	114,966	0	**114,966**
1995-96	518,993	21,753	128,521	33,796	**703,063**	236	0	**236**
1996-97	760,268	68,708	82,930	20,734	**932,641**	170,109	54,780	**224,889**
1997-98	906,426	127,460	79,058	13,918	**1,126,862**	94,306	137,018	**231,324**
1998-99	283,025	25,311	124,909	20,107	**453,352**	7,734	0	**7,734**
1999-00	361,012	35,084	114,236	2,575	**512,907**	21,479	0	**21,479**
2000-01	259,317	5,645	23,296	6,944	**295,203**	8	0	**8**
2001-02	297,368	5,427	41,654	2,095	**346,543**	81	0	**81**
2002-03	426,046	8,704	122,039	11,732	**568,521**	530	0	**2,156**
2003-04	229,667	2,410	34,374	73,973	**340,424**	391	0	**805**
2004-05	614,095	18,274	240,023	80,064	**952,456**	2,372	0	**2,372**
TOTAL	**19,937,050**	**1,279,791**	**5,142,100**	**513,502**	**26,872,447**	**1,871,704**	**476,474**	**2,350,218**
AVERAGE	**463,652**	**29,763**	**119,584**	**11,942**	**624,941**	**43,528**	**11,081**	**54,656**

SECTION 3: MANAGEMENT PROGRAM

3.1 Statutory Authority

The District hereby includes in its groundwater management program the right to engage in all of those activities provided by statutes, which authorize or are related to Plan developments.

California Water Code § 10753.7(a) states that, for the District to have a qualifying plan eligible to receive state funds administered by the Department of Water Resources, that such plan shall include as components all of the following:

(1) Prepare and implement basin management objectives;
(2) Involve other agencies to work cooperatively;
(3) Prepare a Plan Area map detailing the groundwater basin; and
(4) Adopt monitoring protocols designed to detect changes in groundwater conditions.

California Water Code § 10753.8 authorizes the District to include as components in its groundwater management plan the following:

(a) The control of saline water intrusion;
(b) Identification and management of wellhead protection areas and recharge areas;
(c) Regulation of the migration of contaminated groundwater;
(d) The administration of a well abandonment and well destruction program;
(e) Mitigation of conditions of overdraft;
(f) Replenishment of groundwater extracted by water producers;
(g) Monitoring of groundwater levels and storage;
(h) Facilitating conjunctive use operations;
(i) Identification of well construction policies;
(j) The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling and extraction projects;
(k) The development of relationships with state and federal regulatory agencies; and
(l) The review of land use plans and coordination with land use planning agencies to assess activities, which create a reasonable risk of groundwater contamination.

Additionally, the District intends to exercise all of the authority given to a water replenishment district in California Water Code § 60220 through § 60232, together with the authority of a water replenishment district to fix and collect fees and assessments within the Plan Area for groundwater management in accordance with California Water Code § 60300 through § 60352, as may be necessary for the District to accomplish the purposes and goals of the Plan.

Notwithstanding the foregoing, the District reserves the right to decide whether or not it will be involved and to the extent to which it will be involved in each of the activities authorized by the aforementioned

statutes. The District assumes no responsibility or liability for any authorized activity in which it is not actually involved. Further, upon thirty (30) days written notice to all other local agencies located within the Plan Area, the District may terminate the Plan, together with any and all activities, which may be a part of its groundwater management program at the time of such termination. The District shall not be required to notify other local agencies, or anyone else, if it merely terminates its involvement in an activity authorized by the aforementioned statutes, without terminating the Plan itself.

3.2 Basin Management Objectives

The goal of the Plan is to offer efficient and effective groundwater management in an effort to provide a sustainable, high quality supply of groundwater for agricultural, environmental and urban use for the future. The groundwater of San Joaquin Valley Groundwater Basin aquifer underlying the Kaweah Delta Water Conservation District is a significant water resource that must be reasonably used and conserved for the benefit of the overlying lands. This can be accomplished by avoiding extractions that exceed safe yield or produce a condition of overdraft within the Plan Area.

To accomplish the Plan's goal, the following management objectives are adopted under the Plan:

- ✓ Stabilize and potentially reverse the long-term decline of groundwater levels
- ✓ Monitor groundwater quality
- ✓ Monitor inelastic land surface subsidence resulting from groundwater pumping
- ✓ Maintain and augment surface water supplies that directly affect groundwater levels
- ✓ Monitor changes to surface water quality that directly affect groundwater quality
- ✓ Evaluate groundwater replenishment projects
- ✓ Evaluate cooperative management projects
- ✓ Provide effective and efficient management of groundwater recharge projects, facilities and programs
- ✓ Coordinate groundwater basin management with local agencies with groundwater authority within the Plan Area

Each of the adopted management objectives is designed toward attaining the Plan's goal. The way in which each objective contributes toward a more reliable supply of groundwater for long-term benefical use is described as follows:

- ✓ Stabilizing or reversing long-term decline of groundwater levels provides a balancing between groundwater demand and supply, ensuring a resource that will be available into the future
- ✓ Monitoring groundwater quality will enable the Plan to assess possible impacts that might diminish the usability of the resource

- ✓ Monitoring inelastic land surface subsidence is valuable in determining available groundwater storage and evaluating groundwater supplies
- ✓ Maintenance and augmentation of surface water supplies will reduce expected impacts of increased demands on groundwater supplies, which is critical in maintaining the ability to stabilize long-term draw down
- ✓ Monitoring surface water quality changes will enable the Plan to assess possible impacts that might diminish the usability of the resource
- ✓ Evaluation of replenishment projects will focus on providing greater recharge productivity, which will make the most efficient and effective use of facilities and resources.
- ✓ Evaluation of cooperative management projects is an effort to provide for greater recharge opportunities, which is important in attaining the stabilization of groundwater levels
- ✓ Providing effective and efficient management of groundwater recharge projects, facilities and programs works toward increasing recharge in the efforts to stabilize groundwater levels
- ✓ Coordinating groundwater basin management will promote a consistency in objectives between local agencies, providing a unified approach to meeting goals.

The interaction between basin management objectives, Plan elements and corresponding activities is fundamental to Plan effectiveness. The Plan will be carried out based upon the specific correlations developed between objectives and activities. The relationships for implementation of the Plan are diagramed in Plate No. 14.

3.3 Monitoring Program

Attaining the Plan's goal requires obtaining a comprehensive understanding of the interactive components that comprise and define the aquifer system. A vital Plan function is the collection of information concerning and related to groundwater conditions. Management objectives have been founded upon the knowledge of past and current conditions ascertained through the District's monitoring efforts. The Plan will continue to progress toward its goal through ongoing monitoring of the following components:

- ✓ Groundwater Supply and Quality
- ✓ Surface Water Supply and Quality
- ✓ Surface Water Management
- ✓ Inelastic Land Surface Subsidence

Consistent and reliable information is critical for any monitoring program. The Plan will be able to achieve this requirement through the implementation of monitoring protocols. Protocols have been and will continue to be developed to track changes in conditions.

Plate No. 14

Groundwater Management Plan Implementation Diagram

Kaweah Delta Water Conservation District

3.3.1 Groundwater

The District has an extensive monitoring network that was initially established in the 1950's. This network has been maintained and improved in a continuing effort to provide reliable information for annual and long-term assessment of groundwater conditions. Plate 15 identifies the location of monitoring sites where groundwater level measurements are currently collected. Ongoing groundwater monitoring will provide information needed to document current conditions, assess long-term trends and to support development and implementation of objectives associated with:

- ✓ Groundwater levels
- ✓ Groundwater quality
- ✓ Inelastic land surface subsidence

3.3.1.1 Groundwater Levels

Since the establishment of the groundwater monitoring network, the District has performed static groundwater level measurements in the spring and fall periods. Such measuring operations have been performed in coordination with DWR's semiannual requests for groundwater levels. The information is utilized by DWR in mapping groundwater levels for the San Joaquin Valley Groundwater Basin and by the District in annual reporting of groundwater conditions.

The District shall continue to monitor groundwater levels semi-annually. Further, the District will prepare charts depicting the information gathered through the monitoring phase, as well as reports quantifying the water demands, surface water and groundwater supplies. These summaries will assist the District in evaluating the effectiveness of the various elements of its program. The collection of this data will be continued with the conduct of the Plan. The information that has been prepared from this data in the past includes the following:

- ✓ Charts of spring and fall water elevations
- ✓ Charts of spring and fall depths to groundwater
- ✓ Charts showing the changes in groundwater levels

In addition, groundwater reports could include estimates of changes in groundwater storage, water delivered, water use and overdraft. Existing information coupled with possible new data would benefit the evaluation of the effectiveness of management activities.

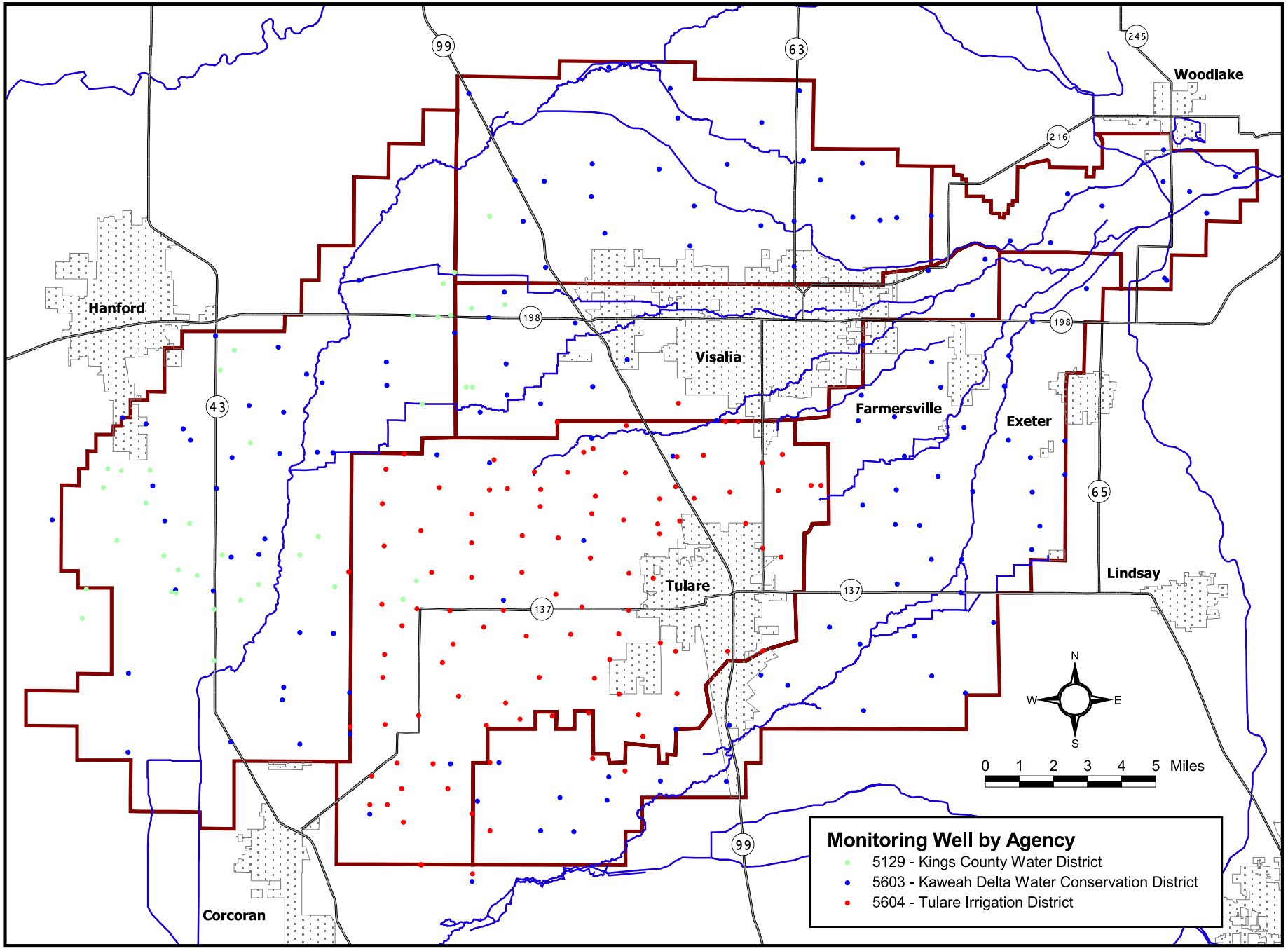


Plate No. 15 : Monitoring Wells (Water Levels)

3.3.1.2 Groundwater Quality

The District will pursue the collection of groundwater quality data from those agencies that have existing programs that record and report on relevant conditions. The effort will be focused toward monitoring key indicators of groundwater quality for the aquifers lying within the District. The indicators that the Plan will concentrate on will consist of the following:

- ✓ Temperature
- ✓ Total Dissolved Solids (TDS)
- ✓ Electrical Conductivity (EC)
- ✓ Acidity (pH)
- ✓ Chloride
- ✓ Sodium
- ✓ Nitrates

The initial effort will be the collection and review of water quality data for adequacy. The Environmental Health Departments of Kings and Tulare Counties will be used as a primary source for acquiring relevant data. Additionally, the Regional Water Quality Control Board can provide information gathered through their regulatory efforts. The District also intends to incorporate findings from the "Ground-Water Ambient Monitoring and Assessment Program" (GAMA) that is currently being performed by the United States Geological Survey and the State Water Resources Control Board. Compiling diverse sources of available information for tracking, trending and reporting within a specified area will be a useful way for the Plan to monitor groundwater quality conditions.

3.3.2 Surface Water

The delivery of surface water throughout the District is known to have a major influence on groundwater conditions. Percolation of surface water delivered through natural and man-made conveyance facilities is a primary source of inflow to the aquifers. Approximately 95 percent of all water usage within the District is for agricultural purposes. The supply for such demands is met with a combination of surface and groundwater. Therefore, the annual quantity and distribution of surface water has a direct correlation to the quantity of groundwater withdrawn from the aquifer. The quality of groundwater can also be affected through its supply source, as well as by changes in aquifer flow conditions that occur from groundwater elevation differences that result from the aquifer's response to water demands.

3.3.2.1 Surface Water Flows

There are two (2) primary surface water supply sources to lands lying within the Plan. The first source is water originating from the Kaweah River Watershed and the second from outside water sources such as the Friant-Kern Canal or Kings River. These available waters are obtained by or entitled to various irrigation companies and districts for delivery for beneficial purposes to lands within their respective

service areas. Continual measurement of all such surface flows are made and recorded by these entities for operational and legal purposes. Presently all those entities that have entitlement to Kaweah River water are bound together by the "Kaweah & St. Johns Rivers Association" (Association). The Association functions as Watermaster for delivery of waters to its members by means of the natural watercourses that run throughout the District. In the performance of such duties all surface water deliveries, both Kaweah River and imported sources, are regularly recorded and reported. Plate 16 identifies the watercourses and recording station locations operated or reported by the Association.

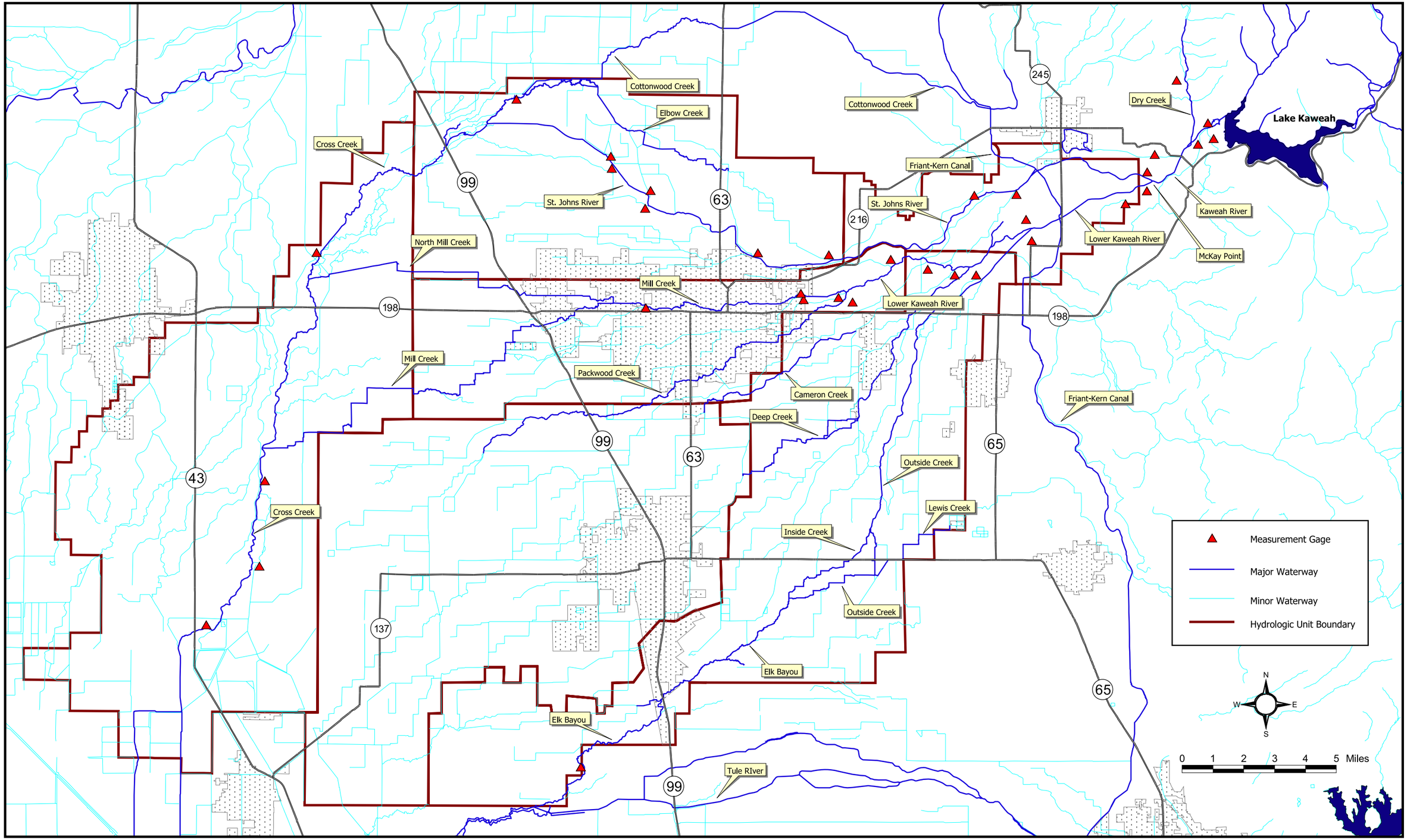
The District is a Kaweah River entitlement holder and member of the Association and as such has access to surface water flow information that will be utilized in exercising the Plan. More importantly, the District is under contract with the Association for performing all management and operational responsibilities. Thereby, the District directly oversees all aspects of measuring and recording surface water flows.

3.3.2.2 Surface Water Quality

The District will pursue the collection of surface water quality data from those agencies or organizations that have existing programs that record and report on relevant conditions. The District may use the surface water quality data it collects to monitor potential contamination of groundwater within the Plan Area. The effort will be focused toward monitoring key indicators of water that is conveyed in the natural systems within the District. Those indicators that the Plan will concentrate will consist of the following:

- ✓ Temperature
- ✓ Total Dissolved Solids (TDS)
- ✓ Electrical Conductivity (EC)
- ✓ Acidity (pH)
- ✓ Chloride
- ✓ Sodium
- ✓ Nitrates

As with groundwater quality monitoring, the Plan's initial effort will be the collection and review for adequacy of surface water quality data. Currently, the Association is engaged in a water quality program in response to the California Regional Water Quality Control Board's "Agricultural Conditional Discharge Waiver." The program involves performing surface water sampling at established locations on a defined cycle. Additionally, the Board also has permits in place for the monitoring and regulation of point source discharges, such as the City of Visalia's treated effluent discharges into Mill Creek. Plate 17 identifies known locations where surface water is sampled and monitored. The Plan will monitor surface water quality based upon available data in an effort to provide a consistent representation of key indicators on an annual and long-term basis.



Kaweah Watercourses

Plate No. 16

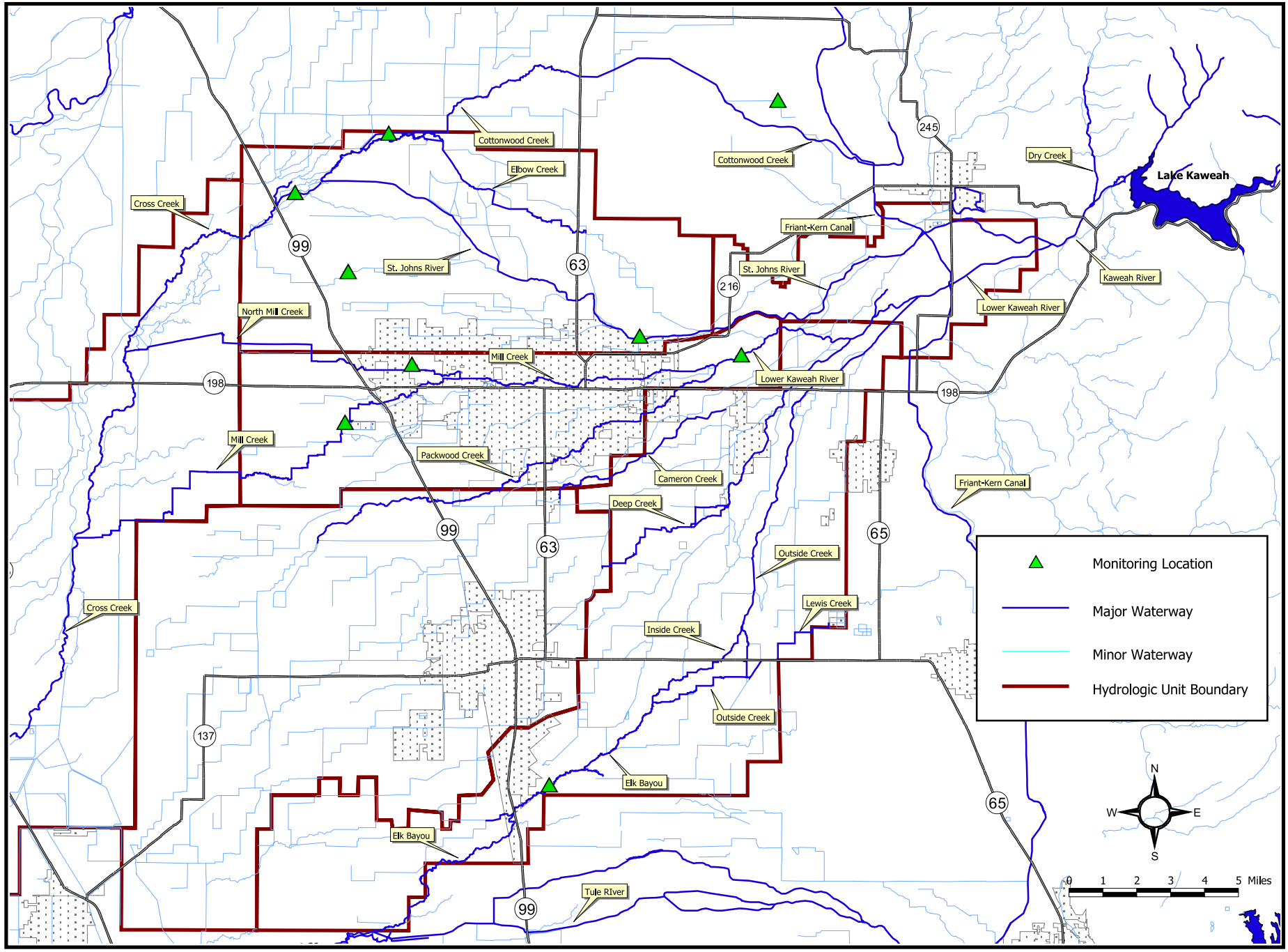


Plate No. 17 : Surface Water Monitoring

3.3.3 Water Transfers

Since the development of water storage facilities, like Lake Kaweah, water users have been able to manage surface water supplies for increased benefit. The ability to store water provides opportunities to acquire additional or release excess supplies through the water transfer process. Water transfers are means for the redistribution of surface waters to meet water demands. Groundwater is influenced by water transfers in such a way that those areas that are able to acquire additional surface supplies will proportionally reduce aquifer withdrawals. The two (2) types of transfers that the Plan is designed to monitor are Intra-District and Inter-District Transfers.

3.3.3.1 Intra-District Transfers

Intra-District surface water transfers are those that occur for the Plan's native water source, the Kaweah River, within the Kaweah River Basin as designated by the Association's "Transfer Policy". A copy of the "Transfer Policy" is included in Appendix "A." Kaweah River entitlement holders that store water within Lake Kaweah have the ability to transfer quantities of water in storage, under defined conditions, between like parties. An entitlement holder's water supply is based upon such factors as mean daily inflows to the lake and an allocation schedule. The most commonly occurring transfer is between users that have supplies in excess of their immediate demand to those users that have insufficient supplies. Frequency and magnitude of transfers are normally a function of the influence of seasonal climatic conditions on run-off from the watershed. Kaweah River water transfers within the Plan Area take place on a routine basis. The Plan has and will continue to monitor these transfers and their influence on groundwater conditions. Water transfers within the Plan Area are permissible and subject to the administration of the Kaweah River Watermaster under the direction of the Association's Board of Directors.

3.3.3.2 Inter-District Transfers

Inter-District surface water transfers are those that transfer Kaweah Water outside the District in exchange for a transfer back into the District from an external water source. The circumstances for these transfers are similar in nature to Intra-District Transfers. Supply and demand is the driving force behind such transactions. The main differences consist of utilizing multi-regional conveyance facilities and prolonged scheduling of deliveries.

Kaweah River water transfers between different water entities have been previously performed and will continue in the future. In the past, the District and Plan participants have completed such transfers on a limited basis. Intra-District transfers are seen as a mechanism that could be used to increase the total water supply within the Plan Area or to augment the water supply in specific areas of the basin during

critically dry years. In all cases, transfers shall be such that there is no net loss of water supply to lands within the District. The District shall endeavor to promote advantageous water transfers that increase the water supply available within the Plan Area. The Board of Directors of the District ("District Board of Directors") has the authority to initiate such transfers.

3.3.4 Inelastic Land Surface Subsidence

The San Joaquin Valley has been characterized as the largest human alteration of the earth's surface. The reason behind this statement comes from inelastic land surface subsidence that has occurred principally from aquifer-system compaction. The lowering of groundwater levels through sustained groundwater overdraft causes this type of subsidence. The impact to groundwater from such subsidence is the reduction in available aquifer storage capacity caused by the compaction of soil void space that retains groundwater. Studies performed by the Department of Water Resources and the United States Geological Survey have identified an area of subsidence in the western portion of the District that correlates with a confining geologic layer known as the Corcoran Clay. The magnitude of subsidence within this portion of the District was in the order of four feet for a study period extending from 1926 to 1970. Plate 18 is a representation of this subsidence in the San Joaquin Valley for this study period as reported in Geological Survey Professional Paper 437-H[2]. Studies performed since these findings have revealed a dramatic decrease in the rate of subsidence. This could be a result of the provision of State Project water to lands that pumped high amounts of groundwater that were in a condition of sustained groundwater overdraft.

The Plan will continue to monitor inelastic land surface subsidence through the use of research and reporting accomplished by agencies or organizations with a developed program. Monitoring efforts relating to subsidence will also consist of annual and long-term evaluations of sustained overdraft. Based on such indicators versus available data, the Plan will continue to assess the need for a more proactive approach through implementing subsidence surveying or installing and operating compaction recorders (extensometers).

3.3.5 Monitoring Protocols

Adequate assessment of groundwater conditions requires information that is both consistent and reliable. This is necessary in order to properly track and evaluate annual and long-term changes in those conditions that are monitored. The Plan's monitoring program has developed and employs measures to provide dependable and comparable data. The monitoring protocols applied by the Plan are outlined as follows:

[2] Figure 5, Page H11 of "Land Subsidence in the San Joaquin Valley, California, As of 1972", Studies of Land Subsidence, U.S. Geological Survey Professional Paper 437-H, by J.F. Poland, B.E. Lofgren, R.L. Ireland, and R.G. Pugh. Prepared in cooperation with the California Department of Water Resources. (1975)

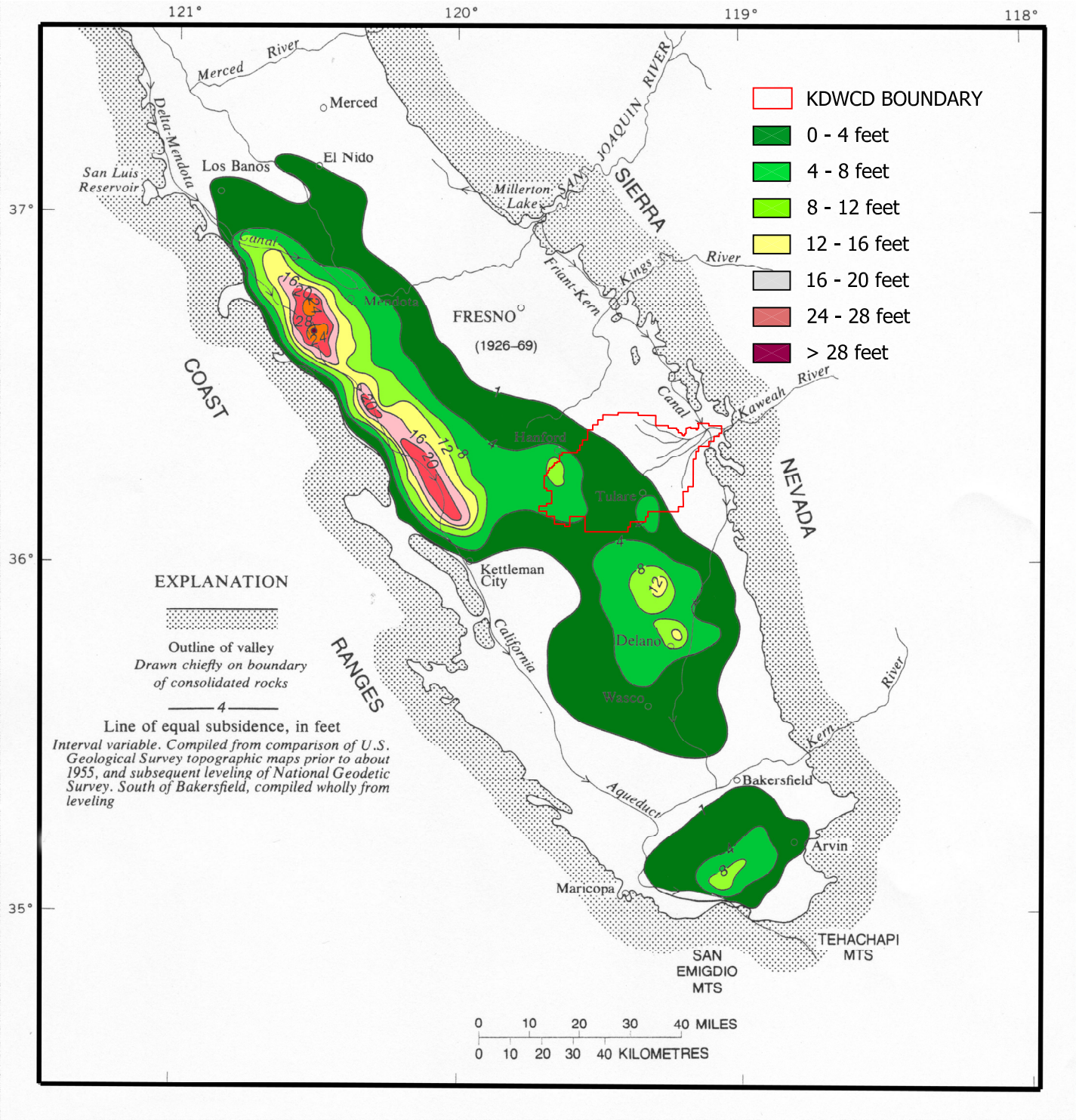


Plate No. 18
Inelastic Land Surface Subsidence
1926 thru 1970

Groundwater Levels: Measurements are taken semi-annually by the District and Plan participants in coordination with DWR's Spring and Fall measurement program. All identification, measuring and recording of data is performed in accordance with DWR's standards and procedures. The recorded data is compiled for presentation in the District's annual groundwater report.

Groundwater Quality: The Plan has established seven (7) different groundwater quality indicators that will be monitored. The District will annually compile data for the Plan from agencies that regularly collect groundwater quality data. The information will be organized in a manner for annual presentation and evaluation of the indicators. The effort will be focused on accumulating analogous data for tracking changes or trends in groundwater quality conditions.

Surface Water Flows: The District, in accordance with contracted responsibilities to the Association, regularly acquires surface flow measurements. Most all of the flows are measured on a continuous basis and in accordance with standard accepted practices. All flow information is compiled into annual water year reports. The Plan will draw all necessary surface flow information from this source.

Surface Water Quality: The Plan has established seven (7) different surface water quality indicators that will be monitored. The District will annually compile data for the Plan from agencies that regularly collect surface water quality data. The information will be organized in a manner for annual presentation and evaluation of the indicators. The effort will be focused on accumulating analogous data for tracking changes in surface quality conditions as it relates to groundwater management.

Water Transfers: The District, in accordance with contracted responsibilities to the Association, obtains all water transfer data on an occurrence basis. The collected information is recorded for reporting in the Association's annual water year reports. The Plan will draw all necessary water transfer information from this source. The data will be assembled in such a manner as to report the redistribution of surface water throughout the District and evaluate its influence on groundwater conditions.

Inelastic Land Surface Subsidence: The District will annually research known sources, like the United States Geological Survey or the State Department of Water Resources, for recent documentation and data from applicable programs focused primarily on the San Joaquin Valley. Pertinent information will be extracted for assessing conditions for inelastic land surface subsidence within the Plan Area.

3.4 Resource Protection

The Plan recognizes the importance of protecting the groundwater aquifer system. This resource is considered a vital component for both the region's economy and public health. California Water Code § 10753.8 authorizes the District to include components in its Plan for the provision of resource protection measures. Notwithstanding the foregoing, the District reserves the right to decide whether or not it will be involved in each of the activities authorized by the aforementioned statute. The Plan provides for resource protection through federal, state and local agency measures currently in place. The Plan will continue to coordinate with agencies that have protection measures in the form of ordinances and programs relevant to the protection of groundwater resources within the Plan Area. The following discussions will focus on those Plan components that address specific resource protection measures.

3.4.1 Well Abandonment

The County of Tulare, Kings County and City of Visalia have adopted Well Ordinances that address well destruction and establish requirements for destroying or abandoning wells within each agencies jurisdiction. All of these ordinances have provisions that stipulate impairment of the quality of water within the well or groundwater encountered by the well is not allowed. Those wells that are identified as defective require correction of the defective conditions or destruction of the well. Both county agencies have promoted programs for the destruction of abandoned wells in an effort to reduce potential sources that could have a negative impact to groundwater. In all cases, the primary responsibility for remedying defective or abandoned wells falls on the landowner and in those cases of non-compliance, the agencies have the authority to take necessary action to abate unsatisfactory conditions.

3.4.2 Wellhead Protection

The federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986. The purpose of the program is to protect groundwater sources of public drinking water supplies from contamination, thereby eliminating the need for costly treatment to meet drinking water standards. A Wellhead Protection Area (WHPA), as defined by the 1986 Amendments, is "the surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." The WHPA may also be the recharge area that provides the water to a well or wellfield. Unlike surface watersheds that can be easily determined from topography, WHPAs can vary in size and shape depending on geology, pumping rates, and well construction.

Wellhead Protection Programs are not regulatory by nature, nor do they address specific sources. They are designed to focus on the management of the resource, rather than control a limited set of activities or

contamination sources. Efforts to supply wellhead protection include Kings County's ordinance section for "Special Protection Areas." The ordinance provides for the prevention of mixing water between aquifers where groundwater quality problems are known to exist. Other protection areas within the Plan involve municipal/industrial water systems and small rural domestic water systems that rely on groundwater as a supply source.

3.4.3 Saline Water Intrusion

Saline water can slowly degrade a groundwater basin and ultimately render all or part of a basin unusable. The concentration of minerals in water is also referred to as total dissolved solids (TDS). The dissolved minerals are classified as inorganic salts, thus the term "salinity" is another way to describe mineral concentration. Several sources can contribute to increased salinity in groundwater. In addition to sea water intrusion, saline degradation of groundwater can be caused by use and re-use of the water supply; lateral or upward migration of saline water; downward seepage of sewage and industrial wastes; downward seepage of mineralized surface water from streams, lakes and lagoons; and interzonal or interaquifer migration of saline water.

Salt accumulation in surface water and groundwater in the Central Valley is a natural process inherent to lands with semi-arid to arid climates, enclosed basins, or reduced or impeded drainage. Salt accumulation in surface water and groundwater can impact and eventually eliminate most beneficial uses. Salt accumulation can be exacerbated by a wide variety of human activities including irrigation; importation of surface water; application of fertilizer (including manure and biosolids) and pesticides; land disposal of wastes including those from food processing facilities, wineries and municipal wastewater treatment plants; discharge of urban storm water runoff; and use of recycled wastewater.

Control of saline water intrusion occurs primarily at the state level through the State Water Resources Control Board and the Central Valley Regional Water Quality Control Board.

3.4.4 Migration of Contaminated Groundwater

Groundwater contamination originates from a number of sources or activities such as leaking tanks discharging petroleum products or solvents, or the application of pesticides and fertilizers. Effective control and clean-up of contaminated groundwater requires a coordinated effort between all regulatory agencies involved, source control, understanding of the hydrogeology and delineation of the contamination.

Agencies with a role to play in mitigating groundwater contamination include the Kings and Tulare County Environmental Health Departments, California Regional Water Quality Control Board, California Environmental Protection Agency and the U.S. Environmental Protection Agency. The degree to which each agency participates depends on the nature and magnitude of the problem.

3.4.5 Well Construction Policies

The County of Tulare, Kings County and City of Visalia have adopted Well Ordinances that specify water well construction, deepening and reconstruction standards within each agencies' respective jurisdiction. In all the ordinances, reference is made to State of California, Department of Water Resources Bulletin's 74-81 and 74-90 as that agency's adopted water well standard or supplementary to their established standard. The ordinances have provisions that require permits for well construction, deepening and reconstruction, with oversight provided by the agencies' health or building departments.

3.5 Sustainability

Maintaining the ability to use the underlying aquifer without incurring depletion or permanent damage is one of the Plan's main objectives. The sustainability of the groundwater supply for all beneficial uses is of critical importance to the region's economic, social and environmental well-being. California Water Code § 10753.8 authorizes the District to include components in its Plan to implement measures that progress toward attaining a sustainable groundwater resource. Notwithstanding the foregoing, the District reserves the right to decide whether or not it will be involved in each of the activities authorized by the aforementioned statute. Groundwater replenishment, overdraft mitigation and conjunctive use have been identified by the Plan as fundamental elements in attaining groundwater sustainability.

3.5.1 Groundwater Replenishment

In any conjunctive use area, groundwater recharge is a critical part of the overall Plan. For many years, the District has operated and maintained recharge basins throughout the District. They are generally located in areas of highly permeable soils. One of the District's ongoing objectives is the location and acquisition of additional recharge sites. In addition, effective recharge is also obtained through the natural channels, canals and ditches located within the Plan Area. The reason being that most of the channels are located within soil zones with high permeability. The District has established and will continue to develop programs that promote surface water use that result in additional groundwater recharge and reduction in groundwater pumping.

3.5.1.1 Distribution of District Owned Water

There is a tremendous difference in the aquifer characteristics within the Plan Area. This is evident in both storage capability and yield. The impact of cyclical droughts is revealed by a greater drop in groundwater levels for those areas with limited aquifer thickness in comparison to portions of the Plan Area that are located over a thicker and higher yielding aquifer. The District has surface water sources derived from appropriated Kaweah River entitlement and temporary Central Valley Project Water supply contracts (CVP Section 215 Water). When such waters are utilized, they are distributed in a fashion to maximize the benefits of the resource and effectively recharge groundwater. During critically dry years, District owned surface water, if available, may need to be directed to the most severely impacted areas. The distribution of District owned water is at the discretion of and according to the direction given by the District Board of Directors.

3.5.1.2 Channel Recharge

There are over 200 miles of natural channels and many times that amount of manmade channels located within the Plan Area. One of the primary means of recharging groundwater is accomplished through the seepage that occurs in these channels during the conveyance of water. The transport of surface water throughout the Plan Area generally requires that water be diverted from natural channels into ditch systems. Natural channels are typically located in permeable soils. The effective amounts of channel recharge vary from year to year and are dependent upon water supplies, which are contingent upon annual climatic conditions. Channel recharge can also occur through programs, promulgated by the Plan, that use various sources of surface water to supply either conveyance losses for supplement of irrigation deliveries or that are delivered and retained in the channels solely for recharge.

The Plan participants will continue to use available surface waters to meet demands, which in turn replenish the aquifers by sinking those waters through distribution system seepage. The District will actively seek the cooperation of other government and water entities in the development of programs that promote channel recharge through water conveyance. When feasible, the District will consider delivery of water for channel recharge within the Plan Area. All such deliveries of recharge water shall be at the discretion of the District Board of Directors. The District will endeavor to evaluate and utilize recharge from natural channels, when appropriate. Natural channels with good recharge capabilities will be used as groundwater recharge facilities to receive recharge water.

3.5.1.3 Basin Recharge

Surface water that is conveyed into recharge facilities for the purpose of having such water infiltrate into the aquifer is classified as basin recharge. This type of recharge can be accomplished in a variety of

different ways. Basin recharge most commonly occurs during non-irrigation periods when water is released from Terminus Reservoir for flood control purposes. These flows are conveyed throughout the District, distributed in conveyance systems and delivered to recharge basins. The primary purpose of this activity is flood control with a simultaneous benefit of groundwater recharge. Other occurrences of basin recharge consist of programs, promulgated by the Plan, that use various sources of surface water delivered to recharge facilities.

Plan participants will continue to use available surface waters to replenish the aquifers by sinking those waters through recharge basins. The District will actively seek the cooperation of other government and water entities in the development of programs that promote basin recharge through utilization of existing facilities and the creation of new facilities. When feasible, the District will consider delivery of water for basin recharge within the Plan Area. All such deliveries of recharge water shall be at the discretion of the District Board of Directors.

3.5.1.4 In-Lieu Recharge

Another method of recharge occurs when additional surface water supplies are acquired and used to satisfy irrigation demands. These additional supplies proportionately reduce the amount of irrigation demand on groundwater. Thereby, surface water is used in-lieu of groundwater, allowing aquifers the ability to recover through a reduction in demand during irrigation cycles. This type of recharge is considered highly effective because groundwater demand is reduced while at the same time additional recharge is taking place from the delivery channels.

The Plan will continue to promote the acquisition of additional water supplies in order to maximize the amount of surface water available in the promulgation of in-lieu recharge. The District will actively seek the cooperation of other government and water entities in the development of programs that promote in-lieu recharge through the provision of additional water supplies. When feasible, the District will consider delivery of water for in-lieu recharge within the Plan Area. All such deliveries of recharge water shall be at the discretion of the District Board of Directors. The District will endeavor to evaluate and utilize in-lieu recharge, when appropriate.

3.5.1.5 Construction and Operation of Facilities

Presently there are more than forty (40) groundwater recharge basins located within the Plan Area. Most of these basins were constructed and are operated by the District. Additionally, there are Facilities Use Agreements in place between the District and most of the irrigation water entities within the Plan. These agreements grant the District the right to use and operate those companies' facilities for multiple

purposes, including the sinking (recharge) of water. The combination of recharge basins and access to conveyance facilities enables the District to capture available water for replenishment to the aquifer throughout the District. The District, in its sole discretion, shall determine which sinking basin(s), natural channel(s), canal(s) or ditch(es) shall be used to sink any water which the District has available for such purpose.

One of the District's objectives, which is integral to the Plan, is the expansion and improvement to the system of facilities that are used in the recharge of groundwater. New developments include cooperative programs that are progressing toward the construction of multi-functional facilities. These programs are expected to result in facilities that will provide composite solutions to such issues as urban storm water runoff, environmental enhancement and groundwater replenishment. The District will actively seek cooperation with other government and water entities in the acquisition and construction of facilities for groundwater replenishment.

3.5.2 Overdraft Mitigation

Since the early 1950's, the District has observed declining groundwater levels and the Kaweah Basin has been identified by the California Department of Water Resources as a basin subject to critical conditions of overdraft.[3] Critical conditions of overdraft are defined as a groundwater basin in which continuation of present practices would probably result in significant adverse overdraft-related environmental, social or economic impacts. Throughout the years the District has accomplished various studies that examined groundwater supplies. The most recent study was completed at the end of 2003. The "*Water Resources Investigation of the Kaweah Delta Water Conservation District*" once again confirmed the Basin was in a state of overdraft. The study was a comprehensive review of all the elements required to determine safe yield for the aquifers within the District. The final conclusion was that annual groundwater supplies were insufficient for water demands not met by surface water in the range of 20,000 to 36,000 acre-feet annually. The Plan will consider certain actions that will help alleviate the ongoing strain on the Basin aquifers. These actions are considered to be of great value in mitigating the existing overdraft of groundwater.

3.5.2.1 Water Conservation

Groundwater overdraft exists mainly because water demands exceed supply, with the difference taken from groundwater. Reducing demands through the most efficient usage of water is considered a viable approach to assist in mitigating overdraft. Water conservation efforts will be encouraged throughout the

[3] California Department of Water Resources, Bulletin 118-80: *Ground Water Basins in California*, A Report to the Legislature in Response to Water Code Section 12924 (January 1980)

Plan Area for agricultural, industrial and residential users. Existing and new irrigation methods, reuse of industrial water and domestic water saving devices are and will be encouraged.

District's policies and procedures promote the beneficial use of water. The District will continue to promote policies that enhance water conservation policies. The District Board of Directors has the authority to adopt water conservation and water regulation policies for the District and, pursuant to its Groundwater Management Plan, the Plan Area. If a local public agency adopts and enforces a water conservation plan within its boundaries, such a plan is encouraged to the extent it is not inconsistent with the District's Plan.

3.5.2.2 No Exportation of Groundwater

The Plan recognizes the importance of applying groundwater to lands within the Plan Area. Hydrogeologic conditions are such that equilibrium cannot be achieved or maintained if groundwater supplies are withdrawn and exported from the area. Since the District is located within an overdrafted basin, it is prudent to utilize all groundwater resources within the Plan Area. The District will take all appropriate action to prevent the exportation of water from the Plan Area.

A position has been adopted in the Plan that there shall be no exportation of groundwater that results in any additional net loss to the Plan Area's total available water supplies. The District Board of Directors has the authority to institute any measures proposed to prevent such loss.

3.5.2.3 Reduction in Groundwater Outflow

Groundwater within the Basin is not static, but travels vertically and horizontally due to a range of hydrogeological factors. The direction and quantity of groundwater flow is susceptible to changes that occur to the hydraulic gradient. Groundwater level measurements taken twice a year within the District will be used to identify the direction and quantity of groundwater flow. Typically, this outflow has been to the west and southwest. Groundwater outflow has historically been a naturally occurring condition within the Plan Area. The District will continue its efforts to monitor the amounts of such groundwater outflow annually. Monitoring will be used to assess changes to groundwater outflow resulting from influences outside the Plan Area.

3.5.2.4 Additional Water Supply and Storage

As previously noted, groundwater overdraft is the result of inadequate water supplies. One of the most effective means to overcome this shortfall is acquiring additional supplies of water. These supplies can be obtained from external water sources or be produced as a result of additional storage. Development of

additional water supply and storage is a crucial element in the Plan's efforts to mitigate groundwater overdraft.

A supplemental source of surface water necessary to conduct extensive programs is normally available in wet years when floodwaters are available on the Kaweah River or additional water supplies are available from other sources. The District has historically made beneficial use of floodwaters and excess waters for recharging groundwater supplies and will continue to do so in the future. Further, the District will continue to seek opportunities to purchase and import water into the District for groundwater recharge purposes.

Additional water supplies would enhance the local groundwater. Present political and environmental realities discourage developing additional water supplies by building dams and large water storage projects. Yet through the cooperative efforts of Plan participants, the District was able to promote an enlargement project for Lake Kaweah that provides over 42,000 acre-feet of additional storage in Terminus Reservoir. The enlargement project took the United States Army Corps of Engineers over 20 years from the initial study until completion. Water was first stored to the new gross pool elevation in 2005. The District will continue to pursue feasible efforts to secure additional water supply and storage that will be beneficial to the Plan Area.

3.5.2.5 Pumping Restrictions

The progress of those measures taken in mitigating groundwater overdraft will require ongoing evaluation as to their effectiveness. Upon a determination that the measures are not accomplishing desired results, restriction of groundwater pumping could be considered. Pumping restrictions could reduce the amount of groundwater use. Restricting groundwater pumping is highly controversial and would currently be considered as the last alternative to be implemented in mitigating groundwater overdraft.

Implementation of this step could have severe implications to a local economy that relies on unrestricted access to groundwater. Initially, any program requiring pumping restrictions would be voluntary rather than mandatory. From a practical standpoint, when restrictions on urban groundwater water supplies are implemented, mandatory agricultural pumping restrictions would be considered.

Only under special circumstances would pumping restrictions be imposed. The District Board of Directors will not impose such restrictions until consulting with local agencies and holding a mandatory public hearing at least sixty (60) days prior to the effective date of such restrictions. The District Board of Directors could impose such action only by resolution.

3.5.3 Conjunctive Use

Conjunctive use is defined as the coordinated and planned management of both surface and groundwater resources in order to maximize the efficient use of the resource. The District began conjunctive use activities in the 1930's, starting with the construction of groundwater recharge basins for the capture of available Kaweah River water. Facilities Use Agreements accompanied basin development enabling the District to convey and sink water throughout the delta of the Kaweah River. After the completion of Terminus Dam in 1962, conjunctive use was increased as a result of the ability to annually store and regulate river flows.

Conjunctive use within the Plan Area takes place through the distribution of surface water for irrigation and groundwater recharge, with groundwater being used when and where surface waters are unable to fully meet demands, either in time or area. Since the early 1970's, water entities have worked together through a formal association to use available water to its greatest benefit. The Plan will continue to foster and facilitate conjunctive use with an objective toward mitigating groundwater overdraft conditions.

3.6 Stakeholder Involvement

The management of groundwater resources is based upon serving the public interest in a responsible manner. The Plan fulfills this purpose through the involvement of entities with a permanent stake in the availability of the groundwater source. These stakeholder groups consist of various water entities like ditch companies, irrigation districts, water districts and urban water service purveyors. Local government agencies are also included as Plan stakeholders. Interactive participation by stakeholders in the review and planning process is a fundamental element in carrying out the Plan's purpose. The Plan offers a forum for stakeholders through the following elements.

3.6.1 Memorandum of Understanding

The Plan officially recognizes stakeholders through the execution of a Memorandum of Understanding (MOU) between the District and the interested entity. The purpose of the MOU is to document the interests and responsibilities of participants in the adoption and implementation of the Plan. The MOU also promotes the sharing of information, the development of a course of action and the resolving of differences that may arise regarding the Plan. Since the Plan's inception in 1995, the number of stakeholders has regularly grown to the present number of thirteen (13). It is foreseen that stakeholder involvement will increase with time. The District will continue to pursue new stakeholder involvement and shall endeavor to enter into an agreement with other local agencies in the form of a Memorandum of Understanding in compliance with California Water Code § 10750.8. A sample of one form of Memorandum of Understanding is included in Appendix "B".

One of the initial Plan participants was Tulare Irrigation District (TID), who adopted a groundwater management program in accordance with AB 255 in 1992, the first agency in the state to adopt such a program and plan. In 1996, the District and TID executed a MOU obligating both districts to coordinate their respective plan efforts and groundwater management activities within areas of overlap. It is the District's understanding that TID intends to update and amend its plan in accordance with AB 3030 provisions and as may be modified by other state legislation.

3.6.2 Advisory Committee

The Advisory Committee offers one of the primary means that stakeholders are given to participate in the Plan. This committee is open to stakeholders that have been recognized as a Plan participant through a MOU. The Advisory Committee helps guide the development and implementation of the Plan and provides a forum for resolution of controversial issues. Meetings are held annually, at a minimum, for the purpose of review and discussion of past, present and future Plan activities.

3.6.3 Relationships with Other Agencies

The Plan acknowledges that there are interests in the groundwater resource that reach beyond the area covered by the Plan. State and Federal agencies' participation in managing groundwater is an important element to the Plan. The development and enhancement of relationships with other agencies benefits the Plan through the exchange of information and resources that progress toward a better understanding and management of groundwater.

Such agencies not only have regulations that influence the Plan, but extend opportunities by sharing information, providing relevant programs and allocating funds that can be used for programs and projects within the Plan. The Plan has historically tapped into these valuable sources and it is expected to continue to do so in the future. California Water Code § 10753.8 authorizes the District to include components in its groundwater management plan for the development of relationships with state and federal agencies. Notwithstanding the foregoing, the District reserves the right to decide whether or not it will be involved in each of the activities authorized by the aforementioned statute.

3.7 Planning and Management

The establishment of an organized structure is necessary in order for the Plan to fulfill its intended purpose. The Plan is structured to function in such a way that numerous elements relating to or influencing groundwater conditions are brought together and managed for meeting Plan objectives. The planning process also plays an important role in developing such objectives and providing direction in

accomplishing goals. Both the process of planning and management combined afford the opportunity to produce the most beneficial use of the groundwater resource.

3.7.1 Land Use Planning

The District has long-standing relationships with both city and county agencies within the Plan Area that oversee land use and zoning activities. The connection between land use and the groundwater resource is reflected in the differing water demands related to land classifications and the need to supply those demands from groundwater. Land use planning coordination enables the Plan to participate in decisions that will affect future groundwater conditions. Coordination also supplies the Plan participants with information pertinent to forming programs that could address forecasted changes to groundwater. Involvement with land use planning essentially affords the Plan the opportunity to be proactive instead of reactive.

California Water Code § 10753.8 authorizes the District to include components in its groundwater management plan for the review of land use plans and coordination with land use planning agencies to assess activities that create a reasonable risk for groundwater contamination. Notwithstanding the foregoing, the District reserves the right to decide whether or not it will be involved in each of the activities authorized by the aforementioned statue.

3.7.2 Groundwater Model

An important planning and management tool that was recently implemented is the District's numerical groundwater flow model. In 2005, utilizing a cooperative grant from the State Department of Water Resources, the District developed a groundwater model to calculate future changes in groundwater conditions that could occur based upon major influences such as changes in population growth, water supply and distribution. The model is able to calculate quantifiable changes to groundwater levels and flow conditions. This analytical tool can be applied to assess how existing and proposed groundwater management actions, changes in cultural practices or changes in hydrologic conditions may influence groundwater sustainability. The knowledge gained from the model will be applied in the development and evaluation of new and existing programs. The expected result will be the progression of programs and policies that will efficiently use available resources to affect the most beneficial influence to groundwater supplies.

3.7.3 Groundwater Reports

Adequate information is a vital element of planning and management of the groundwater resource. The Plan will produce, at a minimum, annual reports summarizing groundwater basin conditions and

management activities. These annual reports will include the following presentations as they pertain to the Plan.

- ✓ Summary of monitoring results, including a discussion of historical trends
- ✓ Summary of management actions during the period covered by the report
- ✓ A discussion, supported by monitoring results, of whether management actions are achieving progress in meeting management objectives
- ✓ Summary of proposed management actions for the future
- ✓ Summary of any plan component changes, including addition or modification of management objectives, during the period covered by the report
- ✓ Summary of actions taken to coordinate with other water management and land use agencies, and other government agencies

3.7.4 Plan Re-evaluation

An essential task in determining the value of management activities and goals is a periodic re-evaluation of the entire Plan. The effectiveness of the Plan is a reflection of the success and failure of measures taken in attempts to change or maintain groundwater conditions. Reviews will be focused on identifying potential changes to the Plan that could be beneficial to the groundwater resource. Additionally, assessing changing conditions in the Basin could warrant modifications of management objectives. Periodic Plan re-evaluation will occur at an interval of not more than five years apart. Separate from entire re-evaluations will be adjustments to Plan components on an ongoing basis, if necessary. The re-evaluations will focus on determining if actions under the Plan are meeting management objectives and if the management objectives are achieving the goal of sustaining the resource.

3.7.5 Dispute Resolution

The Plan acknowledges that controversial issues could arise concerning the groundwater resource. Stakeholders are encouraged to work through the Plan in addressing and resolving differences. When this process proves insufficient, the District has an applicable policy in place for dispute resolution. The Plan hereby adopts the District's "Alternative Dispute Resolution Policy", as included in Appendix "C" or the most current version of the policy.

3.7.6 Program Funding and Fees

Plan activities are funded through various sources relevant to the specific program. The District alone regularly performs recharge programs with capital budgeted for that purpose. The District also funds multiple other groundwater programs, such as facility development, operation and maintenance. Respectively, plan participants support their own individual programs from revenue derived from that

agency's budget. The Plan additionally fosters and supports multi-agency programs, where participants cooperatively combine funds and resources toward common objectives in a regional approach.

Future activities required to fully implement the Plan may require additional funding sources. Implementing legislation related to AB 3030 allows for the levying of groundwater assessments or fees under certain circumstances and according to specific procedures. Prior to instituting a groundwater assessment or fee structure, the District must hold an election on whether or not to proceed with the enactment of the assessments. A majority of the votes cast at the election is required to implement an additional funding assessment.

The District intends to exercise all of the authority given to a water replenishment district in California Water Code § 60220 through 60232 as may be necessary for the District to accomplish its purposes and goals for the Plan. A water replenishment district has the authority to fix and collect fees and assessments within the Plan Area for groundwater management in accordance with California Water Code § 60300 through 60352. The District reserves the right to decide whether or not it will be involved in this activity authorized by the aforementioned statutes.

SECTION 4: RULES AND REGULATIONS

The below presented items in this section are the Groundwater Management Plan rules and regulations to implement the Groundwater Management Plan of Kaweah Delta Water Conservation District adopted August 1, 1995 and updated on November 7, 2006.

1. Water Monitoring: At least twice per year, the Kaweah Delta Water Conservation District (hereinafter the "District") shall provide staff at its expense to monitor and measure the depth to standing groundwater at well sites within the Plan Area. In its sole discretion, District shall select the number and location of well sites. District shall prepare charts as required by the Plan.

2. Channel Recharge: District shall endeavor to evaluate and utilize recharge from natural channels when appropriate, as determined by District. Natural channels with good recharge capabilities will be evaluated for potential use as groundwater recharge facilities to receive recharge water.

3. Basin Recharge: When feasible, District will consider delivery of water to recharge basins within the Plan Area. All such deliveries of recharge water shall be at the discretion of District Board of Directors ("District Board of Directors").

4. Water Conservation: District's policies and procedures promote the beneficial use of water. The District shall continue to promote policies that enhance water conservation policies. The District Board of Directors has the authority to adopt water conservation and water regulation policies for the District and, pursuant to its groundwater management plan, the Plan Area. If a local public agency adopts and enforces a water conservation plan within its boundaries, such Plan shall be effective to the extent it is not inconsistent with the District's Plan.

5. No Exportation of Groundwater: After the adoption hereof, there shall be no exportation of groundwater that results in any additional net loss to the Plan Area's total available water supplies. The District Board of Directors has the authority to institute any measures proposed to prevent such net loss.

6. Intra-district Water Transfers: Water transfers within the Plan Area are permissible and subject to the administration of the Kaweah River Watermaster under the direction of the Kaweah & St. Johns Rivers Association Board of Directors.

7. Inter-district Water Transfers: District shall endeavor to promote advantageous water transfers (water transfers that increase the water supply available within the Plan Area). The District Board of Directors has the authority to initiate such transfers.

8. Reduction in Groundwater Outflow: The District may monitor the outflow of groundwater from the Plan Area. Before the District takes any steps to prevent such outflow, such steps shall be approved by the District Board of Directors.

9. Pumping Restrictions: Only under special circumstances would pumping restrictions be imposed. The District Board of Directors shall not impose such restrictions until after consulting with local agencies and holding a mandatory public hearing at least sixty (60) days prior to the effective date of such restrictions. The District Board of Directors could impose such action only by resolution.

10. Additional Water Supply and Storage: The District will continue to actively review and evaluate potential new supplies of water and new storage facilities for water which may benefit the Plan Area. To the extent the District Board of Directors determines that it has the capability to do so, the District will fund projects which increase the water supply and water storage which benefit the Plan Area. The District's involvement in any project to increase water supply or water storage shall be approved by the Board of the Directors of the District.

11. <u>Redistribution of Surface Water:</u> The District, in its sole discretion, shall determine which sinking basin(s), natural channel(s), canal(s) or ditch(es) shall be used to sink any water which the District has available for such purpose.

GLOSSARY

A

acre-foot (af) The volume of water necessary to cover one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

alluvial Of or pertaining to or composed of alluvium.

alluvium A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material, deposited during comparatively recent geologic time by a stream or other body of running water, as a sorted or semi sorted sediment in the bed of the stream or on it's floodplain or delta, as a cone or fan at the base of a mountain slope**.**

aquitard A confining bed and/or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs, but stores ground water.

aquifer A body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

artificial recharge The addition of water to a groundwater reservoir by human activity, such as putting surface water into dug or constructed spreading basins or injecting water through wells.

average annual runoff The average value of total annual runoff volume calculated for a selected period of record, at a specified location, such as a dam or stream gage.

average year water demand Demand for water under average hydrologic conditions for a defined level of development.

B

basin management objectives (BMOs) See management objectives

beneficial use One of many ways that water can be used either directly by people or for their overall benefit. The State Water Resources Control Board recognizes 23 types of beneficial use with water quality criteria for those uses established by the Regional Water Quality Control Boards.

C

confined aquifer An aquifer that is bounded above and below by formations of distinctly lower permeability than that of the aquifer itself. An aquifer containing confined ground water. See artesian aquifer.

conjunctive use The coordinated and planned management of both surface and groundwater resources in order to maximize the efficient use of the resource; that is, the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin for later and planned use by intentionally recharging the basin during years of above-average surface water supply.

contaminant Any substance or property preventing the use or reducing the usability of the water for ordinary purposes such as drinking, preparing food, bathing washing, recreation, and cooling. Any solute or cause of change in physical properties that renders water unfit for a given use. (Generally considered synonymous with pollutant).

critical conditions of overdraft A groundwater basin in which continuation of present practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts. The definition was created after an extensive public input process during the development of the Bulletin 118-80 report.

D

dairy and related water demand The use of water from those facilities where herds of cows are managed for the production of milk.

deep percolation Percolation of water through the ground and beyond the lower limit of the root zone of plants into groundwater.

drought condition Hydrologic conditions during a defined period when rainfall and runoff are much less than average.

E

electrical conductivity (EC) The measure of the ability of water to conduct an electrical current, the magnitude of which depends on the dissolved mineral content of the water.

environmental water Water serving environmental purposes, including instream fishery flow needs, wild and scenic river flows, water needs of fresh-water wetlands, and Bay-Delta requirements.

evapotranspiration (ET) The quantity of water transpired (given off), retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces.

G

groundwater basin An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom.

groundwater budget A numerical accounting, the *groundwater equation*, of the recharge, discharge and changes in storage of an aquifer, part of an aquifer, or a system of aquifers.

groundwater in storage The quantity of water in the zone of saturation.

groundwater management The planned and coordinated management of a groundwater basin or portion of a groundwater basin with a goal of long-term sustainability of the resource.

groundwater management plan A comprehensive written document developed for the purpose of groundwater management and adopted by an agency having appropriate legal or statutory authority.

groundwater monitoring network A series of monitoring wells at appropriate locations and depths to effectively cover the area of interest. Scale and density of monitoring wells is dependent on the size and complexity of the area of interest, and the objective of monitoring.

groundwater overdraft The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.

groundwater recharge facility A structure that serves to conduct surface water into the ground for the purpose of replenishing groundwater. The facility may consist of dug or constructed spreading basins, pits, ditches, furrows, streambed modifications, or injection wells.

groundwater recharge The natural or intentional infiltration of surface water into the zone of saturation.

groundwater storage capacity volume of void space that can be occupied by water in a given volume of a formation, aquifer, or groundwater basin.

groundwater subbasin A subdivision of a groundwater basin created by dividing the basin using geologic and hydrologic conditions or institutional boundaries.

groundwater table The upper surface of the zone of saturation in an unconfined aquifer.

groundwater Water that occurs beneath the land surface and fills the pore spaces of the alluvium, soil, or rock formation in which it is situated. It excludes soil moisture, which refers to water held by capillary action in the upper unsaturated zones of soil or rock.

H

hydraulic conductivity A measure of the capacity for a rock or soil to transmit water; generally has the units of feet/day or cm/sec.

hydrograph A graph that shows some property of groundwater or surface water as a function of time.

hydrologic region A study area consisting of multiple planning subareas. California is divided into 10 hydrologic regions.

I

infiltration The flow of water downward from the land surface into and through the upper soil layers.

in-lieu recharge The practice of providing surplus surface water to historic groundwater users, thereby leaving groundwater in storage for later use.

L

land subsidence The lowering of the natural land surface due to groundwater (or oil and gas) extraction.

lithologic log A record of the lithology of the soils, sediments and/or rock encountered in a borehole from the surface to the bottom.

lithology The description of rocks, especially in hand specimen and in outcrop, on the basis of such characteristics as color, mineralogic composition, and grain size.

losing stream A stream or reach of a stream that is losing water by seepage into the ground.

M

management objectives Objectives that set forth the priorities and measurable criteria of local groundwater basin management.

N

natural recharge Natural replenishment of an aquifer generally from snowmelt and runoff; through seepage from the surface.

O

operational yield An optimal amount of groundwater that should be withdrawn from an aquifer system or a groundwater basin each year. It is a dynamic quantity that must be determined from a set of alternative groundwater management decisions subject to goals, objectives, and constraints of the management plan.

ordinance A law set forth by a governmental authority.

P

perched groundwater Groundwater supported by a zone of material of low permeability located above an underlying main body of groundwater.

perennial yield 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.

perforated interval The depth interval where slotted casing or screen is placed in a well to allow entry of water from the aquifer formation.

permeability The capability of soil or other geologic formations to transmit water. See hydraulic conductivity.

point source A specific site from which wastewater or polluted water is discharged into a water body.

public water system demand The use of water from small, regulated public water systems. Typical facility types included mutual water companies, schools, mobile home parks, golf courses, county facilities, motels, livestock sales yards, and miscellaneous industries such as nurseries, food processing facilities, packing houses, etc.

R

recharge Water added to an aquifer or the process of adding water to an aquifer. Ground water recharge occurs either naturally as the net gain from precipitation, or artificially as the result of human influence. See artificial recharge.

recharge basin A surface facility constructed to infiltrate surface water into a groundwater basin.

runoff The volume of surface flow from an area.

rural domestic water demand The use of water from residences not served by a municipal connection, mutual water company, or other small public water system.

S

safe yield The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect.

salinity Generally, the concentration of mineral salts dissolved in water. Salinity may be expressed in terms of a concentration or as electrical conductivity. When describing salinity influenced by seawater, salinity often refers to the concentration of chlorides in the water. See also total dissolved solids.

saline intrusion The movement of salt water into a body of fresh water. It can occur in either surface water or groundwater bodies.

seepage The gradual movement of water into, through or from a porous medium. Also the loss of water by infiltration into the soil from a canal, ditches, laterals, watercourse, reservoir, storage facilities, or other body of water, or from a field.

semi-confined aquifer A semi-confined aquifer or leaky confined aquifer is an aquifer that has aquitards either above or below that allow water to leak into or out of the aquifer depending on the direction of the hydraulic gradient.

specific yield the ratio of the volume of water a rock or soil will yield by gravity drainage to the total volume of the rock or soil**.**

stakeholders Any individual or organization that has an interest in water management activities. In the broadest sense, everyone is a stakeholder, because water sustains life. Water resources stakeholders are typically those involved in protecting, supplying, or using water for any purpose, including environmental uses, who have a vested interest in a water-related decision.

surface supply Water supply obtained from streams, lakes, and reservoirs.

sustainability Of, relating to, or being a method of using a resource so that the resource is not depleted or permanently damaged.

T

total dissolved solids (TDS) a quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter. See also salinity

transmissivity The product of hydraulic conductivity and aquifer thickness; a measure of a volume of water to move through an aquifer. Transmissivity generally has the units of ft^2/day or gallons per day/foot. Transmissivity is a measure of the subsurface's ability to transmit groundwater horizontally through its entire saturated thickness and affects the potential yield of wells.

U

unconfined aquifer An aquifer which is not bounded on top by an aquitard. The upper surface of an unconfined aquifer is the water table.

unsaturated zone The zone below the land surface in which pore space contains both water and air.

urban water demand The use of water from incorporated cities (Visalia, Tulare, Farmersville, Exeter, Ivanhoe) and in the unincorporated areas served by a municipal water purveyor.

urban water management plan (UWMP) An UWMP is required for all urban water suppliers having more than 3,000 connections or supplying more than 3,000 acre-feet of water. The plans include discussions on water supply, supply reliability, water use, water conservation, and water shortage contingency and serve to assist urban water suppliers with their long-term water resources planning to ensure adequate water supplies for existing and future demands.

usable storage capacity The quantity of groundwater of acceptable quality that can be economically withdrawn from storage.

W

water quality Description of the chemical, physical, and biological characteristics of water, usually in regard to its suitability for a particular purpose or use.

water year A continuous 12-month period for which hydrologic records are compiled and summarized. Different agencies may use different calendar periods for their water years.

watershed The land area from which water drains into a stream, river, or reservoir.

well completion report A required, confidential report detailing the construction, alteration, abandonment, or destruction of any water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well. The reports were called *Water Well Drillers' Report* prior to 1991 and are often referred to as "driller's logs." The report requirements are described in the California Water Code commencing with Section 13750.

APPENDIX A

KAWEAH & ST. JOHNS RIVERS ASSOCIATION
TRANSFER POLICY

KAWEAH & ST. JOHNS RIVERS ASSOCIATION
STATEMENT OF POLICY RE WATER TRANSFERS AND EXCHANGES
(Adopted September 8, 1994)

The purpose of this policy statement is to confirm the intent of the Association to retain waters of the Kaweah River and its tributaries in the Kaweah River hydrologic surface basin ("Basin") for beneficial use therein. The boundaries of the Basin are set forth on Exhibit A, appended hereto and made a part of this statement.

Each of the Member Units shall retain the right and privilege alter, amend, change or modify their respective service areas, without notice to or consent of the Association, provided that the expanded service area of the Member Unit does not extend beyond the boundary of the historical Basin. Should a Member Unit make such an adjustment to its service area, it shall so notify the Watermaster. Documentation shall be provided by the Member Unit, to the Watermaster, adequate to demonstrate that the expanded service area is within the Basin.

Water to which Member Units are entitled shall be utilized only within said Basin boundary except as provided hereinafter for periods of flood release. Transfer(s) of entitlement waters shall be allowed within the Basin upon proper notification to the Watermaster of such impending transfer(s). The Watermaster shall provide notification to the Board of Directors of any such transfer(s). Approval of the Board of Directors shall not be required for any transfer within the Basin. It is acknowledged that under certain flood release conditions, after irrigation and spreading demands have been fully satisfied and the capability of the Basin to retain flood release water has been fulfilled, flood water flows naturally to the historic Tulare Bed which lies within the Basin.

Member Units may enter into water exchange agreements which call for no net loss to the Basin of to any in-Basin water rights holder, subject to administrative rules and regulations adopted by the Board of Directors.

Transfer(s) of riparian waters or waters resulting from settlement of riparian entitlement negotiations shall not be allowed. Transfers of water received under contracts for water made available through the State Water Project, the Federal Central Valley Project or the Cross Valley Canal Exchange Program shall not be subject to these provisions.

This policy shall be implemented by the following additions to the rules and regulations effective upon adoption of the policy by the Board of Directors:

Transfers of water shall be allowed between entities for use within the Basin. Notice of an impending transfer shall be provided to the Watermaster in writing.

Exchanges of water out of the Basin shall be subject to approval of the Board of Directors. Such exchanges shall only be considered when the recipient of the water can demonstrate, to the satisfaction of the Board of Directors, that a hardship situation exists. The required information associated with the documentation of the hardship situation shall be established by the Board of Directors on a case by case basis.

An out-of-Basin water exchange agreement may be entered into by a member unit subject to approval of the Association Board of Directors. Any exchange approved by the Board of Directors shall be conditioned on the full execution of an exchange/return agreement submitted with the petition for approval. Such agreement(s) shall call for no net loss to the Basin or to any in-Basin water rights holder.

To this end, exchanges shall call for channel loss water to be withheld from the total quantity of water available for exchange in the year of the exchange.

The total quantity of water exchanged shall be returned to the Basin for further diversion to a headgate designated by the exchanger subject to coordination with the Watermaster.

To compliment the Terminus and in-Basin storage capabilities available to members of the Association, temporary out-of-Basin storage historically has been permitted on a case-by-case basis and may be permitted in the future. Authority to grant permission to store out-of-Basin shall reside with the Watermaster, subject to appeal to the Board of Directors. Permission shall be predicated on the ability of the requesting entity to demonstrate the eventual delivery within the Basin of waters temporarily stored out-of-Basin. Following removal from storage, documentation shall be provided that the water, less the normal losses, was delivered within the Basin.

APPROVED BY
THE KAWEAH AND ST. JOHNS RIVERS ASSOCIATION BOARD OF DIRECTORS
ON SEPTEMBER 8, 1994.

APPENDIX B

MEMORANDUM OF UNDERSTANDING (SAMPLE)

MEMORANDUM OF UNDERSTANDING BETWEEN KAWEAH DELTA WATER CONSERVATION DISTRICT AND CITY OF TULARE

ARTICLE I - AGREEMENT

The articles and provisions contained herein constitute a bilateral and binding agreement by and between KAWEAH DELTA WATER CONSERVATION DISTRICT (hereinafter the "District") and CITY OF TULARE (hereinafter "Agency").

ARTICLE II - RECOGNITION

The District has developed a Groundwater Management Plan (hereinafter the "Plan") with input from several local agencies located within the District. It is the intent of District to allow and encourage such agencies to coordinate efforts and be a part of the District's Plan by means of a separate Memorandum of Understanding (hereinafter the "MOU") between each agency and District.

ARTICLE III - PURPOSE

It is the purpose of the MOU, entered into willingly, between District and Agency, to document the interests and responsibilities of both parties in the adoption and implementation of the Plan. It is also hoped that such MOU will promote and provide a means to establish an orderly process to share information, develop a course of action and resolve any misunderstandings or differences that may arise regarding the Plan.

ARTICLE IV - COORDINATE

There shall be an annual coordinating meeting (hereinafter the "Meeting") between the District and the Agency. District shall give notice to the Agency thirty (30) days prior to date of the Meeting to discuss the manner in which the Plan is being implemented and other items related to the Plan. If there are concerns or questions regarding the Plan, Agency shall transmit its concerns in writing to District seven (7) days prior to the Meeting.

SAMPLE

ARTICLE V - OBLIGATIONS

The Plan shall be binding on the parties hereto unless superseded by the MOU or amendment thereto.

ARTICLE VI - AREA OF PLAN.

The Plan shall be effective in all areas within the Agency boundaries. The Plan shall also be effective in any area annexed to the Agency subsequent to the adoption of the Plan.

ARTICLE VII - TERM

The initial term of the MOU shall commence on the date hereof and continue for five (5) years, and shall continue year to year thereafter, unless terminated by written notice given at least one (1) year prior to such termination.

This Memorandum of Understanding is made and entered into this _____ day of _____, 2004.

KAWEAH DELTA WATER CONSERVATION DISTRICT	**CITY OF TULARE**
By:_____	By:_____
Title:_____	Title:_____
By:_____	By:_____
Title:_____	Title:_____

SAMPLE

APPENDIX C

KAWEAH DELTA WATER CONSERVATION DISTRICT
ALTERNATIVE DISPUTE RESOLUTION POLICY

KAWEAH DELTA WATER CONSERVATION DISTRICT
ALTERNATIVE DISPUTE RESOLUTION POLICY
(Adopted February 3, 2004)

Purpose. The District recognizes that defending or prosecuting lawsuits can be expensive and time-consuming, resulting in a drain on District resources that should be avoided, if reasonably possible. To that end, the District hereby implements this policy to encourage the resolution of disputes, claims and lawsuits through alternative dispute resolution procedures.

Procedures. Whenever the District is named in a lawsuit or receives a written claim or a serious threat of imminent litigation, the District staff shall immediately consult with the District General Counsel regarding the same. Together, the District staff and the District General Counsel shall formulate a recommended response to be considered by the Board of Directors at its next meeting.

Whenever the District becomes aware of any unasserted potential lawsuit, claim or dispute, with a reasonable likelihood of being asserted, against the District, the District staff shall consult with the District's counsel regarding the best method for responding to the same. Possible responses include, but are not limited to, the following:

1. Do nothing.
2. A verbal communication from the District or its general counsel.
3. A written communication from the District or its general counsel.
4. An offer to meet and discuss the matter with District personnel.
5. An offer to mediate the matter before a neutral third-party mediator.
6. An offer to arbitrate the matter before the American Arbitration Association.
7. An offer to arbitrate the matter using the rules of Judicial Arbitration found in California statutes.

District staff shall advise the Board of Directors of any unasserted lawsuit, claim or dispute, with a reasonable likelihood of being asserted, including the District's response to the same. The Board of Directors shall be advised whether or not the matter is resolved. If the potential lawsuit, claim or dispute becomes an actual lawsuit, claim or dispute, the response of the District shall be handled as set forth above in the previous paragraphs.

It shall be the practice of the District to encourage mediation of lawsuits, claims or disputes, whenever reasonably practical, in order to resolve such matters. Mediation shall be by a neutral third-party qualified to mediate such matters.

APPENDIX G – TID GROUNDWATER MANAGEMENT PLAN (2010 UPDATE) (CD)

GROUNDWATER MANAGEMENT PLAN

TULARE IRRIGATION DISTRICT

SEPTEMBER 2010

PREPARED BY:

PROVOST AND PRITCHARD
CONSULTING GROUP

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

REGISTERED PROFESSIONAL ENGINEER
DENNIS RAY MILLS
No. 67,478
Civil
STATE OF CALIFORNIA

Date:_____

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List of Abbreviations

AB	Assembly Bill
ACWA	Association of California Water Agencies
AF	Acre-feet
AWEP	Agricultural Water Enhancement Project
bgs	below ground surface
CVP	Central Valley Project
DBCP	dibromochloropropane
DWR	Department of Water Resources
EPA	Environmental Protection Agency
ET	evapotranspiration
F	Fahrenheit
FKC	Friant-Kern Canal
FWA	Friant Water Authority
FWUA	Friant Water Users Authority
GAC	Groundwater Advisory Committee
GMP	Groundwater Management Plan
GPM	gallons per minute
GPS	Global Positioning System
ID	Irrigation District
IRWMP	Integrated Regional Water Management Plan
KDWCD	Kaweah Delta Water Conservation District
KSJRA	Kaweah and St. Johns River Association
MOU	Memorandum of Understanding
NRCS	Natural Resources Conservation Service
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SOR	Systems Optimization Review
TID	Tulare Irrigation District
TDS	total dissolved solids
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey
WHPA	Wellhead protection area
WRI	Water Resources Investigation of the Kaweah Delta Water Conservation District

1 – INTRODUCTION

This Groundwater Management Plan (GMP or Plan) is an update of a Plan that was adopted by the Tulare Irrigation District in October 1992. The original Plan was prepared in accordance with the requirements prescribed in Assembly Bill No. 255 (California Water Code Section 10750 et seq.).

This GMP is a revision that satisfies the new requirements for GMPs created by the September 2002 California State Senate Bill No. 1938, which amended Sections 10753 and 10795 of the California Water Code. This Plan also addresses recommended components for a Groundwater Management Plan described in Appendix C of Department of Water Resources Bulletin 118 (2003 Update). **Table 1.1** shows the required and recommended components (See Section 1.4).

This plan outlines the framework for TID's groundwater management efforts. General categories that are addressed include a description of the District's geology and hydrogeology, basin management objectives, stakeholder involvement, groundwater monitoring, groundwater resources protection, groundwater sustainability, groundwater operations, and groundwater planning and management. Within these categories, specific groundwater management elements are described including existing activities and planned actions to expand and improve groundwater management.

1.1 - Area Covered by Groundwater Management Plan

This GMP covers the entire area served by TID, which includes about 72,000 acres (see **Attachment 1**). TID also owns and operates some facilities outside of their service area boundaries, and has determined that adjacent areas could impact their groundwater resources. As a result, the GMP discusses the physiography, geology, hydrogeology and groundwater issues in neighboring lands. Specifically, a 'Buffer Zone' has been defined (see **Attachment 8**), which is bounded by several hydrologic features (i.e. rivers and creeks). Groundwater investigations and studies suggest that groundwater management activities in this buffer zone influence the groundwater in TID. The buffer zone primarily covers lands in the Kaweah Delta Water Conservation District, but also includes several other water agencies and municipalities. TID can manage groundwater in these water agencies if they give TID permission to do so.

The KDWCD is a regional water management agency covering 340,000 acres, including all of TID. KDWCD also has a GMP, and recognizing their common interests and overlapping areas, TID and KDWCD signed a MOU regarding groundwater management in areas the two plans overlap, as well as adjacent zones and facility areas. TID interprets these 'adjacent zones and facilities areas' as the Buffer Zone lands within KDWCD. This agreement is informally called the 'Overlap MOU'. In the MOU, KDWCD and TID agreed to allow both agencies to manage groundwater in the

overlap areas and adjacent zones, unless there is a disagreement, in which case TID will have sole authority to manage groundwater in TID and the City of Tulare, but not in the buffer zone lands of KDWCD. If necessary in the future, TID may seek permission from other agencies in the buffer zone to manage their groundwater according to this GMP.

1.2 - Background Information on Tulare Irrigation District

Below is a brief description of the origin, physiography, geology, water supplies and facilities of the District.

History

TID is a political subdivision of the State of California – an independent agency operating under the California Water Code. TID is a conjunctive use district, formed in 1889 for the purpose of managing, supplying and delivering water to growers within TID. The District has conjunctively utilized Kaweah River waters and groundwater since at least the early 1940's. TID's original water service contract with the USBR was signed in 1950 for water delivery from the Friant Unit of the CVP. This imported contract supply was also designed around TID's conjunctive use capabilities. The contract includes a large quantity of Class 2 entitlement, a supplemental supply made available by USBR largely for groundwater recharge within the Friant Unit service area.

Geography

TID is located in western Tulare County on the eastern part of the San Joaquin Valley, about 20 miles west of the Sierra Nevada foothills, approximately 50 miles southeast of the City of Fresno and approximately 65 miles northwest of the City of Bakersfield (see **Attachment 1** for a vicinity map). The District surrounds, but does not contain, the City of Tulare. State Highways 63, 99 and 137 traverse the District. Adjacent agricultural water agencies include Corcoran Irrigation District, Kaweah Delta Water Conservation District, Kings County Water District, Consolidated Peoples Ditch Company, and Farmers Ditch Company. Refer to **Attachment 2a** for a map of neighboring surface water delivery districts, **Attachment 2b** for a map of neighboring municipal water delivery districts, and **Attachment 3** for a map of neighboring ditch and irrigation companies. The District covers about 77,000 acres (120.3 square miles). The topography slopes generally from northeast to southwest at an average of 6.2 feet per mile.

Climate

The District is characterized as having hot and very dry summers, with relatively mild winters. Average annual precipitation and temperature are 10.15 inches and 63° F, respectively. With the long, hot summers that normally occur in the valley, there is a potential for about five feet of evaporation per year, with the majority occurring from April through October. Rainfall in the District occurs primarily in the winter months, with

virtually no rainfall in the summer months. Annual crop use per acre averages several times the amount of average precipitation. As a result, agricultural crops grown within the District are heavily dependent upon irrigation from surface water deliveries and groundwater pumping, with water needs only partially satisfied by rainfall.

Soils and Agronomy

Refer to **Attachment 4** for a NRCS soils map of TID. Soils in the district are primarily loam and sandy loam. About 59,000 acres, or 77% of the total District area, is cropped. The major crops include corn, alfalfa, cotton, pistachios and wheat; with a total of over 20 different crops grown (2009 data). According to the District's most recent Water Management Plan, the irrigation methods include drip and micro (4%), gravity (96%), and sprinkler (<1%). The combined average irrigation efficiency is estimated to be between 75 and 85%.

Geology

TID is located in the Kaweah Groundwater Sub-basin (see **Attachment 5**). The geological sequences of permeable, water bearing sediments within TID, from youngest to oldest, are: Topsoil, Young Alluvium and the Kern River Series. Recent standing groundwater levels average about 135 feet bgs. TID cooperates with the USBR in monitoring groundwater levels. The number of groundwater wells within the District is unknown as they are private facilities owned and controlled by landowners. Refer to Section 2 for more details on the geology in TID.

Water Demands

The agricultural demand within the District was estimated to be approximately 221,500 AF/year in the District's 2002 Agricultural Water Management Plan. However, in recent years, the District has experienced a significant shift in cropped acreage away from cotton and towards crops that support the dairy industry. These plantings are more often double cropped and so the average annual water demand within the District may be increasing.

Groundwater Supply

The District does not operate any groundwater wells and therefore does not supply groundwater to District landowners. Each individual landowner must provide his own well(s) to sustain irrigation during periods when the District is not diverting surface water into its system. See **Attachment 6** for a map of private wells in the District that are monitored by TID. It has previously been estimated that TID growers pump approximately 100,000 AF/year (CH2MHill, 2000), on average, from private groundwater wells to supplement District supplies. The District tracks depths to groundwater in the area through a network of private irrigation wells shown on **Attachment 6**.

Surface Water Supplies

The District's average annual surface water supply from 1988 to 2008 was approximately 163,400 AF, from water rights on Kaweah River and Friant Unit entitlement imported from the San Joaquin River. TID's Kaweah rights yield is, on average, about 75,000 AF annually. TID has a CVP Friant Unit water supply contract for up to 30,000 AF of Class 1 water and up to 141,000 AF of Class 2 water annually. In addition, the District enters into annual contracts for Section 215 water (surplus CVP water).

Facilities

The vast majority of the District's distribution system consists of unlined earthen channels with reinforced concrete control structures and road crossings. Collectively, the District owns and operates approximately 300 miles of earthen canals and ditches. The District also owns approximately 30 miles of pipeline. The District's distribution system begins in the Friant-Kern Canal. Diversions into the distribution system are also utilized further downstream from the St. Johns River and Lower Kaweah River. There are a few other channels (Cameron and Packwood Creeks) that flow from the Kaweah River that terminate in or near the District. Once the Main Intake Canal reaches the District boundary, it bifurcates into the Main Canal, which extends southwesterly to serve a major portion of the District and the North Branch Canal which serves the northwesterly portion of the District. The District's distribution system is currently built out and can deliver surface water to the vast majority of the landowners. The District has approximately 968 farm service turnouts. Additionally, the District maintains and operates 11 regulation and recharge basins covering approximately 1,110 acres. The recharge basins and canals in the District are shown on **Attachment 7**. Although the District owns a few production wells, it does not use them for groundwater extraction to supplement its surface water supplies.

1.3 - Goals and Objectives of Groundwater Management Plan

This GMP documents the existing groundwater management efforts in TID and planned efforts to improve groundwater management. The purpose of the GMP is to help TID meet the following objectives:

1. Address potential changes in local hydrology brought about by surface water losses (i.e. San Joaquin River Restoration), urban development and drought.
2. Preclude surface water or groundwater exports that would reduce the long-term reliability of groundwater.
3. Coordinate groundwater management efforts between regional water users.
4. Maintain local management of the groundwater resources.
5. Implement a groundwater-monitoring program to provide an "early warning" system to future problems.
6. Stabilize groundwater levels in order to minimize pumping costs and energy use, and provide groundwater reserves for use in droughts.

7. Develop groundwater storage facilities to reduce stress on local groundwater reserves during droughts.
8. Maximize the use of all surface water sources, including available flood water, for beneficial use and groundwater recharge, and thus reduce stress on groundwater resources.
9. Increase knowledge of the local geology and hydrogeology to better understand threats to groundwater quality and quantity.
10. Minimize future land subsidence caused by groundwater pumping through in-lieu groundwater recharge, and wise and conservative use of pumped groundwater.
11. Prevent groundwater degradation by protecting groundwater quality, importing clean surface water, and preventing intrusion of poor quality groundwater from neighboring areas.

In addition, the District will take a proactive role in the legislative process. TID will participate in development of sound legislation concerning groundwater management if it becomes necessary. TID will also take an active role in opposing any legislation that is detrimental to local groundwater management efforts, or prevents the local management of groundwater. In furtherance of this effort, District staff are active in the Groundwater Committee of ACWA, in which groundwater legislation and implementation strategies are regularly discussed.

1.4 - Statutory Authority for Groundwater Management

The District, under the authority of AB 255 passed by the state legislature in 1991, adopted a groundwater management plan in 1992. The District was one of the first in the state to adopt such a plan and groundwater management program. The District, like others in the San Joaquin Valley, felt it best to adopt a plan locally as a means to demonstrate its commitment to local conjunctive use management and embrace the authorities afforded therein to further that commitment. AB 255 essentially empowered districts with the authorities of groundwater replenishment districts. These powers include the ability to impose charges and levy taxes for the purposes of acquiring and recharging surface water.

Under subsequent legislation, namely AB 3030 which passed in 1992, Kaweah Delta WCD also adopted a groundwater management plan in 1995. The KDWCD's Plan was regional in extent and overlaps the service area of TID and twelve other water agencies. The newer legislation provided for many of the same authorities and powers as did AB 255; however, one additional management power was the ability to regulate (reduce) groundwater pumping should other measures first prove inadequate to address overdraft issues.

The authorities in AB255 and AB3030 remained unchanged with the amendments to the law provided by 2002 California Senate Bill 1938 (SB 1938), which also identified

new requirements for GMPs. The GMP represents an updated version, and includes the additional components listed in California SB 1938.

The powers granted to an agency adopting a Groundwater Management Plan include:

1. The District may take any actions needed to replenish the groundwater within the District, including buying and selling water, delivering water in-lieu of groundwater pumping, and spreading water for recharge.

2. The District has the authority to limit or suspend groundwater extractions, but only if they determine through study and investigation that groundwater replenishment programs, or other alternative sources of water supply, have proved insufficient or infeasible to lessen the demand for groundwater.

3. The District may take actions needed to protect or prevent interference with water, water quality, or water rights within the District.

4. The District may take any actions necessary to put water under its control to beneficial use.

5. Using water quality goals, the District may take any action needed to preserve the water within the District for beneficial uses. These actions include preventing contaminants from entering District groundwater supplies, removing contaminants, locating and characterizing contaminants within the District, identifying parties responsible for contamination of groundwater, and performing studies relative to the listed water quality goals.

6. The District may enter into agreements with other local agencies or private parties to manage mutual groundwater supplies, including those existing in overlapping areas.

7. The District may levy and collect general groundwater replenishment assessments, as well as water extraction fees based on the amount of groundwater extracted from the aquifer. However, these fees must be "ratified" by a majority vote in an election, according to the election rules applicable to the District.

8. The District may sue to recover the amount of District expenditures for protection of groundwater quality protection from parties responsible for the contamination.

9. The District is granted additional powers of a Replenishment District, which allows it to:
   a) Acquire and operate facilities, waters and rights needed to replenish

the groundwater supplies.

b) Store water in groundwater basins, acquire water rights, import water into the District, and conserve water.
c) Participate in legal proceedings as required to defend water rights, and water supplies, and to prevent unlawful exportation of water from the District.
d) Under certain conditions, to exercise the right of eminent domain.
e) Act jointly with other entities in order to economically perform required activities.
f) Carry out investigations required to implement programs.
g) Fix rates for water for replenishment purposes.
h) Fix the terms and conditions of contracts for use of surface water in-lieu of groundwater.

The District's overall strategy in using these powers is to limit their control over private groundwater facilities, and, through a combination of grower education, water conservation efforts, groundwater recharge, and groundwater banking, to reduce the rate of groundwater level decline, and, if possible, stabilize groundwater levels to help ensure that groundwater resources are sustainable and economically accessible.

1.5 - Groundwater Management Plan Components

This GMP includes the required and voluntary components for a GMP as identified in California Water Code Section 10753, et. seq. This Plan is also consistent with the recommended elements for a GMP as identified in DWR Bulletin 118 (2003), Appendix C. **Table 1.1** identifies the appropriate section of the GMP where each component is addressed.

Table 1.1 - Location of Groundwater Management Plan Components

Description		Plan Section(s)
California Water Code Mandatory Requirements (10750 *et seq.*)		
1.	Documentation of public involvement	1.6, Appendix A
2.	Groundwater basin management objectives	1.3, 3
3.	Monitoring and management of groundwater elevations, groundwater quality, land subsidence, and surface water	5
4.	Plan to involve other agencies located in the groundwater basin	4.3
5.	Monitoring protocols	5.3
6.	Map of groundwater basin and agencies overlying the basin	Att. 2,3 and 5
California Water Code Voluntary Components (10750 *et seq.*)		
7.	Control of saline water intrusion	6.3
8.	Identification and management of wellhead protection areas and recharge areas	6.2, 7.2
9.	Regulation of the migration of contaminated groundwater	6.3, 6.4
10.	Administration of well abandonment and well destruction program	6.1
11.	Mitigation of overdraft conditions	7.1, 7.2
12.	Replenishment of groundwater extracted by water users	7.2
13.	Monitoring of groundwater levels and storage	5.1, 9.3
14.	Facilitating conjunctive use operations	7.3
15.	Identification of well construction policies	8.1
16.	Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects	6.4, 7, 8.2
17.	Development of relationships with state and federal regulatory agencies	4.2, 4.3
18.	Review of land use plans and coordination with land use planning agencies	9.1
Additional Components Recommended by DWR (App. C of Bulletin 118)		
19.	Advisory committee of stakeholders	4.1
20.	Description of the area to be managed under the Plan	1.1, 1.2, 2
21.	Descriptions of actions to meet management objectives and how they will improve water reliability	4 - 9
22.	Periodic groundwater reports	9.3
23.	Periodic re-evaluation of Groundwater Management Plan	9.5

1.6 - Adoption of Plan

Refer to **Appendix A** for documentation on the adoption of the GMP and the public process that was followed.

Public Participation in Plan Development
The public was invited to participate in the development of the updated GMP through newspaper notices and public hearings. The City of Visalia, City of Tulare and Kaweah Delta Water Conservation District were also sent copies of the Draft GMP for their review and comments.

Groundwater Advisory Committee
A Groundwater Advisory Committee was formed comprising the District Manager, District Engineer and TID Board of Directors. The TID Board of Directors is comprised of local farmers and represents the local community. They are familiar with the local and regional water issues and are best suited to serve as the primary voice on the GAC. The general public was informed of the GMP update through a series of public notices and meetings.

Public Notice of Intention to Update the Groundwater Management Plan
As required by the California Water Code, a public hearing was duly noticed consistent with Code §10753.2(a) and held on August 11, 2009, to discuss updating TID's existing GMP. No public comments beyond those offered by the GAC were received at this meeting.

Resolution of Intention to Update the Groundwater Management Plan
TID adopted a Resolution of Intention to Update the Groundwater Management Plan on August 11, 2009. This resolution was then published on July 27 and August 3, 2009 consistent with Code §10753.2(a).

Resolution of Intention to Adopt the Updated Groundwater Management Plan
TID adopted a Resolution of Intention to Adopt the Groundwater Management Plan on May 11, 2010, consistent with Code §10753.2(a).

Resolution Adopting the Updated Groundwater Management Plan
TID adopted a Resolution to Adopt the Updated Groundwater Management Plan on September 14, 2010. This resolution was then published on September 23, 2010 and September 30, 2010 consistent with Code §10753.2(a).

1.7 - Kaweah Delta Water Conservation District Groundwater Management Plan

TID is a cooperating agency in the KDWCD GMP, which was updated in November 2006. KDWCD's original plan was prepared in 1995 in accordance with the requirements prescribed in Assembly Bill No. 3030. The 2006 Plan was revised to satisfy the new requirements for GMPs created by the September 2002 Senate Bill No. 1938. Refer to Section 4.2 for more information on KDWCD and **Attachment 8** for a map showing the border of KDWCD in relation to TID.

The Plan officially recognizes stakeholders through the execution of a MOU. The

purpose of the MOU is to document the interests and responsibilities of participants. The MOU also promotes the sharing of information, the development of a course of action, and the resolving of differences that may arise regarding the Plan. Since the Plan's inception in 1995, thirteen stakeholders have signed the MOU. A list of the stakeholders is provided in Section 4.2 – Relationships with Other Agencies.

In 1996, TID and KDWCD executed an additional MOU referred to as the "Overlap MOU" for the purpose of coordinating the implementation of their respective Plans (see **Appendix B**). From the District's perspective, the two principle features of the MOU as stated therein are that (1) each agency will coordinate its groundwater management activities in the overlap area with the other, and (2) should there be unresolved disputes, TID's plan will govern within its prescribed area, including the City of Tulare.

The two groundwater management plans share common goals and themes. This GMP focuses on groundwater issues unique to TID and its surrounding area, while the KDWCD GMP focuses on regional groundwater issues. TID considers both GMPs important resources in their groundwater management program. While the KDWCD and several other agencies within the Kaweah sub-basin currently maintain individual GMP's, TID will continue to maintain and implement its own Plan given its historic and leading role in the basin of importing large quantities of surface water from the Friant Unit, a practice that has and will serve as one of the most significant measures in combating local and regional overdraft.

2 - GEOLOGY AND HYDROGEOLOGY

This section discusses the geology and hydrogeology of TID and the surrounding area. The purpose of this section is to provide general background information on the local hydrogeology that will aid in selecting and implementing groundwater management programs. Most of the information on the local geology was derived from reports prepared by USBR (February, March 1949), and Fugro West (2007). Regional geologic information is documented in Bertoldi et al (1991), Page (1986), and Croft (1968).

The following sections include technical discussions on the District's groundwater. These are intended to provide geologists, engineers, and water managers a greater understanding of the area's stratigraphy, groundwater conditions, and hydrogeologic parameters. The content of this chapter requires a basic understanding of some geologic principles and terminology. Less technical discussions on groundwater management programs can be found in Sections 3-9.

2.1 - Regional Geology

The District is located entirely within the confines of the San Joaquin Valley. The San Joaquin Valley is a large asymmetric structural trough that has been receiving sediments from the Sierra-Nevada Mountains to the east and from the Coast Ranges to the west. In the area of TID, these sediments and corresponding structures control the direction of groundwater flow and the quality of groundwater available to wells. In general, TID is underlain by (oldest to youngest) basement rocks, unconsolidated deposits, and topsoil.

Groundwater Basin

TID is located in the Tulare Lake Hydrologic Region, which covers 10.9 million acres (17,000 square miles) and includes all of Kings and Tulare Counties and most of Fresno and Kern Counties. The Tulare Lake Hydrologic Region has 12 distinct groundwater basins and 7 sub-basins. TID is located in the Kaweah sub-basin of the San Joaquin Valley Groundwater Basin (**Attachment 5**). The San Joaquin Valley Groundwater Basin is surrounded on the west by the Coast Range, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada Mountains and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. General information on the San Joaquin Valley Basin and Kaweah sub-basin can be found in the California Department of Water Resources Groundwater Bulletin (2003 update).

The Kaweah sub-basin lies between the Kings Groundwater sub-basin on the north, the Tule Groundwater sub-basin on the south, the crystalline bedrock of the Sierra Nevada foothills on the east and the Tulare Lake sub-basin on the west. The Kaweah sub-basin boundaries are similar to those for the KDWCD. Major rivers and streams in

the sub-basin include the Lower Kaweah and St. Johns Rivers. The Kaweah River is considered a primary surface water source for groundwater recharge to the area. In the 1980 California Groundwater Bulletin 118 (DWR, 1980), DWR classified the Kaweah sub-basin as being critically overdrafted. This designation was not re-evaluated by DWR when Bulletin 118 was updated in 2003. (However, recent analysis by Fugro (2007) still shows the basin to be in a state of overdraft). DWR has assigned the sub-basin a 'Type B' groundwater budget, which means that enough data are available to estimate the groundwater extraction to meet the local water needs, but not enough data is available to characterize the groundwater budget.

According to DWR (2003), well yields in the Kaweah sub-basin are 1,000 to 2,000 gpm, with a maximum of 2,500 gpm. The total dissolved solids in the groundwater ranges from 35-580 mg/L with an average of 189 mg/L.

Previous Studies

In December 2003, Fugro West, Inc. prepared a report for KDWCD entitled "*Water Resources Investigation of the Kaweah Delta Water Conservation District*". The report was revised in July 2007. The purpose of the study was to conduct a detailed geologic and hydrogeologic analysis to evaluate and assess the safe yield within the District. The overall purpose of the study was to provide the District, overlying water purveyors, and Tulare County planning agencies with foundational data to help plan future water supply projects. Although the investigation does not address specific planning or water management issues, it provides a foundation for agencies to continue and to optimize their water resource planning efforts. The results of the study are discussed throughout this GMP.

The KDWCD was divided into 5 separate Hydrologic Units for the study (see **Attachment 9**). TID is located in Hydrologic Unit No. 5, which essentially covers the District, as well as the City of Tulare and a small overlapping portion of the Elk Bayou Ditch Company. Hydrologic Unit No. 5 covers 81,500 acres in comparison to TID which covers 77,000 acres. For general purposes, these two areas are assumed to be the same. The most important results from the study include detailed figures for hydrologic balance parameters, and an estimated safe yield for Hydrologic Unit No. 5.

2.2 - Physiography of the District

The San Joaquin Valley, which is the southerly part of the great Central Valley of California, extends from the Sacramento-San Joaquin Delta area on the north about 250 miles to the Tehachapi Mountains on the south. In the vicinity of the District, it is approximately 65 miles wide. The Valley is bordered on the east by the Sierra Nevada Mountains, which range in elevation from about 1,000 feet or less to more than 14,000 feet above sea level. The Coast Range Mountains, which borders the Valley on the west, rises to about 6,000 feet above sea level.

The southern end of the San Joaquin Valley, also known as the Tulare Basin, is a closed feature, with water flowing out of the basin only in extreme wet periods. Tributary streams drain to depressions, the largest of which is Tulare Lake bed located to the west of the District's boundary. The Kings River, Kaweah River, Tule River, White River, Deer Creek, Lewis Creek and Poso Creek, and, on occasion, the Kern River, discharge into Tulare Lake at times when flows exceed the capacity of foothill reservoirs and of the irrigation and recharge diversion systems.

Water level fluctuations in the Tulare Lake waters have been common, and it is reasonable to assume that the process has been taking place for many centuries. During years of heavy precipitation and run-off, before levees were constructed, large volumes of water accumulated in Tulare Lake, and as the relief is very low, the area of the lake fluctuated widely with slight changes in depth of water. Through the years, very little water has escaped from the lake by overflow; most has evaporated or been absorbed by the sands and silts of the lake bottom. Dissolved salts brought in by tributary streams have, in this way, been concentrated. Currently, much less water accumulates in the Lake from runoff due to the construction of several dams and numerous irrigation diversions, and much of the land in the Lakebed is now cropped.

2.3 - Stratigraphy

The following discussion focuses on significant hydrogeologic units that could have an impact on the groundwater resources within the District. Stratigraphy in the District is documented in several reports. The description below is based primarily on the information provided in *Technical Studies in Support of the Factual Report – Tulare Irrigation District* (USBR, February 1949). The generalized stratigraphic sequence of the District includes topsoil, a water bearing series and a non-water bearing series.

Topsoil

Soils in the District are generally favorable for irrigated agriculture with regards to depth, texture and freedom from gravel, stones, or hardpan. According to the Natural Resources Conservation Service Soil Survey for Western Tulare County (2007), most of the District is comprised of loam or sandy loam. The primary soil types include Colpien loam, Nord fine sandy loam, and Gambogy loam. According to the TID Factual Report (March 1949), about 80 percent of the District's land is affected by varying concentrations of alkali, which has resulted from former high water table conditions.

Water Bearing Series

The water-bearing series consists of alluvial fans and lake beds of late Tertiary and Quaternary geologic age which form the groundwater reservoir of the District and adjacent areas. They consist generally of the Delano beds, the Kern River formation, and Young Alluvium. For the purpose of this study, the Kern River Series has been divided into the lower "Kern River formation", and an upper portion, the "Delano beds".

Clay beds apparently formed in relatively still lakes are included within the latter. The water-bearing sediments form a huge wedge, thickest near the western edge of the San Joaquin Valley and thinnest along the mountain front to the east.

Kern River Series. The Kern River formation, in this discussion, includes all known or suspected local sediments older than the Delano beds. Sediments of the Kern River Formation crop out south of Tule River where they disappear northerly beneath the Delano beds. Aquifers in this formation presumably contribute water to the deeper wells. The lithology is similar to the Delano Beds described below.

The Delano Beds consist of fluvial sands, silts, sandy clays, and clays, in part lacustrine, with a few thin lenses of gravel. They crop out east of the District in the area of Lindsay. The sands are generally arkosic, angular to subangular, friable to loose, poorly sorted, and of various shades of reddish-brown, tan and gray.

Young Alluvium. This material forms the fans, floodplains, and channels of the present streams. It resembles the Delano beds, but being younger is not so deeply weathered.

Soils developed in Young Alluvium are generally open and porous, but on the outer fringes of the fans of Tule and Kaweah Rivers and in interfan areas between distributaries of the Kaweah Branch, dense sub soils correspond to areas formerly having a high water table and restricted surface drainage.

Younger alluvium consists of gravelly sand, silty sand, silt, and clay deposited along stream channels and laterally away from the channels in the westerly portion of the District. Younger alluvium is relatively thin locally, reaching a maximum depth below ground surface of perhaps 100 feet. The Young Alluvium is generally above the water table and does not constitute a major water-bearing unit.

Soils developed on the Young Alluvium do not show multiple soil horizons (layers) and are generally free of underlying clay subsoil or hardpan. Because percolation rates through the Young Alluvium are moderate to high, this deposit serves as a permeable conveyance system for recharge to underlying water-bearing materials.

Clay Layers. The westerly two-thirds of the District is largely underlain by the so-called Corcoran Clay or E-Clay, which separates a generally unconfined aquifer system above and a confined aquifer system below. Irrigation wells in the District's area are generally perforated in both systems.

Although as many as six laterally continuous clay zones have locally been defined in the southern San Joaquin Valley, only the most prominent of these E-Clay zones known as the E-Clay (or Corcoran Clay member) is found within the District. The E-Clay is one of

the largest confining bodies in the area and underlies about 1,000 square miles of the San Joaquin Valley. The beds were deposited in a lake that occupied the San Joaquin Valley trough and which varied from 10 to 40 miles in width and was more than 200 miles in length (Davis et al., 1957).

The E-Clay extends from Tulare Lake Bed to U.S. Highway 99 and is vertically bifurcated near Goshen. It is about 140 feet thick near Corcoran and the average thickness is about 75 feet. The deposits near the City of Corcoran are probably the thickest section in the San Joaquin Valley. The Corcoran Clay is generally used to differentiate between a lower confined aquifer and an upper unconfined aquifer west of its eastern extent.

As mapped by Page (1986), the E-Clay (or Corcoran Clay) underlies the majority of the District. Pages' mapping extends the eastern limit of the Corcoran Clay in the vicinity of the plan area from earlier studies by Davis et. al. (1957), and Croft (1968). Later mapping of the Corcoran Clay by R. S. Brown (1981) of the California Department of Water Resources, is in large part similar to Pages (1986) mapping, and as such his description is used here. All of the sources consulted for this study agree that the Corcoran Clay dips and thickens southwest beneath the District. The depth to the top is questionable in the northeast portion of the plan area, but appears to be between 200 to 300 feet deep there, dipping to depths of 400 feet beneath the southwest part of the District. While information on thickness is incomplete in the District, it does show that the Corcoran Clay thickens from about 20 feet thick in the northeast to about 40 feet thick in the southwest portion of the District, and locally maybe as much as 60 feet thick.

Alluvial Fans. TID is located on the recent and still growing alluvial fan of the Kaweah and St. Johns Rivers. The Tule River alluvial fan approaches to about two miles southeast of the District. The alluvial fan slopes generally southwesterly at 7 to 8 feet per mile in the northeastern half of the district. Land classification studies show the soils in this area to be generally light-textured. The southwestern half of the District slopes southwesterly about 5 feet per mile, with prevailingly medium-textured soils. Change in slope and in soil texture reflects the change from the active portion of the fan to the outer, largely inactive, portion.

The Kaweah alluvial fan was built by deposition from Kaweah River and its distributaries. Original slopes of the fan were gentle, and deposition was sufficiently slow to allow deep weathering and break down of coarser materials. The aquifers are lenticular (composed of lenses) in character and are separated from each other by less permeable deposits, permitting a slow, steady migration of ground water from sand lens to sand lens.

Basement Complex (Non-water bearing series)
The non-water bearing series is the Basement Complex, which crops out throughout the mountains and foothills, 10 miles or so east of the District. The Basement Complex consists of ancient sedimentary and volcanic rocks, now greatly metamorphosed, and of the granitic rocks which intrude them. These were involved in the late Jurassic deformation and form a unit that underlies the valley fill at varying depths—probably not less than 5,300 feet below TID. The Basement Complex is relatively impervious and inhibits groundwater recharge. Streams flowing through the Basement Complex lose little or none of their original flow by influent seepage. In the District the basement is assumed to be deep enough to have no significant effect on ground-water supply and conditions.

2.4 - Aquifer Characteristics

In TID, aquifers occur in unconfined, semi-confined, and confined states. Water levels in an unconfined aquifer system coincide with the top of the zone of saturation, where hydrostatic pressure is equal to atmospheric pressure. Seasonal water level variations in such systems are typically subdued. In confined or artesian aquifers, water bearing materials are completely saturated and are overlain by confining materials of low permeability, such as clay and fine silt, and water within the aquifer is under hydrostatic pressure. The hydrostatic head, or pressure, in such an aquifer is reflected by the height above the confining stratum to which water will rise in a well drilled into the aquifer.

Because the alluvial and continental deposits in the District are characteristically heterogeneous in composition, containing individual strata of low permeability that generally exhibit little or no continuity, most aquifer systems are, in fact, semi-confined, becoming increasingly confined with depth. Such aquifers respond to pressure changes over short periods of time, however hydrostatic heads reach equilibrium with unconfined water tables only over extended periods of static, non-pumping conditions.

Specific Yield
Specific yield is defined as the volume of water that will drain by gravity from sediments within a designated storage unit if the regional water table were lowered. Conversely, it is also defined as the volume of water to re-saturate the deposits after they are drained (as long as the sediments do not collapse i.e., subsidence).

Average estimated specific yield of sediments underlying TID is 10 percent (USBR, February 1949). This figure was derived from studies of 477 water wells, in which the material evaluated was, in most cases, between 20 and 70 feet below the surface (USBR, February 1949). The specific yield of the ground water reservoir was estimated by segregating sediments recorded in driller's water well logs into the following classifications:

Table 2.1 – Specific Yield of Various Sediments

Sediment	Relative Permeability	Specific Yield
Clay and silt	Impermeable	2.9%
Very find sand, silt and clay	Relatively impermeable	4.2%
Fine sandy silt	Poor permeability	5.8%
Sandy silt, slightly cemented sand	Relatively permeable	7.5%
Medium and fine sand	Permeable	24.2%
Gravel and coarse sand	Very permeable	34.8%

Note that the estimated specific yield of 10% is for a zone (20 to 70 feet depth) that has been mostly dewatered. Average groundwater depths in TID were approximately 135 feet in Fall of 2009.

Fugro (2007) also estimated specific yield for the entire KDCWD area. Considered in an overall picture, the contours of equal specific yield percentage in the Kaweah area follow a fairly uniform pattern. High percentages are centered around the present main channel of Kaweah River. Decreasing percentages are found north into the Ivanhoe area and as the topographic low in the interfan area between the Kaweah and Tule Rivers is approached. These details can be seen on a specific yield map (Fugro, 2007, Plate 23). The map shows a specific yield of 10 percent in most of TID and slightly lower specific yield in the northern part of District. The extreme southwest corner of TID is higher, with some areas having an estimated 13% specific yield. The specific yields were estimated for depths from 0 to 200 feet below ground surface.

Transmissivity

Transmissivity data for the TID area from available literature is sparse. A study by Davis et al., (1964) summarized numerous specific capacity values from Pacific Gas & Electric pump tests performed across the San Joaquin Valley. Using data from field tests in the TID area, they calculated specific capacities ranging from 42 to 60 gpm per foot. Driscoll (1986) provides an approximate relationship between specific capacity data and transmissivitiy. Using this method, transmissivity values for the District and immediately surrounding areas range from 63,000 to 90,000 gpd/ft. These values of specific capacity and transmissivity are probably valid for the unconfined aquifer, as at the time of the report most wells drilled in the area were most likely completed above the E-Clay.

Wells Yields and Depths

Usable groundwater in the District occurs both above and below the Corcoran Clay, and many water wells perforate zones both above and below the E-Clay. These wells allow significant amounts of inter-aquifer flow between the upper unconfined aquifer and lower confined aquifer, thereby equalizing piezometric (head) differences.

According to USBR (February, 1949), pump tests gave no indication of any particularly favorable pumping areas in the District from the viewpoint of specific capacity or yield. Well yields throughout the district averaged approximately 700 gallons per minute and specific capacity averaged 55 gallons per minute per foot of drawdown. However, this data is over 50 years old and conditions and well construction methods have changed substantially over time.

The California DWR (2003) states that well yields in the Kaweah groundwater sub-basin range from 1,000 to 2,000 gpm, with a maximum of 2,500 gpm.

The City of Tulare Urban Water Management Plan includes attributes for 30 City production wells (Table 3-2 in Urban Water Management Plan). The well depths range from 200 to 780 feet, and capacities range from 230 to 1,500 gpm.

Safe Yield

The safe or perennial yield of a groundwater basin is typically defined as the volume of groundwater that can be pumped year after year without producing an undesirable result. Any withdrawal in excess of safe yield is considered overdraft. The "undesirable results" mentioned in the definition are recognized to include not only the depletion of groundwater reserves, but also deterioration in water quality, unreasonable and uneconomic pumping lifts, creation of conflicts in water rights, land subsidence, and depletion of stream flow by induced infiltration. It should also be recognized that the concepts of safe yield and overdraft imply conditions of water supply and use over a long-term period.

The supplemental supply to be furnished from the Friant-Kern Canal was intended to maintain water levels approximating those during 1921-1946, or during a similar cycle of normal runoff. Therefore, with full utilization of the surface water supplies, then groundwater pumping should match the safe yield. However, several factors have contributed to the current condition of overdraft, including: 1) Planting of high water use crops; 2) Double cropping; 3) Dairy development; 4) Urban development and attendant pumping and land use impacts; 5) High groundwater pumping in neighboring areas; and 6) Endangered species issues that result in less surface water diversions to water agencies in the region. In addition, the San Joaquin River Restoration project will reduce TID's surface water deliveries and create a greater disparity between groundwater pumping and the safe yield.

Fugro provided a 'Practical Rate of Withdrawal' for Hydrologic Unit No. 5 (Table 78), which is considered to be the estimated safe yield. This value ranges from 126,000 to 141,000 AF/year for Hydrologic Unit No. 5. Fugro (2007) estimated that the overdraft in the KDWCD ranges from 21,700 to 36,000 AF/year, and the overdraft in Hydrologic Unit No. 5, which is roughly equivalent to the TID service area, is 6,800 AF/year. Within

KDWCD, the greatest overdraft is occurring west of TID, which includes distinctive pumping depressions according to groundwater contour maps.

Groundwater Storage

The area of the District is 72,000 acres and the average specific yield is about 10 percent. With an assumed average groundwater depth of about 135 feet, there is 8.9 million AF of storage capacity between the groundwater table and a depth of 20 feet below the ground surface.

Groundwater Flow

In general, a characteristic regional northeast to southwest pattern of groundwater flow occurred during the 1980's and 1990's. Areas of pumpage depressions are persistently present north of Corcoran, west of Visalia, and northwest of Exeter. Groundwater also flows into TID from the Tule River area into the southern portion of TID. Fugro (2007) estimated groundwater inflow and outflow in Hydrologic Unit No. 5 to average 22,200 AF/year and 16,200 AF/year, respectively, between 1981 and 1999. This equates to a net groundwater inflow of 22,200 – 16,200 = 6,000 AF/year.

Recharge

The estimated specific yield and soil permeabilities resulting from land classification studies indicate that conditions in TID favor artificial water spreading (USBR, February 1949). The northeast quarter of the District is the most suitable for this purpose and the southwest quarter is fairly suitable. The northwest and southeast quarters are generally unfavorable, although there are some areas of moderate permeability in each. The Young Alluvium that overlies all of the TID varies widely in porosity and texture. This variation is noticeable, particularly in the small interfan areas between the natural distributaries of the Kaweah River.

Regionally, most of the KDWCD is underlain by soils with "moderate" rates of water infiltration. Geologically, these correspond to areas of Holocene alluvium. Areas of slow infiltration are also common; these areas correspond to areas of Pleistocene alluvium. Scattered pockets of high infiltration soils appear to be associated with stream channels and associated deposits.

2.5 - Groundwater Levels

In the early 1900's, groundwater levels were high in TID and many wells experienced artesian flow. Since the early 1950's, the District has observed declining groundwater levels and the Kaweah sub-basin has been identified by the DWR as a sub-basin subject to critical conditions of overdraft. Critical conditions of overdraft are defined as a groundwater basin in which continuation of present practices would probably result in significant adverse overdraft-related environmental, social or economic impacts.

Throughout the years the KDWCD has accomplished various studies that examined

groundwater supplies. The most recent study, "*The Water Resources Investigation of the Kaweah Delta Water Conservation District*", was completed in 2003 and updated in 2007. The study once again confirmed the Basin was in a state of overdraft. The study was a comprehensive review of the elements required to determine safe yield for the aquifers within the District. The final conclusion was that annual groundwater supplies in KDWCD were insufficient for water demands not met by surface water in the range of 20,000 to 36,000 AF annually.

TID has been monitoring groundwater levels within and adjacent to its service area since the 1940's. This is accomplished through groundwater level measurements taken in the late fall and early spring. This data is provided to USBR as part of that agency's assessment of groundwater trends within the Friant Unit service area. The KDWCD also measures depths to groundwater basin-wide. Based on historical water level readings by these and other entities, there is an overall trend of declining groundwater levels within the Sub basin. It is important to note that the Basin does have the ability to respond to positive conditions and this is demonstrated during years of above-average precipitation when the decline has been periodically interrupted by short-term groundwater recovery, as a result of reduced groundwater pumping and increased surface water imports. The most severe water level declines within the Basin from 1950 to 2000 occurred in the extreme western end, which is westerly of TID.

The groundwater levels (elevation and depth) in TID and the KDWCD are shown on **Attachments 10** and **11**. Between 1950 and 2000, groundwater levels fluctuated seasonally and according to climatic conditions. Fugro (2007, Plate 30) shows 18 hydrographs for wells throughout TID. Almost all of the hydrographs show a precipitous drop in groundwater levels from 1987 to 1995, a 7-year drought. The water level drops ranged from 50 to 120 feet, with most wells seeing about an 80-foot drop in water levels. From 1995 to 2000 the hydrographs show that water levels recovered and in some cases were slightly higher than in 1950.

USBR (February 1949) notes that TID may lose water by groundwater outflow in years when they take large quantities of Friant Unit CVP Class 2 water. They suggest that this could be avoided by recharging or using some of the water in areas outside of TID. TID is doing this through their various water sales and transfer agreements, discussed in Sections 4.2 and Chapter 7.

2.6 - Land Subsidence

According to Ireland et al. (1984), land subsidence from 1926 to 1970 in the KDWCD has likely been no more than several feet and restricted to the extreme west side of the KDWCD. Subsequent work by Swanson (1998) indicates that with the availability of new surface water supplies in the San Joaquin Valley in about 1970, rates of subsidence were substantially reduced. From 1925 to 1995, such subsidence occurred only in drought years and in local areas where historic low water levels were exceeded.

Ireland (1984) indicates land subsidence of up to 4 to 5 feet in the southern and western portion of the Kaweah sub-basin.

2.7 - Groundwater Quality

Groundwater quality in TID is known only from limited testing. However, the chemical quality of both surface water and groundwater in the District is generally excellent for irrigation, and satisfactory for municipal and industrial use, although there may be some localized problems. The quality of groundwater is expected to remain satisfactory in view of the excellent quality of the replenishment water. The quality of runoff from the Kaweah River and San Joaquin River, which furnishes most ground and surface supply to the District, is very good to excellent quality.

Generally, water is considered suitable for agriculture if the total dissolved solids (TDS) is less than 700 mg/L (Cherry, 1979). According to DWR (2003), TDS in the Kaweah Groundwater sub-basin averages 189 mg/L with a range from 35 to 580 mg/L.

The TID Factual Report (USBR, March 1949) mentions deep brackish water zones within the District. The reports states that they may not be extensive, but should not be ignored, and caution should be used when deep well drilling (greater than 650 feet) is being considered.

The City of Tulare 2008 Consumer Confidence Report also includes information on the local groundwater quality. Between 2006 and 2008 the City did not have any water quality violations. Ranges in water quality parameters included the following:

- Total dissolved solids: 86-220 ppm
- Specific conductance: 130-340 uS/cm
- Arsenic: 2.1-10 ppb

3 - BASIN MANAGEMENT OBJECTIVES

The District's Basin Management Objectives are listed below:

1. **Stabilize Groundwater Levels.** Stabilize average long-term groundwater levels to prevent the loss of groundwater reserves, and prevent the need for well deepening or the installation of new wells. This would be achieved through a combination of water conservation measures, direct groundwater recharge, in-lieu groundwater recharge (importing surface water) and groundwater banking.

2. **Increase Groundwater in Storage.** Increase groundwater storage through the development of groundwater banking projects in areas that have geologic conditions conducive to groundwater recharge and recovery.

3. **Prevent Further Land Subsidence.** Prevent further land subsidence that can cause a reduction in groundwater storage space and damage water delivery infrastructure through efficient use of groundwater supplies and full utilization of surface supplies.

4. **Prevent Groundwater Degradation.** Prevent groundwater degradation by protecting groundwater through proper well construction and abandonment, proper use of agricultural amendments, importing clean high quality surface water, and preventing intrusion of poor quality groundwater from neighboring areas.

5. **Maintain Good Groundwater Quality for Agricultural Irrigation.** Maintain suitable groundwater quality for agricultural irrigation according to published guidelines for crops grown in the District.

6. **Increase Knowledge of Local Geology and Hydrogeology.** Increase knowledge of the local geology and hydrogeology through technical studies, subsurface investigations, water quality testing, water level monitoring, and land subsidence monitoring. Gain a better understanding of regional groundwater quality, groundwater overdraft, and groundwater flow conditions. Seek funding for these investigations through State and Federal grant programs.

7. **Solidify District's Claim to Local Groundwater Management.** Solidify the District's position and authority as the manager of the local groundwater, provide better representation for the District growers on groundwater issues, and develop

a relationship with the State that fosters local assistance and decision-making to assist in promulgating state goals and objectives.

Existing Activities

- All existing and on-going activities described in Sections 4-9 will be maintained, unless stated otherwise. (In Sections 4-9 the Existing Activities are not repeated under Planned Actions, even though they will be continued in the future).

Planned Actions

- All new policies and projects described in Sections 4-9 will be pursued, but their implementation will be subject to available funding and staff time.
- Manage local groundwater resources with an emphasis on meeting the GMPs Basin Management Objectives.

4 - STAKEHOLDER INVOLVEMENT

4.1 - Groundwater Advisory Committee

A Groundwater Advisory Committee (GAC) was formed in 2009 to assist with the development of this GMP. The GAC is comprised of the District Manager, District Engineer and TID Board of Directors. The TID Board of Directors is comprised of local farmers and represents the local community. They are familiar with the local and regional water issues and are best suited to serve as the primary voice on the GAC. However, no members of the general public have presently expressed any interest in serving on the GAC, although with an indication of interest in the future public members may be added by the Board. The GAC offered several useful and insightful comments that were incorporated into this GMP. The GAC will also monitor and evaluate the technical progress made in achieving the goals of this GMP.

Existing Activities

Assisted with the development of this GMP.

Planned Actions

The Committee will attempt to hold special groundwater sessions at regular Board meetings once each year, or more frequently if deemed appropriate, and said Committee will have the following responsibilities:

- Review trends in groundwater levels and available information on groundwater quality.
- Evaluate the effectiveness of current groundwater management policies, programs and facilities.
- Discuss the need for new groundwater supply/enhancement facilities.
- Determine the sufficiency of revenue sources to fund the District's conjunctive use operations.
- Educate landowners on groundwater management issues.
- Assess the overall progress in implementing the programs outlined in the GMP.
- Recommend updates or amendments to the GMP.
- Identify regional and multi-party groundwater projects.
- Review and comment on the Annual Groundwater Report.
- If needed, form special committees or task forces to undertake special groundwater management tasks.

4.2 - Relationships with Other Agencies

The District is located in the Kaweah groundwater sub-basin, which extends beyond many political boundaries and includes other municipalities, irrigation districts, water districts, private water companies, and individual water users (see **Attachments 2 and 3**). This emphasizes the importance of inter-agency cooperation, and the District has

historically made efforts to work conjunctively with many other water management agencies.

Below is a list of some agencies that the District has and is working with in managing the local groundwater**:**

- Kaweah Delta Water Conservation District
- Consolidated Peoples Ditch Company/Farmers Ditch Company
- Member Units of the Friant Water Authority
- Friant Water Users Authority
- United States Bureau of Reclamation
- California Department of Water Resources
- Association of California Water Agencies
- City of Tulare
- City of Visalia
- Southern San Joaquin Valley Water Quality Coalition
- County of Tulare
- Kaweah River Basin IRWMP
- Tulare County

A description of each agency and their role in managing groundwater within TID is provided below.

Kaweah Delta Water Conservation District

The Kaweah Delta Water Conservation District was formed in 1927 under provisions of the Water Conservation District Act of 1927 for the purpose of conserving and storing waters of the Kaweah River and for conserving and protecting the underground waters of the Kaweah Delta. The District includes lands in both Tulare County and Kings County (see **Attachment 8**). The total area of the District is approximately 340,000 acres.

KDWCD's Plan Area contains multiple local agencies that provide various types of water services. Those local agencies have been included as stakeholders through the execution of a (MOU). Signatories to this stakeholder MOU are as listed below:

- California Water Service Company
- City of Farmersville
- City of Lindsay
- City of Tulare
- City of Visalia
- City of Woodlake
- Consolidated Peoples Ditch Company
- Kings County Water District

- Lakeside Ditch Company
- Lakeside Irrigation Water District
- St. Johns Water District
- Stone Coral Irrigation District
- Ivanhoe Irrigation District

TID also prepared a special MOU (the "Overlap MOU") with KDWCD regarding groundwater management in areas where their two GMPs overlap (see **Appendix B**). TID has cooperated with the KDWCD on many projects, including the KDWCD GMP (see Section 1.6), KDWCD Numerical Groundwater Model (see Section 9.2), and the Kaweah River Basin IRWMP (in process). TID also meets with KDWCD on a regular basis to discuss their respective groundwater management objectives as called for in the MOU.. TID has worked with KDWCD on numerous occasions to maximize the importation of surplus CVP water into the Kaweah sub-basin.

Ditch Companies

TID developed an exchange agreement with Consolidated Peoples and Farmers Ditch Companies which provides for delivery of imported water thereto in exchange for Kaweah water in storage in Lake Kaweah. Such exchanges are planned at times when more diversion capacity for imported CVP water is needed beyond what TID may have available. This practice in accordance with the agreement allows for the maximization of imported surface supplies into the basin.

Member Units of the Friant Water Authority

The Friant Water Authority is a joint powers authority comprised of 22 member districts located in Fresno, Tulare, and Kern Counties. In addition to its primary mission of operating and maintaining the Friant-Kern Canal, FWA also addresses various water supply, financial, legislative, legal and other policy issues on behalf of its members. As a member of FWA, TID is often involved in water management projects which involve transfer and exchange arrangements with other FWA members. TID's goal in such arrangements is to increase the net deliveries of imported water into the District.

Friant Water Users Authority

The Friant Water Users Authority is a joint powers authority that has member districts in Madera, Fresno, Tulare, and Kern Counties. The FWUA is staffed by employees of the Friant Water Authority under an agreement between the two organizations. FWUA is maintained to work on projects and legal matters that preceded the formation of the Friant Water Authority. The FWUA is further charged in working with USBR and others in advancing the needs of its members with respect to maximizing the availability of CVP water deliveries to the Friant Service area, much of which is in a state of overdraft.

USBR/DWR
TID currently participates in the Semi-annual Groundwater Measurement Program administered by the USBR. This program requires TID to take water level measurements from specified wells two times a year and share the data with USBR. USBR then shares this data with the DWR. TID has also historically applied for and received grants from the DWR and USBR that fund water management studies and construction of water infrastructure.

Association of California Water Agencies
TID is an active member of the Association of California Water Agencies. ACWA fosters cooperation among all interest groups concerned with stewardship of the State's water resources. TID staff attends the ACWA semi-annual meetings, selected committee meetings, and benefits from the educational and informational services that ACWA offers.

City of Tulare
In May 2005, the District and the City of Tulare renewed a long-standing agreement which provides for the City's use of certain District-owned canal and ditch facilities for disposing of storm drainage, payments by the City in-lieu of District assessments, a process to develop joint policies related to impacts of new urban development on District facilities, and also to consider and enter into various joint projects of mutual benefit. The outcome of this agreement was evaluating various joint projects and the eventual development of a water importation agreement to maximize groundwater levels in and around the City. The "City Groundwater Augmentation Program" was developed by the City/District Joint Operations Committee in early 2006. This program outlines the basis for District/City cooperation, the groundwater recharge locations, the water sources, fee collection mechanisms, and the fund accounting to carry out programs purposes. The District prepares an annual report for the City to document the accomplishments of the program in accordance with the agreement.

City of Visalia
TID is holding discussions with the City of Visalia on groundwater recharge projects and the use of City wastewater effluent for crop irrigation in exchange for an expansion of TID's conjunctive use operations in ways to benefit the City.

Southern San Joaquin Valley Water Quality Coalition
TID is a member of the Southern San Joaquin Valley Water Quality Coalition (Coalition) through their association with the Kaweah and St. Johns River Association. The Coalition encompasses the entire Tulare Lake Basin (4.4 million acres) and is comprised of four sub watershed groups (Kings, Kaweah, Tule and Kern). TID is a member of the Kaweah River sub watershed group. The Coalition is organized under a MOU, adopted in 2002, to jointly and cooperatively address water quality issues. The

Coalition monitors surface water (irrigation and storm water) and prepares annual reports.

Tulare County
TID stays apprised of water issues with the County of Tulare through the Tulare County Water Commission. The Water Commission serves as an advisory body to the Tulare County Board of Supervisors. The Commission is made up of local water experts including engineers, water district managers, elected officials and community activists. The Commission meets monthly to discuss regional water issues. TID is indirectly represented through a member belonging to KDWCD. TID staff is actively engaged in the Water Resources Committee of the Water Commission.

Kaweah River Basin IRWMP
TID is a member of the Integrated Regional Water Management Plan for the Kaweah River Basin. The IRWMP is a collaborative process among a number of public entities, non-profit groups and other stakeholders to identify, formulate and advocate surface and groundwater projects for the region. TID intends to coordinate its proposed groundwater management projects within this overall effort to seek grant and loan funds from DWR.

Existing Activities

- On-going agreements, cooperative programs and projects with other agencies as mentioned above.
- Continued involvement in the development of the Kaweah Groundwater Basin Integrated Regional Water Management Plan that is being led by Kaweah Delta Water Conservation District.

Planned Actions

- Implement multi-agency projects identified in the Kaweah River Basin IRWMP that will benefit TID and the region's groundwater resources.
- Implement projects funded as part of the Water Management Goal of the San Joaquin River Restoration Settlement. These are expected to include groundwater recharge projects with 50% funding provided by the Federal government.

4.3 - Plan to Involve the Public and Other Agencies

The District is already involved with many neighboring and regional agencies on groundwater management projects. Nevertheless, TID is always interested in building new relationships with other agencies that share the same groundwater basins. TID will also strive to involve the public in groundwater management decisions. Additional cooperative relationships can be achieved through the sharing of data, inter-agency committees, interagency meetings, memorandums of understandings, formal agreements, and collaborations on groundwater projects.

Existing Activities

- Conducted public hearings to discuss the content of this GMP prior to its adoption.

Planned Actions

- Hold annual Groundwater Advisory Committee meetings that are open to the public.
- Provide copies of the annual groundwater reports to the public at their request. Notify the public of the availability of the annual reports on the TID website and District newsletter.
- Publish information on groundwater management accomplishments on the TID website and quarterly newsletter.

5 - MONITORING PROGRAM

Optimal use of the groundwater resource is dependent on obtaining good basic data respecting both geology and hydrology. The purpose of this element of the Program is to characterize the conditions within the groundwater basin, both to document the accomplishments of the Management Program and to identify and implement specific programs, as needed, to reflect changing conditions in the basin.

This section discusses monitoring of groundwater levels, groundwater quality, land surface subsidence, and surface water. Monitoring is considered critical to future management decisions, and the District's monitoring program is intended to:

1. Provide warning of potential future problems.
2. Use data gathered to generate information for water resources evaluations.
3. Develop meaningful long-term trends in groundwater characteristics.
4. Provide data comparable from place to place in the District.

5.1 - Groundwater Level Monitoring

The District began routinely measuring groundwater levels in the late 1940's. The District now measures groundwater levels in about 100 wells each spring and fall. **Attachment 6** illustrates the location of private wells that are monitored by TID. **Attachment 12** includes a list of attributes for these wells. TID plans to collect more detailed well attribute information (such as well depth, screened interval, type of well, precise coordinates, etc.) in the future, if landowners are willing to share the data with the District. Pending the availability of grant funding, TID plans to install dedicated piezometer wells to better determine depth to groundwater in both the unconfined and confined (below the E-Clay) zones.

Groundwater Level Data

TID maintains the groundwater level data in a spreadsheet database. Electronic data is available as far back as the 1940's in some wells. Occasionally, TID has used the data to generate groundwater contour maps. TID plans to prepare annual groundwater reports documenting groundwater levels, groundwater contour maps, well hydrographs, and change in groundwater storage. Refer to Section 9.3 for more detail on these reports. An annual report is currently being prepared as referenced in Section 4.2 for submittal to the City of Tulare to document localized groundwater recharge accomplishments.

Sharing of Groundwater Level Data

TID currently participates in the Semi-annual Groundwater Measurement Program administered by the USBR. This program requires TID to take water level measurements from specified wells two times a year and share the data with USBR. In

compliance with SB7X-6, the District intends to comply with state requirements to furnish groundwater level data to DWR under the provisions prescribed therein.

KDWCD Monitoring

KDWCD performs groundwater level monitoring on a regional scale. KDWCD has an extensive monitoring network that was initially established in the 1950's. This network has been maintained and improved in a continuing effort to provide reliable information for annual and long-term assessment of groundwater conditions. The KDWCD prepares semi-annual maps of groundwater depth, groundwater elevations, and annual change in groundwater depth. This data is useful to TID for assessing groundwater inflow and outflow, and assessing the health of regional groundwater supplies. The groundwater contour maps use a lower density well network than TID uses, and therefore TID still sees value in generating their own groundwater contour maps.

Existing Activities

- Measurement of groundwater levels each spring and fall.
- Review regional groundwater contour maps and hydrographs prepared by KDWCD each year.

Planned Actions

- Periodically review the monitoring network to determine if it provides sufficient aerial coverage to evaluate groundwater levels.
- Protect wells in monitoring program from being abandoned.
- Encourage landowners and developers to convert unused wells to monitoring wells. Inform them through the District website and newsletter that their abandoned well could be useful to TID.
- Install data loggers in a select number of wells to collect groundwater level data more frequently than twice a year.
- Collect more detailed information on the attributes of each monitoring well.
- Determine the perforated interval for each monitoring well so the groundwater level in confined and unconfined aquifers can be differentiated.
- Prepare annual groundwater reports, which will include detailed evaluations of groundwater level trends and estimated changes in groundwater storage (see Section 9.3).
- Maintain at least the same number of wells in the monitoring network by constructing monitoring wells, or adding new private wells to the network, when existing wells are taken out of the monitoring network due to lack of landowner cooperation or well failure.
- Coordinate data collection with the City of Tulare to better integrate trends in depths to water under the City boundaries and outer agricultural areas.
- Seek grant funds to install dedicated monitoring wells, including nested wells that measure groundwater levels above and below the Corcoran Clay.

- Convert groundwater well data and associated contouring efforts from a computer-aided drafting process to a Geographic Information System process.

5.2 - Groundwater Quality Monitoring

Groundwater quality monitoring is an important aspect of groundwater management in TID. Groundwater monitoring efforts serve the following purposes:

1) Spatially characterize water quality according to soils, geology (above and below the Corcoran Clay), surface water quality, and land use.
2) Establish a baseline for future monitoring.
3) Work with the City of Tulare with respect to its assessment of water quality for potable use purposes and its abilities in meeting federal and state requirements.
4) Compare constituent levels at a specific well over time (i.e. years and decades).
5) Determine the extent of groundwater quality problems in specific areas.
6) Identify groundwater quality protection and enhancement needs.
7) Determine water treatment needs.
8) Identify impacts of recharge and banking projects on water quality.
9) Identify suitable crop types that are compatible with the water characteristics.
10) Monitor the migration of contaminant plumes.

The District has only performed limited groundwater quality monitoring in the past, and has relied on private landowners and other agencies for groundwater quality data. As there are very few water quality concerns in the District, this approach has generally provided adequate information to monitor and manage the groundwater quality. Furthermore, the groundwater quality in TID has generally been of good quality for irrigation, so extensive monitoring does not appear to be necessary. A discussion on groundwater quality monitoring by the District, landowners, and other agencies is provided below.

TID Monitoring

TID currently collects groundwater samples each year on about five agricultural wells. The landowners have given TID permission to collect samples and review the test results, but have requested that the information be kept confidential. An effort is made to sample different wells on a year-to-year basis and resample the same wells after 5 years for a comparison analysis. In addition, the District will begin to measure electrical conductivity in a larger number of wells each year to serve as a general long-term indicator of groundwater quality. If TID develops a groundwater bank in the future, they may perform detailed monitoring in the vicinity of the bank.

Landowner Monitoring

Many landowners test the water quality of their domestic and irrigation wells on a regular basis. Some landowners will provide the test results to TID, however, the

results are proprietary, and the landowners typically ask that TID use the data for their information only and not release it to the general public.

Other Agency Monitoring
Numerous other agencies play important roles in the monitoring and maintenance of groundwater quality. These agencies include the Regional Water Quality Control Board, state and federal Environmental Protection Agency, Department of Toxic Substances Control, Tulare County Environmental Health Department, USGS, State Water Resources Control Board, City of Tulare, and neighboring irrigation and water districts. TID makes an effort to collect and review pertinent water quality data published by these agencies. The Tulare County Environmental Health Department is currently developing a Groundwater Data Management System, which will help to consolidate much of the data into a single database.

Existing Activities
- Test the groundwater quality in a select number of agricultural wells each year.
- Regularly collect new water quality information from other agencies and review it to identify any impending groundwater quality problems from an agricultural standpoint.

Planned Actions
- Protect wells in monitoring program from being abandoned.
- Measure electrical conductivity at all monitoring wells every five years in conjunction with groundwater management plan updates.
- Assess the adequacy of the groundwater quality monitoring network annually.
- Install dedicated nested monitoring wells, with the ability to sample groundwater above and below the Corcoran Clay.

5.3 - Groundwater Monitoring Protocols
Monitoring protocols are necessary to ensure consistency in monitoring efforts and are required for monitoring evaluations to be valid. Consistency should be reflected in factors such as location of sample points, sampling procedures, testing procedures, and the time of year when the samples were taken. Without such common ground, comparisons between reports must be carefully considered and used with considerable caution. Consequently, uniform data gathering procedures are practiced by the District. The District has developed new water level and water quality monitoring protocols, which can be found in **Appendix C**. These protocols will be cross-referenced against any monitoring guidelines promulgated by DWR as called for in SB7X-6.

Existing Activities
None

Planned Actions

- Use the District's new protocols when performing groundwater level and groundwater quality monitoring.
- Perform annual calibration of water level sounder devices or confirmation of tape measurement elevation reference points.

5.4 - Surface Water Monitoring

Several minor surface streams pass through TID including Cameron Creek, Packwood Creek and Deep Creek. TID also uses surface water from sources that originate and flow through other areas, namely the San Joaquin River and Kaweah River. Detailed monitoring of these water supplies is performed by other agencies.

San Joaquin River. San Joaquin River Water is stored in Millerton Lake and impounded behind Friant Dam. The USBR operates Friant Dam and monitors water releases, reservoir levels, and water quality. San Joaquin River Water is made available to TID from the Friant-Kern Canal, which is operated by the FWA. FWA monitors flow rates in the Friant-Kern Canal, diversions to TID and others, and canal water quality.

Kaweah River. Kaweah River water is monitored by the Kaweah & St. Johns River Association. The KSJRA monitors river flows, river stage, deliveries to TID, and water quality.

Due to the efforts of these other agencies, TID has not had a need to monitor the quality of their surface water sources. However, TID regularly reviews the data and monitoring reports prepared by FWA, USBR and the KSJRA with the primary goals of understanding the long-term hydrology and water availability, and monitoring changes in water quality that could affect crop irrigation or groundwater quality.

Existing Activities

- Regularly review hydrologic and water quality data for the San Joaquin and Kaweah Rivers.
- Cooperate with the Southern San Joaquin Valley Water Quality Coalition in monitoring surface waters.

Planned Actions

- Monitor changes to surface water quality that could directly affect groundwater quality.

5.5 - Land Surface Subsidence Monitoring

Subsidence in the San Joaquin Valley has been characterized as the largest human alteration of the earth's surface. The reason behind this statement comes from inelastic land surface subsidence that has occurred principally from aquifer-system compaction.

The lowering of groundwater levels through sustained groundwater overdraft causes this type of subsidence. The impact to groundwater from such subsidence is the reduction in available aquifer storage capacity caused by the compaction of soil void space that retains groundwater. Studies performed by the DWR and the USGS have identified an area of subsidence in the western portion of the District that correlates with the Corcoran Clay. The magnitude of subsidence within this portion of the District was on the order of four feet for a study period extending from 1926 to 1970 (USGS Professional Paper 437-H).

In addition, Lofgren and Klausing (1969) reported that:

> *"Intensive pumping of groundwater has caused more than 800 square miles of irrigable land to subside in the Tulare-Wasco area. In the southeastern part of the Tulare-Wasco area [in the Tulare ID area], subsidence was arrested in the late fifties, when water levels recovered as much as 130 feet in response to reduced pumping and increased recharge resulting from importation of water through the Friant-Kern Canal."*

Studies performed since these findings have revealed a dramatic decrease in the rate of subsidence. It is likely that some of the land subsidence has been arrested with the importation of large volumes of surface water since the 1950's.

A return to higher groundwater pumping rates could result in land subsidence across a broad area, result in aquifer compaction and irrecoverable loss of storage capacity, and cause adverse effects to surface features such as canals, flood control systems, and water supply pipelines which rely on gravity flow.

Currently, land subsidence does not appear to be a major problem in TID. TID staff and landowners have not observed any obvious signs of subsidence to irrigation facilities and structures. However, as access to surface water rights are reduced and demand from groundwater grows commensurately, there is a real threat of a return to major land subsidence. If subsidence is occurring, then some unstoppable residual subsidence will continue to occur for several years. Lands within the District will be observed for land subsidence, and, if land subsidence becomes a problem, this Plan will be amended to include preventative and mitigative measures.

Existing Activities
None

Planned Actions

- Periodic resurvey of control points, local benchmarks, water control structures and wells to check for land subsidence. The control points and local benchmarks will be checked relative to High Precision Geodetic Network benchmarks.
- Participate in any regional efforts to monitor and evaluate land subsidence.
- Pursue funding to construct and operate an extensometer within the District boundary.
- Educate local growers on the potential for land subsidence and visual indicators of possible subsidence.
- Review published information by others such as the DWR, USBR and CalTrans on local subsidence findings.

6 - GROUNDWATER RESOURCES PROTECTION

6.1 - Well Abandonment

Proper destruction of abandoned wells is necessary to protect groundwater resources and public safety. Abandoned or improperly destroyed wells can result in contamination from surface sources, or undesired mixing of water of different chemical qualities from different strata. This is especially important in TID because part of the District has a confined aquifer, and there may be some isolated perched aquifers.

The administration of a well construction, abandonment and destruction program has been delegated to the counties by the state legislature. Many counties have adopted a permitting program consistent with Department of Water Resources Bulletin 74-81 for well construction, abandonment, and destruction.

The County of Tulare has adopted a Well Ordinance that addresses well destruction and establishes requirements for destroying or abandoning wells. The ordinance has provisions which stipulate that impairment of the quality of water within the well or groundwater encountered by the well is not allowed. Those wells that are defective require correction of the defective conditions or destruction of the well. In all cases, the primary responsibility for remedying defective or abandoned wells falls on the landowner and in those cases of non-compliance, the County has the authority to take necessary action to abate unsatisfactory conditions.

The District will properly abandon their own wells when they are no longer useful. In addition, the District will encourage landowners and developers to properly abandon their own wells, or preferably, convert unusable wells to monitor wells so that they can become a part of the District's groundwater monitoring program.

Before abandoned wells are converted to monitoring wells they will be evaluated for suitability, including their condition, depth, peroration interval, etc.

Existing Activities

None

Planned Actions

- When no longer in use, destroy any District owned wells according to County and State standards.
- Educate landowners, through the District website and newsletter, on well abandonment standards, and that abandoned wells could be useful to TID as monitoring wells.
- When possible, convert unusable production wells to monitoring wells.

- Meet with the County of Tulare to discuss a partnership whereby TID would be informed of any landowner that has filed a permit to abandon a well, so TID can ask them if the well can be converted into a monitoring well.

6.2 - Wellhead Protection

Need for Wellhead Protection

Contaminants from the surface can enter an improperly designed or constructed well along the outside edge of the well casing or directly through openings in the well head. A well is also the direct supply source to the customer, and such contaminants entering the well could then be pumped out and discharged directly into the distribution system. Therefore, essential to any wellhead protection program are proper well design, construction, and site grading to prevent intrusion of contaminants into the well from surface sources.

Furthermore, since wells can be a direct conduit to the aquifer, they must be properly destroyed and abandoned or they will provide an unimpaired route for pollutants to enter the groundwater, particularly if pumping equipment is removed from the well and the casing is left uncapped. Well Abandonment is discussed in Section 6.1.

In the past, wells were commonly contaminated from chemigation systems that allowed the chemicals to flow back into the pump column. This potential contamination can be reduced by installing a check valve on all piping systems that include a chemigation system.

Wellhead Protection Policy

Any wells constructed by the District will be designed and constructed in accordance with DWR Bulletins 74-81 and 74-90 and Tulare County standards. In addition, the District will encourage landowners to follow the same standards for privately owned wells. The DWR bulletins and County standards provide specifications for the following:

- Methods for sealing the well from intrusion of surface contaminants.
- Covering or protecting the boring at the end of each day from potential pollution sources or vandalism.
- Site grading to assure drainage is away from the well head.
- Set-back requirements from known pollution sources.

Wellhead Protection Area

As defined in the Federal Safe Drinking Water Act Amendments of 1986, a wellhead protection area is “the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field.” The WHPA may also be the recharge area that provides the water to a well or well field. Unlike surface

watersheds that can be easily determined from topography, WHPAs can vary in size and shape depending on geology, pumping rates, and well construction. Private agricultural wells are randomly and fairly closely spaced throughout the District. The District encourages growers to treat land within 200 feet of any well as a wellhead protection area.

Existing Activities
None

Planned Actions
- Provide wellhead protection on all newly constructed TID wells according to County and State standards.
- Through landowner education efforts (newsletters, website, meetings, etc.) encourage local growers to incorporate proper wellhead protection into all new wells, and retrofit old wells with proper wellhead protection.

6.3 - Saline Water Intrusion

Salt accumulation in surface water and groundwater in the Central Valley is a natural process inherent to lands with semi-arid to arid climates, enclosed basins, or reduced or impeded drainage. Salt accumulation in surface water and groundwater can impact and eventually eliminate most beneficial uses. Salt accumulation can be exacerbated by a wide variety of human activities including irrigation, importation of surface water, application of fertilizer (including manure and biosolids) and pesticides, land disposal of wastes including those from food processing facilities, wineries, municipal wastewater treatment plants, discharge of urban storm water runoff, and use of recycled wastewater. Groundwater inflow of saline water is also a problem in some regions of the Central Valley.

Currently, there are no known saline groundwater problems in TID. The District will review available water quality data on a periodic basis. Should saline intrusion become a problem in the future, a GMP amendment will be prepared to address the issue. Currently, the District strives to prevent the importation of saline surface waters that could ultimately degrade the groundwater. When alternative water sources are available for importation, the District considers not only the cost but also the quality, including salinity, of the water. The District will evaluate all possible alternatives, and, when practical and feasible, select water sources with low levels of salinity that will not substantially degrade their soils or groundwater.

Existing Activities
- Review available water quality data to identify areas with the potential for saline water intrusion.

Planned Actions

- Map and track the progression of any saline water bodies in the District which may be identified in the future.

6.4 - Migration of Contaminated Groundwater

Groundwater contamination can be human induced or caused by naturally occurring processes and chemicals. Human induced sources of groundwater contamination can include irrigation, confined animal facilities, improper application of agricultural chemicals, septic tanks, industrial sources, storm water runoff, and disposal sites.

The groundwater quality in TID has been good for agricultural irrigation. However, there are areas of concern in TID and in neighboring agencies. These areas include dairies, milk processing plants, Medford Field Airport, and the City of Tulare Wastewater Treatment Plant. The District will continue to review groundwater quality data from other sources and remain cognizant of the possibility of contaminated groundwater migration into TID. However, the management and remediation of contaminant plumes generally falls under the responsibility of other agencies such as the Tulare County Environmental Health Department, California Regional Water Quality Control Board, California Environmental Protection Agency and the U.S. Environmental Protection Agency. The degree to which each agency participates depends on the nature and magnitude of the problem.

Existing Activities

- Regularly review data and reports from regulatory agencies on contaminant plumes to provide warning of potential future problems.

Planned Actions

- Seek to locate recharge basins next to areas with water quality problems to blend water supplies and create a hydraulic barrier to impede movement of contaminant plumes.
- Collect and consolidate maps from other agencies identifying the contaminant plumes in the District.
- If necessary, alter groundwater pumping patterns to change the hydraulic gradient and reduce contaminant migration, or reduce the pumping of contaminated groundwater.

6.5 - Groundwater Quality Protection

The District's surface water supplies cannot fully support the crop demand within the District, and therefore some groundwater will always be necessary. The groundwater, however, will have limited or no use if it has poor quality. Therefore, protecting the quality of the groundwater is a cardinal component of this GMP. Groundwater quality can be protected through proper use of pesticides, herbicides

and fertilizers, storm water quality management, septic system management, and water vulnerability planning and management. Some of these tasks are the responsibility of cities and communities, but TID will support their efforts whenever possible.

Existing Activities

- Cooperate with water quality monitoring as a member of the Southern San Joaquin Valley Water Quality Coalition.
- Discussions with the County of Tulare on water quality issues that are identified by the County within the District or in the area.
- Review of information made public by the County of Tulare Water Commission.
- Educate growers on the proper use of pesticides, herbicides and fertilizers in the District newsletter.

Planned Actions

- Seek funding to improve security at TID water facilities (i.e. wells, recharge basins, etc.) and reduce the potential for contamination from acts of vandalism or terrorism.
- Follow State and Tulare County well construction standards for wellhead protection to protect groundwater quality.

7 - GROUNDWATER SUSTAINABILITY

On average, groundwater comprises about 25-50% of the water used in TID, but can comprise up to 100% of water supplies in an extreme drought. During years with low surface water allocations, groundwater is essential to prevent the loss of permanent crops and agricultural businesses. Groundwater is the most dependable water supply for the District's growers and the local domestic water users. Therefore, preserving the sustainability of groundwater is essential for the economic well being of the District and its growers.

A decline in groundwater levels reduces groundwater reserves, increases pumping lifts, and could require deepening or abandonment of wells. Therefore, maintaining stable groundwater levels is a high priority for TID.

7.1 - Issues Impacting Groundwater Sustainability

Issues of concern for groundwater sustainability in TID are discussed below:

San Joaquin River Settlement. Friant Division CVP supplies have been recently curtailed due to the Settlement Agreement of Natural Resources Defense Council v. Rodgers on the San Joaquin River. Based on the Agreement, Friant Division water contractors will be impacted by about 200,000 AF per year. One estimate shows that deliveries to TID would be reduced by an average of 1,800 AF/year of Class I water and 12,600 AF/year of Class II water and 4,300 AF/year of surplus water on the system (Section 215). However, total losses could be as high as 32,000 AF/year in some years. This would represent about 20% of the District's average surface water supplies. Interim releases to the river began in 2009, with full restoration flows potentially beginning in 2014. TID has a goal of fully recovering the lost contract supplies, primarily through conservation and groundwater conjunctive-use recharge projects, as well as Water Management Goal provisions as called for in the Settlement.

Surface Storage. Millerton Lake provides the primary surface storage element for the Friant Unit of the CVP. The District is capable of storing some of its allocated CVP entitlement behind Friant Dam at Millerton Lake, but this storage is subject to the flood operations criteria of the facility and the management of USBR, and TID can only store water for a limited period. In addition, Millerton Lake lacks sufficient carry-over storage capacity to balance the wet and dry year needs for conservation storage. Similarly, Lake Kaweah, which stores Kaweah River water behind Terminus Dam, has similar limitations and could benefit from expanded storage.

Delta Pumping Restrictions. Due to problems with the California Delta smelt, there have been incremental reductions over time in export pumping allowed from the Delta, which is affecting numerous water users throughout the San Joaquin Valley. Cross

Valley Canal water users in the area of TID may be impacted. This loss of surface water is being offset in part by increased groundwater pumping from the common groundwater basin. The first priority for Delta exports is to meet the demands of the lower San Joaquin River Exchange Contractors (EC). These entities receive Delta export supplies in trade for their river water right supplies to be dedicated to the Friant system as delivered from Millerton Lake. Should the Delta exchange supply be limited, USBR will likely call on Millerton water to meet the EC demands. This has never happened in the 60 plus years of Friant operations; however, with the Delta export constraints that currently in place, there is a chance that the Friant contractors could loose some of their imported supplies, which will result in further adverse impacts to groundwater conditions as the lost surface supply will likely be offset by increased pumping.

Drought and Groundwater Level Declines. Depths to groundwater within the District have continued to increase over the last several years. Not being deep enough to reach lowered water levels, many local wells have gone dry over the last two years. With another year or more of drought, more wells can be expected to go dry in the future. Additional conservation and groundwater recharge projects are essential to maintain the District's groundwater resources so that they are as reliable as possible during times of drought and reduced surface water availability.

Cropping Patterns. In recent years, the District has experienced a significant shift in cropped acreage. Plantings are more often double cropped than in the past so the general understanding is that the average annual agricultural demand within the District has been increasing.

Population Growth. The San Joaquin Valley is one of the fastest growing regions in California. Although TID primarily provides agricultural water, significant population growth will increase water demands and tensions over limited water supplies in the region.

System Optimization Review Study. To address water supply sustainability, in 2009 TID sought funding to perform a System Optimization Review study. Funding was awarded by the USBR in August 2009. The SOR Study will evaluate: (1) the District's historic surface diversion versus the District's currently-available supplies, (2) the existing capacity of the District's surface water source diversion and end user delivery system, (3) the District's historic and current agricultural demands, (4) the estimated amount of agricultural and municipal groundwater pumped versus the estimated safe yield, (5) potential groundwater recharge or banking projects near the District's delivery system and (6) new projects or programs to address specific limiting issues identified through the SOR through preliminary design, estimated yield and project cost estimates. The SOR will also develop a strategic plan to address the pressing issues the District

faces of the next several years. The overall goal of the SOR is to address the aforementioned issues regarding water supply sustainability in TID, and develop a plan and vision for the future to address these problems.

7.2 - Overdraft Mitigation

Groundwater overdraft has been a concern since the early 1900's, and was one of the reasons the District sought a CVP contract for surface water. The District's groundwater levels are sensitive to drought conditions and significant declines have been observed during prolonged droughts. Moreover, the District is concerned that reductions in surface water supplies as a result of the San Joaquin River Restoration plan may lead to greater groundwater overdraft.

Groundwater recharge can help reduce overdraft and is discussed in Section 7.3. The following groundwater management practices and policies are also followed to help reduce groundwater overdraft:

Limitations on Pumping

The California Water Code gives local agencies with an adopted GMP the power to limit or suspend groundwater extractions. However, such limits can only be implemented if the District determines through study and investigation that groundwater replenishment programs, or other alternative sources of water supply, have proved insufficient or infeasible to lessen impacts to groundwater. In the unlikely event that it becomes necessary to reduce groundwater extractions, the District intends to accomplish such reductions under a voluntary program, which would include suitable incentives to compensate users for reducing their groundwater pumping. Generally, only as a last resort will the District restrict or interfere with any landowner or water user exercising a valid property right to pump and utilize groundwater.

Limitations on the Exportation of Water Supplies

The District generally does not support groundwater pumping for export out of the District unless it involves a transfer or exchange of water that will not reduce the total water supply available to the District. In addition, the District usually opposes surface water transfers that are accompanied with increased groundwater pumping used to replace the transferred surface water. Exceptions could apply to growers that own land on both the TID border and just outside of the border, since they will be using the groundwater in the vicinity of TID and in the same groundwater basin. Other groundwater exports will be reviewed on a case-by-case basis and will be permitted if they are approved by the Board of Directors. Under some circumstances, an exchange involving a net loss in water may be considered. This could occur, for instance, if TID exchanges poor quality water for good quality water, or if TID exchanges floodwater for dry year water.

The KSJRA has also adopted a policy that forbids the exportation of groundwater that results in a net loss to KSJRA's total water supplies. The KSJRA Board of Directors has the authority to institute any measures proposed to prevent such net loss in the furtherance of this policy.

Water Transfers

Under certain conditions (for example, during wet years), the District has facilities that transfer/convey surface water to other San Joaquin Valley areas. Conversely, the District has been the recipient of wet-year water from neighboring areas. Water exchanges, in various forms, are also a part of the District's conjunctive use portfolio. Groundwater benefits can accrue to the District through such arrangements.

In critically-dry years, the District has had insufficient surface water supplies available to make efficient delivery thereof for irrigation because of excessive seepage losses. Arrangements have been made in recent critically-dry years, through exchange agreements, to deliver this water to other agencies (primarily other Friant contractors) for their immediate use. In exchange, the District may be paid back in additional water, generally during "normal" years, historically at ratios of up to four to one, i.e., the District receives four acre-feet for every acre-foot so exchanged. The District may also be paid back monetarily, an such additional funds are placed in a groundwater replenishment reserve funds and are later used to purchase water in wet years at a reduced cost. These transfers benefit both parties and in particular provide significant volumes of water, either directly or indirectly, for direct or in-lieu recharge within TID.

Economic Inducements

The District recognizes that management of water supplies should reflect water conservation and the protection of groundwater resources. The District currently provides an indirect economic inducement by establishing water rates high enough to promote water conservation yet low enough to compete with groundwater pumping costs. This pricing system encourages the use of surface water to meet irrigation demands when available, thereby preserving the underlying groundwater resource.

In addition, the Code provides those agencies with an adopted GMP the ability to tax or otherwise place fees or assessments to cover the cost of groundwater management activities or for groundwater extractions. However, such taxing ability cannot be imposed unless brought to a landowner vote. Like extraction restrictions, this step is to be considered only as a last resort in the overall management of groundwater in the District.

Existing Activities

- Restrict groundwater exports from the District.

- Set surface water sale rates to remain competitive with groundwater pumping costs.
- Continued development of the McKay Point Reservoir Project to provide off-stream storage for surplus river system water to provide the District with additional in-lieu recharge capabilities.

Planned Actions

- Develop a water marketing plan to sell surplus waters to other water agencies and entities within the same groundwater basin. The program will outline the basis for evaluating the effectiveness of the District's existing water marketing commitments in light of other available opportunities.
- Periodically, such as every 5 years, perform a hydrologic balance to estimate the amount of groundwater overdraft, if any.
- Evaluate annual groundwater contour maps for evidence of pumping well interference from neighboring agencies.
- Establish groundwater banking goals (total storage capacity and annual recovery capacity) as part of a Systems Optimization Review (SOR) study.
- Distribute awarded Drought Relief grant funds from USBR to growers within the District for groundwater well projects.

7.3 - Groundwater Replenishment

Replenishment of groundwater underlying the District occurs both naturally and through deliberate, controlled means (artificial). The various forms of groundwater replenishment in TID are discussed below:

Groundwater Inflow to District Area. In general, a characteristic regional northeast to southwest pattern of groundwater flow occurred during the 1980's and 1990's. Areas of pumpage depressions are persistently present north of Corcoran, west of Visalia, and northwest of Exeter. Groundwater also flows into TID from the Tule River area into the southern portion of TID. Fugro (2007) estimated groundwater inflow and outflow in Hydrologic Unit No. 5 to average 22,200 AF/year and 16,200 AF/year, respectively, during the period 1981 through 1999. This equates to a net groundwater inflow of 22,200 – 16,200 = 6,000 AF/year.

Deep percolation from precipitation. The WRI Report (Fugro, 2007) estimates that deep percolation from precipitation in TID averages about 20,600 AF/year (0.3 feet/acre).

Artificial recharge. The District operates 11 groundwater recharge basins located throughout the District. These basins are show on **Attachment 7** and listed in **Table 7.1** below.

Table 7.1 - Groundwater Recharge Basins

Basin Name	T, R and Sec	Area (acres)
Abercrombie	20 24 23	20
Anderson	20 23 6	167
Creamline	19 25 20	153
Doris	21 23 6	21
Enterprise	19 24 29	20
Guinn	19 23 30	162
Tagus	19 24 15	120
Watte	20 23 34	19
KDWCD #3	19 23 22	155
KDWCD #6	19 23 35	155
KDWCD #8	20 23 10	118
	Total	1,110

The WRI Report (2007) estimated recharge basin deliveries in TID to range from 0 to 141,000 AF/year, with an average of 30,000 AF/year. TID also has an agreement to allow KDWCD to recharge water in these basins when they are not being used by TID.

The individual recharge capacities in each basin are currently unknown. The District is in the process of implementing a program to measure inflows and infiltration rates to determine the rates of recharge.

Groundwater banking. TID does not currently operate groundwater banks in their service area. Although the purpose of groundwater banks is to store and later recover water, groundwater banking can result in some long-term groundwater replenishment. Water that is recovered from groundwater banks serves as in-lieu groundwater recharge, by providing a dry-year water supply that would normally be obtained from groundwater. Also, groundwater banking agreements often require that a portion of the banked water, e.g. 10%, be left in the aquifer as a payment to the banking agency (i.e. TID) to account for unavoidable losses and groundwater migration. In addition, often some water that is banked is for various reasons never recovered.

The City of Tulare and the District jointly developed a “City Groundwater Augmentation Program” in early 2006. This program was developed through the understanding that the City of Tulare depends on groundwater resources for all its municipal supplies and wanted to assist the District to bring as much surplus surface water into the area as possible. The mutual goal in this endeavor is to make the shared groundwater resources as reliable as possible. Generally the program sets up an arrangement for the

City to fund surplus water procurement by the District that is conveyed to recharge facilities in areas beneficial to the City's groundwater recovery wells.

In an outgrowth of the joint program, the District and the City of Tulare entered into an agreement in 2007 providing for the joint purchase of property known as the "Plum Property," for the purpose of developing such property for groundwater, recharge and surface water regulation. This purchase agreement between the two entities establishes joint rights in the Plum Property and the mutual intent to develop the property into a water recharge/regulation facility. After execution of the agreement the property was successfully purchased. The 154 acre project will include three basins and associated control structures. The project will allow for a long-term average recharge of about 3,700 AF/year.

In May 2008 the City of Tulare and TID signed an agreement regarding the delivery of water to groundwater banking facilities (**Appendix D**). In this agreement the parties determined where recharge would occur under their on-going program, to continue the joint operations committee which evaluates projects of mutual benefit, and evaluate the development of additional groundwater recharge facilities. The agreement also provides guidelines for determining the average annual quantity of water delivered by TID to the City. This quantity was initially 10,000 AF/year, but will vary depending on the area of the City, City groundwater pumping, and the cost of imported surplus water supplies available to the District. The delivery of TID water to City basins will directly benefit City wells, and indirectly benefit TID by reducing stress on the local groundwater supply.

In-lieu deliveries. The District views in-lieu deliveries as a practical and effective means of groundwater replenishment. In-lieu deliveries, also called indirect deliveries, involve the delivery of surface water to landowners and water users who would otherwise have pumped groundwater, thus leaving water in the aquifer for future use. With the diversion of around 100,000 AF of surface water annually which is sold to District water users (CH2MHill, 2000), TID is performing a significant amount of in-lieu recharge.

TID plays a significant role in importing water and providing in-lieu deliveries in the area, primarily because TID has extensive water rights that they attempt to fully utilize each year. In comparison, other districts in the area have less surface water rights, and must rely more on groundwater to meet their irrigation water needs.

Streambed infiltration. Three creeks flow into TID, namely Cameron Creek, Packwood Creek and Deep Creek. These creeks operate more as irrigation conveyance facilities than natural creeks and have, in certain reaches, each been modified and realigned over the years. Little to no seepage from natural creek flow

occurs. There is some seepage from storm water inflows which are directed under agreements into such creeks. Seepage from irrigation flows is discussed below under 'Seepage from distribution facilities'.

Deep percolation from irrigation. Deep percolation occurs when some of the water applied for irrigation percolates beyond the crop root zone and accumulates in the aquifer. The extent of deep percolation varies with the irrigation method, irrigation efficiency, and antecedent moisture condition. The WRI Report (2007) estimated that deep percolation from irrigation in TID averages 44,400 AF/year.

Seepage from distribution facilities. Collectively, the District owns and operates approximately 300 miles of earthen canal and approximately 30 miles of pipeline. The unlined canals cover approximately 450 acres. The average transport loss through the District's system is estimated to be 60,000 to 70,000 AF per year. This is a large percentage of the District's average available surface water supply; however, this "loss" provides recharge to the common underground basin supply both up-gradient of and within the District, from which TID water users later pump for on-farm irrigation. This loss averages about 40 percent of total diversions and consists of a 10 percent loss largely in the unlined canals and ditches providing service to TID water users. The District has worked with regional partners to be financially reimbursed in part for these losses as they are considered significant groundwater recharge through the region.

Existing Activities

- Groundwater recharge in eleven existing recharge basins.
- Construction of new multi-purpose basin behind the new TID office location.
- Construction of a new multi-purpose basin at Mooney's Grove in cooperation with Tulare County.
- Feasibility evaluation of a potential groundwater banking project with several other Kaweah River districts at Rancho de Kaweah.
- Allow KDWCD to use TID recharge facilities when they are available.
- Measure the volume of water delivered to groundwater recharge basins.
- Periodically remove sediment and rip the soils in recharge basins to maintain infiltration rates.
- Maintain existing unlined canals in an unlined condition in those locations where it is determined that canal seepage is a significant source of recharge and does not create detrimental side effects.
- Regular meetings with the City of Tulare regarding the City Groundwater Augmentation Program, the joint Plum Basin project, and other on-going cooperative efforts.
- Discussions with the City of Visalia on scenarios where recharge can be facilitated in the local creeks in above average water years.

- Evaluate potential arrangements and projects with existing and potential partners to cooperatively improve groundwater recharge within the District.
- Continue practice of acknowledging seepage through Main Intake Canal as a benefit to the regional area in return for financial reimbursement from KDWCD.
- Apply for grants or participate in grant applications in conjunction with partners to construct new groundwater monitoring wells within the District and the surrounding area.
- Apply for grants or participate in grant applications with partners to improve the operation of groundwater recharge basins or the development of new basins.
- Work with regional partners (both Kaweah River water rights holders and Friant Unit CVP) to acquire available excess surface waters to recharge within the District boundaries when recharge capacity in the District's basins is available.

Planned Actions

- Procure lands for more groundwater recharge basins when property is available and is affordable to the District at market value.
- Investigate the feasibility of constructing additional recharge basin capacity on the western end of the District.
- Monitor the rates of infiltration in basins, natural channels and ditches, and, when feasible use the facility that offers the greatest recharge rate in order to maximize recharge potential.
- Produce a Five Year Strategic Plan for TID that addresses water policy, surface water supply, groundwater resources, groundwater banking, water exchanges, District staffing, and establishes short-term and long-term water management goals.
- Evaluate potential groundwater banking opportunities for the District and for others to improve groundwater conditions within the District.
- Work cooperatively to minimize development on lands that are favorable for artificial recharge.
- Develop and maintain an inventory of sites in the District that are suitable for recharge.
- Estimate the infiltration rate in each basin by monitoring inflows, outflows and water levels.

7.4 - Conjunctive Use of Water Resources

Conjunctive use of water is defined as the coordinated use of both subsurface and surface water sources so that the combination will result in optimum water supplies. Groundwater management in California is rooted in the conjunctive use of surface and groundwater resources. In this regard, the District has two primary sources of surface water supply; local Kaweah River water through water right holdings and imported CVP water (originating in Millerton Lake on the San Joaquin River) under a long-term contract with the USBR. Also, the District has short-term and year-to-year

arrangements to secure additional CVP and Kaweah River supplies. Kaweah River waters and groundwater have been conjunctively utilized within the District since the early 1900s. In 1950, the District integrated CVP water into its conjunctive use operations. Necessarily, the District operates an extensive system of conveyance, distribution and recharge facilities throughout its service area to make use of the surface supplies as available.

The District's conjunctive use program includes surface water delivery in lieu of groundwater pumping, groundwater recharge, and, when practical, transfers to neighboring areas sharing a common groundwater supply. These are discussed below:

Surface Water Deliveries. The District delivers surface water to District growers through an extensive distribution system. The surface water is a form of in-lieu groundwater recharge, since it reduces the volume of groundwater pumped. TID strives to keep surface water rates low enough that growers choose to fully utilize surface water supplies before resorting to groundwater. Historically, TID has provided, on average, 50% of its surface water directly to District growers.

Groundwater Recharge. TID performs direct groundwater recharge in eleven recharge basins, and through seepage in earthen canals that are left unlined because of their recharge benefit. The amount of recharge varies each year with the availability of water. Having significant recharge capacity is important so that large volumes of water can be captured in wet years to recharge and later extracted by water users in dry years. Refer to Section 7.3 for more details on the Districts recharge facilities. TID desires to construct more recharge facilities and potentially some groundwater banking facilities in the future.

Water Transfers to Agencies within the Same Groundwater Basin. TID sometimes ends up with small amounts of water that cannot be beneficially delivered to growers given the seepage losses in the long delivery system to the District. Also in very wet years the District will have supplies in excess of agricultural demand within the District and available storage behind local reservoirs. With these water supplies TID regularly performs water transfers and exchanges with other water agencies. TID strives to keep any exported or excess water in their region so it benefits the local groundwater supply and groundwater migration out of the District. TID also selects local exchange partners because it can benefit the local economy. The priority of water transfer partners include: 1) neighboring agencies; 2) agencies in the same groundwater sub-basin, 3) agencies within Friant Unit service area; and 4) agencies in the Central Valley.

Existing Activities

- Support and facilitate the delivery of imported water supplies to neighboring agencies for the purposes of reducing groundwater migration out of the District.

- Work with all appropriate public agencies, private organizations, and individuals within and outside of the Plan area to protect existing surface water rights and supplies.
- Participation in Friant Water Authority water supply and managers meetings to facilitate the cooperative operation and efficient use of available resources within the Friant Unit CVP system.
- Participation in KDWCD water supply and board of directors meetings and KSJRA meetings to facilitate the cooperative operation and efficient use of available resources on the Kaweah and St. Johns rivers system.
- Explore additional partnerships with other districts and water supply entities to optimize the collective water assets of each for basin-wide benefits.
- Maintenance and operation of approximately 300 miles of earthen channel to deliver water throughout the District to sustain TID's ability to divert large quantities of water when available, particularly on short notice.

Planned Actions

- Support the development of new surface storage and other water supply projects that would permit the participants to better utilize surface water supplies.
- Investigate additional groundwater banking projects and facilities.
- Investigate additional groundwater recharge facilities and potential partner affiliations.

7.5 - Water Conservation and Education

The District considers water conservation and education important aspects of their overall groundwater management efforts. The District's Rules and Regulations (**Appendix E**) state the following in Rule 10: Waste of Water:

> *"Persons wasting water on roads or vacant land, or land previously irrigated, either willfully, carelessly, or on account of defective ditches or inadequately prepared land or who shall flood certain portions of the land to an unreasonable depth or amount in order to properly irrigate other portions will be refused the use of water until such conditions are remedied."*

In fact, most District growers use water in a responsible and efficient manner. Many of the District's growers conserve water through the use of highly efficient drip, micro-jet, and micro-sprinkler irrigation system technology. In addition, all water deliveries are measured and billed on a volumetric basis. Therefore, all customers have an incentive to minimize water usage. Despite all these water conservation achievements, TID still provides on-going water conservation education to its growers.

Since about 1993 the District has been submitting an annual Water Conservation Plan with associated updates to USBR in accordance with provisions of the Reclamation

Reform Act and CVP Improvement Act. This plan sets forth water efficiency targets and objectives and documents the District's progress towards their implementation. This plan has been accepted by the Agricultural Water Management Council, a DWR agency established to foster voluntary agricultural water conservation at the district level. The District is a member of the Council and participates in its meetings and workshops.

Existing Activities

- Monthly water statements include water use information for each customer. In addition, the District maintains historic water use by turnout. This data is available to water users on request as it could be beneficial in making on-farm water management decisions.
- The District participates in the KDWCD WRI Study and its updates to analyze the region's water balance and document changing conditions over time.
- The District is conducting a System Optimization Review of District operations, which will identify potential areas for water conservation.
- The District publishes a quarterly newsletter to, among other things, help educate local growers on important issues such as water conservation and water quality protection, as well as several informational articles on recently declining groundwater levels within the District.
- The District volunteers with local grade school classes making presentations on water resources and the importance of water conservation.
- The District is a member of the Association of California Water Agencies.
- The District is a member of the Agricultural Water Management Council.
- The District is positioned to administer up to $4 million in Natural Resources Conservation Service grant funding for the implementation of on-farm water use efficiency projects which should aid in reducing groundwater demands from TID growers.

Planned Actions

- Continue to educate growers on water conservation measures.
- Distribution of awarded Agricultural Water Enhancement Program grant funds from NRCS for on-farm water conservation projects within the District.

7.6 - Water Recycling

TID has held discussions with the cities of Tulare and Visalia on using municipal wastewater effluent for crop irrigation. According to the WRI Report (Fugro, 2007), the City of Tulare generated, on average, 3,900 AF/year of wastewater return flow between 1981 and 1999. The water is currently sent to evaporation ponds. Some farmers adjacent to the ponds use a portion of the water for crop irrigation, but none is delivered directly into the TID distribution system. The water is currently treated using a secondary level treatment process. TID would like to divert the water to its distribution system, but are reluctant to unless the water has received tertiary level treatment

(disinfection) due to concerns about contaminating edible crops and due to the required permitting involved in the arrangement. TID is also exploring a proposal to take delivery of wastewater effluent from the City of Visalia, but that water is likewise treated only to a secondary level. The City of Visalia would have the opportunity to improve treatment as part of a planned treatment plant expansion and is taking steps to implement tertiary treatment as part of its operations. In exchange for receipt of such treated water, TID is considering an expansion of its conjunctive use operations into areas up gradient of the City to enhance groundwater recharge in these areas.

Existing Activities

- Discussions with the Cities of Tulare and Visalia regarding the use of wastewater effluent for irrigation in TID.
- Continued discussions with the City of Visalia regarding a potential water exchange agreement for tertiary treated waste water after the City's wastewater treatment expansion is completed.

Planned Actions

- Remain cognizant of opportunities to purchase recycled water from other local industrial facilities and municipalities.

8 - GROUNDWATER OPERATIONS

8.1 - Well Construction Policies

The District does not currently own any monitoring wells, but has recently acquired two irrigation wells on the jointly-owned Plum Basin property which are not connected to the District's conveyance system. The District may construct monitoring wells in the near future as part of a phased implementation of a dedicated groundwater monitoring well/piezometer network..

Proper well construction is important to ensure reliability, longevity, and protection of groundwater resources from contamination. DWR Bulletins 74-81 and 74-90 provide useful guidelines for the construction of groundwater wells. Proper wellhead protection is essential to ensure that contaminants do not inadvertently enter a well. Well construction policies that are intended to ensure proper wellhead protection are discussed in Section 6.2 – Wellhead Protection.

In addition, the District will follow the quality assurance procedures listed below when contracting for the construction of new District wells. Landowners are also encouraged to follow these procedures when constructing private wells:

1. Well construction will be performed under contract by a licensed and experienced well driller, in accordance with specifications prepared by a licensed engineer or geologist, and reviewed by legal counsel.
2. A licensed engineer or geologist will oversee construction of the wells.
3. A licensed land surveyor in the State of California will oversee a survey of any newly constructed wells to determine locations for mapping and groundwater depth purposes.

Existing Activities

- Educate landowners on the existing Tulare County well ordinance and State guidelines.

Planned Actions

- Construct wells according to DWR Bulletin 74-81 and 74-90, and Tulare County standards.
- Construct wells using qualified and licensed contractors, engineers, geologists and land surveyors.

8.2 - Operation of Facilities

Groundwater facilities in TID include production wells, monitoring wells, recharge basins, and the distribution system (see **Attachment 6 and 7**). The operation of each of these is discussed below.

Production Wells. The District does not currently own any production wells, but has recently acquired two irrigation wells on the Plum Basin property which are not connected to the District's conveyance system. All other production wells in the District are currently owned by private landowners or the City of Tulare, who are responsible for constructing, operating, maintaining and abandoning the wells.

Monitoring Wells. TID does not currently own any dedicated monitoring wells. Instead, the District has historically used private agricultural wells to monitor groundwater levels. Currently, the monitoring network includes about 100 wells. Groundwater levels are monitored each spring and fall. TID may construct dedicated monitoring wells in the future to fill gaps in their network, and monitor proposed groundwater banking and recharge facilities. TID would also like to construct nested monitoring wells to measure groundwater levels in the different aquifers.

Recharge Basins. TID currently operates eleven groundwater recharge basins. The basins are for the most part owned by KDWCD; however, by agreement TID maintains them. Regular inspection and maintenance of these basins is important to ensure they function properly and maintain good recharge rates.

Distribution System. TID's distribution system is sufficiently built out to cover the entire District service area and does not appear to need any significant expansion. As a result, TID can provide surface water to all parts of the District. Most of the canals in TID are unlined and seepage from the canals recharges the groundwater. TID generally plans to leave these canals unlined. TID has an agreement with KDWCD to be compensated for the imported water that seeps in the upstream diversion channels easterly of the District, and thus TID has no plans to line these upstream diversion channels.

Existing Activities

- Maintenance of recharge facilities including de-vegetation, discing, deep ripping, and de-silting, as necessary to improve recharge potential.
- Leave earthen canals unlined so they can be used for groundwater recharge.
- Expansion of SCADA system for better management and operation of basin facilities when water is being conveyed thereto.

Planned Actions

- When practical and beneficial, develop groundwater recharge facilities as multi-functional facilities that also serve other purposes such as urban storm water runoff, environmental enhancement, aesthetics, and groundwater banking.
- Investigate partnership with local wildlife groups to see if common goals can be pursued through shared resources in efforts to develop additional recharge areas.

9 - GROUNDWATER PLANNING AND MANAGEMENT

9.1 - Land Use Planning

The intent of this Plan is not to dictate land-use planning policies, but rather to establish some land-use planning goals that can aid in protecting and preserving groundwater resources. TID does not have direct land-use planning authority. However, TID does have the opportunity to comment on environmental documents for land-use related activities and proposed developments as well as proposed Tulare County General Plans and updates. TID will attempt to work cooperatively with other agencies to minimize adverse impacts to groundwater supplies and quality as a result of proposed land-use changes. Some specific land-use planning goals include: (1) preserving areas with high groundwater recharge potential for recharge activities; (2) protecting areas sensitive to groundwater contamination; (3) requiring hydrogeologic investigations, water master plans, and proven and sustainable water supplies for all new developments; and (4) requiring appropriate mitigation for any adverse impacts that land use changes have on groundwater resources.

Existing Activities

- Notify residents and agencies of TID projects that have the potential to impact groundwater within their sphere of influence.
- When appropriate, comment on environmental documents and land-use plans that have the potential to impact groundwater.
- Provide input on City of Visalia, City of Tulare, and County of Tulare General Plans, particularly on issues that impact groundwater resources.
- Stay informed of changes to the City of Tulare's Sphere of Influence, annexations and de-annexations.

Planned Actions

None

9.2 - Numerical Groundwater Model

In 2005, utilizing a cooperative grant from the State Department of Water Resources, the KDWCD developed a groundwater model to calculate future changes in groundwater conditions that could occur based upon major influences such as changes in population growth, water supply and distribution. The model is able to calculate quantifiable changes to groundwater levels and flow conditions. This analytical tool can be applied to assess how existing and proposed groundwater management actions, changes in cultural practices, or changes in hydrologic conditions may influence groundwater sustainability. The knowledge gained from the model will be applied in the development and evaluation of new and existing programs. The expected result will be the progression of programs and policies that will efficiently use available resources to

affect the most beneficial influence to groundwater supplies.

Existing Activities

- Remain abreast of the uses of the groundwater model by local partners for planning purposes and KDWCD's efforts to periodically update the model and it's analysis of the region's groundwater.

Planned Actions

- When appropriate, use the numerical groundwater model to evaluate proposed projects and changes to current groundwater operations, and determine their net impact on groundwater conditions.

9.3 - Groundwater Reports

The District has a goal to prepare groundwater reports every year to document groundwater levels, available groundwater storage, historical trends, and other important groundwater related topics. As a supplement to such reports, TID intends to more explicitly document and disseminate its annual accomplishments in the area of conjunctive use operations and accompanying benefits to the regional groundwater supply. This information will be used to forecast future problems, plan future groundwater projects, and develop new groundwater policies. The annual report will cover the prior calendar year and will be completed each year by April 30th. See **Attachment 13** for a report outline.

Existing Activities

- TID prepares an Agricultural Water Management Plan every five years for the United States Bureau of Reclamation as a requirement to maintain their Central Valley Project water supply. The Water Management Plan focuses on surface water but includes sections on groundwater usage and groundwater projects.
- TID provides crop and groundwater level information to KDWCD for periodic evaluations of groundwater conditions and groundwater reports.
- TID prepares and provides the city of Tulare an annual report documenting its groundwater recharge operations of immediate benefit to the City groundwater supply. The report is prepared in accordance with a groundwater augmentation agreement executed by both agencies in 2008.

Planned Actions

Prepare an annual Groundwater Report that will include the following:

1. Groundwater level data.
2. Groundwater contour maps and groundwater flow directions.
3. Groundwater storage estimates.

4. Evaluation of one-year and five-year historical trends in groundwater levels, contours, and storage, and perceived reasons for any changes.
5. Estimates of deliveries to recharge basins.
6. Estimates of groundwater pumpage by private agricultural well owners based on estimated crop demand minus surface water deliveries.
7. Documentation of groundwater pumpage for municipal supply by the City of Tulare and other local mutual water companies.
8. Summary of important groundwater management actions.
9. Discussion on whether management actions are meeting the associated objectives.
10. Summary of proposed management actions for the future.
11. Summary of groundwater related actions taken by other regional groups.
12. Recommendations for changes in the content or format of the annual report.
13. Recommendations for updates to the GMP.

9.4 - Plan Implementation

Implementation of this updated GMP is expected to result in significant amounts of new knowledge and an achievable improvement in groundwater management in TID. **Attachment 14** includes an implementation schedule for this GMP from 2010-2016. The schedule does not include existing activities that will be continued. TID will maintain all existing programs unless stated otherwise in this GMP. In addition, the schedule does not include proposed actions that are new policies or guidelines, which will be implemented on a continuous basis. Rather, the schedule only includes new tasks and projects.

9.5 - Plan Re-evaluation

The GAC will be responsible for monitoring the progress in implementing the GMP objectives. Refer to Section 4.1 for more information on the membership, policies, and procedures of the Committee. The Committee will attempt to meet at least once a year to review and evaluate groundwater conditions as well as evaluate the effectiveness of the GMP. As new policies, practices, and ordinances become necessary or desirable to enhance the management of the District's groundwater supply, this Plan will be amended as necessary.

Existing Activities

None

Planned Actions

- Update the GMP at least every five years through a formal public process, or more frequently if a sufficient quantity of revisions, updates and additions have been identified.

- Evaluate the effectiveness of the GMP and need for an update at the annual Groundwater Advisory Committee meetings.
- Document recommendations for improving or updating the GMP in each annual Groundwater Report.

9.6 - Dispute Resolution

Groundwater disputes will probably require input from the District General Manager, and possibly an engineering consultant and District Counsel. In resolving these disputes several factors will be considered such as a landowner's right to extract groundwater, beneficial use of water resources, and, if applicable, restrictions on export of groundwater.

Groundwater disputes in TID can fall into three general categories: 1) Landowner versus Landowner; 2) TID versus Landowner; and 3) TID versus another agency.

Landowner versus Landowner

Disputes between landowners are not the responsibility of TID, however, when asked to, TID may choose to help resolve disputes as an impartial mediator. Such efforts are intended to maintain amicable relationships among landowners, educate landowners on groundwater management goals and policies, and avoid a court process which may lead to adjudication.

TID versus Landowner

Disputes with landowners are generally resolved using the general process outlined in the District's Rules and Regulations (**Appendix E**). These state the following under Rule 2: Ditchtenders and Other Employees:

> "*Each ditchtender shall have charge of his respective section and shall be responsible to the Superintendent. From the ditchtender's decision an appeal may be made to the Superintendent. From the Action of the Superintendent, appeal may be made to the Board of Directors*"

The District's current Rules and Regulations deal primarily with surface water; however, in furtherance of this GMP and the authorities contained therein, new rules may be promulgated which could lead to disputes related to groundwater extraction fees, pumping restrictions, and other groundwater issues involving landowners.

TID versus Another Agency

When TID faces a dispute with another agency the dispute will be resolved through the TID Board of Directors. If necessary, the District General Manager may also use legal counsel, technical staff, or technical consultants to assist in addressing any disputes.

If a dispute arises between TID and KDWCD or another district within KDWCD, then it will be handled according to the MOU between TID and KDWCD (**Appendix B**). The MOU discusses coordination of efforts, management of the overlap area, and dispute resolution procedures.

Existing Activities

- Resolve disputes through the District's general dispute resolution procedures.

Planned Actions

- Discuss issues of concern at the annual GAC meetings in an effort to prevent future disputes.

9.7 - Program Funding and Fees

Several alternatives are available to TID for funding groundwater projects, and are described below:

Water Replenishment Fees

Under AB255 and AB3030, local agencies have the authority to limit groundwater extractions and implement water replenishment fees based upon the amount of water extracted (extraction based fees must first be approved by majority vote of impacted landowners). Inherent in these powers is the authority to implement metering of private wells. These are considered measures of last resort and TID will make any and all efforts to ensure the private, non-metered use of groundwater by the local growers. However, if at some point the State were to take steps to initiate regulation or control over groundwater extractions, or if a legal adjudication of the basin pumping rights were to occur, then these fees may be unavoidable.

Capital Improvement Fees

The District has the authority to finance capital improvement projects and collect repayment charges from the benefited parties. This process would require a favorable vote from the constituency, and is considered a realistic alternative for large capital projects, such as groundwater recharge or banking projects.

Grants and Loans

The District will pursue available grants and low-interest loans from the DWR as well as other state and federal agencies like the Bureau of Reclamation. The District realizes that funding from state and federal agencies for groundwater projects will be partially based on their progress in implementing this GMP. Established programs from which grant funding has and may be sought in the future include the USBR Challenge Grant program, Part III funding from the San Joaquin River Settlement Act and the state's IRWMP program.

Other Revenue Sources

Groundwater projects can also be financed through water user fees and assessments that are collected regularly from all District landowners.

Exiting Activities

- Regularly research grant and loan opportunities from the state and federal government and apply for these opportunities when they appear advantageous to the District.
- On-going negotiations with the Bureau of Reclamation to convert its contract from a 9(e) to a 9(d) contract. This would require advance repayment of the District's remaining capital obligations. To raise this capital the District would likely sell bonds, which necessitate modifications to the existing assessments. The District would likely modify assessments by switching the facility repayment costs from water charges to land based assessments in an effort to reduce the interest rate associated with the necessary bond financing.

Planned Actions

- Identify beneficial groundwater projects that become economically feasible when costs are shared among two or more participants.
- Share information on funding opportunities with other agencies that may be potential partners in multi-agency groundwater projects.

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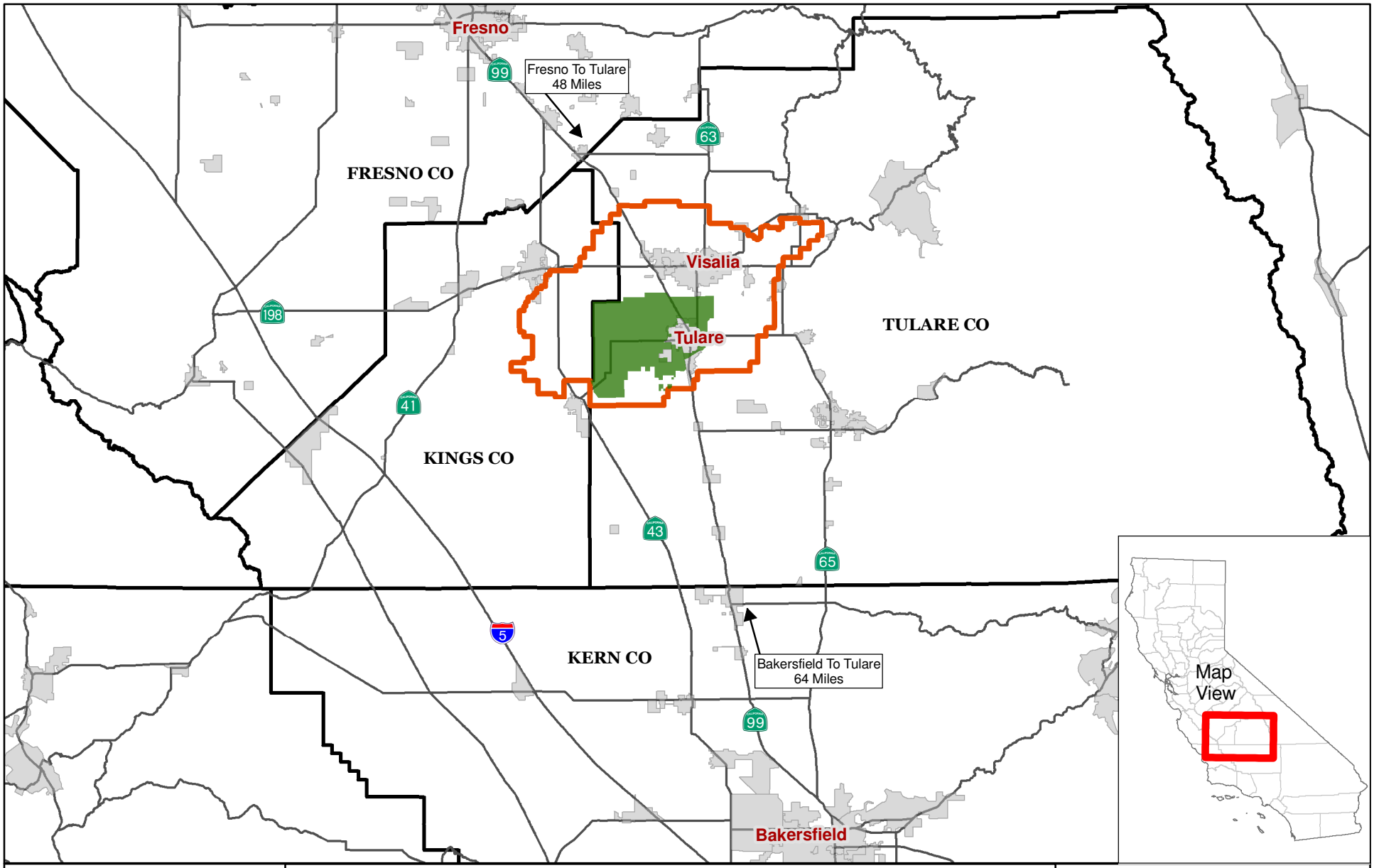

0 10 20
Miles

EST. 1968
PROVOST& PRITCHARD
CONSULTING GROUP
An Employee Owned Company

130 N. Garden Street
Visalia, CA 93291
(559) 636-5900

Legend

- Tulare ID
- Kaweah Delta WCD
- City
- County
- Major Road

Tulare Irrigation District

Attachment 1

Vicinity Map

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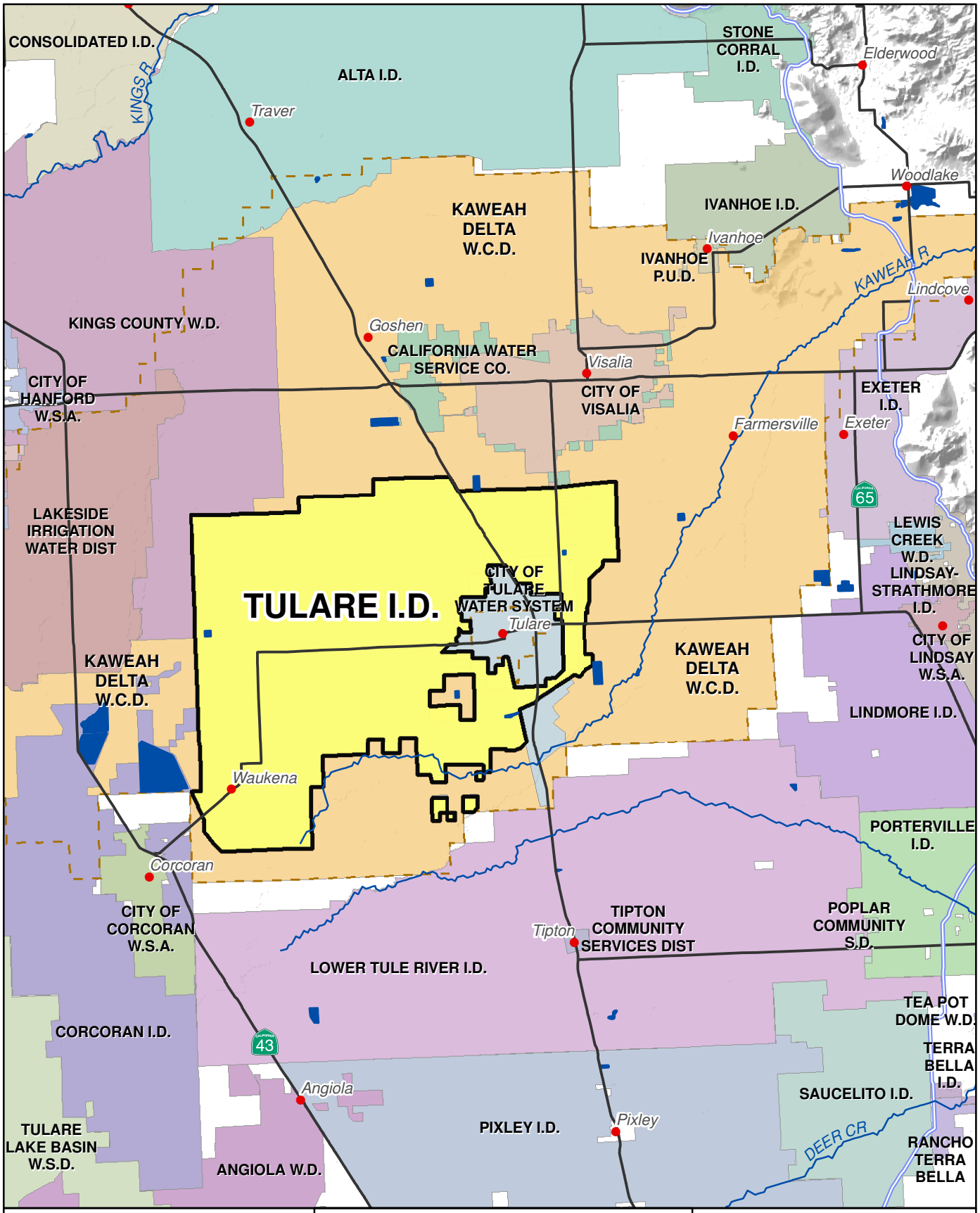

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Tulare Irrigation District

Attachment 2

Neighboring Water Agencies

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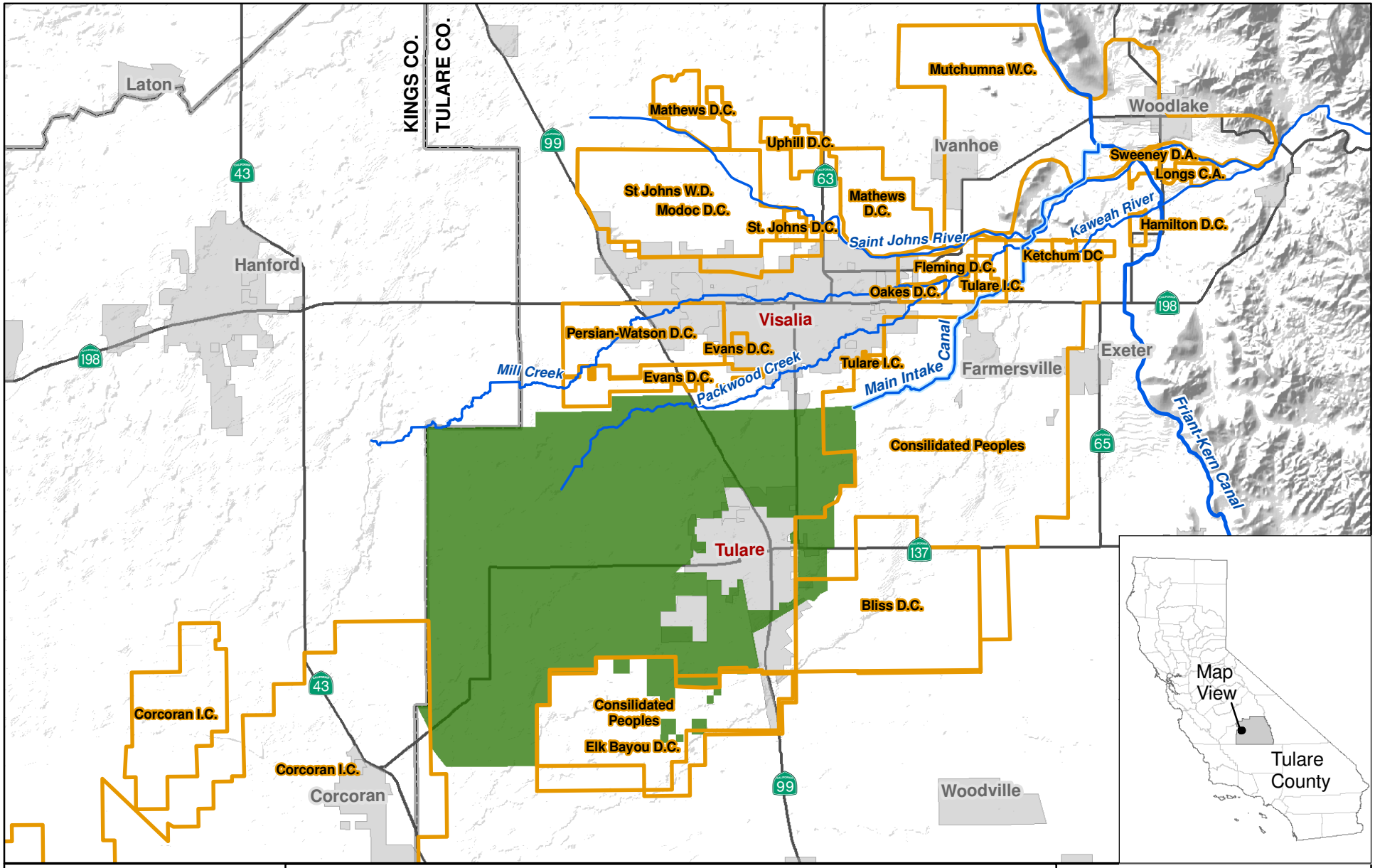

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Legend

- Tulare ID
- Main Intake Canal
- Ditch Companies
- City
- County
- Major Road

Tulare Irrigation District

Attachment 3

Neighboring Ditch and Irrigation Companies

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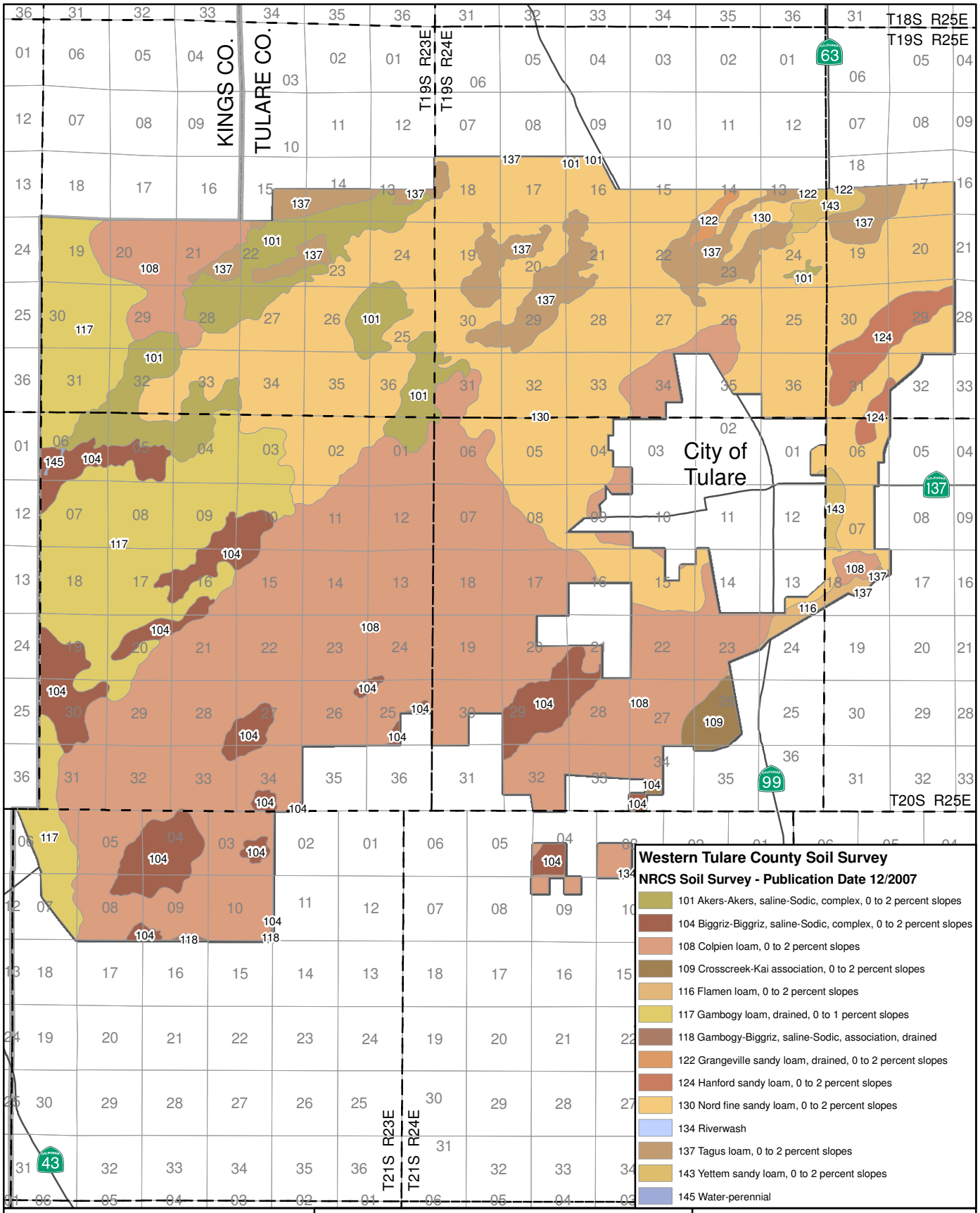

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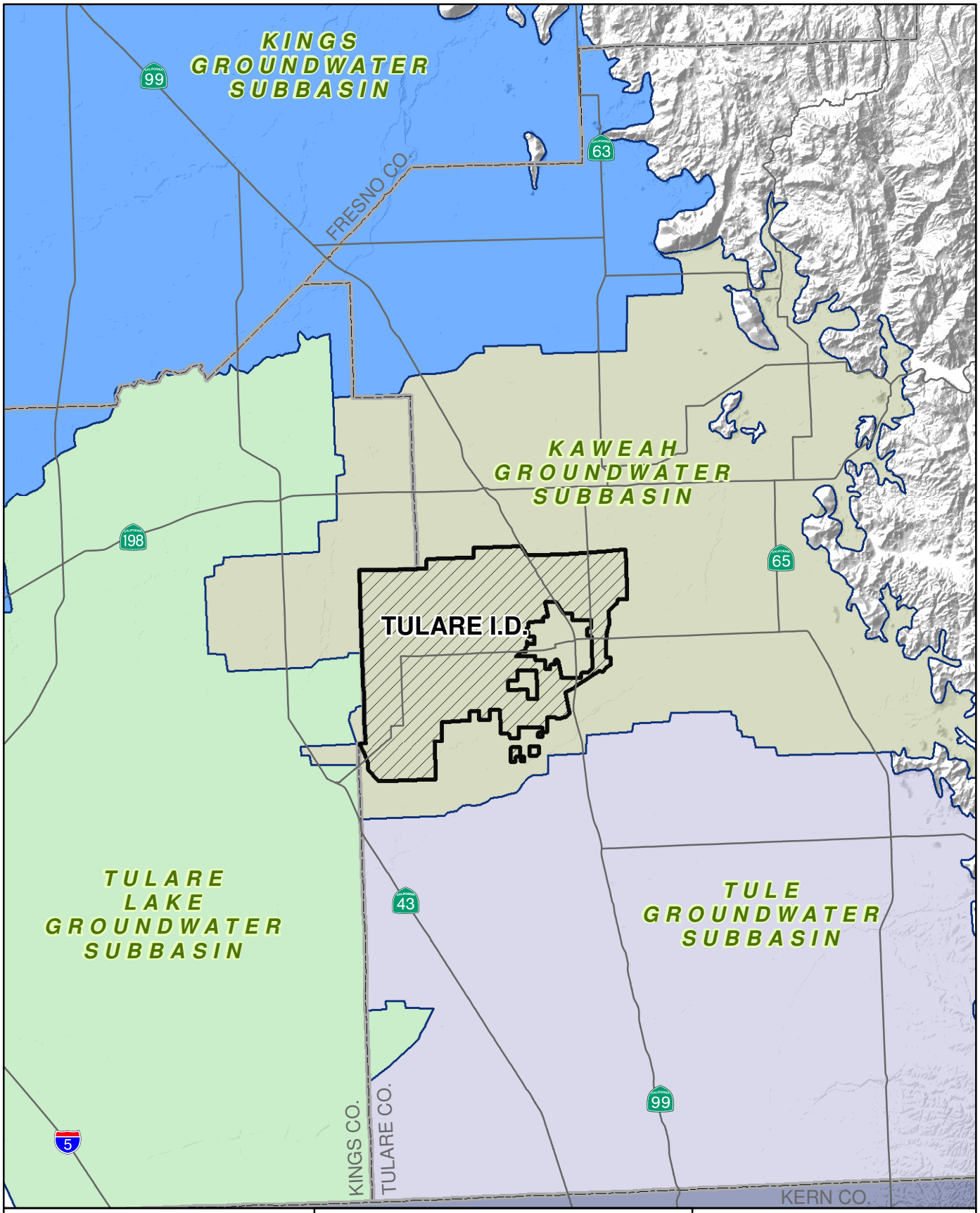
Tulare Irrigation District

Attachment 4

Soils



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Groundwater Sub Basin
DWR 118-80 (GIS Oct 2000)

- KAWEAH
- KERN COUNTY
- KINGS
- TULARE LAKE
- TULE

Tulare Irrigation District

Attachment 5

Groundwater Sub Basins

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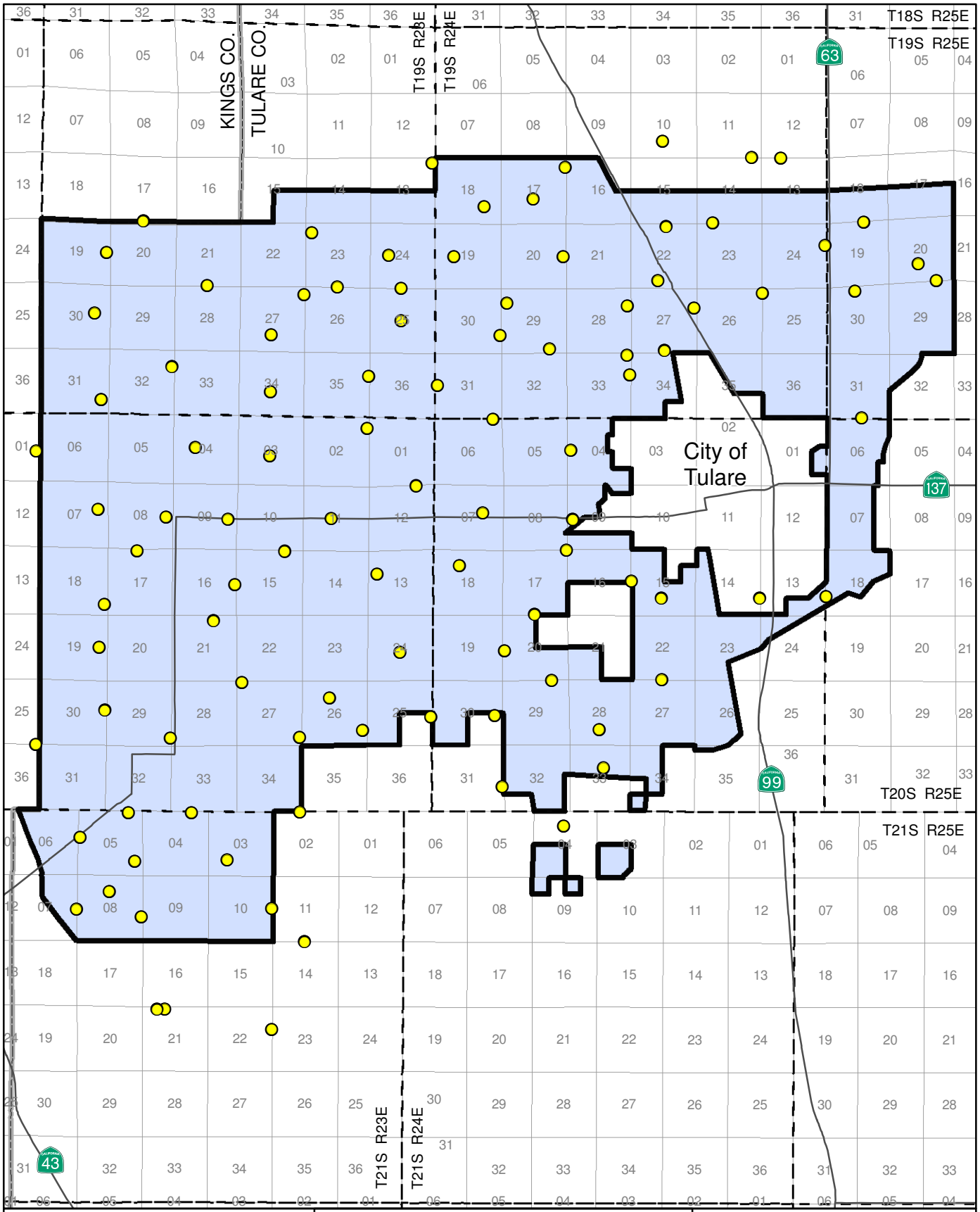

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An Employee Owned Company

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Visalia, CA 93291
(559) 636-1166

Legend

- Wells
- Tulare ID
- County
- Township / Range

Tulare Irrigation District

Attachment 6

Wells

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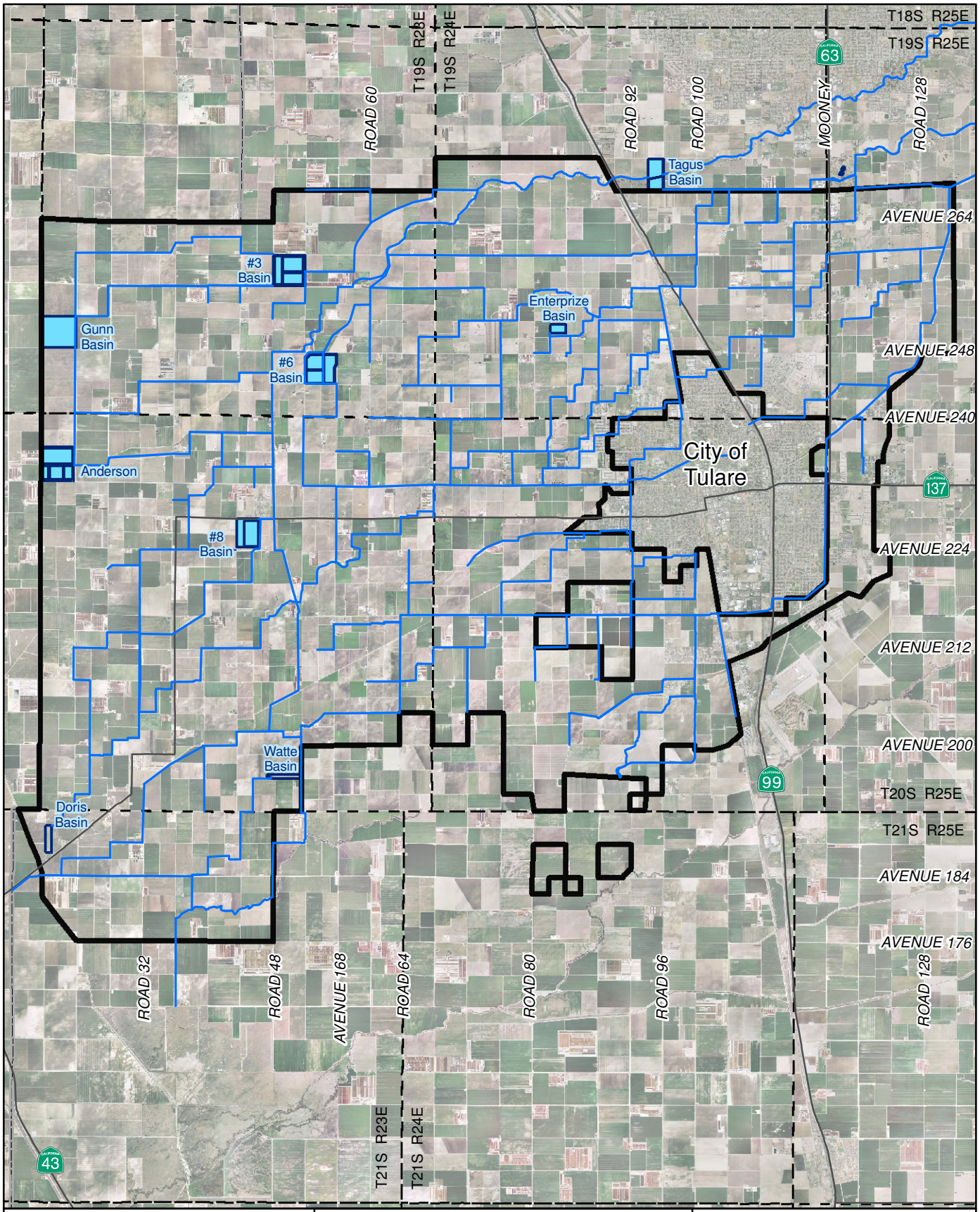

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(559) 636-1166

Legend

- Ditch / Stream
- Recharge Basin
- Tulare ID
- County
- Township / Range

Tulare Irrigation District

Attachment 7

Conveyance Facilities and Recharge Basins

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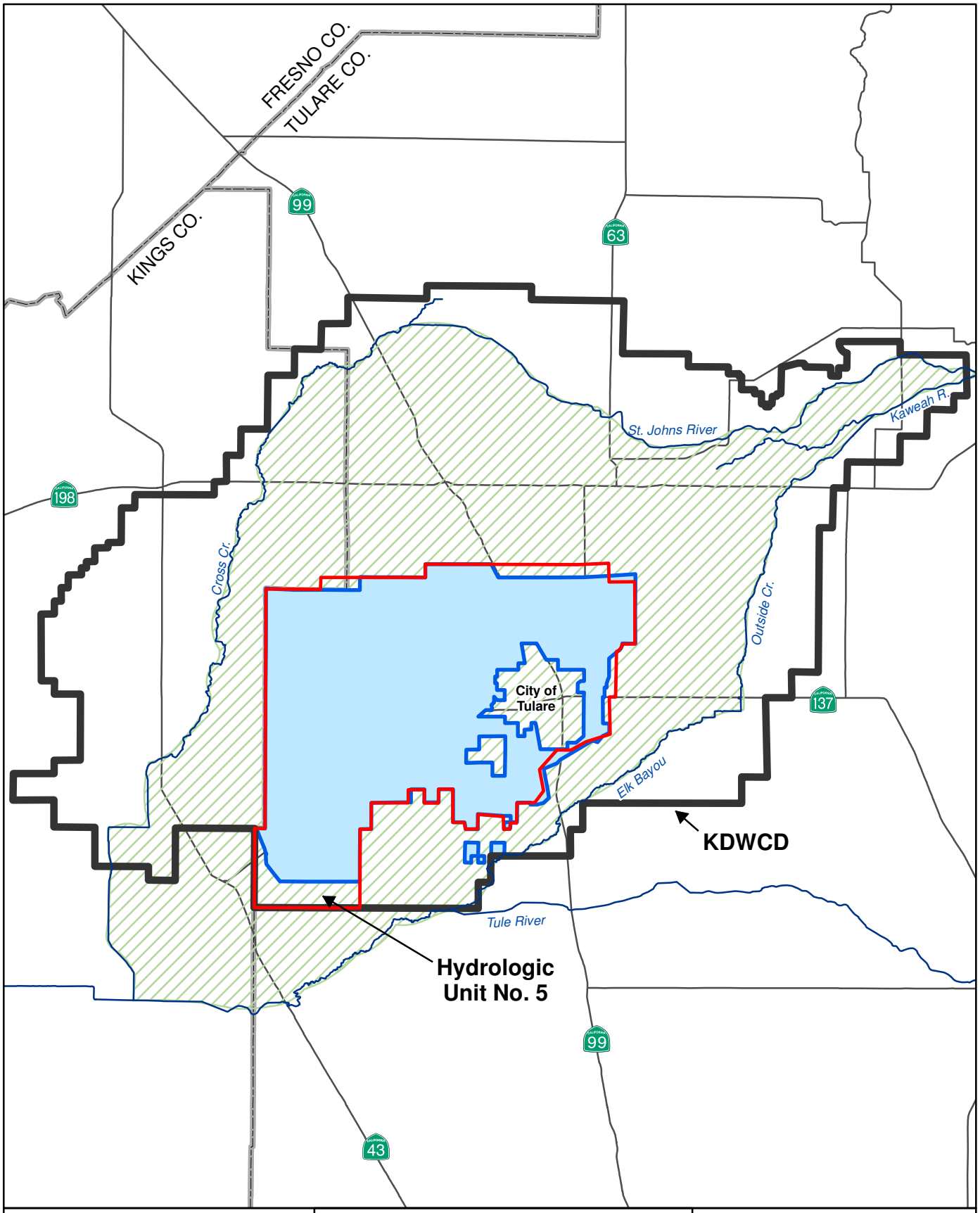

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Visalia, CA 93291
(559) 636-1166

Legend

- Tulare ID
- Kaweah Delta WCD
- County
- *Hydrologic Unit 5 (Water Resources Investigation 2007)*
- *Groundwater Management Plan Buffer Zone*

Tulare Irrigation Distrtict

Attachment 8

Water Management Boundaries

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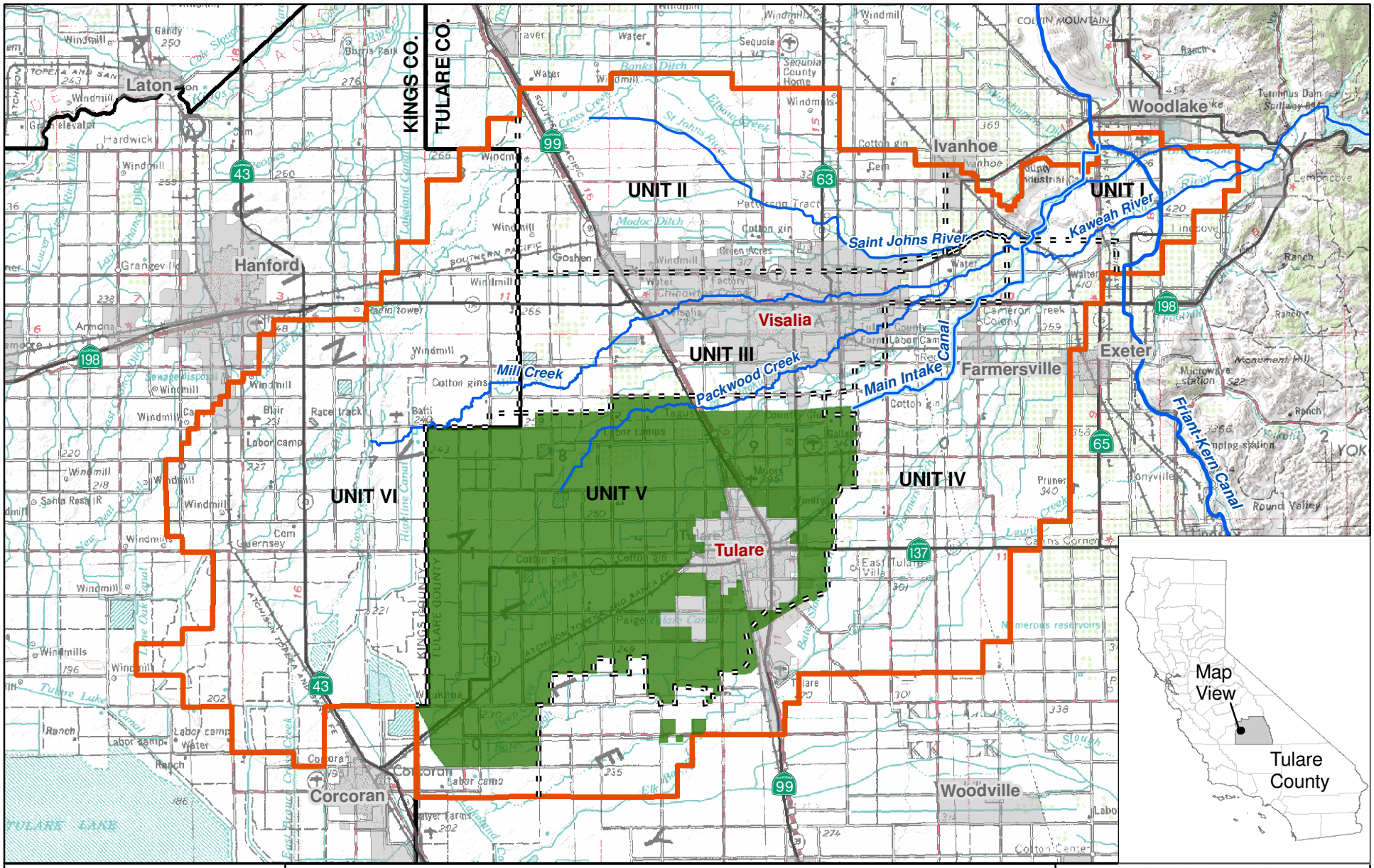

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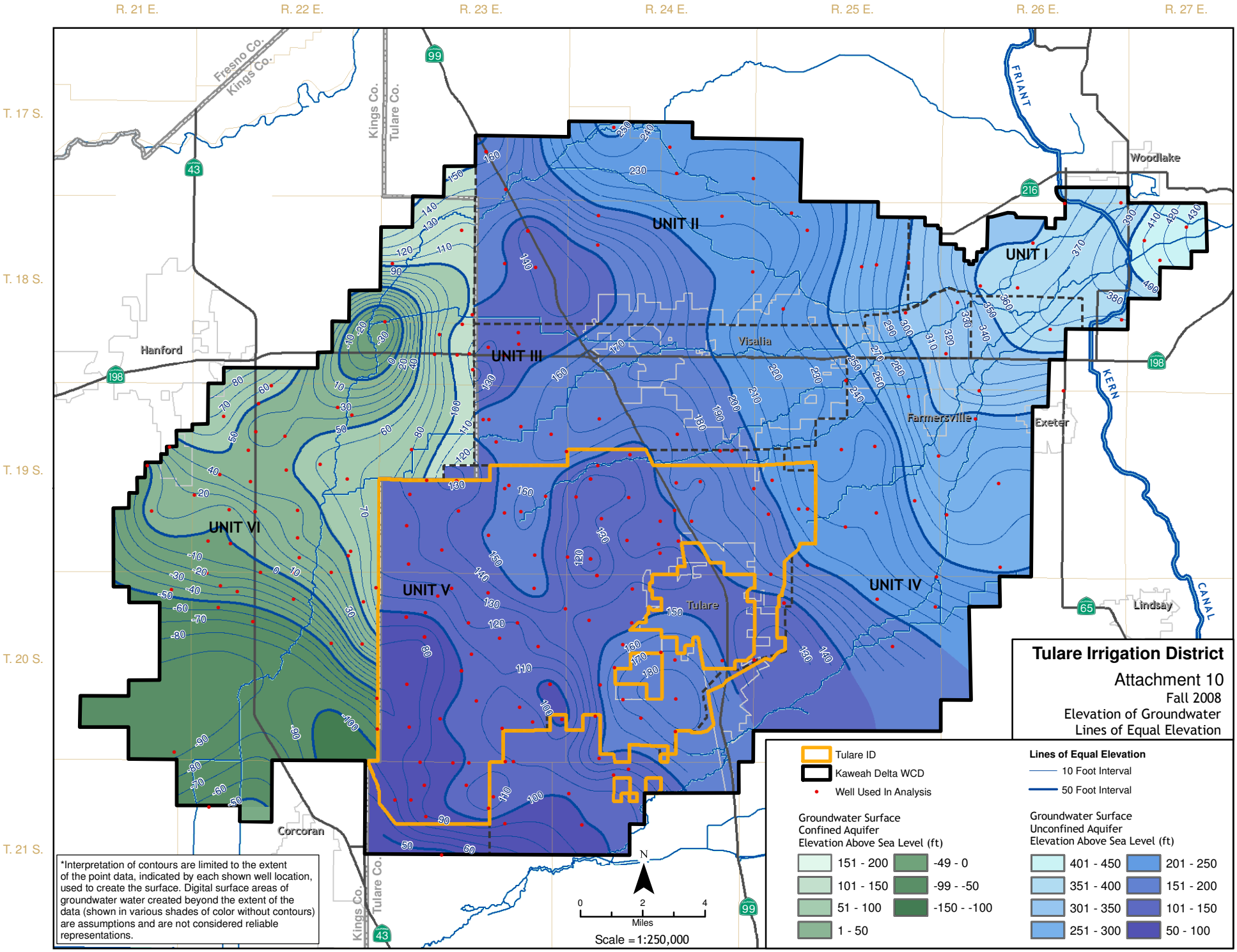
Legend

- Tulare ID
- Main Intake Canal
- Kaweah Delta WCD
- KDWCD Hydrologic Unit
- City
- County
- Major Road

Tulare Irrigation District

Attachment 9

Regional Hydrologic Units



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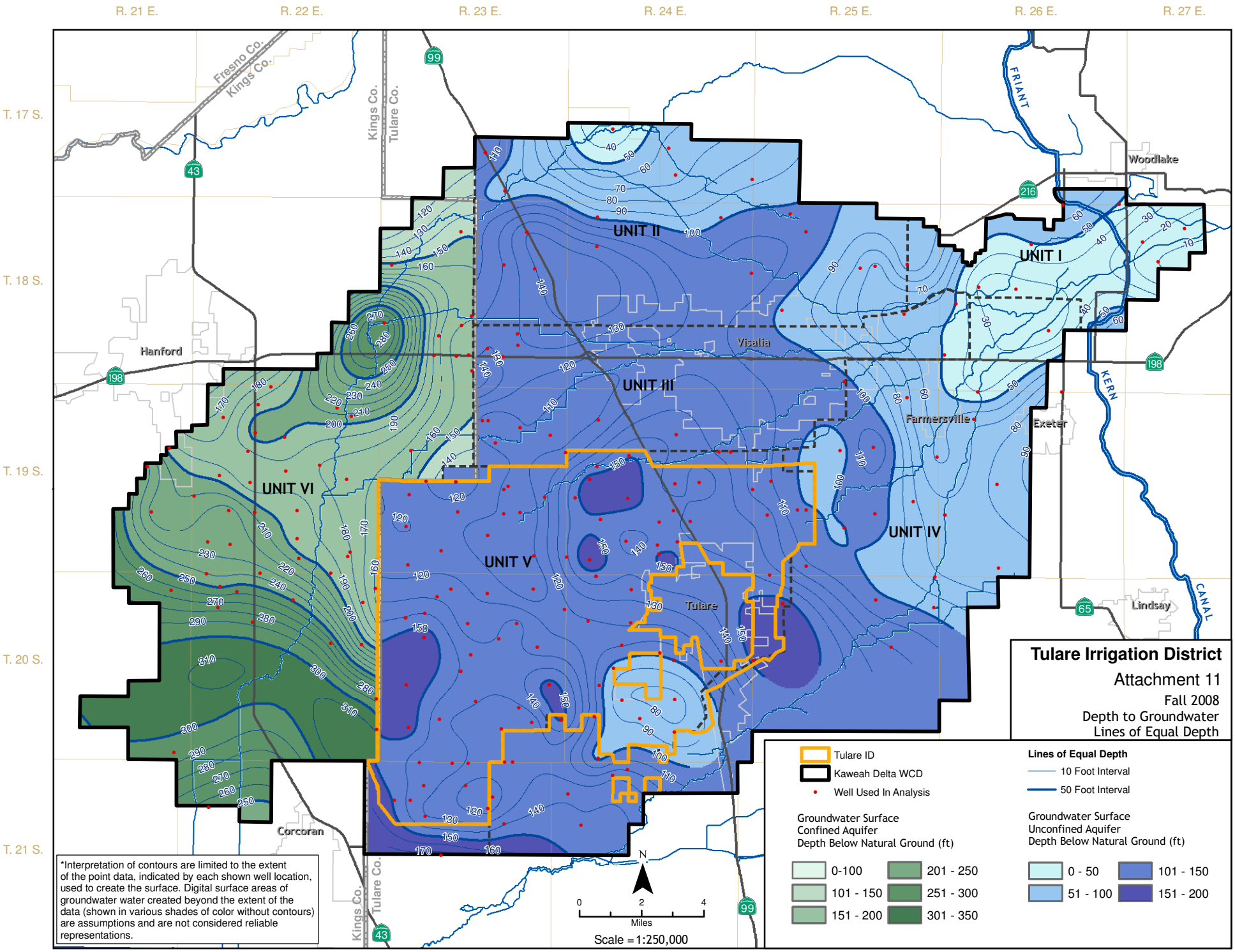

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Attachement 12 - Table of Well Attributes

Well ID	Township		Range		Section	Tract and Squence	Owner
192313 A03	19	S	23	E	13	A03	Nichols
192319 H01	19	S	23	E	19	H01	Te Velde
192320 C01	19	S	23	E	20	C01	Te Velde
192321 P01	19	S	23	E	21	P01	Westra
192323 D01	19	S	23	E	23	D01	Pacheco
192324 L01	19	S	23	E	24	L01	Fisher
192325 C01	19	S	23	E	25	C01	Mederos
192325 L02	19	S	23	E	25	L02	Gist
192326 B01	19	S	23	E	26	B01	Pacheco
192327 A01	19	S	23	E	27	A01	Bebereia
192327 P01	19	S	23	E	27	P01	Pires
192330 H02	19	S	23	E	30	H02	Te Velde
192331 R01	19	S	23	E	31	R01	Hildebrand
192332 H01	19	S	23	E	32	H01	Lemstra
192334 L01	19	S	23	E	34	L01	Bassett
192335 H01	19	S	23	E	35	H01	Mendonca
192410 G01	19	S	24	E	10	G01	Gordon
192413 C02	19	S	24	E	13	C02	Out of District
192414 A01	19	S	24	E	14	A01	Blain
192417 A01	19	S	24	E	17	A01	Pacheco
192417 N01	19	S	24	E	17	N01	Hamstra
192418 R01	19	S	24	E	18	R01	Hamstra
192419 L01	19	S	24	E	19	L01	Goeman
192420 J01	19	S	24	E	20	J01	Darthelemy
192422 C02	19	S	24	E	22	C02	Nunes
192422 P01	19	S	24	E	22	P01	Royal Farms
192423 D01	19	S	24	E	23	D01	Goins
192424 A03	19	S	24	E	24	A03	Visser
192425 D01	19	S	24	E	25	D01	Thomas
192427 H01	19	S	24	E	27	H01	Thomas
192427 Q01	19	S	24	E	27	Q01	K.D. Gin
192428 H01	19	S	24	E	28	H01	Gist
192429 D01	19	S	24	E	29	D01	Bertao
192429 R01	19	S	24	E	29	R01	Stuhaan
192430 J01	19	S	24	E	30	J01	De Campos
192431 E01	19	S	24	E	31	E01	Oak Valley School
192433 A02	19	S	24	E	33	A02	Fisher
192433 H01	19	S	24	E	33	H01	Fisher
192436 R01	19	S	24	E	36	R01	Lagomarsino
192519 B01	19	S	25	E	19	B01	Rodgers
192520 P01	19	S	25	E	20	P01	Serpa
192529 B01	19	S	25	E	29	B01	Gerawan
192530 C01	19	S	25	E	30	C01	Gerawan
202201 H01	20	S	22	E	1	H01	Out of District
202225 R01	20	S	22	E	25	R01	Out of District
202302 H01	20	S	23	E	2	H01	Hillman

Well ID	Township		Range		Section	Tract and Squence	Owner
202303 L01	20	S	23	E	3	L01	Clark
202304 F01	20	S	23	E	4	F01	Fagundes
202307 H03	20	S	23	E	7	H03	Anderson
202308 H01	20	S	23	E	8	H01	Monteiro
202309 J02	20	S	23	E	9	J02	J.R. Simplot Co.
202311 L01	20	S	23	E	11	L01	Watte
202312 A01	20	S	23	E	12	A01	Kotsier
202313 E02	20	S	23	E	13	E02	Almeida
202315 A01	20	S	23	E	15	A01	Watte
202316 J01	20	S	23	E	16	J01	Terra Linda
202317 C01	20	S	23	E	17	C01	Quinn
202318 R01	20	S	23	E	18	R01	Monteiro
202319 J01	20	S	23	E	19	J01	Harmon
202321 B01	20	S	23	E	21	B01	Watte
202324 L01	20	S	23	E	24	L01	Heiskell
202325 J02	20	S	23	E	25	J02	Jones
202326 C01	20	S	23	E	26	C01	Mederos
202326 R01	20	S	23	E	26	R01	Smith
202327 D01	20	S	23	E	27	D01	VandeVelde
202327 R01	20	S	23	E	27	R01	Watte
202329 J02	20	S	23	E	29	J02	Souza
202330 R01	20	S	23	E	30	R01	Quinn
202404 E01	20	S	24	E	4	E01	Junio
202406 A01	20	S	24	E	6	A01	Royal Crest
202407 G01	20	S	24	E	7	G01	Clarklind
202409 M01	20	S	24	E	9	M01	Soults
202414 R01	20	S	24	E	14	R01	Souza
202415 P01	20	S	24	E	15	P01	Clarklind
202416 H01	20	S	24	E	16	H01	Catron
202417 A02	20	S	24	E	17	A02	Texeira
202417 P01	20	S	24	E	17	P01	Faria
202418 F01	20	S	24	E	18	F01	Koetsier
202420 M02	20	S	24	E	20	M02	Clarklind
202427 C01	20	S	24	E	27	C01	Mello
202428 L01	20	S	24	E	28	L01	Eddy
202429 B01	20	S	24	E	29	B01	Mello
202430 J02	20	S	24	E	30	J02	Silveira
202431 R01	20	S	24	E	31	R01	Cardosa
202433 C01	20	S	24	E	33	C01	Hamilton
202506 C01	20	S	25	E	6	C01	Lagomarsino
202518 M01	20	S	25	E	18	M01	Uchita
212302 C01	21	S	23	E	2	C01	Wilbur
212303 N01	21	S	23	E	3	N01	Martin
212304 A01	21	S	23	E	4	A01	Ribeiro
212305 A02	21	S	23	E	5	A02	Cunha
212305 E02	21	S	23	E	5	E02	Valov

Well ID	Township		Range		Section	Tract and Squence	Owner
212305 R01	21	S	23	E	5	R01	Nunes
212307 H01	21	S	23	E	7	H01	Curti
212308 F02	21	S	23	E	8	F02	Valov
212308 R01	21	S	23	E	8	R01	Curti
212310 J02	21	S	23	E	10	J02	Leyendekker
212314 C01	21	S	23	E	14	C01	Torrez
212321 C03	21	S	23	E	21	C03	Salyer
212404 F01	21	S	24	E	4	F01	Bowles

TULARE IRRIGATION DISTRICT

2010 ANNUAL GROUNDWATER REPORT

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Tulare Irrigation District
Groundwater Management Plan
Implementation Schedule

ATTACHMENT 14

Task No.	Task[1]	2010				2011				2012				2013				2014				2015				2016			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	CEMEX Basin Project	■	■	■	■	■	■	■	■																				
2	Basin Project north of New Office	■	■	■																									
3	Mooney's Grove Basin Project	■	■																										
4	Potential Water Exchange Agreement with City of Visalia for Tertiary Treated Waste Water	■	■	■	■																								
5	Rancho de Kaweah Groundwater Banking Evaluation\Feasibility Study			■	■																								
6	Feasibility Studies for potential Title III funded projects to offset SJR Restoration Impacts			■	■																								
7	9(d) Contract negotiations with USBR, Prop. 218 Engineers Report & Assessment Elections			■	■	■	■																						
8	Kaweah Groundwater Basin Integrated Regional Water Management Plan Development	■	■	■	■	■	■	■	■	■	■																		
9	Groundwater Advisory Committee meetings		■				■				■				■				■				■				■		
10	Prepare annual groundwater reports					■	■			■	■				■	■			■	■			■	■			■	■	
11	KDWCD Water Resources Investigation study updates	■	■	■										■	■	■	■									■	■	■	■
12	Systems Optimization Review study	■	■	■	■	■	■																						
13	Develop Water Marketing Plan					■																							
14	Develop Water Reuse Project and Exchange Program with City of Visalia			■	■	■	■	■	■	■	■																		
15	Develop district-wide geographic information system (GIS)		■	■	■	■																							
16	Determine infiltration rates in all recharge basins													■	■														
17	Construct Plum Basin - Phase 1		■	■	■	■																							
18	Construct Plum Basin - Phases 2 & 3						■	■	■	■																			
19	Investigate groundwater recharge and banking sites	■	■	■	■	■	■																						
20	Construct groundwater recharge and banking projects							■	■	■	■	■	■	■	■	■	■												
21	Install dataloggers in selected monitoring wells					■	■											■	■										
22	Construct nested monitorng wells											■	■							■	■								
23	Measure electrical conductivity in all monitoring wells			■																						■			
24	Distribute ARRA drought relief funds from USBR to growers	■	■	■	■	■	■	■	■																				
25	Select private AWEP water conservation projects for funding from USDA\NRCS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■												
26	Update Groundwater Management Plan																									■	■		

Notes:
1 - Only proposed new projects are shown in this schedule. Existing and on-going projects are not shown. Also, new policies and guidelines that will be implemented on a continuous basis are not shown.
2 - Implementation of some projects will depend on the results of current feasibility studies and the availability of staff amd construction funding.

TULARE IRRIGATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

ATTACHMENTS

TULARE IRRIGATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

APPENDIX A - PUBLIC PARTICIPATION IN PLAN ADOPTION

TULARE IRRIGATION DISTRICT

RESOLUTION NO. 09-12

WHEREAS, the Tulare Irrigation District adopted a Groundwater Management Plan in 1992 in accordance with Assembly Bill 255; and

WHEREAS, the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, updating the District's Groundwater Management Plan is in furtherance of and consistent with the District's goals and objectives and will be in the best interests of the District's landowners and water users; and

WHEREAS, a public hearing was held on August 11, 2009, to discuss updating the Groundwater Management Plan;

NOW, THEREFORE, BE IT RESOLVED, by the Board of Directors that it is the intention of the District to update their Groundwater Management Plan in accordance with Senate Bill No. 1938, that this resolution shall be deemed a resolution of intention in accordance with California Water Code § 10753.2, and that the Board hereby authorizes its officers to execute all documents and take any other action necessary or advisable to carry out the purposes of this resolution.

THE FOREGOING RESOLUTION WAS PASSED AND ADOPTED at a regular meeting of the Board of the Tulare Irrigation District held on this 11th day of August, 2009, by the following vote:

Ayes: Directors Bixler, Martin, Rogers and Thomas

Noes: None

Abstain: None

Absent: Director Borges

ATTEST:

David G. Bixler

David G. Bixler, President

TULARE IRRIGATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

APPENDIX B - MEMORANDUM OF UNDERSTANDING BETWEEN KAWEAH DELTA WATER CONSERVATION DISTRICT AND TULARE IRRIGATION DISTRICT

MEMORANDUM OF UNDERSTANDING
BETWEEN
KAWEAH DELTA WATER CONSERVATION DISTRICT
AND
TULARE IRRIGATION DISTRICT

ARTICLE I - AGREEMENT

The articles and provisions contained herein constitute a bilateral and binding agreement by and between KAWEAH DELTA WATER CONSERVATION DISTRICT (hereinafter "Kaweah Delta") and TULARE IRRIGATION DISTRICT (hereinafter "Tulare").

ARTICLE II - RECOGNITION

Tulare developed a Groundwater Management Plan (hereinafter "The Tulare Plan") in 1992 with input from the City of Tulare located within the exterior boundaries of the district. Kaweah Delta has developed a Groundwater Management Plan (hereinafter "the Kaweah Delta Plan") the plan area of which overlaps the entire area of the Tulare Plan (hereinafter "the Overlap Area") and additionally overlaps Tulare facilities outside of the Tulare boundary. (Namely a buffer zone adjacent to the perimeter boundary and additionally areas along its main intake canal facility from Tulare non-tributary source water supply.)

ARTICLE III - PURPOSE

It is the purpose of this Memorandum of Understanding, entered into willingly by the districts, to document the interests and obligations of the districts with respect only to the Overlap Area of the two plans. It is also hoped that this Memorandum of Understanding will promote and provide a means to establish an orderly process to share information, develop a course of action and resolve any misunderstandings or differences that may arise regarding both plans.

ARTICLE IV - COORDINATION

There shall be an annual coordinating meeting (hereinafter "the meeting") between the districts. Kaweah Delta shall give notice to Tulare thirty (30) days prior to the date of the meeting to discuss the manner in which the plans are being implemented and other items relating to the plans. If there are concerns or questions regarding the plans, each district shall transmit its concerns in writing seven (7) days prior to the meeting.

ARTICLE V - MANAGEMENT OF OVERLAP AREA

Subject to the provisions of this Agreement, Tulare Irrigation District and Kaweah Delta Water Conservation District will allow each District to manage both their respective groundwater and their respective tributary and non-tributary source groundwater pursuant to their own Groundwater Management Plans in all areas overlapped by both Districts and adjacent zones and facilities areas.

The districts agree to meet as necessary to attempt to resolve any disputes developed from implementation of their respective plans within the Overlap Area. If differences cannot be resolved acceptable to both districts, Kaweah Delta will immediately cease to manage the Kaweah Delta Plan in any area inside the boundaries of Tulare. Additionally, Tulare will immediately cease to manage The Tulare Plan in any area outside its boundaries, provided such area is also within the boundaries of Kaweah Delta, except the area within the City of Tulare, which will continue to be subject to The Tulare Plan. Thereafter, this Agreement shall be deemed terminated.

ARTICLE VI - TERM

The initial term of this Agreement shall commence on the date hereof and continue for five (5) years, and shall continue from year to year thereafter unless terminated by written notice given at least one year prior to such termination,

or as stated in Article V due to a lack of conflict resolution.

This Memorandum of Understanding is made and entered into this 29th day of April, 1996.

KAWEAH DELTA WATER CONSERVATION DISTRICT	TULARE IRRIGATION DISTRICT
By	By
Title Chairman	Title President
By	By
Title Secretary	Title General Manager

DLR\Agrmnts\KDWCDTID\4.3.96

TULARE IRRIGATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

APPENDIX C – GROUNDWATER MONITORING PROTOCOLS

GROUNDWATER MONITORING PROTOCOLS

GENERAL SCOPE

The purpose of this document is to insure that the sampling and analytical methods are adequately documented and appropriate for the project scope and purpose by individuals responsible for implementing the monitoring program. Examples of all required forms are presented at the end of this section.

In general, measurements of the static water level will be taken from the top of each casing, and then the monitoring wells will be purged and sampled. A detailed description of these procedures follows.

EQUIPMENT USED DURING SAMPLING

Water level sounding equipment and field meter probes (pH, dissolved oxygen, conductivity, temperature, and turbidity) will be thoroughly rinsed with deionized/distilled water before and after each reading. All field meters will be calibrated according to manufacturer's guidelines and specifications before and after every day of field use.

The monitoring wells will be equipped with a dedicated sampling well pump or sampling activities will utilize disposable bailing equipment. All non-dedicated sampling equipment (in contact with sample) shall be thoroughly cleaned prior to each sampling event to prevent cross-contamination between samples and to ensure accurate representation of analytes of interest in each sample. All sample containers and sampling equipment shall be sterilized and transported to the field under conditions to preserve its sterility. Personnel performing decontamination shall wear gloves, eye-protection, and such other safety equipment as needed. The analytical laboratory as part of their agreement shall provide all sample containers, container preparation services, preservatives, and field blanks.

EQUIPMENT DECONTAMINATION PROCEDURES

All equipment that comes into contact with potentially contaminated water will be decontaminated. Disposable equipment intended for one-time use will not be decontaminated, but will be packaged for appropriate disposal. Decontamination will occur prior to and after each use of a piece of equipment. The following, to be carried out in sequence, is the recommended procedure.

- Non-phosphate detergent and tap water wash, using a brush if necessary;
- Tap water rinse; and
- Deionized/distilled water rinse.

WATER LEVEL MEASUREMENT PROCEDURES

Water levels will be measured in wells that have the least amount of known contamination first. Wells with known or suspected contamination will be measured last.

If wellheads are accessible, all wells will be sounded for depth to water from top of casing and total well depth prior to purging. An electronic sounder, accurate to the nearest +/- 0.01-ft, will be used to measure depth to water in each well. When using an electronic sounder, the probe is lowered down the casing to the top of the water column, the graduated markings on the probe wire or tape are used to measure the depth to water from the surveyed point on the rim of the well casing. Total well depth will be sounded from the surveyed top of casing by lowering the weighted probe to the bottom of the well. The weighted probe will sink into silt, if present, at the bottom of the well screen. Total well depths will be measured by lowering the weighted probe to the bottom of the well and recording the depth to the nearest 0.1-ft. Depth to water and total well depth will be recorded on a Monitoring Well Purging and Sampling Record as presented at the end of this section.

WELL PURGING

The wells will be sampled no sooner than 48 hours after well development. All wells will be purged prior to sampling. If the well casing volume is known, a minimum of three casing volumes of water will be purged using the dedicated well pump, if present, or a bailer, hand pump, or submersible pump depending on the diameter and configuration of the well. When a submersible pump is used for purging, clean flexible Teflon tubes will be used for groundwater extraction. Pumps will be placed 2 to 3 ft from the bottom of the well to permit reasonable draw down while preventing cascading conditions.

Water will be collected into a measured bucket to record the purge volume. Casing volumes will be calculated based on total well depth, standing water level, and casing diameter. One casing volume will be calculated as $\mathbf{V = \pi r^2 h\ 7.48}$ where **V** is the volume of one well casing of water in gallons ($1ft^3$ = 7.48 gallons); π = 3.14; **r** is the radius of the inner well casing (in ft); and **h** is the total height of the water column in the well (in ft).

It is most important to obtain a representative sample from the well. Stable water quality parameter field measurements (temperature, pH, and specific conductivity [EC]) indicate representative sampling is obtainable. Water quality is considered stable if for three consecutive readings:

- Temperature range is no more than +1/C;
- pH varies by no more than 0.2 pH units; and
- EC readings are within 10% of the average.

If the well casing volume is known, measurements will be taken before the start of purging, in the middle of purging, and at the end of purging each casing volume. If the well casing volume is NOT known, measurements will be taken every 2.5 minutes after flow starts. If water quality parameters are not stable after 5 casing volumes or 30 minutes, purging will cease, which will be noted in the field notes, and ground water samples will be taken. The depth to water, water quality field measurements, and purge volumes will be recorded on a Monitoring Well Purging and Sampling Record as presented at the end of this section.

If a well dewaters during purging and three casing volumes are not purged, that well will be allowed to recharge up to 80% of the static water column and dewatered once more. After water levels have recharged to 80% of the static water column, groundwater samples will be collected.

WATER LEVEL MEASUREMENT AND WELL PURGING RECORDS

During the collection of each sample, the following information will be recorded on a Monitoring Well Purging and Sampling Record as presented at the end of this section:

- Well identification;
- Sampler's name(s);
- Date and time of sample collection;
- Designation of sample as composite or grab, if applicable;
- Type of sampling equipment used;
- Field instrument readings and calibration;
- Field observations and details related to analysis or integrity of samples (e.g., conditions in nearby waterways, weather conditions, noticeable odors, colors, etc.);
- Preliminary sample descriptions (e.g., clear with strong ammonia-like odor);
- Time of arrival/entry on site and time of site departure; and
- Deviations from sampling plans.

PURGED WATER DISPOSAL

Purged and excess groundwater collected for sample container filling may be disposed on site or in the sampling area by dispersing onto the ground, or at the owner's direction.

ANALYTICAL METHODS AND REPORTING LIMITS

Requested analytes are provided in the following table. Reporting limits are laboratory specific based on the type of equipment each laboratory uses. Analytical methods and holding times are listed by analyte below.

Analyte	Standard Method	EPA Method	Holding Time
PH	4500H-B	150.1	24 hours
EC	2510B	120.1	28 days
Alkalinity	2320B	310.1	14 days
Ammonium	4500NH4	350.1	28 days
Bicarbonate	2320B	310.1	14 days
Carbonate	2320B	310.1	14 days
Chloride	4500Cl	300.0	28 days
Iron	3120B	200.7	6 months
Magnesium	3120B	200.7	6 months
Manganese	3120B	200.7	6 months
Nitrate as N	4500NO3	353.2; 300.0	48 hours
Nitrite as N	4500NO2	353.2; 300.0	48 hours
Phosphorus	4500P	365	28 days
Potassium	3120B	200.7	6 months
Sodium	3120B	200.7	6 months
Sulfate	4500SO4	300.0	28 days
TDS	2540C	160.1	7 days
TKN	4500-NH3	351	28 days

SAMPLE CONTAINERS AND PRESERVATIVES

Sample containers are generally available directly from the laboratory. All containers will be one-liter polyethylene, precleaned, and analyte specific. Groundwater samples for TKN and ammonia will be collected in containers containing H_2SO_4 as a preservative. The remaining samples need not be preserved. If a preservative is present, the bottle will be capped and lightly shaken to mix in the preservative. Samples from each location that require the same preservative may be placed in the same bottle if being analyzed by the same laboratory. Samples to be analyzed for dissolved metals must be filtered prior to preservation and analysis.

SAMPLING PROCEDURES

Water samples will be collected from each well and placed into laboratory prepared containers, sealed with tight fitting caps, labeled, and stored in a cool ice chest. Water

used for field measurements of temperature, pH, and EC shall not be used as sample water. The following are the recommended sample collection procedures:

- Rinse the tubing with one liter of sample prior to sample collection;
- If no preservative is present, rinse sample bottles three times with a small amount of sample;
- Collect sample directly into the sample bottle;
- Allow sample containers to be open for the shortest time possible to prevent contamination;
- Do not touch the inside of bottles, lids, or tubes. Hold the bottle lid with the inside facing down to prevent contaminating the inside of the lid;
- Allow the sample water to flow into the bottle from above;
- Close bottle tightly,
- Samples will be chilled to 4 C^o immediately upon collection; and
- Transport samples to the lab as soon as possible.

At each sampling location, all bottles designated for a particular analysis will be filled sequentially before bottles designated for the next analysis are filled. If a duplicate sample is to be collected at this location, all bottles designated for a particular analysis will be filled sequentially before bottles for another analysis are filled.

All samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Every sample, including samples collected from a single location but going to separate laboratories, will be pre-assigned an identifiable, unique sample number. The following is an example sample label:

Sample #:	**Well ID:**
Analytes:	**Date:**
Collected by:	**Time:**

It will be possible to identify each unique sample by recording the following information on the Monitoring Well Purging and Sampling Record:

- Sample identification numbers and any explanatory codes;
- Sample date and time;
- Lot numbers of the sample containers;
- Chain-of-custody form numbers;
- Shipping arrangements (overnight air bill number); and
- Name(s) of recipient laboratory (ies).

CHAIN-OF-CUSTODY

A chain-of-custody (COC) record will be completed and accompany all sample shipments for each laboratory and each shipment. If multiple coolers are sent to a

single laboratory on a single day, COCs will be completed and sent with the samples for each cooler. Generally, the laboratory will supply blank COCs. An example COC is included at the end of this section.

The COC will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. The sampling team leader or designee will sign the COC in the "relinquished by" box and note date, time, and air bill number.

SAMPLE HANDLING AND TRANSPORT

The following outlines the packaging procedures for sample delivery to a California Certified Environmental Laboratory Accreditation Program (ELAP) laboratory:

- Pack ice in zip-locked, double plastic bags. Seal the drain plug of the cooler with tape to prevent melting ice from leaking out;
- Line the bottom of the cooler with bubble wrap to prevent breakage during shipment;
- Check screw caps for tightness;
- Seal all container tops with tape;
- Secure sample labels onto the containers with clear tape;
- Wrap all glass sample containers in bubble wrap to prevent breakage;
- Seal all sample containers in heavy-duty plastic zip-lock bags with the sample numbers written on the outside of the bags with indelible ink;
- Place samples in a sturdy cooler(s) lined with a large plastic trash bag. Enclose the appropriate COC(s) in a zip-lock plastic bag affixed to the underside of the cooler lid;
- Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment;
- Double seal ice in two ziplock plastic bags and place on top and around the samples;
- Secure each ice chest with strapping tape; and
- Secure address and shipping labels to cooler.

EST. 1968
PROVOST & PRITCHARD
CONSULTING GROUP
An Employee Owned Company

Monitoring Well Purging and Sampling Record

Client:		Date:	
Project Name:		County:	
Project Address:			
Project Manager:		Job No:	Phase(s):
Regulatory Contact:		Telephone:	
Sample Containers:		Air Temp (F):	
Preservatives:		Precipitation:	
Instrumentation:		Wind (dir/speed):	
Date Last Calibrated/By:		Sampler Signature:	

Well Number						
Well Elevation (ft)						
Well Diameter (in)						
Slotted Interval (ft)						
DTW (ft)						
GW Elevation (ft)						
Sounding Depth (ft)						
Well Volumes (gal)						
Notes:						
Well Volume Purged (1st)						
Time						
Temp (C°)						
pH						
EC						
Volume Removed (gal)						
Well Volume Purged (2nd)						
Time						
Temp (C°)						
pH						
EC						
Volume Removed (gal)						
Well Volume Purged (3rd)						
Time						
Temp (C°)						
pH						
EC						
Volume Removed (gal)						
Sample Depth (ft)						
Sample Time						

Equipment used:

Remarks:

2" Well Volume = 0.163 x height of water column

4" Well Volume = 0.653 x height of water column

TULARE IRRIGATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

APPENDIX D – GROUNDWATER RECHARGE AGREEMENT WITH THE CITY OF TULARE

Paul

TULARE IRRIGATION DISTRICT

◆ MEMORANDUM ◆

June 11, 2008

COPY

TO: Lew Nelson – Public Works Director, City of Tulare

FROM: J. Paul Hendrix

SUBJECT: Water Agreement

The District's Board of Directors approved the agreement between the City and District titled "Agreement Regarding Delivery of Water to Certain Groundwater Recharge Facilities" at its June 10th meeting. Accordingly, enclosed is one fully-executed original of the agreement for the City's files. In accordance with Section 3 thereof, the District will submit a report this fall detailing the water recharge accomplishments for 2008. This is likely the convenient time to also submit an annual billing per Section 5 of the agreement.

Thank you for all of your efforts in bringing this agreement to fruition.

Enclosure

cc: Alex Peltzer – Dooley, Herr & Peltzer (w/enclosure)

1350 West San Joaquin Avenue • Tulare, California 93274 • Telephone (559) 686-3425 • Fax (559) 686-3673

AGREEMENT REGARDING DELIVERY OF WATER TO CERTAIN GROUNDWATER RECHARGE FACILITIES

THIS AGREEMENT is made and entered into this 6th day of May, 2008, by and between TULARE IRRIGATION DISTRICT, an Irrigation District organized and existing pursuant to the laws of the State of California (hereinafter referred to as "District"), and the CITY OF TULARE, a Municipal Corporation of the State of California (hereinafter referred to as "City").

WITNESSETH

A. WHEREAS, District is a public entity engaged in the importation and delivery of water for irrigation purposes to landowners within the District; and

B. WHEREAS, City and District entered into an Agreement dated May 10, 2005 (the "Master Agreement"), which provides for the use by City of certain canal and ditch facilities owned and controlled by District for the purpose of disposing of storm drainage; payments by City in lieu of District assessments; an agreement to develop joint policies related to impacts of new urban development on District facilities; and an agreement to consider and enter into various joint projects; and

C. WHEREAS, City has determined that it is in City's interest to acquire water from District and to deliver such water to groundwater recharge basins in locations that will provide a groundwater recharge benefit to areas that serve City; and

D. WHEREAS, in addition to purchasing water, City has the need to acquire basins to which such water can be delivered; and

E. WHEREAS, City and District have entered into an agreement dated December 4, 2007, ("Joint Purchase Agreement") providing for the joint purchase of property located at the corner of Road 132 and Avenue 256, known as the "Plum Property", for the purpose developing such property to a groundwater recharge basin. The Joint Purchase Agreement establishes joint rights in the Plum Property. After execution of the Joint Purchase Agreement, the property has been acquired as envisioned; and

F. WHEREAS, the Joint Purchase Agreement obligates the parties to negotiate and enter into a subsequent agreement providing for the purchase of water by City and the delivery of such water to various City, District and joint City-District facilities; and

G. WHEREAS, the parties now desire to set forth their agreement regarding the obligation of District to deliver water to various facilities, and the obligation of the City to pay the costs of such delivered water.

NOW THEREFORE, the parties hereto covenant and agree as follows:

1. **Definitions.** The following terms, when appearing as capitalized terms elsewhere in this Agreement, shall have the following meanings:

"Agreed Facilities" shall mean all of those facilities described in Exhibit A attached hereto. City may identify in the future any City-owned property it believes would be beneficial to receive water pursuant to this Agreement, and with the consent of District, such facility shall be added to the Agreed Facilities list, subject the District maintaining its discretion for determining the timing and amount of water to be delivered to such City facilities.

"Average Annual Quantity" shall initially mean approximately 10,000 a.f., such amount to be increased proportionally if adjustments to City's jurisdictional boundaries consistent with the Master Agreement results in more land being included within City boundaries or if the City increases its groundwater extractions from City-owned wells. Said Average Annual Quantity is to be annually derived in accordance with a formula as defined in Exhibit B attached hereto.

"Credited Water Balance" is defined as the amount of water, in acre feet, calculated by determining the total cumulative water delivered by District during the five year period immediately preceding the date of calculation, and subtracting from that amount the sum of the Average Annual Quantity for each of the previous five years or the number of years this Agreement has been in effect, whichever is less. By way of example only and not by limitation, assuming 55,000 acre feet have been delivered to the Agreed Facilities during the past five years, and assuming that the Average Annual Quantity in effect through the past five years is 10,000 acre feet, the Credited Water Balance would be equal to: 55,000 a.f. – (10,000 a.f. * 5); or 55,000 a.f. – 50,000 a.f.; or +5,000 a.f.

2. **Obligation to Deliver Water.** District hereby agrees to deliver on an annual basis a certain average quantity of water, defined above as the Average Annual Quantity, to the facilities defined above as the Agreed Facilities. District shall be responsible for determining, with the advice and consent of City, the manner and location of the water to be delivered, and shall not be

required to deliver all or any percentage of the water to be delivered to any particular basin, including the basin to be constructed by City and District jointly on the Plum Property. District shall endeavor to ensure that the Credited Water Balance, as annually reported pursuant to the provisions of paragraph 3 below, remains greater than or equal to zero. The purpose of the Credited Water Balance calculation is ensure that a total of 10,000 acre-feet of water is delivered on a rolling five year average annual basis, recognizing that water conditions will allow for more water to be delivered in some years and less in other years. The Credited Water calculation and accounting is not intended to establish a "water bank" or in any other way establish a right to the amount of water calculated through the Credited Water accounting system.

3. Accounting for Delivered Water. District shall, by October 31st each year, document and provide an annual summary of the water deliveries made pursuant the Water Purchase Agreement, and shall endeavor to document estimates of groundwater recharge benefits that resulted from or are anticipated to result from such water deliveries. As part of such annual summary, District shall calculate the Credited Water Balance according to the formula defined above.

4. Timing of Water Deliveries. Water deliveries shall occur only during those times when water is available to District for delivery, and can be recharged into the Agreed Facilities. To the extent that District makes deliveries to any of the Agreed Facilities that are under the City's control ("City's Facilities"), District shall provide an anticipated schedule of such deliveries and flow rate with reasonable advance notice to City for approval, and District shall not cause water to flow into any such City's Facilities without City's consent.

5. Water Charges. City shall pay a unit water delivery charge associated with such delivered water that is equal to the water charge paid by District for its Central Valley Project Class 2 contract supply. Such payment shall be made annually and shall be based on the then-current Average Annual Quantity.

6. Water Source & Quality. District reserves the right to determine the source of the water from which deliveries will be made to satisfy this Agreement. District does not guarantee the quality of water delivered pursuant to this Agreement; District agrees that such water shall be of a similar quality to water District delivers to other users from the Friant-Kern Canal or the Kaweah River.

7. District's Obligations Contingent Upon Continuation of US-District Contract, Etc. District's obligations to deliver water to the Agreed Facilities pursuant to this Agreement are contingent upon, and subject to, the continuing existence of **(i)** a contract between the United States government (or agency thereof) and District for the provision of water from the Central Valley Project via the Friant-Kern Canal, or **(ii)** a contract or entitlement otherwise affording District sufficient water to meet its obligations pursuant to Section 5.

8. Term. The Water Purchase Agreement shall be in effect for as long as the City and District continue to abide by the terms of the Master Agreement.

9. Representations and Warranties of Authority. Each party represents to all other parties that such party has the full power and authority to enter into this Agreement, that the execution and delivery thereof will not violate any agreement to which such party is a party or by which such party is bound, and that this Agreement, as executed and delivered, constitutes a valid and binding obligation of such party, enforceable in accordance with its terms. The corporate, partnership, and association signatories to this Agreement expressly warrant that they have been authorized by their respective company, partnership, or association entities to execute this Agreement and to bind them to the terms and provisions hereof. Any public agency signatory to this Agreement represents and warrants that the Agreement is executed in compliance with a resolution of the governing entity of the public agency, duly adopted by the governing entity and transcribed in full in the minutes of the governing entity. Any individual signing this Agreement on behalf of a public agency represents that she/he has full authority to do so.

10. Duty to Cooperate. Each party shall cooperate so as to facilitate the other party's efforts to carry out its obligations under this Agreement.

11. Successors and Transferees. The obligations and benefits of this Agreement do not run with the land, and are personal to the City and the District and are not assignable or transferable.

12. Entire Agreement. This Agreement constitutes the entire agreement between the parties, and it is expressly understood and agreed that the Agreement has been freely and voluntarily entered into by the parties with the advice of counsel, who have explained the legal effect of this Agreement. The terms of this Agreement are contractual and not mere recitals. The parties further acknowledge that no warranties, representations or inducements not contained in this Agreement have been made on any subject in connection with this Agreement, and that

they have not been induced to execute this Agreement by reason of non-disclosure or suppression of any fact. This Agreement may not be altered, modified or otherwise changed in any respect except by writing, duly executed by the parties or their authorized representatives. This Agreement is fully integrated.

13. Construction. The parties acknowledge that each party and its counsel have reviewed and revised this Agreement and that no rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall be employed in the interpretation of this Agreement.

14. Severability. In the event any of the terms, conditions or covenants contained in this Agreement is held to be invalid, any such invalidity shall not affect any other terms, conditions or covenants contained herein which shall remain in full force and effect.

15. Governing Law. California law shall govern the interpretation and enforcement of this Agreement.

16. Remedies. Any motion or other action by the parties to enforce this Agreement shall be filed or otherwise brought and adjudicated in the Tulare County Superior Court. The Tulare County Superior Court shall maintain and reserve jurisdiction of this action for the purpose of enforcing the terms of this Agreement as a judgment or order of the Court. Nothing in this paragraph shall be interpreted in a manner to preclude whatever rights the parties may have to appeal rulings of the Tulare County Superior Court. The parties otherwise retain the full range of legal and equitable remedies to enforce the terms of this Agreement, including injunctive relief and specific performance, to ensure the parties comply with their commitments under this Agreement. In any action to enforce this Agreement, each party shall be responsible for its own attorneys' fees and costs. The parties shall meet and confer and attempt to resolve their differences informally before commencing any action to enforce this Agreement.

17. Further Assurances. In addition to the documents and instruments to be delivered as herein provided, each of the parties shall, from time to time at the request of the other parties, execute and deliver to the other parties such other instruments of transfer, conveyance and assignment and shall take such other action as may be required to more effectively carry out the terms of this Agreement.

18. Time of the Essence. Time is expressly declared to be of the essence of this Agreement and of every provision hereof in which time is an element.

19. Captions. Paragraph titles or captions contained herein are inserted as a matter of convenience and for reference, and in no way define, limit, extend or describe the scope of this Agreement or any provision thereof.

20. Notices. Where required by this Agreement, notice shall be provided by regular mail or overnight delivery, and shall be considered made when deposited in U.S. or express mail.

21. Counterparts. The parties may execute this agreement in counterparts. The counterparts, if any, constitute a single agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement to be effective as of the date and year last below written.

CITY OF TULARE

"CITY"

By: _____ 5-7-08

Darrel L. Pyle — Date

City Manager

TULARE IRRIGATION DISTRICT

"DISTRICT"

By: _____ 6-10-2008

David G. Bixler — Date

President, Board of Directors

Attested

By: _____ 5/7/08

Chief Deputy City Clerk — Date

By: _____ 6/11/08

J. Paul Hendrix — Date

General Manager

Approved as to form and content.

By: _____ 5/6/08

S.L. Kabot — Date

City Attorney

Approved as to form and content.

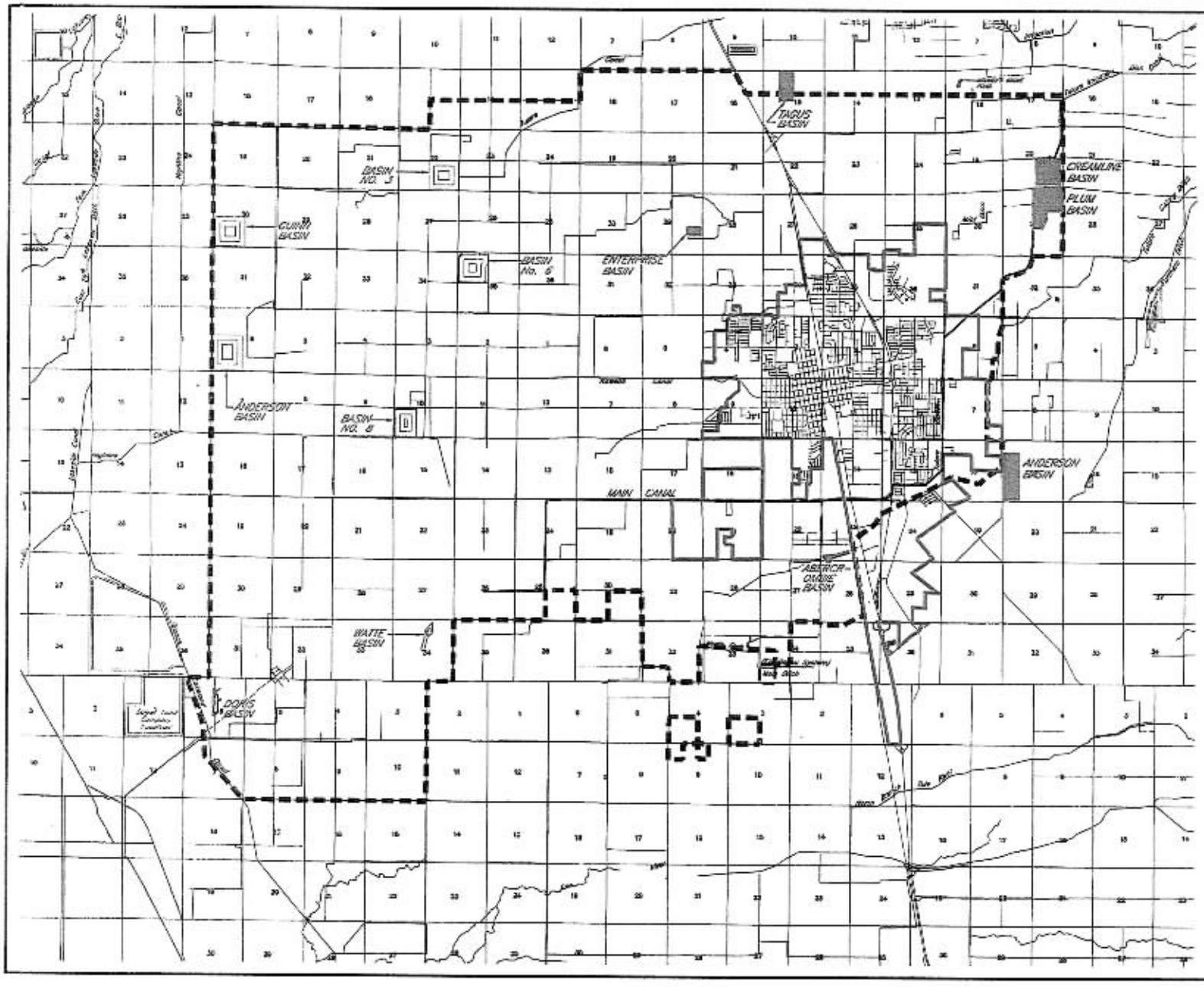
By: _____ 6/11/08

Alex M. Peltzer — Date

District Counsel

\\DHPSERVER\Data\Client Files\Tulare Irrigation District 59\1XX Administrative\104 City of Tulare Agreement Follow up\Agreement w COT re Purchase & Delivery of Water.doc

EXHIBIT A



LEGEND

- TULARE IRRIGATION DISTRICT SERVICE AREA
- CITY OF TULARE CITY LIMITS
- BASIN UTILIZED TO SINK WATER FOR CITY OF TULARE RECHARGE

NORTH

TULARE IRRIGATION DISTRICT

TID BASIN LOCATION MAP

Tulare Irrigation District
1390 W. SAN JOAQUIN AVE
TULARE, CA 93274
TEL: (559) 686-3425
FAX: (559) 686-3673
WEB: www.tulareid.org

Exhibit B
Calculation of Average Annual Quantity

For the purposes of the Agreement, the following parameters will apply:

Avg. surface water supply to TID water users: 60%[1]

Groundwater overdraft in Tulare region: 7,000 AF[2]

City annual groundwater pumping: City Use

District area: TID A

City area: City A

City share of total area: City A ÷ (TID A + City A)

Based on the foregoing parameters, the Average Annual Quantity shall be computed as follows:

Average Annual Quantity = 60% X City Use + (City A/(TID A+City A) X 7,000)

Example for 2007: 60% X 18,870 AF + (18.78 sq. mi./ (104.04 sq. mi. + 18.78 sq. mi.)X 7,000 AF) = 12,392 AF

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(1) Based on long-term TID surface water deliveries and crop water usage
(2) Per KDWCD "Water Resources Investigation Report" - April 2005

TULARE IRRIGATION DISTRICT

GROUNDWATER MANAGEMENT PLAN

APPENDIX E – RULES AND REGULATIONS GOVERNING DISTRIBUTION OF WATER IN THE TULARE IRRIGATION DISTRICT

RULES

AND

REGULATIONS

GOVERNING

THE DISTRIBUTION OF WATER

IN THE

TULARE

IRRIGATION DISTRICT

Adopted April 25, 1893

Amended July 7, 1953

RULES AND REGULATIONS
Governing The Distribution Of Water In The
TULARE IRRIGATION DISTRICT

Section 22257 of the Water Code of the State of California is, in part, as follows:

"Each district shall establish equitable rules for the distribution and use of water, which shall be printed in convenient form for distribution in the district."

RULE 1
CONTROL OF SYSTEM

The canals and works of the District are under the exclusive management and control of the Superintendent, appointed by the Board of Directors, and no other person, except his employees and assistants, shall have any right to interfere with said canals and works in any manner.

RULE 2
DITCHTENDERS AND OTHER EMPLOYEES

The Superintendent shall employ such ditchtenders and other assistants as may be necessary for the proper operation of the system, and the distribution of the water. Each ditchtender shall have charge of his respective section and shall be responsible to the Superintendent. From the ditchtender's decision an appeal may be made to the Superintendent. From the Action of the Superintendent, appeal may be made to the Board of Directors.

RULE 3
APPORTIONMENT OF WATER

The water will be apportioned to each distributing section by the Superintendent, and in cases of controversy or shortage of water the apportionment shall be made upon the basis of the assessed valuation of the land in each section.

RULE 4
DELIVERY OF WATER

Water will be delivered to the irrigator on demand or by rotation, depending upon the quantity available for distribution.

When delivery is made on demand application must be made to the ditchtender or the district office at least three days before the water is needed. Efforts will be made to make delivery in less than three days, and where possible the delivery will be made within 24 hours. All deliveries will be made in sequence of receipt of application.

When the quantity of water available is insufficient for full service on demand, a rotation schedule will be established. When water is available for irrigation notice will be given to each irrigator as soon as possible to allow preparation to be made to receive the water, which notice will state the approximate time when the run will be commenced, approximate head to be delivered and the time of discontinuance.

RULE 5
CONTINUOUS USE OF WATER

No allowance will be made for failure to use water at night during a regular run. If an irrigator

turns the water from his place, it will be considered that the irrigator has completed his irrigation, and service may be discontinued for the current delivery unless cessation of use be due to an emergency and necessary.

RULE 6
IRRIGATION OF EXCESSIVELY HIGH GROUND

The District will not be required to raise water to an excessive height in canals or ditches in order to give service to lands or ditches of unreasonable elevation. Such unreasonable elevation to be determined by the particular conditions wherein such diversions would jeopardize the District ditches and which would interfere with water users service above and below said diversions.

RULE 7
USE OF DELIVERY GATES

Irrigators will receive water only through the delivery gates provided. If it is found that water is taken through cuts in the canal bank, or in any other manner than that provided by the District, the irrigator can be refused further water until all damage caused has been repaired or paid for.

RULE 8
CONTROL OF DIVERTING GATES

The control of all structures on the District's system is under the management of the District, and no water user is allowed to change or interfere with them except by permission, or in case of an emergency, to be reported at once to the District office.

RULE 9

USING WATER OUT OF TURN

Any person who uses water out of his turn and without permission of his ditchtender forfeits his right to water at the next regular irrigation and is also subject to criminal prosecution.

RULE 10

WASTE OF WATER

Persons wasting water on roads or vacant land, or land previously irrigated, either wilfully, carelessly, or on account of defective ditches or inadequately prepared land or who shall flood certain portions of the land to an unreasonable depth or amount in order to properly irrigate other portions will be refused the use of water until such conditions are remedied.

RULE 11

ACCESS TO LAND

The authorized agents of the District shall have free access at all times to lands irrigated from the canal system for the purpose of examining the canals and ditches and the flow of the water therein.

RULE 12

WATER RECEIPTS

Any person to whom water is offered must sign a receipt therefor. If the water is used, the receipt must show upon what kind of crop it was used; and if not used, the receipt must specify the reason.

RULE 13
IN CASE OF BREAKS

When a break or a succession of breaks occur under any distributing section, the person to whom the water is last given while the break is being repaired, will be allowed to finish before the water is taken from him, and shall not claim another irrigation for that run.

RULE 14
PARTY DITCHES

Before water is furnished to any private distributing ditch the land owners receiving the water therefrom must agree upon and sign rules and regulations satisfactory to the Board of Directors, providing for the repair, maintenance, and distribution of water from such ditch, authorizing some one to represent the users in all conferences with the ditchtender, and providing for the apportionment of water, subject to all rules and regulations of the District.

RULE 15
PUMPING RULES

All users pumping water from the canals shall be governed in all respects by the rules and regulations applicable to users under gravity service. The District will not be held resopnsible for any debris which may accumulate in stream flow which may tend to decrease the full operative capacity of pumps or pipelines.

RULE 16
USE OF DISTRICT RIGHT OF WAY

No trees, vines, or alfalfa shall be planted on

the right of way of any District canal and all such crops growing on such right of way shall belong absolutely to the District. Permission, however, may be granted by the Board of Directors, under such restriction as they may deem expedient, to raise annual crops thereon.

RULE 17
LIABILITY OF DISTRICT

The District will not be liable for any damage resulting directly or indirectly from any private ditch or the water flowing therein; but its responsibility shall absolutely cease when the water is turned therein according to these rules and regulations.

RULE 18
LIABILITY OF IRRIGATORS

Every consumer of water shall be responsible to the District for all damages caused by his wilful neglect or careless acts, and upon his failure to repair such damage after notification by the ditch-tender, such repairs shall be made at his expense by the District.

RULE 19
LIABILITY OF PERSONS INTERFERING WITH THE REGULATIONS OF WATER OR TAKING WATER OUT OF TURN

Section 592 of the Penal Code of California is as follows:

"WATER-DITCHES, ETC., PENALTY FOR TRESPASS OR INTERFERENCE WITH. Every person who shall, without authority of the owner or managing

agent, and with intent to defraud, take water from any canal, ditch, flume or reservoir used for the purpose of holding or conveying water for manufacturing, agricultural, mining, irrigating or generation of power, or domestic uses, or who shall without like authority, raise, lower or otherwise disturb any gate or other appartus thereof, used for the control or measurement of water, or who shall empty or place, or cause to be emptied or placed, into any such canal, ditch, flume or reservoir, any rubbish, filth or obstruction to the free flow of the water, is guilty of a misdemeanor."

Under such statute persons interfering with the regulation of water in the canals and ditches are subject to prosecution.

RULE 20

BUILDING DIVERTING GATES AND WEIRS

No openings shall be made or structures placed in any District canal without the special permission of the Superintendent. All structures in the District canals must be constructed according to requirements of the District, and must be maintained in a condition satisfactory to the Superintendent, and must not be changed without the permission of the Superintendent.

RULE 21

OBSTRUCTIONS ON RIGHT OF WAY

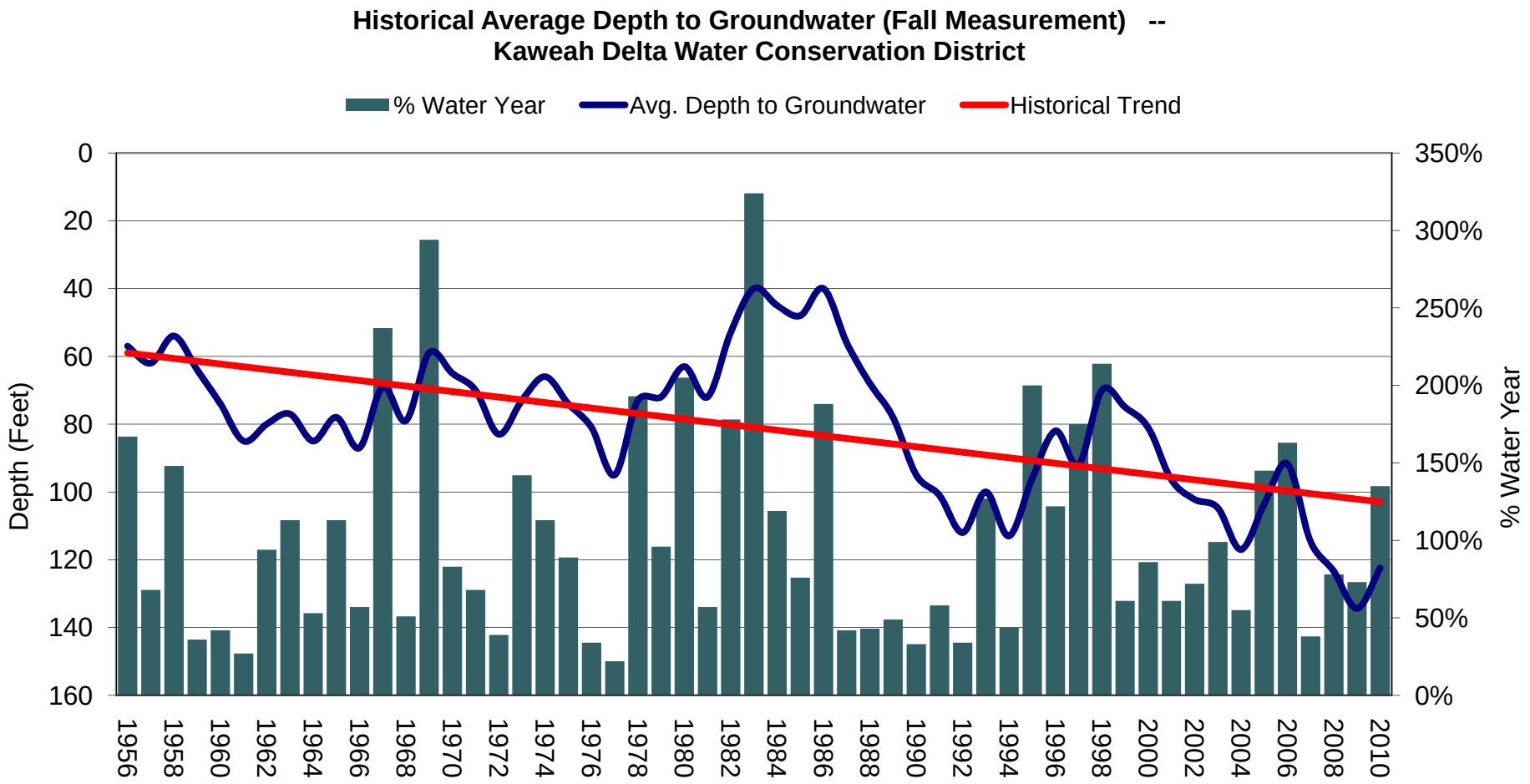
No fences or other obstruction shall be placed across or upon or along any canal bank or right of way belonging to the District without the special permission of the Board of Directors. Whenever such permission shall be granted it shall always

be with the distinct understanding that proper openings or passage ways for equipment shall be provided, and that such fence or obstruction must be removed whenever requested by the Superintendent.

RULE 22
ENFORCEMENT OF RULES

Refusal to comply with the requirements hereof, or transgression of any of the foregoing rules and regulations, or any interference with the discharge of the duties of any official, shall be sufficient cause for shutting off the water, and water will not again be furnished until full compliance has been made with all requirements herein set forth.

APPENDIX H – HISTORICAL AVERAGE DEPTHS TO GROUNDWATER (1956-2010), KDWCD


Historical Average Depth to Groundwater (Fall Measurement) --
Kaweah Delta Water Conservation District
% Water Year
Avg. Depth to Groundwater
Historical Trend
Depth (Feet)
% Water Year
0
20
40
60
80
100
120
140
160
350%
300%
250%
200%
150%
100%
50%
0%
1956
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1962
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2004
2006
2008
2010

APPENDIX I – DWR HISTORICAL GROUNDWATER ELEVATION MAPS

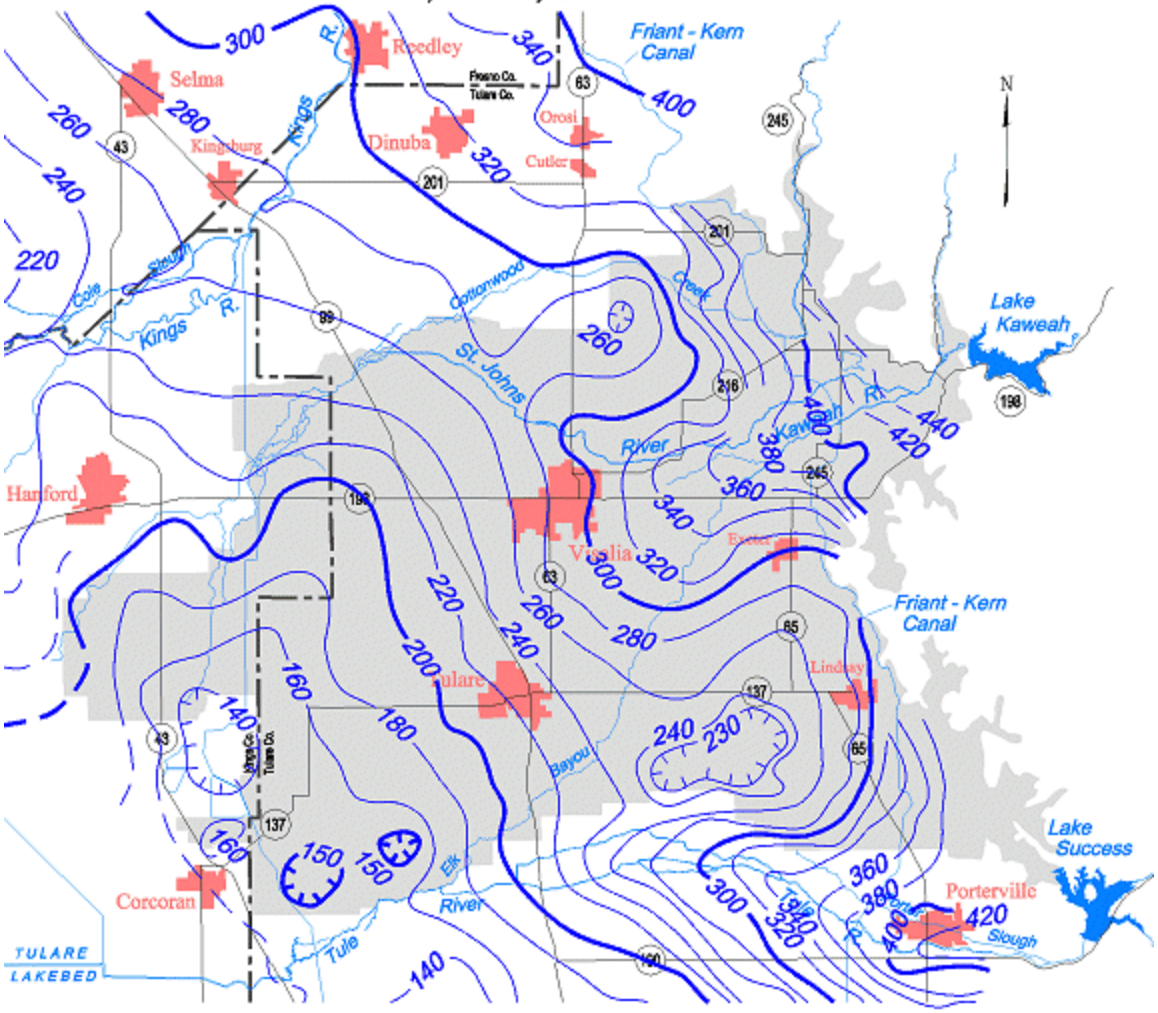
Kaweah Groundwater Basin

Spring 1958, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles

2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10, 20 and 60 feet.

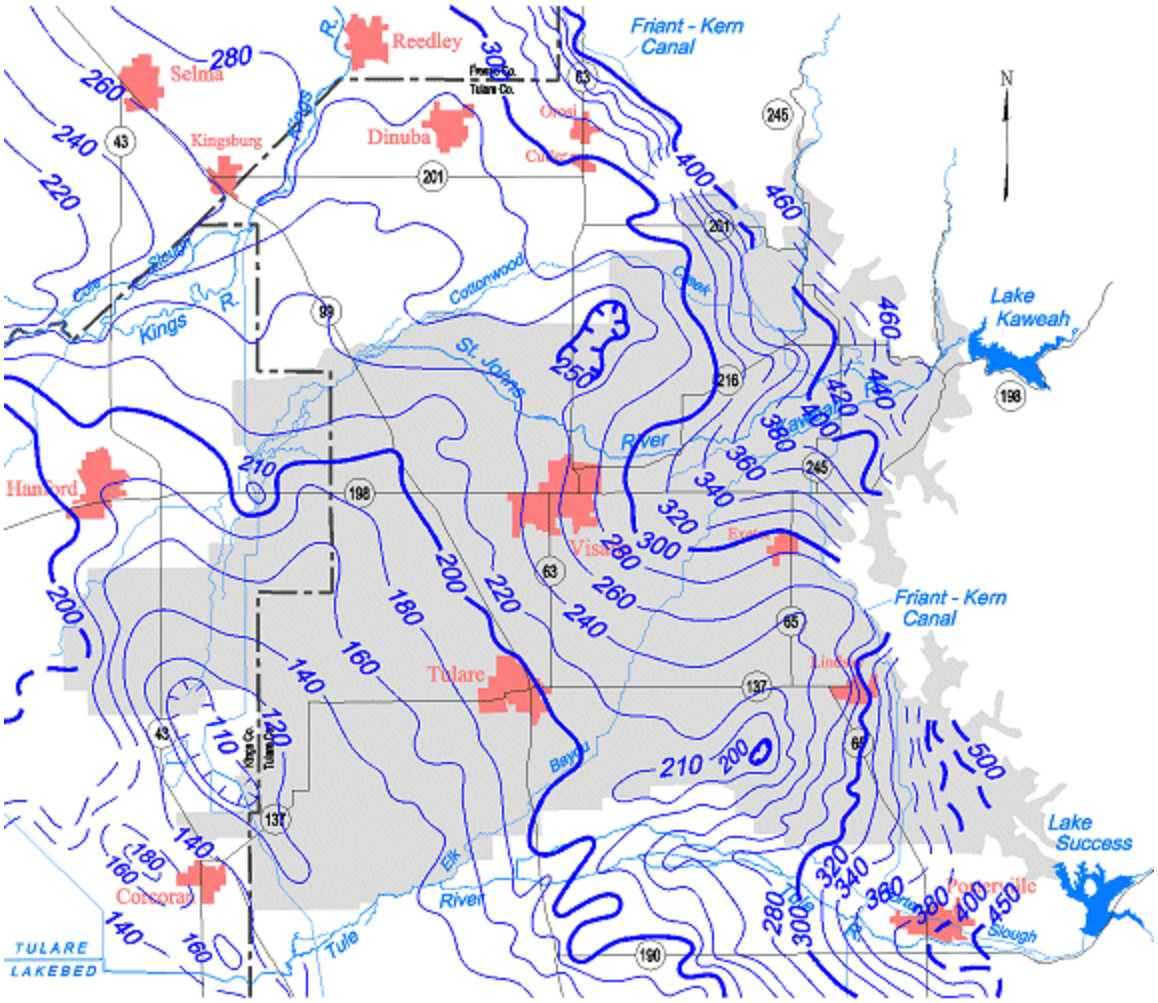
Kaweah Groundwater Basin

Spring 1962, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles

2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

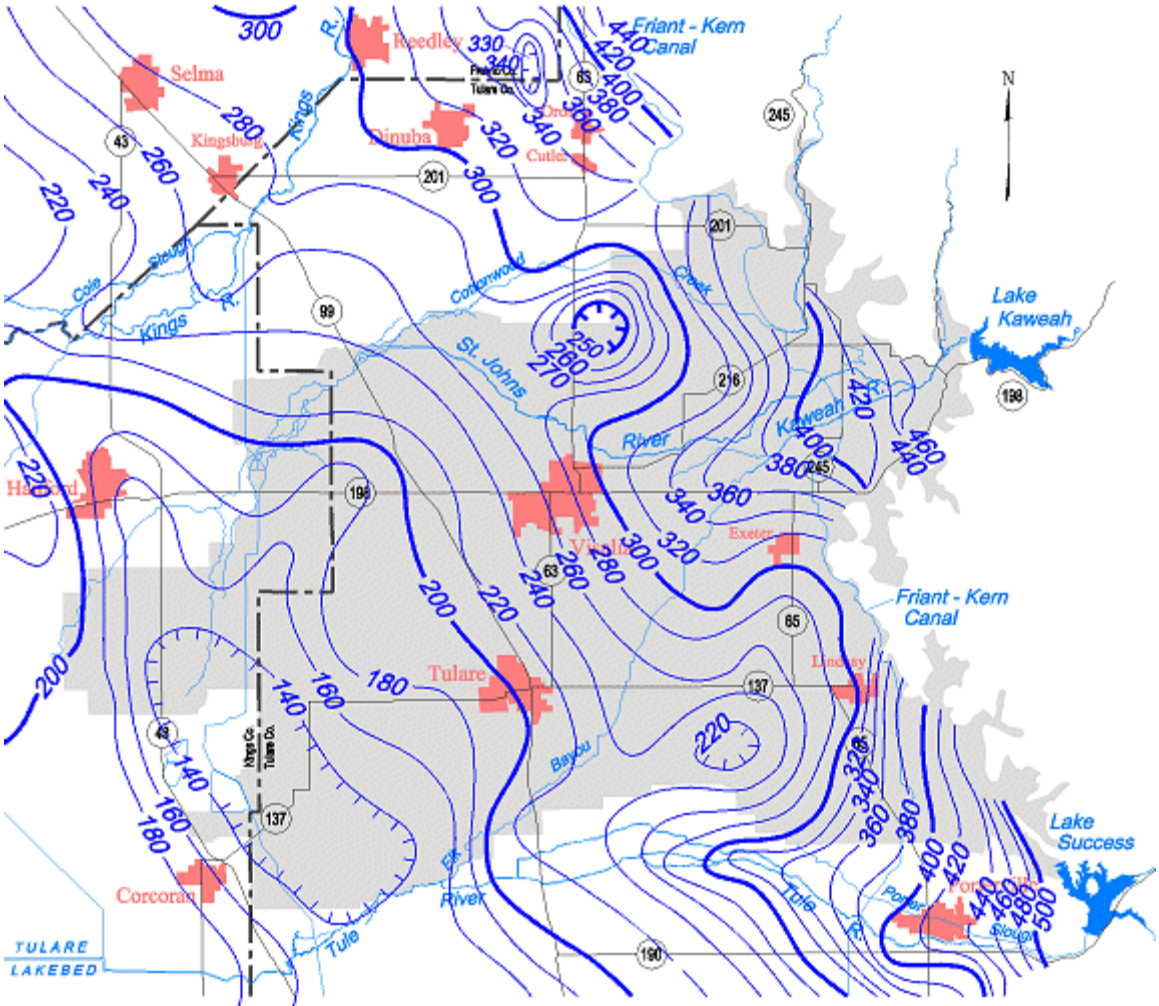
Kaweah Groundwater Basin

Spring 1969, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles

2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

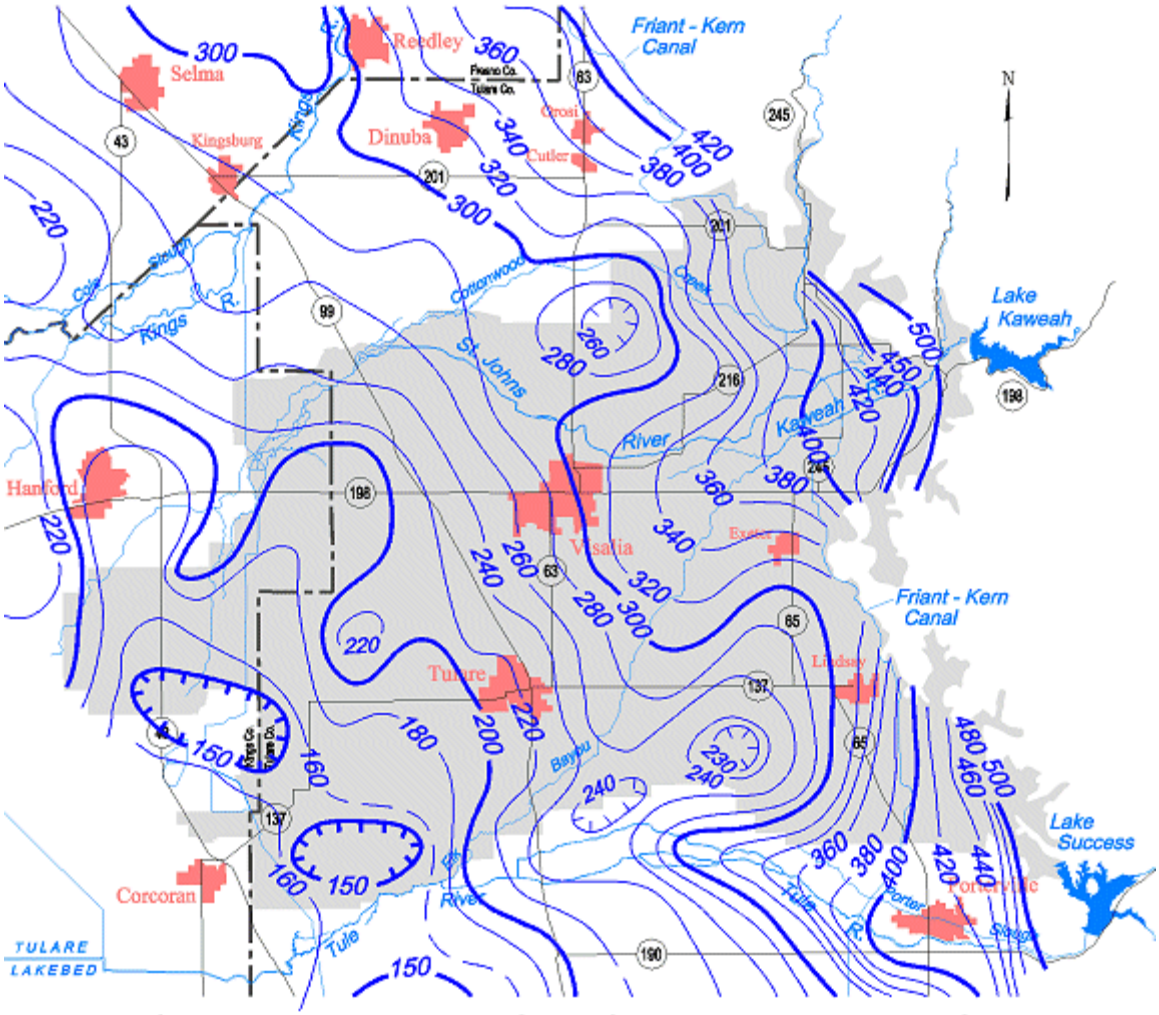
Kaweah Groundwater Basin

Spring 1970, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles

2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

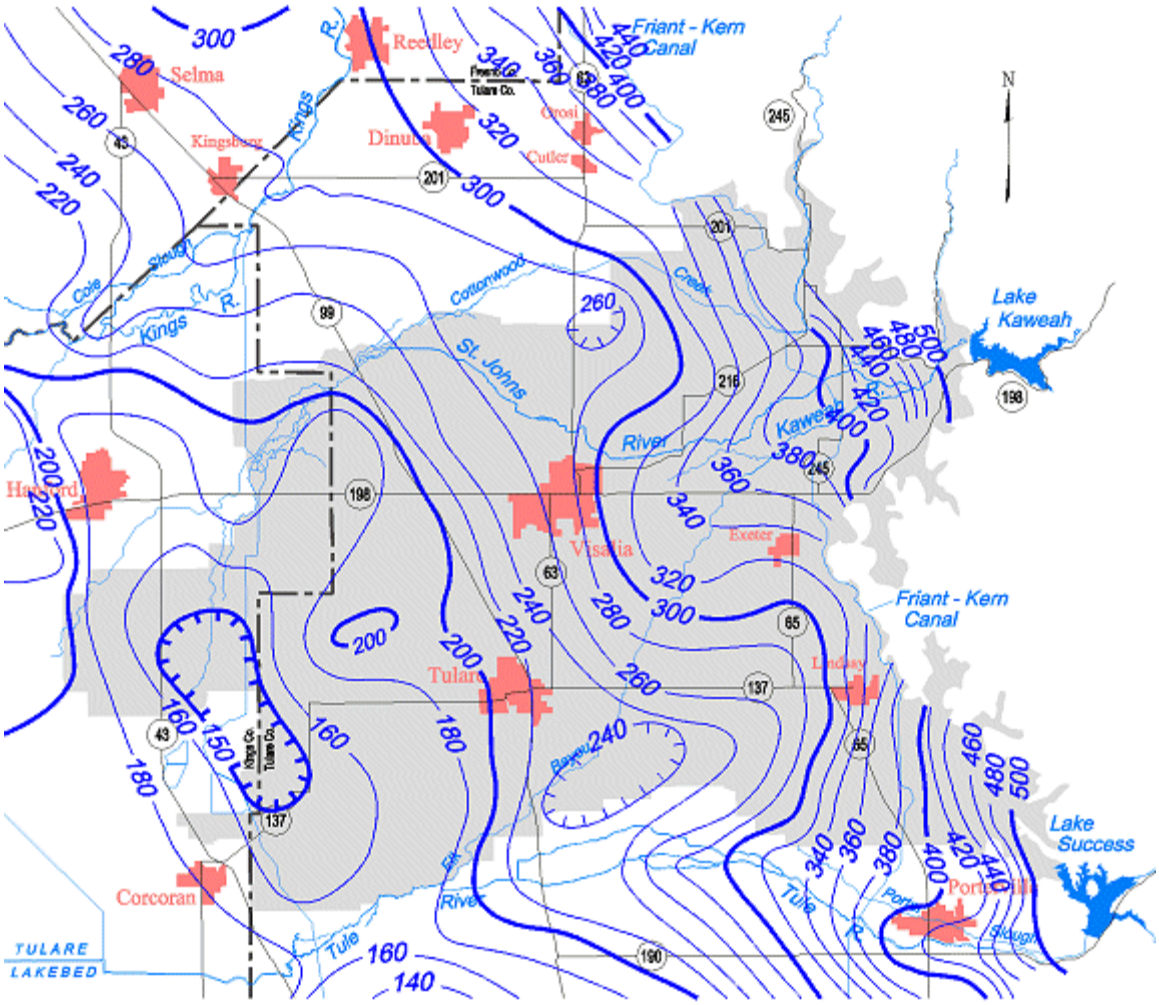
Kaweah Groundwater Basin

Spring 1976, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles

2 0 2 4 6 8

Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

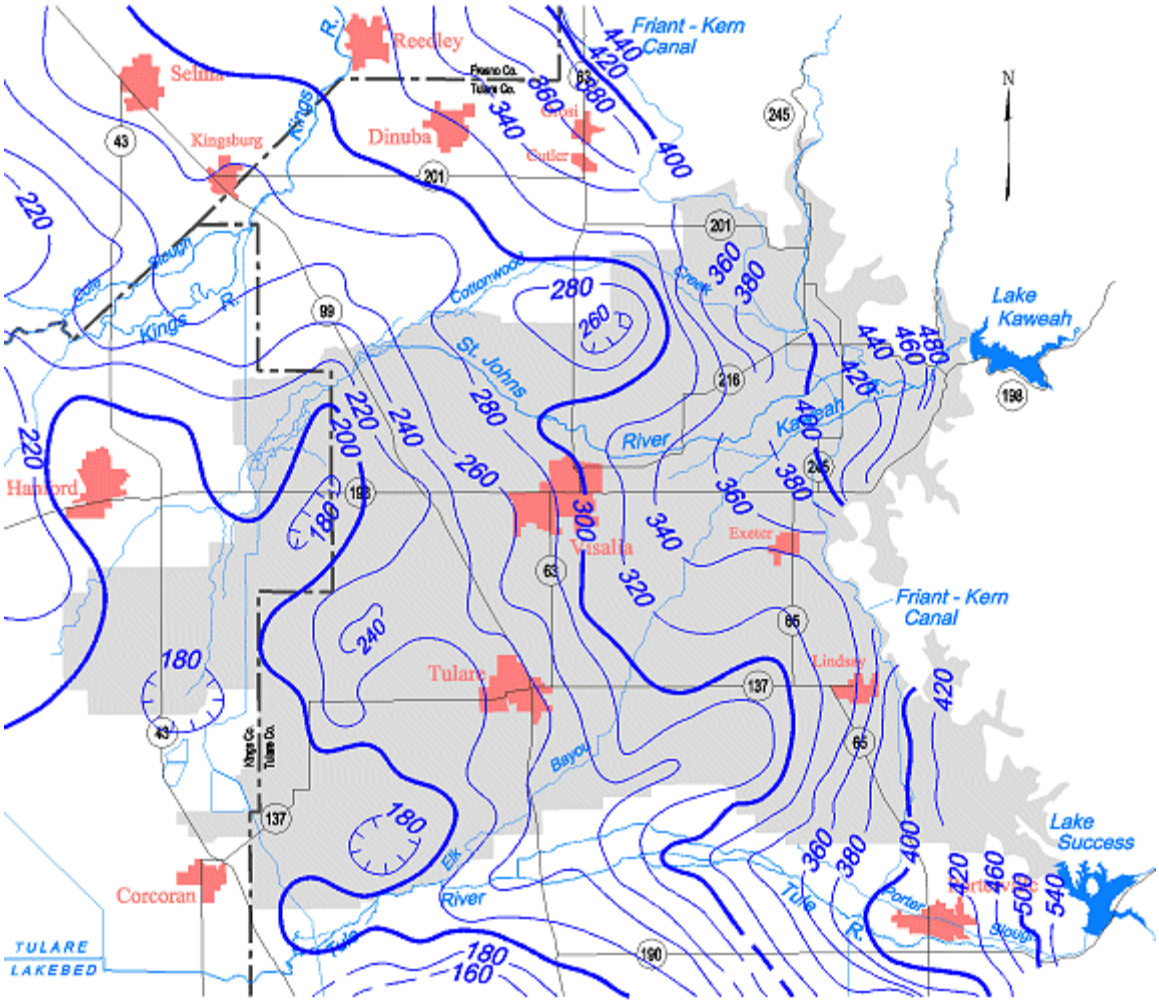
Kaweah Groundwater Basin

Spring 1984, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer

Scale of Miles

2 0 2 4 6 8

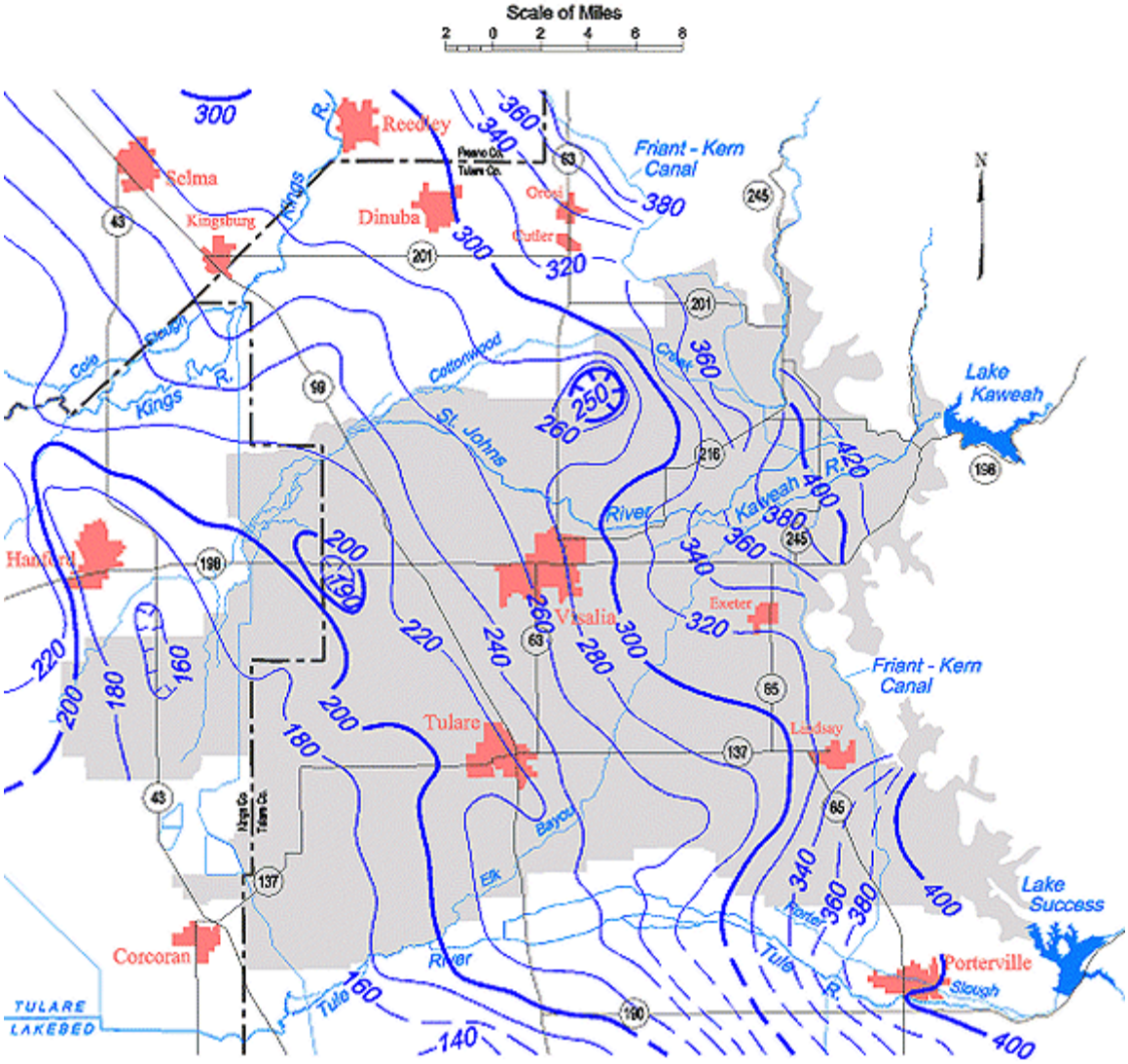
Disclaimer: Base map created from current USGS 1:24,000 and 1:100,000 maps. Some base map features may not have been present (i.e. roads, canals, reservoirs) for the water year shown.



Contours are dashed where inferred. Contour interval is 20 and 40 feet.

Kaweah Groundwater Basin

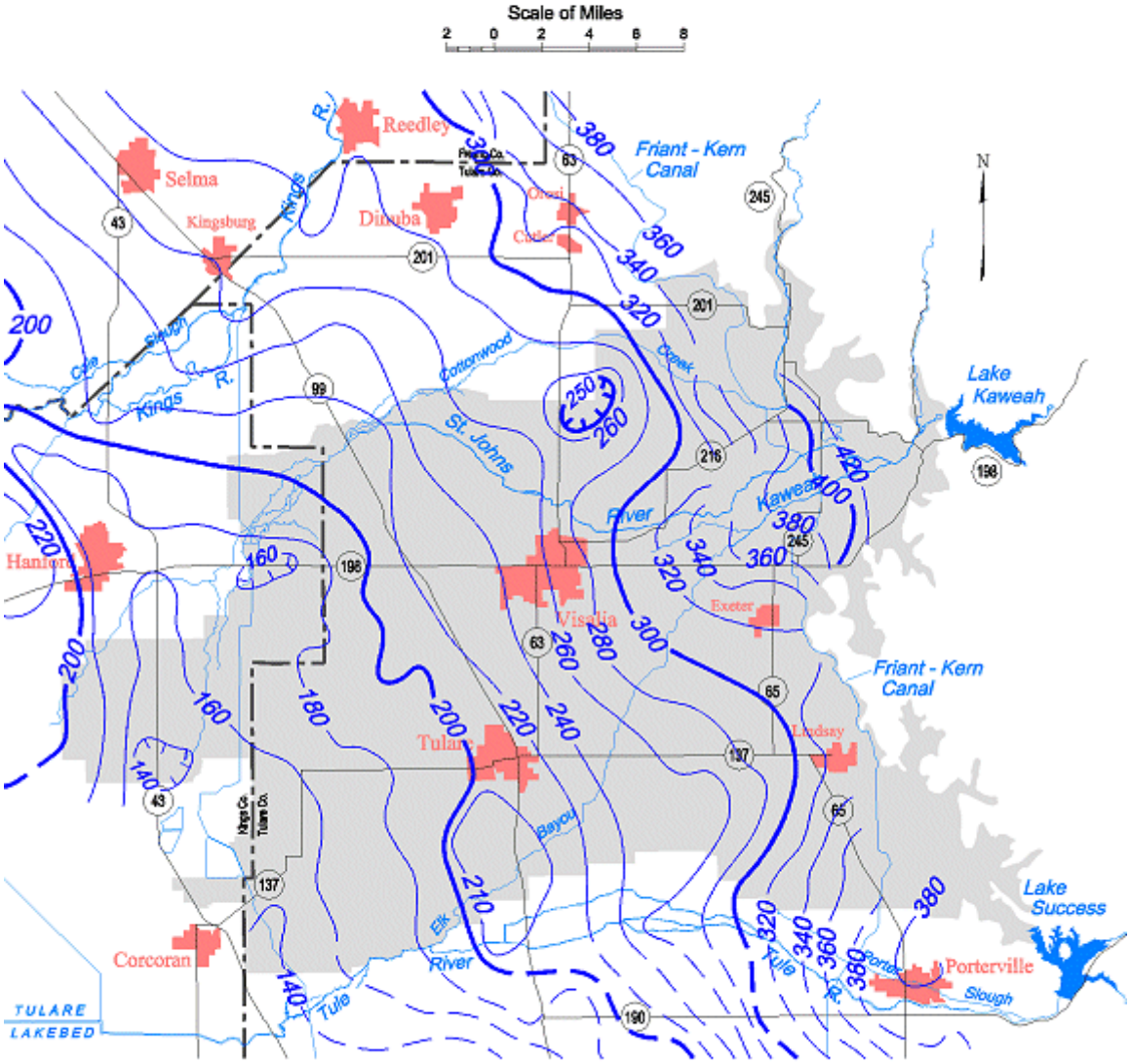
Spring 1989, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

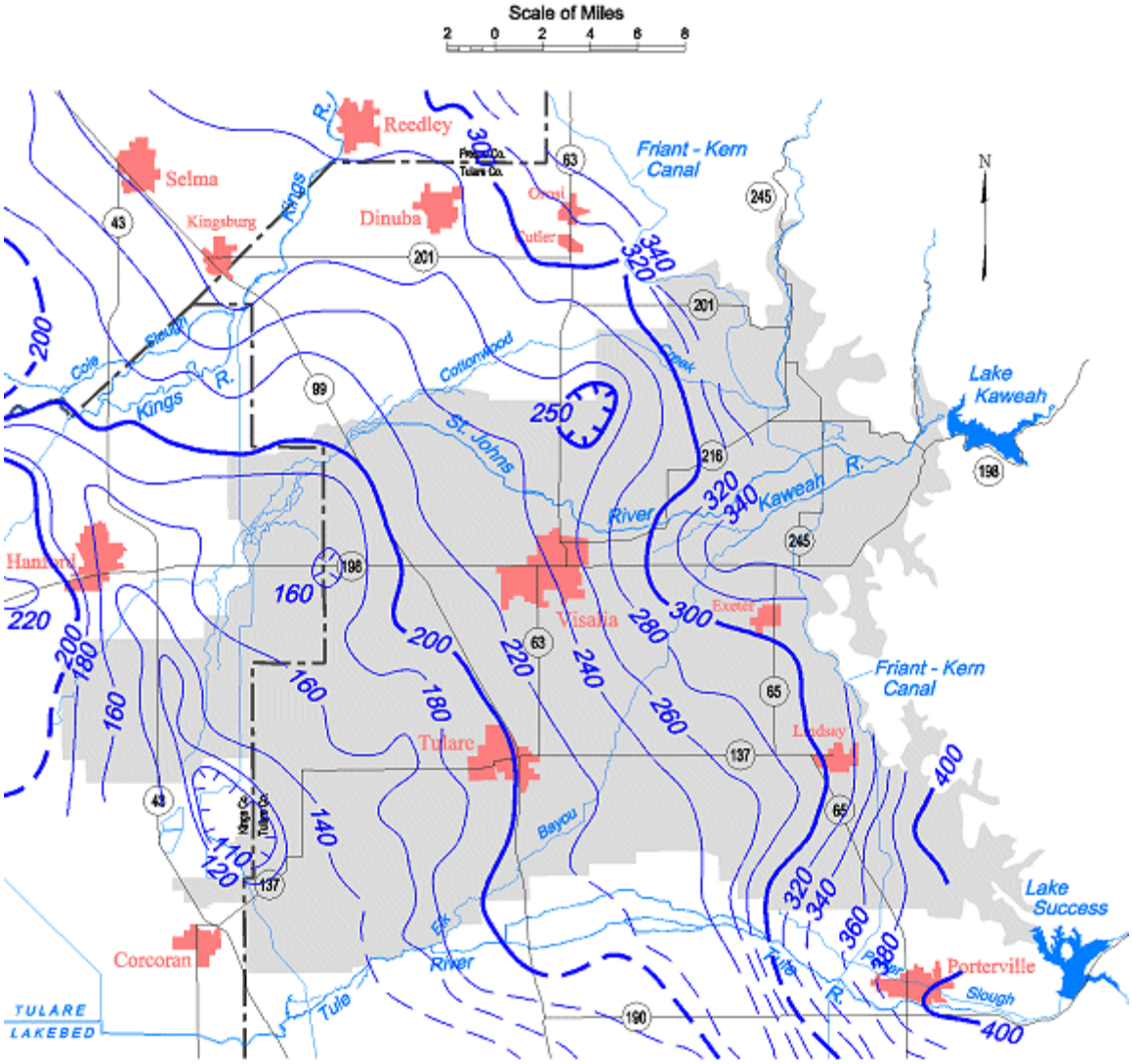
Spring 1990, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

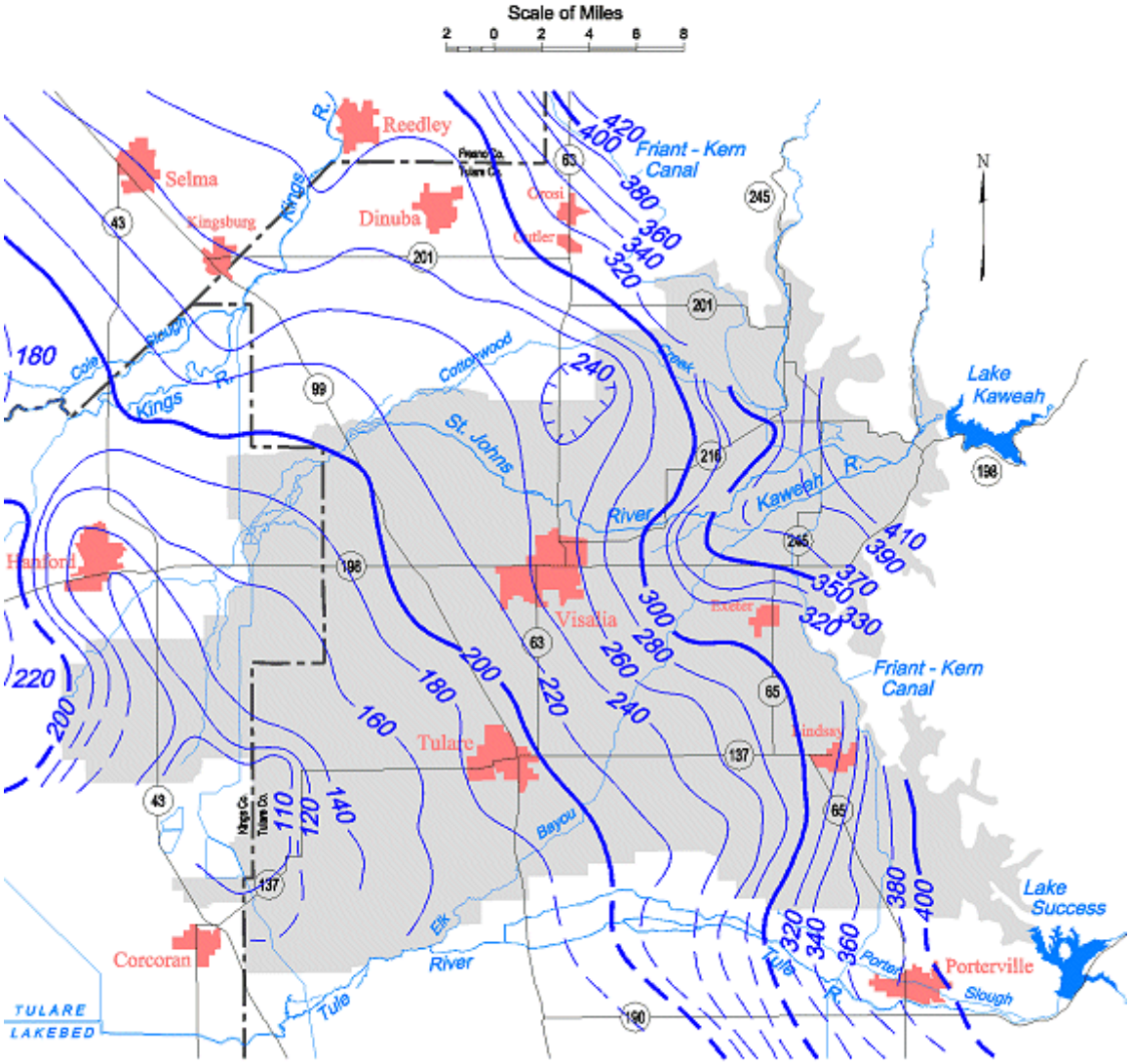
Spring 1991, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

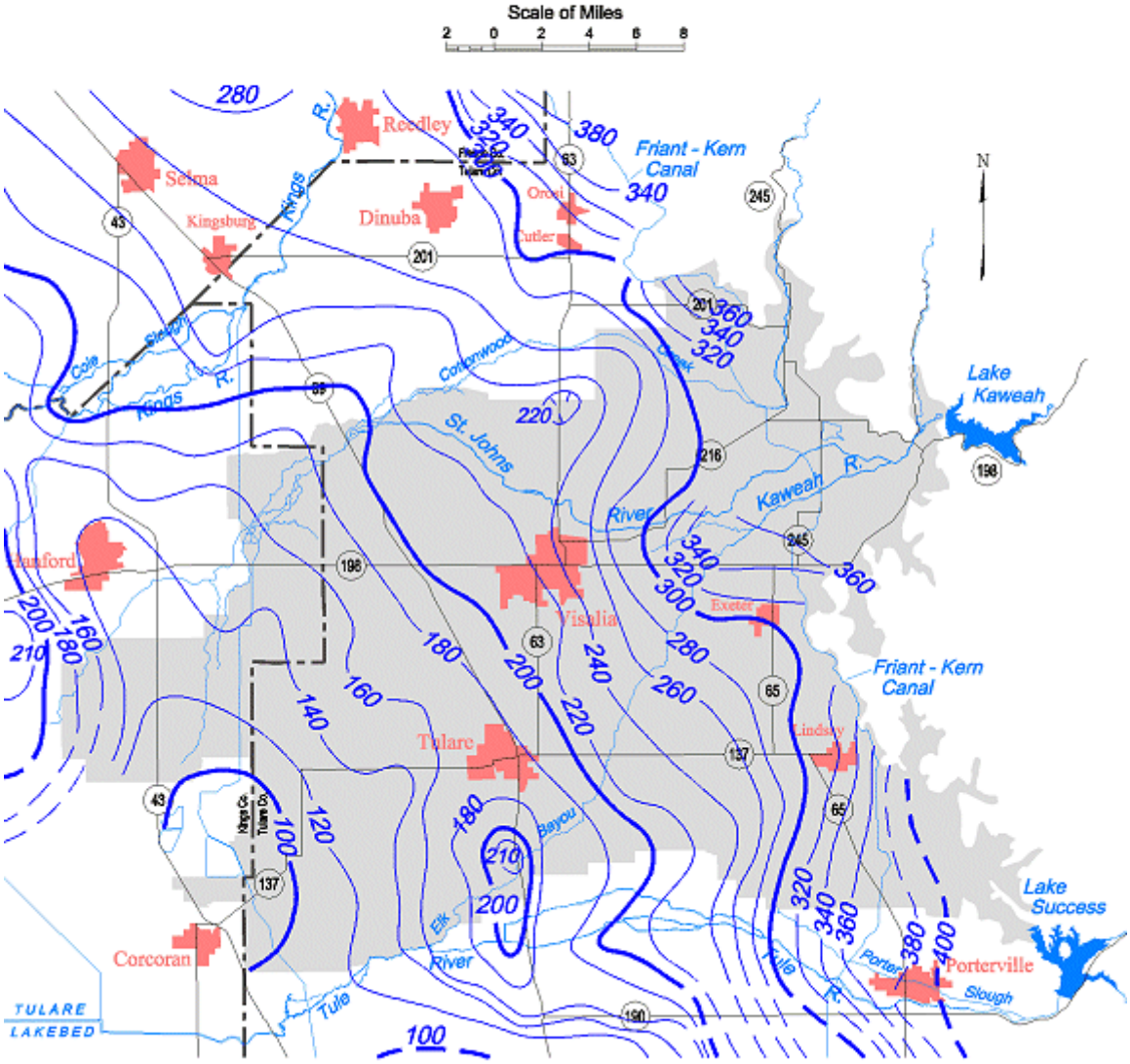
Spring 1992, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

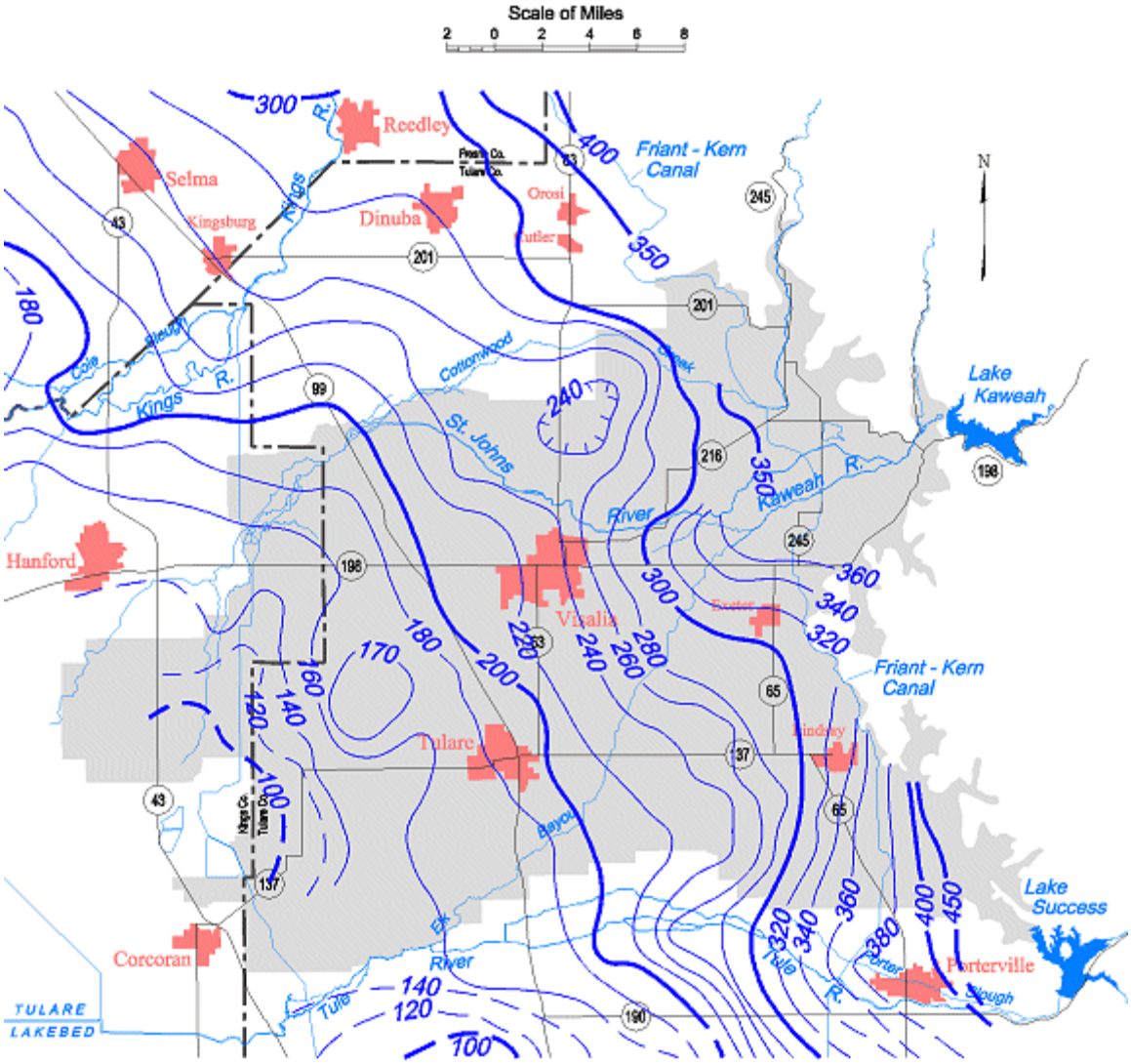
Spring 1993, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

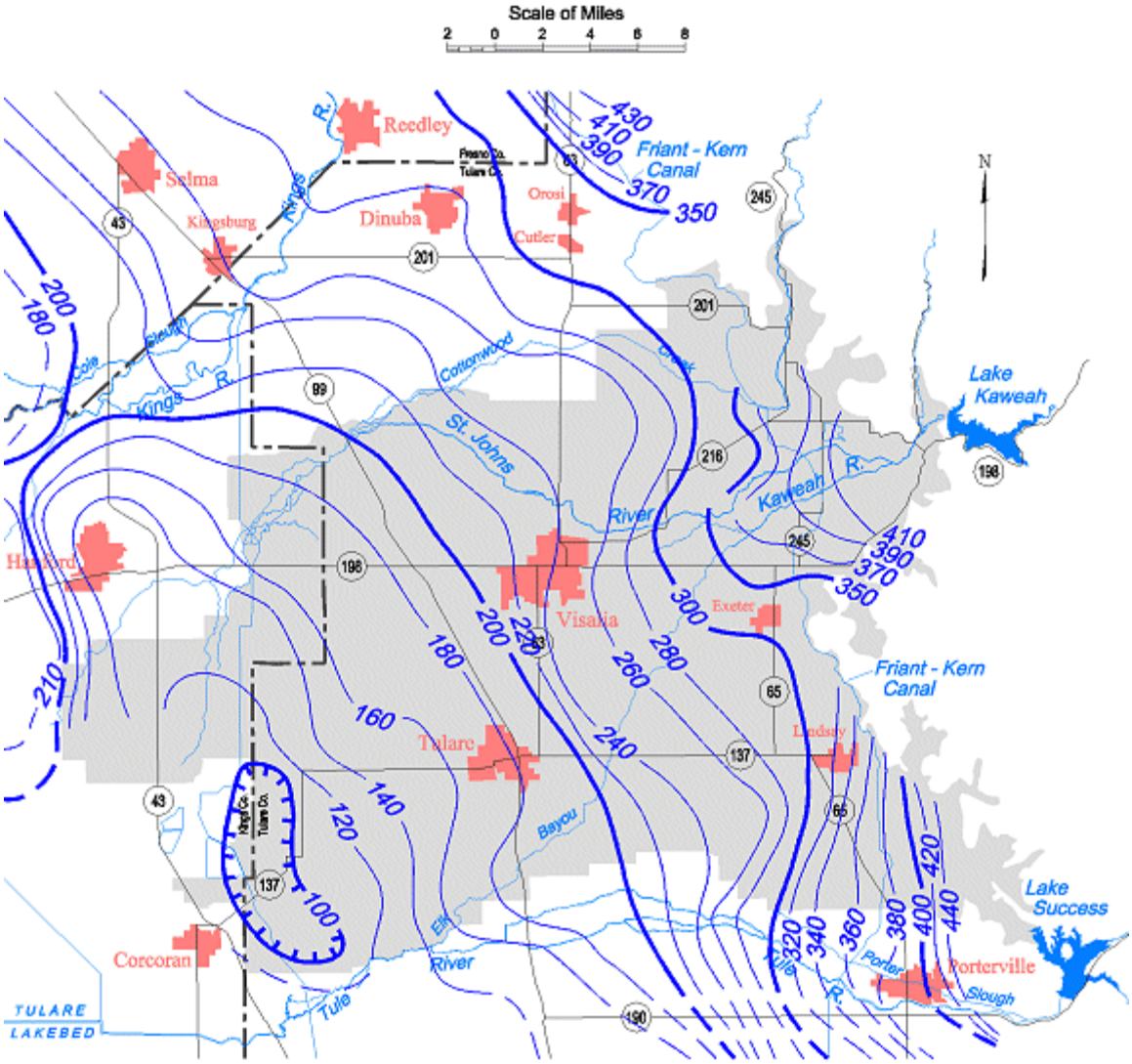
Spring 1994, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

Kaweah Groundwater Basin

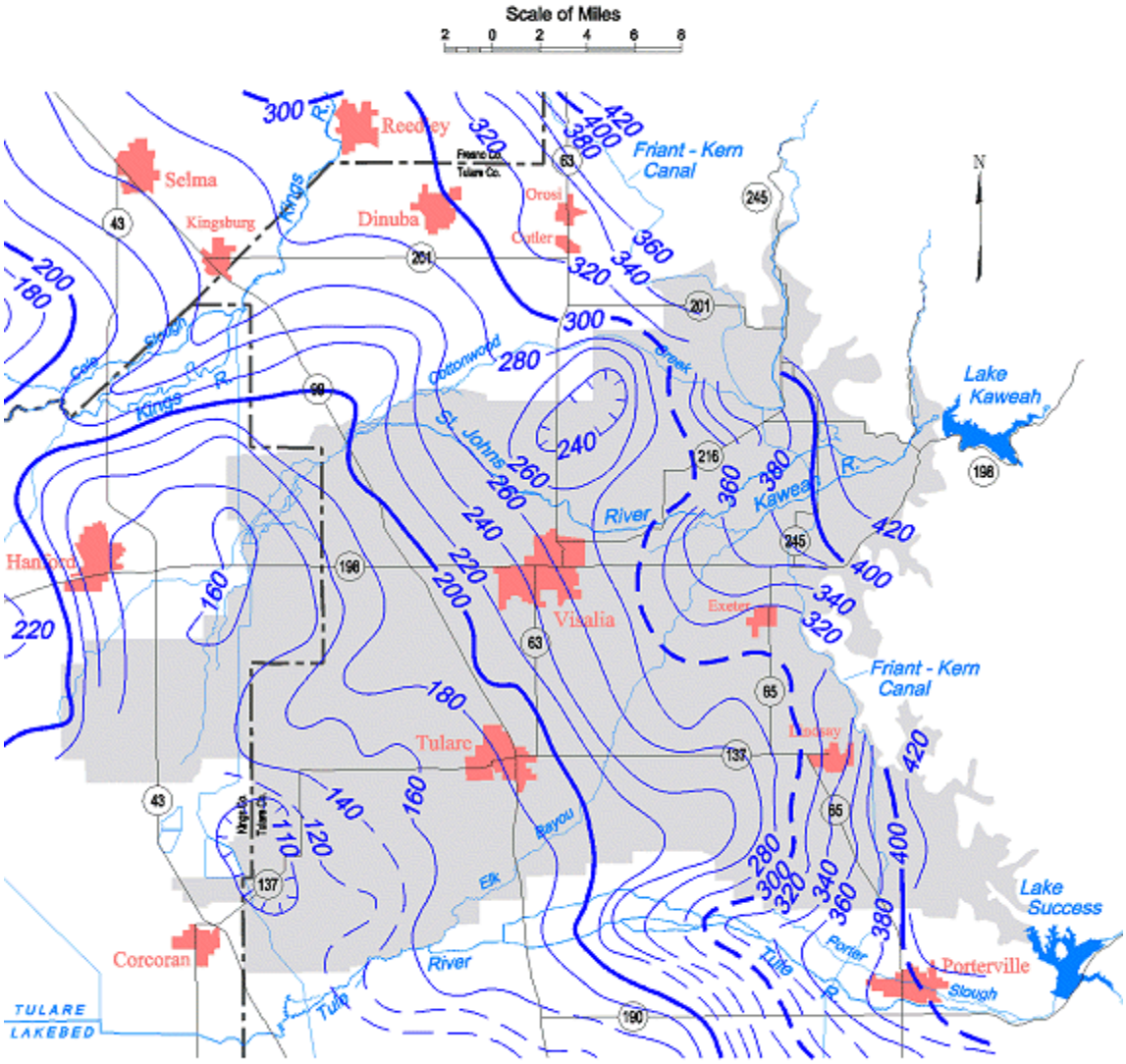
Spring 1995, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

Kaweah Groundwater Basin

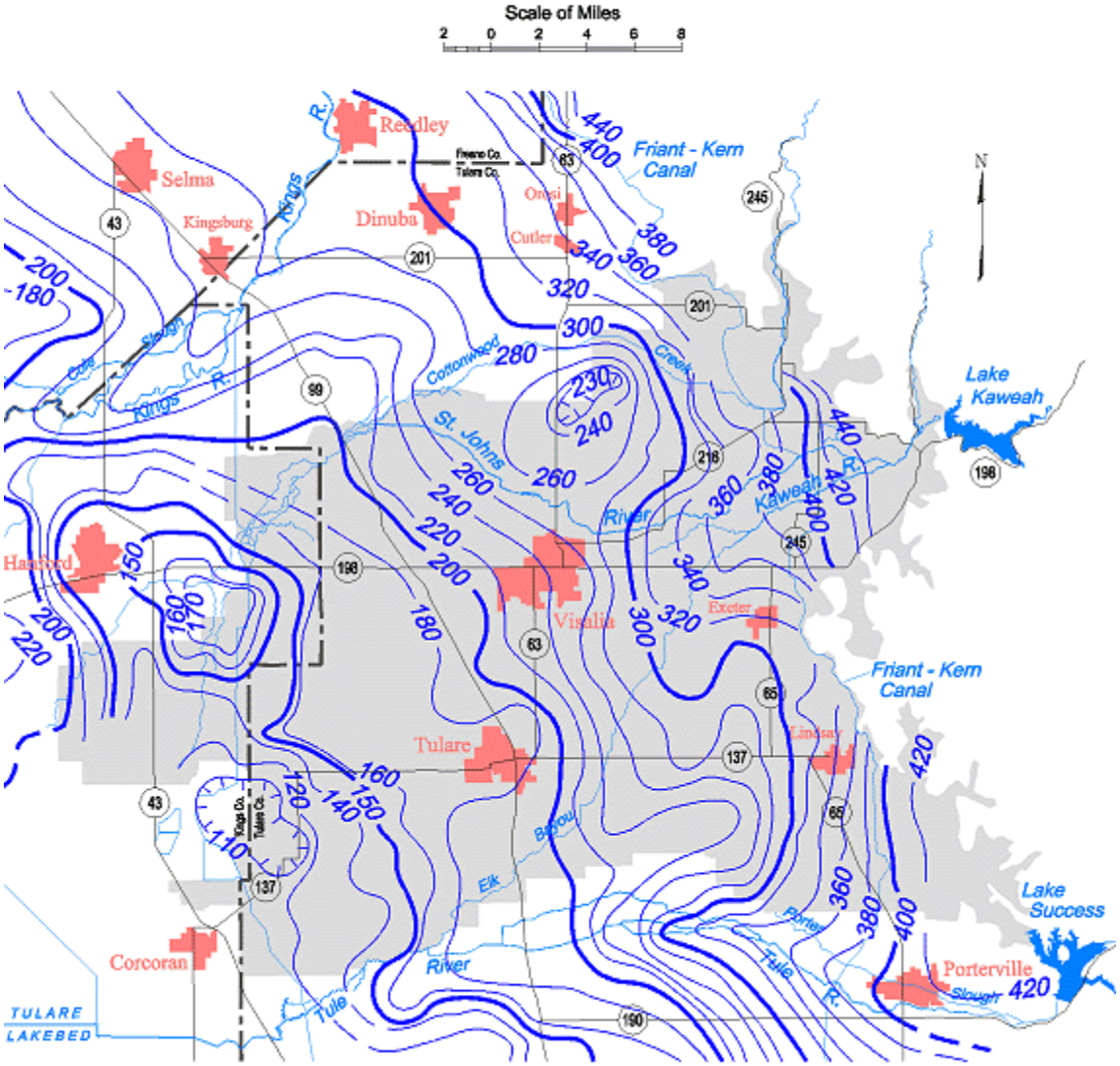
Spring 1996, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

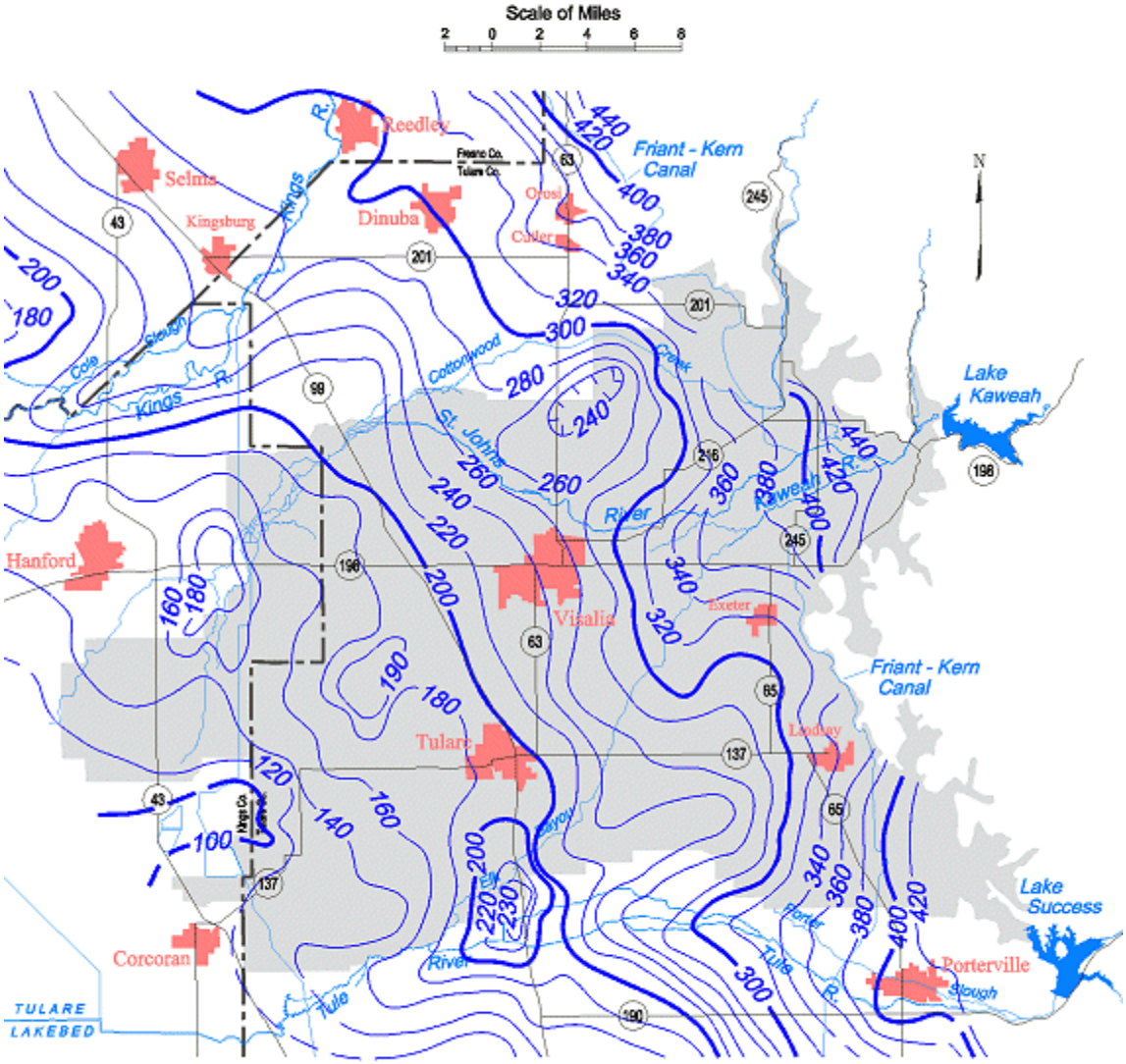
Spring 1997, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

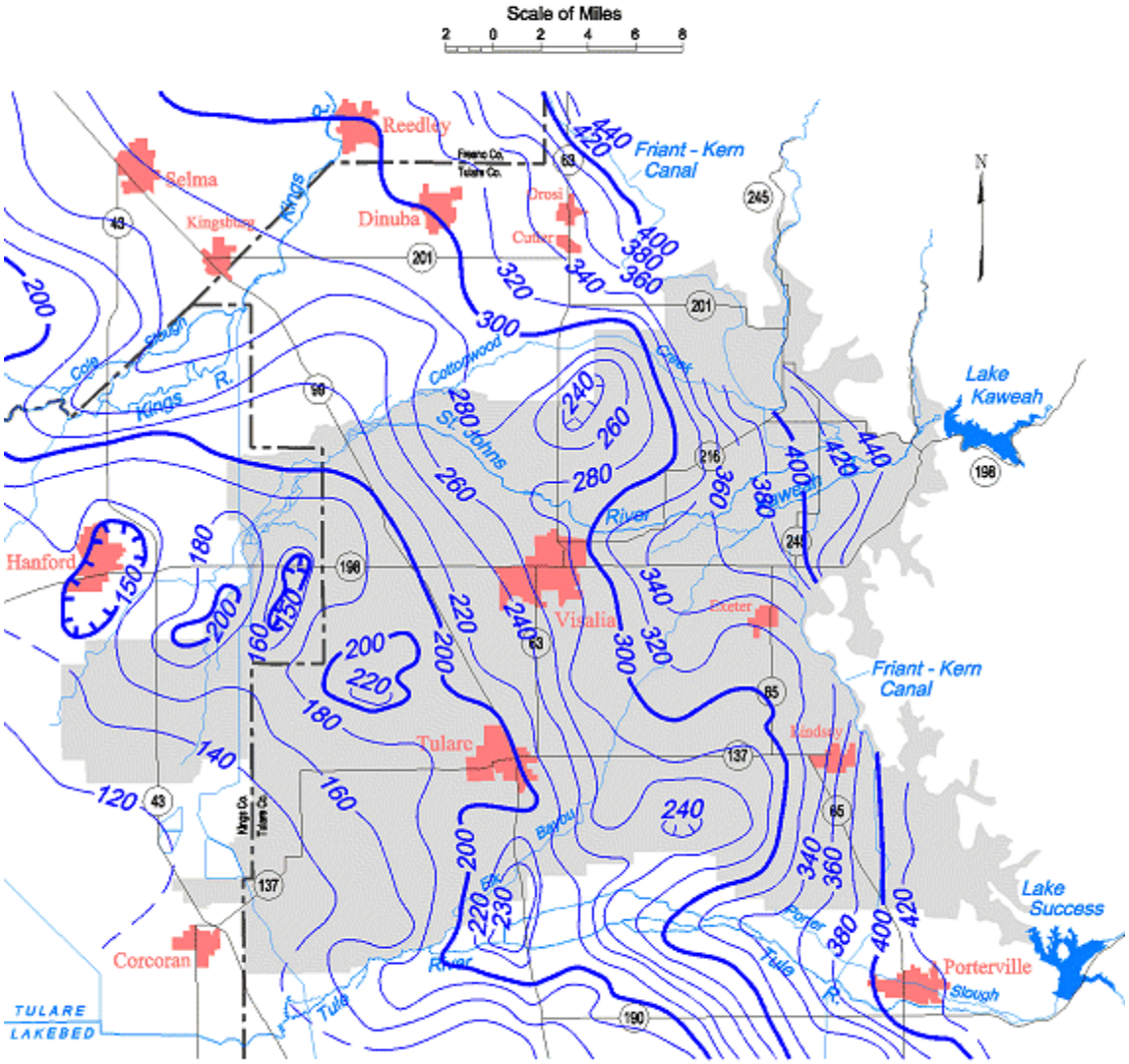
Spring 1998, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

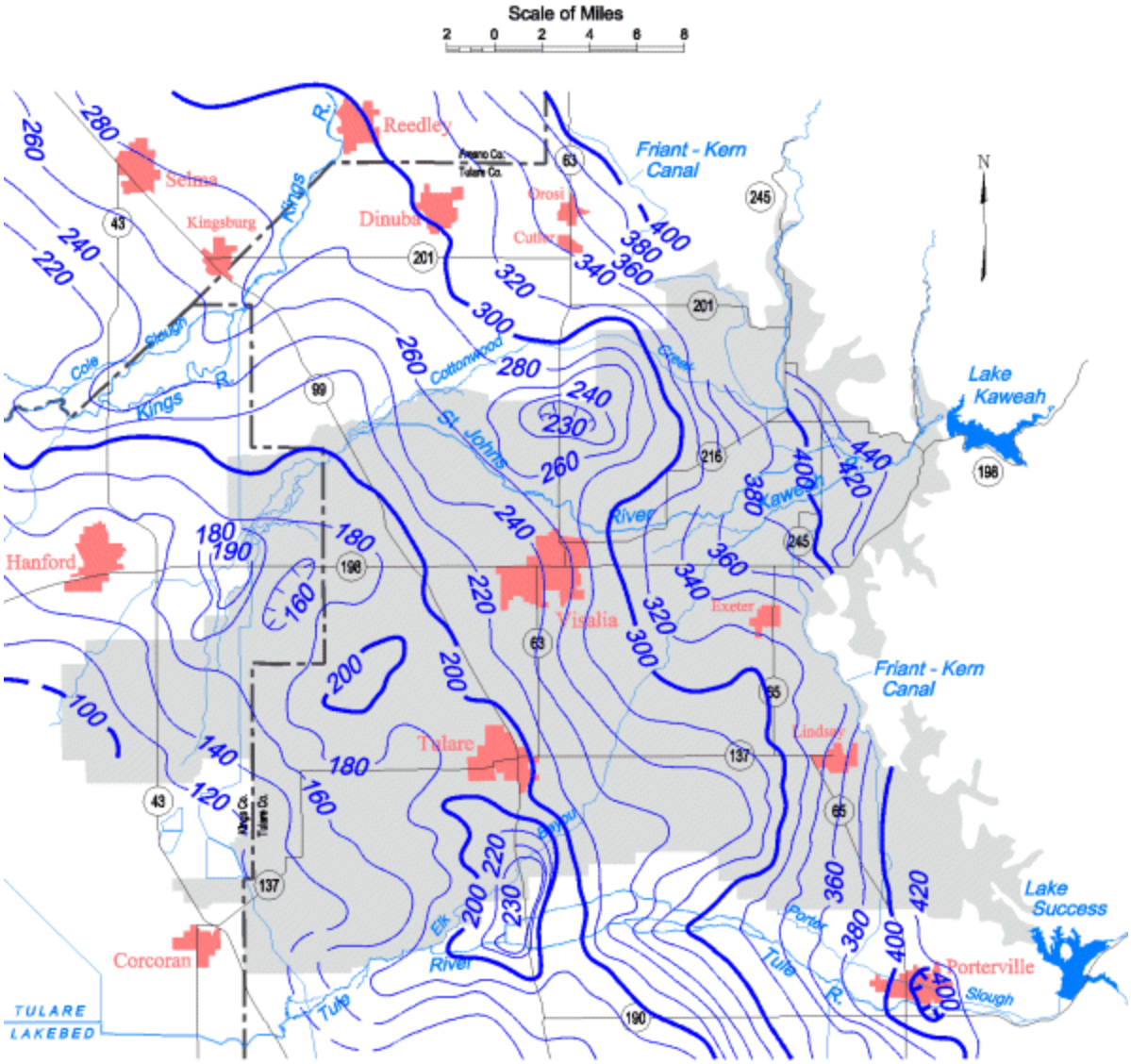
Spring 1999, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

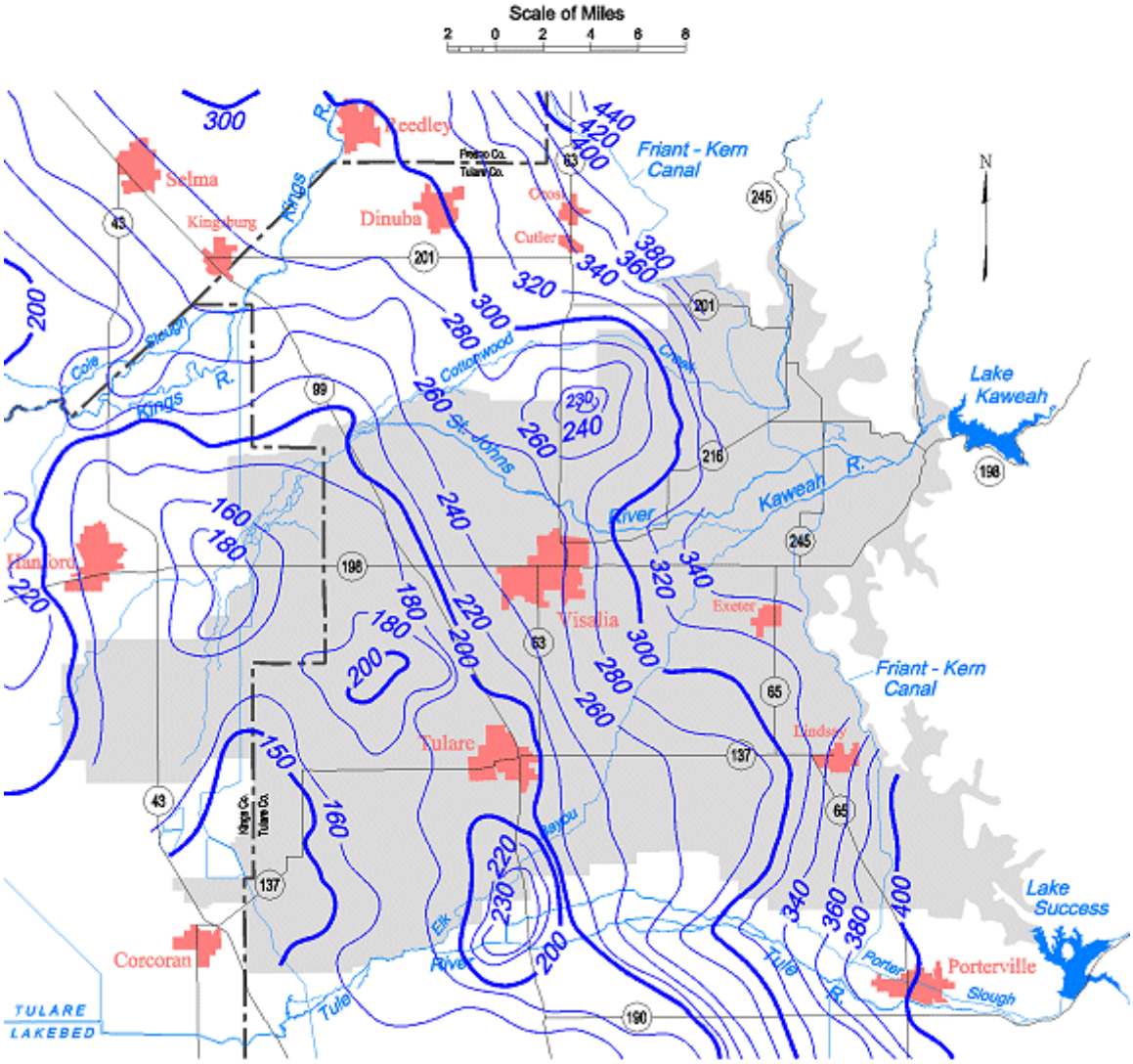
Spring 2000, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

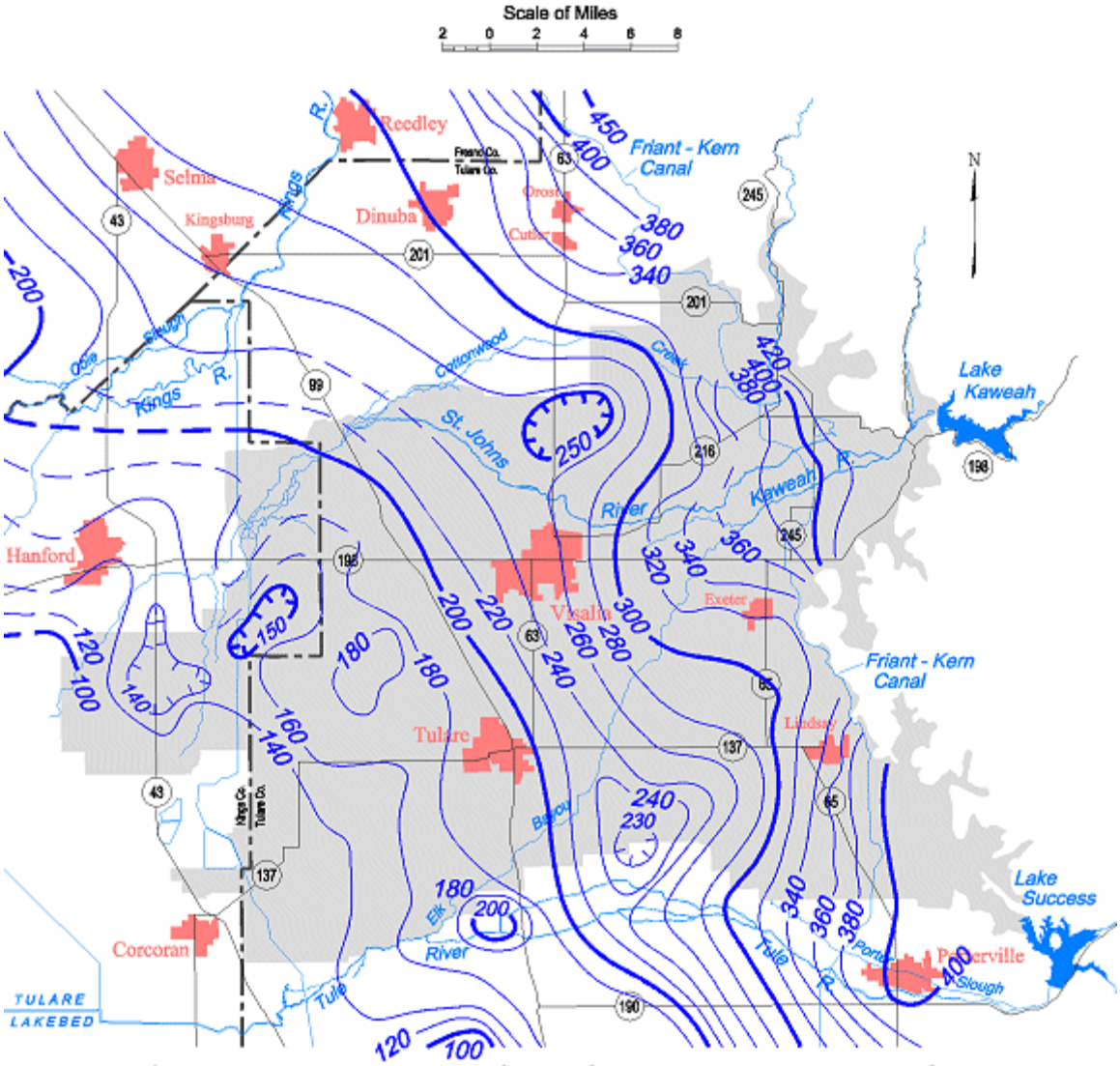
Spring 2001, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

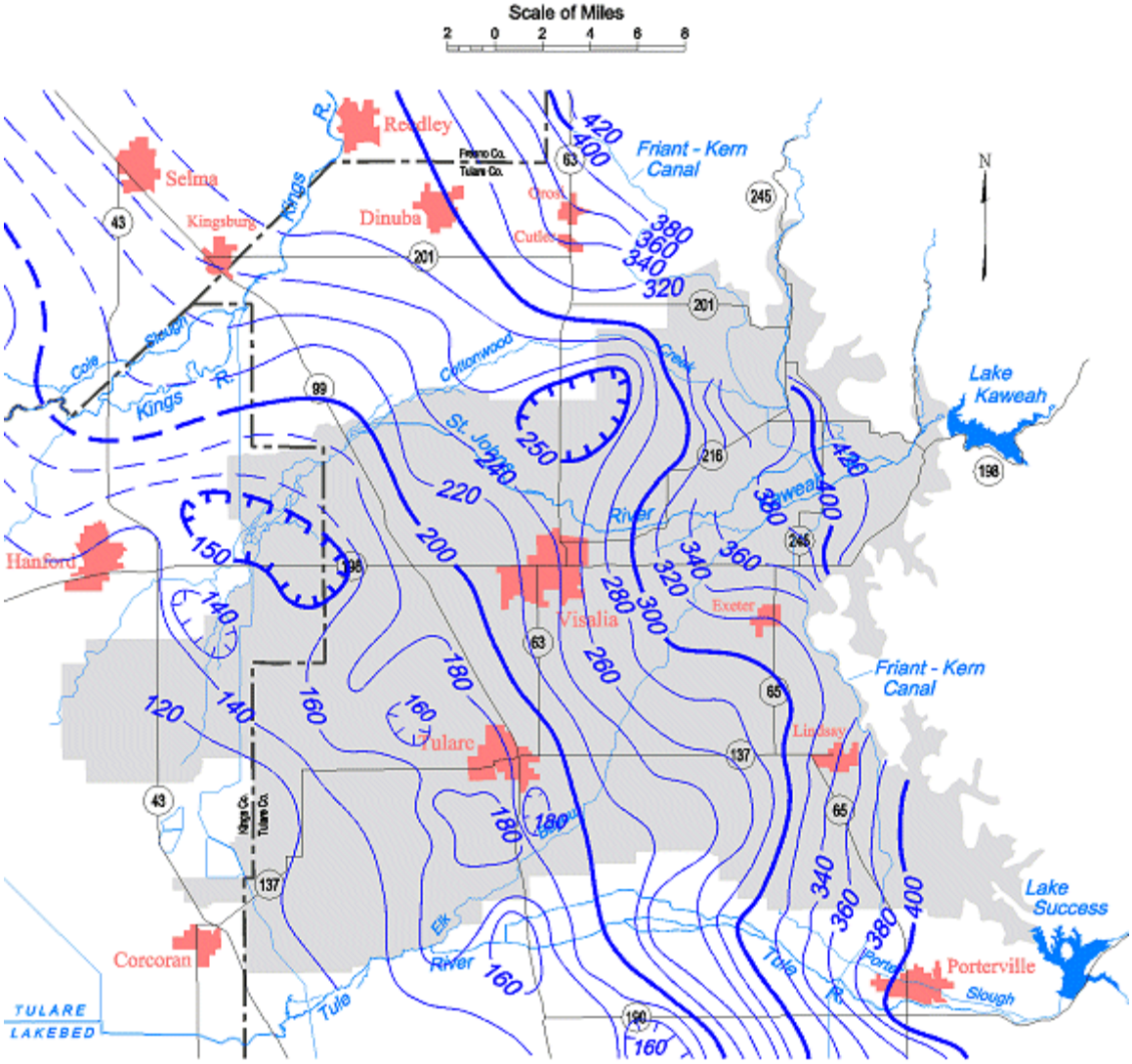
Spring 2002, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

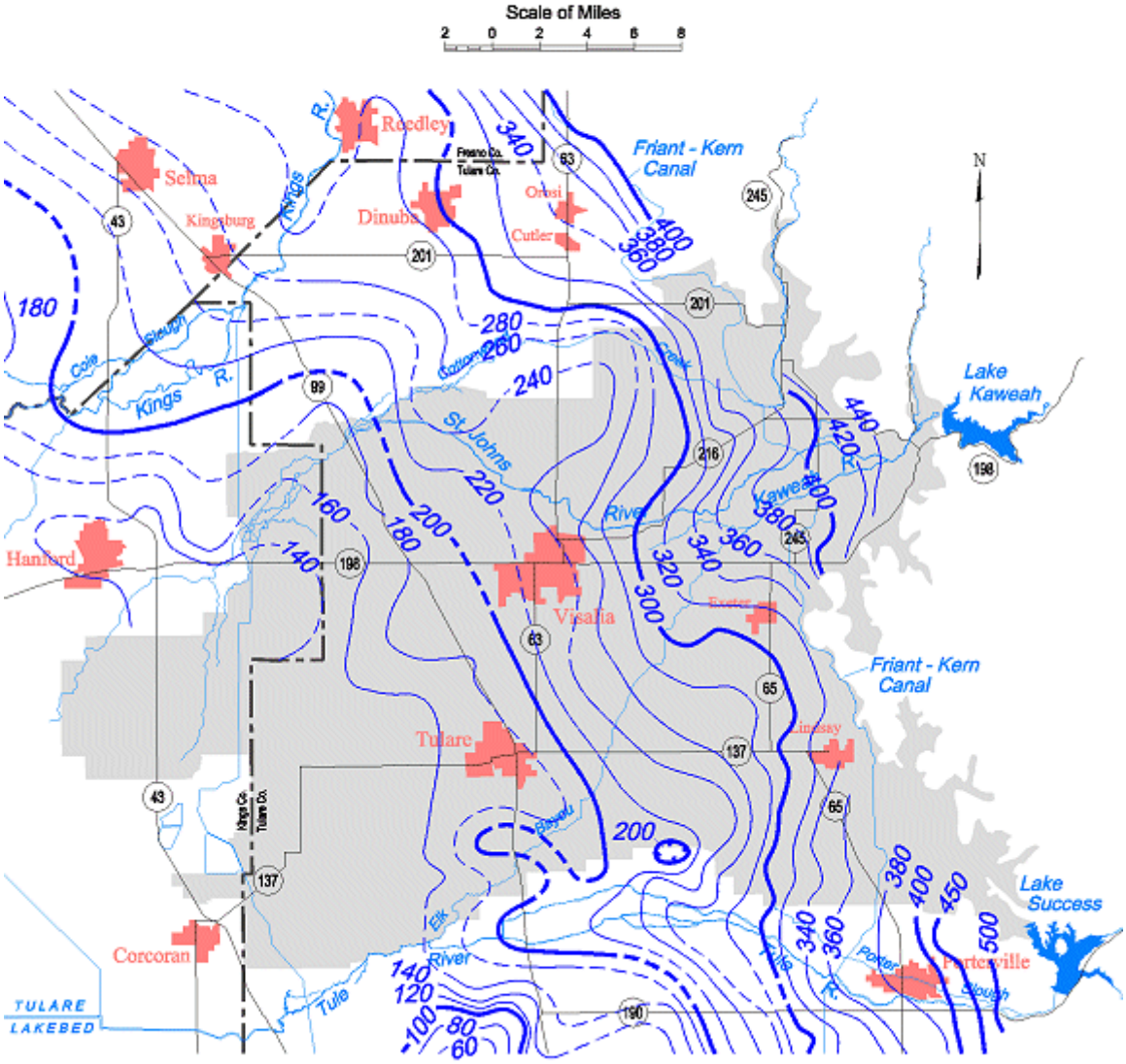
Spring 2003, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10 and 20 feet.

Kaweah Groundwater Basin

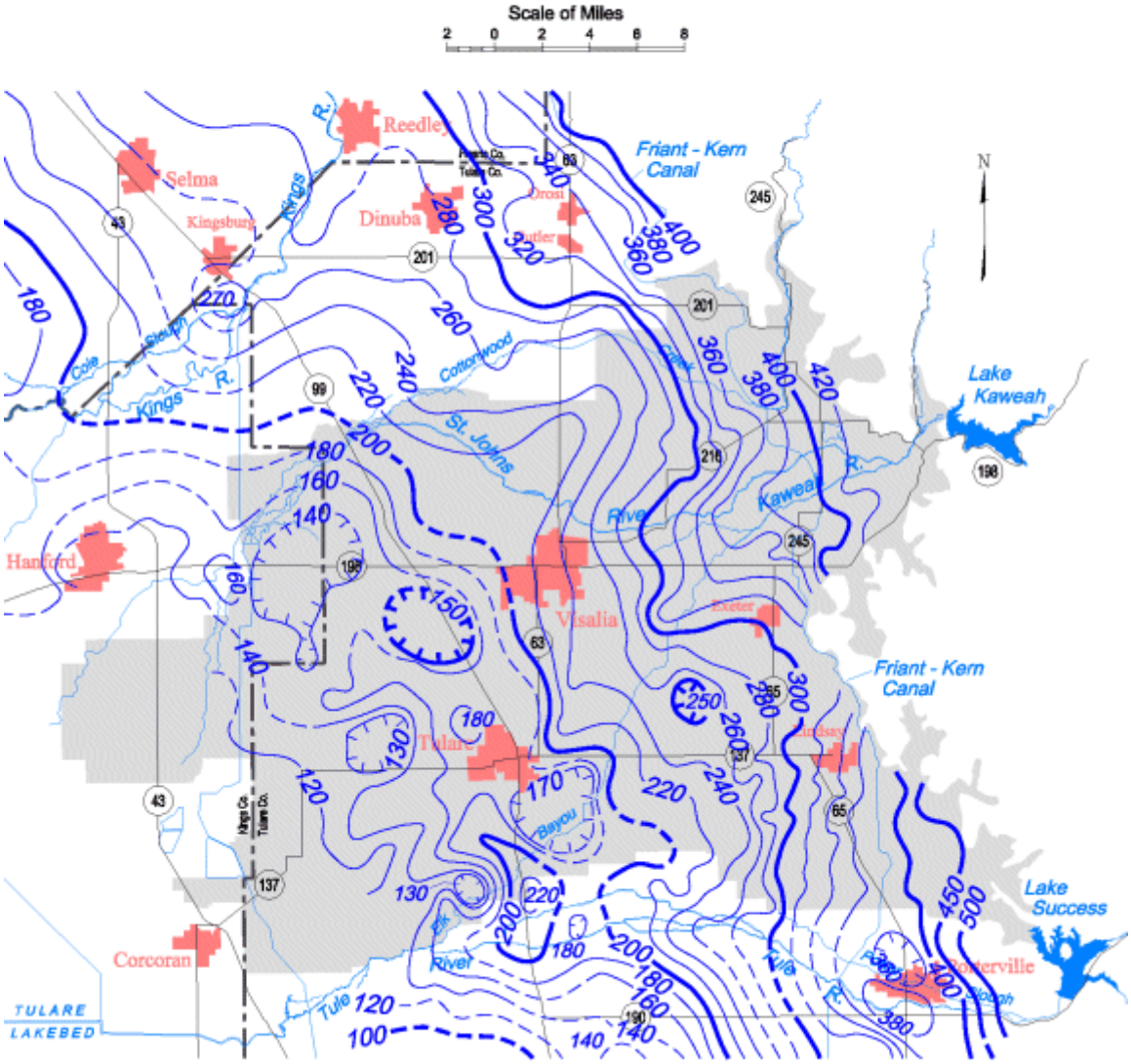
Spring 2004, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 20 and 50 feet.

Kaweah Groundwater Basin

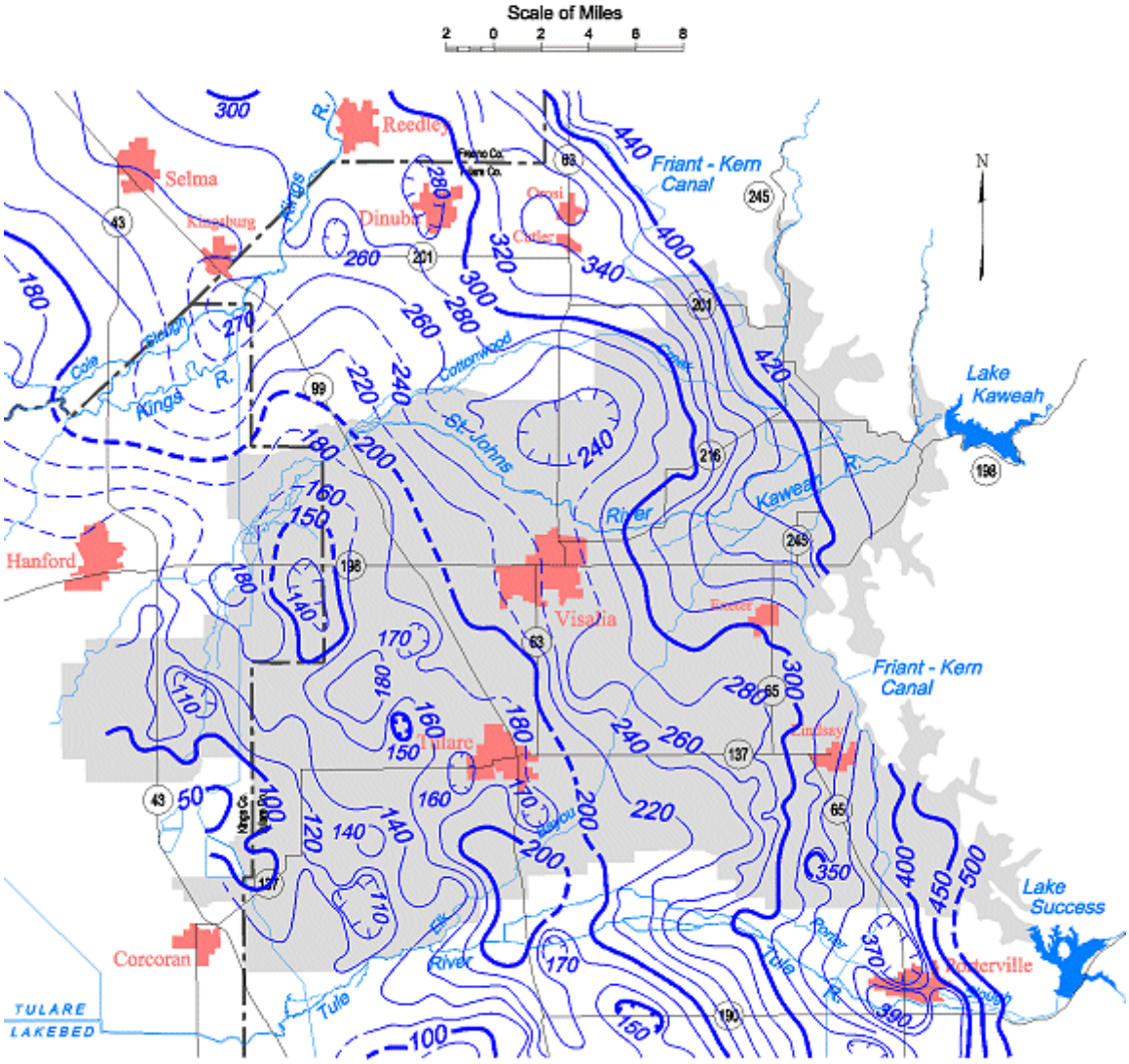
Spring 2005, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

Kaweah Groundwater Basin

Spring 2006, Lines of Equal Elevation of Water in Wells, Unconfined Aquifer



Contours are dashed where inferred. Contour interval is 10, 20 and 50 feet.

APPENDIX J – GROUNDWATER RECHARGE AGREEMENT

AGREEMENT REGARDING DELIVERY OF WATER TO CERTAIN GROUNDWATER RECHARGE FACILITIES

THIS AGREEMENT is made and entered into this 6th day of May, 2008, by and between TULARE IRRIGATION DISTRICT, an Irrigation District organized and existing pursuant to the laws of the State of California (hereinafter referred to as "District"), and the CITY OF TULARE, a Municipal Corporation of the State of California (hereinafter referred to as "City").

WITNESSETH

A. WHEREAS, District is a public entity engaged in the importation and delivery of water for irrigation purposes to landowners within the District; and

B. WHEREAS, City and District entered into an Agreement dated May 10, 2005 (the "Master Agreement"), which provides for the use by City of certain canal and ditch facilities owned and controlled by District for the purpose of disposing of storm drainage; payments by City in lieu of District assessments; an agreement to develop joint policies related to impacts of new urban development on District facilities; and an agreement to consider and enter into various joint projects; and

C. WHEREAS, City has determined that it is in City's interest to acquire water from District and to deliver such water to groundwater recharge basins in locations that will provide a groundwater recharge benefit to areas that serve City; and

D. WHEREAS, in addition to purchasing water, City has the need to acquire basins to which such water can be delivered; and

E. WHEREAS, City and District have entered into an agreement dated December 4, 2007, ("Joint Purchase Agreement") providing for the joint purchase of property located at the corner of Road 132 and Avenue 256, known as the "Plum Property", for the purpose developing such property to a groundwater recharge basin. The Joint Purchase Agreement establishes joint rights in the Plum Property. After execution of the Joint Purchase Agreement, the property has been acquired as envisioned; and

F. WHEREAS, the Joint Purchase Agreement obligates the parties to negotiate and enter into a subsequent agreement providing for the purchase of water by City and the delivery of such water to various City, District and joint City-District facilities; and

G. WHEREAS, the parties now desire to set forth their agreement regarding the obligation of District to deliver water to various facilities, and the obligation of the City to pay the costs of such delivered water.

NOW THEREFORE, the parties hereto covenant and agree as follows:

1. **Definitions.** The following terms, when appearing as capitalized terms elsewhere in this Agreement, shall have the following meanings:

"Agreed Facilities" shall mean all of those facilities described in Exhibit A attached hereto. City may identify in the future any City-owned property it believes would be beneficial to receive water pursuant to this Agreement, and with the consent of District, such facility shall be added to the Agreed Facilities list, subject the District maintaining its discretion for determining the timing and amount of water to be delivered to such City facilities.

"Average Annual Quantity" shall initially mean approximately 10,000 a.f., such amount to be increased proportionally if adjustments to City's jurisdictional boundaries consistent with the Master Agreement results in more land being included within City boundaries or if the City increases its groundwater extractions from City-owned wells. Said Average Annual Quantity is to be annually derived in accordance with a formula as defined in Exhibit B attached hereto.

"Credited Water Balance" is defined as the amount of water, in acre feet, calculated by determining the total cumulative water delivered by District during the five year period immediately preceding the date of calculation, and subtracting from that amount the sum of the Average Annual Quantity for each of the previous five years or the number of years this Agreement has been in effect, whichever is less. By way of example only and not by limitation, assuming 55,000 acre feet have been delivered to the Agreed Facilities during the past five years, and assuming that the Average Annual Quantity in effect through the past five years is 10,000 acre feet, the Credited Water Balance would be equal to: 55,000 a.f. – (10,000 a.f. * 5); or 55,000 a.f. – 50,000 a.f.; or +5,000 a.f.

2. **Obligation to Deliver Water.** District hereby agrees to deliver on an annual basis a certain average quantity of water, defined above as the Average Annual Quantity, to the facilities defined above as the Agreed Facilities. District shall be responsible for determining, with the advice and consent of City, the manner and location of the water to be delivered, and shall not be

required to deliver all or any percentage of the water to be delivered to any particular basin, including the basin to be constructed by City and District jointly on the Plum Property. District shall endeavor to ensure that the Credited Water Balance, as annually reported pursuant to the provisions of paragraph 3 below, remains greater than or equal to zero. The purpose of the Credited Water Balance calculation is ensure that a total of 10,000 acre-feet of water is delivered on a rolling five year average annual basis, recognizing that water conditions will allow for more water to be delivered in some years and less in other years. The Credited Water calculation and accounting is not intended to establish a "water bank" or in any other way establish a right to the amount of water calculated through the Credited Water accounting system.

3. Accounting for Delivered Water. District shall, by October 31st each year, document and provide an annual summary of the water deliveries made pursuant the Water Purchase Agreement, and shall endeavor to document estimates of groundwater recharge benefits that resulted from or are anticipated to result from such water deliveries. As part of such annual summary, District shall calculate the Credited Water Balance according to the formula defined above.

4. Timing of Water Deliveries. Water deliveries shall occur only during those times when water is available to District for delivery, and can be recharged into the Agreed Facilities. To the extent that District makes deliveries to any of the Agreed Facilities that are under the City's control ("City's Facilities"), District shall provide an anticipated schedule of such deliveries and flow rate with reasonable advance notice to City for approval, and District shall not cause water to flow into any such City's Facilities without City's consent.

5. Water Charges. City shall pay a unit water delivery charge associated with such delivered water that is equal to the water charge paid by District for its Central Valley Project Class 2 contract supply. Such payment shall be made annually and shall be based on the then-current Average Annual Quantity.

6. Water Source & Quality. District reserves the right to determine the source of the water from which deliveries will be made to satisfy this Agreement. District does not guarantee the quality of water delivered pursuant to this Agreement; District agrees that such water shall be of a similar quality to water District delivers to other users from the Friant-Kern Canal or the Kaweah River.

7. District's Obligations Contingent Upon Continuation of US-District Contract, Etc. District's obligations to deliver water to the Agreed Facilities pursuant to this Agreement are contingent upon, and subject to, the continuing existence of **(i)** a contract between the United States government (or agency thereof) and District for the provision of water from the Central Valley Project via the Friant-Kern Canal, or **(ii)** a contract or entitlement otherwise affording District sufficient water to meet its obligations pursuant to Section 5.

8. Term. The Water Purchase Agreement shall be in effect for as long as the City and District continue to abide by the terms of the Master Agreement.

9. Representations and Warranties of Authority. Each party represents to all other parties that such party has the full power and authority to enter into this Agreement, that the execution and delivery thereof will not violate any agreement to which such party is a party or by which such party is bound, and that this Agreement, as executed and delivered, constitutes a valid and binding obligation of such party, enforceable in accordance with its terms. The corporate, partnership, and association signatories to this Agreement expressly warrant that they have been authorized by their respective company, partnership, or association entities to execute this Agreement and to bind them to the terms and provisions hereof. Any public agency signatory to this Agreement represents and warrants that the Agreement is executed in compliance with a resolution of the governing entity of the public agency, duly adopted by the governing entity and transcribed in full in the minutes of the governing entity. Any individual signing this Agreement on behalf of a public agency represents that she/he has full authority to do so.

10. Duty to Cooperate. Each party shall cooperate so as to facilitate the other party's efforts to carry out its obligations under this Agreement.

11. Successors and Transferees. The obligations and benefits of this Agreement do not run with the land, and are personal to the City and the District and are not assignable or transferable.

12. Entire Agreement. This Agreement constitutes the entire agreement between the parties, and it is expressly understood and agreed that the Agreement has been freely and voluntarily entered into by the parties with the advice of counsel, who have explained the legal effect of this Agreement. The terms of this Agreement are contractual and not mere recitals. The parties further acknowledge that no warranties, representations or inducements not contained in this Agreement have been made on any subject in connection with this Agreement, and that

they have not been induced to execute this Agreement by reason of non-disclosure or suppression of any fact. This Agreement may not be altered, modified or otherwise changed in any respect except by writing, duly executed by the parties or their authorized representatives. This Agreement is fully integrated.

13. Construction. The parties acknowledge that each party and its counsel have reviewed and revised this Agreement and that no rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall be employed in the interpretation of this Agreement.

14. Severability. In the event any of the terms, conditions or covenants contained in this Agreement is held to be invalid, any such invalidity shall not affect any other terms, conditions or covenants contained herein which shall remain in full force and effect.

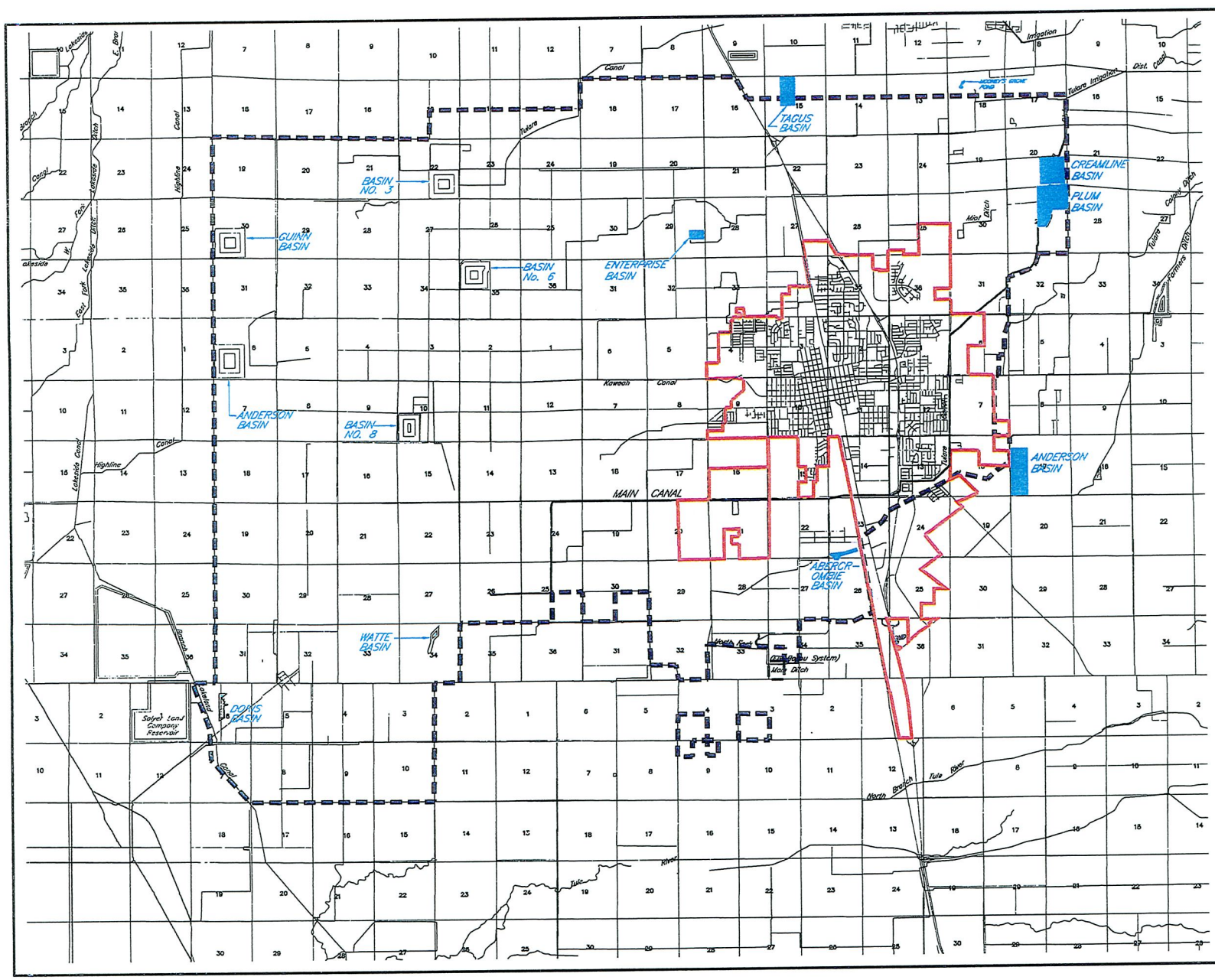
15. Governing Law. California law shall govern the interpretation and enforcement of this Agreement.

16. Remedies. Any motion or other action by the parties to enforce this Agreement shall be filed or otherwise brought and adjudicated in the Tulare County Superior Court. The Tulare County Superior Court shall maintain and reserve jurisdiction of this action for the purpose of enforcing the terms of this Agreement as a judgment or order of the Court. Nothing in this paragraph shall be interpreted in a manner to preclude whatever rights the parties may have to appeal rulings of the Tulare County Superior Court. The parties otherwise retain the full range of legal and equitable remedies to enforce the terms of this Agreement, including injunctive relief and specific performance, to ensure the parties comply with their commitments under this Agreement. In any action to enforce this Agreement, each party shall be responsible for its own attorneys' fees and costs. The parties shall meet and confer and attempt to resolve their differences informally before commencing any action to enforce this Agreement.

17. Further Assurances. In addition to the documents and instruments to be delivered as herein provided, each of the parties shall, from time to time at the request of the other parties, execute and deliver to the other parties such other instruments of transfer, conveyance and assignment and shall take such other action as may be required to more effectively carry out the terms of this Agreement.

18. Time of the Essence. Time is expressly declared to be of the essence of this Agreement and of every provision hereof in which time is an element.

EXHIBIT A



LEGEND

- TULARE IRRIGATION DISTRICT SERVICE AREA
- CITY OF TULARE CITY LIMITS
- BASIN UTILIZED TO SINK WATER FOR CITY OF TULARE RECHARGE

NORTH

TULARE IRRIGATION DISTRICT

TID BASIN LOCATION MAP

TULARE IRRIGATION DISTRICT
FORMED IN 1889

1350 W. SAN JOAQUIN AVE.
TULARE, CA 93274
TEL: (559) 686-3425
FAX: (559) 686-3673
WEB: www.tulareid.org

Exhibit B
Calculation of Average Annual Quantity

For the purposes of the Agreement, the following parameters will apply:

Avg. surface water supply to TID water users: 60%[1]

Groundwater overdraft in Tulare region: 7,000 AF[2]

City annual groundwater pumping: City Use

District area: TID A

City area: City A

City share of total area: City A ÷ (TID A + City A)

Based on the foregoing parameters, the Average Annual Quantity shall be computed as follows:

Average Annual Quantity = 60% X City Use + (City A/(TID A+City A) X 7,000)

Example for 2007: 60% X 18,870 AF + (18.78 sq. mi./ (104.04 sq. mi. + 18.78 sq. mi.)X 7,000 AF) = 12,392 AF

---

(1) Based on long-term TID surface water deliveries and crop water usage
(2) Per KDWCD "Water Resources Investigation Report" - April 2005

APPENDIX K – TID REPORT ON 2010 WATER MANAGEMENT OPERATIONS FOR THE CITY OF TULARE

Tulare Irrigation District

Report on 2010 Water Management Operations for the City of Tulare

Purpose:

The purpose of this report is to provide information regarding the Tulare Irrigation District's 2010 water operations and how such operations have afforded a groundwater benefit to the City and surrounding environs. Such benefits are being sought by the City in order to improve groundwater conditions under the City area. Said water operations described in this report are prepared in accordance with the terms and conditions of the May 2008 "Agreement Regarding Delivery of Water to Certain Groundwater Recharge Facilities" between the City and District.

Overview:

Water supply conditions in 2010 were well above average – runoff was 133% of average for the Kaweah River and 132% for the San Joaquin River. Due to these above normal conditions and as augmented by additional water purchase and conjunctive use programs, the District diverted about 272,000 AF for both irrigation deliveries and groundwater recharge for the year. Overall, the District supplemented its allocated entitlements with water secured from several Friant sources and Kaweah entities totaling 112,000 AF. Continuing from 2009, the District also was advantaged by a program under which an additional 26,000 AF Kaweah water was secured for delivery during extraordinary river operations this winter and spring to accommodate the construction of the McKay Point water control facilities.

Of the total diversions to the District's service area, about 124,500 AF was percolated and recharged the underground aquifers, and a significant portion of this was accomplished by the utilization of various recharge basins operated by the District with the balance stemming from seepage in District canals and ditches. Of this total, about 25,400 AF was percolated in recharge basins providing direct and immediate benefit to the groundwater level depression under the City.

Background:

The City and District, pursuant to Section 15 of the City-District 2005 master agreement, entered into an "Agreement Regarding Delivery of Water to Certain Groundwater Recharge Facilities" in May of 2008. This Agreement establishes a program by which (a) the District will engage in groundwater recharge operations to provide benefits to the City , (b) the City will provide payment to the District for such operations, and (c) a methodology to account for recharged water under this program is established. This report, prepared in accordance with

Section 3 of the 2008 Agreement, documents the accomplishments of such groundwater recharge operations for the calendar year 2010.

District Purchase of Additional Water for Recharge:

Given the above-average water supply year, ample water was available for groundwater recharge operations. The extra water came largely from the Friant Unit of the CVP via the availability of "Uncontrolled Season" Class 2 water in the spring. Such water is occasionally offered for purchase during a limited time frame in which Friant Dam may otherwise spill non-storable water into the San Joaquin River. The District purchased and diverted about 44,800 AF of this type of water. During this "Uncontrolled Season" period, the District purchased 28,300 AF of additional Class 2 supplies – over and above our own delivery capacity – and transferred a like amount to Kaweah Delta WCD and Lindsay-Strathmore ID. These transfers resulted in additional gains to the overall Kaweah basin water supply balance to the benefit of all water suppliers in the region.

With 2010 being the first year of implementation of the San Joaquin River Settlement restoration program, the District took advantage of the opportunities available to it from the Settlement's Water Management Goal programs. The District took delivery of about 8,300 AF of its Recovered Water Account (RWA) water, a low-priced supply made available by USBR to help mitigate for the loss of CVP contract supplies to Settlement fishery purposes. Additionally, the District delivered some 4,500 AF of Settlement flows sent down the San Joaquin River that were credited to Friant districts as stored water in San Luis Reservoir (fed by Delta exports from the Delta Mendota Canal). This water was provided to Tulare Lake Bed interests in trade for Kaweah River water stored behind Terminus Dam assigned to the District for its use.

Further, the District embarked on a long-term exchange program with another Friant district, Kern-Tulare WD, which enabled the purchase and delivery of 17,600 AF of Friant water from other districts this year in exchange for ½ this amount to be returned over an extended period of time. This partnership will enable the District to be competitive with others on the open market in the purchase of surplus Friant supplies for conjunctive use (recharge) purposes. Other exchanges added 2,800 AF of Friant Class 1 water to the District's supply.

Lastly, the District purchased about 4,100 AF of Kaweah River water from other ditch companies to supplement its summer irrigation run. Under a separate program, the District was able to purchase another 1,740 AF from Farmers Ditch Co. for the sole purpose of supplementing recharge deliveries to basins benefiting the City but outside of District boundaries. Another 26,000 AF of extra water was secured and diverted in the spring from Terminus Dam releases necessitated during construction of the McKay Point water control facilities.

The aforementioned water supply purchases, exchanges and other actions, while complicated and intricate in their operations, provide real water with which the District can maximize recharge deliveries to basins offering direct benefit to the City as well as provide incidental

benefits to groundwater levels in and around the City via recharge in other basins within the larger District service area, seepage losses, and in-lieu recharge from well pumping foregone. All of this supplemental water is in addition to the water made available to the District under its portfolio of CVP Class 1 and Class 2 contract entitlements and Kaweah River water rights. Funds available to the District from City payments per the 2008 Agreement help pay for this supplemental water which, in one way or another, aids in sustaining the groundwater resources of the area.

District Recharge Basin Deliveries:

Of the total 124,500 AF recharged to the underground during this year's water run periods, about 25,400 AF was directed into recharge basins within the District providing a direct benefit to City groundwater extraction operations (the "Agreed Facilities" as defined in the 2008 Agreement). See the map on Attachment A-1 showing the location of these basins. Also depicted on the map are the groundwater elevation contours in and around the City. Shown in Attachment A-2 is a tabulation of the aforesaid recharge accomplishments benefiting the City by month for each of the basins.

The pumping depression under much of the City evidenced in Attachment A-1 underscores the fact that all such basins identified in the Agreement provide a benefit to the City. Groundwater pressure gradients direct water recharged in these basins towards the City and its groundwater well field. Some of the indicated recharge amounts occur above the Corcoran Clay layer, particularly in those basins westerly of the City. However, hydrogeological studies of the Kaweah basin have postulated that recharge water infiltrating through the soil profile eventually percolates through the clay layer due to its semi pervious nature and the presence of perforations from numerous wells which penetrate into the semi confined zone beneath the layer and which are screened both above and below it. In addition, monitoring well and piezometric head data collected above and below the clay layer have indicated, over the course of time, that water channel seepage and recharge basin infiltration inflows do in fact reach the semi confined zone.

Other Recharge Basin and Channel Deliveries:

In addition to District-operated basins, several others located within the Farmers Ditch Co. system east of the City were utilized. These also are shown in Attachment A-1 and are being included as part of the Agreed Facilities per the 2008 Agreement. The District arranged for the purchase and diversion of about 1,740 AF to be devoted to groundwater recharge deliveries directly into these basins, and Farmers Ditch Co. representatives have indicated that this quantity has been delivered thereto. Lastly, the District diverted over 5,000 AF of its surplus Class 2 water to Packwood Creek, Cameron Creek and the Tulare Irrigation Co. Canal, all for enhancing upstream recharge under a program with the City of Visalia.

Groundwater Level Changes:

The graph shown on Attachment B depicts recent changes in groundwater levels, comparing depth to water in the fall season of 2010 with the fall of 2009 and previous years. The overall trend in Section 1, within which lies the City, is an upward change in level of about 8 feet since 2009. Farther west in Sections 2 and 3, the data indicate that groundwater levels have risen by 9 feet during the same time period. Differences among the sections are probably due to several factors, including movement of upstream recharge waters down-gradient over time, possible impacts of the pumping depression under the City, and confined aquifer v. unconfined aquifer readings as among the various well data collected.

City water supply well data for this same time period indicate a different short-term trend, showing a decrease of about 19 feet. This data represents conditions below the Corcoran Clay layer, unlike the surrounding data representing conditions both above and below the clay layer. Such data, however, do not represent "static" levels but, rather, generally reflect water levels during drawdown conditions at the wells since the City well field is extracting water generally on a year-round basis. Recharge to the upper, unconfined zone from basin infiltration and canal seepage does not immediately translate to the confined layer below but, rather, happens over several seasons. As previously noted, such water supply well data suggests that the recharge efforts around the periphery of the City, particularly along the northeastern quadrant, are providing a water supply source to fill the depression under these wells.

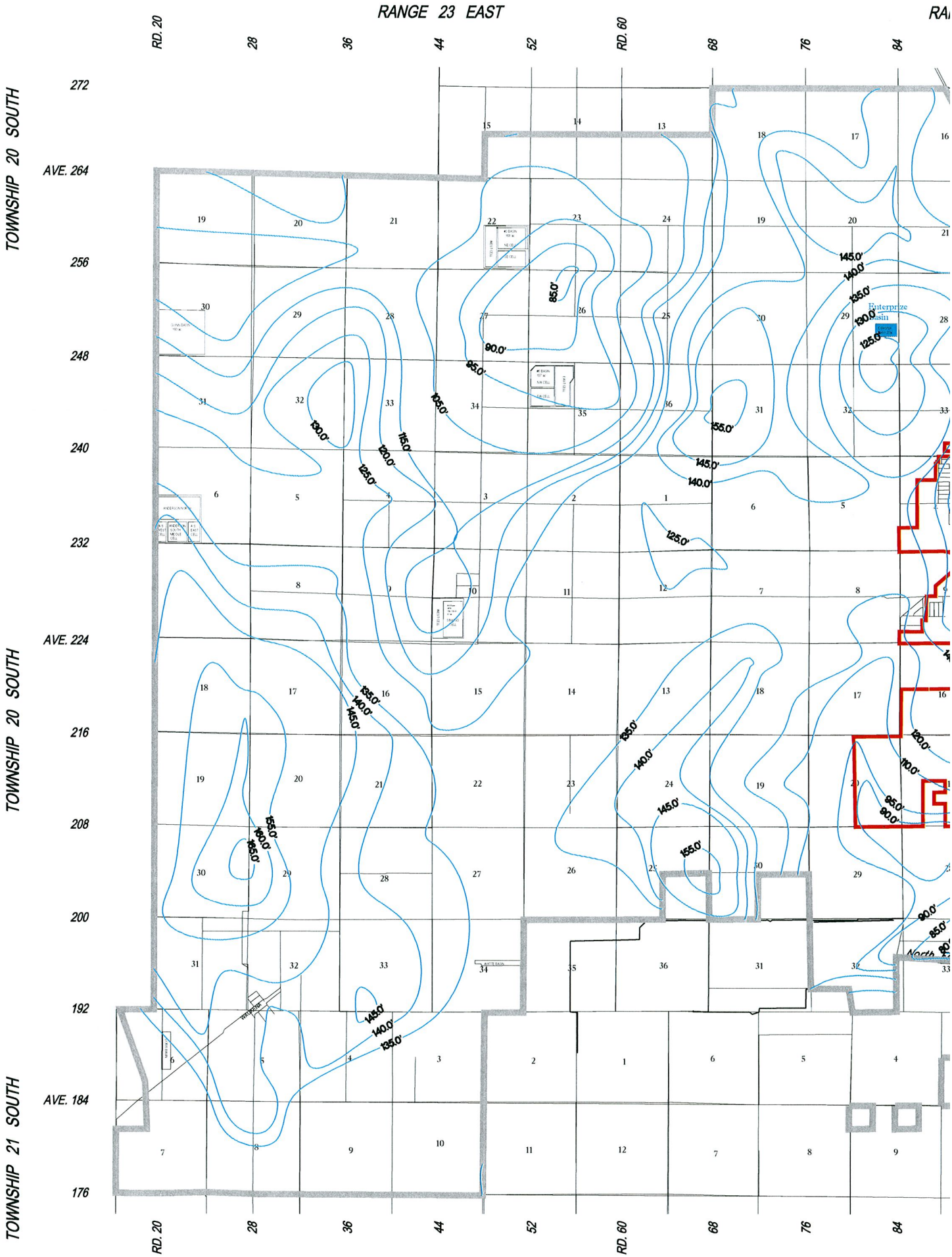
Financial Contributions by the City:

Per the aforementioned 2008 Agreement, the City contributes funds towards the District's recharge efforts based on the District's current CVP Class 2 unit contract price multiplied times the "Average Annual Quantity" as computed in accordance therewith. For 2010, the Class 2 price is $28.41/AF and the Average Annual Quantity was calculated to be 12,169 AF based on acreage and City pumping data from 2009. The City's payment for 2010 was thus determined to be $345,721.

Credited Water Balance:

The 2008 Agreement identifies a means by which the accomplishments of the City/District recharge efforts may be measured. Called the "Credited Water Balance," the determination is essentially a rolling 5-year accrual of the difference between the annual recharge quantities identified in these reports relative to the Average Annual Quantity for each year. For water accounting purposes, this 5-year period has been assumed to commence in 2006, the first year of payment by the City. Shown in Attachment C is the calculation of the Credited Water Balance. The Credited Water Balance as of the year 2010, i.e. 19,761 AF, continues to remain positive, thereby indicating that the District's recharge program is thus far accomplishing what was intended per the Agreement.

Attachments


RANGE 23 EAST
RD. 20
28
36
44
52
RD. 60
68
76
84
TOWNSHIP 20 SOUTH
TOWNSHIP 20 SOUTH
TOWNSHIP 21 SOUTH
272
AVE. 264
256
248
240
232
AVE. 224
216
208
200
192
AVE. 184
176
Enterprize Basin
145.0'
140.0'
135.0'
130.0'
125.0'
120.0'
115.0'
110.0'
105.0'
100.0'
95.0'
90.0'
85.0'
155.0'
160.0'
165.0'

Attachment A-2

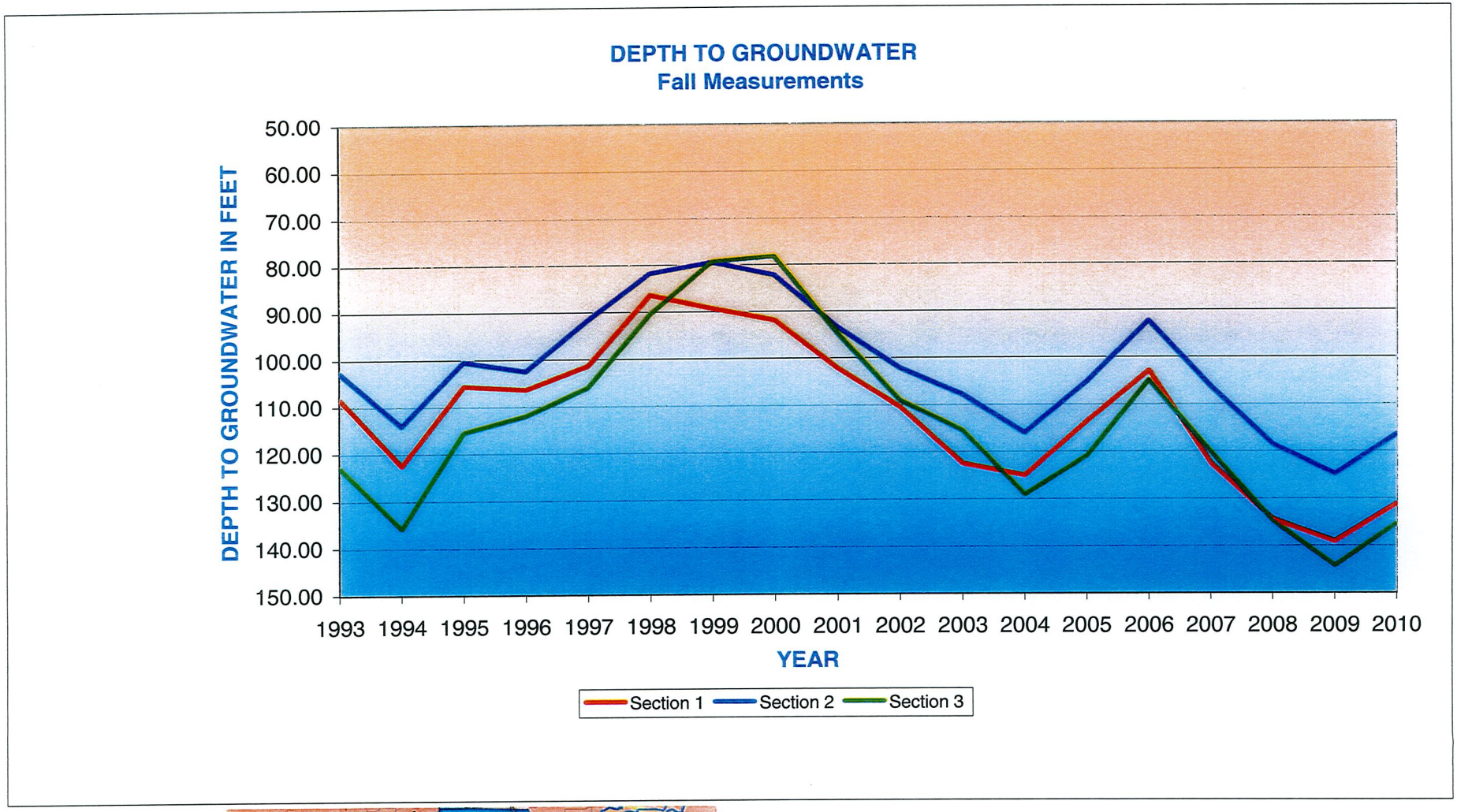
Tulare Irrigation District
Recharge/Seepage Data for City of Tulare
2010

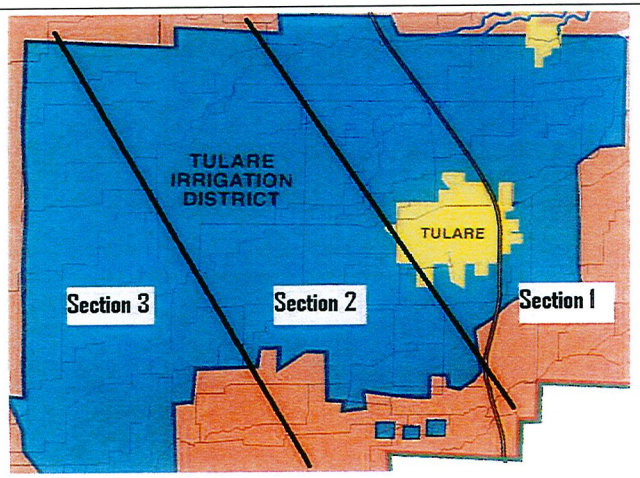
Quantities in Acre-Feet

	Basins									
Month	Enterprise	Abercrombie	Tagus	Creamline	Swall (Plum)	Cordeniz	Mooney Grove	Sundale	**Total**	**Running Total**
January	97	56	494	1,218	0	113	0	0	1,978	1,978
February	87	60	351	1,087	0	85	0	0	1,670	3,648
March	81	52	432	1,107	0	75	0	0	1,747	5,395
April	145	91	956	1,682	0	177	0	0	3,051	8,446
May	157	123	993	2,235	0	198	0	0	3,706	12,152
June	181	119	843	2,112	81	89	0	0	3,425	15,577
July	147	123	184	2,231	167	0	0	0	2,852	18,429
August	133	123	184	1,884	20	0	0	1,742	4,086	22,515
September	18	32	42	383	0	0	46	0	521	23,036
October	0	0	0	0	0	0	0	0	0	23,036
November	0	0	0	0	0	0	0	0	0	23,036
December	93	44	569	1,638	54	0	0	0	2,398	25,434
Total	1,139	823	5,048	15,577	322	737	46	1,742	25,434	

Note: Water runs spanned the date intervals: Jan. 15th - Feb. 5th
Feb. 18th - March 16th
April 5th - Sep. 7th
Dec. 9th - Dec. 31st

Attachment B





	2007	2008	2009	2010
Section 1	123	135	139	131
Section 2	106	119	125	116
Section 3	120	135	144	135
Averages	**116**	**129**	**135**	**127**

Attachment C

May 2008 Agreement - City of Tulare & Tulare ID

Calculation of Avg. Annual Quantity & Credited Water Balance

Terms per Agreement:

Avg. surface supply to TID	60%
Groundwater overdraft in Tulare region (AF)	7,000

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Year	**Dist. Area** (end of prior yr) (acres)	**City Area** (end of prior yr) (acres)	**City Pumping** (prior yr) (AF)	**Avg. Annual Quantity** (AF)	**Recharge per Agmt.** (current yr) (AF)	**Difference, Col 8 - Col 5** (AF)	**Credited Water Bal.** (AF)
2006	-----	-----	-----	10,000	32,300	22,300	22,300
2007	68,574	11,914	17,763	11,694	3,400	-8,294	14,006
2008	66,587	12,026	18,870	12,393	4,200	-8,193	5,813
2009	67,632	13,350	18,664	12,352	13,035	683	6,496
2010	67,344	12,384	18,470	12,169	25,434	13,265	19,761

Note: Avg. Annual Quantity calculated per Exhibit B of 2008 Agreement. Said quantity, and associated payment, was assumed to be 10,000 AF for 2006.

APPENDIX L – CONJUNCTIVE USE AGREEMENT

AGREEMENT

THIS AGREEMENT is made and entered into this 10th day of May, 2005, by and between TULARE IRRIGATION DISTRICT, "District," an Irrigation District organized and existing pursuant to the laws of the State of California (hereinafter referred to as "District"), and the City of Tulare, a Municipal Corporation of the State of California (hereinafter referred to as "City")

WITNESSETH

A. WHEREAS, District is a public entity engaged in the importation and delivery of water for irrigation purposes to landowners within the District; and

B. WHEREAS, District's water importation efforts create an important groundwater recharge benefit to City; and

C. WHEREAS, City and District entered into an Agreement dated August 18, 1954 (hereafter referred to as "1954 Agreement"), which provided for the use by City of certain canal and ditch facilities owned and controlled by District for the purpose of disposing of storm drainage; and

D. WHEREAS, the 1954 Agreement, in recognition of the groundwater recharge and storm water disposition benefits afforded by the District, provided for the payment by City of fees to replace assessments the District loses by virtue of the detachment from the District of lands that are annexed into the City; and

E. WHEREAS, the 1954 Agreement provided terms for the maintenance and control of certain District facilities necessary to handle City's storm drainage needs; and

F. WHEREAS, the 1954 Agreement terminated by its terms in 1988, but the parties have been operating pursuant to the terms of the 1954 Agreement notwithstanding its expiration; and

G. WHEREAS, consistent with the 1954 Agreement, the District granted its interest in a portion of the Kaweah Ditch to the City by way of a quitclaim deed dated August 18, 1954, subject to a reserved right for the District to use the portion of the granted ditch for the conveyance of irrigation water; and

H. WHEREAS, the parties desire to enter into a new agreement based generally on the provisions of the 1954 Agreement, and desire also to enter into additional agreements regarding, among other things, policies for the conversion of canal or ditch easements to pipeline

easements; construction of encroachments within such converted easements; conditions to be imposed for fencing of canal, ditch or pipeline easement areas; and agreements to enter into various joint projects;

NOW THEREFORE, the parties hereto covenant and agree as follows:

1. **Acknowledgment of Reserved Right of District To Use City-owned Portions of Kaweah Ditch Pipeline.** The parties acknowledge that although portions of the Kaweah Ditch were deeded to the City by Quitclaim Deed dated August 18, 1954, the District retained the right to use the Kaweah Ditch Pipeline to its full capacity for the conveyance of District's water. This reserved right is limited only by District's obligation under this Agreement to allow for the specified storm drain flows.

2. **Use of District Facilities By City For Storm Drain Purposes.** The District does hereby give and grant to the City the right and privilege of pumping water, or otherwise diverting water from its storm drain system, into the irrigation canals of the District running through the City, or along or near the boundary lines of the City, as follows:

   a. That portion of the irrigation ditch or pipeline commonly known as the Kaweah Ditch Pipeline existing within the boundaries of the City of Tulare, as they may from time to time be modified;

   b. That portion of the irrigation ditch commonly known as the Town Ditch existing within the boundaries of the City of Tulare, as they may from time to time be modified and

   c. That portion of the irrigation ditch commonly known as the Railroad Ditch existing within the boundaries of the City of Tulare, as they may from time to time be modified.

3. **Discharge Volumes.** The City agrees that it will not, without the written consent of the District through its Board of Directors or General Manager, divert more than the following amounts:

   a. Thirty cubic feet per second (30 cfs) of water at any time into Kaweah Ditch Pipeline; or

   b. Seventy-five cubic feet per second (75 cfs) of water at any time into the Town Ditch; or

c. Twenty cubic feet per second (20 cfs) of water at any time into the Railroad Ditch (not including the flow from the Kaweah Ditch and the Town Ditch).

The above-noted discharge rates are maximum rates, and are subject to the limitations of the particular facilities that are actually in place. The parties acknowledge that particular portions of the above-noted facilities may have capacities that are lower than the above-noted maximum discharges.

4. Maintenance. District hereby agrees to keep up and maintain at its cost and expense the above-referenced ditches or pipelines which are owned by District, together with District's system of ditches connected therewith, so that they may have the capacity to dispose of the water from the storm drain system of the City. City hereby agrees to keep up and maintain at its cost and expense the portion of the Kaweah Ditch Pipeline which was transferred to City by quitclaim deed dated August 18, 1954, so that the Kaweah Ditch Pipeline maintains the capacity to carry irrigation water to other facilities of the District.

5. Additional Facilities. The parties acknowledge that there may be additional locations other than those enumerated above at which City has established a discharge of storm water into District's system. These additional locations may or may not be properly authorized through separate agreements between City and District, or they may have been intended to be included within the capacities noted above. The parties agree that as part of the ongoing efforts to meet and confer regarding the operation of this Agreement (as called for below), City and District will endeavor to inventory and quantify all discharges, including those that are in addition to the authority established by this Agreement. The parties further agree to amend this Agreement, if necessary, to establish the terms under which such additional discharges will be accepted by District.

6. Operation And Control Of Headgates, Pumping Stations And Diversion Points. City agrees that District shall exercise exclusive control of the headgates which regulate the flow of water into and through the ditches subject to this Agreement during the storm seasons for the duration of this agreement, and City further agrees that District's acceptance of the storm drain volumes provided in paragraph 2 above is subject to the existence of spare capacity in the subject ditches at the time of the desired discharge. District agrees that City shall have the right to control the pumping stations and diversion points it maintains for the purpose of diverting storm drain water pursuant to this Agreement into the subject canals and pipelines, providing such

operation does not cause the volume of such discharges to exceed the volumes provided in paragraph 2 above.

7. **Installation of Additional Pumping Stations.** District agrees that City may establish such additional pumping stations and diversion points as it may, from time to time, require, upon any rights of way owned by District, for the purpose of diverting storm water into the ditches that are the subject of this Agreement, provided that such pumping stations will not interfere with District's use and maintenance of such ditches or pipelines, or with the rights of others in said rights of way, or increase the total diversion volume beyond that provided in paragraph 2 above. City shall consult with District prior to construction of any such pumping stations and diversion points, and shall apply for and receive any encroachment agreement that District shall require.

8. **Non-Pollution Agreement.** City hereby agrees that it will not deposit in any ditches, canals or pipelines of District any water which is polluted with sewage or any other unhealthful or noxious matter. In addition, City specifically agrees as follows:

a. District reserves the right to cause all discharges of storm waters into its canals or pipelines to cease should it receive evidence that any pollutants or other unhealthful or noxious matter, has been discharged into the storm drain system and is likely to reach its canals or pipelines.

b. City agrees that it alone shall be responsible for compliance with any applicable state or federal laws relating to the discharge of storm drainage and any related discharges into District's facilities, including the obtaining of any necessary permit under state or federal law, and City shall defend, indemnify and hold District harmless from any claim of violation of such state or federal laws arising from any discharge of storm water into its canals or pipelines pursuant to this Agreement.

9. **City Payments In Lieu Of District Assessments Upon Annexation and Detachment.** In consideration of the foregoing, and in recognition of the District's groundwater recharge benefits to the City and surrounding lands, City agrees to pay to the District on each Assessment Date an amount equal to the product of the number of Detached Acres multiplied times the Assessment Rate, where:

a. "Assessment Date" means the first day of January of each year of the term of this agreement;

b. "Detached Acres" means the total number of acres of all land that was within the

original boundary of the District and has, as of the Assessment Date, been both annexed into the City and detached from the District's boundaries; and

c. "Assessment Rate" means the total average per-acre rate assessed by District on the Assessment Date upon lands within the District that are adjacent to City's boundaries, including the portion of the rate imposed as a pass through federal environmental restoration charge pursuant to the Central Valley Project Improvement Act of 1992 and subsequent rules, regulations and agreements. By way of example only, assuming the average valuation of lands within the District adjacent to the City's boundaries as of the Assessment Date is $2,000 per acre, and the lands are assessed at $.80 per $100 of valuation, this would result in an assessment of $16 per acre. In addition to this, lands within the District are assessed a $16 per acre federal environmental restoration charge. The City charge would therefore be $32 per acre of Detached Lands. The Assessment Rate shall be adjusted annually if necessary to reflect the average per-acre rate assessed upon lands adjacent to City's boundaries on the Assessment Date, as determined by District.

The parties agree that all lands annexed into the City but not detached from the District shall continue to be assessed directly by the District and shall not be included as Detached Acres for the purpose of calculating the City's annual payment. The parties further agree that "Detached Acres" shall include, for the purpose of calculating City's annual assessment payment only, that land owned by City for which deliveries of surface water are made by District, including land used by City for its wastewater treatment facility.

10. Power Charges for Town Ditch Pump. In addition to the annual payment established in paragraph 7 above, City shall pay all power charges associated with the operation of the booster pump on the Town Ditch near the northwest corner of Section 15, Township 20 South Range 24 East.

11. Effective Date and Term of Agreement. The effective date of this agreement shall be the date last signed below. This Agreement shall expire 30 years after the effective date. This agreement shall have no force or effect upon a determination that the performance of any provision of this Agreement will result or has resulted in the violation of state or federal law.

12. City Obligations As Consideration For Benefits To City. It is the intention of the parties that City's obligations contained in this Agreement shall constitute consideration in exchange for the various benefits City may receive by reason of any of the following:

a. the transportation by District of irrigation water or water for sinking purposes into the District,

b. any pumping of ground water by City, or any agency thereof, within the boundaries of City, or otherwise,

c. the disposal of storm drainage from City into the irrigation system of the District as Authorized by this Agreement, and

d. any other direct or indirect benefits which may accrue to the City through the operations of the District.

13. Joint Operations Committee. City's City Manager and District's General Manager shall appoint at least two appropriate representatives to a Joint Operations Committee, which shall meet not less than once every six months for the purpose of addressing ongoing operational issues. As an initial matter, the Joint Operations Committee shall conduct an inventory of existing discharge sites and their capacities, and determining the authority for such sites.

14. Creation of Joint Development Policies. In addition to ongoing operation issues, the Joint Operations Committee shall initially undertake an effort to develop policies, procedures and standards to be applied by the respective parties in addressing development proposals within the City's boundaries that have the potential to affect or are affected by the existence of District's canals, ditches or pipelines. Such polices, procedures and standards to be drafted and proposed for adoption shall address the following issues, at a minimum:

a. Uniform requirements and conditions to be imposed by District for the conversion of open ditches or canals to covered pipelines, including the responsibility of landowners or developers, the terms and conditions of pipeline easements that are required to be granted to District in conjunction with such conversion, the conditions under which encroachments will be allowed within such easements, standard specifications for pipelines, work to be performed by District and assignment of cost of such work related to conversion to pipelines, and the liability of the parties in relation to the converted pipelines and permitted encroachments.

b. Requirements and conditions imposed by City and District for the fencing of District ditch, canal, pipeline and service road easement areas, including the specifications and standards for construction of such fences or walls, and separate specifications for residential and industrial development.

c. Requirements for setbacks from District's ditches, canals or pipelines.

d. Requirements for the aesthetic features of developments in relation to the ditches, canals or pipelines, and attendant improvements such as roads, fences, walls, walkways, trails, greenbelts or setback areas.

e. Ongoing operational issues, as the parties may see fit.

The Joint Operations Committee shall meet at least quarterly and as long as may be necessary for the completion of the drafting of such proposed policies. Nothing in this paragraph shall be construed as a requirement by either party to adopt any specific policy, ordinance, standard or procedure, and each party shall retain full discretion in determining whether to adopt any specific policy, ordinance, standard or procedure.

15. Consideration of Joint Water Management and Other Projects. City and District agree to work jointly toward the development and consideration of projects to which City and District shall both contribute resources for joint benefit. Such joint projects shall potentially include, but not be limited to, the following:

a. Development of groundwater recharge facilities.

b. Acquisition of local water rights or imported supplies to provide mutual benefits.

c. Development of a wastewater treatment program, whereby City delivers treated wastewater into District's water delivery system.

d. Development of a program for surface water supplies to be delivered by District to City for municipal uses, including aesthetic or other non-consumptive uses.

e. Joint ownership, construction and use of bridges.

f. Telemetry (SCADA) and automation of City's storm water discharge operations into District conveyance system.

g. Accommodation for property acquisition and construction by City of a fire station on District property.

The items noted above shall be addressed by the Joint Operations Committee, or by a subcommittee or separate ad hoc committee, as the parties may see fit. Nothing in this paragraph

shall be construed as a requirement by either party to adopt or agree to participate in any specific project, and each party shall retain full discretion in determining whether to adopt or agree to participate in any such project. .

16. Adoption of Recommendations of Joint Operations Committee. All recommendations of the Joint Operations Committee shall be referred to the City Council and the District Board of Directors for appropriate review consistent with their applicable required procedures for action on such matters. The approval of each governing body shall be required to adopt and implement such recommendations

17. Representations and Warranties of Authority. Each party represents to all other parties that such party has the full power and authority to enter into this Agreement, that the execution and delivery thereof will not violate any agreement to which such party is a party or by which such party is bound, and that this Agreement, as executed and delivered, constitutes a valid and binding obligation of such party, enforceable in accordance with its terms. The corporate, partnership, and association signatories to this Agreement expressly warrant that they have been authorized by their respective company, partnership, or association entities to execute this Agreement and to bind them to the terms and provisions hereof. Any public agency signatory to this Agreement represents and warrants that the Agreement is executed in compliance with a resolution of the governing entity of the public agency, duly adopted by the governing entity and transcribed in full in the minutes of the governing entity. Any individual signing this Agreement on behalf of a public agency represents that she/he has full authority to do so.

18. Duty to Cooperate. Each party shall cooperate so as to facilitate the other party's efforts to carry out its obligations under this Agreement.

19. Successors and Transferees. The obligations and benefits of this Agreement do not run with the land, and are personal to the City and the District and are not assignable or transferable.

20. Entire Agreement. This Agreement constitutes the entire agreement between the parties, and it is expressly understood and agreed that the Agreement has been freely and voluntarily entered into by the parties with the advice of counsel, who have explained the legal effect of this Agreement. The terms of this Agreement are contractual and not mere recitals. The parties further acknowledge that no warranties, representations or inducements not contained in this Agreement have been made on any subject in connection with this Agreement, and that

they have not been induced to execute this Agreement by reason of non-disclosure or suppression of any fact. This Agreement may not be altered, modified or otherwise changed in any respect except by writing, duly executed by the parties or their authorized representatives. This Agreement is fully integrated.

21. Construction. The parties acknowledge that each party and its counsel have reviewed and revised this Agreement and that no rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall be employed in the interpretation of this Agreement.

22. Severability. In the event any of the terms, conditions or covenants contained in this Agreement is held to be invalid, any such invalidity shall not affect any other terms, conditions or covenants contained herein which shall remain in full force and effect.

23. Governing Law. California law shall govern the interpretation and enforcement of this Agreement.

24. Remedies. Any motion or other action by the parties to enforce this Agreement shall be filed or otherwise brought and adjudicated in the Tulare County Superior Court. The Tulare County Superior Court shall maintain and reserve jurisdiction of this action for the purpose of enforcing the terms of this Agreement as a judgment or order of the Court. Nothing in this paragraph shall be interpreted in a manner to preclude whatever rights the parties may have to appeal rulings of the Tulare County Superior Court. The parties otherwise retain the full range of legal and equitable remedies to enforce the terms of this Agreement, including injunctive relief and specific performance, to ensure the parties comply with their commitments under this Agreement. In any action to enforce this Agreement, each party shall be responsible for its own attorneys' fees and costs. The parties shall meet and confer and attempt to resolve their differences informally before commencing any action to enforce this Agreement.

25. Further Assurances. In addition to the documents and instruments to be delivered as herein provided, each of the parties shall, from time to time at the request of the other parties, execute and deliver to the other parties such other instruments of transfer, conveyance and assignment and shall take such other action as may be required to more effectively carry out the terms of this Agreement.

26. Time of the Essence. Time is expressly declared to be of the essence of this Agreement and of every provision hereof in which time is an element.

27. Captions. Paragraph titles or captions contained herein are inserted as a matter of convenience and for reference, and in no way define, limit, extend or describe the scope of this Agreement or any provision thereof.

28. Notices. Where required by this Agreement, notice shall be provided by regular mail or overnight delivery, and shall be considered made when deposited in U.S. or express mail.

29. Counterparts. The parties may execute this agreement in counterparts. The counterparts, if any, constitute a single agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement to be effective as of the date and year last below written.

CITY OF TULARE
"CITY"

By: 4-20-05
Kevin Northcraft — Date
City Manager

TULARE IRRIGATION DISTRICT
"DISTRICT"

By: 5-10-2005
David G. Bixler — Date
President, Board of Directors

Attested

By:
Deputy City Clerk — Date

By: May 11, 2005
J. Paul Hendrix — Date
General Manager

Approved as to form and content.

By: 4/19/05
S.L. Kabot — Date
City Attorney

Approved as to form and content.

By: 5/2/05
~~Daniel M. Dooley~~ Alex M. Peltzer — Date
District Counsel

F:\Client Files\Tulare Irrigation District 59\100 Administrative\100 Miscellaneous Memos & Corr\Agreement w COT for Stormwater etc.doc

APPENDIX M – WATER CONSERVATION ORDINANCE

CHAPTER 7.32: WATER CONSERVATION

Section

7.32.010 Purpose.

7.32.020 Short title.

7.32.030 Authorization.

7.32.040 Application.

7.32.050 Prohibition on water waste.

7.32.060 Outdoor water use—Water conservation stages.

7.32.070 Mandatory conservation phase implementation.

7.32.080 Violations—Penalties.

7.32.090 Exceptions.

§ 7.32.010 Purpose.

It is the purpose and intent of the ordinance codified in this chapter to minimize outdoor water use and to control unnecessary consumption of the available potable water supplies in the city.

(1995 Code, § 7.32.010) (Ord.1895, passed - -2002)

§ 7.32.020 Short title.

The ordinance codified in this chapter shall be known as the “Water Conservation Ordinance of the City of Tulare”.

(1995 Code, § 7.32.020) (Ord.1895, passed - -2002)

§ 7.32.030 Authorization.

The City Manager, or the Water Conservation Coordinator upon the recommendation of the Public Works Director, is hereby authorized and directed to implement the applicable provisions of this chapter upon his or her determination that the implementation is necessary to protect the public welfare and safety.

(1995 Code, § 7.32.030) (Ord.1895, passed - -2002)

§ 7.32.040 Application.

The provisions of this chapter shall apply to all persons, customers and property within the limits of the city.

(1995 Code, § 7.32.040) (Ord.1895, passed - -2002)

§ 7.32.050 Prohibition on water waste.

The following uses of water are defined as a “waste of water” and are hereby prohibited, except as otherwise authorized:

(A) The use of water which allows any amount of water to run off to a gutter, ditch or drain. Every water user is deemed to have his or her water distribution lines and facilities under his or her control at all times and to know the manner and extent of his or her water use and excess run-off.

(B) The excessive use, loss or escape of water through breaks, leaks or malfunctions in the water user’s plumbing or distribution facilities for any period of time after the escape of water should reasonably have been discovered and corrected. It shall be presumed that a period of 48 hours after discovery is a reasonable time within which to correct the leak or break.

(C) The washing of vehicles, building exteriors, sidewalks, driveways, parking areas, tennis courts, patios or other paved areas without the use of a positive shut-off nozzle on the hose, which results in excessive run-off, except where necessary to dispose of liquids or substances that would endanger the public’s health and safety.

(D) The watering of lawns, ground cover and shrubbery shall be prohibited between the hours of 10:00 a.m. and 6:00 p.m. from April 1, or earlier as determined by the prior winter water conditions, and shall remain in effect through September 30. Restrictions may be extended beyond September 30, depending on actual water conditions. Exception: Commercial nurseries, commercial sod farms, golf courses and public parks are exempt from the restriction in this division (D), but will be requested to minimize water waste at all times.

(1995 Code, § 7.32.050) (Ord.1895, passed - -2002)

§ 7.32.060 Outdoor water use—Water conservation stages.

No one within the city or customers of the Water Utility Division of the city shall knowingly make, cause, use or permit the use of water for residential, commercial, industrial, government or any other purpose in a manner contrary to any provision of this chapter, or in an amount in excess of that use permitted by the conservation state in effect pursuant to action taken by the City Manager and/or Water Superintendent, in accordance with the provisions of this chapter.

(A) *Stage 1, Voluntary Compliance, Water Alert.* The following restrictions shall apply to all persons year round unless removed by publication of notice of Stage 2 or 3. Upon removal of Stage 2 or

3, Stage 1 shall be in effect.

(1) Irrigation utilizing permanently installed automatic sprinkler systems of lawn, gardens, landscaped areas, trees, shrubs or other plants is prohibited between the hours of 10:00 a.m. and 6:00 p.m., April 1 through September 30, and then from 10:00 a.m. and 2:00 p.m., October 1 through March 31. Irrigation of lawns, gardens, landscaped areas, trees, shrubs or other plants is permitted at any time if:

(a) A hand-held faucet filled bucket of five gallons or less is used; or

(b) A drip irrigation system is used.

(2) Irrigation utilizing individual sprinklers not on automatic timing device may be used between the hours of 6:00 a.m. and 10:00 a.m. and/or between the hours of 6:00 p.m. and 10:00 p.m. Exception: Commercial nurseries, commercial sod farmers, and public parks are exempt from Stage 1 irrigation restrictions, but will be requested to curtail all nonessential water use.

(3) The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment is permitted only when using a hand-held hose equipped with a positive shutoff nozzle for quick rinses.

(4) The refilling or adding of water to swimming pools, wading pools and/or spas is permitted only between the hours of 7:00 p.m. and 10:00 a.m.

(5) The operation of any ornamental fountain or other structure making similar use of water is prohibited unless the fountain uses a recycling system, such as an electric pump.

(6) The washing of sidewalks, driveways, parking areas, courts, patios or other paved areas is only permitted when using a hose equipped with a positive shut-off nozzle.

(7) All restaurants are requested to serve water to customers only when specifically requested by the customers.

(B) *Stage 2, Mandatory Compliance, Water Warning.* Upon implementation by the City Manager and/or the Water Superintendent and publication of notice, the following restrictions shall apply to all persons. All elements of Stage 1 shall remain in effect in Stage 2 except that:

(1) All outdoor irrigation of vegetation shall occur only between the hours of 6:00 p.m. and 10:00 a.m. on designated days.

(2) Dwellings or establishments with even-numbered street addresses shall water only on Wednesday and Friday and Sunday, subject to the time restrictions set forth above.

(3) Dwelling or establishments with odd-numbered street addresses shall water only on Tuesday, Thursday and Saturday subject to the time restrictions set forth above.

(4) Monday is a non-watering day unless an exemption is on file with the Water Department.

(5) The washing of sidewalks, driveways, parking areas, courts, patios or other paved area is absolutely prohibited.

(6) The use of water for irrigation of golf greens and tees is permitted only on designated irrigation days between the hours of 8:00 p.m. and 10:00 a.m.

(7) Any person found violating any portion of Stage 2 mandatory compliance more than three times in a calendar year will be subject to the instillation of a meter.

(C) *Stage 3, Mandatory Compliance, Water Emergency.* Upon implementation by the City Manager and/or the Water Superintendent and publication of notice, the following restrictions shall apply to all persons. All elements of Stage 2 shall remain in effect in Stage 3 except that:

(1) All outdoor irrigation of vegetation shall be allowed only between the hours of 8:00 p.m. and 7:00 a.m. on designated days.

(2) The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment not occurring upon the immediate premises of commercial car washes and commercial service stations and not in the immediate interest of the public health, safety and welfare shall be prohibited.

(3) The washing of automobiles, trucks, trailers, boats, airplanes or other types of mobile equipment upon the immediate premises of commercial managed and supervised hand car washes or in the immediate interest of the public health, safety and welfare, shall occur only between the hours of 6:00 a.m. and 1:00 p.m.

(4) The washing of automobiles, trucks, trailers, boats, airplanes or other types of mobile equipment upon the immediate premises of commercial no-managed car washes (hand-held nozzle type) and commercial service stations or in the immediate interest of the public health, safety and welfare, shall occur only between the hours of 7:00 p.m. and 8:00 a.m.

(5) The watering of golf course tee areas is prohibited.

(6) Use of water from fire hydrants shall be limited to fire fighting and/or other activities immediately necessary to maintaining the health, safety and welfare of the citizens of Tulare.

(7) Commercial nurseries, commercial sod farms, and similar establishments shall water only on designated days between the hours of 10:00 a.m. and 6:00 p.m. and shall use only hand-held hoses, drip irrigation systems or hand-held buckets.

(8) The filling, refilling or adding of water to swimming pools, wading pools and/or spas is prohibited. Exception: City parks may water during the hours of 8:00 a.m. to 6:00 p.m. to protect the investment in public parks.

(D) *Stage 4, Mandatory Compliance, Extreme Emergency.* Upon implementation by the City Manager and/or Water Superintendent and publication of notice, the following restrictions shall apply to all persons. Al elements of Stage 2, Stage 3 shall remain in effect in Stage 4 except that:

(1) No outdoor irrigation of vegetation. There shall be no watering outdoors until State 4 emergency restrictions is over.

(2) No washing of automobiles, trucks, trailers, boats, airplanes or other types of mobile equipment until Stage 4 emergency restriction is over. Exception:

(a) Outdoor water use in the interest of public health, safety and welfare shall be by permit only, after review and approval by Water Superintendent.

(b) City parks, schools, golf courses, commercial nurseries and similar establishments may water once per week by permit only, after review and approval of Water Superintendent.

(1995 Code, § 7.32.060) (Ord.1895, passed - -2002; Ord. 95-1754, passed - -1995)

§ 7.32.070 Mandatory conservation phase implementation.

The Public Works Department shall monitor the projected supply and demand for water within the city and shall recommend to the City Manager and Water Superintendent the extent of the conservation required through the implementation and/or termination of particular conservation stages in order to assure the water supply to the city. Thereafter, the City Manager and/or the Water Superintendent, as directed by administrative policies, may order that the appropriate phase of water conservation be implemented or terminated in accordance with the applicable provisions of this chapter. The notice shall further be published in a newspaper of general circulation within the city at least once prior to its effective date. The declaration shall remain in full force and effect until such time as the Water Superintendent finds and determines that the conditions which generated the need for the declaration are no longer in existence. At that time, the Water Superintendent shall withdraw the declaration by giving written notice to the City Council and the Board of Public Utilities, with an effective date identified.

(1995 Code, § 7.32.070) (Ord.1895, passed - -2002)

§ 7.32.080 Violations—Penalties.

Any person violating any provision of this chapter shall be guilty of an infraction and upon conviction thereof shall be subject to the general penalty provisions of § 1.12.010 of this code. A person shall be deemed guilty of a separate offense for each day during any portion of which a violation of this title is committed, continued or permitted by the person and shall be punishable, as herein provided. All remedies provided for herein shall be cumulative and not exclusive.

(1995 Code, § 7.32.080) (Ord.1895, passed - -2002)

§ 7.32.090 Exceptions.

Consideration of written applications for exceptions regarding regulations and restrictions on water use not otherwise set forth in previous sections of this chapter shall be as follows:

(A) Written application for exception may be granted by the Water Superintendent upon recommendation of the Public Works Director.

(B) Exceptions may be granted if:

(1) Compliance with this chapter would cause an unnecessary and undue hardship to the applicant, including, but not limited to, adverse economic impacts, such as loss of production or jobs; and/or

(2) Compliance with this chapter would cause a condition affecting the health, sanitation, fire protection or safety of the applicant or the public.

(1995 Code, § 7.32.090) (Ord.1895, passed - -2002)

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APPENDIX N – ANNUAL WATER QUALITY REPORTS (2000-2010)

What's In My Water?

We are pleased to report that during the past year, the water delivered to your home or business complied with, or did better than, all state and federal drinking water requirements. For your information, we have compiled a list in the table below showing what substances were detected in our drinking water during 2000. Although all of the substances listed below are under the Maximum Contaminant Level (MCL) set by U.S. EPA, we feel it is important that you know exactly what was detected and how much of the substance was present in the water.

REGULATED SUBSTANCES DETECTED

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AVERAGE DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Primary Regulated Substances (Monitoring of these substances is regulated to protect against possible adverse health effects.)							
Radionuclides							
Alpha emitters (pCi/l)	2000	15	(0)	3.8	0 - 8	No	Erosion of natural deposits
Inorganics							
Arsenic (ppb)	2000	50	NA	4.6	0 - 8	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes
Barium (ppm)	2000	1	(2)	0.0158	0.002 - 0.07	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Chromium (ppb)	2000	50	2.5	2.3	0 - 3	No	Discharge from steel and pulp mills; Erosion of natural deposits
Dibromochloropropane (DBCP) (ppt)[1]	2000	200	1.7	88	0 - 200	No	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards
Fluoride (ppm)	2000	2	1	0.27	0 - 1	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Nitrate (ppm)[2]	2000	45	45	14	0 - 39	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Microbiologicals							
Total Coliform Bacteria (% positive monthly samples)	2000	5% positive samples	(0)	0.68	NA	No	Naturally present in the environment
Organics							
TTHMs [Total trihalomethanes] (ppb)	2000	100	NA	1.06	0 - 1.6	No	By-product of drinking water chlorination
Turbidity (NTU)	2000	TT	NA	1	0 - 9.5	No	Sand particulates from soil
Secondary Regulated Substances (Monitoring of these substances is regulated to protect the odor, taste and appearance of drinking water.)							
Chloride (ppm)	2000	500	NA	7.3	3 - 24	No	Runoff/leaching from natural deposits; seawater influence
Color (color units)	2000	15	NA	1.1	0 - 5	No	Naturally occuring organic materials
Iron (ppb)	2000	300	NA	206	0 - 490	No	Leaching from natural deposits; industrial wastes

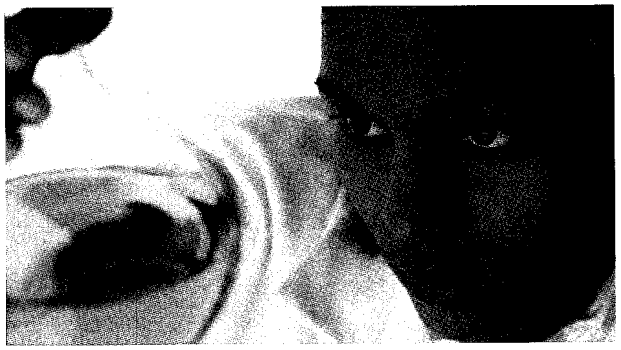

TABLE DEFINITIONS

Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHG (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

NA: Not applicable.

Nephelometric Turbidity Units (NTU): Measurement of the clarity, or turbidity, of water.

Primary Drinking Water Standard or PDWS: MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Parts per billion (ppb): One part per billion (or micrograms per liter) is equivalent to one penny in $10,000,000.

Parts per million (ppm): One part per million (or milligrams per liter) is equivalent to one penny in $10,000.

Parts per trillion (ppt): One part per trillion (or nanograms per liter) corresponds to one penny in $10,000,000,000.

Picocuries per liter (pCi/L): Measurement of the natural rate of disintegration.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Water Conservation Tips

Specific Conductance (umhos /cm)	2000	1600	NA	211	140 - 353	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2000	500	NA	7.24	3 - 28	No	Runoff/leaching from natural deposits;industrial wastes
Total Dissolved Solids (ppm)	2000	1000	NA	130	70 - 260	No	Runoff/leaching from natural deposits

LEAD AND COPPER MONITORING (Tap water samples were collected from 30 area residences. The 90th percentile values are shown.)

SUBSTANCE (UNITS)	YEAR SAMPLED	ACTION LEVEL	MCLG	AMOUNT DETECTED	HOMES ABOVE AL	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2000	1.3	1.3	0.05	0	No	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives
Lead (ppb)	2000	15	0	9.8	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

UNREGULATED SUBSTANCES (Unregulated substances do not have MCLs or MCLGs. Monitoring of these substances helps the Department to determine where certain contaminants occur and whether it needs to regulate those contaminants.)

SUBSTANCE (UNITS)	YEAR SAMPLED	AVERAGE DETECTED	RANGE LOW-HIGH
Aggressiveness Index (ppm)	2000	11.89	11.6 - 12.2
Bicarbonate (ppm)	2000	74.8	30 - 150
Boron (ppm)	2000	0.43	0 - 0.9
Calcium (ppm)	2000	10.3	0 - 40
Carbonate (ppm)	2000	17.9	10 - 30
Magnesium (ppm)	2000	2.7	0 - 3
pH (Std. Units)	2000	8.8	7.8 - 9.6
Potassium (ppm)	2000	1.5	0 - 2
Sodium (ppm)	2000	34	20 - 79
Sodium Adsorption Ratio (SAR) (ppm)	2000	4.4	1 - 14
Total Alkanlinity (as CaC03)(ppm)	2000	77	60 - 140
Total Hardness (as CaC03) (ppm)	2000	34	5 - 108

[1]During the past three years, DBCP was detected in three city wells. Two wells only had trace amounts and were well below the MCL. The third-well had one sample that met the MCL and was immediately removed from the City's distribution system. The water from this well is being tested every month. The results from this increased monitoring have shown DBCP levels to be well below the MCL. This well is still considered to be operating within state and federal standards.

[2]Nitrate in drinking water at levels above 45 mg/L is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 45 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider.

W measures are an important first step in protecting our water supply. Such measures not only save the supply of our source water, but can also save you money by reducing your water and sewer bills. Here are a few suggestions.

Conservation measures you can use inside your home include:

- Fix leaking faucets, pipes, toilets, etc.
- Install water-saving devices in faucets, toilets and appliances. Replace old fixtures with new ones. This will reduce water consumption by nearly one-half.
- Wash only full loads of laundry.
- Do not use the toilet for trash disposal.
- Take shorter showers. Do not let the water run while shaving or brushing teeth.
- Soak dishes before washing. Run the dishwasher only when full.

You can conserve outdoors as well:

- Water the lawn and garden in the early morning or evening, and only on your desiganted days.
- Use mulch around plants and shrubs.
- Repair leaks in faucets and hoses. Use water-saving nozzles.
- Use water from a bucket to wash your car, and always use a positive shut-off nozzle on the hose for quick rinses.

Information On The Internet

The U.S. EPA Office of Water (www.epa.gov/watrhome) and the Centers for Disease Control and Prevention (www.cdc.gov) Web sites provide a substantial amount of information on many issues relating to water resources, water conservation, and public health. Also, the California Department of Health Services hosts a Web site (www.dhs.ca.gov) that provides complete and current information on water issues in our own state.

What's In My Water?

We are pleased to report that during the past year, the water delivered to your home or business complied with, or did better than, all state and federal drinking water requirements. For your information, we have compiled a list in the table below showing what substances were detected in our drinking water during 2001. Although all of the substances listed below are under the Maximum Contaminant Level (MCL) set by the U.S. EPA, we feel it is important that you know exactly what was detected and how much of the substance was present in the water.

REGULATED SUBSTANCES Primary (Monitoring of these substances is regulated in order to protect against possible adverse health effects)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AVERAGE DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Aluminum (ppm)	2001	1	NA	0.09	0-0.42	No	Discharge from petroleum and chemical factories; Underground gas tank leaks
Arsenic (ppb)	2001	50	NA	2.7	0-10	No	Erosion of natural deposits; Runoff from orchards; Glass and electronics production wastes
Barium (ppm)	2001	1	(2)	0.02	0.003-0.07	No	Discharge of oil drilling wastes and from metal refineries; Erosion of natural deposits
Chromium (ppb)	2001	50	2.5	1.9	0-3	No	Discharge from steel and pulp mills and chrome plating; Erosion of natural deposits
Dibromochloropropane (ppt)[1]	2001	200	1.7	40	0-170	No	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
Fluoride (ppm)	2001	2	1	0.10	0-1	No	Erosion of natural deposits; water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Gross Alpha Activity (pCi/L)	2001	15	(0)	1.95	0-8	No	Erosion of natural deposits
Nitrate (as nitrate, NO3) (ppm)	2001	45	45	12	0-43.5	No	Runoff and leaching from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
TTHMs [Total Trihalomethanes] (ppb)	2001	100	NA	0.1	0-1.1	No	By-product of drinking water chlorination
Total Coliforms (% positive samples)	2001	5% positive samples	(0)	5.26	NA	Yes	Naturally present in the environment

REGULATED SUBSTANCES Secondary (Monitoring of these substances is regulated in order to protect the odor, taste and appearance of drinking water)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AVERAGE DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2001	500	NS	7	3-24	No	Runoff/leaching from natural deposits; Seawater influence
Color (units)	2001	15	NS	1.4	0-15	No	Naturally occurring organic materials
Iron (ppb)	2001	300	NS	64	0-710	No	Leaching from natural deposits; Industrial wastes
Odor-Threshold (units)	2001	3	NS	0.12	0-1	No	Naturally occurring organic materials
Specific Conductance (umhos/cm)	2001	1,600	NS	225	148-353	No	Substances that form ions when in water; Seawater influence

Table Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (2nd MCL) are set to protect the odor, taste and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

NA: Not applicable

NS: No standard

pCi/L (picocurries per liter): Measurement of the natural rate of disintegration.

PDWS (Primary Drinking Water Standard): MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part

							Industrial wastes
Total Dissolved Solids [TDS] (ppm)	2001	1,000	NS	145	70-260	No	Runoff/leaching from natural deposits
Turbidity (units)	2001	5	NS	1.1	0-10.6	No	Sand particulates from soil

Tap water samples were collected for lead and copper analyses from 33 homes in the service area

SUBSTANCE (UNITS)	YEAR SAMPLED	AL	PHG (MCLG)	AMOUNT DETECTED	HOMES ABOVE AL	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2001	1.3	0.17	0.02	0	No	Internal corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives
Lead (ppb)	2001	15	2	1.5	0	No	Internal corrosion of household water plumbing systems; Discharges from industrial manufacturers; Erosion of natural deposits

UNREGULATED SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AVERAGE DETECTED	RANGE (LOW-HIGH)	SUBSTANCE (UNITS)	YEAR SAMPLED	AMOUNT DETECTED	RANGE (LOW-HIGH)
Aggressiveness Index (ppm)	2001	12	11.5-12.3	**Potassium** (ppm)	2001	1.3	0-2
Bicarbonate (ppm)	2001	74.4	50-150	**Sodium** (ppm)	2001	34	20-79
Boron (ppm)	2001	0.09	0-0.9	**Sodium Absorption Ratio** (ppm)	2001	4	1-11
Calcium (ppm)	2001	8.75	2-24	**Sulfate** (ppm)	2001	7.9	3-28
Carbonate (ppm)	2001	20	0-20	**Total Alkalinity** (ppm)	2001	75	60-140
Chloroform (ppb)	2001	0.12	0-1.1	**Total Hardness** (ppm)	2001	31	5-108
Magnesium (ppm)	2001	0.4	0-3	**pH** (units)	2001	8.8	7.7-9.7

[1]During the past few years, DBCP was detected in three city wells. Two wells only had trace amounts and were well below the MCL. The third well had one sample that met the MCL in the year 2000. We tested this well monthly and results have shown DBCP levels below the MCL. This well is now for emergency stand-by only and was not used in 2001. A filter system has been budgeted for this site to be installed sometime this year. All three wells are considered to be operating within state and federal standards.

Special Health Information

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC (Centers for Disease Control) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

milligrams per liter).

ppt (parts per trillion): One part substance per trillion parts water (or nanograms per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

umhos/cm (micromhos per centimeter): A measure of electrical conductance.

Water Conservation Tips

Water conservation measures are an important first step in protecting our water supply. Such measures not only save the supply of our source water, but can also save you money by reducing your water bill. Here are a few suggestions:

Conservation measures you can use inside your home include:

- Fix leaking faucets, pipes, toilets, etc.
- Replace old fixtures; install water-saving devices in faucets, toilets and appliances.
- Wash only full loads of laundry.
- Do not use the toilet for trash disposal.
- Take shorter showers.
- Do not let the water run while shaving or brushing teeth.
- Soak dishes before washing.
- Run the dishwasher only when full.

You can conserve outdoors as well:

- Water the lawn and garden in the early morning or evening.
- Use mulch around plants and shrubs.
- Repair leaks in faucets and hoses.
- Use water-saving nozzles.
- Use water from a bucket to wash your car, and save the hose for rinsing.

What's In My Water?

We are pleased to report that during the past year, the water delivered to your home or business complied with, or did better than, all state and federal drinking water requirements. For your information, we have compiled a list in the tables below showing what substances were detected in our drinking water during 2002. Although all of the substances listed are under the Maximum Contaminant Level (MCL) set by the U.S. EPA, we feel it is important that you know exactly what was detected and how much of the substance was present in the water.

PRIMARY DRINKING WATER STANDARD (Regulated in order to protect against possible adverse health effects)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AVERAGE AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Aluminum (ppm)	2002	1	0.6	0.09	ND-0.42	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic (ppb)	2002	50	NA	2.86	ND-10	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppm)	2002	1	(2)	0.015	0.0063-0.071	No	Discharge of oil drilling wastes and from metal refineries; erosion of natural deposits
Chromium (ppb)	2002	50	(100)	1.97	ND-3	No	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Dibromochloropropane (ppt)	2002	200	1.7	50	ND-175	No	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
Fluoride (ppm)	2002	2	1	0.00022	0.00022-0.001	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Activity (pCi/L)	2002	15	NA	2.64	ND-13	No	Erosion of natural deposits
Nitrate (as nitrate, NO_3) (ppm)	2002	45	45	0.0126	ND-0.0435	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
TTHMs [Total Trihalomethanes] (ppb)	2002	80	NA	0.1	ND-1.1	No	By-product of drinking water disinfection
Total Coliforms (% positive samples)	2002	5% positive samples	(0)	1	NA	No	Naturally present in the environment

Tap water samples were collected for lead and copper analysis from 33 homes in the service area

SUBSTANCE (UNITS)	YEAR SAMPLED	ACTION LEVEL	PHG (MCLG)	AMOUNT DETECTED (90th %tile)	HOMES ABOVE ACTION LEVEL	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2001	1.3	0.17	0.02	0	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	2001	15	2	1.5	0	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

SECONDARY DRINKING WATER STANDARD

Table Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (2nd MCL) are set to protect the odor, taste and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

NA: Not applicable

ND: Not detected

NS: No standard

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water.

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AVERAGE AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2002	500	NS	9.45	4-29	No	Runoff/leaching from natural deposits; seawater influence
Color (Units)	2002	15	NS	0.68	ND-15	No	Naturally occurring organic materials
Corrosivity (Units)	2002	Non-corrosive	NS	0.25	0.1-1.4	No	Natural or industrially-influenced balance of hydrogen, carbon and oxygen in the water; affected by temperature and other factors
Iron (ppb)	2002	300	NS	67	ND-360	No	Leaching from natural deposits; industrial wastes
Odor-Threshold (Units)	2002	3	NS	0.17	ND-1	No	Naturally occurring organic materials
Specific Conductance (umhos/cm)	2002	1,600	NS	230	148-430	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2002	500	NS	8.37	3-28	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids [TDS] (ppm)	2002	1,000	NS	146	70-260	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2002	5	NS	0.87	ND-10.6	No	Soil runoff

OTHER SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AVERAGE AMOUNT DETECTED	RANGE (LOW-HIGH)
Aggressiveness Index (ppm)	2002	11.9	11.5-12.3
Bicarbonate (ppm)	2002	100	50-150
Boron (ppm)	2002	0.07	ND-9
Calcium (ppm)	2002	8.8	2-27
Carbonate (ppm)	2002	0.33	ND-20
Chloroform (ppb)	2002	0.12	ND-1.1
Magnesium (ppm)	2002	0.34	ND-3
Potassium (ppm)	2002	1.2	ND-2
Sodium (ppm)	2002	36	20-79
Sodium Absorption Ratio (ppm)	2002	4	1-11
Sulfate (ppm)	2002	0.87	3-28
Total Alkalinity (ppm)	2002	78	54-140
Total Hardness (ppm)	2002	27.7	5-110
Vanadium (ppb)	2002	21.5	ND-69
pH (Units)	2002	8.7	7.4-9.7

milligrams per liter).

ppt (parts per trillion): One part substance per trillion parts water (or nanograms per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

umhos/cm (micromhos per centimeter): A measure of electrical conductance.

Contamination from Cross-connections

Cross-connections that could contaminate drinking water distribution lines are a major concern. A cross-connection is formed at any point where a drinking water line connects to equipment (boilers), systems containing chemicals (air conditioning systems, fire sprinkler systems, irrigation systems) or water sources of questionable quality. Cross-connection contamination can occur when the pressure in the equipment or system is greater than the pressure inside the drinking water line (backpressure). Contamination can also occur when the pressure in the drinking water line drops due to fairly routine occurrences (main breaks, heavy water demand) causing contaminants to be sucked out from the equipment and into the drinking water line (backsiphonage).

Outside water taps and garden hoses tend to be the most common sources of cross-connection contamination at home. The garden hose creates a hazard when submerged in a swimming pool or when attached to a chemical sprayer for weed killing. Garden hoses that are left lying on the ground may be contaminated by fertilizers, cesspools or garden chemicals. Improperly installed valves in your toilet could also be a source of cross-connection contamination.

Community water supplies are continuously jeopardized by cross-connections unless appropriate valves, known as backflow prevention devices, are installed and maintained. We have surveyed all industrial, commercial, and institutional facilities in the service area to make sure that all potential cross-connections are identified and eliminated or protected by a backflow preventer. We also inspect and test each backflow preventer to make sure that it is providing maximum protection.

For more information, visit the Web site of the American Backflow Prevention Association for a discussion on current issues at www.abpa.org.

CA1485

Sampling Results

During the past year, we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. Although all of the substances listed here are under the Maximum Contaminant Level (MCL), we feel it is important that you know exactly what was detected and how much of the substance was present in the water. The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

PRIMARY DRINKING WATER STANDARD (REGULATED IN ORDER TO PROTECT AGAINST POSSIBLE ADVERSE HEALTH EFFECTS.)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Aluminum (ppm)	2003	1	0.6	0.0775	ND-0.42	No	Erosion of natural deposits; Residue from some surface water treatment processes
Arsenic (ppb)	2003	50	NA	2.456	ND-10	No	Erosion of natural deposits; Runoff from orchards; Glass and electronics production wastes
Barium (ppm)	2003	1	2	0.0182	0.0022-0.0706	No	Discharge of oil drilling wastes and from metal refineries; Erosion of natural deposits
Chlorine (ppm)	2003	MRDL= 4 (as Cl_2)	MRDLG= 4 (as Cl_2)	0.45	0.32-0.59	No	Drinking water disinfectant added for treatment
Chromium (ppb)	2003	50	(100)	2.025	ND-3	No	Discharge from steel and pulp mills and chrome plating; Erosion of natural deposits
Dibromochloropropane [DBCP] (ppt)	2003	200	1.7	45.472	ND-230	No	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
Fluoride (ppm)	2003	2	1	0.125	ND-1.1	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Gross Alpha Particle Activity (pCi/L)	2003	15	NA	2.786	0.161-9.96	No	Erosion of natural deposits
Haloacetic Acids [HAAs] (ppb)	2003	60	NA	0.25	ND-2	No	By-product of drinking water disinfection
Mercury [inorganic] (ppb)	2003	2	1.2	0.00525	ND-0.04	No	Erosion of natural deposits; Discharge from refineries and factories; Runoff from landfills; Runoff from cropland
Nickel (ppb)	2003	100	12	0.025	ND-1	No	Erosion of natural deposits; Discharge from metal factories
Nitrate (as nitrate, NO_3) (ppm)	2003	45	45	12.24	ND-44.2	No	Runoff and leaching from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
TTHMs [Total Trihalomethanes] (ppb)	2003	80	NA	0.0609	ND-2	No	By-product of drinking water chlorination
Total Coliforms (% positive samples)	2003	5% positive samples	(0)	1.96	NA	No	Naturally present in the environment
Turbidity (NTU)[1]	2003	TT	NA	10.6	ND-10.6	No	Soil runoff
Uranium (pCi/L)	2003	20	0.5	2.16	0.195-4.14	No	Erosion of natural deposits

Tap water samples were collected for lead and copper analyses from 33 homes throughout the service area

SUBSTANCE (UNITS)	YEAR SAMPLED	AL	PHG (MCLG)	AMOUNT DETECTED (90TH %TILE)	HOMES ABOVE AL	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2001	1.3	0.17	0.02	0	No	Internal corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives
Lead (ppb)	2001	15	2	1.5	0	No	Internal corrosion of household water plumbing systems; Discharges from industrial manufacturers; Erosion of natural deposits

SECONDARY DRINKING WATER STANDARD (REGULATED IN ORDER TO PROTECT THE ODOR, TASTE AND APPEARANCE OF DRINKING WATER.)

SUBSTANCE (UNITS)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE (LOW-HIGH)	VIOLATION	TYPICAL SOURCE
Aluminum (ppb)	2003	200	NS	0.0775	ND-0.42	No	Erosion of natural deposits; Residual from some surface water treatment processes
Chloride (ppm)	2003	500	NS	8.4	3-36	No	Runoff/leaching from natural deposits; Seawater influence
Color (Units)	2003	15	NS	0.875	ND-15	No	Naturally occurring organic materials
Corrosivity (Units)	2003	Non-corrosive	NS	0.0255	0.6-0.3	No	Natural or industrially influenced balance of hydrogen, carbon and oxygen in the water; Affected by temperature and other factors
Iron (ppb)	2003	300	NS	50.97	ND-260	No	Leaching from natural deposits; Industrial wastes
Manganese (ppb)	2003	50	NS	0.5	ND-20	No	Leaching from natural deposits
Odor-Threshold (Units)	2003	3	NS	0.025	ND-1	No	Naturally occurring organic materials
Specific Conductance (umhos/cm)	2003	1,600	NS	270.47	149-389	No	Substances that form ions when in water; Seawater influence
Sulfate (ppm)	2003	500	NS	8.35	3-34	No	Runoff/leaching from natural deposits; Industrial wastes
Total Dissolved Solids [TDS] (ppm)	2003	1,000	NS	147.5	70-260	No	Runoff/leaching from natural deposits
Turbidity (NTU)[1]	2003	5	NS	1.11	ND-10.6	No	Soil runoff
Zinc (ppm)	2003	5.0	NS	0.0005	ND-0.02	No	Runoff/leaching from natural deposits; Industrial wastes

UNREGULATED SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AMOUNT DETECTED	RANGE (LOW-HIGH)	TYPICAL SOURCE
Boron (ppm)	2003	0.0522	ND-0.86	Naturally occurring
Bromoform (ppb)	2003	0.0115	ND-1.3	By-product of drinking water disinfection
Chloroform (ppb)	2003	0.035	ND-1.1	By-product of drinking water disinfection
Sodium (ppm)	2003	34.225	20-80	Naturally occurring
Sulfate (ppm)	2003	8.35	2-40	Naturally occurring
Total Hardness (ppm)	2003	26.22	4.99-108	Naturally occurring
Vanadium (ppm)	2003	0.0231	ND-0.062	Naturally occurring

[1] Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of water quality and the effectiveness of disinfectants.

Table Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (SMCL) are set to protect the odor, taste and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

NA: Not applicable

ND: Not detected

NS: No standard

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water.

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

ppt (parts per trillion): One part substance per trillion parts water (or nanograms per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

umhos/cm (micromhos per centimeter): A measure of electrical conductance.

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Sampling Results

During the past year we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. Although all of the substances listed here are under the Maximum Contaminant Level (MCL), we feel it is important that you know exactly what was detected and how much of the substance was present in the water. The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data is included, along with the year in which the sample was collected.

PRIMARY DRINKING WATER STANDARD (Regulated in order to protect against possible adverse health effects.)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Aluminum (ppm)	2004	1	0.6	0.092	ND-0.32	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic (ppb)	2004	50	0.004	3	ND-10	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppm)	2004	1	2	0.0182	0.0022-0.0692	No	Discharge of oil drilling wastes and from metal refineries; erosion of natural deposits
Chlorine (ppm)	2004	[4.0 as Cl_2]	[4 as Cl_2]	0.30	ND-0.92	No	Drinking water disinfectant added for treatment
Chromium (ppb)	2004	50	(100)	2	ND-3	No	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
Dibromochloropropane (DBCP) (ppt)	2004	200	1.7	11.25	ND-140	No	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
Fluoride (ppm)	2004	2	1	0.16	ND-1.1	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha particle Activity (pCi/L)	2004	15	NA	2.45	0.161-13	No	Erosion of natural deposits
Haloacetic Acids (ppb)	2004	60	NA	0.25	ND-2	No	By-product of drinking water disinfection
Mercury [inorganic] (ppb)	2004	2	1.2	0.009	ND-0.04	No	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills; runoff from cropland
Nickel (ppb)	2004	100	12	0.04	ND-1	No	Erosion of natural deposits; discharge from metal factories
Nitrate (as nitrate, NO_3) (ppm)	2004	45	45	12.2	ND-43	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Uranium (pCi/L)	2004	20	0.43	1.60	0.20-4.14	No	Erosion of natural deposits
Sampling results from distribution system only							
Total Coliforms (% positive samples)	2004	5% positive monthly samples	(0)	2	NA	No	Naturally present in the environment
TTHMs [Total Trihalomethanes] (ppb)	2004	80	NA	0.095	ND-2	No	By-product of drinking water chlorination

Table Definitions

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MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

MRDL (Maximum Residual Disinfectant Level): The level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs are set the U.S. Environmental Protection Agency.

NA: Not applicable

ND: Not detected

NS: No standard

pCi/L (picocuries per liter): A measure of radioactivity in water.

PDWS (Primary Drinking Water Standard): MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known

SUBSTANCE (UNITS)	YEAR SAMPLED	ACTION LEVEL	PHG (MCLG)	AMOUNT DETECTED (90th%TILE)	HOMES ABOVE ACTION LEVEL	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2004	1.3	0.17	0.012	0	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	2004	15	2	0.5	0	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

SECONDARY DRINKING WATER STANDARD (Regulated in order to protect the odor, taste and appearance of drinking water.)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2004	500	NS	10.4	3-49	No	Runoff/leaching from natural deposits; seawater influence
Color (Units)	2004	15	NS	1.85	ND-20	No	Naturally-occurring organic materials
Corrosivity (Units)	2004	Non-corrosive	NS	-0.09	-0.9-0.7	No	Natural or industrially-influenced balance of hydrogen, carbon and oxygen in the water; affected by temperature and other factors
Iron (ppb)	2004	300	NS	77.5	ND-260	No	Leaching from natural deposits; industrial wastes
Manganese (ppb)	2004	50	NS	1.85	ND-20	No	Leaching from natural deposits
Odor--Threshold (Units)	2004	3	NS	0.025	ND-1	No	Naturally-occurring organic materials
Specific Conductance (µmhos/cm)	2004	1,600	NS	245	146-389	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2004	500	NS	9.5	3-34	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids [TDS] (ppm)	2004	1,000	NS	154	90-260	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2004	5	NS	1.78	ND-2	No	Soil runoff
Zinc (ppm)	2004	5.0	NS	0.00074	ND-0.02	No	Runoff/leaching from natural deposits; industrial wastes

UNREGULATED SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	TYPICAL SOURCE
1,2,3-Trichloropropane (ppb)	2004	0.0076	ND-0.026	Industrial solvent, paint remover and cleaner, It is not a naturally occurring chemical
Boron (ppm)	2004	0.075	ND-0.70	Naturally occurring
Sodium (ppm)	2004	34.5	20-80	Naturally occurring
Sulfate (ppm)	2004	9.5	3-34	Naturally occurring
Total Hardness (as $CaCO_3$) (ppm)	2004	30.9	4.99-103	Naturally occurring
Vanadium (ppm)	2004	0.0207	ND-0.062	Naturally occurring

set by the California EPA.

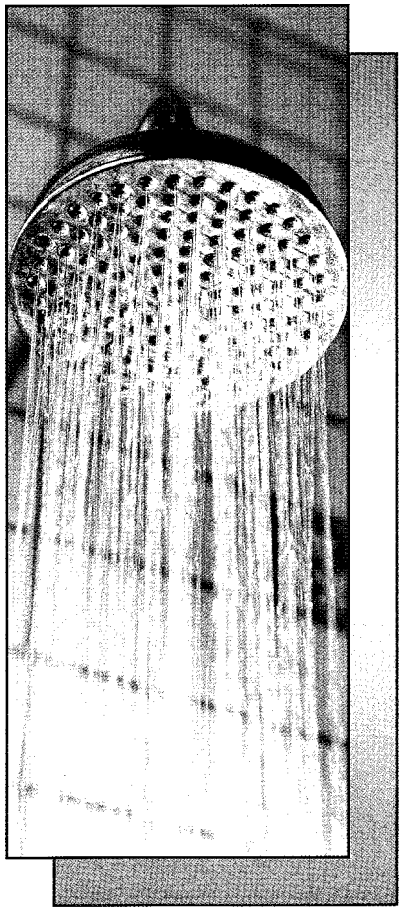
ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

ppt (parts per trillion): One part substance per trillion parts water (or nanograms per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

µmhos/cm (micromhos per centimeter): A measure of electrical conductance.



Sampling Results

During the past year we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. Although all of the substances listed here are under the Maximum Contaminant Level (MCL), we feel it is important that you know exactly what was detected and how much of the substance was present in the water. The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

PRIMARY DRINKING WATER STANDARD (Regulated In Order To Protect Against Possible Adverse Health Effects)

SUBSTANCE (UNITS)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Aluminum (ppm)	2005	1	0.6	0.08	ND-0.32	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic (ppb)	2005	50	0.004	2.44	ND-12	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppm)	2005	1	2	0.034	0.0025-0.0181	No	Discharge of oil drilling wastes and from metal refineries; erosion of natural deposits
Chlorine (ppm)	2005	[4.0 (as Cl_2)]	[4 (as Cl_2)]	0.57	ND-0.78	No	Drinking water disinfectant added treatment
Chromium (ppb)	2005	50	(100)	1.7	ND-3	No	Discharge from steel and pulp mills and chrome plating; erosion of natural deposits
DBCP [Dibromochloro-propane] (ppt)	2005	200	1.7	18	ND-150	No	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
Fluoride (ppm)	2005	2.0	1	0.192	ND-1.1	No	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha particle Activity (pCi/L)	2005	15	(0)	1.81	ND-12.9	No	Erosion of natural deposits
Haloacetic Acids (ppb)	2005	60	NA	4.45	ND-6.4	No	By-product of drinking water disinfection
Mercury [inorganic] (ppb)	2005	2	1.2	0.0375	ND-0.01	No	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills; runoff from cropland
Nickel (ppb)	2005	100	12	0.043	ND-1	No	Erosion of natural deposits; discharge from metal factories
Nitrate (as nitrate, NO_3) (ppm)	2005	45	45	13.8	ND-32.4	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Nitrite (as nitrogen, N) (ppm)	2005	1	1	0.012	ND-0.31	No	Runoff and leaching from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
TTHMs [Total Trihalomethanes] (ppb)[1]	2005	80	NA	0.1	ND-2	No	By-product of drinking water chlorination
Uranium (pCi/L)	2005	20	0.43	3.2	0.18-8.77	No	Erosion of natural deposits

Table Definitions

AL (Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

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MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

MRDL (Maximum Residual Disinfectant Level): The level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs are set by the U.S. Environmental Protection Agency.

NA: Not applicable

ND: Not detected

NS: No standard

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water.

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements

SUBSTANCE (UNITS)	YEAR SAMPLED	ACTION LEVEL	PHG (MCLG)	AMOUNT DETECTED (90TH%TILE)	HOMES ABOVE ACTION LEVEL	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2004	1.3	0.17	0.012	0	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead (ppb)	2004	15	2	0.5	0	No	Internal corrosion of household water plumbing systems; discharges from industrial manufacturers; erosion of natural deposits

SECONDARY DRINKING WATER STANDARD (Regulated In Order To Protect The Odor, Taste And Appearance Of Drinking Water)

SUBSTANCE (UNITS)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2005	500	NS	10.9	3-49	No	Runoff/leaching from natural deposits; seawater influence
Corrosivity (Units)	2005	Non-corrosive	NS	-0.1	-0.9-0.7	No	Natural or industrially influenced balance of hydrogen, carbon and oxygen in the water; affected by temperature and other factors
Iron (ppb)	2005	300	NS	69	ND-130	No	Leaching from natural deposits; industrial wastes
Manganese (ppb)	2005	50	NS	15	ND-20	No	Leaching from natural deposits
Odor--Threshold (Units)	2005	3	NS	0.025	ND-1	No	Naturally occurring organic materials
Specific Conductance (µmhos/cm)	2005	1,600	NS	238	140-430	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2005	500	NS	9.3	3-34	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids [TDS] (ppm)	2005	1,000	NS	163	90-260	No	Runoff/leaching from natural deposits
Turbidity (Units)	2005	5	NS	0.47	0.02-0.85	No	Soil runoff
Zinc (ppm)[2]	2005	5.0	NS	0.02	ND-0.02	No	Runoff/leaching from natural deposits; industrial wastes

UNREGULATED SUBSTANCES

SUBSTANCE (UNITS)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH	TYPICAL SOURCE
1,2,3-Trichloropropane (ppb)	2005	0.004	ND-0.056	Industrial solvent; paint remover and cleaner
Boron (ppm)	2005	0.036	ND-0.07	Naturally occurring
Bromoform (ppb)	2005	0.052	ND-1.3	By-product of drinking water disinfection
Chloroform (ppb)	2005	0.112	ND-1.8	By-product of drinking water disinfection
Sodium (ppm)	2005	34.6	20-86	Naturally occurring
Sulfate (ppm)	2005	9.3	3-34	Naturally occurring
Total Hardness (as $CaCO_3$) (ppm)	2005	33.1	5-111	Naturally occurring
Vanadium (ppm)	2005	0.02	ND-0.06	Naturally occurring

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

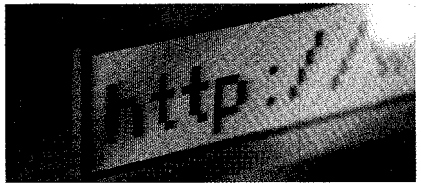
ppt (parts per trillion): One part substance per trillion parts water (or nanograms per liter).

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

µmhos/cm (micromhos per centimeter): A measure of electrical conductance.

Footnotes:

[1] Samples taken from the distribution system.
[2] Tests show only one sample detected.



Information on the Internet

The U.S. EPA Office of Water (www.epa.gov/watrhome) and the Centers for Disease Control and Prevention (www.cdc.gov) Web sites provide a substantial amount of information on many issues relating to water resources, water conservation and public health. Also, the California Department of Environmental Protection has a Web site (www.calepa.ca.gov) that provides complete and current information on water issues in our state.

Sampling Results

During the past year, we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water. Although all of the substances listed here are under the Maximum Contaminant Level (MCL), we feel it is important that you know exactly what was detected and how much of the substance was present in the water.

The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included along with the year in which the sample was taken.

REGULATED SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Aluminum (ppb)	2006–2008	1,000	600	101.3	0.066–650	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic[1] (ppb)	2006–2008	10	0.004	4	2.1–10	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppb)	2006–2008	1	2	40.5	10–70	No	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Combined Radium (pCi/L)	2006–2008	5	(0)	1	1–1	No	Erosion of natural deposits
Dibromochloropropane [DBCP] (ppb)	2006–2008	200	1.7	0.84	0.013–0.79	No	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes and tree fruit
Fluoride (ppm)	2006–2008	2.0	1	0.168	0.01–1.1	No	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Particle Activity (pCi/L)	2006–2008	15	(0)	2.1	2–2.25	No	Erosion of natural deposits
Mercury [inorganic] (ppb)	2006–2008	2	1.2	0.21	NA	No	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and cropland
Nitrate [as nitrate] (ppm)	2006–2008	45	45	16.9	2.2–38	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Xylenes (ppm)	2006–2008	1.750	1.8	0.275	0.05–0.5	No	Discharge from petroleum and chemical factories; fuel solvent

Tap water samples were collected for lead and copper analysis from sample sites throughout the community (lead was not detected)

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	ACTION LEVEL	MCLG	AMOUNT DETECTED (90TH%TILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2008	1.3	1.3	0.025	0/33	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

SECONDARY SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2006–2008	500	NS	10.2	4–30	No	Runoff/leaching from natural deposits; seawater influence
Color (Units)	2006–2008	15	NS	4.3	1–10	No	Naturally occurring organic materials
Foaming Agents [MBAS] (ppb)	2006–2008	500	NS	50	NA	No	Municipal and industrial waste discharges
Iron (ppb)	2006–2008	300	NS	131.8	10–280	No	Leaching from natural deposits; industrial wastes
Manganese (ppb)	2006–2008	50	NS	5.1	NA	No	Leaching from natural deposits
Odor–Threshold (TON)	2006–2008	3	NS	1	1–1	No	Naturally occurring organic materials
Specific Conductance (µS/cm)	2006–2008	1,600	NS	216.5	130–340	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2006–2008	500	NS	10.4	4.5–32	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (ppm)	2006–2008	1,000	NS	143.9	86–220	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2006–2008	5	NS	1.1	0.04–7.7	No	Soil runoff
Zinc (ppm)	2006–2008	5.0	NS	3.75	0.26–5.7	No	Runoff/leaching from natural deposits; industrial wastes

UNREGULATED AND OTHER SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH
1,2,3-Trichloropropane (ppb)	2006–2008	0.275	0.05–0.5
Aggressiveness Index (ppm)	2006–2008	11.66	11–12
Bicarbonate (ppm)	2006–2008	74.9	13–120
Bromoform (ppb)	2006–2008	110	100–120
Calcium (ppm)	2006–2008	12	1–39
Carbonate (ppm)	2006–2008	9.9	1.6–39
Hydroxide (ppm)	2006–2008	1	1–1
Magnesium (ppm)	2006–2008	0.85	0.01–2
Potassium (ppm)	2006–2008	2.1	1–6.4
Sodium (ppm)	2006–2008	33.48	20–78
Total Alkalinity (CaCO3) (ppm)	2006–2008	74.69	55–130
Total Hardness (CaCO3) (ppm)	2006–2008	33.48	20–78

Footnotes:

[1] While your drinking water meets the EPA standard for arsenic, it does contain low levels of arsenic. The arsenic standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The U.S. Environmental Protection Agency continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects, such as skin damage and circulatory problems.

Definitions

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µS/cm (microsiemens per centimeter): A unit expressing the amount of electrical conductivity of a solution.

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NA: Not applicable.

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NS: No standard.

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

pCi/L (picocuries per liter): A measure of radioactivity.

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ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

TON (Threshold Odor Number): A measure of odor in water.

TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.

Sampling Results

During the past three years we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The table below shows only those contaminants that were detected in the water.

The state requires us to monitor for certain substances less than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Aluminum (ppb)	2009	1,000	NA	155	54–650	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic (ppb)	2009	10	0.004	4.5	2.1–9.4	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppb)	2009	1,000	NA	177.6	3–420	No	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Fluoride (ppm)	2009	2.0	1	0.21	0.10–1.1	No	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Particle Activity (pCi/L)	2009	15	(0)	2.38	0.15–5.6	No	Erosion of natural deposits
Nitrate [as nitrate] (ppm)	2009	45	45	17.2	2.2–38	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
Total Coliform Bacteria [Total Coliform Rule] (% positive samples)	2009	More than 5.0% of monthly samples are positive	(0)	2.2	NA	No	Naturally present in the environment
Uranium (pCi/L)	2009	20	0.43	2.7	1.0–6.1	No	Erosion of natural deposits

Tap water samples were collected for lead and copper analyses from sample sites throughout the community (lead was not detected at the 90th percentile)

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	MCLG	AMOUNT DETECTED (90TH%TILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2009	1.3	0.3	0.025	0/33	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

SECONDARY SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2009	500	NS	10.02	3.9–44	No	Runoff/leaching from natural deposits; seawater influence
Color (Units)	2009	15	NS	5	NA	No	Naturally occurring organic materials
Iron (ppb)	2009	300	NS	430	100–1000	No	Leaching from natural deposits; industrial wastes
Odor–Threshold (TON)	2009	3	NS	1	1–1	No	Naturally occurring organic materials
Specific Conductance (µS/cm)	2009	1,600	NS	224	140–460	No	Substances that form ions when in water; seawater influence
Total Dissolved Solids (ppm)	2009	1,000	NS	146	93–270	No	Runoff/leaching from natural deposits

UNREGULATED AND OTHER SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AMOUNT DETECTED	RANGE LOW-HIGH
Aggressiveness Index (Units)	2009	11.9	11–12
Bicarbonate (ppm)	2009	88	52–200
Bromoform (ppb)	2009	99.9	92–110
Calcium (ppm)	2009	13.2	1.8–49
Magnesium (ppm)	2009	0.95	0.22–4.9
pH (Units)	2009	8.5	7.9–9.5
Potassium (ppb)	2009	3	2.1–6.4
Sodium (ppm)	2009	34.5	20–95
Total Alkalinity (ppm)	2009	79.5	58–150
Total Hardness (ppm)	2009	50.8	2.8–140

Sampling Results

During the past year we have taken hundreds of water samples in order to determine the presence of any radioactive, biological, inorganic, volatile organic, or synthetic organic contaminants. The tables below show only those contaminants that were detected in the water. The state requires us to monitor for certain substances less often than once per year because the concentrations of these substances do not change frequently. In these cases, the most recent sample data are included, along with the year in which the sample was taken.

REGULATED SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	MCL [MRDL]	PHG (MCLG) [MRDLG]	AVERAGE AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Aluminum (ppb)	2010	1000	600	149	ND–370	No	Erosion of natural deposits; residue from some surface water treatment processes
Arsenic (ppb)	2010	10	0.004	4.9	ND–9.4	No	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
Barium (ppb)	2010	1000	2000	88.3	ND–420	No	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Chlorine (ppm)	2010	[4.0 (as Cl2)]	[4 (as Cl2)]	0.62	0.1–1.68	No	Drinking water disinfectant added for treatment
Combined Radium (pCi/L)	2010	5	(0)	1.2	1.10–1.30	No	Erosion of natural deposits
Dibromochloropropane [DBCP] (ppt)	2010	200	1.7	54	ND–130	No	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
Fluoride (ppm)	2010	2.0	1	0.18	ND–0.82	No	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
Gross Alpha Particle Activity (pCi/L)	2010	15	(0)	5.0	3.1–5.6	No	Erosion of natural deposits
Nitrate [as nitrate] (ppm)	2010	45	45	17.37	ND–38	No	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
TTHMs [Total Trihalomethanes][1] (ppb)	2010	80	NA	1.9	ND–1.9	No	By-product of drinking water disinfection
Total Coliform Bacteria [Total Coliform Rule] (% positive samples)	2010	More than 5.0% of monthly samples are positive	(0)	1.06	NA	No	Naturally present in the environment
Uranium (pCi/L)	2010	20	0.43	3.1	1.0–6.1	No	Erosion of natural deposits

Tap water samples were collected for lead and copper analyses from sample sites throughout the community

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AL	PHG (MCLG)	AMOUNT DETECTED (90TH%TILE)	SITES ABOVE AL/TOTAL SITES	VIOLATION	TYPICAL SOURCE
Copper (ppm)	2009	1.3	0.3	0.025	0/33	No	Internal corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives

Definitions

90th percentile: A percentile is a value on a scale of 100 that indicates the percent of a distribution that is equal to or below it. The 90th percentile is equal to or greater than 90% of the lead and copper values detected at your water system.

AL (Regulatory Action Level): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

µS/cm (microsiemens per centimeter): A unit expressing the amount of electrical conductivity of a solution.

MCL (Maximum Contaminant Level): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs (SMCLs) are set to protect the odor, taste, and appearance of drinking water.

MCLG (Maximum Contaminant Level Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. EPA.

MRDL (Maximum Residual Disinfectant Level): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

MRDLG (Maximum Residual Disinfectant Level Goal): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

NA: Not applicable

SECONDARY SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	SMCL	PHG (MCLG)	AVERAGE AMOUNT DETECTED	RANGE LOW-HIGH	VIOLATION	TYPICAL SOURCE
Chloride (ppm)	2010	500	NS	9.69	3.6–44	No	Runoff/leaching from natural deposits; seawater influence
Color (Units)	2010	15	NS	0.5	ND–10	No	Naturally occurring organic materials
Iron (ppb)	2010	300	NS	145	ND–230	No	Leaching from natural deposits; industrial wastes
Odor–Threshold (Units)	2010	3	NS	0.83	ND–1	No	Naturally occurring organic materials
Specific Conductance (µS/cm)	2010	1,600	NS	228	140–460	No	Substances that form ions when in water; seawater influence
Sulfate (ppm)	2010	500	NS	9.04	3.8–23	No	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (ppm)	2010	1,000	NS	137	84–270	No	Runoff/leaching from natural deposits
Turbidity (NTU)	2010	5	NS	NA	NA	No	Soil runoff
Zinc (ppm)	2010	5.0	NS	0.072	ND–0.072	No	Runoff/leaching from natural deposits; industrial wastes

UNREGULATED SUBSTANCES

SUBSTANCE (UNIT OF MEASURE)	YEAR SAMPLED	AVERAGE AMOUNT DETECTED	RANGE LOW-HIGH	TYPICAL SOURCE
Sodium (ppm)	2008-2010	33.7	23–95	Naturally occurring

[1] The results shown include Stage 2 samples.

ND (Not detected): Indicates that the substance was not found by laboratory analysis.

NS: No standard

NTU (Nephelometric Turbidity Units): Measurement of the clarity, or turbidity, of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

pCi/L (picocuries per liter): A measure of radioactivity.

PDWS (Primary Drinking Water Standard): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements and water treatment requirements.

PHG (Public Health Goal): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California EPA.

ppb (parts per billion): One part substance per billion parts water (or micrograms per liter).

ppm (parts per million): One part substance per million parts water (or milligrams per liter).

ppt (parts per trillion): One part substance per trillion parts water (or nanograms per liter).

APPENDIX O – ECONOMIC ANALYSIS FOR DEMAND MANAGEMENT MEASURE 1

DMM 1 Residential Surveys
Step 1 - Annual Costs

Administration Costs					
1. Staff hours to administer the survey program		200	hrs/yr		
2. Staff hourly rate, including overhead[1]	$	75	/hr		
3. Administration costs (Line 1 x Line 2)	$	15,000	/yr		
Field Labor Costs		Single Family Surveys		Multi Family Surveys	
4. Field labor hours		275	hrs/yr	13	hrs/yr
5. Field labor hourly rate, including overhead	$	75.00	/hr	$ 75.00	/hr
6. Field labor cost (Line 4 x Line 5)	$	20,625.00	/yr	$ 937.50	/yr
Materials Costs		Single Family Surveys		Multi Family Surveys	
7. Unit cost of materials (e.g., retrofit kits, lawn kits, nozzles)	$	55.00	/unit	$ 55.00	/unit
8. Number of surveys[2]		220	/yr	10	/yr
9. Total materials cost (Line 7 x Line 8)	$	12,100	/yr	$ 550	/yr
Publicity Costs					
10. Marketing collateral cost (e.g., brochure design, printing, web services)	$	4,000	/yr		
11. Advertising cost (i.e. newspaper, radio, TV, web)	$	1,000	/yr		
12. Total publicity costs (Line 10 + Line 11)	$	5,000	/yr		
Evaluation and Followup Costs					
13. Labor & Consultant costs	$	5,000	/yr		
14. **Total Costs** (Line 3 + Line 6 + Line 9 + Line 12 + Line 13)	$	59,213	/yr		
Program Cost Sharing					
15. Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$	-	/yr		
16. **Net Agency Cost** (Line 14 - Line 15)	$	59,213	/yr		

Notes:
1) 2005 UWMP used $50 per hour
2) Requirement of 1.5% of all residential customers per year; 3,814 SFR accounts and 673 MFR accounts in 2005
SFR: 0.015 x 14,616 = 220 surveys
MFR: 0.015 x 625 = 10 surveys

DMM 1 Residential Surveys
Step 2 - Customer Water Savings

	Single Family Surveys		Multi Family Surveys	
1. Reduction in Avg. Use[1] (gallons per day per residential unit)	32.00	gpd	32.00	gpd
2. Savings Decay[2]	25.00	%/yr	25.00	%/yr
3. Number of Surveys (from STEP 2 Line 8)	220.00		10.00	
4. Lifetime Savings	**31.51**	**AF**	**1.43**	**AF**

Notes:

1) Per 2005 CUWCC BMP Cost Savings Study Update - targeting high users. 2005 UWMP used 10 gallons per day)

2) Per 2005 CUWCC BMP Cost Savings Study Update

DMM 1 Residential Surveys
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)			
1. Marginal Source of Suppy (List name)		Groundwater Wells	
2. Avoidable Supply Acquisition Cost[1]	$	59	/AF
Avoided Treatment & Distribution Capacity Costs			
3. Avoided capacity expansion costs[1] (dollars per AF of water saved by conservation)	$	5	/AF
Avoided Wastewater Capacity Costs (*if service provided by agency*)			
4. Avoided capacity expansion costs[1] (dollars per AF of water saved by conservation)	$	67	/AF
Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*			
Avoided chemical costs			
5. Total annual chemical costs[1]	$	-	/yr
6. Annual fixed costs for chemicals	$	-	/yr
7. Annual chemical costs not related to water production	$	-	/yr
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$	-	/yr
9. Average annual treated water use		20207	AF
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$	-	/AF
Avoided energy costs			
11. Annual energy costs[1]	$	350,000.00	/yr
12. Annual fixed costs	$	-	/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$	-	/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$	350,000.00	/yr
15. Average annual water use (from Line 9 above)		20,207.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$	17.32	/AF
17. Avoided Treatment & Distribution Variable Costs	$	160.00	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$	291.00	/AF
Environmental Benefits			
19. Environmental benefit per AF saved[1] (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$	50	/AF

Notes:

1) As described in "Assumptions for all DMMs"

DMM 1 Residential Surveys
Step 4 - Other Benefits & Costs

OTHER BENEFITS

Avoided Customer Energy Costs		Single Family Surveys	Multi Family Surveys
1. Hot water use as a percent of meter water savings		2 %	2 %
2. Percent of residential hot water heated with gas[1]		90 %	90 %
3. Marginal cost per therm	$ 1.5 /therm		
4. Marginal cost per KWh	$ 0.12 /KWh		
5. Customer Energy Benefit		$ 47.02 /AF	$ 47.02 /AF

Avoided Wastewater Utility Variable Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

6. Avoided energy & chemical costs	$ 0 /AF of conserved water

Avoided Wastewater Utility Capacity Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

7. Avoided wastewater capacity expa	$ 0 /AF of conserved water

OTHER COSTS

Customer participation costs	Single Family Surveys	Multi Family Surveys
8. Average customer expenditures per survey (e.g., change landscaping, appliances, etc)	$ 100 /Survey	100 /Survey
9. Number of surveys (from Line 8 of STEP 1)	220.00 /yr	10.00 /yr
10. Total customer costs (Line 8 x Line 9)	$ 22,000.00 /yr	$ 1,000.00 /yr

Notes:
1) Source: http://websafe.kemainc.com/RASSWEB/DesktopDefault.aspx; data is for SCE)

DMM 1 Residential Surveys
Step 5 - Discounting Information

Discount Rates (required)		
1. Agency Discount Rate	2.5	%
2. Social Discount Rate	2.0	%
Annual Escalation Rates (optional)		
3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

DMM 1 Residential Surveys
Step 6 - Review Results

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total surveys	230		230	
2. Total water savings	32.9	AF	32.9	AF
3. Agency program costs	$59,213		$59,213	
4. Customer program costs	NA		$23,000	
5. Cost share	$0		NA	
6. Net Program Cost	$59,213		$82,213	
Program Present Value Benefits				
7. Agency supply & wastewater bene	$8,937		$9,058	
8. Environmental benefits	$1,536		$1,556	
9. Customer program benefits	NA		$1,464	
10. Other utility benefits	NA		$0	
11. Total benefits	$10,473		$12,078	
12. Net Present Value (Line 11 - Line 6)	**($48,740)**		**($70,135)**	
13. Benefit-Cost Ratio (Line 11 ÷ Line 6)	0.18		0.15	
14. Simple Unit Supply Cost (Line 6 ÷ Line 2)	$1,797	/AF	$2,495	/AF
15. Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$1,928	/AF	$2,641	/AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is not cost-effective to implement from the Society Perspective

APPENDIX P – WATER RATE RESOLUTION (NO. 09-01)

RESOLUTION NO. 09-01

A RESOLUTION OF THE BOARD OF PUBLIC UTILITIES COMMISSIONERS OF THE CITY OF TULARE RESCINDING RESOLUTION 03-611 AND ESTABLISHING WATER RATES EFFECTIVE MARCH 1, 2009

BE IT RESOLVED BY THE BOARD OF PUBLIC UTILITIES COMMISSIONERS OF THE CITY OF TULARE AS FOLLOWS, TO WIT:

SECTION 1. Resolution No. 03-611 is hereby repealed, effective September 1, 2009.

SECTION 2. SERVICE AND/OR METER INSTALLATIONS. When a customer applies for a new water connection service, or for the installation of a meter on an existing service, said customer will pay to the Water Division of the City of Tulare connection charges as follows:

METER SIZE	NEW METERED WATER SERVICE CONNECTION	METER AND METER BOX INSTALLATION ONLY
3/4"	$ 630.00	$ 180.00
1"	650.00	200.00
1-1/2"	1,000.00	375.00
2"	1,200.00	500.00

A minimum size 1" metered service will be installed to multi-family, commercial or industrial lots and to any single-family residence constructed after January 1, 1992.

The installation of 3/4" meters will only be considered for use as landscape irrigation sub-meters to determine appropriate sewer bills to business establishments as defined in the sewer rate resolution.

Connections larger than 2" shall be installed to current standards by the customer's licensed contractor at the customer's expense.

Where an approved pipe connection has been constructed as part of main extensions to serve tracts or subdivisions and has been paid for by the applicant as provided herein, no additional connection fee will be charged under this section, unless additional labor and materials are necessary to make the service fully acceptable by current standards. Current rates will be charged for such additional labor and materials.

SECTION 3. METERED RATES.

The following minimum monthly rates shall be charged for water usage up to the designated "Baseline" allowances:

		Baseline	July 1, 2003
3/4"	Metered Service	10,000 Gallons	$ 9.39
1" Residential Only Metered Service		10,000 Gallons	10.07
1"	Metered Service	10,000 Gallons	10.35
1-1/2"	Metered Service	20,000 Gallons	17.48
2"	Metered Service	40,000 Gallons	32.70
3"	Metered Service	70,000 Gallons	76.32
4"	Metered Service	110,000 Gallons	109.35
6"	Metered Service	160,000 Gallons	161.11
8"	Metered Service	220,000 Gallons	221.94
10"	Metered Service	290,000 Gallons	295.04

Any metered service not listed shall be charged the monthly minimum equivalent to the next larger size listed above.

(b) For all water in excess of the "Baseline" allowance, the monthly rate for each 1,000 gallons used shall be: $ 0.584

SECTION 4. WATER-COOLED REFRIGERATION AIR CONDITIONING

(a) The unit shall not be connected to the water system unless it has a cooling tower or equivalent, approved by the Department of Public Utilities, providing for recirculation. The unit shall not be connected to the sewer system.

SECTION 5. EVAPORATIVE COOLERS. All evaporative type coolers installed in the city shall be equipped with a recirculating pump as required in Section 4.24.020 of the City Code.

SECTION 6. SWIMMING POOLS. Customers with residential type swimming pools equipped with a re-circulating filter system shall not be charged additional service fees.

SECTION 7. STAND-BY FIRE PROTECTION SERVICE. No charge will be made for stand-by fire protection services. Stand-by fire protection services shall be provided with an approved backflow prevention device and metered by-pass. Water metered through the by-pass will be billed at the established metered rates.

It shall be the customer's obligation to fully maintain the fire protection services starting from the point of connection at the city's main. The customer shall have each backflow prevention device and metered by-pass certified annually as to its proper working order.

SECTION 8. TEMPORARY USE OF WATER.

(a) Any fire hydrants to be used for a temporary water supply by a construction contractor or other user shall be metered, unless specifically waived by the Water Superintendent. A minimum connection and meter installation/removal charge shall be pre-paid as follows:

$ 50.00

The prepayment charge shall cover the first 10,000 gallons used. Any water used in excess of 10,000 gallons will be billed at the established metered rates.

(b) Upon issuance of a permit for construction on any lot or parcel not being billed for water, the permittee shall pay for "construction water" as follows:

(1) Single Family Residence: An amount equivalent to four (4) months metered 1" (minimum) service.

(2) Metered Accounts: An amount equivalent to four (4) months minimum charge for the size of metered service requested.

SECTION 9. SERVICE OUTSIDE CITY LIMITS. All water services outside the city limits are subject to Board approval and customers shall pay the established monthly rates for the type of service provided.

SECTION 10. RIGHT TO CONTRACT SEPARATELY. The Board reserves the right and power to contract separately with any person, firm or corporation for the sale and delivery of water at wholesale, the times, places, and prices to be fixed and agreed upon by resolution of the Board of Public Utilities Commissioners. Any person, firm or corporation desiring to purchase water at wholesale from the Department of

Public Utilities of the City of Tulare shall make written application to the Board of Public Utilities Commissioners for a contract specifying the time, place and nature of the intended use of said water. Said Board shall consider application, and as in its judgment, said application may be granted without detriment to the City of Tulare, a contract may be entered into for sale and delivery of water wholesale, at times, or over a period of time, at places and prices which in the opinion of the Board will be to the best interest of the City of Tulare.

SECTION 11. BILLS PAYABLE. Bills for water service shall be due and payable on or before the 20th day following each applicable billing month. All bills that remain unpaid at five o'clock p.m. on the 20th of said month shall be added to, a 10% amount thereof as a penalty for said delinquency, and shall become a part of said delinquent water bill. Upon being declared delinquent, a ten-day notice of discontinuance shall be sent to the consumer stating the amount due, including penalties. The next billing statement will serve a final forty-eight (48) hour notice of discontinuance.

SECTION 12. DELINQUENT WATER SERVICE. Once a water service bill has been declared delinquent, and said water service has been discontinued in accordance with the provisions of these rules and regulations, said service shall not be reconnected until all accrued bills, penalties, and a $ 35.00 service fee have been paid. An additional incremental service fee of $10.00 will be charged for each subsequent discontinuation of service.

It shall be the responsibility of the owner of the property, or the consumer requesting reconnection, to pay the delinquent bill and service fee. Payments made by

2:30 p.m. will result in reconnection of water service the same business day. Payments made after 2:30 p.m. will result in reconnection of water service the next business day. An additional $25 service fee is required if payment is made after 2:30 p.m. and service restoration is requested the same business day.

A consumer's water service may be discontinued by the Department of Public Utilities for the non-payment of a bill for water service at a previous location, provided said bill has not been paid within thirty days after presentation at the new location.

SECTION 13. Effective date. These rules and regulations shall be in full force and effect from and after September 1, 2009.

PASSED, ADOPTED, AND APPROVED this 22nd day of January 2009.

President of the Board of Public Utilities
Commissioners of the City of Tulare

ATTEST:

Secretary, Board of Public Utilities
Commissioners of the City of Tulare

BOARD OF PUBLIC UTILITIES COMMISSIONERS
CITY OF
TULARE
CALIFORNIA

STATE OF CALIFORNIA)

COUNTY OF TULARE) ss

CITY OF TULARE)

I, DARREL L. PYLE, City Clerk of the City of Tulare and Secretary of the Board of Public Utilities Commissioners of said City, do hereby certify that the foregoing **Resolution No. 09-01** was duly adopted by the Board of Public Utilities Commissioners of said City and was signed by the Vice President of said Board, at a special meeting of said Board held on the **22nd day of January 2009**, and was approved by the following vote:

AYES:	**COMMISSIONERS:**	**Ron Quinn** **Dick Johnson** **Scot Hillman**
ABSENT:	**COMMISSIONERS:**	**Wayne Hinman** **Darlene Jensen**
NOES:	**COMMISSIONERS:**	**None**

BOARD OF PUBLIC UTILITIES COMMISSIONERS
CITY OF TULARE CALIFORNIA

DARREL L. PYLE, CITY CLERK

BY:
Secretary, Board of Public Utilities
Commissioners of the City of Tulare