PG&E Energy Summary for Fresno County 2005 to 2013

Contact Government and Community Partnerships at GHGDataRequests@pge.com for more information

Pacific Gas and Electric Company

This document will help you understand drivers of Fresno County's energy usage and the ways the community and PG&E are partnering to decrease energy consumption.

Overall energy usage

This is the breakdown between Non-Residential and Residential energy usage in 2013 for Fresno County.

61,245,770

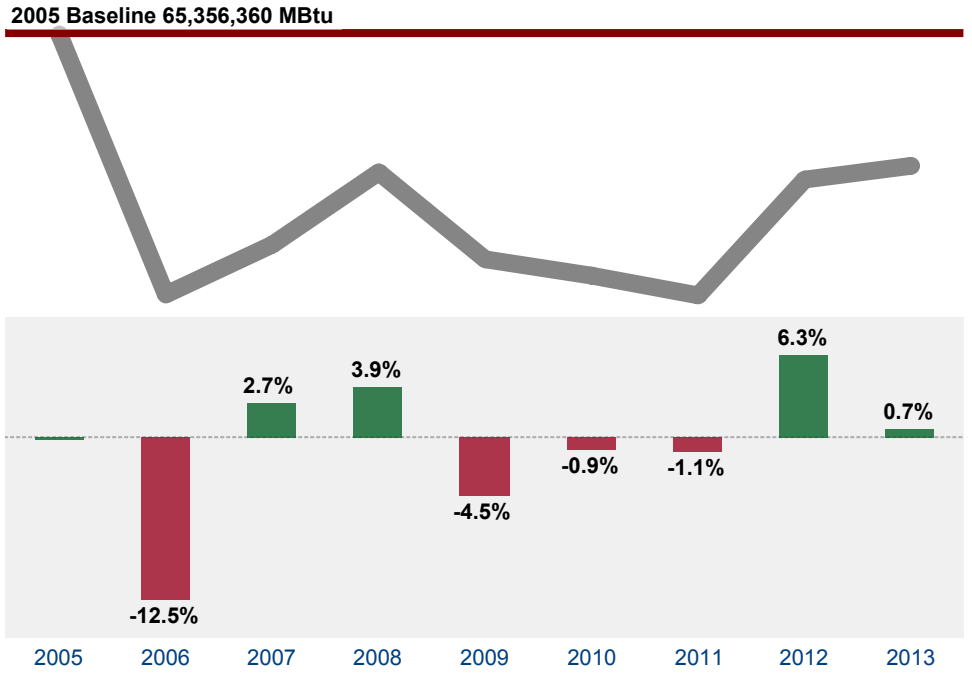
million British thermal units in 2013*

Energy usage has changed by -6.3% since 2005

This is the Year over Year change in overall energy usage from the prior year

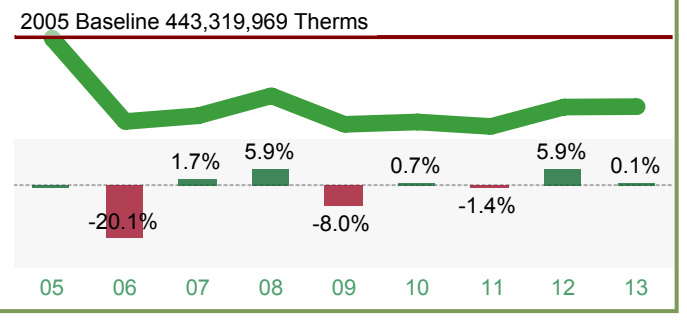
*Consumption has been converted to British thermal units (Btu) to compare electricity and natural gas usage

Non-Residential 69% | Residential 31%



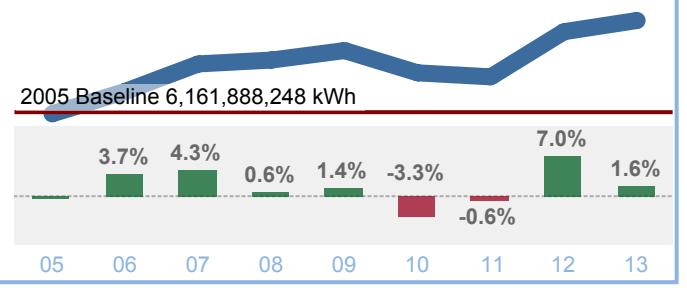
370,143,536 Therms in 2013 | **60% of energy usage ***

Natural Gas Usage has changed by -16.5% since 2005



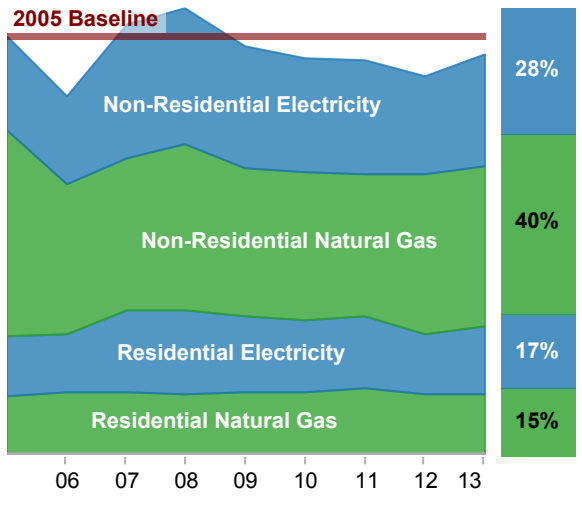
7,101,822,056 kWh in 2013 | **40% of energy usage***

Electricity usage has changed by 15.3% since 2005



Energy Related Emissions

CO2 Emissions from energy usage changed by -4.0% since 2005



3,571,830 MTCO2

GHG emissions from energy usage in Fresno County 2013

68% | 33%

282,791 MTCO2 Avoided since 2006 through PG&E programs

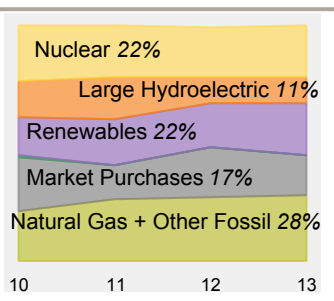
equivalent to 47,211 cars off the road for one year

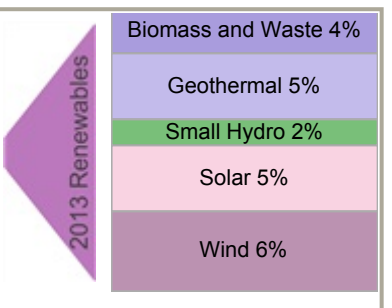
Non-Residential Programs	24,121	144,485 MTCO2
Residential Programs	2,218	13,288 MTCO2
Through Manufacturers and Distributors	20,871	125,019 MTCO2

Pacific Gas and Electric

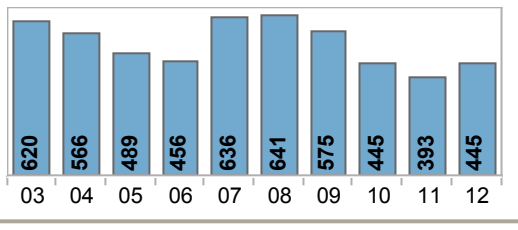
Where Electricity Comes From

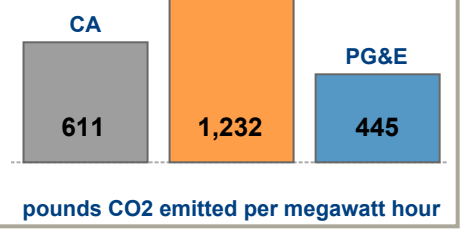
PG&E's delivers some of the cleanest electric power in the nation. Here's how we did it in 2013





PG&E's average emissions from delivered electricity was less than half the U.S. Average in 2012 (shown in lbs CO2 per MWh)



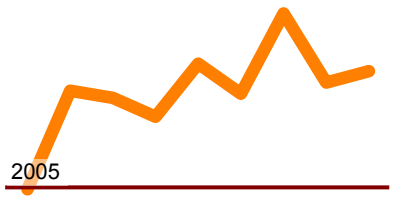


pounds CO2 emitted per megawatt hour

Residential Energy

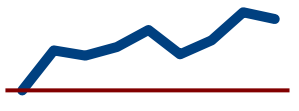
Usage

31% of community energy usage (Btu) is from residential customers



Energy usage has changed by 6.5% since 2005

47% — Residential electricity usage changed by 10.4% since 2005



53% — Residential natural gas usage has changed by 3.2% since 2005

Averages

Averages

Monthly Household Averages in 2013

Multi Family	336 kWh per month	28.8% since 2005
Single Family	688 kWh per month	-1.0% since 2005
Multi Family	21 therms per month	-2.6% since 2005
Single Family	35 therms per month	-5.4% since 2005

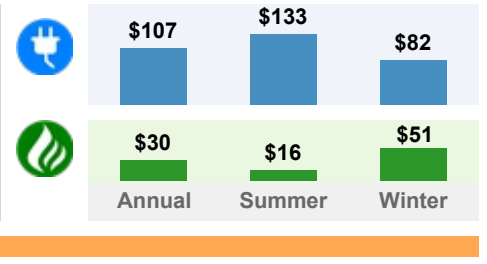
Climate Zone Average: 691 kWh

Climate Zone Average: 35 therms

Climate Zone 13

By Season

Average Monthly Bill



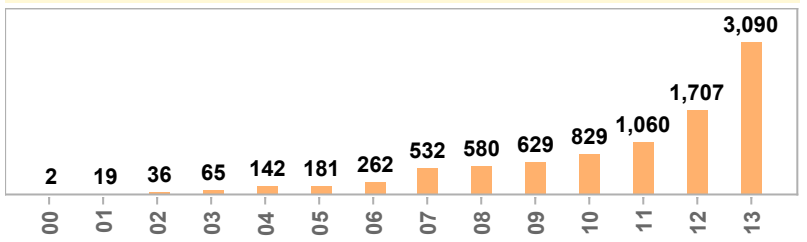
Renewables

Photovoltaics

9,124 Sites

48,760 kW

CEC AC Capacity

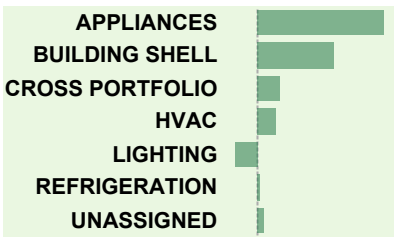


Energy Efficiency

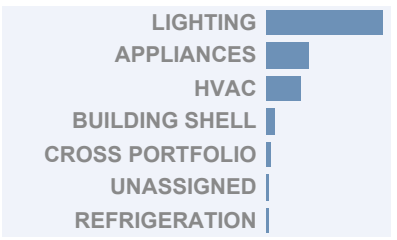
13,288 MTCO2

Annual avoided emissions since 2006 through PG&E programs

966,000 Therms Saved

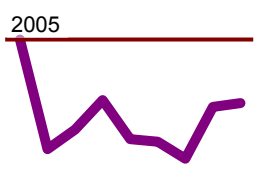


35,253,000 kWh Saved



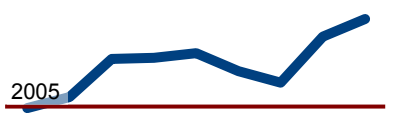
Non-Residential Energy Usage

69% of Fresno County energy usage (Btu) is from non-residential customers



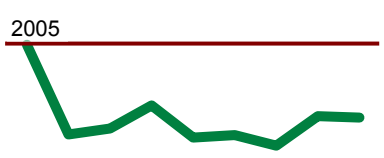
Non-residential energy usage has changed by -11.2% since 2005

36%



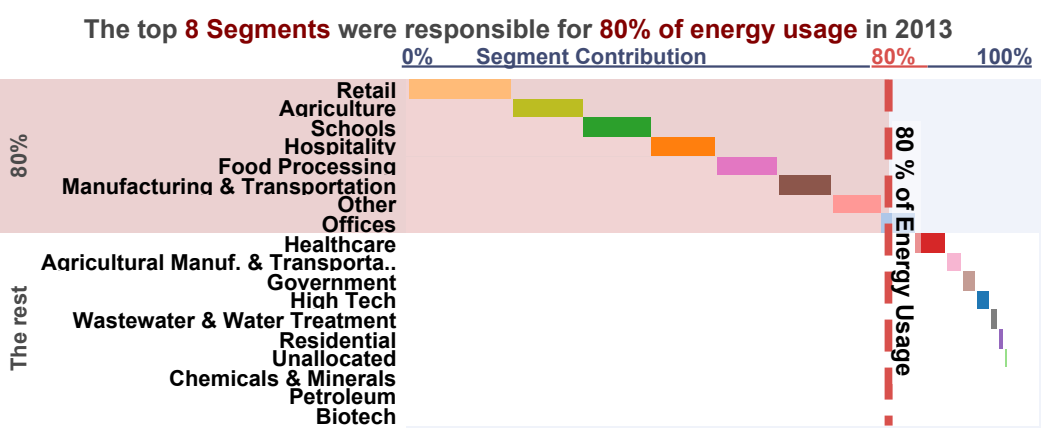
Electricity usage has changed by 18.3% since 2005

64%



Non-residential natural gas usage has changed by -22.2% since 2005

The top 8 Segments were responsible for 80% of energy usage in 2013



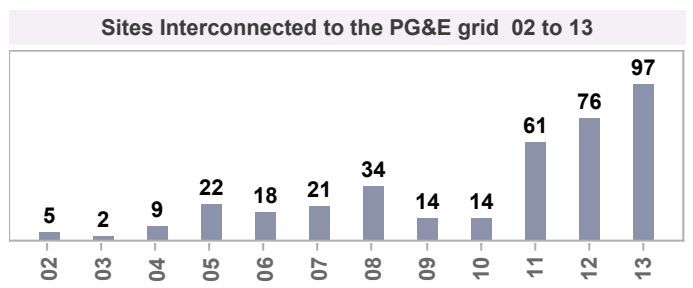
Renewables

Photovoltaics

373 Sites

53,562 kW

CEC AC Capacity

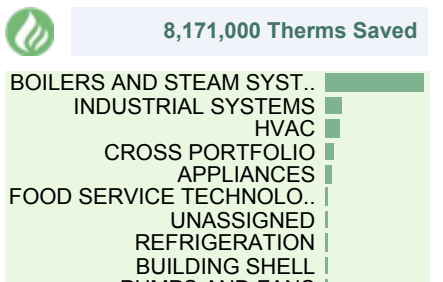


Energy Efficiency

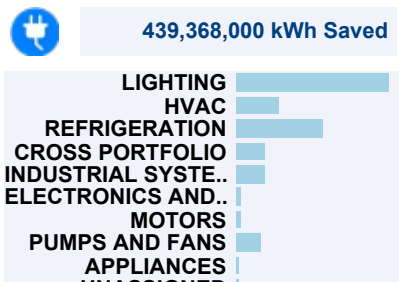
144,485 MTCO2

Annual avoided emissions since 2006 through PG&E programs

8,171,000 Therms Saved



439,368,000 kWh Saved



CITY OF CLOVIS

URBAN WATER MANAGEMENT PLAN

2010 UPDATE

NOVEMBER 2011

EST. 1968
PROVOST & PRITCHARD
CONSULTING GROUP
An Employee Owned Company

TABLE OF CONTENTS

APPENDIX

LIST OF FIGURES

Page

LIST OF TABLES

Page

ABBREVIATIONS – Entities

BWC ..... Bakman Water Company

CDPH ..... California Department of Public Health

CVWAC ..... Central Valley Water Awareness Committee

DWR ..... Department of Water Resources

FID ..... Fresno Irrigation District

FMFCD ..... Fresno Metropolitan Flood Control District

GWD ..... Garfield Water District

MCWD ..... Malaga County Water District

PCWD ..... Pinedale County Water District

SWRCD ..... State Water Resources Control Board

UWMP ..... Urban Water Management Plan

UWMPA ..... Urban Water Management Plan Act

UWMPGB ..... UWMP 2010 Guidebook

WMP ..... Water Master Plan

ABBREVIATIONS – Terminology & Units

AB ..... State Assembly Bill

ac ..... acre

ADD ..... Average Daily Demand

af ..... acre-feet

afy ..... acre-feet per year

bgs ..... below ground surface

CWC ..... California Water Code

DBCP ..... dibromochloropropane

DMM..... Demand Management Measures

DU ..... dwelling unit

ft ..... feet

gpd ..... gallons per day

gpcd ..... gallons per capita per day

MDD ..... Maximum Day Demand

mgd ..... million gallons per day

µg/L ..... micrograms per liter

pCi/L..... picocuries per liter

PHG ..... Public Health Goal

PKH..... Peak Hour Demand

psi..... pounds per square inch

SB ..... State Senate Bill

TCP 1,2,3-Trichloropropane

ULF ..... Ultra-Low Flush toilet

1 INTRODUCTION

1.1 Purpose

The Urban Water Management Plan (UWMP) is a requirement of the Urban Water Management Planning Act (UWMPA) (Division 6, Part 2.6 of the California Water Code (CWC) §10610-10656). The UWMPs must be filed every five years and submitted to the Department of Water Resources (DWR). The submittal is required to meet the requirements of the UWMPA, including the most current amendments that have been made. The UWMPA applies to urban water suppliers with 3,000 or more connections being served or supplying more than 3,000 acre-feet (af) of water annually.

UWMPs are required of the state's urban water suppliers in an effort to assist their resource planning and to ensure adequate water supplies are available for future use. A secondary purpose of the UWMP is to provide for a plan or series of plans during water drought situations. This report was prepared according to the requirements of the CWC, UWMPA and the UWMP Guidebook 2010.

1.2 Background

1.2.1 Urban Water Management Planning Act

In 1983, SB797 altered Division 6 of the CWC by producing the UWMPA. Since 1983, several amendments to the original document have increased the requirements of the UWMPs submitted today. One such amendment required projections for water use to extend 20 years at 5-year intervals. Recently, this has been increased to a 25 year projection providing for a minimum 20-year projection up until the next UWMP is completed.

Various other amendments have increased requirements to include sections on recycled water use, demand management measures (DMMs), and water shortage contingency plans. Recycled water use sections were added to assist in evaluation of alternate water supplies for future use when projects exceed the current water supplies. Demand management measures must be clearly described including which measures are being implemented and which are scheduled for implementation in the future. Water contingency plans are to be prepared and coordinated with other water suppliers in the area for use during times of drought. Pertinent bills that have passed are as follows.

Bill	Requirements
SB610 and AB901	Consideration of water availability when reviewing new large developments
SB318	Investigate possibilities of developing desalinated water
AB105	Submit UWMP to State Library
Water Conservation Bill (2009)	Urban water suppliers to reduce the statewide average per capita daily water consumption by 20% by December 31, 2020

1.2.2 Previous Urban Water Management Plan

The City previously prepared an UWMP in 2005, which was approved and adopted by the City Council in February 2006. Following adoption, the 2005 UWMP was submitted to and approved by DWR.

This 2010 UWMP serves as an update to the 2005 UWMP and complies with all new requirements and regulations.

1.3 Resource Maximization/Import Minimization

The City of Clovis optimizes many water management strategies and tools to maximize water resources and minimize the need for imported water. The City worked with the Fresno Irrigation District, Fresno Metropolitan Flood Control District, County of Fresno, City of Fresno, City of Kerman, Malaga County Water District, Pinedale County Water District, Garfield Water District and Bakman Water Company to develop the Fresno Area Regional Groundwater Management Plan in 2005. The plan was developed in accordance with California SB1938.

The City also contributed to the Integrated Regional Water Management Plan along with more than 20 other districts, cities and agencies that comprise the Upper Kings River Forum. The final draft of the plan was completed in July 2007. A joint powers authority was created in 2009 to administer the Plan and Clovis is a member agency. The Plan objectives are:

- Collect and compile water quality baseline data for the region and define opportunities to integrate existing local, state, and federal programs.
- Investigate and resolve legal and institutional issues that may affect project development.
- Identify and pursue sources of funding needed to support project development.
- Compile an inventory of existing water resources plans and policies for the region (including state agencies); include an inventory of local government and water district strategies and initiatives for dealing with water resources problems.

- Develop an integrated hydrologic model to determine regional water budgets, understand how the groundwater basin operates, evaluate and compare alternatives, and support decision making.
- Involve local water districts and land use agencies in generating and confirming the current and future water needs
- Seek to ensure compatibility and consistency with land use and water supply plans.
- Create and define opportunities to share data and information.
- Develop and implement a community affairs strategy to provide outreach and educate the public and decision makers on water management problems and solutions.
- Evaluate local and regional economic impacts and benefits of proposed projects.
- Identify potential environmental and ecosystem benefits associated with developing the IRWMP.
- Avoid environmental impacts during planning and project design where possible.
- Coordinate needed environmental review of the final alternative projects and programs.

2 PLAN PREPARATION

2.1 Coordination

Legal Requirements:

§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 §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, an 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 efforts to prepare this UWMP were coordinated with appropriate agencies to provide the most accurate and clear picture of the water picture in the City.

Table 2-1: Coordination with Appropriate Agencies

(UWMPGB Table 1)

Coordinating Agencies	Participated in Developing UWMP	Commented on the Draft	Attended Public Meetings	Contacted for Assistance	Sent Copy of the Draft Plan	Sent Notice of Intention to Adopt
City of Fresno Public Utilities Department	X	X		X	X	X
County of Fresno Public Works					X	X
Fresno Irrigation District	X	X		X	X	X
Fresno Metropolitan Flood Control District				X	X	X

2.2 Plan Adoption, Submittal, and Implementation

Legal Requirements:

> *§10640 – 10621(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3.*
>
> *§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.*

The City will hold a public hearing and adopt the 2010 UWMP on December 5, 2011. A copy of the adopting resolution is included in Appendix A. Prior to the public hearing; a notice will be publishing notifying the public of the pending hearing.

Once the UWMP has been adopted, a copy of the UWMP and amendments will be submitted to DWR and the State Library. Once submitted to DWR, a copy will be made available for public review for 30 days and the reliability and Supply-and-Demand section will be submitted to Fresno County within 60 days.

3 SYSTEM DESCRIPTION

3.1 Service Area Physical Description

Legal Requirements:

§10631(a) Describe the service area of the supplier.

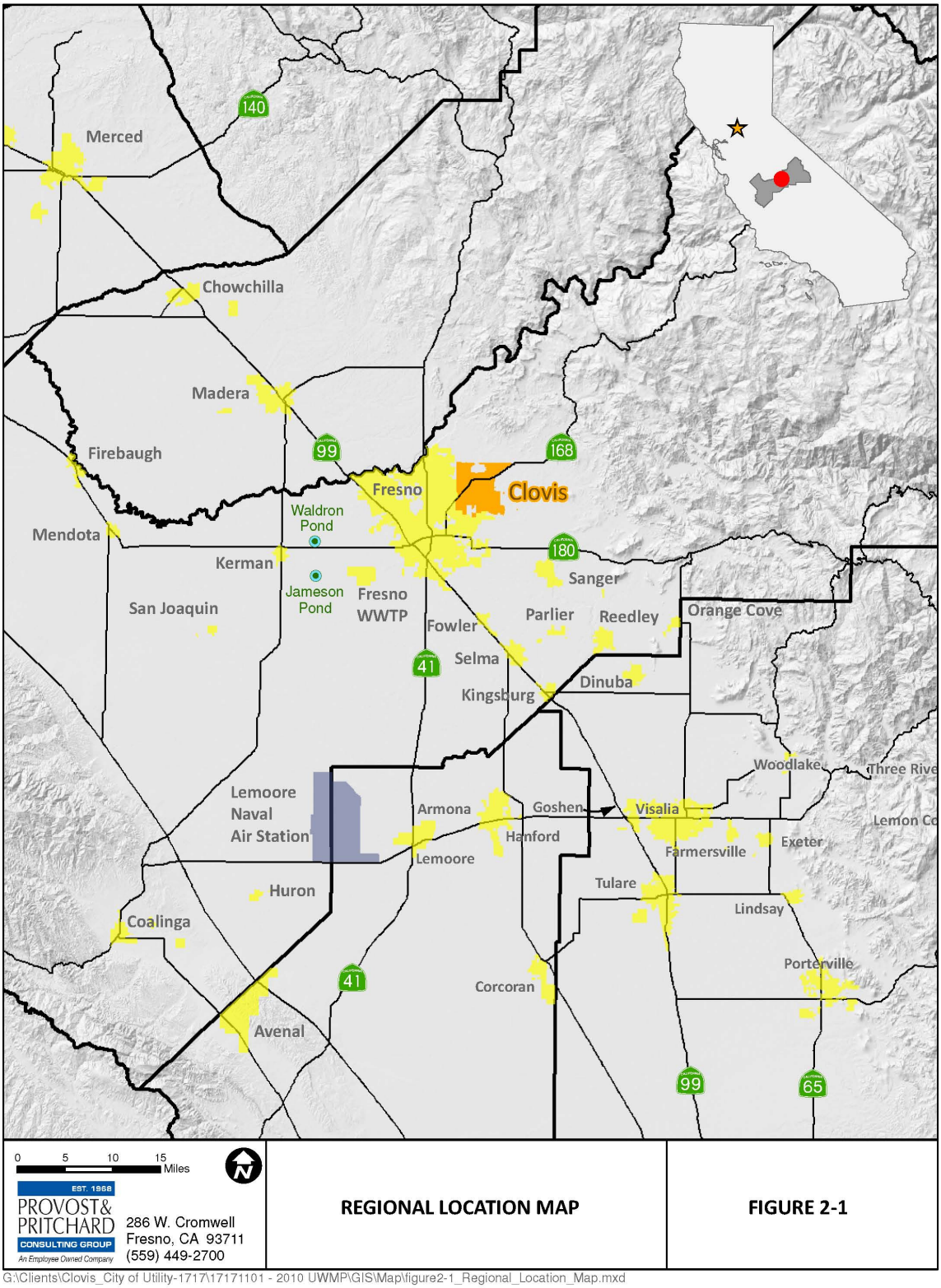
§10631(a) (Describe the service area) climate.

3.1.1 Location and History

The City of Clovis was incorporated in 1912 and lies just west of the Sierra Nevada foothills and northeast of the City of Fresno in Fresno County. The City encompasses 23.10 square miles and is home to 95,631 residents (2010 Census). The Clovis economy is typical of many communities that are part of metropolitan areas. The economy depends heavily on education, health care, retail and services along with small to medium sized manufacturing and electronics companies. The area, which at one time was predominantly agricultural, has become mostly residential. The average household size is 2.86 persons per occupied housing per the 2010 Census.

In 1989, the City of Clovis assumed the operation of a small water system, which served an unincorporated county island called Tarpey Village. The unincorporated area is home to approximately 3,888 people (2010 Census). The area is almost entirely single family residential with a small commercial area. The area has no public landscaping, no parks and no institutional or government facilities. Tarpey Village is largely individually unmetered because of the agreement between the former County Waterworks District No. 8 and the City, which allowed them to stay unmetered. However over time 435 residential and commercial customers in Tarpey Village have had meters installed at their request in order to control their water costs.

Figure 3-1: Regional Location Map



G:\Clients\Clovis_City of Utility-1717\17171101 - 2010 UWMP\GIS\Map\figure2-1_Regional_Location_Map.mxd

3.1.2 Land Use

The City of Clovis is a culturally, economically and commercially diverse city. Due to these characteristics, the city has a diverse range of land uses within its boundaries, offering plenty of residential, commercial, recreation and employment opportunities to serve its residents. Table 3-1 indicates the distribution of land amongst the various land use categories, as discussed in the 1993 General Plan.

Table 3-1: Land Use Categories

Land use	Area (acres)	Percent of Total (%)
Residential	6851	47
Agriculture	926	6
Commercial	778	5
Industrial	430	3
Public/Open Space	1,128	8
Vacant	859	6
Right-of-Way	3,162	22
Utilities	481	3
Total	14,615	100
Source: Clovis Community Profile (2009)		

3.1.3 Climate

Clovis has a semi-arid climate with hot, dry summers and mild winters. Average daily temperatures vary from minimums of 37.0° F in December to 66.1° F in July and maximums of 53.4°F in December and 96.6°F in July. The area receives an average annual precipitation of 11.23 inches. The precipitation varies considerably year to year. During the past 50 years the smallest amount received was 6.07 inches and the largest 21.56 inches. Precipitation is largely confined to the late fall, winter and early spring months. Summer water consumption is three to five times winter consumption because of the lack of rainfall and the high temperatures.

Table 3-2: Climate Characteristics

Month	Average Eto	Maximum Temperature	Minimum Temperature	Average Temperature	Average Rainfall
January	0.85	54	38	46	2.16
February	1.63	61	41	51	2.12
March	3.23	66	45	56	2.20
April	5.23	74	48	61	0.76
May	6.96	83	55	69	0.39
June	7.97	91	61	76	0.23
July	8.65	97	66	81	0.01
August	7.64	95	65	80	0.01
September	5.41	89	60	75	0.26
October	3.59	78	52	65	0.65
November	1.68	63	42	53	1.10
December	0.85	53	37	45	1.34
Annual	53.69	75.3	50.8	63.2	11.23

3.2 Service Area Population

Legal Requirements:

§10631(a) (Describe the service area) current and projected population…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…

§10631(a) …(population projections) shall be in five-year increments to 20 years or as far as data is available.

§10631(a) Describe…other demographic factors affecting the supplier's water management planning.

Population growth in the City of Clovis has averaged 2.5% over the past five years but had a peak growth year in 2006 of 4.4%. Population growth during the next five years is expected to average 2.9% annually through 2020 and 2.5% thereafter through 2030 per the Clovis General Plan. From 2030 to 2035 the population is projected to increase at the same rate of 2.5% annually. The Tarpey Village area is assumed to have a stagnant population because it is built out.

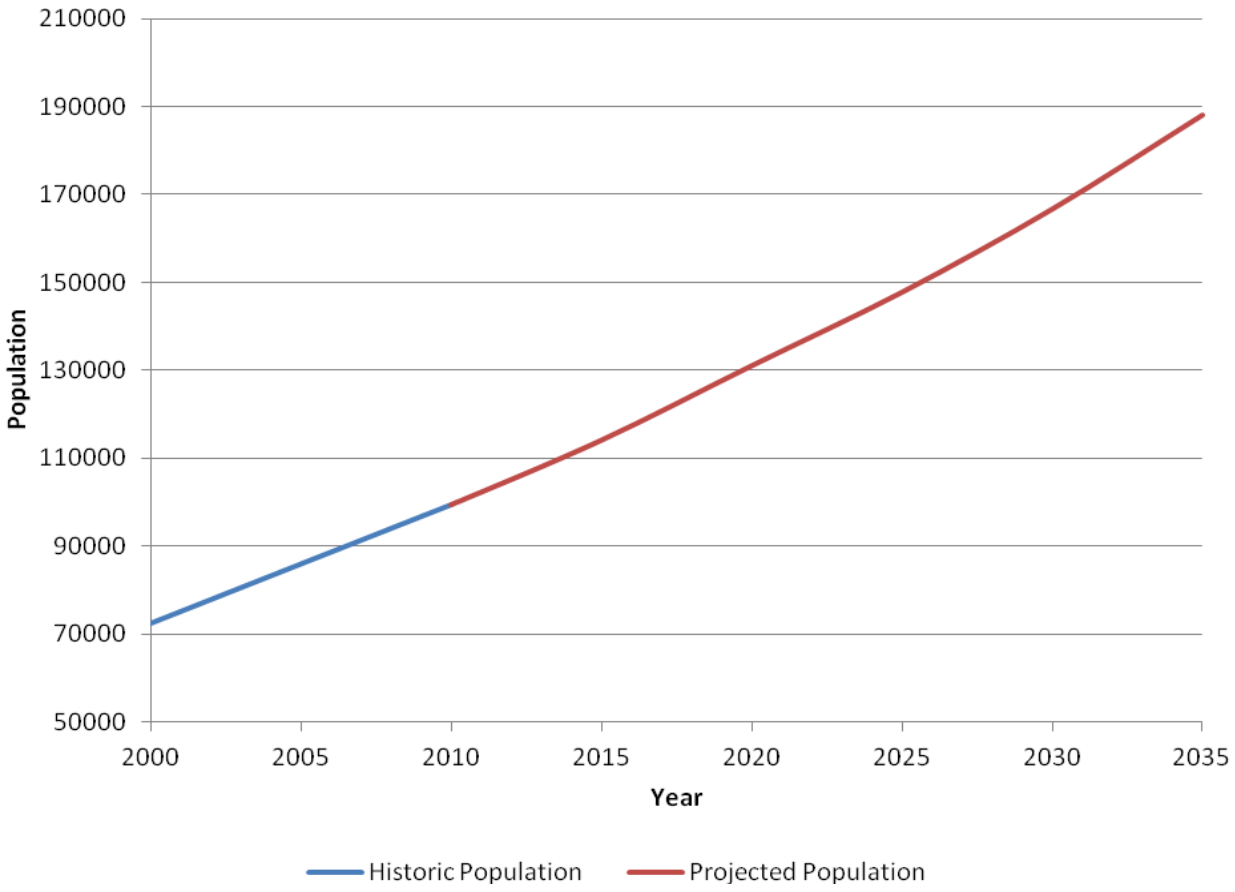
Table 3-3: Service Population – Current and Projected

(UWMPGB Table 2)

	2010	2015	2020	2025	2030	2035
Service Area Population[1]	99,519	114,213	131,166	147,891	166,814	188,224

[1]Service area population is defined as the population served by the distribution system.
Source: Census (2010); City of Clovis and Tarpey Village and General Plan population increase projections.

Figure 3-2: Population – Historical and Projected



The current 2010 City of Clovis population is 95,631 persons in a gross area of 14,856 acres. That equates to an average density of 6.44 persons per gross acre. The General Plan concept includes three urban centers with open and rural residential areas transitioning between the centers and the existing City core. The Loma Vista Specific Plan, the first of the three urban centers, is now being developed in the southeast portion of the City. Once 60% of that area is developed the northwest urban center can begin development. The northeast urban center does not have any restrictions on

development but is not within the current City sphere of influence. Some property owners in the area are pursuing development in that area and if a sphere change is approved by the City and the County Local Area Formation Organization Committee (LAFCo) development could occur sooner than anticipated. If development follows the General Plan, the water demands for the area should be less on a per acre basis because of the lower densities. However, there have been movements to increase densities which can result in higher demands on a per acre basis.

Table 3-4: Dwelling Unit Demands

Land Use	Dwelling Unit Range		ADD (afy/ac)	MDD (gpm/ac)	MDD (gmp/DU)	PKH (gpm/ac)	PKH (gpm/DU)
	Low (DU/ac)	High (DU/ac)					
Very Low Density Residential	0	2	3.1	4.04	4.04	6.15	6.15
Low Density Residential	2	4	2.1	2.73	0.91	4.17	1.39
Medium Density Residential	4	7	2.1	2.73	0.50	4.17	0.76
Medium-High Density Residential	7	15	3.4	3.58	0.33	5.06	0.46
High Density Residential	15	23	5.1	5.37	0.36	7.59	0.4
Commercial			1.8	1.9		2.68	
Schools			2.8	5.21		5.21	

Notes:
MDD per DU is equal to MDD per acre divided by the average dwelling unit for each land use.
PKH per DU is determined by the same procedure used for MDD
Commercial and School water use is based on acreage and not connections
Unit water demands were taken from the WMP

4 SYSTEM DEMANDS

4.1 Historical Water Use

Water demands within the City's service area are largely residential, with commercial, institutional, industrial and open space accounting for approximately 22% of the total water supply. As of 2010, the City has 29,694 metered services, which is 96% of the total service connections.

In 2010, the City produced 8,059 million gallons of water between groundwater and surface water supplies to serve a population of just under 100,000. Table 4-1 lists the historical water usages from 1980-2009, while Table 4-2 details the actual water deliveries for 2005 in terms of metered versus unmetered services.

Table 4-1: Historical Water Use

Year	Potable Water Demand (afy)	Year	Potable Water Demand (afy)	Year	Potable Water Demand (afy)
1980	7,865	1990	13,568	2000	19,249
1981	8,501	1991	13,388	2001	20,196
1982	8,410	1992	14,157	2002	21,336
1983	8,161	1993	15,231	2003	22,539
1984	9,517	1994	16,430	2004	24,352
1985	9,429	1995	15,893	2005	24,135
1986	10,185	1996	17,067	2006	25,495
1987	10,072	1997	18,779	2007	27,275
1988	10,832	1998	16,464	2008	27,761
1989	12,522*	1999	18,653	2009	26,179
				Average (1980 – 2009)	14,535

** Tarpey Village was added to the City's system in 1/1/1989*

As illustrated above, the City's water use has increased in a fairly linear fashion from 1980 through 2007. Beginning in 2008, water use began to decline due to economic conditions, water conservation measures and in 2010 increasing water rates. It is

anticipated that overall use will continue to increase, but at a slower pace due to conservation measures that are being implemented.

Table 4-2: Water Deliveries – 2005

(UWMPGB Table 3)

Water use sectors	Metered		Not metered		Total Volume
	# of accounts	Volume	# of accounts	Volume	
Single family	23,376	14,330	1,046	1,226	15,556
Multi-family	783	2,574	0	0	2,574
Commercial	1,109	2,818	2	6	2,824
Industrial	43	232	0	0	232
Institutional	40	390	0	0	390
Landscape	429	953	46	102	1,055
Agriculture	0	0	0	0	0
Construction	416	221	595	383	604
Total	26,196	21,518	1,689	1,717	23,235
Units : acre-feet per year					

All of the City of Clovis is metered, while there are remaining service connections within Tarpey Village that remain unmetered. There is a program in place to continue to convert these connections to metered services, which the City plans to have completed by 2025.

4.2 Baselines and Targets

Legal Requirements:

> *§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.*

Determining the City's baseline per capita use is the first step of calculating the required targets for the 20-year planning period, which will allow DWR to determine the City's compliance with required reduction described in the Water Conservation Bill of 2009.

4.2.1 Baseline

To determine the City's baseline water use, it was determined that the City would take the 10-year approach, as they are not currently delivering over 10% of recycled water. A 5-year baseline must also be calculated to assist in establishing the reduction targets. The following table summarizes the 2005 baseline data and water deliveries made in 2008, substantiating the 10-year baseline approach.

Table 4-3: Base Period Ranges

(UWMPGB Table 13)

Base	Parameter	Value
10- year base period	2008 total water deliveries	9,045
	2008 total volume of delivered recycled water	0
	2008 recycled water as a percent of total deliveries	0
	Number of years in base period[1]	10
	Year beginning base period range	2000
	Year ending base period range[2]	2009
5-year base period	Number of years in base period	5
	Year beginning base period range	2004
	Year ending base period range[3]	2008
Units : MGY		
[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.		
Source: DOF Table E-4 (City of Clovis Population); 2000 & 2010 Census (Tarpey Village Population)		

The data used to calculate the baseline is summarized in the following table. The UWMPA requirements state a continuous range must be used with the range ending between the end of 2004 and 2010.

Table 4-4: Base Daily Per Capita Water Use – 10 Year Range

(UWMPGB Table 14)

Base period year		Distribution System Population	Daily system gross water use (mgy)	Annual daily per capita water use (gpcd)
Sequence	Calendar Year			
1	2000	72,473	6,306	237
2	2001	73,949	6,580	244
3	2002	76,471	6,933	249
4	2003	79,762	7,364	252
5	2004	84,068	7,935	259
6	2005	88,509	7,864	243
7	2006	92,196	8,284	247
8	2007	94,112	8,936	259
9	2008	96,441	9,045	256
10	2009	97,586	8,530	239
10-Year Base Daily Per Capita Water Use				249
Source: GPCD Calculations Revised.xls 7/19/2011; City of Clovis Production – PWI 7/19/2011				

The following table summarizes the data used to calculate the 5-year baseline, which has a UWMPA requirement to be a continuous range, ending between the end of 2007 and 2010.

Table 4-5: Base Daily Per Capita Water Use – 5 Year Range

(UWMPGB Table 15)

Base period year		Distribution System Population	Daily system gross water use (mgd)	Annual daily per capita water use (gpcd)
Sequence	Calendar Year			
1	2004	84,068	7,935	259
2	2005	88,509	7,864	243
3	2006	92,196	8,284	247
4	2007	94,112	8,936	259
5	2008	96,441	9,045	256
5-Year Base Daily Per Capita Water Use				253

Source: GPCD Calculations Revised.xls 7/19/2011; City of Clovis Production – PWI 7/19/2011

4.2.2 Targets

Four methods have been developed to determine water use targets for the City. The UWMPA requires a target be established for 2020 and an interim target for 2015. Each method and its calculated water use is described below.

4.2.2.1 Method 1 – 80 Percent

Method 1 is based upon the determined base daily per capita use as determined by the water supplier. The base daily per capita use is 249 gallons per person per day (gpcd). Method 1 requires that this usage be reduced to by 20%, yielding a target use of 199 gpcd.

4.2.2.2 Method 2 – Performance Standards

Method 2 uses commercial, industrial, institutional, indoor residential, and landscape water usage quantities to calculate a water use target. The City's data is deficient of landscape water usage, therefore making this method impractical for use in calculating a target water use.

4.2.2.3 Method 3 – 95 Percent Hydrologic Region Target

Method 3 is based upon the hydrologic region target, which is reduced by 5% to obtain the 95% Target. According to the 20x2020 Water Conservation Plan, the region-specific

conservation goal is 170 gpcd for the South Lahontan region. With this information, Method 3 yields are target use of 162 gpcd.

4.2.2.4 Method 4 – Provisional

Development of Method 4 by DWR began in February 2010. The draft method was released on January 24, 2011. The draft method had to be presented to several agencies including the California Water Commission before being adopted in mid-February 2011 and being released along with DWR's final 2010 guidebook. DWR has stated that this is a provisional method, subject to later revisions during the 2015 UWMP cycle. The methodology for the provisional draft method relies on the base daily per capita use in 2000 and reduction in the three urban use sectors:

- Residential indoor;
- Commercial, industrial, and institutional (CII); and
- Landscape use and water loss.

A discussion of each of these components, and the calculated savings in each of these sectors is included below.

4.2.2.4.1 Residential Indoor Savings

Since indoor and outdoor water use is delivered through a single meter, an assumption of 70 gpcd has been provided by DWR for standard residential indoor water use. To determine indoor residential savings, the draft provisional method outlines two methodologies. First, a best management practices (BMP) calculator has been developed to sum the savings for three conservation elements including single and multi-family residential housing toilets, residential washers, and showerheads. Due to insufficient data on the implementation of these water-saving measures, it will not be discussed further or used to assess indoor residential savings for the City. Therefore, the City will use what has been termed the "default option" to determine these savings. Based on the draft provisional method, this default value is 15 gpcd.

4.2.2.4.2 Commercial, Industrial and Institutional Savings

Baseline CII water can be easily established for the City since all commercial, industrial, and institutional connections were metered in 2000, 2005 and 2010. The calculated baseline for CII use (over the same 2000 through 2009 period) was 34.9 gpcd. The draft provisional method estimates a default value for CII savings of 10 percent. The CII water savings are therefore 3.5 gpcd.

4.2.2.4.3 Landscape and Water Loss Savings

The landscape and water loss water use is determined by subtracting the default indoor water use of 70.0 gpcd and CII water use of 35 gpcd from the calculated base line per capita use of 249. Based on calculated baseline per capita water use, the landscape and water loss use is 144 gpcd. The draft provisional method estimates a default value

for landscape and water loss savings of 21.6 percent. The landscape and water loss savings are therefore 31.1 gpcd.

4.2.2.4.4 Metered Savings

Metered savings are considered in addition to the savings attributed to the three sectors previously discussed. Based on the provisional method, a meter savings of 20 percent is applied to the average delivery per unmetered connection in the midpoint of the baseline period. Using the assumed savings outlined in the provisional method of 20 percent, savings from metering is calculated as 3.7 gpcd.

4.2.2.4.5 Summary

Based on the steps above, the total water savings is estimated at 53.3 gpcd. When compared with the baseline demand of 249 gpcd, this would result in a water conservation target of 196 gpcd.

Table 4-6: Method 4 Summary

	Baseline Water Use (gpcd)	Water Savings (gpcd)
Residential Indoor	70[1]	-15.0[2]
CII	35[1]	-3.5[3]
Landscape/Water Loss	144	-31.1[4]
Metered	N/A	-3.7[5]
Totals	249	-53.3
Net Usage	**196**	

[1] Assumed value based on UWMPGB Draft Provisional Method 4
[2] Source:
[3] CII water savings of 10% based on UWMPGB Draft Provisional Method 4
[4] Landscape and Water Loss savings of 21.6% based on UWMPGB Draft Provisional Method 4
[5] Metered savings of 20% based on UWMPGB Draft Provisional Method 4

4.2.2.5 Minimum Water Use Reduction Requirement

The minimum reduction required by DWR is below 95% of the 5-year baseline, which is 240 gpcd, as defined in Table 4-5. This number is used as the target confirmation, to ensure that the target calculated is adequate to meet the State's objectives.

4.2.3 Summary of Baseline and Targets

Based on the water use targets, the City's water use target for 2020 is 199 gpcd, while the interim 2015 target is 224 gpcd (based on 90% of the 10-year baseline). The 2020 target was determined using Method 1, 80% of the 10-year baseline. According to DWR

guidelines, this target is valid because it is less than the target confirmation. A summary of the baselines and targets is presented in the following table.

Table 4-7: Baseline and Targets Summary

Baselines (gpcd)	
10-Year	249
5-Year	253
Target Determinations (gpcd)	
Method 1	199
Method 2	N/A
Method 3	162
Method 4	196
Target Confirmation (gpcd)	240
Target Selected (gpcd)	199
Interim Target (gpcd)	224

Notes:
Method 1: 80% of 10-Year Baseline
Method 3: 95% of Hydrologic Region Target (Tulare - 170gpcd)
Target Confirmation: 95% of 5-Year Baseline
Interim Target: Target Selected plus 10-year Baseline, divided by 2

4.3 Water Demands

Legal Requirements:

§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; (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.

Since 2005, new connections to the water system have been added at an annual rate of 2% with an overall water demand increase of 0.5% per year. The City has continued during the past 5 years to implement conservation measures throughout the City. This

has contributed to an overall decrease in per capita water consumption. Table 4-8 indicates the historic water demands from 1965 through present.

Table 4-8: Historic Water Demands: 1965-2010

Year	Demands (af)	Year	Demands (af)
1965	2,265.30	1988	10,832.10
1966	2,919.90	1989	12,521.9*
1967	2,807.30	1990	13,568.60
1968	3,037.50	1991	13,388.30
1969	2,837.10	1992	14,157.2**
1970	3,523.30	1993	15,231.1 **
1971	3,969.60	1994	16,429.9**
1972	4,379.00	1995	15,892.5**
1973	4,301.60	1996	17,066.8**
1974	5,378.30	1997	18,779.2**
1975	5,001.10	1998	16,463.9**
1976	5,716.50	1999	18,652.9*
1977	4,557.30	2000	19,248.9**
1978	5,992.10	2001	20,195.70
1979	7,428.10	2002	21,335.6**
1980	7,865.20	2003	22,538.7**
1981	8,501.10	2004	24,352
1982	8,409.90	2005	24,135
1983	8,161.30	2006	25,495**
1984	9,517.30	2007	27,275**
1985	9,428.90	2008	27,761
1986	10,185.10	2009	26,179
1987	10,072.20	2010	24,803**
**Tarpey Village was added to the City's system January 1, 1989.*			
*** Values were adjusted to a 365-day year.*			
Source: Demand.doc 7/13/2011 (Varies from City of Clovis Production – PWI 7/19/2011)			

Table 4-9 illustrates current and projected water demand from 2010 to 2035 in acre-feet per year and the number of metered/non-metered service connections for the same time period. In the table below the data for the year 2010 is actual data. For future years the data is projected based on general plan land uses, the amount of undeveloped land within the current sphere of influence and the unit demands shown in Table 3-4.

Table 4-9: Water Deliveries 2010 – 2030

(UWMPGB Tables 4, 5, 6 & 7)

Year	Account Information		Water Use Sectors								Total
			SF	MF	COM	IND	INST	LAN	CON	AG	
2010	Metered	# Accounts	26,771	844	1,274	35	48	524	198	0	29,694
		Deliveries (afy)	14,902	2,431	3,021	257	383	1,258	127	0	22,379
	Unmetered	# Accounts	925	0	2	0	0	13	210	0	1,150
		Deliveries (afy)	1,289	0	7	0	0	31	135	0	1,462
2015	Metered	# Accounts	31,185	974	1,470	40	55	605	198	0	34,527
		Deliveries (afy)	16,884	3,482	3,911	425	563	1,362	127	0	26,754
	Unmetered	# Accounts	625	0	0	0	0	0	210	0	835
		Deliveries (afy)	733	0	0	0	0	0	135	0	868
2020	Metered	# Accounts	36,276	1,123	1,696	47	64	697	198	0	40,101
		Deliveries (afy)	17,596	3,554	3,991	434	575	1,390	127	0	27,667
	Unmetered	# Accounts	325	0	0	0	0	0	210	0	535
		Deliveries (afy)	379	0	0	0	0	0	135	0	514
2025	Metered	# Accounts	41,368	1,271	1,918	53	72	789	198	0	45,669
		Deliveries (afy)	20,291	4,011	4,505	490	649	1,569	127	0	31,642
	Unmetered	# Accounts	0	0	0	0	0	0	210	0	210
		Deliveries (afy)	0	0	0	0	0	0	135	0	135
2030	Metered	# Accounts	46,804	1,438	2,171	60	82	893	198	0	51,646
		Deliveries (afy)	22,910	4,528	5,086	553	732	1,771	127	0	35,707
	Unmetered	# Accounts	0	0	0	0	0	0	210	0	210
		Deliveries (afy)	0	0	0	0	0	0	135	0	135
2035	Metered	# Accounts	52,955	1,627	2,456	67	93	1,010	198	0	58,406
		Deliveries (afy)	25,872	5,113	5,743	625	827	2,000	127	0	40,307
	Unmetered	# Accounts	0	0	0	0	0	0	210	0	210
		Deliveries (afy)	0	0	0	0	0	0	135	0	135

SF – Single Family
MF – Multi-Family
COM – Commercial
IND – Industrial
INST – Institutional/Governmental
LAN – Landscape
CON - Construction
AG - Agricultural

Residential Customer Class

In the City of Clovis, customers average 2.86 persons per household. Total system per capita water production which includes the City and Tarpey Village was 222.5 gallons per person per day for all uses, including residential, commercial, industrial, schools and governmental. For the City of Clovis without Tarpey Village, the per capita production was 217 gallons per day. For Tarpey Village alone, the per capita production was 348 gallons per day. For residential use only, consumption for Clovis connections average 160 gallons per person per day and Tarpey alone averages 345 gallons per person per day. The significant difference in residential use in the two areas' consumption is partially attributable to the lack of meters and the large residential lots in Tarpey. Per capita residential consumption has decreased by 9.3% in Clovis and increased by 9.3% in Tarpey over the past 5 years. The Tarpey consumption is projected to decrease due the installation of additional meters and due to it being a built out area with no new connections expected. The overall Clovis residential consumption is expected to increase as additional customers are added but per capita consumption should continue to decline due to conservation measures. It also is expected that by 2025 all of the Tarpey unmetered customers will have had meters installed.

Commercial Customer Class

The City has a wide variety of commercial customers, ranging from the downtown area which has antique shops, restaurants, beauty, printing, offices and other small shops to a regional shopping mall. The City is host to several car dealerships, national chain retail stores and several newer community shopping centers. The City also includes in its commercial customer class churches, hospitals and other governmental uses besides the City's. The growth in the consumption of this class of customer has lagged the population growth of the City with an annual average of 1.4% over the last 5 years. The growth in the number of connections has exceeded the population increase, averaging around 2.8% annually. This most likely reflects the downturn in the economy and the resultant lower business activity.

Industrial Customer Class

The City has a small industrial customer class that has shrunk slightly in the last five years. There are currently 35 customers classed as industrial, a reduction of 8 since 2005. The customers are generally light industrial with a few exceptions. One food processing plant is an exceptionally heavy seasonal water user and there are a few other year round large water users. Consumption over the past five years has increased 10.8%. This customer class could either substantially decrease if the largest customer reduced or eliminated operations or it could increase as the City's new industrial technology park builds out. The industrial customer class consumption is projected to increase as new industrial customers are added.

Institutional/Governmental Customer Class

This customer class includes schools and City government buildings. There are currently 48 customers in this class, an increase of 8 since 2005. However, despite the increase in connections, the consumption has decreased 1.8% since 2005.

Landscape Customer Class

This class includes all of the publicly maintained landscape in the City. This class has increased in connections by 13% since 2005 and has increased consumption by 22% in the same period. These meters are only read once a year during January. In the future this class will continue to grow however it will grow more in line with population growth in both connections and consumption.

Construction Water Customer Class

This class consists of two groups of users. One consists of customers who utilize hydrant water meters and the other consists of new connections to the system, prior to the meter being set. There will always be some of these new connections and their demand is not expected to increase. Similarly, the use from hydrant meters is not expected to increase.

Agricultural Customer Class

The City at this time has no agricultural customers and does not at this point have plans to add any. Eventually the City may have agricultural customers when recycled water becomes fully available.

4.4 Water Demand Projections

Legal Requirements:

> *§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 population growth data summarized in Table 3-3 was used to estimate the future water use within the City. The population in 2010 was 99,519 and is projected to reach 188,224 by 2035.

The following series of tables summarizes the usage of water supply not identified previously followed by a summary of all water usage in the City. The projections are based on a similar growth pattern as the population where applicable.

The City of Clovis currently does not sell water to any other agencies. However, the City does have an agreement with Fresno County to potentially provide water treatment and distribution services to a County Water Service Area. The water supply would be provided by the County. The agreement will not become effective if the County Water Service Area does not approve the assessment district to fund the infrastructure necessary to provide the service.

The City also has another agreement in place with the City of Fresno which provides for interconnections between the two systems to supply treated water during peak demand periods. Over time the interconnection would act as an emergency backup for temporary production problems. The infrastructure has not been completed yet but may be constructed during the next 5 year period. The raw water supply would typically be provided by the using agency.

Table 4-10: Sales to Other Water Agencies

(UWMPGB Table 9)

Water distributed	2005	2010	2015	2020	2025	2030	2035
N/A	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0
Units :acre-feet per year							
Source: City of Clovis Production.xls 7/19/2011							

Table 4-11: Additional Water Uses and Losses

(UWMPGB Table 10)

Water use	2005	2010	2015	2020	2025	2030	2035
Groundwater Recharge[1]	10,760	8,400	8,400	8,400	8,400	8,400	8,400
Untreated Surface Water[2]	0	172	200	200	200	200	200
Recycled water[3]	0	0	1,219	1,219	2,403	2,403	2,403
System losses[4]	899	894	1,036	1,057	1,192	1,345	1,517
Total	11,659	9,466	10,855	10,876	12,195	12,348	12,520
Units :acre-feet per year							

Source:
[1] Depth Recharge Rainfall.xls 7/19/2011 (Projection 2015-2035 same as 2010 recharge)
[2] Includes Letterman Park and Reagan Educational Center.
[3] Water Supplies/SWTP Production.xls
[4] 3.6% of total uses actual for 2010 and projected for future years.

Table 4-12: Total Water Use

(UWMPGB Table 11)

Water Use	2005	2010	2015	2020	2025	2030	2035
Total water deliveries[1]	23,235	23,841	27,622	28,181	31,777	35,842	40,442
Sales to other water agencies[2]	0	0	0	0	0	0	0
Additional water uses and losses[3]	11,659	9,466	10,855	10,876	12,195	12,348	12,520
Total	34,894	33,307	38,447	39,057	43,972	48,190	52,962
Units :acre-feet per year							
[1] Table 4-2 and Table 4-9 *[2] Table 4-10* *[3] Table 4-11*							

As shown above, the total water use for the City service area will continue to increase due to population growth.

4.5 Planned Development

Legal Requirements:

§10910(a) Any city or county that determines that a project, as defined in section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.

§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.

Within the next five years the City has a few large scale projects planned that may fall within the statutory definition under *§10912(a)*. They include an additional expansion of the Clovis Community Hospital to include additional medical office buildings and a conference center and an industrial park near the northeast corner of Herndon and Peach Avenues.

4.5.1 Low Income Projected Water Demands

The City of Clovis 1993 General Plan Housing Element was updated on July, 7 2008 and revised on September 7, 2010. The Housing Element contains the Regional Housing Needs Allocation (RHNA) and the assumptions used to develop the allocations. The RHNA identified the need to construct 3,275 very low and 2,354 low income housing units by 2013. The City of Clovis expressed concern with the aggressive projections. For Clovis to meet the RHNA projection by 2013 the expansion of the sphere of influence would be necessary, and is considered unrealistic. Therefore, a more reasonable projection is being considered for the 2030 General Plan Update which would attain the RHNA housing unit projections of 5,629 units by 2030 not 2013. A linear projection of low income housing development from 2010 to 2030 has been assumed and results in an average unit construction of 1,407 units every five years.

To calculate the low income water demands the 2010 Census shows 2.86 persons per occupied household, the interim demand target of 224 gpcd will be used for 2015 and the 2020 target of 199 will be used for the years 2020 through 2035.

For the year 2015:

1,407 x 2.86 persons per unit x 224 gpcd x 365 days ÷ 325,828.8 gallons per AF= 1,010 AF per year demand

For the years after 2015, the low income additional water demand will be 897 af/year.

Table 4-13: Low-Income Projected Water Demands

(UWMPGB Table 8)

Low Income Water Demands	2015	2020	2025	2030	2035
Residential	1,010	1,907	2,804	3,701	3,701
Total	1,010	1,907	2,804	3,701	3,701
Units : afy					

4.6 Water Use Reduction Plan

Legal Requirements:

> *CWC§10608.26 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 (10608.36). 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 previously discussed water use targets will result in a large amount of water conserved but will take a significant effort to attain. The following demand projections are not inclusive of the demand management measures, as those are difficult to

quantify and will be better understood with actual data as the measures are implemented.

Table 4-14: Total Water Use Projections

Demand Projection	2015	2020	2025	2030	2035
Population	114,213	131,166	147,891	166,814	188,224
Demand Projection w/o Water Conservation	31,858	36,587	41,252	46,530	52,502
Demand Projection w/ Water Conservation	28,659	29,240	32,968	37,187	41,960
Difference	3,199	7,347	8,284	9,343	10,543
Units : af/yr					

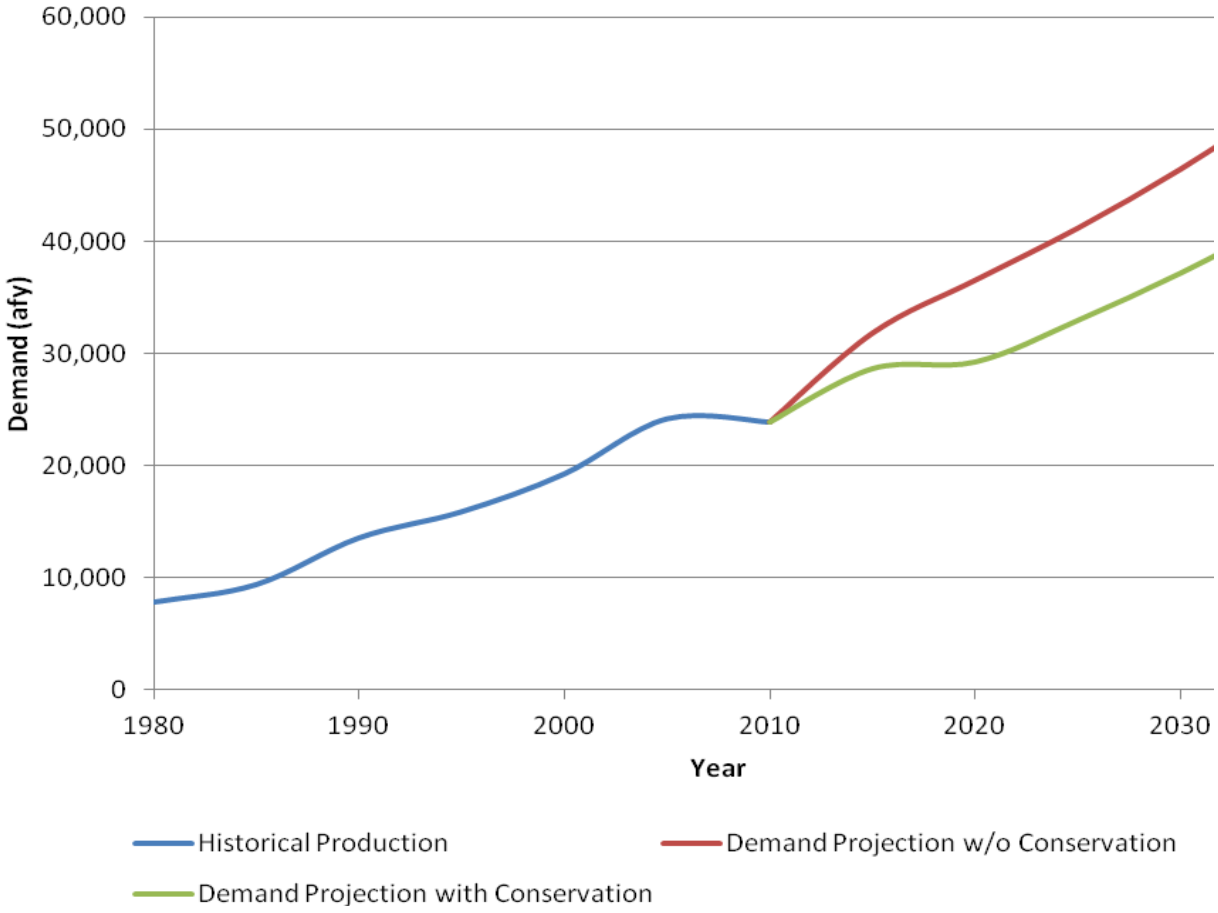


Figure 4-1: Water Use – Historical and Projected

Figure 4-1 shows the disparity between the projection with and without conservation practices in place. The City will have to achieve a water savings of 10,543 afy by 2035. To achieve these savings, the City will make efforts toward implementing the DMMs described in Section 6. Of primary importance are the residential DMMs, as the customer base is largely residential.

5 SYSTEM SUPPLIES

5.1 Water Sources

Legal Requirements:

> *§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).*

UWMPA requirements state the water supplier must describe their existing and planned water supply sources for the next 20 years. The following description includes information such as water rights, an overdraft summary, any adjudication decrees and other pertinent information from the ground water management plan.

5.1.1 Water Supply and Storage Facilities

The City of Clovis currently has three sources of water available to it; groundwater, surface water and recycled water. The City has plans to increase its use of recycled water and surface water, in order to reduce the City's reliance on groundwater.

The City has 40 wells that serve City and Tarpey Village connections. Of these wells, three were on standby status during 2010 due to water quality issues (Wells 14, 20 and 41). In 2010, 32 of the City wells produced 5,703 million gallons while 4 of the Tarpey Village wells produced 226 million gallons.

The Surface Water Treatment Plant (SWTP) currently provides potable drinking water to the City. The capacity of the SWTP will be increased in the near future, allowing for more of the City's supply to come from this source. In 2010, however, the SWTP produced 2.1 billion gallons.

The City of Clovis has recently completed their wastewater treatment plant (Water Reuse Facility) and will be utilizing the recycled water within the City for landscape purposes primarily. The City anticipates this volume to increase in the future. Section 5.5 further describes the City's recycled water plans and usages.

In conjunction with the system's supply facilities, the City maintains five storage reservoirs, with a total capacity of 7.06 million gallons. Table 5-1 shows a detailed list of the reservoirs.

Table 5-1: Water Storage Reservoirs

Reservoir Name	Volume (MG)
Reservoir 1	0.06
Reservoir 2	0.5
Reservoir 3	2.0
Reservoir 4	2.0
Surface Water Treatment Plant Reservoir	2.5
Total	7.06

Table 5-2: City of Clovis Wells

Well ID #	Capacity (gpm)	Standby Capacity (gpm)	Planned Wells (gpm)	Status
2A	1100			GAC
4AA	900			OK
7	1293			OK
8A	1200			GAC
10	1000			OK
11		925		GAC Well offline for rehab
12	1200			OK
14		1300		DBCP
15A	1330			OK
16	1000			Fe/Mn
17	1242			OK
18	800			OK
20		400		Standby - High Fe/Mn
21	925			GAC
22	625			OK
23	280			OK
24	850			OK
25	1000			OK
26	1400			OK
27	950			GAC
28	2400			GAC
29	525			OK
30	900			OK
31	350			OK
32	1900			OK
34	1200			OK
35			1250	Future
36	1100			GAC
37	2000			OK
T-5	900			OK
5A	1300			Ok
38	1500			OK
39			2000	Future
40	900			OK
41	1400			OK
42	2100			OK
43	1500			OK
SWTP	10417			
T-2	500			OK
T-3	900			OK
T-6	600			GAC
T-7	523			OK
T-8	450			OK
Total	50,460	2625	3250	

Wells 3, 19, 33, and T-1 are not listed in Table 5-2 due to inactivity.

Current and future supply projections through 2035 are shown in Table 5-3. The future supply projections assume normal surface water entitlements from the FID. The FID water exchanged for recycled water from the Fresno-Clovis Regional Wastewater Reclamation Facility is assumed to increase from 2010 on due to reclamation capability increases at the Regional Facility; however the Clovis' share will fluctuate due to diversions off of the Fowler Trunk Sewer to serve the Clovis treatment plant. The quantity is constrained by the number of reclamation wells on the Plant property and by the seasonal demand for irrigation water. During dry years the amount available will generally be higher than in wet years due to the need for additional supply by Fresno Irrigation District. A new supply from recycled water became available in 2009 from the Clovis facility. This amount will increase due to plant expansions in future years.

Since 2006, two banking facilities have been built, Waldron Pond and Boswell Groundwater Banking Facility. The purpose of these facilities is to 'bank' surplus water supplies for groundwater recharge, thereby making it available to the City on an as needed basis. Excess that is not withdrawn from the aquifer will serve to restore groundwater levels in the region.

The City expects to receive 9,315 afy from Waldron Pond and 4,500 afy from Boswell (beginning in 2011 or 2012). There is a possibility that Waldron Pond or Boswell could be expanded in the future, at which point the City will analyze its role in the potential expansion.

Table 5-3: Water Supplies

(UWMPGB Table 16)

Water Supply Sources	2010	2015	2020	2025	2030	2035
Clovis-produced groundwater	18,200	10,212	10,662	13,727	9,252	12,542
FID Kings River Water[1]	26,748	26,700	28,925	32,262	35,430	35,430
FID Class II CVP Water	406	1,243	1,347	1,503	1,651	1,651
GWD Class I CVP Water	0	0	585	1,170	1,170	1,170
Recycled Water (Clovis)	1,784	2,913	2,913	6,273	6,273	6,273
Regional WWTP Exchange (Fresno)	453	1,026	1,100	733	831	918
Waldron Pond Banking Facility[2]	9,315	9,315	9,315	9,315	9,315	9,315
Boswell Banking Facility[3]	0	4,500	4,500	4,500	4,500	4,500
Units : acre-feet per year						

Sources:
[1] 2010 From FID Data; Buildout within FID assumed by 2030.
[2] City of Clovis 2005 UWMP Page 26
[3] Provost and Pritchard, Jameson Pond Expansion Project Initial Study and Mitigated Negative Declaration, January 2010

Table 5-4: Wholesale Supplies

(UWMPGB Table 17)

Wholesale Sources	Contracted	2015	2020	2025	2030
N/A	0	0	0	0	0

The City does not use wholesale water for its supply source.

5.2 Groundwater

Legal Requirements:

§10631(b) (Is) groundwater…identified as an existing or planned source of water available to the supplier…?

§10631(b)(1) (Provide a) copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

§10631(b)(2) (Provide a) description of any groundwater basin or basins from which the urban water supplier pumps groundwater.

§10631(b)(2) For those basins for which a court or the board has adjudicated the rights to pump groundwater, (provide) a copy of the order or decree adopted by the court or the board.

§10631(b)(2) (Provide) a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.

§10631(b)(2) For basins that have not been adjudicated, (provide) 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 use 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 reasonably available, including, but not limited to, historic use records.

5.2.1 Groundwater Description and Management Plan

The City lies within the Kings Groundwater Sub-basin, which lies within the San Joaquin Basin Hydrologic Study Area. The Kings Sub-basin is also identified as sub-basin 5-22.08 of the Tulare Lake Hydrologic Basin in the Department of Water Resources Bulletin 118. The Kings sub-basin has been identified as critically overdrafted. Total storage in the basin was estimated to be 93,000,000 acre-feet in 1961 (Williamson, 1989). The groundwater aquifer from which the City obtains it water is not adjudicated. There are however agencies within Fresno County which have adopted groundwater management plans in accordance with AB3030. Clovis, Fresno City, Fresno County and Fresno Irrigation District have all adopted Plans. Clovis' was adopted in November

1997. The City also participated in a regional groundwater management plan update which was completed in 2007.

Up until July 2004, the City's sole source of drinking water was the groundwater aquifer underlying the community. The water system dates back to approximately 1913, when the first municipal well was installed. The City currently obtains approximately 18,200 acre-feet of water per year from its 40 active or standby wells with two of the wells on standby status due to water quality issues (Wells 14 and 20). Dibromochloropropane (DBCP) and high iron and manganese are the main water quality constraints in the Clovis area. A few of the City's wells are currently on inactive status due to being dry or producing too much sand (Wells 3, 19, 33 and T-1).

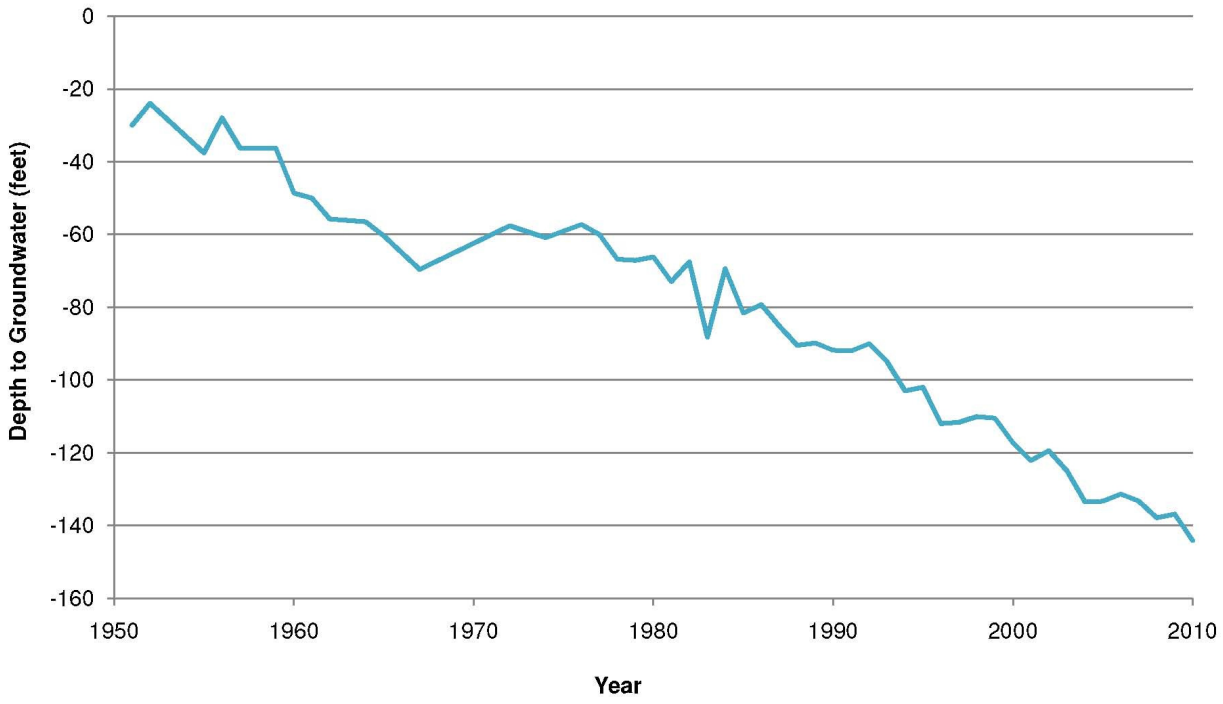
5.2.2 Groundwater Levels and Historical Trends

Recharging the underground aquifer is a very important aspect in the use of groundwater for supply and is one of the means to address the basin overdraft. In order to affect recharge, a surface water supply is required. In drought conditions the City's ability to recharge water is reduced. During the drought year of 1977 recharge was only 2,845 AF compared to 6,397 AF the next year. This has a direct effect on the groundwater level. As can be seen on Table 5-5 and Figure 5-2, after heavy rainfall years, which correspond with high recharge years, the water table rebounds or holds steady. Because of the continual increase in the amount of water pumped and the cyclic drought conditions, the water table has dropped 114 feet in the past 59 years. In just the past 10 years, the water table has dropped 27 feet. Recharge efforts began in 1974, and in 2004 the City began utilizing surface water with the goal of reducing groundwater pumpage. Recharge efforts by the City have not been enough to stem the decline as the basin is shared with other users who either don't recharge or inadequately recharge.

Table 5-5: Depth to Water, Recharge & Rainfall

Average Depth to Water, Recharge and Rainfall							
Year	Water Level (feet)	Intentional Recharge (af)	Rainfall (inches)	Year	Water Level (feet)	Intentional Recharge (af)	Rainfall (inches)
1951	29.95		10.30	1981	72.95	4,930	8.23
1952	24.00		13.95	1982	67.53	7,445	11.10
1953			9.70	1983	88.20	6,475	23.57
1954			8.89	1984	69.40	6,356	7.62
1955	37.55		10.28	1985	81.58	5,817	7.94
1956	27.95		13.40	1986	79.29	8,859	14.80
1957	36.20		8.20	1987	85.08	3,349	9.32
1958			18.99	1988	90.44	3,948	8.07
1959	36.30		6.87	1989	89.80	6,668	8.73
1960	48.60		8.00	1990	91.80	5,500	9.45
1961	50.00		6.87	1991	92.00	7,369	9.77
1962	55.76		11.37	1992	90.00	8,395	11.05
1963			11.59	1993	95.00	9,224	16.53
1964	56.50		6.76	1994	103.00	6,403	8.56
1965	60.36		11.20	1995	102.00	8,751	19.03
1966			6.14	1996	111.97	11,024	10.92
1967	69.60		14.99	1997	111.58	8,591	11.99
1968			7.24	1998	110.04	10,250	20.16
1969			22.98	1999	110.50	9,076	7.01
1970			9.12	2000	117.23	8,365	12.91
1971			8.53	2001	122.12	9,141	10.56
1972	57.60		5.34	2002	119.40	7,901	7.03
1973	59.22		13.94	2003	124.97	6,661	9.80
1974	60.92	3,179	10.42	2004	133.39	9,204	7.58
1975		5,021	7.69	2005	133.35	10,760	15.84
1976	57.26	3,540	8.18	2006	131.35	9,718	14.56
1977	60.02	2,845	7.61	2007	133.24	6,257	6.03
1978	66.80	6,397	18.16	2008	137.87	9,157	8.40
1979	67.10	6,952	10.65	2009	136.83	8,225	7.77
1980	66.20	6,751	11.92	2010	144.14	8,400	12.36

Figure 5-1: Depth to Groundwater



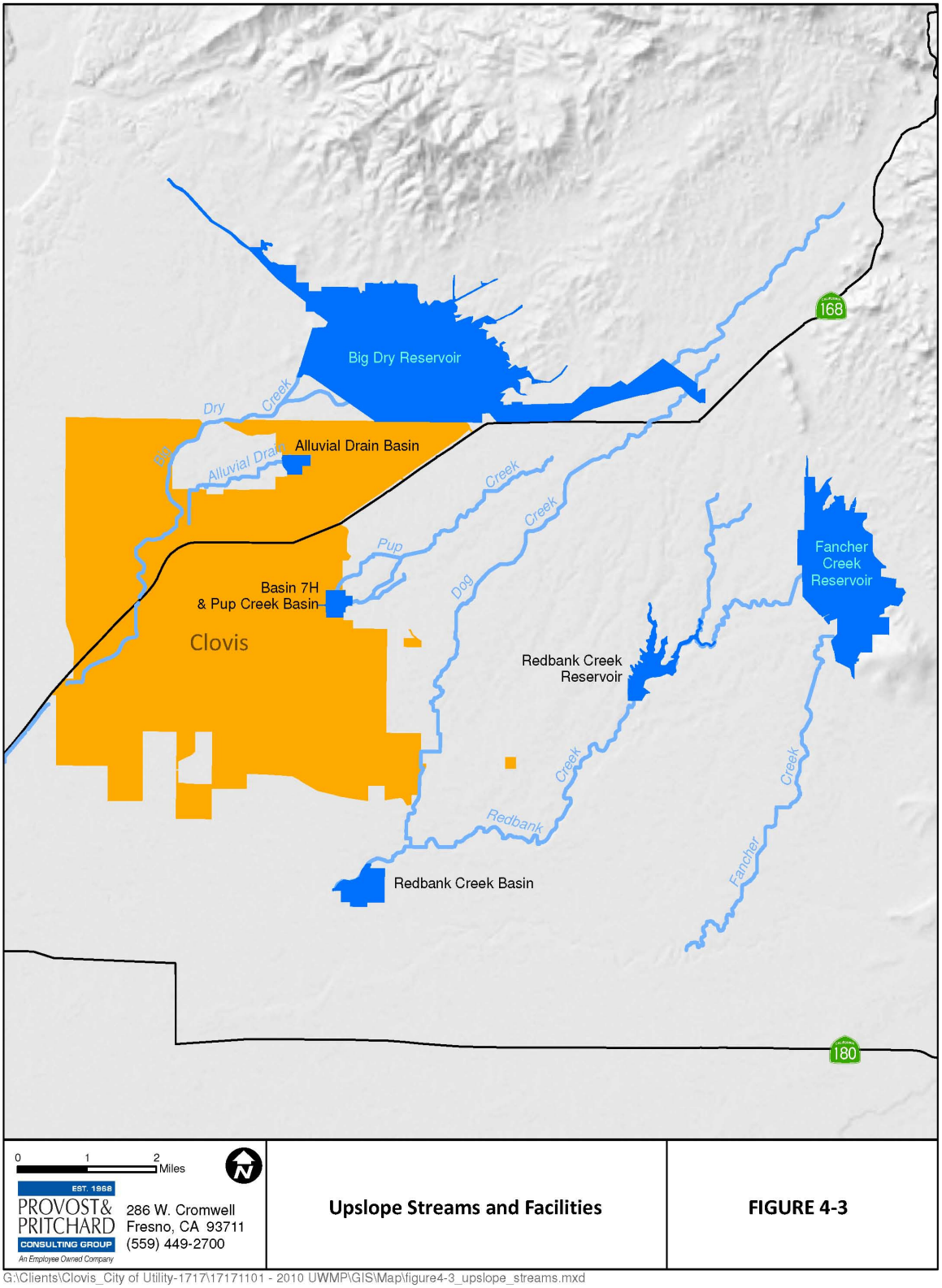
5.2.3 Sources of Recharge

The City's current intentional artificial recharge totals 8,400 afy. In addition to the City's artificial recharge activities the City has determined through master planning studies, that approximately 7,700 afy of natural groundwater recharge flows into the Clovis area annually as a result of existing hydrogeologic characteristics. Therefore, the approximate average annual sustainable yield of the groundwater is 16,100 afy for the Clovis service area which is the sum of the average artificial recharge plus the estimated natural recharge.

Currently the City's supply of surface water is used to supply the surface water treatment plant, provide direct irrigation to Letterman Park and to the Reagan Educational Center and to recharge the ground water. The City utilizes flood control basins in the summer for recharge and one dedicated year round recharge facility. The recharge facility encompasses approximately 90 acres. Fresno Metropolitan Flood Control District also utilizes surface water to irrigate the turf at Basin 1E and Basin S. In addition to the City's artificial recharge activities the City has determined through master planning studies, that approximately 7,700 af annually is the sustainable yield of the groundwater in the Clovis service area without artificial recharge activities. Table 5-5 shows how the City has historically utilized its surface water for recharge.

Major streams upslope from the City of Clovis are Big Dry, Dog, Redbank, Fancher, and Pup Creeks, and the Alluvial Drain. These streams carry storm runoff from drainage areas east of the City. Recently constructed Army Corps of Engineers' projects (Alluvial Drain Basin, Pup Creek Detention Basin, Redbank Reservoir, Fancher Creek Reservoir and Big Dry Creek Reservoir) detain the flows to reduce the possibility of flooding (shown on Figure 5-2). The City of Clovis is a joint applicant with the City of Fresno, Fresno Metropolitan Flood Control District and Fresno Irrigation District in acquiring the documented Water Rights for this water which is currently used within the basin for recharge. Continued diversion of this historical use will ensure continued beneficial use of this water. The Fresno Metropolitan Flood Control District now owns the Alluvial Detention Basin, the Pup Creek Detention Basin, the lands of the Fancher Creek Reservoir and the lower portion of the Big Dry Creek Reservoir. The District has indicated that these facilities may be available to the City to assist in the management of the City's surface water entitlements. Army Corps of Engineers requirements will need to be met in order to utilize these facilities.

Figure 5-2: Upslope Streams and Facilities



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In 2004, the City entered into an agreement with the Fresno Irrigation District to participate in financing of the construction of a dedicated water banking facility called the Waldron Pond Banking Facility. The facility is actually comprised of three separate sites encompassing approximately 252 acres of intentional artificial recharge facilities and can produce an estimated 10,350 af of water annually according to the Waldron Banking Facilities 2010 Operations Report. The City is entitled to receive up to 90% of the annual production in a given year. The City plans on taking the water in dry years to augment supply. The agreement requires in years when the banking project's available supply is less than the amount needed by the City, the Fresno Irrigation District will attempt to acquire additional water supply from other sources to meet Clovis' needs. In the event Fresno Irrigation District is unable to acquire such additional water for Clovis, the District will make water available for purchase to Clovis from the District's Kings River entitlements.

The City and FID have entered into a similar agreement regarding the Boswell Groundwater Banking Facility whereby the City will have access up to 4,500 afy of surface water. The existing 35 acre facility was expanded to 100 acres and 3 new recovery wells were constructed. Water supplies available to the District will be conveyed through the Lower Dry Creek Canal into the facility where the water will be intentionally recharged to the groundwater table. The recharged water will be "banked" for future recovery during dry periods or to accommodate planned growth. In the event the Facility cannot produce the 4,500 afy of surface water, FID will endeavor to acquire supplemental water for Clovis from other sources, which the City will be required to fund.

5.2.4 Existing and Projected Groundwater Pumping

The City has historically relied on groundwater pumping for a large portion of its water supply. The following tables show the quantities of groundwater the City has pumped in the last five years and anticipates what will be pumped through 2030.

Table 5-6: Groundwater – Volume Pumped

(UWMPGB Table 18)

Basin name(s)	Metered or Unmetered	2006	2007	2008	2009	2010
Tulare Lake – 5-22.08	Metered	18,543	22,477	21,342	19,087	18,200
Total groundwater pumped		18,543	22,477	21,342	19,087	18,200
Percent of total water supply		43%	47%	39%	36%	32%
Units : afy						

Table 5-7: Groundwater – Volume Projected to be Pumped

(UWMPGB Table 19)

Basin name(s)	2015	2020	2025	2030	2035
Tulare Lake – 5-22.08	10,212	10,662	13,727	9,252	12,542
Total groundwater pumped	10,212	10,662	13,727	9,252	12,542
Percent of total water supply	18%	18%	20%	14%	17%
Units : afy					

As shown in Table 5-6, the amount of groundwater being pumped has seen a decline from 2007 to 2010. The projection from 2010 to 2035 anticipates that the amount of groundwater being pumped will decline further due to expansion of the surface water treatment plant, despite increased population numbers, while the percent of the total water supply that groundwater represents will fluctuate depending on other supplies. Overall the City will continue decreasing its dependence on groundwater for the community's water supply

5.3 Transfer Opportunities

Legal Requirements:

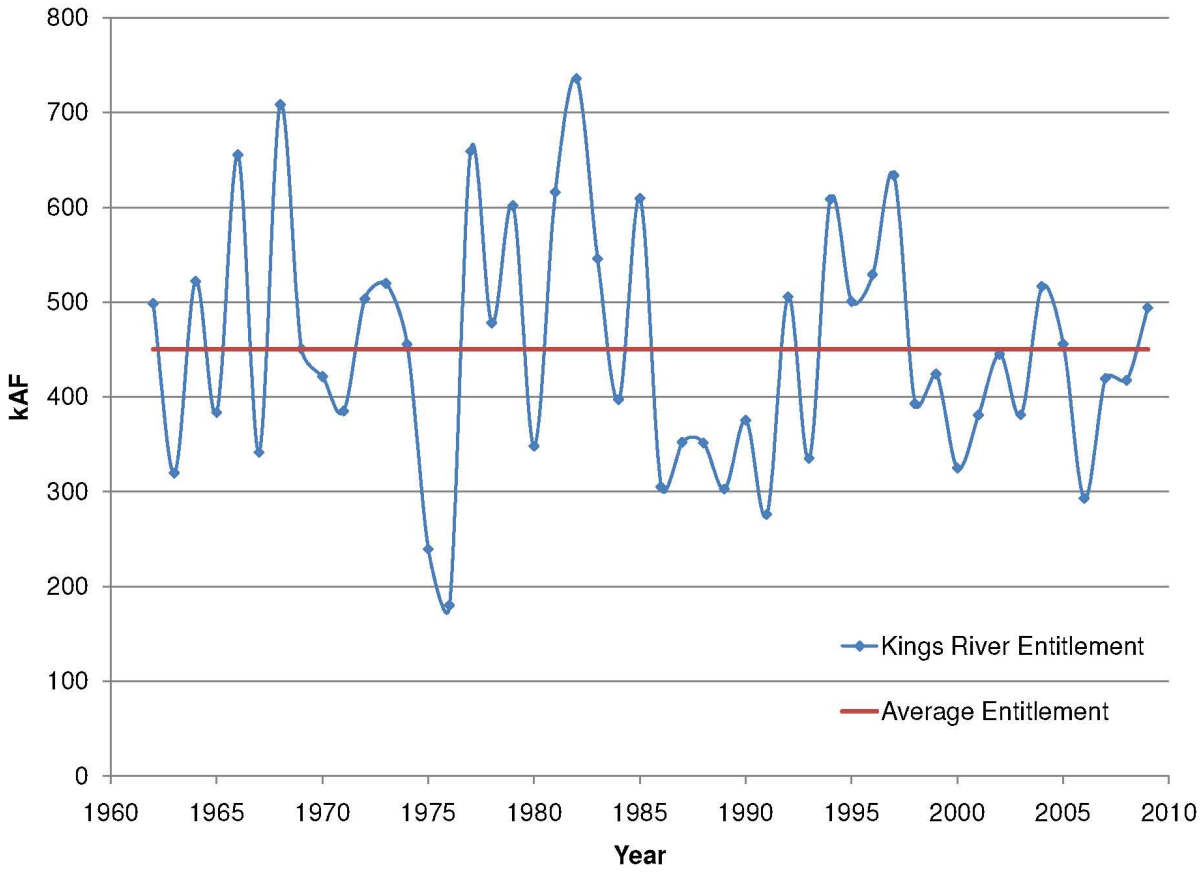
§10631(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

The City of Clovis is presently located almost entirely within the Fresno Irrigation District (FID) except for the City center which is excluded from FID and some recently annexed areas which are northeast of the Enterprise Canal. FID obtains the majority of its water from the Kings River. FID is a member of the Kings River Water Association which holds water rights licenses for all of the Kings River and storage rights licenses on Kings River reservoirs. FID is entitled to water based upon a prorated monthly schedule determined by the natural flow of the Kings River as it would occur without reservoir storage above the historic Piedra gauging station. FID is entitled to water from the Kings River at all flows but the percentage is higher at relatively low Kings River flows. If the snowmelt is slow, the District receives a greater entitlement. FID average gross annual entitlement is 454,000 AF. An entitlement of 300,000 AF has occurred or has been exceeded in 95 percent of the years of record. The smallest entitlement received was 174,000 AF and occurred in 1924. In the recent past, only 197,000 AF was received in 1977. Figure 5-3 shows the Fresno Irrigation District Kings River Entitlement from 1962 to 2009.

Water transfers could necessitate the City purchasing water rights or land with associated water rights. The most logical choice for a potential water transfer would be from a CVP-Friant Unit contractor. If land can be found that does not have a permanent crop and is served by a Class I CVP contract, a fairly reliable source of water may be found. The cost of such water however may be high. It is estimated that with a

minimum delivery of 75% of normal, in a drought year, 1.5 acre-feet per acre could be realized.

Figure 5-3: FID Kings River Entitlement



The Fresno Irrigation District has one other source of surface water from the Friant Division of the Central Valley Project. The water obtained from this source comes from the diversion and storage of water from the San Joaquin River behind Friant Dam. The total available water on the San Joaquin River has been estimated at 2,150,000 acre-feet. Of that, 800,000 acre-feet have been designated as Class I supply. Class I supply is considered to be dependable in most years with shortages only in very dry years. Class II water is in excess of Class I and is therefore much less dependable. Class II allotment has averaged 35 percent since 1966. It has been 100 percent during 7 of the last 40 years and 0 percent in 10 of the last 40 years. FID has a contract with the United States Bureau of Reclamation for 75,000 AF of Class II water from this source.

The City has an existing agreement with the Fresno Irrigation District whereby the City receives and manages on behalf of the landowners within the urbanized lands, the Kings River water which would be available to those lands. The City's allocation is proportional to the total acreage of the City's included area to the total FID area. The City now has 11,006 acres in FID relative to 198,817.8 acres in the District currently

receiving supply. The City's current entitlement in an average year for Kings River water is 24,488 af. In addition, approximately 1,140 AF is available from the Class II CVP water on average based on the last 30 years of data. The agreement between the City and FID does not allow the City to directly receive FID's CVP supplies but has been interpreted to mean that FID will make a like amount of Kings River water available to the City for its proportional share of Class II CVP supplies.

Within the City's General Plan area are lands which are outside the Fresno Irrigation District. Some of this land is located within either the Garfield Irrigation District or the International Irrigation District. Fifty percent of the Garfield Irrigation District and all of the International Water District are within the City's planned urbanized areas. The International Water District has a Class I CVP contract for 1,200 af per year. The Garfield Water District has a Class I CVP contract for 3,500 af per year. Since half of Garfield is within the City's sphere of influence, 1,750 af annually of supply could be expected to be added to the City's supply upon development. For this Plan 1,170 af is considered available for land likely to be developed. The remainder is within a rural residential area. The International Water District is within the City's General Plan area but not the current sphere of influence so its supply is not included in this Plan. The City needs to insure that the land is not annexed to the City without the water supply being assigned to the City. Table 5-8 shows these transfer opportunities.

Fresno County Service Area 51 (CSA 51) is group of rural residents located north of Shepherd Avenue and east of Sunnyside Avenue in Fresno County and outside of the Sphere of Influence of the City. The area has approximately 430 connections that rely exclusively upon groundwater for their water needs. Dry weather cycles and increased demand on the local groundwater aquifer have created significant supply issues for many residents in this area. As a result, Fresno County has entered into an agreement with FID to supply 530 acre-feet annually for potable water use. These water supplies will be directed from FID into either the City of Fresno or Clovis for treatment and delivery to CSA 51 for their use. This supply is listed in the table below to account for its existence but the water is not available for City use.

Table 5-8: Transfer and Exchange Opportunities

(UWMPGB Table 20)

Transfer agency	Transfer or exchange	Short term or long term	Proposed Volume
Garfield Irrigation District	Transfer	Long Term[1]	1,170
FID/CSA 51	Exchange	Long Term[2]	530
Regional WWTP Exchange (Fresno)	Exchange	Long Term[3]	1,000
Total			2,700

Units : acre-feet per year
[1] Volume only available upon development within the District that coincides with the City Limits.
[2] Volume to be provided to the City as raw water from FID; treated by the City and returned to CSA 51 as potable supply.
[3] See Section 5.5 for further information.

5.4 Desalinated Water Opportunities

Legal Requirements:

§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.

Because the City of Clovis is located in the Central San Joaquin Valley, there are no opportunities to develop desalination of ocean water or brackish ocean water. In addition the groundwater is of adequate quality and desalination is not necessary.

Table 5-9: Desalination Opportunities

Water Source	Proposed Volume to be Desalinated
Seawater	0
Brackish Seawater	0
Brackish Groundwater	0
Total	0
Units : acre-feet per year	

5.5 Recycled Water Opportunities

Legal Requirements:

§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.

A large portion of the City of Clovis' wastewater is treated at the Fresno-Clovis Regional Wastewater Treatment Facility, located southwest of the City of Fresno. It is

approximately 16 miles by trunk sewer to the City of Clovis. Currently the water is treated to the secondary level and then some is spread in percolation ponds and some is used directly on non-food crops. The plant then uses wells on the treatment plant property to pump water in order to reduce groundwater mounding under the plant. The pumped water is then put into Dry Creek and the Houghton Canal for use by farmers downstream. FID in exchange gives Fresno an additional one af of surface water for each two af of water pumped and put into the canals. Because Clovis contributes a percentage of the flow to the plant and pays a percentage share of maintenance, operations, and capital improvement costs, Clovis is entitled to a proportionate share of any exchanged water. Approximately 30,000 af per year can currently be pumped from the reclamation wells. The City therefore is entitled to an additional 1,225 af per year, but due to fluctuations in the amount of wastewater sent to the facility the amount will be less in most years.

The City has constructed a new wastewater treatment plant within the City of Clovis which began service in 2009 and is expected to start delivering recycled water to use areas in the City during 2011. The facility produces a disinfected tertiary treated water supply. The plant will serve the new growth areas of the City in the Southeast, the Northwest and ultimately the Northeast Urban Centers. The plant is located on Ashlan Avenue approximately 600 feet west of McCall Avenue. The first phase of the project utilizes wastewater flow from the City's Southeast Area and diverted flow from the Fowler Trunk Sewer that was previously being treated at the Regional Wastewater Treatment Plant for a total average daily flow of 2.8 million gallons per day. Ultimately the plant will treat 8.4 million gallons per day. The City has developed a recycled water master plan for the reuse of the treated wastewater.

Table 5-10: Recycled Water – Wastewater

(UWMPGB Table 21)

Type of Wastewater	2005	2010	2015	2020	2025	2030	2035
Wastewater collected & treated in service area	0	1,784	2,913	2,913	6,273	6,273	6,273
Volume that meets recycled water standard	0	1,784	2,913	2,913	6,273	6,273	6,273
Units : afy							

Table 5-11: Recycled Water – Wastewater Disposal

(UWMPGB Table 22)

Method of disposal	Treatment Level	2010	2015	2020	2025	2030	2035
Percolation ponds at Regional Plant	Secondary	6,000	6,067	7,447	5,448	6,988	8,731
Recycled Water Use in Clovis	Tertiary	0	1,219	1,219	2,403	2,403	2,403
Recycled Water Use by FID	Tertiary	1,784	1,694	1,694	3,870	3,870	3,870
	Total	7,784	8,980	10,360	11,721	13,261	15,004
Units : afy							

Landscape irrigation is projected to be a major use of the water. All of the public landscaped areas in the Southeast Specific Plan area and in Harlan Ranch will be irrigated with the reclaimed water. Other large landscape areas such as schools, parks and Freeway 168 are anticipated uses.

The recycled water produced by the tertiary treatment plant will also be used for agricultural purposes. The California State University, Fresno,(CSUF) located just west of Clovis and Freeway 168 north of Shaw Avenue has expressed interest in utilizing the recycled water. In addition the Fresno Irrigation District uses the water to distribute to agricultural customers downstream from Clovis. The water is discharged to Fancher Creek and conveyed through irrigation canals to agricultural lands southwest of Clovis.

There are currently no wildlife habitat areas or wetlands within the Clovis service area. Potentially the water discharged to the Fresno Irrigation District could be used for wetlands or wildlife habitat enhancement areas.

The water could potentially be used by future industrial customers within the new growth areas of the City; however it will depend on their needs and their proximity to the recycled water transmission and distribution lines. At this point none have been specifically identified.

Even though recycled water has been permitted to be used for groundwater recharge, the regulatory agencies have been discouraging this use. If, in the future, the use of the recycled water for groundwater recharge is more accepted by the regulatory agencies, the City will pursue this use. Recharge may occur outside the Clovis Service area with an exchange of water with the Fresno Irrigation District.

It is expected that a large development in the Southeast Specific Plan area will incorporate into its design a large water feature. Recycled water will be used for this feature.

Regarding the regional wastewater treatment plant, the City of Fresno, who is the responsible manager of the plant, is currently reviewing the proposed reuse options for the plant effluent. Based on the cost, it is very doubtful that any recycled water from the existing plant will be proposed for use within the City of Clovis' service area.

Table 5-12: Recycled Water – Projection Compared to Actual

(UWMPGB Table 24)

Use type	2010 Actual Use	2005 Projection for 2010[1]
Agricultural irrigation/incidental recharge	1,784	2,304
Landscape irrigation[2]	0	609
Industrial reuse	0	0
Groundwater recharge	0	0
Water Feature	0	0
Total	1,784	2,913

Units : afy

[1]From the 2005 UWMP. There has been some modification of use types. Data from the 2005 UWMP can be left in the existing categories or modified to the new categories, at the discretion of the water supplier.

[2]Includes parks, schools, cemeteries, churches, residential, or other public facilities)

Table 5-13: Recycled Water – Potential Future Users

(UWMPGB Table 23)

User type	Description	Feasibility	2015	2020	2025	2030	2035
Agricultural irrigation	Tertiary Treated	Yes	2,913	2,913	6,273	6,273	6,273
Landscape irrigation	Tertiary Treated	Yes	1,219	1,679	2,280	2,280	2,280
Industrial reuse	Tertiary Treated	No	10	20	30	40	40
Groundwater recharge	Tertiary Treated	No	2,913	2,913	6,273	6,273	6,273
Water Feature	Tertiary Treated	Yes	0	123	123	123	123

Units : afy

Note: Each line item is a possible use; not all would be utilized concurrently.

Table 5-14: Recycled Water – Projected Future Uses

User type	2015	2020	2025	2030	2035
Agricultural irrigation	1,684	1,091	3,840	3,504	3,504
Landscape irrigation	1,219	1,679	2,280	2,280	2,280
Industrial reuse	10	20	30	40	40
Groundwater recharge	0	0	0	0	0
Water Feature	0	123	123	123	123
Total	2,913	2,913	6,273	5,947	5,947

Units : afy

Because many of the future areas of the City where recycled water is proposed to be used are not yet developed, it will be much easier to encourage the use of recycled water. The City is requiring that new development within areas to receive recycled

water install recycled water mains (purple pipe) to supply recycled water to landscape areas. The City will be able to guarantee availability to customers even during water shortages that are not disaster related.

Customers will be educated about the uses of recycled water and the need for its reuse. A rate structure has been adopted which makes it a cost competitive alternative to potable water. Potential customers will be educated about the merits of using recycled water for recirculation uses. During the development process, the City will utilize its Development Review Committee to promote, encourage, and in some cases, require potential developments to include ways to use recycled water. The following table summarizes potential methods the City may use to encourage recycled water use.

Table 5-15: Methods to Encourage Recycled Water Use

(UWMPGB Table 25)

Actions	Projected Volume				
	2015	2020	2025	2030	2035
Lower Cost of Water	112	233	303	403	386
Dual Distribution System	21	41	55	73	72
Customer Education	62	124	164	219	215
Promotion of Recirculating Uses	5	5	5	5	5
Development Review Committee	8	10	20	30	40
Total	208	413	547	730	718

Units : acre-feet per year

5.6 Future Water Projects

Legal Requirements:

> *§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 was previously described, the City has entered into an agreement with the Fresno Irrigation District for an estimated supply of 4,500 acre-feet per year of banked water at Boswell Groundwater Banking Facility. Because this facility does not provide for carryover of supply from prior years, during multiple dry year scenarios, it is less likely that water will be available in the second or third year of a drought. However the District has committed to acquire water supplies for the City during these situations. Because these additional supplies will likely be very costly, a reduced supply will be assumed for multiple dry year scenarios.

Table 5-16: Future Water Supply Projects

(UWMPGB Table 26)

Project name		Boswell	Totals
Projected start date		2010	
Projected completion date		2011	
Potential project constraints			
Normal-year supply		4,500	4,500
Single-dry year supply		4,500	4,500
Multiple Dry Years	Year 1	4,500	4,500
	Year 2	3,000	3,000
	Year 3	3,000	3,000
Units : afy			

6 WATER SUPPLY RELIABILITY AND WATER SHORTAGE CONTINGENCY PLAN

6.1 Water Supply Reliability

Legal Requirements:

> *§10620(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)(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.*
>
> *§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 supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.*

6.1.1 Frequency and Magnitude of Supply Deficiencies

Because the water supply system utilizes both surface water and groundwater there are two ways the system could have supply deficiencies. For the groundwater portion of the system, the most likely reasons the City would have a deficit are that wells could not be used because of contamination, repairs or an emergency occurs which limits the water system's ability to deliver the water. Another possibility is that eventually if not enough recharge is carried out or others in the basin over pump from the groundwater there could be a shortage caused by falling water levels. Wells could dry up and in certain areas deeper wells may not be possible.

There are three major types of contamination that cause problems for Clovis wells, bacteriological, organic and inorganic. Certain City wells have been affected by dibromochloropropane (DBCP) and high iron and manganese levels. The wells affected by DBCP are scattered throughout the City. Wells with high iron and manganese have been found in the easterly portion of the City, east of Fowler Avenue. Many of the City's wells have also detectable amounts of 1,2,3-Trichloropropane (TCP), which at this time does not have an MCL. In the future an MCL is anticipated to be promulgated due to a public health goal (PHG) being established in 2007 and revised in 2009, of 0.00007 µg/L. However, due to the lack of an official MCL, the Department of Public Health (CDPH) continues to use the notification level of 0.005 µg/L established in 1999. As of 2008 a proposed MCL was established in 2008 for Radon, at 5pCi/L but an official MCL has not been issued. Any of these water quality problems can cause a well to be shut down temporarily or sometimes permanently.

When a well supply exceeds the State's Maximum Contaminant Level (MCL) for a primary standard, a six month period of monthly sampling is conducted before a decision is made regarding the continued production of water. Unfortunately, six

months is not an adequate time period to design and construct a treatment facility, so the supply would be temporarily lost until such a time as treatment could be put in place. Also unless the contaminant level was substantially above the MCL, the City would not want to begin design of a treatment facility until all the water quality data was in.

Wells occasionally have to be shut down temporarily due to necessary repairs. These can include electrical problems, lowering of pump bowls, valve repairs, and pump motor repairs, amongst others. These can cause the well supply to be unavailable for periods ranging from a day to several months depending on the required maintenance needed.

An emergency situation in which the City could be hampered in delivering water might be as routine as power failures or as extraordinary as a severe earthquake which causes power failures and breaks in supply lines. Most power failures do not affect the entire City at one time; when one does happen, it usually lasts no more than two to four hours. The City has taken steps to prevent a prolonged power outage from disrupting service by the addition of permanent auxiliary power sources at 14 well locations and the three pump stations.

A shortage of surface water would affect the ability of the City to supply water for both the surface water treatment plant and for recharge activities. Obviously because of the need to continue supplying potable water to the City's customers, the surface water treatment plant will have priority in deliveries. Recharge activities will get excess surface water.

6.1.2 Surface Water Availability

There were two periods since 1895 which over a three-year period could be considered the driest. The first one was in 1929 - 1931 with three years of well below average surface water availability. The second such period was in 1975 - 1977. For this second period, the first year was actually slightly above average, with the second and third years around half of average. Because long droughts of three years or more are more common and more devastating, the 1929 - 1931 period will be used for worst case forecasting.

The City is not allowed to carry over any unused FID entitlement water from previous years. It therefore has no impact on the amount of water available the next year. The impact is felt in reduced groundwater recharge and perhaps increased groundwater pumping. It is not an immediate problem, but a long-term one. Because of the limited availability of locations to recharge, deficits in recharge cannot be easily made up in wetter years.

In the event of surface water shortages the City could order water from the Waldron Pond Banking Facility or the Boswell Groundwater Banking Facility. The City can acquire 9,000 and 4,500 acre feet of water annually from the facilities, respectively. In the event of prolonged droughts, FID may not be able to recover the total 13,500 acre

feet of water from both facilities. In that case FID is committed to obtaining the water elsewhere if possible.

Table 6-1: Basis of Water Year Data

(UWMPGB Table 27)

Water Year Type	Base Year(s)
Average Water Year	2003
Single-Dry Water Year	1924
Multiple-Dry Water Years	1929-1931

Table 6-2: Supply Reliability – Historic Conditions

(UWMPGB Table 28)

Supply Source	Average / Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Ground Water	18,200	18,200	18,200	18,200	18,200
Surface Water	25,064	9,439	17,951	18,561	11,849
Total	43,264	27,639	36,151	36,761	30,049
Percent of Average/Normal Year:		64%	84%	85%	69%

Source: Supply Reliability.xls

Table 6-3: Supply Reliability – Current Water Sources

(UWMPGB Table 31)

Water Supply Sources	Normal Water Year	Single Dry Water Year	Multiple Dry Water Years		
			Year 1	Year 2	Year 3
Clovis-produced groundwater	18,200	18,200	18,200	18,200	18,200
FID Kings River Water[1]	24,488	9,652	18,355	18,979	12,116
FID Class II CVP Water[1]	1,140	0	0	0	0
Urban Storm Water Recharge[2]	2,000	1,000	1,000	1,000	1,000
Recycled Water (Clovis)[3]	2,913	2,913	2,913	2,913	2,913
Regional WWTP Exchange (Fresno)[4]	1,225	1,225	1,225	1,225	1,225
Waldron Pond Banking Facility[5]	9,315	9,315	9,315	9,315	9,315
Jameson Banking Facility[6]	4,500	4,500	4,500	3,000	3,000
Percent of Normal Year:	100%	73%	87%	86%	75%

Units : afy

Sources:
[1] Based on 2010 share of FID supplies.
[2] City of Clovis 2005 UWMP Page 26
[3] City of Clovis 2005 UWMP Page 55; This water supply is unaffected by drought
[4] Water Balance Memo 2/10/2003; This water supply is unaffected by drought
[5] City of Clovis 2005 UWMP Page 26; This water supply is unaffected by drought
[6] Provost and Pritchard, Jameson Pond Expansion Project Initial Study and Mitigated Negative Declaration, January 2010; This water supply is unaffected by drought but due to cost may be unaffordable in later years of a drought.

6.1.3 Projected Normal Water Year Demands

The normal year water demands are based on the historical data and population projections developed above. The demand and supply data is discussed in more detail in Chapters 3 and 4, respectively.

Table 6-4: Supply and Demand Comparison – Normal Year

(UWMPGB Table 32)

Water Use	Water Use (AFY)				
	2015	2020	2025	2030	2035
Supply totals [1]	55,908	59,346	69,483	68,422	71,798
Demand totals[2]	38,478	39,059	43,971	48,190	52,962
Difference	17,430	20,287	25,512	20,233	18,836
Difference as % of Supply	31%	34%	37%	30%	26%
Difference as % of Demand	45%	52%	58%	42%	36%

Units : AFY

[1] Table 5-3
[2] Table 4-12

As shown, both supply and demand are expected to increase from 2015 to 2035, as expected. The supply totals reflect using groundwater only to the extent required to meet potable demands. Excess supply is a reflection of other supplies such as surface water or recycled water. The supplies utilized will be provided by the sources discussed previously.

6.1.4 Projected Single Dry Water Year

The conservation measures identified in Section 6 of this report for Stage 3 and 4 water shortage restrictions should result in water savings when implemented. However, the natural tendency of people is to use additional water during dry years. Further, State 3 or 4 restrictions may not be required during a Critical Dry Year if supplies are adequate. Assuming an increase in dry year water use is a more conservative approach for evaluating dry year projections. The single dry year projections are based on the assumption that potable demands will increase by 6% in a single dry year and that recycled water use will increase by 10% over normal year projections. Recharge demands will be satisfied if there are available surface water supplies. Supplies will be reduced for surface water sources with groundwater pumping increased to match supplies to demands. Supply totals below do not include recycled water produced by the City that is excess of recycled water demands and that isn't exchanged.

Table 6-5: Supply and Demand Comparison – Single Dry Year

(UWMPGB Table 33)

Water Use	Water Use (AFY)				
	2015	2020	2025	2030	2035
Supply totals	38,236	39,808	45,443	43,915	47,924
Demand totals	31,919	32,535	37,789	42,261	47,320
Difference	6,316	7,274	7,653	1,654	604
Difference as % of Supply	17%	18%	17%	4%	1%
Difference as % of Demand	20%	22%	20%	4%	1%
Units : AFY					

Below is shown the projected changes to groundwater usage and potential groundwater recharge from the normal year projections during the single dry year.

Table 6-6: Supply and Demand Comparison – Single Dry Year

Water Use	Water Use (AFY)				
	2015	2020	2025	2030	2035
Additional Groundwater Use	1,340	1,368	1,542	1,330	1,962
Total Groundwater Use	11,552	12,030	15,269	10,582	14,504
Surface Supply Available for Recharge	6,316	7,274	7,653	1,654	604
Units : AFY					

6.1.5 Projected Multiple Dry Water Years

The multiple year projections are based on the projected normal demands increased by 6% and recycled water use increases of 10%. Recharge activities are not included in the demands. Any excess supplies may be used for that purpose.

Table 6-7: Supply & Demand Comparison – Multiple Dry Years

(UWMPGB Table 34)

Water Use		Water Use (AFY)				
		2015	2020	2025	2030	2035
Year 1	Supply totals	47,650	50,339	59,497	57,286	61,295
	Demand totals	31,919	32,535	37,789	42,261	47,320
	Difference	15,731	17,804	21,708	15,025	13,975
	Difference as % of Supply	33%	35%	36%	26%	23%
	Difference as % of Demand	49%	55%	57%	36%	30%
Year 2	Supply totals	47,160	51,103	51,281	56,794	62,068
	Demand totals	32,166	34,099	38,684	43,273	48,462
	Difference	15,117	17,003	12,597	13,522	13,606
	Difference as % of Supply	32%	33%	25%	24%	22%
	Difference as % of Demand	47%	50%	33%	31%	28%
Year 3	Supply totals	39,909	43,833	42,797	47,401	52,802
	Demand totals	32,166	35,022	39,578	44,285	49,603
	Difference	7,744	8,811	3,219	3,116	3,199
	Difference as % of Supply	19%	20%	8%	7%	6%
	Difference as % of Demand	24%	25%	8%	7%	6%
Units : AFY						

6.1.6 Factors Affecting Supply Reliability

The factors that can affect water supply reliability are varied. Table 6-8 lists the factors that are anticipated to potentially affect the City's water supply.

Table 6-8: Factors Resulting in Inconsistency of Supply

(UWMPGB Table 29)

Water supply sources[1]	Limitation quantification	Legal	Environmental	Water quality	Climatic
Clovis-produced groundwater	X			X	
FID Kings River Water[1]					X
FID Class II CVP Water[2]					X
GWD Class I CVP Water[3]					X
Recycled Water (Clovis)[4]					
Regional WWTP Exchange (Fresno)[5]					X
Waldron Pond Banking Facility[6]					
Jameson Banking Facility[7]					
Units : acre-feet per year					

Sources:
[1] Based on 2030 build-out projection from Water Balance Memo 2/10/2003, 2010-2025 interpolated according to population growth; Population growth from Clovis Community Profile pg 55 May 2009
[2] City of Clovis 2005 UWMP Page 16
[3] City of Clovis 2005 UWMP Page 17
[4]City of Clovis 2005 UWMP Page 55
[5] Water Balance Memo 2/10/2003
[6] City of Clovis 2005 UWMP Page 26
[7] Provost and Pritchard, Jameson Pond Expansion Project Initial Study and Mitigated Negative Declaration, January 2010;

6.1.6.1 Legal

The supplies the City relies upon are neither in the process of adjudication nor the subject of any new legislation limiting them. However that could change in the future; in which case those supplies could be diminished from their current volume.

6.1.6.2 Environmental

The status of environmental regulation in California is routinely changing due to new legislation, endangered species statuses, et cetera. Should new environmental legislation come into existence it could potentially cause a lack of supply. The recent water supply reductions in the Delta are an example of environmental water needs versus community water supplies. Due to the mixture of groundwater and surface water within the City, it is anticipated that alterations to the water supply could be made to accommodate these changes, should they occur.

6.1.6.3 Water Quality

Water quality standards are fairly stable but can still experience periods of modification as new constituents are deemed 'of concern' and MCLs are created or made more stringent. Due to past MCL exceedances within the City, staff is particularly in tune with changes to these regulations and will maintain vigilance in monitoring new and changing MCLs.

It is conceivable that an MCL may change or be introduced that removes a portion of the City's water supply for a short period until treatment can be developed or new supplies can be secured.

6.1.6.4 Climatic

As climate change becomes more quantifiable and potentially affects the local water conditions more, alterations in the water supply planning arena will have to take place. Climate change elements such as drought or massive flooding could strongly affect supply reliability, therefore requiring the City to make modifications to their water supplies.

6.2 Water Shortage Contingency Planning

Legal Requirements:

§10632(a) 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(b) 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.

§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 or 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) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

§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.

6.2.1 Water Shortage Stages and Reduction Objectives

Water shortages may be mitigated by either increasing supply or reducing demand. Increasing supply for Clovis includes the following possible methods: drilling additional wells; providing treatment facilities for DBCP contaminated wells that exceed the MCL; rehabilitating wells to increase production; building additional water storage reservoirs; creating banking facilities or by purchasing additional surface water supplies. Each of these methods requires a long lead time before operational capability. This minimizes their usefulness in a drought situation where a solution may be needed immediately. They are however useful as a long term supply augmentation plan.

Demand reduction is the quickest and least costly method of addressing supply shortages caused by a drought, emergency or other unforeseen events. They should not be used for expected consumption increases such as population growth however, because when an actual emergency or drought induced supply shortage occurs there is no quick way to reduce demand.

Techniques for demand reduction which could be used are as follows: water surveys; leak detection; plumbing fixture replacement and retrofit; irrigation restrictions; information programs; specific use restrictions; new connection restrictions; plumbing code changes; development restrictions on landscaping and pools; development offset programs; rationing; or price restructuring. Any one or a combination of these could be used depending on the severity of the shortage.

Supply Augmentation Measures

Drilling new wells requires a minimum of one year to become operational, from drilling the test hole to installing the pump and motor. This measure therefore, cannot be used as a quick response to an emergency supply deficit. A new well can provide between 400 and 2200 gallons per minute. The cost can vary between $500,000 and $800,000 depending on size and location. If the quality of the well does not meet State standards, which often is not known until after the well has been in production for a minimum of 6 months; the well may need treatment. This can take up to a year to design and build and cost approximately $800,000. Drilling a well and treating a well both require amendments to the City's Water System Permit from the State Department of Public Health. An environmental review is also required. Depending on the type of treatment required however, environmental clearance could become more difficult and time consuming. The operation and maintenance cost of a treated well is higher than an untreated one. The drilling of new wells is a measure that should be undertaken as growth requires. It is not a measure that can be taken quickly enough to solve an immediate shortage problem. Treatment facilities also cannot be installed quickly and so should be viewed as a long term supply enhancement.

Rehabilitation of a well can take many forms, from drilling deeper, replacing the pump and motor, slipping a new casing or screening inside of the existing casing, redeveloping open bottom wells, lowering the pump bowls, and swabbing and jetting the casing. The cost therefore can vary considerably depending on what process is used and the size and depth of the well. It could be $15,000 or as much as $500,000 or more. If the well was not operational previously then the yield may be between 400 gallons per minute up to 2200 gallons per minute depending on the well's original production. If the well is operational and it is just being enhanced, the yield may be increased 100 gallons per minute or more. Normally the quality of water from a rehabilitated well is not changed from the previous quality unless old strata are sealed or new strata tapped. The time needed to rehabilitate a well averages 6 months and does not require any environmental review or water permit amendments. This measure is cost effective in the case of a well which is not operational and can be completed in a short time. It

should be utilized as good candidates for well rehabilitation come up, but cannot be counted upon when an unplanned shortage occurs.

Any of the above methods which increase the amount of water pumped from the underground aquifer will ultimately require increased recharge efforts. If recharge is not increased to meet withdrawals, the groundwater table will continue to lower and the cost to pump the water increases.

Building more storage reservoirs takes a minimum of one year and can be very expensive. The cost of the City's most recent 2 million gallon reservoir was approximately 2.6 million dollars in 2004. It requires an environmental evaluation and an amendment to the City's water permit. This measure does not actually increase the amount of water available but provides additional supply during peak periods. The water quality is not affected by reservoir storage. Building more storage reservoirs is not cost effective in areas where new wells can be drilled, but for instance, where the quality of the well water is poor or in low quantity, a reservoir is effective in providing additional pressure and supply during peak demand periods.

Expanding the City's surface water treatment plant is generally a long term enhancement of the City's ability to provide water. It can be expanded from its current 15 mgd capacity up to 22.5 mgd by adding additional membrane feed pumping capacity and additional membrane racks. This could probably be accomplished in a year. Expansion beyond 22.5 mgd would require an extensive expansion project which would probably take at least 2 years to design and construct. Of course if the surface water supply is reduced during drought conditions additional treatment capacity will not help. This measure has the benefit of reducing the need for recharge facilities, which are difficult to locate in Clovis and are expensive to acquire and construct.

Demand Reduction Measures

Water audits and fixture leak detection and repair are measures that go hand in hand. However they are not quickly implemented. It could take months or years to survey all of the City's accounts and unless these measures were done in conjunction with rationing or price restructuring, customers would have little incentive to follow through with repairs or change their habits. The cost of conducting water surveys and fixture leak repair are high relative to the amount of water savings. These measures require significant staff time to implement.

Plumbing fixture replacement with ultra-low flow toilets costs approximately $3.00 per 1,000 gallons saved over a 10 year period. This program would have to be in place a lengthy period before significant savings are realized and would probably require more than two months to set up. This measure has the potential of saving 10,000 to 20,000 gallons per year per toilet replaced.

Information programs are low cost and are required to be used if mandatory conservation programs are implemented. It can take as little as a week or as much as

two months to get information to the customers depending on cost and the urgency of the information.

New development requirements, restrictions, offset programs and plumbing code changes do not have any significant direct costs. However, restrictions on connections can have significant indirect costs to the City in the form of lost revenues.

Irrigation restrictions are fair to all customers. They can be the most effective way to reduce consumption. They also have the advantage of spreading out demands. The only problem is enforcement. If it is done in conjunction with price restructuring and rationing, it is most effective. The only lead time required is for notifying customers. There is a cost associated with enforcement, but this could be offset with fines collected for noncompliance.

Rationing is the most effective way to reduce demand. The water savings will be dependent on the level of the rationing but can be predicted easily. The lead-time required for a rationing program is limited to the time necessary to get the information out to the public. If the rationing is based upon past consumption there will be time needed to calculate every customer's allowance. This method is not equitable because it penalizes customers who were conserving in the past. A fixed allotment rationing establishes a customer's water consumption goal on a unit basis. This is easier to determine and can be varied by customer type. The cost to the City of a rationing plan would include information dissemination, staff time and the cost of any incentives the City chose to offer to make rationing compliance easier.

Price changes can reduce consumption but the reduction amount is not easy to estimate. Excess use charges or increasing block rates charge a higher rate at higher levels of consumption. The amount of water saved can vary between 0.2 and 0.5 times the percentage price increase. For example, if the rate increase is 100%, the savings could vary between 20% and 50%. A rate increase necessitates an ordinance change and can take effect 5 days after Council action in an emergency.

Stages of Action

The City of Clovis has four triggering levels which correspond to four water shortage stages. The water shortage stages have reduction in consumption goals varying from 10% to 50%. Stage 1, with a target of 10% reduction, is effective whenever there is an overdraft of the groundwater table or when available water production is within plus 10% of estimated monthly peak hourly demands. Overdraft is defined as a decline in the water table as determined by the average of the depth to water in all of the City's wells from the previous year. Stage 2, with a target of between 10% and 20% reduction, is effective whenever overdraft of the groundwater table is in its second or more consecutive year or the available water production is 10% less than the estimated monthly peak hourly demands. Stage 3, with a target of between 20% and 35% reduction, is effective whenever the available water production is 20% less than the estimated monthly peak hourly demand. Stage 4, with a target of between 35% and 50% reduction, is effective whenever the available water production is 35% less than

the estimated monthly peak hourly demand or surface water supplies are 50% less than required. Each week the available supply and estimated demand is compared. When it is determined by the Director of Public Utilities that a change in stage is required, the City Council will be notified at the next Council meeting. However, the requirements for the declared stage are effective immediately upon the Director of Public Utilities determination and customer notification for Stage 3 and Stage 4 if the ordinance establishing the water shortage plan has been previously adopted. Table 6-9 shows the shortage stages, the initiating conditions and the reduction goals.

Table 6-9: Water Shortage Stages and Reduction Objectives

(UWMPGB Table 35)

Stage	Conditions	Percentage Shortage
1 Minor (voluntary)	Groundwater in overdraft or available production within 10% of peak hour demands	10%
2 Moderate (mandatory)	Groundwater in overdraft in second consecutive year or available water production is 10% less than the peak hour demands	10% to 20%
3 Severe (mandatory)	Available water production is 20% less than peak hour demands	20% to 35%
4 Critical (mandatory)	Available water production is 35% less than peak hour demands or surface water supply is 50% of required.	35% to 50%

6.2.2 Prohibitions, Consumption Reduction Methods, and Penalties

The first step in a demand reduction program is to prohibit wasteful practices and provide enforcement methods. The current City ordinance regulates wastage of water and provides penalties for wastage and failure to comply with any water conservation program the City enacts. The penalties range from a warning, to fines, to flow restrictors or discontinuance of service.

Table 6-10: Water Shortage Contingency – Mandatory Prohibitions

(UWMPGB Table 36)

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Using a hose without a nozzle	Stage 1
Outdoor water use on a non-watering day	Stage 2
Broken sprinklers or other leaks	Stage 1
Excessive runoff from property	Stage 1
Evaporative cooler overflowing	Stage 1

Stage 1, minor water shortage, initiates a voluntary demand reduction effort, consisting of enforcement of the water waste ordinance with the City Council determining what is

considered wasting water. A public information campaign is initiated in which the water shortage situation, other potential stages of the water shortage, and what could be expected in the future are explained. Voluntary conservation is requested. Additional information about ways to save water is sent to customers. The City participates in committees which promote water conservation through their activities.

Stage 2, moderate water shortage, requires a mandatory demand reduction effort. The public information program and participation in water conservation committees is continued. Customers are asked to conserve between 10% and 20%. Rate changes may be adopted which promote conservation by lowering the threshold for the higher user rate for excess consumption from current levels to a volume indicated by the needed reduction for residential customers. Unmetered customers are all charged an excess consumption charge based upon the production of the wells which serve them. These new rates are explained to customers. The City evaluates its water use for main flushing, street cleaning and landscaping to see if reductions are possible. The number of meters tested and repaired is increased. Outdoor water use is restricted to three days a week for all customers. Landscape watering may be restricted to outside peak demand hours. Hoses without self-closing nozzles are not allowed. Enforcement of the water waste and water conservation ordinance is continued.

Stage 3, severe water shortage, requires mandatory reductions in consumption through a rationing program. The rationing program includes fixed allotments for residential customers and percent reductions for commercial and industrial customers. For single family residential customers the allotment is 75% of the 10 year baseline monthly average per capita residential consumption x 3 persons per household. For multiple family customers the allotment is 75% of the 10 year baseline monthly average per capita residential consumption X 2.5 persons per unit. Allotments can be appealed by customers if they can demonstrate that occupancy is greater than that assumed. For commercial, institutional and industrial customers the percent reduction is 15% from average consumption for the previous two years in the same billing period. Landscaping-only accounts are allotted 70% of the previous 2-year average in the same billing period. The fixed allotments are also applied to all residential unmetered accounts with the average consumption for the entire unmetered service area being the basis for comparison of consumption. Rate changes are implemented to penalize use over allotment. Main flushing is only done on a sand, odor, or taste complaint basis or due to contamination and public health reasons. Outdoor water use is limited to two days a week for all customers. Landscape watering time restrictions are continued. Water waste patrols must be used in this stage and Stage 4 to patrol during the evenings and early mornings. Pool covers are encouraged. No draining and refilling of pools is allowed. No new connections are allowed unless the developer can offset the new expected water use by a two to one water savings in existing development.

Stage 4, critical water shortage, requires drastic reductions in water usage. All of the Stage 3 steps apply but the allotments are smaller and percentage reductions are larger. Single family residential customers have an allotment of 60% of the 10 year baseline monthly average per capita residential consumption x 3 persons per

household. Multiple family residential customers have an allotment of 60% of the 10 year baseline monthly average per capita residential consumption x 2.5 persons per unit. Commercial, institutional and industrial customers are required to reduce consumption by 20% from the average monthly consumption for the previous 2 years. Landscape-only accounts, are entitled to 50% of the previous average monthly consumption for the previous 2 years. Outdoor water use is restricted to once a week except for drip irrigation systems. No new connections are allowed. Construction water usage is limited or prohibited for dust control, new main disinfection and new home construction. For Stage 3 or 4 implementation, an ordinance which provides for a rationing program and revised water rates is adopted.

Table 6-11: Water Shortage Contingency – Consumption Reduction Methods

(UWMPGB Table 37)

Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Customer allotments/Rate Changes	Stage 3 and 4	25% to 40%
No refilling of pools	Stage 3 and 4	1%
Irrigation reduced to 2 or 1 day per week	Stage 3 and 4	18% to 35%
No new connections w/o offsets	Stage 3	None but no increase
No new connections	Stage 4	None but no increase
Main flushing only on complaint basis	Stage 3 and 4	50%

6.2.3 Revenue and Expenditure Impacts/Measures to Overcome Impacts

As consumption drops so does revenue. Current City water rates were developed based on conservation measures in effect during 2009. However, if a Stage 3 or Stage 4 level of conservation is required, additional revenue is needed to fund the existing utility functions and also fund the extra expenses involved with the conservation program and potentially purchasing additional supplies on the open market. Additionally, to make the rationing programs effective, there has to be a penalty for excess consumption beyond the allotted amounts. The City's current rates can support Stage 1 and Stage 2. If Stage 3 were implemented, residential consumption would drop by an estimated 25% from 2010 per capita levels. Commercial, industrial and institutional consumption would drop by 15% from present levels. The corresponding drop in revenue would be approximately 28% from current revenue projections. To offset this loss and pay for an estimated Stage 3 shortage plan cost of $200,000 the rates would need to be adjusted to $2.30 for every 1,000 gallons under the allotment and over the minimum billed amount and $7.20 for every 1,000 gallons over the allotment (four times the cost of production).

At Stage 4 it is estimated that consumption will drop by 40% for residential customers from 2010 levels. Commercial, industrial and institutional consumption will drop by 20% from present levels. The associated loss in revenue would be approximately 44% from current projected revenue. The Stage 4 shortage plan will cost approximately the same

as Stage 3 ($200,000). The rates will need to be adjusted to $2.60 for every 1,000 gallons under the allotment and over the minimum billed amount and $7.20 for every 1,000 gallons over the allotment (four times the cost of production). Revenues will need to be monitored monthly with adjustments made no more frequently than every 6 months.

Table 6-12: Water Shortage Contingency – Penalties and Charges

(UWMPGB Table 38)

Penalties or Charges	Stage When Penalty Takes Effect
Penalty rate of 4 times cost of production for use over allotment.	Stage 3
Flow restrictors for waste	Stage 2 after 4 violations within 1 year
Fines for waste	Stage 2 after 2 violations within 1 year

6.2.4 Actions During a Catastrophic Interruption

In the event of non-drought related events that interrupt the City's ability to provide water immediate measures need to be planned that will allow the City to provide a minimum amount of water to customers. Possible catastrophes include a regional power outage, terrorism event at selected locations or a natural disaster which affects selected facilities. The City is working with the City of Fresno to provide an intertie connection between the two systems which during certain service interruptions would provide an emergency backup supply.

Table 6-13: Actions During a Catastrophic Event

Event	Action
Regional Power Outage	Utilize emergency backup power at selected facilities and provide public notice through broadcasts of emergency and ask customers to reduce consumption to essential uses.
Terrorism Event	Make use of alternate production facilities as available and make use of planned intertie connection with City of Fresno system.
Natural Disaster	Utilize emergency backup power if utility provided power is interrupted. Utilize intertie connection if available. Immediately implement Stage 3 or Stage 4 demand reduction program.

6.2.5 Reduction Measuring Mechanism

In the spring of each year the City projects peak demands and anticipated supply. All wells are sounded for depth in February. A preliminary schedule of shortage stages is determined. During the months of April, May, June, July, August, and September, each week the water production figures are compared to the projected production figures to determine if conservation goals are being met. Projected available supply for the next week is also compared to the previous week's production, adjusted for the next weeks expected weather. This indicates whether a change in stage, increase in public information or increased enforcement is necessary.

Implementing Steps

1. By the first City Council meeting in April of each year City staff will project demands and supplies for the year. At that time a schedule of water shortage stages will be determined.

2. If a Stage 3 or Stage 4 level is anticipated, the draft ordinance will be adopted by the Council for implementation of the required measures.

3. The stages will be declared by the Public Utilities Director and shall be effective immediately upon publication. Each stage shall be effective until a new stage is declared or the stage has been declared ended and so published.

6.3 Water Quality

Legal Requirements:

> *§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 quality of the City's water supply is generally good. The Kings River water is low in contaminants and usually easy to treat. Following heavy rain events the turbidity levels can increase significantly. The City's treatment plant can usually handle the increases but it may also be shut down during the spike to save on chemical costs. This is not a concern from a supply perspective because storm events normally occur during low demand periods. The delivery mechanism for the Kings River water, the Enterprise Canal, is patrolled by City staff six days a week, and by a Fresno City staff member one day a week. This helps to insure that the quality of the water stays high.

Groundwater quality is fairly consistent. However, water quality regulations are constantly being revised with new constituents being added for monitoring and new or reduced maximum contaminant levels being established. The City currently has a number of wells that are treated to remove dibromochloropropane (DBCP). The overall level of DBCP appears to be decreasing in most wells. During unregulated contaminant

monitoring it was discovered that some of those same wells also have 1,2,3-Trichloropropane. A maximum contaminant level has not been adopted yet, but it may require additional treatment at these wells, as discussed previously. In general as testing methods become more discerning and regulations become more stringent, it can be expected that sources will need additional treatment to stay in compliance.

Table 6-14: Water Quality – Current and Projected Water Supply Impacts

(UWMPGB Table 30)

Water source	Description of condition	2010	2015	2020	2025	2030	2035
Surface Water	Acceptable	0	0	0	0	0	0
Groundwater	Acceptable	0	0	0	0	0	0

It is not anticipated that water quality will adversely affect water supply in the near future. In the instance that a well or surface water has water quality issues, treatment will be provided.

7 DEMAND MANAGEMENT MEASURES (DMM)

7.1 DMMs

Legal Requirements:

§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 toilets.

§10631(f)(3) 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) 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) 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.

The City has a water conservation and recycling program in place. The City takes water conservation very seriously and considers implementation of BMPs as necessary to achieve the goals of those programs. In the past conservation measures were referred to as Best Management Practices (BMPs). In recent years, California Department of Water Resources (DWR) has expanded on typical BMPs in the form of Demand Management Measures, which are discussed below, including a description, implementation schedule and cost analysis if applicable. At this time, the City is implementing 13 DMMs; DDM10 is not applicable to the City's situation.

Table 7-1: Demand Management Measures

Demand Management Measure	Implemented	Planned for Implementation	Cost Benefit Analysis Completed	Not Applicable
DMM1 – Water Survey Programs	X			
DMM 2 – Residential Plumbing Retrofit	X			
DMM3 – Water System Audits	X			
DMM4 – Metering and Commodity Rates	X			
DMM5 – Landscape Irrigation Programs	X			
DMM6 – Washing Machine Rebate Program	X			
DMM7 – Public Information Program	X			
DMM8 – School Education Program	X			
DMM9 – Commercial, Industrial and Institutional Conservation Programs	X			
DMM10 – Wholesale Agency Programs				X
DMM11 – Conservation Pricing	X			
DMM12 – Water Conservation Coordinator	X			
DMM13 – Water Waste Prohibition	X			
DMM14 – Ultra Low Flush Toilet Replacement	X			

7.1.1 Water Survey Programs

This measure is currently being implemented. Customers are notified annually of the availability of surveys through their consumer confidence report. Additionally customers are asked if they would like a survey when they request an ultra-low flow toilet rebate. Surveys include the following: check for leaks by using the meter; check the flowrate of shower heads and faucet aerators; supply replacements if necessary; check irrigation systems and timers; review the irrigation schedule; measure the landscape area and check the irrigation coverage. Customers are then provided with recommendations to make improvements. Copies of the surveys are retained. Response has been very poor to this measure since its beginning in 1997; however it will continue to be made available. The effectiveness of this measure can be evaluated by comparing meter records to see if there is a reduction in consumption.

Table 7-2: Water Survey Program Implementation

	Actual					Projected				
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
# of single family surveys	2	3	0	6	5	3	3	3	3	3
#of multi-family surveys	0	0	0	0	0	0	0	0	0	0
Actual/projected expenditures $	$160	$240	$0	$480	$400	$240	$240	$240	$240	$240

Implementation Schedule: Ongoing

7.1.2 Residential Plumbing Retrofit

The City has made low flow shower heads and faucet aerators available to customers at no cost to incentivize more extensive utilization. These are distributed to customers at Clovis Farmer's Market and other public events. They also are distributed to customers during toilet rebate inspections and during complaint responses. The program to distribute low flow devices began prior to 1995 with a distribution of over 4,000 shower heads which were provided to the City at no cost by P.G.& E. Since then approximately 1000 additional showerheads and approximately 500 additional aerators have been distributed. The City to date has not tracked the distribution of devices according to single family or multiple family customers. Current plumbing standards are enforced by the Building Division. It is difficult to determine how effective these devices are in use however water savings can be estimated based on assumptions. The use of this demand reduction measure may eventually reduce the City's ability to make further long term reductions in the event of a water shortage. The City will continue to make these retrofit devices available for customers.

Table 7-3: Residential Plumbing Retrofit Implementation

	Actual					
	1992-2005	2006	2007	2008	2009	2010
# of showerheads distributed	4800	51	71	26	36	18
#of faucet aerators distributed	3300	143	166	25	83	60
Actual/projected expenditures ($)	$4,604.95	$199.32	$258.63	$74.31	$130.47	$75.78
Actual/Projected water saving (afy)	305	4.4	5.8	1.7	2.9	1.7

	Projected				
	2011	2012	2013	2014	2015
# of showerheads distributed	40	40	40	40	40
#of faucet aerators distributed	100	100	100	100	100
Actual/projected expenditures ($)	$150	$150	$150	$150	$150
Actual/Projected water saving (afy)	3.34	3.34	3.34	3.34	3.34

Implementation Schedule: Ongoing

7.1.3 Water System Audits

All leaks on the City's side of the meter are repaired. Customers are notified to make repairs when leaks are discovered on their side of the meter. The City follows up to make sure that necessary repairs are made by the customer. A leak detection survey was conducted in January 2007 on 40 miles of water mains. No leaks were found, therefore accounting for no losses. Due to the lack of leaks found or anticipated and the high cost, the City plans to conduct a water system audit using software provided by AWWA during the 2010-2015 period. Depending on future water system conditions, the physical audits may be reinstituted if needed.

Table 7-4: Water System Audits Program Implementation

	Actual				
	2006	2007	2008	2009	2010
% of unaccounted water	0	0	0	0	0
Miles of main surveyed	0	39.98	0	0	0
Miles of main repaired	0	0	0	0	0
Actual Expenditures	0	$7,235.84	0	0	0

Implementation Schedule: Will utilize software provided by AWWA, "Water Audit" to evaluate the system during the 2011 to 2015 period.

7.1.4 Metering and Commodity Rates

The City is fully metered for all customer classes, including separate meters for single family residential (except for Tarpey Village which is metered on gross consumption), commercial, industrial and schools. Multiple family customers are metered but not necessarily individually by living unit. Tarpey Village residential customers who are not individually metered are charged a flat rate which varies depending on the gross consumption of all of the unmetered customers. This has provided an incentive for individually unmetered customers to conserve water and has encouraged some of these customers to request meters. Since 2005, 121 unmetered Tarpey customers have requested the installation of a meter. There currently are 925 customers that are still individually unmetered. The City offers an incentive to these customers to have meters installed by charging them a discounted cost to have the meter installed and allowing the meter to be paid for over a two year period at no interest. The City has been offering this program since 1994. Since then the cost of the meter retrofits has greatly increased to the point that the City is only recovering 26% of the cost. In order to encourage customers to make the change to a meter sooner rather than later, it is proposed that the fee for the meter retrofit be increased annually on January 1 of each year by $100 until the full cost of the retrofit is reached.

The amount of water saved by installing meters at unmetered customers can be estimated by comparing the average consumption of the metered customers in Tarpey to the average consumption of the unmetered customers in Tarpey. The implementation of this demand reduction measure makes it easier to implement additional measures to reduce consumption in the future because the effects can be more easily determined with a meter.

For the City's individually metered residential customers, the City has an inclining block rate structure. There is a base charge which includes a minimum amount of water allowance. Consumption over the minimum allowance is billed per 1,000 gallons at a cost 1.9% higher than the minimum for consumption up to an average consumption

level. Consumption over the average consumption level and up to 200% of the average consumption rate is billed at a rate 25% higher than the average consumption level cost. In 2010 an additional tier was added for customers that use water greater than 200% of the average consumption level which is 50% higher than the average tier.

Metered customers other than residential also have a minimum charge which includes a minimum water allowance. All consumption over the minimum is billed per 1,000 gallons at a constant rate. Because commercial, industrial and school customers are so diverse in size and water needs, no average consumption level could be determined which would not be unfair to some customers, so there is no block rate higher than the cost to provide water to these customers.

Table 7-5: Metering and Commodity Rates Implementation

	Actual				
	2006	2007	2008	2009	2010
# of unmetered accounts*	1,020	1,015	997	980	925
# of retrofit meters installed	26	5	18	17	55
# of accounts without commodity rates	2	2	2	2	2
Actual Expenditures ($)	$23,400	$4,500	$16,200	$15,300	$49,500
Actual water savings (afy)	20.66	3.97	14.3	13.5	43.7
**Does not include non-revenue generating accounts or short-term construction water accounts.*					

	Projected				
	2011	2012	2013	2014	2015
# of unmetered accounts*	865	805	745	685	625
# of retrofit meters installed	60	60	60	60	60
# of accounts without commodity rates	2	2	2	2	2
Projected Expenditures ($)	$54,000	$54,000	$54,000	$54,000	$54,000
Projected water savings (afy)	17.22	17.22	17.22	17.22	17.22
**Does not include non-revenue generating accounts or short-term construction water accounts.*					

Implementation Schedule: The City will continue to install and read meters on all new services. The City will continue to retrofit existing services as requested by Tarpey Village residents.

7.1.5 Landscape and Irrigation Programs

Aside from City maintained landscape areas there are very few landscapes in the City which would qualify as large (currently 3 acres or greater). The City has 10 parks which are 3 acres or greater and a large trail system. The City has soil moisture sensing equipment installed at Gettysburg Park, San Gabriel Park and in Old Town landscape areas. This equipment senses the amount of moisture in the soil and then allows the controllers to turn on the valves when the moisture is low enough. The City also has installed a centralized sprinkler control system which allows irrigation systems to be operated centrally based on current weather data. In 2005, a weather station was added in Railroad Park so that the system will automatically adjust the sprinkler controllers based on current evapotranspiration rates. The system currently is operating at the Civic Center, Sierra Bicentennial Park, Letterman Park, Cottonwood Park, Railroad Park, Rotary Park, Helm Ranch Park, Thurburn Park, the Surface Water Treatment Plant, Water Reuse Facility, Stanford/El Paso Park, Basin 1E Park and Paso Tiempo Park. Future parks to be added to the system are Gettysburg Park, and San Gabriel Park. All new large landscape areas constructed will be added to the system as they are constructed. Including the new sites, there are a total of 198 controllers which are tied into the central irrigation system. The cost to add each site varies between $5,000 and $10,000. This program began in 2001. The magnitude of the effectiveness of this measure is difficult to quantify because of the variability in the weather year to year, however it is definitely effective by not irrigating during wet weather. This measure will reduce the ability of the City to have further reductions in the event of water shortages.

The City adopted a new water efficient landscape ordinance in 2010. It applies to most large landscape projects in the City and requires certification of landscape designs and installation (see Appendix D).

Landscape surveys are available to City water customers. The surveys include a measurement of the landscape area, a review of the irrigation system controller type, the current watering schedule, a review of the irrigation coverage, the amount of sprays, bubblers and drip. Customers are provided information on scheduling, water efficiency, plants, and assistance with setting controllers. Customers are provided with rain gauges to assist in determining how much to irrigate. New developments are advised during the planning phase for their projects that it is recommended they install separate water services for landscape irrigation and that certain landscapes of 2,500 square feet and over are required to have separate meters. This measure has been offered since 1997. The effectiveness of this measure can be determined for individual customers by comparing meter readings. This measure will reduce the ability of the City to have further reductions in the event of water shortages.

Table 7-6: Landscape and Irrigation Program Implementation

	Actual				
	2006	2007	2008	2009	2010
# of large landscape sites converted to central irrigation systems	2	0	2	0[1]	0
# of budgets developed[2]	2	3	0	7	3
# of surveys completed	2	3	0	7	3
# of follow-up visits	0	0	0	0	0
Actual Expenditures ($)	$9,192	0	$9,603	$1,634	0

1 Central system software upgraded.
2 Timers are set to the appropriate schedules.

	Projected				
	2011	2012	2013	2014	2015
# of large landscape sites converted to central irrigation systems	1	1	1	1	1
# of budgets to be developed	1	1	1	1	1
#of surveys to be completed	1	1	1	1	1
# of follow-up visits	0	0	0	0	0
Projected Expenditures ($)	$4,000	$4,000	$4,000	$4,000	$4,000

Implementation Schedule: Each year the City will add landscape areas to the central control system and newly constructed landscapes as they are completed. Surveys will continue to be offered to customers.

7.1.6 Washing Machine Rebate Program

The City currently operates a washing machine rebate program. The City provides a $50 rebate on washers that have a water factor (WF) of 4.5 or less, which correlates to 4.5 gallons of water used per cubic foot of capacity and a $35 rebate for those with a WF between 6 and 4.5. With standard washing machines using water in the range of 12.5 to 15.6 gallons per cubic foot of laundry it is clearly cost effective to provide a rebate for low water using washers. This measure will reduce the ability of the City to have further reductions in the event of water shortages.

Table 7-7: Washing Machine Rebate Program Implementation

	Actual				
	2006	2007	2008	2009	2010
Number of $75 Rebates	0	3	133	269	438
Number of $50 Rebates	0	3	27	30	209
Number of $35 Rebates	0	0	0	0	4
Actual Expenditures ($)	$0	$375	$11,325	$21,675	$43,440
Actual Water Savings (afy)	0	0.1	2.7	5.11	11.1

	Projected				
	2011	2012	2013	2014	2015
Number of $50/$35 Rebates	600	600	600	600	600
Projected Expenditures ($)	$30,000	$30,000	$30,000	$30,000	$30,000
Projected Water Savings (afy)	0.28	0.28	0.28	0.28	0.28

Implementation: Ongoing.

7.1.7 Public Information Program

The City promotes water conservation through its participation in the Central Valley Water Awareness Committee (CVWAC) and on its own. The City distributes public information through bill inserts, brochures, and booths or activities at special events. At these events the City has distributed leaflets, magnets, stickers, litter bags, pencils, pens, hose nozzles and rulers which all carry the water conservation message. The City has a City sponsored newspaper insert which is delivered to all of the City's customers three times annually. At least annually the City will use this forum to discuss water issues. Several of these articles discuss water conservation. Since 2004, the City's website has included a page which discusses water conservation and has a link to the Central Valley Water Awareness Committee's web site.

Beginning in 2008, the City began participating with the "Partners for a Clean Community". This group was organized by the Fresno Metropolitan Flood Control District to pool resources and deliver messages that are common to the members, which include the City of Clovis, the City of Fresno, Caltrans, and Fresno County. With this group the City has participated in the preparation of a children's activity book that educates them about water and other environmental issues. The City has also participated in funding media spots that promote water conservation.

The City has leased land, at no cost to a non-profit group, at one of its park sites for a botanical garden. The garden emphasizes native, low water using plants. Initially the garden was one acre in size but it is in the process of being expanded to approximately 6 acres. The City provides information regarding water conservation at various events the non-profit sponsors throughout the year.

The City has also joined the Central Valley Friendly Landscaping group; whose objective is to promote landscapes in the Central Valley that are appropriate for the area climate and don't require a lot of irrigation. Efforts have included producing a brochure and conducting a contest for Central Valley Friendly Landscaping projects.

City water bills show each customer's current usage and also show last year's consumption so that they can compare their usage.

Some of these measures have been in effect since 1990. The effectiveness of these measures can be determined based on overall per capita water use however since many measures have been simultaneously implemented, it is impossible to determine how much can be attributed to this specific measure. This measure will reduce the ability of the City to have further reductions in the event of water shortages.

Table 7-8: Public Information Program Implementation

	Actual				
	2006	2007	2008	2009	2010
Bill inserts/newsletters sent	24,988	25,784	26,418	26,932	27,696
Clovis Magazines/Newspapers sent		26,000		58,000	
Bills showing water usage comparison	Yes	Yes	Yes	Yes	Yes
Media Buy					$2,000
Demonstration garden acres	1.1	1.1	1.1	1.1	1.1
Special Events	5	6	10	11	5
Participation in CVWAC	Yes	Yes	Yes	Yes	Yes
Participation in Partners for a Clean Community		Yes	Yes	Yes	Yes
Participation in Central Valley Friendly Landscaping				Yes	Yes
Website Information	Yes	Yes	Yes	Yes	Yes
Actual expenditures ($)	$13,720	$13,720	$10,654	$4,078	$2,000

	Projected				
	2011	2012	2013	2014	2015
Bill inserts/newsletters sent	28,519	29,342	30,164	30,987	31,810
Clovis Magazines/Newspapers sent	60,000	60,000	60,000	60,000	60,000
Bills showing water usage comparison	Yes	Yes	Yes	Yes	Yes
Media buy	$2,000	$2,000	$2,000	$2,000	$2,000
Demonstration garden acres	3.5	3.5	3.5	3.5	3.5
Special Events	5	5	5	5	5
Participation in CVWAC	Yes	Yes	Yes	Yes	Yes
Participation in Partners for a Clean Community	Yes	Yes	Yes	Yes	Yes
Participation in Central Valley Friendly Landscaping	Yes	Yes	Yes	Yes	Yes
Website Information	Yes	Yes	Yes	Yes	Yes
Actual/Projected expenditures ($)	$5,000	$5,000	$5,000	$5,000	$5,000

Implementation Schedule: The City will continue to provide public information to remind the public about water issues, as detailed above.

7.1.8 School Education Program

The City has participated in many activities which promote water conservation and awareness to school children. Along with the CVWAC, the City has sponsored activities such as tours of water facilities for school groups, teacher training workshops, science fair awards for water related projects and water awareness contests. In 2005, the City created a PowerPoint presentation that is used during tours of the Surface Water Treatment Plant to educate children about water. Additionally the City is building an aquaponics demonstration project which will be used during these tours to educate children about the water cycle.

This measure cannot be evaluated for effectiveness specifically, however on a long term basis it can reduce future consumption as children mature and make water use decisions in their own homes. This measure will eventually affect the ability to further reduce demands assuming that children implement what they are taught. Having an educated future consumer should make it easier to implement other demand reduction methods in the future. Children can also be effective at influencing and changing their parents' behavior.

Table 7-9: School Education Program Implementation

# of Class Presentations	Actual				
	2006	2007	2008	2009	2010
Grades K-3	0	0	0	0	0
Grades 4-6	0	7	3	0	1
Grades 7-8	0	0	0	1	0
High School	0	0	0	1	0
College	0	0	0	2	1

	Projected				
	2011	2012	2013	2014	2015
Grades K-3	0	0	0	0	0
Grades 4-6	2	2	2	2	2
Grades 7-8	0	0	0	0	0
High School/College	1	1	1	1	1

Implementation Schedule: The City will continue to provide this program in the manner described above.

7.1.9 Commercial, Industrial, and Institutional Conservation Programs

Commercial, industrial and institutional customers are treated the same as residential customers. As a result, any demand reduction measures which are available and marketed to residential customers are also available for commercial, industrial and institutional customers. For example surveys, plumbing retrofits, toilet replacements and public information programs are equally available to these customers and have not been tracked separately. All commercial and industrial projects are reviewed by the City for conformance with the City's water efficient landscape ordinance. Separate water meters are always either recommended or required depending on the size of landscape areas at commercial, industrial and institutional sites. The effectiveness of these measures can be determined based on per account water use however because there are many measures which have been implemented it is impossible to determine how much can be attributed to this specific measure. This measure will reduce the ability of the City to have further reductions in the event of water shortages.

Table 7-10: CII Conservation Program Implementation

	Actual				
	2006	2007	2008	2009	2010
# of surveys completed	0	0	0	1	0
Incentives provided?				No	
# of follow-up visits				0	
Actual expenditures ($)				$160	

	Planned				
	2011	2012	2013	2014	2015
# of surveys to be completed	1	1	1	1	1
Incentives to be provided?	No	No	No	No	No
# of follow-up visits	0	0	0	0	0
Projected expenditures ($)	$160	$160	$160	$160	$160

Implementation Schedule: The City will continue to provide this program in the manner described above.

7.1.10 Wholesale Agency Programs

DMM10 applies to wholesale agencies. Because, the City is not a wholesale agency, this DMM does not apply.

7.1.11 Conservation Pricing

As described under “Metering with Commodity Rates”, the City of Clovis has an inclining block rate structure for metered residential water customers and a uniform rate structure for commercial, industrial, institutional, and irrigation water customers. All water customers have a minimum billing which allows the customer 5,000 gallons of water per month. Because the agreement with Tarpey Village (former Waterworks District 8) precludes the City from requiring individual water meters in the Tarpey Village area, another approach was used to provide a water conservation incentive for these customers. A rate structure was set up where the unmetered customers are charged a flat rate when their total consumption, divided by the total number of unmetered customers, is equal to or less than the year round average consumption. In billing periods where the average unmetered consumption is greater than the year round average, every unmetered customer is charged an excess consumption charge. That

charge is based on every 1,000 gallons over the average and is charged at a rate that is higher than the base flat rate's equivalent per 1,000 gallon charge.

The City provides sewer service. Sewer rates for residential customers are currently flat. Commercial and industrial customers, for the most part are charged a uniform rate based on water consumption with a minimum monthly charge. Industrial customers are billed a metered rate either on water consumption or actual sewage effluent and certain high strength customers are billed based on sewage strength also.

The current rate structures were adopted in 2009 and 2010, but a similar rate structure has been in effect since 1991. This rate structure is very effective in reducing demand. This is apparent when the per capita consumption of Clovis customers is compared to customers in nearby communities that have water rates based on lot size. It is estimated that overall demands are reduced by approximately 25%. It does however limit the ability of the City to further reduce demands.

7.1.12 Water Conservation Coordinator

The City added a full time staff person in November 2000 to act as the water conservation coordinator for the City. The position is filled by a Junior Engineer who now has been in the position for 10 years. Approximately 30% of his time is spent on water conservation activities. This has resulted in increased effectiveness of the water conservation program. It in itself does not affect water consumed but allows the individual measures to be implemented. It does not affect the ability to further reduce demand.

Table 7-11: Water Conservation Coordinator Program Implementation

	Actual				
	2006	2007	2008	2009	2010
# of full-time positions	1	1	1	1	1
Actual expenditures ($)	$29,645	$29,645	$29,645	$29,645	$29,645

	Planned				
	2011	2012	2013	2014	2015
# of full-time positions	1	1	1	1	1
Projected expenditures ($)	$29,645	$29,942	$30,541	$31,151	$31,774

Implementation Schedule: Ongoing.

7.1.13 Water Waste Prohibition

The City established a water waste prohibition ordinance in 1983 and actively enforces it. In 1991, the City adopted an ordinance which levies fines and penalties for noncompliance with the City's water conservation program or water wastage. The penalties include flow restrictors, termination of water service for exterior use or complete termination of water service. The City routinely patrols the City looking for violators during the summer months and also responds to complaints and issues citations when violations are noticed by City employees. Another staff person was hired in April 2003 to assist with the water patrolling. See in Appendix D for copies of the ordinance. For all customers including single family customers, the City currently restricts outside water use to three days a week. This has been a part of the City's water conservation program since 1987 and has been mandatory since 1991. Water softeners are not included in the ordinance currently.

Compliance with the rules is generally good indicating that the program is effective. This measure does reduce the ability to further reduce demands in the future.

Table 7-12: Water Waste Prohibition Program Implementation

	Actual				
	2006	2007	2008	2009	2010
Waste Ordinance in effect	Yes	Yes	Yes	Yes	Yes
# of citations issued	639	590	1,517	1,049	633
Actual expenditures ($)	$36,523	$30,047	$31,550	$33,130	$34,784

	Planned				
	2011	2012	2013	2014	2015
Waste Ordinance in effect	Yes	Yes	Yes	Yes	Yes
Projected # of citations to be issued	600	600	600	600	600
Projected expenditures ($)	$36,523	$36,888	$37,626	$38,379	$39,146

Implementation Schedule: The City has permanently incorporated this program into its ordinances.

7.1.14 Ultra-Low Flush Toilet Replacement

The City offers a rebate program for toilet replacement with ultra-low flush toilets (ULF). A rebate or account credit of up to $75 is made to customers who replace old higher flow toilets with new ultra-low flow models. Since beginning this program in 1997, 479 toilets have been replaced. This equates to a water savings of approximately 18.2 af per year assuming 10 flushes per day per toilet replaced with 3.4 gallons per flush savings. With the new standard of toilets using 1.28 gallons per flush, the savings from 5 gallon per flush toilets is 3.72 gallons per flush. If the incentive is applied to 3.5 gallon per flush toilets the savings are 2.22 gallons per flush. This measure will reduce the ability of the City to further reduce demands in the future.

Table 7-13: Ultra-Low Flush Toilet Replacement Program

	Actual				
	2006	2007	2008	2009	2010
# of ULF rebates	51	30	58	54	83
Actual expenditures ($)	$3,811	$2,250	$4,425	$4,050	$6,198
Actual water savings (afy)	1.94	1.14	2.21	2.06	3.16

	Planned				
	2011	2012	2013	2014	2015
# of ULF rebates	80	80	80	80	80
Projected expenditures ($)	$6,000	$6,000	$6,000	$6,000	$6,000
Projected water savings (afy)	2.0	2.0	2.0	2.0	2.0

Implementation Schedule: The City will continue to provide this program as detailed above.

8 CLIMATE CHANGE

8.1 UWMP Requirement

The UWMP Guidebook does not require a section on Climate Change but suggests it be included for a more complete representation of the water situation, as water supply and demand are related to the climate change phenomena.

8.2 Introduction

California currently enjoys a Mediterranean climate, which is not expected to change with climate change projections in the future. The climate consists of cool, wet winters and hot, dry summers typically.

Increases in global greenhouse gas levels are changing climate patterns around the world and, it is speculated, may begin to change at an accelerated pace from what has occurred in the past. This accelerated rate of change could result in impacts to the local climate of the City in the form of higher temperatures, increased droughts and floods, decrease snow pack amounts and durations and other extreme variations in weather patterns. As the UWMP projects until 2035, these changes could be expected to manifest themselves over that period. The climate variations could affect the availability and volume of water resources.

8.3 Potential Impacts

In the past, the amount of rainfall has been fairly consistent, with periods of drought and periods of excess precipitation spaced relatively far apart. With climate change, the rainfall levels could begin to vary more from year to year, incurring droughts followed by excesses with less time between them. Typically, climate change predicts a decrease in average rainfall for the area, while temperatures are expected to increase. However, increased temperatures could intensify the El Nino Southern Oscillation cycle (ENSO), possibly resulting in very wet, wet years and drought level dry years.

For areas that rely on surface water deliveries, as the City of Clovis does, this weather pattern change could mean less dependable surface water deliveries, as the snow pack diminishes in some years. Increasing temperatures could start the snow pack spring melting period earlier and at an increased rate, which will increase the need for capacity in storage facilities and open channel conveyance facilities (i.e. canals). The increased melting rate could also lead to extensive flooding in lower lying areas due to lack of storage infrastructure.

8.4 Mitigation and Adaptation

To respond to the climate change predictions, the City's response must be two-fold: mitigation and adaptation. Mitigation consists of reducing the amount of greenhouse gas emissions. Adaptation is the process of modifying behaviors in response to the warming climate and related changes.

In relation to water management, emission reduction can be achieved by reducing the amount of water usage, thereby decreasing the energy used to move, treat, and discharge water supplies. As the City implements the DMMs discussed above, their usage will decrease and by association so will their energy use. DMMs that conserve water but utilize excess energy supplies to do so will need to be considered seriously to determine if they are desirable.

Adaptation is generally considered a local principle and, as such, must be contemplated in a very specific manner for each area. Adaptation can consist of more extensive master planning, enhanced management and storage of surface water supplies, increased usage of recycled water, and investment in infrastructure to support the previously stated measures.

9 COMPLETED UWMP CHECKLIST

No.	UWMP requirement [a]	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)		Section 2 Appendix B
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)		Section 2 Appendix B
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)		Appendix A
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)		Section 2 Appendix B
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		Section 2 Appendix B
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		Section 2 Appendix B
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		Appendix A
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		Section 7

No.	UWMP requirement [a]	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)		Section 2 Appendix A
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		Section 2 Appendix B
SYSTEM DESCRIPTION				
8	Describe the water supplier service area.	10631(a)		Section 3
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		Section 3
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.	Section 3
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.	Section 3
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		Section 3
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)		Section 4
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	Section 2
3	Report progress in meeting urban water use targets using the standardized form.	10608.40		N/A until 2015

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
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.	Section 4
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)		Section 4
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.	Section 5
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.	Section 5
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)		Section 5
16	Describe the groundwater basin.	10631(b)(2)		Section 5

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		Section 5
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)		Section 5
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)		Section 5
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.	Section 5
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		Section 5
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)		Sections 4, 5 and 6
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		Section 5
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		Section 5
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)		Section 5

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
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)		Section 5
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)		Section 5
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)		Section 5
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)		Section 5
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)		Section 5
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)		Section 5
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING [b]				
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		Sections 5, 6 and 7
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)		Section 6
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)		Section 6
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)		Section 6

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
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)		Section 6
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)		Section 6
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)		Section 6
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)		Section 6
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		Section 6
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)		Section 6
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		Section 6 Appendix D
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		Section 6
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	Section 6
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)		Section 6

No.	UWMP requirement [a]	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.	Section 7
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		Section 7
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)		Section 7
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.	Not Applicable
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)		Not Applicable

10 BIBLIOGRAPHY/REFERENCES

Fresno-Regional Ground Water Management Plan, December 2005, Provost and Pritchard Engineering Group

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Local Government Commission

Danielle Dolan <ddolan@lgc.org>

kWh per HCF Data for DWR Grant

Joseph Oldham <joldham@lgc.org> Wed, Dec 10, 2014 at 1:16 PM
To: Danielle Dolan <ddolan@lgc.org>

Here is an email from Reedley that explains their method for calculating the kWh per AF for water delivered. I am making reference to this email in my explanation for how we calculated the savings, so we should include it in the packet.

Joseph
---------- Forwarded message ----------
From: **Robertson, Russ** <Russ.Robertson@reedley.ca.gov>
Date: Wed, Dec 3, 2014 at 4:11 PM
Subject: RE: kWh per HCF Data for DWR Grant
To: Joseph Oldham <joldham@lgc.org>
Cc: "Ornellas, John" <John.Ornellas@reedley.ca.gov>

Hi Joseph,

The energy required to lift on-acre foot of water (325,851 gallons) one foot is 2,719,226 ft-lbs.

A kilowatt hour = 2,655,220 ft. lbs. so 2,719,226/2,655,220 equals 1.02 kWh per one foot of elevation pumped. Our newer wells are approx. 700' deep so I am figuring that it takes about 714 kWh to provide one acre ft. of water to our customers.

Russ Robertson

Director of Public Works

City of Reedley

1733 Ninth St.

Reedley, Ca. 93654

(559)637-4200 x213

From: Joseph Oldham [mailto:joldham@lgc.org]
Sent: Wednesday, December 03, 2014 8:35 AM
To: Robertson, Russ

Subject: Re: kWh per HCF Data for DWR Grant

Thanks Russ. I will be looking forward to getting the info.

Joseph

On Wed, Dec 3, 2014 at 8:19 AM, Robertson, Russ <Russ.Robertson@reedley.ca.gov> wrote:

> Harder than we thought to come up with an accurate number on this. I will have something to you by the end of the day.
>
> Thanks
>
> *Russ Robertson*
>
> **Director of Public Works**
>
> **City of Reedley**
>
> **1733 Ninth St.**
>
> **Reedley, Ca. 93654**
>
> **(559)637-4200 x213**
>
> **From:** Joseph Oldham [mailto:joldham@lgc.org]
> **Sent:** Tuesday, December 02, 2014 3:22 PM
> **To:** Robertson, Russ
> **Cc:** Danielle Dolan
> **Subject:** kWh per HCF Data for DWR Grant
>
> [Quoted text hidden]

Spam
Not spam
Forget previous vote

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Joseph Oldham

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Ph #: (559)797-6034

Email: joldham@lgc.org

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Sustainable Landscape

The Numbers Speak for Themselves

Case Study: garden\garden, Santa Monica, California

garden\garden
a comparison of native and traditional gardens in Santa Monica

Type of Project: Adjacent bungalows used as office buildings for Santa Monica College
Objective: compare sustainable and traditional landscaping practices
Size of Project: two front yards approximately 1,900 square feet each
Location: 1718 and 1724 Pearl St., Santa Monica, CA 90405
Total Budget: $29,100
Project Date: March 2004 – March 2013

Project Summary

The initial challenge was to persuade homeowners and landscape professionals that sustainable landscaping, with climate-appropriate plantings and efficient water use, was not only better for the environment than traditional landscaping with exotic plants and inefficient water use, but was just as attractive and made good economic sense. To prove its case, the City of Santa Monica partnered with Santa Monica College and the Metropolitan Water District of Southern California to create **garden\garden**—two gardens in adjacent residential front yards: the *Native Garden* with a climate-appropriate, sustainable design; and the *Traditional Garden* with high-water use plants and inefficient irrigation. The side-by-side landscape comparison provided a unique introduction to the proven benefits of sustainable landscaping practices.

Since 2004, the City has been collecting data on the amount of water used, green waste generated, and maintenance hours for both gardens. The data shows that the sustainable landscaping principles demonstrated in the *Native Garden,* are cost-effective, environmentally beneficial, and easy to replicate. On average the *Native Garden* uses **83% less water**; generates **56% less green waste** and requires **68% less maintenance** than the *Traditional Garden*.

garden\garden has served as a learning laboratory and working example for the local and regional communities. More than 200 local residents have transformed their gardens into sustainable landscapes by participating in the City's Sustainable Landscape Grant and Rebate programs. More than 200 landscape professionals have attended City sponsored workshops that feature the lessons **garden\garden** has to offer. There is still much work to do to transform the landscaping industry, but this study points to results - undeniable results - that should influence homeowners and professionals alike.

Native (Sustainable) Garden
1724 Pearl St., Santa Monica, CA

Traditional Garden
1718 Pearl St., Santa Monica, CA

Project History

Although, the City had for many years provided seminars and tours of local sustainable landscapes, and installed a large demonstration garden at City Hall, most residents were not moved to alter their landscaping practices. Similarly, members of the landscaping community were still inclined to recommend and install the traditional landscapes with which they were most familiar, e.g. lawn with sprinklers.

The concept of a comparison garden, it was thought, would help homeowners and professionals make the connections, demystify complex concepts and provide a viewable template for any residential property in the region.

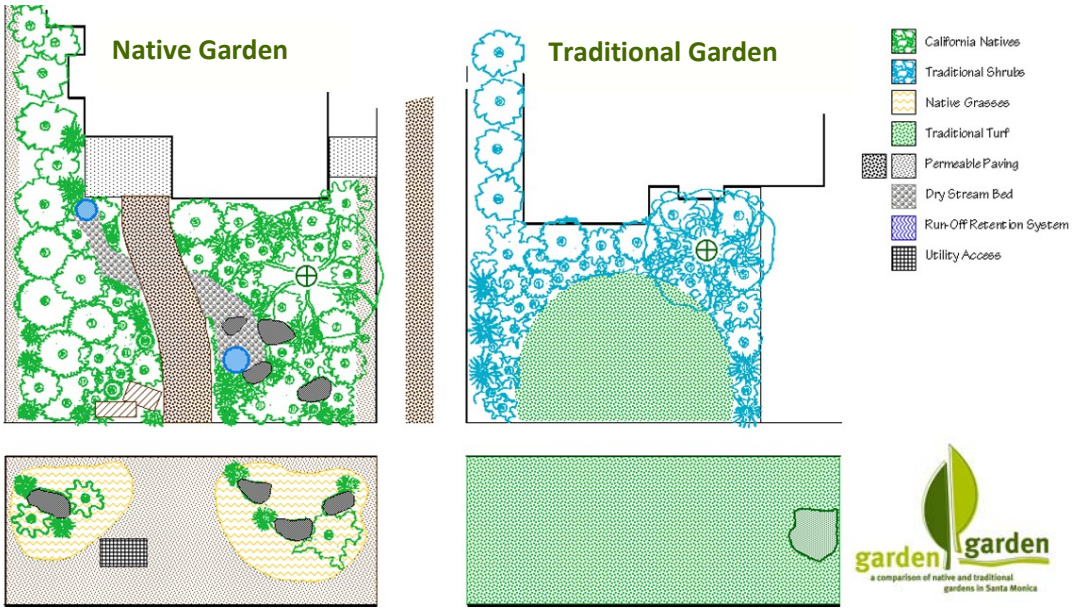
Project Site Information

Santa Monica's climate is coastal Mediterranean and is dominated by the Pacific Ocean. Average daily temperatures are mild and morning fog is common with daily on shore afternoon winds. The air tends to be salt-laden, and the average annual rainfall is 14 inches. The soils are commonly alkaline and sandy in texture.

garden\garden is located in an urban residential neighborhood in front yards of two adjacent bungalows, which house offices for Santa Monica College. Each front yard is approximately 1,900 square feet. In both gardens, the soil type is sandy loam (moderate permeability), poor in organic matter, and

highly compacted from decades of lawn. Tests also indicated high alkalinity and high levels of toxic metals, including zinc and copper.

The existing landscape, for both properties, was completely removed to create an identical base condition for study, with all waste exported for recycling. Soil amendments were applied as appropriate for the respective plant material.



The intent was to bring the soil to a basic level of balance, facilitating a long-term development of healthy soil life and increased plant health. As public garden sites, both gardens also are exposed to high foot and vehicular traf- traffic and the resulting air pollution.

Construction Costs

Total cost of *Native Garden*: $16,700
Total cost of *Traditional Garden:* $12,400

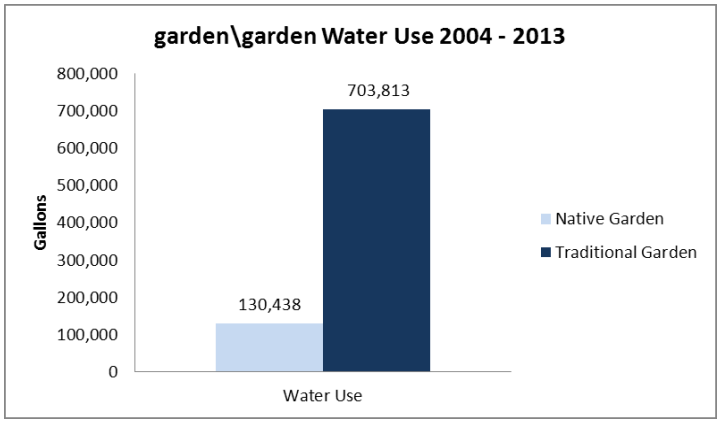
The Native Garden's costs were slightly higher due to: 1) the existing concrete walkway was removed and replaced with a permeable handicap accessible walkway, and 2) rain gutters were installed to direct rainwater into the landscape.

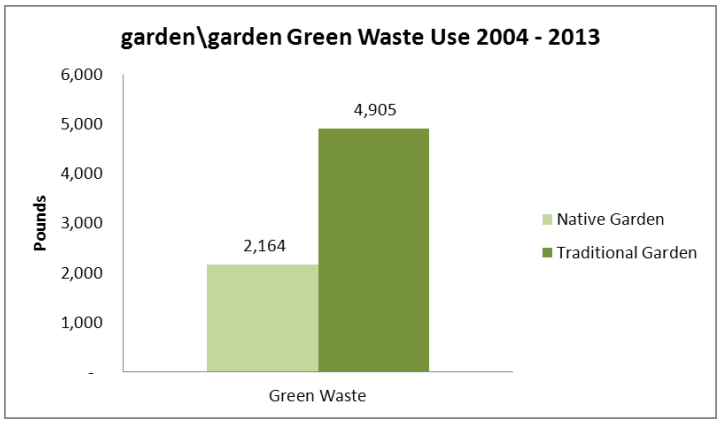
Maintenance

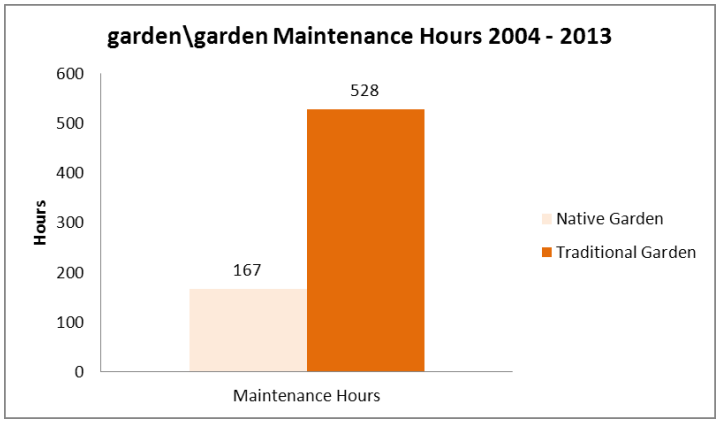
When the installing contractor's 90-day maintenance period expired, a landscape maintenance company was hired to maintain both landscapes. In the first year, both gardens were visited weekly. The company was asked to keep separate records of material costs, labor hours, and green waste production for each garden and to report that data monthly.

In the *Native Garden* after a 12-month establishment period, the garden received a yearly pruning and once per-month maintenance. The drip irrigation system was checked at each visit. Mulch was replaced as needed.

In the *Traditional Garden*, the exotic plants required more water, fertilizers, and pest management. Lawn areas were mowed and edged weekly. Annual plants were replaced two to three times a year. Occasional treatments were required for diseases and insect at-attacks. The sprinklers were checked bi-monthly.







Traditional Garden Landscape Practices

- *No chemical herbicides or insecticides (per Santa Monica City policy) but occasional use of blood meal*
- *Commonly used exotic plants from Northern Europe and the Eastern United States*
- *95% of landscaped area is lawn*
- *Standard inefficient sprinkler irrigation system in the lawn and parkway; sub-surface drip used to limit irrigation runoff from the lawn edges bordering the street and sidewalks*
- *Standard automatic sprinkler timer*
- *Weekly maintenance schedule*

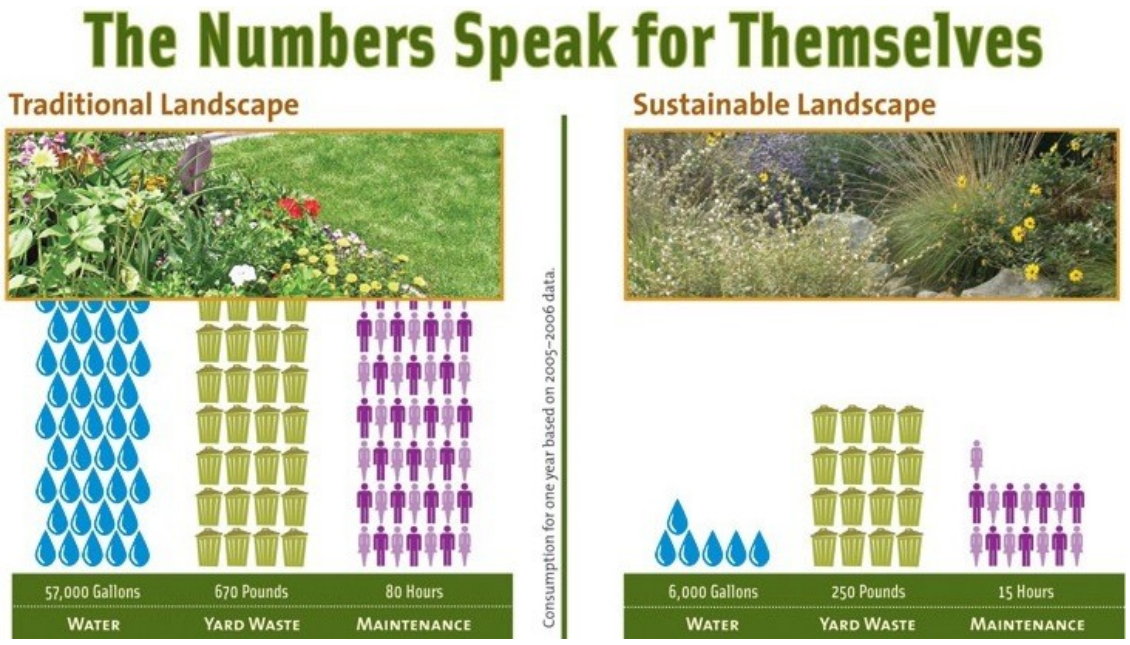
Native Garden Landscape Practices

- *No chemical herbicides or insecticides (per Santa Monica City policy)*
- *Native California plant palette with colorful blooms throughout the year designed to replicate the chaparral of the Santa Monica mountain*
- *Weather-based irrigation controller w/ low-volume drip irrigation*
- *Dry creek bed and infiltration pit for infiltrating rainwater into the ground*
- *Wildlife habitat for local and migratory fauna*

Lessons Learned

Landscaping that follows the principles demonstrated in the *Native Garden* are cost-effective, environmentally beneficial, and easy to replicate. When properly designed and installed, these landscapes need minimal maintenance. The successful practices put into place in the *Native Garden* were the foundation for the City's adoption of local landscape and irrigation standards.

In order for sustainable landscaping to become the predominate style of landscaping, the landscape industry must take ownership of it. Much outreach is needed in this industry from educating landscapers on design, installation and maintenance to stocking efficient irrigation parts and climate-appropriate plants in stores. One city cannot do this alone; regional and state collaboration is required for the successful transformation to sustainable landscaping.



More project details: sustainablesm.org/gardengarden

Project Team:

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Irrigation Designer
Bob Galbreath, City of Santa Monica

Landscape Contractor
Live Art Landscapes

Maintenance Contractors
Form LA Landscapes
RK Landscapes

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A Sustainable Community
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City of Santa Monica