APPENDIX A

Non-Fresno Water Demands by WRIME

APPENDIX A. "NON-FRESNO" WATER DEMANDS

The purpose of this section is to summarize the land use, cropping patterns, and associated water demands for the area outside of the City of Fresno that was collected and processed for the General Plan area and Sphere of Influence to estimate "non-Fresno" demands. The following is presented in this section:

- Water service area outside of the City of Fresno defined;
- 2005 Baseline Water Demand;
- Per Capita Based Water Demand Projections;
- Land Use Based Water Demand Projections;
- Baseline and Projected Water Demand Summary; and
- Baseline and Projected Water Supply Summary.

The City of Fresno provided maps and the assumed timing for when "non-Fresno" lands were to be annexed to the City over the course of the planning horizon. Where detailed land use and water supply data were not readily available, the analysis was simplified by using population projections from the Department of Finance to estimate urban demands. Agricultural cropping patterns and demands were assumed to remain constant in the future, except in those instances were agricultural lands were converted to urban use based on the approved General and Specific Plans and associated land use maps.

WATER SERVICE AREA OUTSIDE OF THE CITY OF FRESNO

The non-Fresno area is defined as follows:

- The areas within the City of Fresno Sphere of Influence not being served by the City which include Pinedale, Bakman, and California State University Fresno (CSUF);
- The area within the City of Fresno General Plan boundaries outside of the current Sphere of Influence, referred to as the General Plan Growth Fringe which includes Malaga; and
- City of Clovis located northeast of the City of Fresno. The Sphere of Influence for City of Clovis encompasses 12,761 acres with a population of 86,015. Within the sphere of influence is a small water system, which serves an unincorporated county island, called Tarpey Village. The unincorporated area has a population of 3,957 and is almost entirely single family residential with a small commercial area. City of Clovis has provided water to the Tarpey Village since 1989.

The community of Pinedale is served by Pinedale County Water District and in part by City of Fresno. Pinedale County Water District is located in the northern area of City of Fresno near Highway 41 and Herndon Avenue. The district encompasses approximately 1,270 acres and serves a population of 8,495. The zoning in the district is primarily commercial. The commercial development near Herndon and Highway 41 is being served by City of Fresno and is not reflected in the total water supplied by Pinedale County Water District.

Bakman Water Company is located within City of Fresno Sphere of Influence in the southeast region near the Fresno Yosemite Airport. The district encompasses approximately 1,920 acres and serves a population of 8,500.

The campus of CSUF is located on Shaw Avenue and Maple Avenue in the northeast region of City of Fresno. The campus encompasses 1,289 acres and serves a "permanent" population of approximately 22,000.

The General Plan Growth Fringe is south east of City of Fresno Sphere of Influence and inside the City's General Plan boundary. The area encompasses nearly 37,000 acres and serves a population of 5,720, not including Malaga. The community of Malaga is served by Malaga County Water District and is located south of Fresno east of Highway 99 near Central Avenue. Malaga County Water District encompasses 2,084 acres and serves a population of approximately 900 and is entirely within the General Plan Growth Fringe.

2005 BASELINE CONDITIONS

The purpose of this section is to summarize the 2005 baseline conditions of annual water demand and supply for the areas previously described. Water production and use records were collected from the individual agencies, when available. Additional sources of information included the Department of Health Services (DHS) Drinking Water Program Annual Report and the Department of Water Resources (DWR). The City of Clovis was the only agency which had water planning documents available. The information found in the City of Clovis' 2005 Urban Water Management Plan (UWMP) and 1999 General Plan was used to produce the baseline and projected data. The 2005 annual water demand reported in the UWMP for the City of Clovis is 24,991 acre-feet (AF). The annual demand includes estimated total water consumption for the month of December. The value report in the UWMP is assumed to be reasonably accurate and will be used for consistency with the planning documents.

The remaining areas contributing to the non-Fresno water demand do not have planning documents or reference materials that could be to establish a change in water demand or supplies. These areas are solely on groundwater and are assumed to use all of the water pumped. Table A-1 is a summary of 2005 baseline conditions for the non-Fresno area.

Table A-1. 2005 Baseline Summary

Non-Fresno 2005 Baseline	Demand (AF)	Supply (AF)	Population	Area (Acres)
Clovis[1]	24,991	44,333	89,972	12,762
Pinedale	2,915	2,915	8,495	1,270
Bakman[5]	3,828	3,828	8,500	1,633
CSUF	1,007	1,007	22,000	1,289
General Plan Growth Fringe[2, 4]	101,236	101,236	5,720	36,986
Malaga[3]	1,765	1,765	900	2,084
Total	135,742	155,084	135,587	56,024

1. Clovis UWMP 2005; service area population includes Tarpey Village
2. Within General Plan 2060 area outside the City of Fresno SOI.
3. Malaga is within General Plan Growth Fringe.
4. Water Demand and Supply based on land use water duty.
5. Information provided by Shelly Marsh, Bakman Water Company.

PER CAPITA BASED WATER DEMAND PROJECTIONS

The purpose of this section is to project water demands to 2060 for the non-Fresno area on a per capita water use. The urban water demand estimates are calculated by multiplying the per capita water use data by the population.

Population

The population for the urban areas was collected from the individual agencies to remain consistent with existing UWMP and information reported by the California Department of Health Services Drinking Water Program and to the Department of Finance Demographic, Economic and Financial Research. For the area not being served by an agency, namely the General Plan Growth Fringe, the population was estimated using the 2000 U.S. Census tract data using Geographic Information System. Table A-2 presents the 2005 baseline and projected population for the non-Fresno area.

Table A-2. 2005 Baseline and Projected Population

Population	2005	2010	2025	2030	2060
Clovis[1]	89,972	103,189	153,382	173,018	322,748
Pinedale[2,3]	8,495	8,495	8,495	8,495	8,495
Bakman[2,3]	8,500	8,500	8,500	8,500	8,500
CSU Fresno[2,3]	22,000	22,000	22,000	22,000	22,000
General Plan Growth Fringe[2,4]	5,720	5,720	5,720	6,284	11,053
Malaga[3]	900	900	900	900	900
Total	135,587	148,804	198,997	219,197	373,696

1. City of Clovis population projection beyond Clovis 2005 UWMP 2030 (173,018) was assumed to increase 2.1% annually.
2. Population is assumed to be constant due to lack of data.
3. Population as reported to Department of Health Services Drinking Water Program
4. Population growth rate assumed to be 1.9% beyond 2025

The population growth in the City of Clovis between 2005 and 2010 is expected to average 2.9 percent annually and 2.5 percent thereafter through 2030. The 2030 population projection of 173,018 is reported in the City of Clovis 2005 UWMP. The population projections beyond 2030 for the City of Clovis are not available and were forecasted assuming a 2.1 percent growth rate. The Tarpey Village area is assumed to have a stagnant population because it is built out.

The area within Pinedale is approximately 17 percent vacant and is zoned for commercial use. The operations manager believes that there will not be an increase in residential development within the district and a decrease of permanent population may occurs due to land use rezoning from residential to commercial. The increase in commercial water demand without an increase in population will reflect an increase in the per capita water use.

There was no projection data or assumptions from the Bakman Water District and it is assumed that the population and water use will remain constant.

The "permanent" population is the current population enrolled on campus, including those residing in on- and off-campus housing. The enrolled or population is assumed to remain constant for the projected timeline.

The area and the population of the General Plan Growth Fringe encompass the Malaga County Water District boundaries. Malaga reported population of 900 served on the DHS annual report. The Growth Fringe population data was estimated using Census tract information. The population change in Growth Fringe from 2000 to 2004 was 6,507 to 6,620, an annual increase of 0.03 percent. The growth in population will likely increase when the City of Fresno reaches its buildout horizon. The population is assumed to remain constant until 2030 (buildout) then increase at the same rate of the City of Fresno at 1.9 percent annually.

Water Use Per Capita

The water use per capita may include all uses, including residential, commercial, industrial, schools and governmental. When the area has a higher concentration of industrial use the per capita use is disproportionately high. The water use per capita may be categorized by residential only classification if the water delivered is metered. Table A-3 presents the estimated water use per capita based on baseline demand and population for the non-Fresno area. Assuming the change in population and the land use remain proportionately the same, the water use per capita is as follows:

Table A-3. Water Use Per Capita

Water Use per Capita	Demand (AF)	Population	AF per Capita	Gallons per Capita daily (gpcd)
Clovis	24,991	89,972	0.278	248
Pinedale	2,915	8,495	0.343	306
Bakman	3,828	8,500	0.450	402
CSUF	1,007	22,000	0.046	41
General Plan Growth Fringe	N/A	5,720	N/A	N/A
Malaga	1,765	900	1.961	1,751

As noted previously, the water use per capita for Malaga gives a distorted view of the water use within the area, although technically correct, makes it difficult for comparative analysis. Also, the area of CSUF with a relatively low demand compared to its "permanent" population.

Projected water demand estimates using population are not consistent since population projections are not readily available for all the individual agencies. The water use per capita will be used to estimate the projected 2060 water demand for the City of Clovis. The 2060 water demand for the City of Clovis is calculated to be 89,648 AF.

LAND USE BASED WATER DEMAND PROJECTIONS

This section provides an estimate of the baseline water demand for the General Plan Growth Fringe using land use and related water duties. Table A-4 presents the average water duty by land use classifications derived from the Clovis UWMP 2005 and the Analysis of Water Demand in Kings Basin 2006.

Table A-4. Water Duty by Land Use Classification

Land Use	Water Duty (Acre-Feet/Acre)
Urban[1]	
Rural Residential	3.1
SF Residential	2.1
MF Residential	3.4-5.1
Commercial	1.8
Institutional	2.8
Agricultural	
Citrus and Subtropical	3.5
Deciduous Fruit and Nut	4
Field Crops	2.5
Grain	1.5
Idle	0
Pasture and Alfalfa	5.1
Truck, Nursery and Berry	1.8
Vineyards	2.3
Semi Ag and Incidental to Ag	1

1. Urban water duties compiled from Clovis UWMP 2005.

The land use maps can were used to determine future water demands. The land use survey maps collected from the DWR summarize the total acreage of urban and agricultural land use. The urban areas are divided by land use classifications which include: Urban, Urban Residential, Urban Commercial, Urban Industrial, Urban Landscaped, and Urban Vacant. The general urban class was used when further breakdown of land use classification is not necessary or information is not readily available. It was assumed that the general urban classification also indicates residential land use. The agricultural land use classifications include: Citrus and Subtropical; Deciduous Fruit and Nut; Field Crops; Grain, Pasture and Alfalfa; Truck; Nursery and Berry; Vineyards; Semi Ag and Incidental to Ag.

The land use water duties were used to calculate the water demand for the 2005 baseline of the General Plan Growth Fringe area. The water demand was estimated to be 101,236 AF. Table A-5 presents the 2005 baseline water demands for the General Plan Growth Fringe area.

Table A-5. General Plan Growth Fringe Area Water Demand

2005 Land Use General Plan Growth Fringe	Water Duty (AFY/AC)	Area (Acres)	Demand (AF)
Residential (average)	3.0	910	2,730
Commercial/Industrial	1.8	1,616	2,909
Landscaped	2.8	300	840
Vacant	0.0	141	0
Citrus	3.5	1,677	5,870
Deciduous	4.0	7,048	28,192
Field	2.5	3,818	9,545
Grains & Pastures	5.1	2,489	12,694
Idle	0.0	134	0
Native	0.0	1,077	0
Semi Agricultural	1.0	1,083	1,083
Truck	1.8	2,041	3,674
Vineyard	2.3	14,652	33,700
Total		36,986	101,236

To estimate future water demands for the Growth Fringe area, it was assumed that there was no urban development prior to 2025 and the buildout would occur by 2060. Table A-6 presents the projected water demand based on land use for the General Plan Growth Fringe area to 2060.

Table A-6. General Plan Baseline and Projected Water Demand

Land Use	2005		2010		2025		2060	
	Area (Acres)	Demand (AF)	Area (Acres)	Demand (AF)	Area (Acres)	Demand (AF)	Area (Acres)	Demand (AF)
Urban [1]	2,967	6,479	2,967	6,479	2,967	6,479	36,791	120,884
Agricultural	32,818	94,757	32,818	94,757	32,818	94,757	0	0
Other [2]	1,201	0	1,201	0	1,201	0	0	0
Total	36,986	101,236	36,986	101,236	36,986	101,236	36,986	120,884

1. Urban water demand from 2005 through 2025 is from existing urban land use not met by the City.

2. Other land use includes native, riparian and other vacant land that does not require water from the City.