Memorandum

To: Imperial Water Forum

From: Chris Smith (GEI), Niel Allen (NRCE), Matt Zidar (GEI)

CC:

Date: August 24, 2010

Re: Historical and Forecasted Municipal, Commercial, and Industrial Water Demand (Updated Technical Memorandum 2.2)

Introduction

A component of the 2009 Imperial Irrigation District (IID) planning effort was to document current municipal, commercial, and industrial (MCI) water demand, and to forecast potential future MCI water demands. The previous water forecasts were updated to reflect the demand in areas outside the IID service area that are in the Imperial Region.

Surface water from the Colorado River is used to meet all water demand within the IID service area. Water is conveyed through open canals to the individual users. Cities in the Imperial Region obtain raw water for treatment and delivery of potable water to end users. All cities treat wastewater and provide ultra-violet treatment before discharging to district drainage canals and valley rivers. All discharge ultimately flows to the Salton Sea. The only source of water outside the IID boundary is groundwater.

This memorandum is separated into two primary sections: current water demand and future water demand within the IID. Each section includes discussions about population and water demand. A section has been added to present the review of current demands in the areas outside of the IID in the larger Imperial Region.

Summary of Findings

Current water demand can be summarized into four categories. These categories and the average current demand associated with them are: municipal – 42,400 acre-feet (af); feedlots and dairies – 20,000 af; geothermal and industrial – 22,500 af; and environmental resources – 1,500 af. The average current MCI water demand was estimated to total 86,400 af.

Future water demand was forecasted for these categories to the year 2040. It was assumed that build-out of all planned areas would happen by that year. Future municipal demands were estimated using three different methods. The average future water municipal demand was estimated to be 86,000 af. Future geothermal water demand, assuming complete development of all geothermal resource areas, was estimated to be 138,000 af. Future industrial and feedlot water use was assumed to remain unchanged from current water demand of 7,000 af and 20,000 af, respectively. Future environment resources water demand was estimated to be 12,000 af. The total future water demand was estimated to 263,000 af.

Water demand for areas outside the IID service area within the Imperial Region, estimated to be 4,809 af based on the land use. Since groundwater supplies are limited, it is assumed that future water demands would be same as current demands.

The data collected to determine current water demand, the methods for estimating future water demand, and future water demand values are discussed below.

Current Water Demand

Current Population

Table 1 shows the 2003 through 2008 population from the California Department of Finance (DoF) and the Imperial Valley Area of Governments (IVAG). Figure 1 shows a chart of the population.

Table 1. Comparison of Imperial County Population

	2003		2004		2005		2006		2007		2008	
	DoF	IVAG	DoF	IVAG	DoF	IVAG	DoF	IVAG	DoF	IVAG	DoF	IVAG
Brawley	22,850	23,319	23,513	24,035	24,014	24,751	25,554	25,942	25,522	27,133	26,513	28,323
Calexico	32,200	32,396	34,420	34,441	36,229	36,485	36,840	37,519	37,295	38,552	38,733	39,586
Calipatria	7,675	7,761	7,808	7,813	7,900	7,864	7,837	8,003	7,750	8,143	7,774	8,282
El Centro	39,550	40,038	40,047	40,765	40,982	41,492	42,116	42,194	41,789	42,896	43,316	43,599
Holtville	5,750	5,779	5,753	5,788	5,738	5,797	5,861	5,825	6,257	5,854	6,467	5,882
Imperial	8,575	9,002	9,326	9,425	9,555	9,847	10,167	10,342	11,772	10,837	12,752	11,331
Westmorland	2,210	2,230	2,221	2,319	2,441	2,408	2,378	2,496	2,359	2,583	2,406	2,671
Unincorporated	33,800	34,045	33,976	34,755	34,762	35,465	30,518	39,420	38,832	43,376	38,197	47,331
County Total	152,610	154,570	157,064	159,340	161,621	164,109	161,271	171,741	171,576	179,373	176,158	187,006

Source: 2009 SDI Apportionment Report, EDP Class data Muni IVAG_CA Dof CHG v31.xls

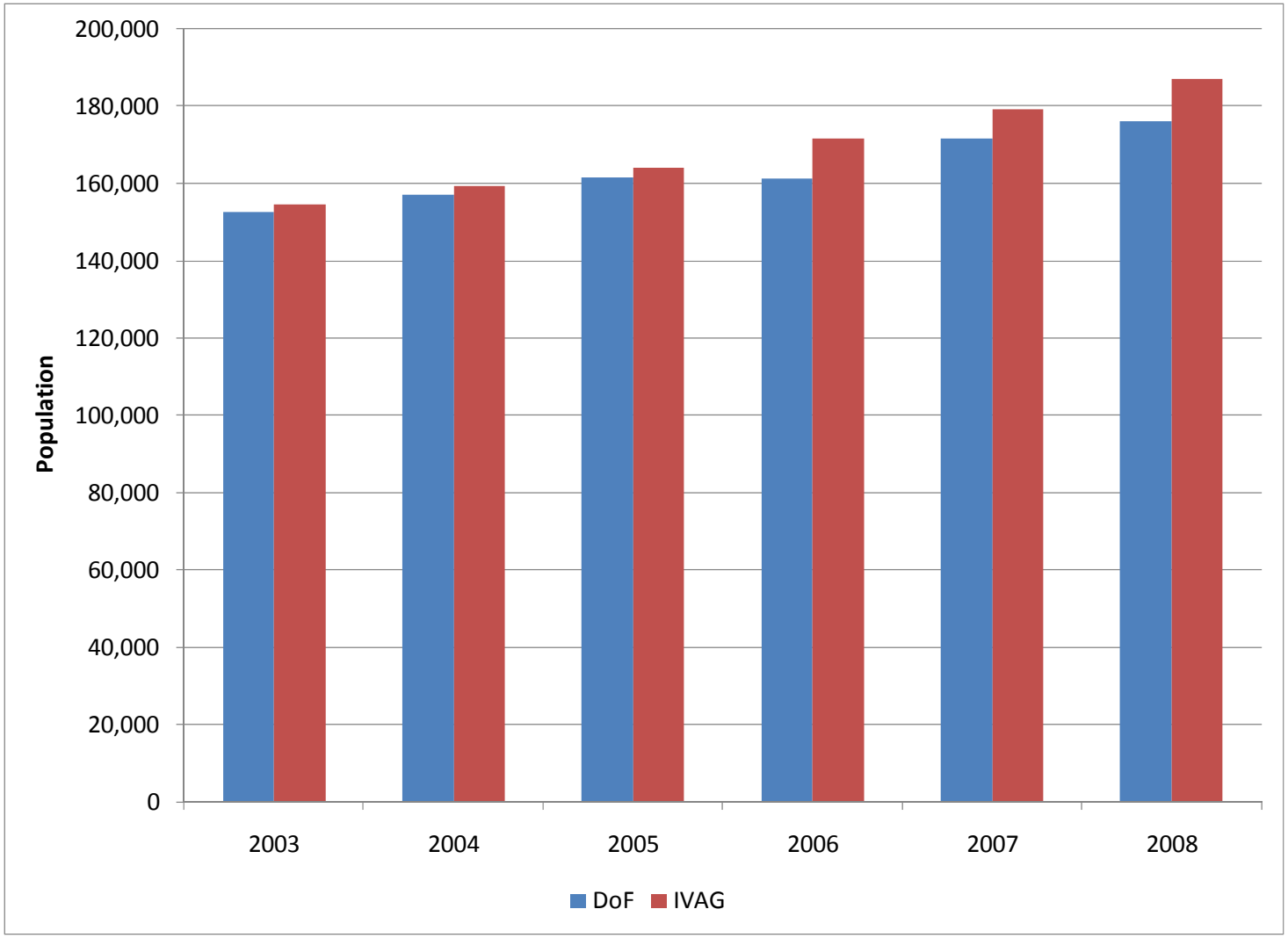

Figure 1. Population of the IID 2003 through 2008

The IVAG population for 2003 is 2,000 more people than the DoF. This difference increases to 11,000 by 2008. Calexico has the biggest population growth for a municipality with an increase of 6,533 and 7,190 for IVAG and CDF, respectively. Unincorporated areas of Imperial County showed the greatest growth with an increase of 13,286 over the five-year period. Table 2 shows the 2000 census data for population, housing units, average household size, land area, and population density for the individual cities within the IID.

Table 2. Year 2000 Demographic Data for IID Cities

	Population[1]	Housing Units[1]	Average Household Size	Land Area (acres)[2]	Population per Acre
Brawley	23,915	7,514	3.3	9,890	2.4
Calexico	36,079	9,148	4.0	8,300	4.3
Calipatria	7,884	1,073	3.6	4,285	1.8
El Centro	40,817	13,029	3.3	14,300	2.8
Holtville	5,715	1,620	3.6	4,080	1.4
Imperial	9,516	2,955	3.3	8,480	1.1
Westmorland	2,430	748	3.5	880	2.8
Total	126,356	36,087		50,215	
Weighted Average			3.51		2.37

1 - State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.
2 – County of Imperial – Imperial County General Plan, 2006

Consumptive Use

MCI water demand accounts for approximately 3 percent of the IID's delivered Colorado River water. However, it is expected that MCI water demand will increase with population growth. This section defines the current or baseline MCI water use.

MCI water demand (also referred to as non-agricultural water demand) is defined as water for domestic, municipal, geothermal energy, industrial, feedlot, dairy, fish, and environmental resources (*IID Regulations for Equitable Distribution Plan* (EDP), December 18, 2007). The IID Efficiency Conservation Definite Plan (Definite Plan) provides specific categories of use based on crop codes used by the IID to account for deliveries (*IID Efficiency Conservation Definite Plan*, May 2007). These crop codes are farmable city, lakes, feed lots, industrial-commercial, in city, service-recreation, small acreage, free accounts, and rural pipes.

The Definite Plan provides the most recent evaluation of MCI water uses. The Definite Plan uses 89,000 acre-feet per year (afy) as the planned MCI water use. The 1997 to 2008 MCI water use is shown in Table 3.

Table 3. Summary of Historical MCI Water Use from 1997-2008 Turnout Deliveries Records

Use	Total	Adjusted Total[1]
	Acre-Feet Per Year	Acre-Feet Per Year
City	32,743	42,400
Feed Lots	4,797	20,000
Industrial	7,092	22,500
Geothermal	16,274	
Environmental	-	1,500
Total	60,906	86,400

[1] Adjusted for Industrial use includes geothermal

Adjusted totals are based on additional analysis of delivery records and more detailed evaluation of actual demands by industrial water users and feedlots. The feedlot value includes water for dust control and feed preparation. The feedlot total includes dairy and fish farms along with feedlot operations.

Delivery Information

For planning purposes, the locations and monthly delivery quantities of major MCI water uses are provided based on available data from the Definite Plan. It is recognized that there are many other smaller MCI deliveries that do not significantly impact delivery or provide distribution constraints. Table 4 provides a summary of MCI water supplies for 1998 through 2005. Table 5 provides a monthly distribution of the MCI deliveries.

Table 4. MCI Summary by Water Year (TAF)

Component	1998	1999	2000	2001	2002	2003	2004	2005	Average
MCI Delivery Input	89.0	87.5	90.0	88.3	90.7	86.4	91.0	89.2	89.0
Rainfall on MCI Land Calc.	15.7	12.6	3.2	5.0	1.4	17.4	19.7	40.0	14.4
Total Municipal & Industrial Inflows Calc.	104.7	100.1	93.2	93.3	92.1	103.8	110.7	129.2	103.4
MCI Consumptive Use of Delivered Water Total	54.8	53.9	55.4	54.4	55.9	53.2	56.1	54.9	54.8
Return Flow Input	34.2	33.6	34.6	33.9	34.8	33.2	34.9	34.3	34.2
Rainfall ET on MCI Land Calc.	11.7	9.4	2.4	3.8	1.0	13.1	14.8	30.0	10.8
Rainfall Runoff & Deep Perc. Calc.	3.9	3.1	0.8	1.3	0.3	4.4	4.9	10.0	3.6
Total Municipal & Industrial Outflows Calc.	104.7	100.1	93.2	93.3	92.1	103.8	110.7	129.2	103.4
MCI Consumptive Use Calc.	66.6	63.3	57.9	58.2	56.9	66.3	70.8	85.0	65.6

Table 5. Mean Monthly (1998-2005) MCI Summary (TAF)

Component	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
MCI Delivery Input	7.7	6.4	6.2	6.2	5.7	6.7	7	8.1	8.7	9.1	8.8	8.5	89.0
Rainfall on MCI Land Calc.	0.7	0.8	1.3	1.2	4.1	1.7	1.1	0.1	0.1	0.8	1.7	0.9	14.4
Total Municipal & Industrial Inflows Calc.	**8.4**	**7.2**	**7.6**	**7.4**	**9.8**	**8.3**	**8.1**	**8.2**	**8.7**	**9.9**	**10.6**	**9.3**	**103.4**
MCI Consumptive Use of Delivered Water Total	**4.8**	**3.9**	**3.8**	**3.8**	**3.5**	**4.1**	**4.3**	**5**	**5.3**	**5.6**	**5.4**	**5.2**	**54.8**
Return Flow Input	3	2.5	2.4	2.4	2.2	2.6	2.7	3.1	3.3	3.5	3.4	3.2	34.2
Rainfall ET on MCI Land Calc.	**0.5**	**0.6**	**1**	**0.9**	**3.1**	**1.2**	**0.8**	**0**	**0.1**	**0.6**	**1.3**	**0.7**	**10.8**
Rainfall Runoff & Deep Perc. Calc.	0.2	0.2	0.3	0.3	1	0.4	0.3	0	0	0.2	0.4	0.2	3.6
Total Municipal & Industrial Outflows Calc.	**8.4**	**7.2**	**7.6**	**7.4**	**9.8**	**8.3**	**8.1**	**8.2**	**8.7**	**9.9**	**10.6**	**9.3**	**103.4**
MCI Consumptive Use Calc.	**5.3**	**4.5**	**4.8**	**4.7**	**6.6**	**5.3**	**5.1**	**5**	**5.4**	**6.2**	**6.7**	**5.9**	**65.6**

Future Water Demand

Future MCI water demand is categorized into four main groups: municipal, geothermal energy and industrial, feedlots/dairies, and environmental resources. The data and method forecasting future water demand for each category is discussed below.

Future Population

Future population estimates have been prepared using IVAG and DoF data. Table 6 and Figure 2 present data collected from the IVAG.

Table 6. IVAG Population Forecasts

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	24,751	30,705	36,206	41,707	45,852	49,996	52,266	54,536	57,743	60,575
Calexico	36,485	41,653	47,764	53,874	58,751	63,628	65,905	68,182	71,759	74,816
Calipatria	7,864	8,561	9,172	9,782	10,177	10,572	10,695	10,818	11,077	11,282
El Centro	41,492	45,003	51,406	57,808	62,257	66,705	68,836	70,967	74,257	77,083
Holtville	5,797	5,939	6,305	6,671	6,937	7,202	7,309	7,416	7,602	7,756
Imperial	9,847	12,321	14,956	17,591	18,783	19,974	20,543	21,112	21,992	22,748
Westmorland	2,408	2,846	3,245	3,644	3,934	4,223	4,367	4,511	4,728	4,915
Heber PUD*	2,988	3,102	3,222	3,342	3,472	3,601	3,740	3,879	4,013	4,149
Seeley CWD*	1,624	1,686	1,751	1,816	1,887	1,957	2,033	2,108	2,181	2,255
Niland*	1,143	1,186	1,232	1,278	1,328	1,377	1,431	1,484	1,536	1,588
Calipatria – CDCR**	4,180	4,180	4,180	4,180	4,180	4,180	4,180	4,180	4,180	4,180
Centinela - CDCR**	5,110	5,110	5,110	5,110	5,110	5,110	5,110	5,110	5,110	5,110
Unincorporated	29,710	49,268	63,893	78,517	80,799	83,081	83,324	83,567	84,830	85,684
Total	173,399	211,560	248,440	285,320	303,463	321,606	329,738	337,870	351,006	362,140

Note: Data extracted from *2009 SDI Apportionment*, IID – EDP Class data Muni IVAG_CA Dof CHG v31.xls. Population for Heber PUD, Seeley CWD, Niland, and CDCR facilities extrapolated from values for 2006 at 3.8%. Unincorporated values do not include Heber, Seeley, and Niland in total amount. * Heber, Seeley, and Niland are unincorporated municipal areas. ** CDCR – CA Dept. of Corrections and Rehabilitation. No growth is assumed for these institutions. Average annual growth is 2.7%.

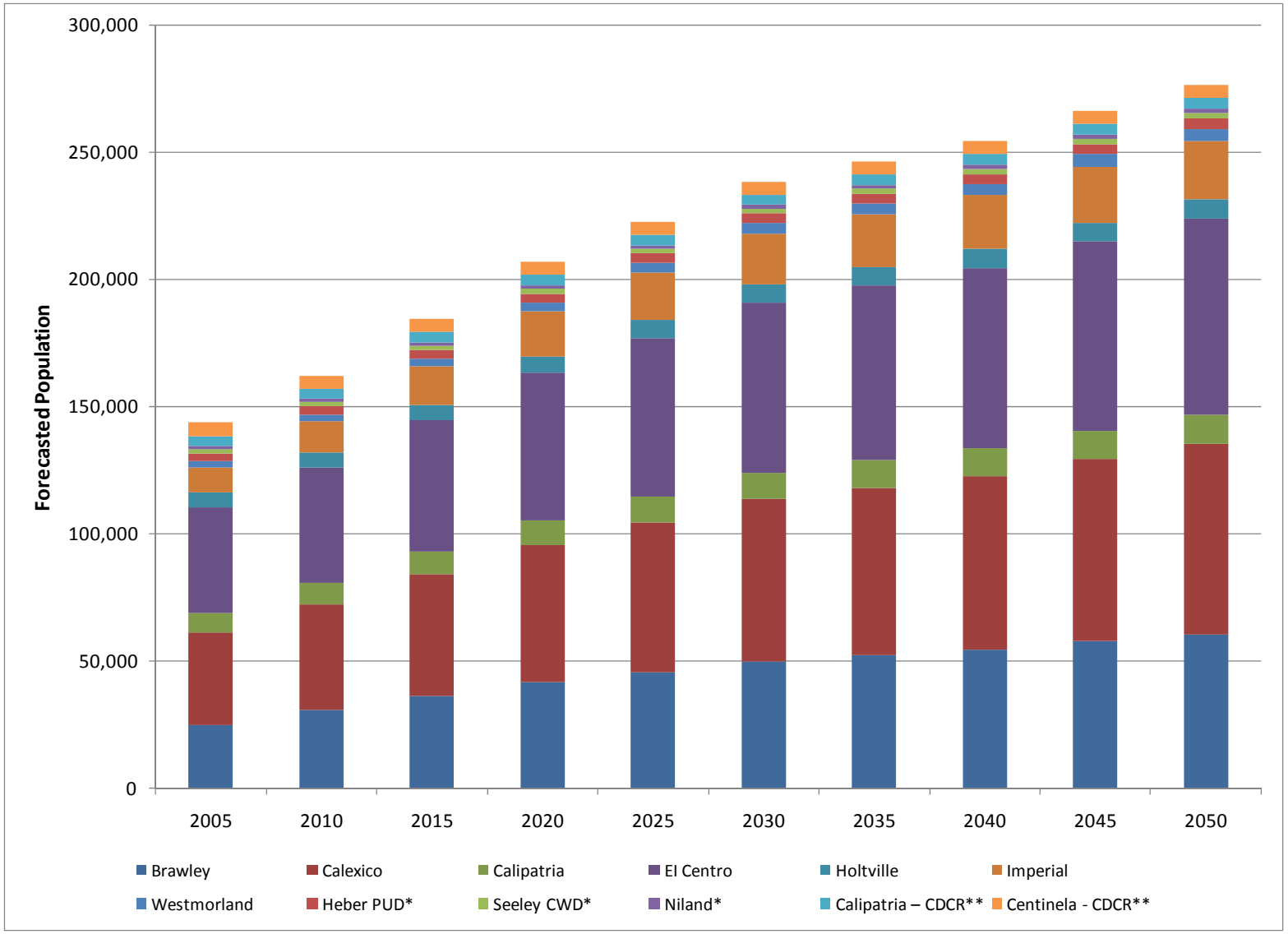

Figure 2. IVAG Population Forecast

The DoF develops population estimates for Imperial County through 2050. Table 7 and Figure 3 show the data from *State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008.* The average population growth rate was 2.6 percent. This rate was used to extend the forecast to 2050.

Table 7. Forecasts based on Department of Finance Population

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	23,915	28,547	32,271	35,994	39,346	42,698	46,555	50,412	54,017	57,722
Calexico	36,079	41,705	47,144	52,583	57,480	62,377	68,013	73,648	78,915	84,329
Calipatria	7,884	8,371	9,463	10,554	11,537	12,520	13,651	14,782	15,839	16,926
El Centro	40,817	46,640	52,723	58,805	64,282	69,758	76,060	82,362	88,251	94,305
Holtville	5,715	6,963	7,871	8,779	9,597	10,415	11,356	12,297	13,177	14,081
Imperial	9,516	13,730	15,521	17,312	18,924	20,536	22,392	24,247	25,981	27,764
Westmorland	2,430	2,591	2,929	3,266	3,571	3,875	4,225	4,575	4,902	5,238
Other*	36,116	37,055	38,018	39,007	40,021	41,062	42,129	43,225	44,279	45,347
Total	162,472	185,602	205,938	226,300	244,757	263,241	284,380	305,548	325,360	345,711

* Includes all unincorporated municipal areas

These estimates represent a potential range of population forecasts. Population within these ranges were used to estimate future residential water demand.

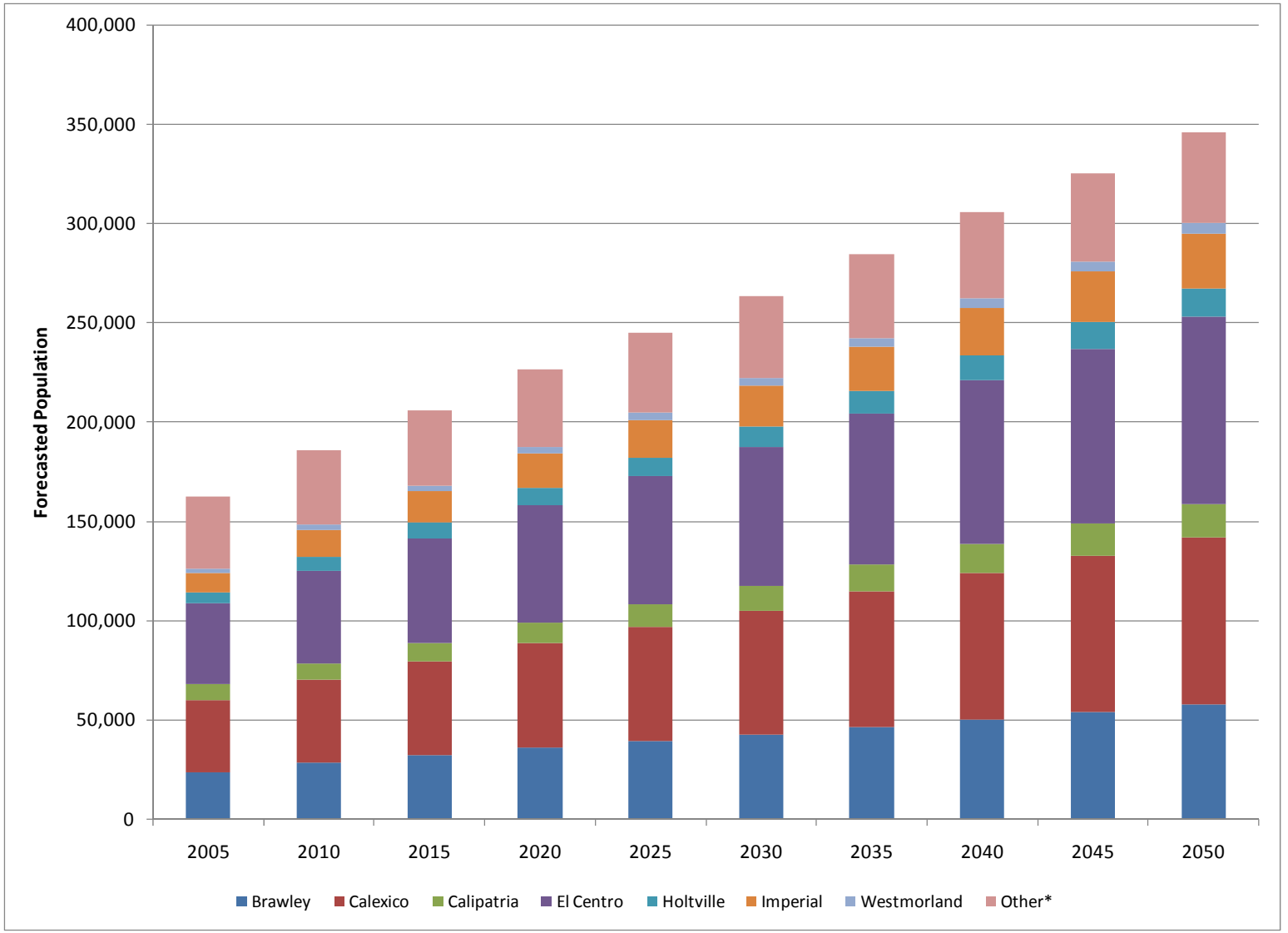

Figure 3. DoF Population Forecast

In 2010, Southern California Association of Governments (SCAG) published population estimates for Imperial County for the years 2020 and 2035. The 2010 SCAG population estimates are compared with those from the IVAG and the DoF in Table 8.

Table 8. Comparison of IVAG, DoF and SCAG Population Estimates

	2020			2035		
	IVAG	DoF	SCAG	IVAG	DoF	SCAG
Brawley	41,707	35,994	39,873	52,266	46,555	50,503
Calexico	53,874	52,583	53,271	65,905	68,013	65,333
Calipatria	9,782	10,554	9,429	10,695	12,746	10,337
El Centro	57,808	58,805	52,783	68,836	76,060	63,787
Holtville	6,671	8,779	7,280	7,309	11,356	7,916
Imperial	17,591	17,312	18,875	20,543	22,392	21,836
Westmorland	3,644	3,266	3,373	4,367	4,225	4,099
Other/Unincorporated	78,517	39,007	73,825	83,324	42,129	79,325
Total	285,320	226,300	258,709	329,738	284,380	303,136

The SCAG population estimates are in the range of the estimates developed by the IVAG and the DoF. It is expected future water demand based on the SCAG population estimates would be within the range developed for the IVAG and the DoF.

Urban Water Management Plans

Urban Water Management Plans (UWMPs) are required by every urban water supplier that provides water to 3,000 or more customers, or that provides over 3,000 af of water annually. These plans document the reliability of water service to meet the needs of its various categories of customers during normal, dry, and multiple dry years. The plans document current demands and forecasts demands over a 20 year period in 5-year increments. Four cities have prepared UWMPs. The demands documented in the UWMPs are shown in Table 9 and Figure 4.

Table 9. UWMP Documented Water Demand

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	11,499	11,232	13,313	15,774	18,690	19,780	21,672	23,565	25,056	26,708
El Centro	9,204	9,722	10,269	10,852	11,462	11,961	12,510	13,060	13,584	14,118
Imperial	1,992	2,549	3,709	4,855	5,953	7,007	7,709	8,646	9,524	10,402
Calexico	17,800	18,800	19,700	20,600	21,500	22,447	23,370	24,292	25,227	26,157
Total	40,495	42,303	46,991	52,081	57,605	61,195	65,261	69,563	73,391	77,385

Other urban areas within the IID are not required to prepare a UWMP. The average annual growth rate for these four cities is 3 percent for Brawley, 1 percent for El Centro, 9.5 percent for Imperial, and 1 percent for Calexico.

Policy of Future Water Allocation

The future apportionment of municipal, industrial, geothermal, feedlots/dairies, and environmental resources was prescribed in the EDP. The EDP prescribes the amount of water that the IID water users receive during periods of supply/demand imbalance (SDI).

Under SDI conditions, industrial and geothermal water users are placed into two categories: (1) For users with existing contracts (as of 2008), water allocated is based on past use, not-to-exceed contracted amount and contract terms; and (2) for contracts after 2008, water allocation is based on anticipated use. The contract terms include not-to-exceed amounts, and considerations for water availability. Future water allocation for dairies and feed lots is based on historical practices. Environmental resources use is based on the amount of mitigation area that has been developed.

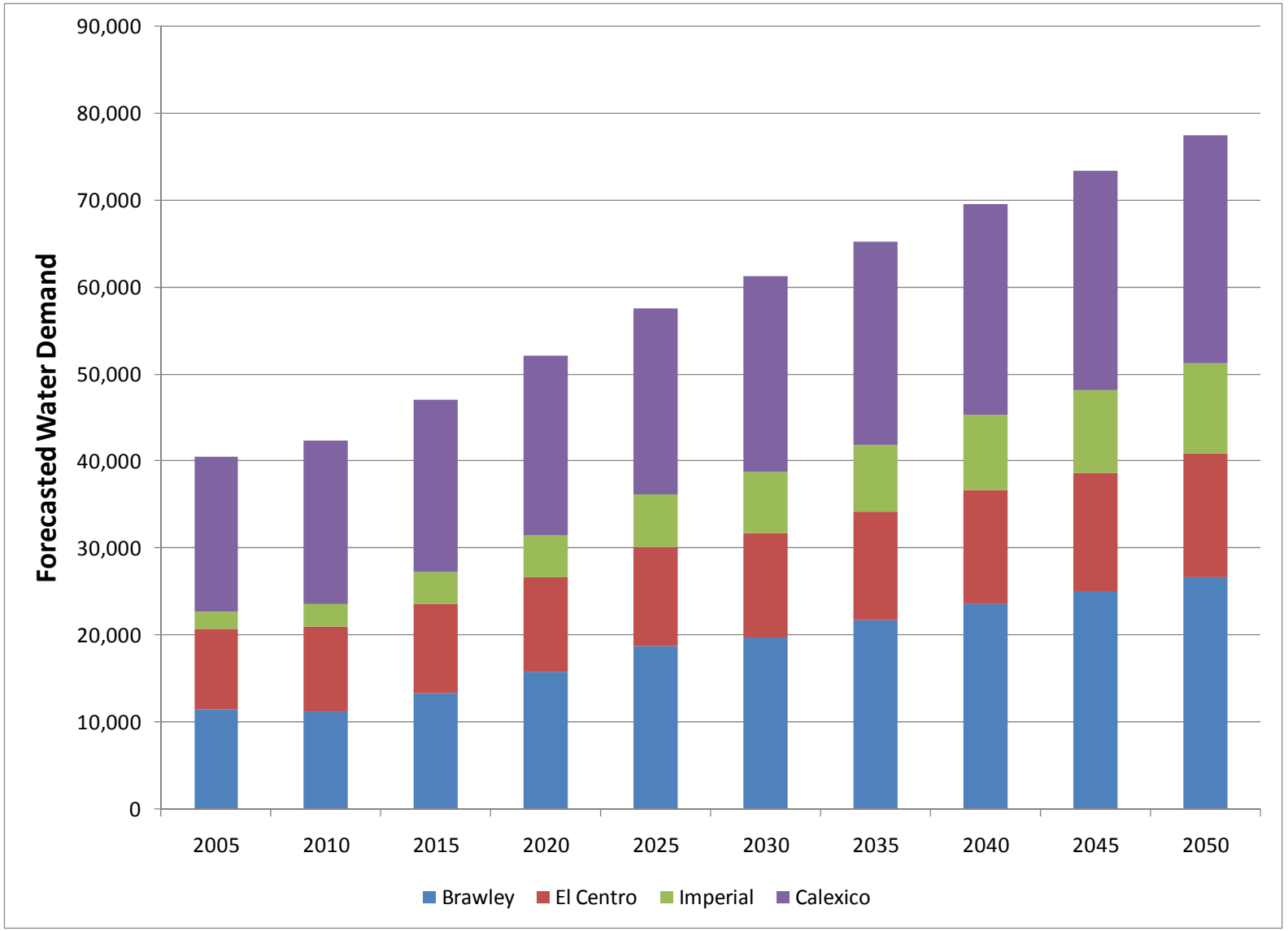

Figure 4. UWMP Forecasted Water Demand

Municipal water is based on the amount of municipal water used in 2006 (37,958 af, *2009 SDI Apportionment Report*, IID) plus the current District-wide average use per capita multiplied by the increase in population since 2006. Average use was calculated as 0.26 af per capita per year. The allotted per capita water use factor is applied to the current service population to determine the total apportionment to the water agency. Water use, on a per capita basis, varies significantly among the urban agencies reflecting (1) differences in the balance of residential, commercial, industrial, and public uses in each town, and (2) differences in the residential density, lot size, building vintage, and landscaping.

Municipal Consumptive Use

There are three methods for estimating municipal consumptive use:

Method 1: Supply/Demand Imbalance (S/D I) apportionment

Method 2: Water Use per Capita Model

Method 3: Land Use Model

Each method is discussed below along with the estimated forecasted demand.

Method 1: Future Water Allocation for Municipal using Equitable Distribution Plan

The EDP prescribes that forecasted water use will be 0.26 acre-feet per capita per year (af/cp/y) for the population difference between 2006 and some future year plus the water use in 2006. Tables 10 and 11 list the 2006 population for each population center that is subject to the EDP, also presenting the forecasted growth through 2050. Table 10 includes data from Table 2 of the *2009 SDI Apportionment, IID* in which IVAG data were extrapolated for 2006, 2010, and 2015. Table 11 includes data from the DoF Table E-5 and data from the IVAG for Heber PUD, Seeley CWD, Niland, and California DCR.

Table 10. Incremental Forecasted Growth based on IVAG Data

	2006 Population	Difference Between 2006 Population and Forecasted Population								
		2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	25,942	4,763	10,264	15,765	19,910	24,054	26,324	28,594	31,801	34,633
Calexico	37,519	4,134	10,245	16,355	21,232	26,109	28,386	30,663	34,240	37,297
Calipatria	8,003	558	1,169	1,779	2,174	2,569	2,692	2,815	3,074	3,279
El Centro	42,194	2,809	9,212	15,614	20,063	24,511	26,642	28,773	32,063	34,889
Holtville	5,825	114	480	846	1,112	1,377	1,484	1,591	1,777	1,931
Imperial	10,342	1,979	4,614	7,249	8,441	9,632	10,201	10,770	11,650	12,406
Westmorland	2,496	350	749	1,148	1,438	1,727	1,871	2,015	2,232	2,419
Heber PUD	2,988	114	234	354	484	613	752	891	1,025	1,161
Seeley CWD	1,624	62	127	192	263	333	409	484	557	631
Niland	1,143	43	89	135	185	234	288	341	393	445
Calipatria – CDCR	4,180	-	-	-	-	-	-	-	-	-
Centinela – CDCR	5,110	-	-	-	-	-	-	-	-	-
Total	147,366	14,926	37,183	59,437	75,302	91,159	99,049	106,937	118,811	129,090

Table 11. Incremental Forecasted Growth based on DoF Data

	2006 Population	Difference Between 2006 Population and Forecasted Population								
		2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	25,426	3,121	6,845	10,568	13,920	17,272	21,129	24,986	28,591	32,296
Calexico	36,651	5,054	10,493	15,932	20,829	25,726	31,362	36,997	42,264	47,678
Calipatria	7,819	552	1,644	2,735	3,718	4,701	5,832	6,963	8,020	9,107
El Centro	41,904	4,736	10,819	16,901	22,378	27,854	34,156	40,458	46,347	52,401
Holtville	5,832	1,131	2,039	2,947	3,765	4,583	5,524	6,465	7,345	8,249
Imperial	10,116	3,614	5,405	7,196	8,808	10,420	12,276	14,131	15,865	17,648
Westmorland	2,368	223	499	836	1,141	1,445	1,795	2,145	2,534	2,870
Heber PUD	2,988	114	234	354	484	613	752	891	1,025	1,161
Seeley CWD	1,624	62	127	192	263	333	409	484	557	631
Niland	1,143	43	89	135	185	234	288	341	393	445
Calipatria – CDCR	4,180	-	-	-	-	-	-	-	-	-
Centinela – CDCR	5,110	-	-	-	-	-	-	-	-	-
Total	145,161	18,650	38,194	57,796	75,491	93,181	113,523	133,861	152,939	172,484

Using the population values in Table 10, 2006 baseline water demand amount of 37,959 af, and 0.26 af/cp/y for all population growth beyond 2006, Table 12 shows forecasted water apportionments based on the IVAG population estimates. The 0.26 af/cp/y equates to approximately 250 gallons per capita per day

(g/cp/d). Table 13 shows forecasted water apportionments based on the DoF population estimates and a population growth rate of 2.6 percent.

Table 12. Forecast SDI Apportionment using IVAG Population Forecasts

	2006 Baseline (AF	Forecasted Apportionments based on IVAG Population Forecasts (AF)								
		2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	9,410	10,648	12,079	13,509	14,587	15,664	16,254	16,844	17,678	18,415
Calexico	6,717	7,792	9,381	10,969	12,237	13,505	14,097	14,689	15,619	16,414
El Centro	9,689	10,419	12,084	13,749	14,905	16,062	16,616	17,170	18,025	18,760
Holtville	1,984	2,014	2,109	2,204	2,273	2,342	2,370	2,398	2,446	2,486
Imperial	3,793	4,308	4,993	5,678	5,988	6,297	6,445	6,593	6,822	7,018
Westmorland	713	804	908	1,011	1,087	1,162	1,199	1,237	1,293	1,342
Heber PUD	344	374	405	436	470	503	540	576	611	646
Seeley CWD	346	362	379	396	414	433	452	472	491	510
Centinela - CDCR	1,515	1,515	1,515	1,515	1,515	1,515	1,515	1,515	1,515	1,515
Golden State WC	3,447	3,603	3,774	3,945	4,060	4,176	4,222	4,268	4,348	4,415
- Calipatria										
- Niland										
- Calipatria – CDCR										
Total	37,958	41,839	47,626	53,412	57,537	61,659	63,711	65,762	68,849	71,521

Table 13. Forecasted SDI Apportionment using DoF Population Forecasts

	2006 Baseline (AF	Forecasted Apportionments based on DoF Population Forecasts (AF)								
		2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	9,410	10,221	11,190	12,158	13,029	13,901	14,904	15,906	16,844	17,807
Calexico	6,717	8,031	9,445	10,859	12,133	13,406	14,871	16,336	17,706	19,113
El Centro	9,689	10,920	12,502	14,083	15,507	16,931	18,570	20,208	21,739	23,313
Holtville	1,984	2,278	2,514	2,750	2,963	3,176	3,420	3,665	3,894	4,129
Imperial	3,793	4,733	5,198	5,664	6,083	6,502	6,985	7,467	7,918	8,381
Westmorland	713	771	843	930	1,010	1,089	1,180	1,271	1,372	1,459
Heber PUD	344	374	405	436	470	503	540	576	611	646
Seeley CWD	346	362	379	396	414	433	452	472	491	510
Centinela – CDCR	1,515	1,515	1,515	1,515	1,515	1,515	1,515	1,515	1,515	1,515
Golden State WC	3,447	3,602	4,052	4,798	5,813	7,096	8,688	10,587	12,774	15,257
- Calipatria										
- Niland										
- Calipatria – CDCR										
Total	37,958	42,807	48,043	53,590	58,937	64,551	71,123	78,002	84,862	92,131

From Tables 12 and 13, it is seen that using a 2.6 percent uniform population growth (an assumption from the 2000 US Census Bureau) results in a higher apportionment value in 2040 (73,756 af) in comparison to the IVAG population estimates (66,718 af). Figure 5 compares the annual totals between the forecasts.

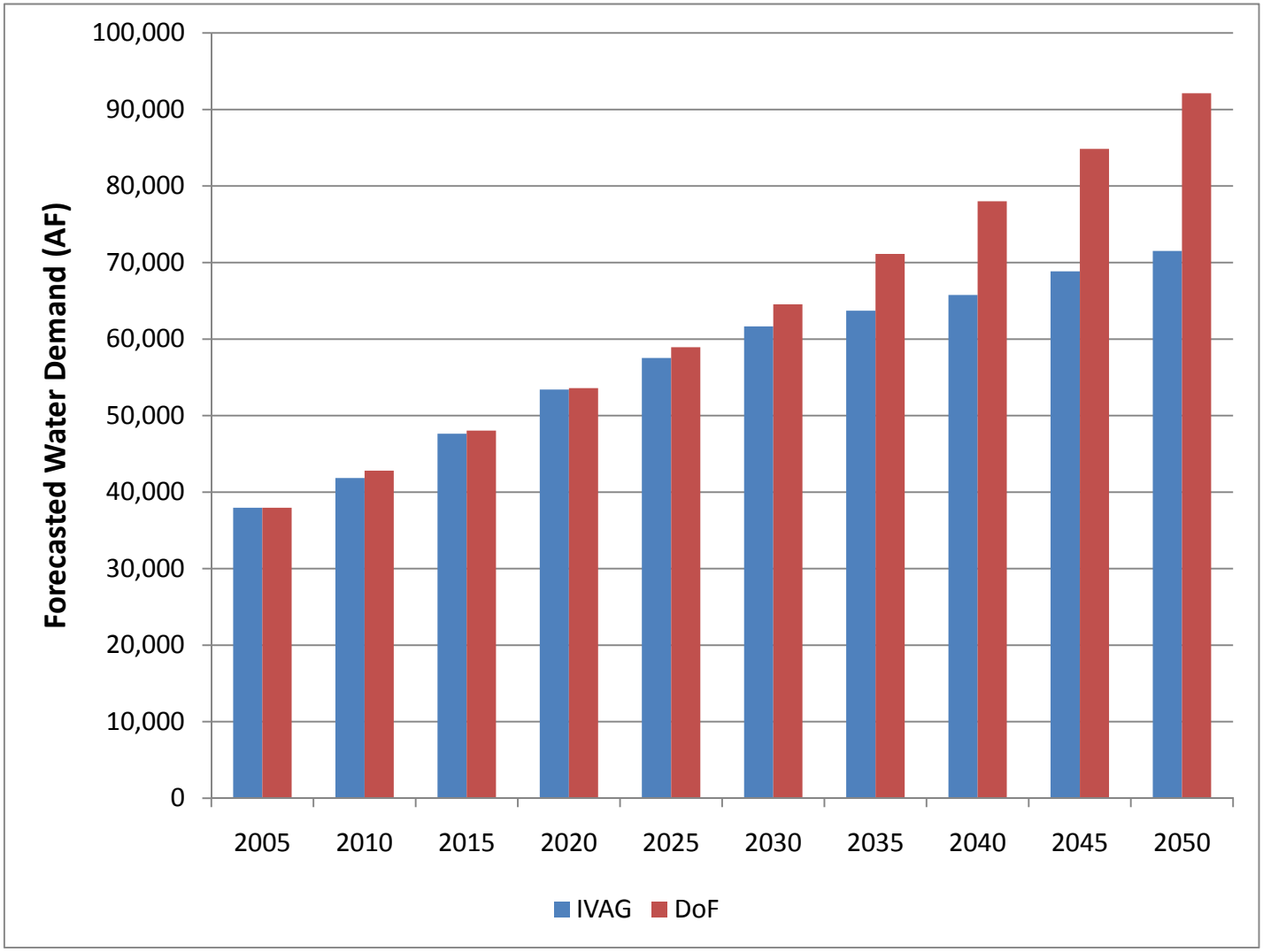

Figure 5. Comparison of Apportionment Forecasts

Method 2: Future Water Demand Using Per Capita Demand Model

Future water demand can be estimated by using per capita water use. A model was developed using a demand per day, a distribution of the daily demand to the different types of water use, and population. Table 14 lists the daily per capita demand (gallons per day, gpd) for the urban areas within the IID.

Table 14. Per Capita Demand

	Per Capita Demand (DOF)		Per Capita Demand (IVAG)	
	Gpd	afy	gpd	afy
Brawley	332	0.37	301	0.34
El Centro	197	0.22	188	0.21
Calexico	157	0.18	154	0.17
Imperial	196	0.22	220	0.25
Heber	171	0.19	171	0.19
Calipatria/Niland	265	0.30	251	0.28
Holtville	178	0.20	196	0.22
Westmorland	262	0.29	236	0.26
Seeley	135	0.15	133	0.15
Average[1]	213	0.24	205	0.23

1 Population weighted average was calculated.

The values in Table 14 were extracted from the El Centro 2005 UWMP; the 2005 Calexico UWMP; the 2005 Brawley UWMP; and the 2005 City of Imperial UWMP.

Demand was forecasted using the average (population weighted value) per capita data listed in Table 14 and the population data contained in Tables 6 and 7. Table 15 lists forecasted demand based on the water use per capita model using the IVAG population data. Table 16 lists the forecasted demand based on the DoF population data. Forecasted data for the individual cities using the DoF population data and detailed water use categories are included in Appendix A. Appendix B includes similar data but for the IVAG population.

Table 15. Water Demand calculated using Water Use per Capita Model with IVAG Population

	Forecasted Demand (AF)									
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	5,909	7,331	8,644	9,957	10,947	11,936	12,478	13,020	14,432	15,387
Calexico	8,711	9,945	11,404	12,862	14,027	15,191	15,735	16,278	17,919	18,990
Calipatria	1,878	2,044	2,190	2,335	2,430	2,524	2,553	2,583	2,742	2,832
El Centro	9,906	10,744	12,273	13,802	14,864	15,926	16,435	16,943	18,576	19,613
Holtville	1,384	1,418	1,505	1,593	1,656	1,719	1,745	1,771	1,867	1,927
Imperial	2,351	2,942	3,571	4,200	4,484	4,769	4,905	5,040	5,635	5,975
Westmorland	575	679	775	870	939	1,008	1,043	1,077	1,180	1,247
Heber	713	741	769	798	829	860	893	926	954	985
Seeley CWD	388	403	418	434	451	467	485	503	518	535
Niland	273	283	294	305	317	329	342	354	365	377
Total	32,088	36,529	41,843	47,156	50,944	54,730	56,613	58,497	64,189	67,868

Table 16. Water Demand calculated using Water Use per Capita Model with DoF Population

	Forecasted Demand (AF)									
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	5,495	6,560	7,415	8,271	9,041	9,811	10,697	11,584	12,365	13,193
Calexico	8,290	9,583	10,833	12,083	13,208	14,333	15,628	16,923	18,064	19,274
Calipatria	1,812	1,924	2,174	2,425	2,651	2,877	3,137	3,397	3,626	3,869
El Centro	9,379	10,717	12,115	13,512	14,771	16,029	17,477	18,925	20,202	21,554
Holtville	1,313	1,600	1,809	2,017	2,205	2,393	2,609	2,826	3,016	3,218
Imperial	2,187	3,155	3,566	3,978	4,348	4,719	5,145	5,572	5,948	6,346
Westmorland	558	595	673	750	821	890	971	1,051	1,122	1,197
Heber	687	713	740	768	798	827	859	891	918	948
Seeley CWD	373	387	402	417	434	450	467	484	499	516
Niland	263	273	283	294	305	316	329	341	351	363
Total	30,357	35,506	40,011	44,515	48,581	52,646	57,320	61,994	66,112	70,476

From Tables 15 and 16, using the DoF population provides a greater 2050 water demand estimate than the IVAG population values. Figure 6 provides a summary of the total demands.

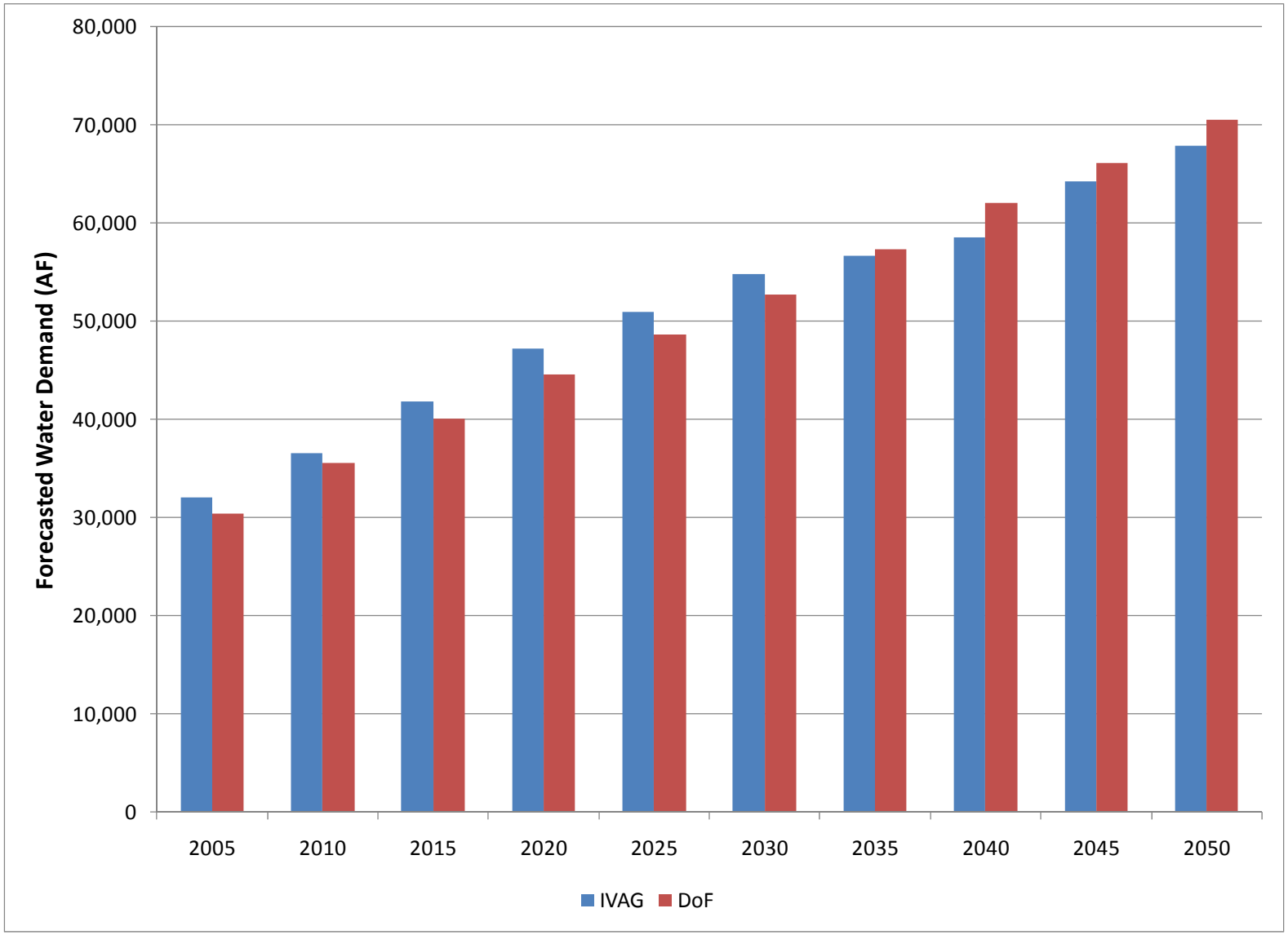

Figure 6. Estimated Water Demand using the Per Capita Method

Method 3: Future Water Demand Using Land Use Demand Model

Future water demand can also be estimated by projected land use. Each land use type has a certain amount of the water use associated on a unit-by-unit basis. Knowing the total area for a certain land use type and multiplying it by unit water use associated with that land use type will provide an estimate of the future water demand for the land use.

Table 17 and Figure 7 summarize the forecasted water demands using planned land use in municipal areas. Imperial County Planning Department provided AutoCAD drawings and GIS data files showing the current limits of municipal boundaries as well as AutoCAD drawings showing the spheres of influence of these municipalities as developed by the Imperial County Local Area Formation Commission (LAFCO). For Calexico, the city limit and sphere-of-influence data were provided by the city. The City of Imperial provided city limit and sphere-of-influence data. The future development date (i.e., the year build-out occurs) of the spheres-of-influence was not provided with the drawings so it was assumed that the build-out of the spheres-of-influence was 2050.

Table 17. Forecasted Developed Land Use Area

	Developed Municipal Area (Ac)									
	Current	2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	2,686	4,193	5,699	7,207	8,714	10,218	11,725	13,231	14,738	16,244
El Centro	5,050	6,576	8,105	9,631	11,158	12,685	14,213	15,739	17,267	18,794
Calexico	3,188	3,893	4,599	5,303	6,008	6,714	7,419	8,124	8,829	9,534
Imperial	964	2,084	3,206	4,326	5,445	6,565	7,685	8,805	9,925	11,045
Calipatria	467	1,651	2,837	4,021	5,206	6,389	7,574	8,758	9,943	11,127
Holtville	525	1,160	1,794	2,428	3,063	3,698	4,333	4,967	5,602	6,236
Westmorland	189	416	646	873	1,101	1,329	1,557	1,785	2,013	2,241
Heber	91	201	312	421	531	641	751	861	971	1,081
Seeley	92	202	313	424	534	645	756	866	977	1,088
Total	13,252	22,386	29,526	36,654	43,785	50,914	58,048	64,176	70,264	77,390

Source: Data extracted from AutoCAD files provided by Imperial County Planning Department, LAFCO and City of Calexico. Heber and Seeley area estimated.

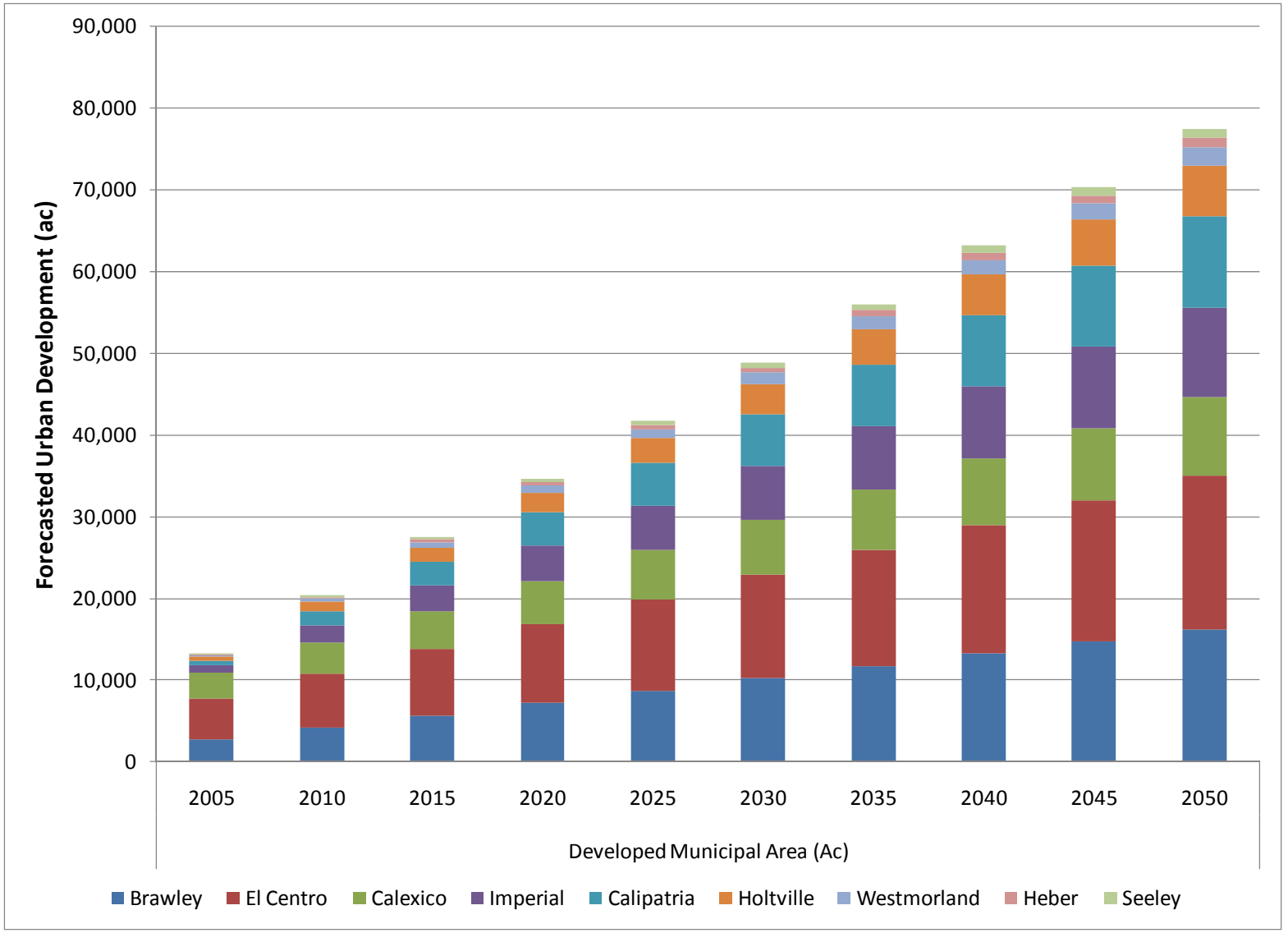

Figure 7. Projected Urban Development

Using the developed municipal area listed in Table 16 and the 2006 water delivery data listed in Table 12, unit water demand values were calculated for each municipal area. These data are shown in Table 18. In addition to calculating unit water demand for each city, an average unit water demand (acre-foot per acre – af/ac)was calculated and an area weighted average unit water demand was calculated.

Table 18. Unit Water Demand Rates

	Area (ac)	Water Demand (af)	Unit Water Demand (af/ac)
Brawley	2,686	9,410	3.5
El Centro	5,050	9,689	1.9
Calexico	3,188	6,717	2.1
Imperial	964	3,793	3.9
Calipatria/Niland	467	2,208	4.7
Holtville	525	1,984	3.8
Westmorland	189	713	3.8
Heber	91	344	3.8
Seeley	92	346	3.8
Total	**13,252**	**35,204**	
Average			**3.5**
Area Weighted Average			**2.7**

Given the variability in unit water demand rates, the weighted average was used with the land area data shown in Table 16 to forecast water demand. Table 19 and Figure 8 list the total forecasted water demands based on the land use methodology.

Table 19. Land Use Based Water Demand

	Forecasted Water Demand (af)									
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Brawley	7,235	11,295	15,351	19,413	23,473	27,524	31,583	35,640	39,699	43,757
El Centro	13,603	17,714	21,832	25,943	30,056	34,169	38,285	42,396	46,510	50,624
Calexico	8,587	10,487	12,388	14,285	16,184	18,085	19,984	21,883	23,783	25,682
Imperial	2,597	5,614	8,636	11,653	14,667	17,684	20,701	23,718	26,736	29,753
Calipatria	1,258	4,447	7,642	10,831	14,023	17,210	20,402	23,591	26,783	29,973
Holtville	1,414	3,125	4,832	6,540	8,251	9,961	11,672	13,380	15,089	16,799
Westmorland	509	1,121	1,740	2,352	2,966	3,580	4,194	4,808	5,423	6,037
Heber	245	541	840	1,134	1,430	1,727	2,023	2,319	2,616	2,912
Seeley	248	544	843	1,142	1,438	1,737	2,036	2,333	2,631	2,929
Total	35,697	54,886	74,106	93,293	112,488	131,678	150,881	170,068	189,270	208,466

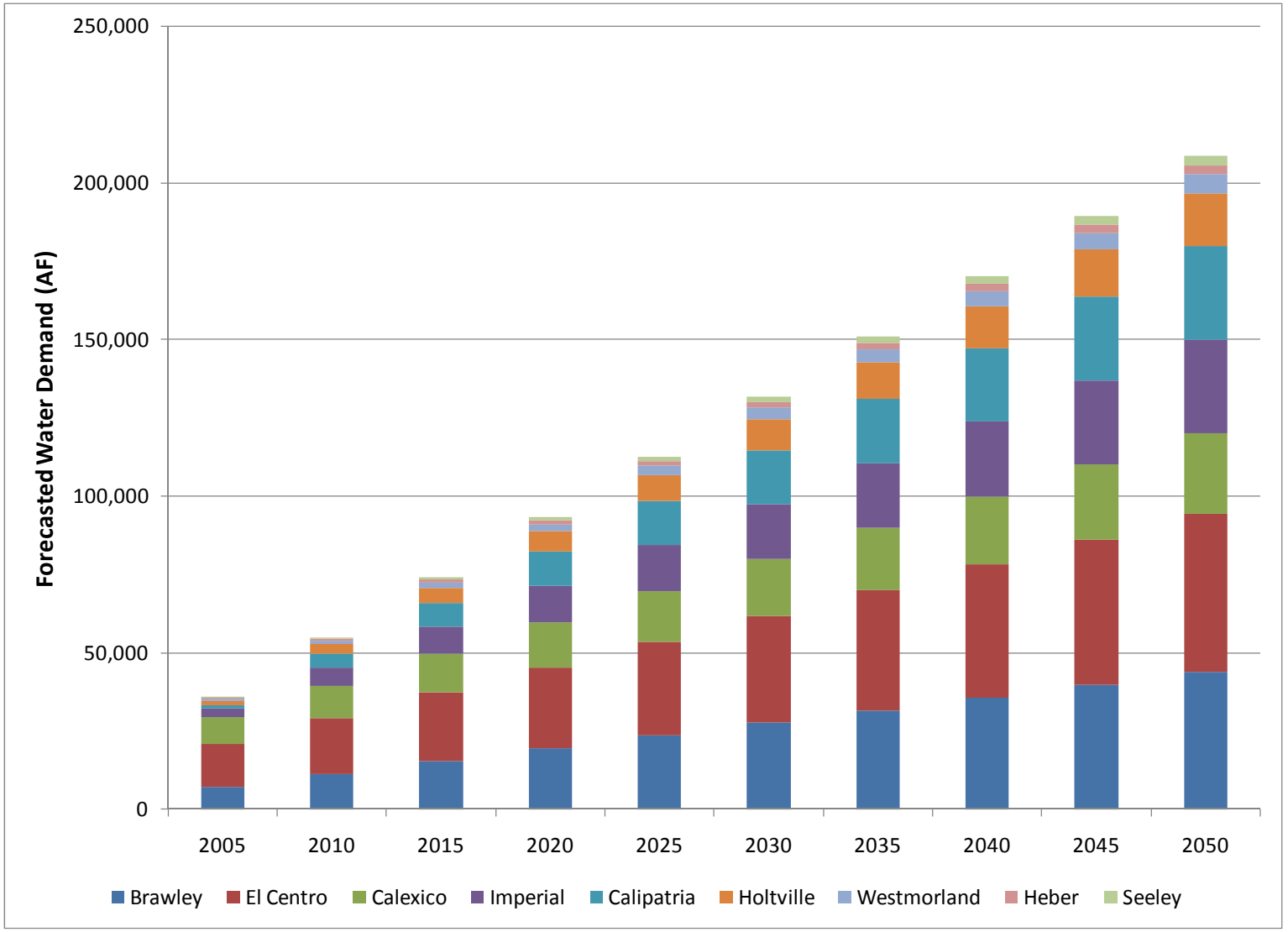

Figure 8. Land Use Based Forecasted Water Demand

Summary

Table 20 provides a summary each of the method used to estimate municipal water demand.

Table 20. Summary of Municipal Water Demand

	Forecasted Water Demand						
	UWMP	S/D - IVAG pop	S/D - DoF pop	Per Capita Model - IVAG	Per Capita Model - DoF	Land Use Model	Average
2005	40,495	37,958	37,958	32,088	30,357	35,697	37,984
2010	42,303	41,839	43,801	36,529	35,506	54,886	44,394
2015	46,991	47,626	48,826	41,843	40,011	74,106	51,887
2020	52,081	53,412	54,373	47,156	44,515	93,293	59,637
2025	57,605	57,537	59,516	50,944	48,581	112,488	66,818
2030	61,195	61,659	65,130	54,730	52,646	131,678	73,417
2035	65,261	63,711	71,467	56,613	57,320	150,881	79,778
2040	69,563	65,762	78,185	58,497	61,994	170,068	86,162
2045	73,391	68,849	84,933	64,189	66,112	189,270	91,124
2050	77,385	71,521	92,102	67,868	70,476	208,466	97,970

From Table 20, the Per Capita Model using the IVAG population estimates represents the low range of forecasted water demand. The forecasted demands included in the municipalities UWMPs are representative of medium range water demand estimate, and the land use model is representative of a high range water demand estimate. These three estimates are shown in Figure 9 to provide the full range of water demand forecasts.

Three methods were used to estimate or forecast future urban area water demand. Figure 9 shows water demand forecasts for each method. These may be considered the high, medium, and low forecasts.

The Land Use method forecasts a water demand that is more than double the demand predicted by the other methods by 2040.

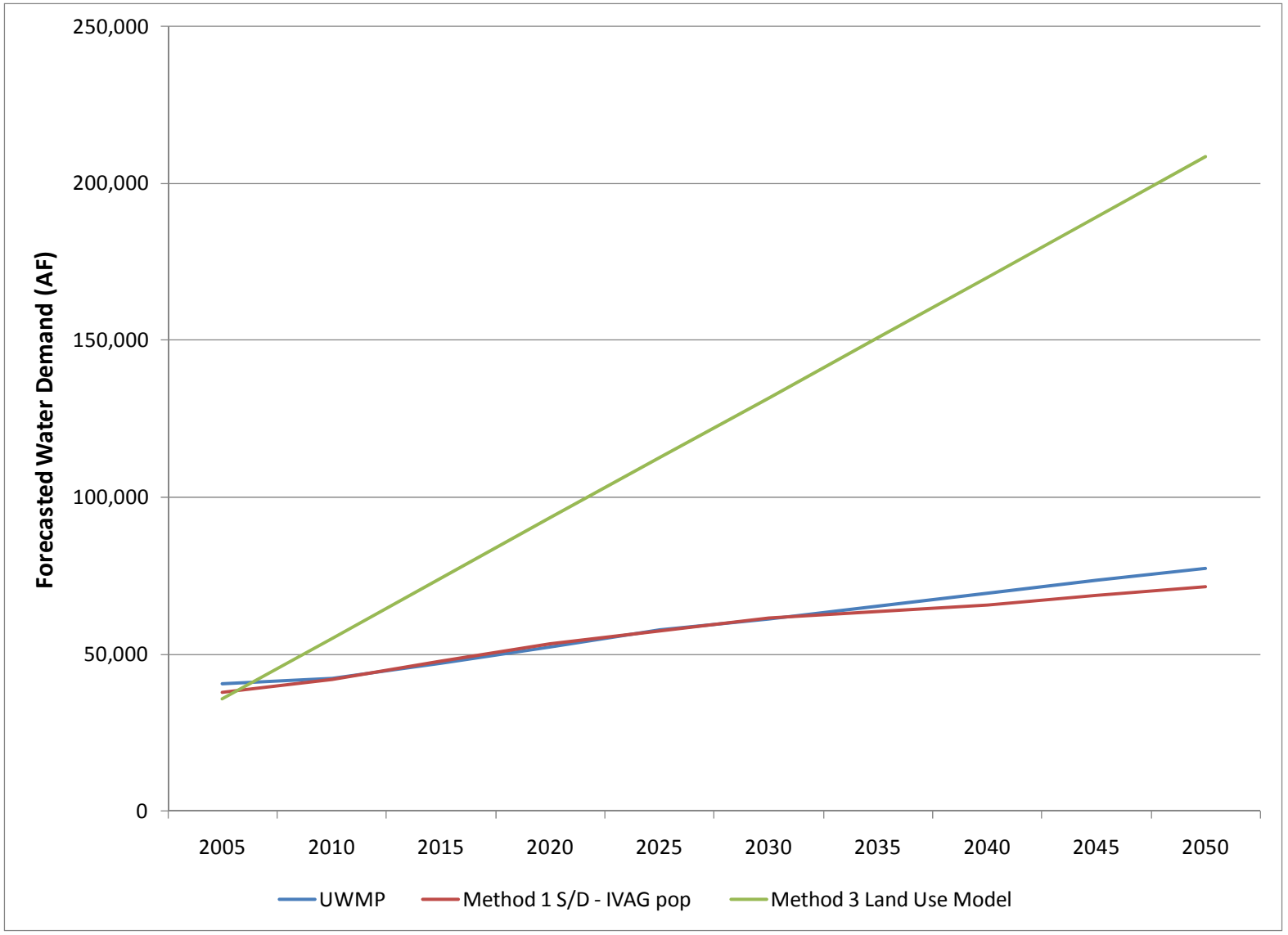

Figure 9. Summary of Estimates of Future Urban Area Water Demand

Future Industrial/Geothermal Water Demand

As of 2006, there were 530 megawatt (MW) installed geothermal capacity within the IID service area, with an additional 552 MW of geothermal capacity under development in early 2009. The capacity has been operational since 2000 (471 MW were operational in 1997). There are an additional 605 MW of geothermal capacity under development. It has been estimated that 4,500 MW could be generated from geothermal energy if fully developed (R*enewable Energy Feasibility Study Final Report*, 2008). The 1997-2008 average water demand, measured as gate deliveries, is 16,274 af. On average, 31.7 af of water was needed to produce one MW over the past 10 years assuming that 471 MW was continuously operational from 1997 through 2000 and 530 MW was continuously operational from 2000 through 2008. The Imperial County General Plan, Geothermal Element, provides a range of 50 af to 100 af per MW.

Using the average calculated from the IID gate deliveries, it is estimated that an additional 19,158 af of water would be needed to meet the water demands if the next 605 MW of geothermal energy are developed. Similarly, it is estimated that 14,250 af would be needed to meet the fully developed geothermal energy potential. Future geothermal water demand will be governed by the EDP. For existing contracts, water demand will be based on contract terms. Future contracts will need to consider the availability of water. Other renewable energy sources, such as solar thermal, wind, and biomass would be subject to similar terms. However, these other renewable energy sources do not rely on water as a significant component of the energy producing process. It is assumed for planning purposes that the water demand for other renewable energy sources is relatively small when compared to geothermal energy. As such, water demand for these other renewable energy sources was assumed to be included in the geothermal build-out demand.

Industrial water users outside municipal areas are governed by the same terms as geothermal energy in the EDP. Their 1997-2008 average water demand was 7,092 af. For planning purposes, it was assumed that industrial water demand will not change going into the future.

Future Feedlots/Dairies Water Demand

The 1997 to 2008 adjusted annual average water use by feedlots and dairies was 20,000 afy. Under the EDP, future use was based upon past use and other considerations. It is assumed that future feedlot and dairy water will remain unchanged from the 1998-2008 average.

Future Environmental Resources Water Demand

Environmental resources water is needed for QSA/Transfer Agreements mitigation. A total of 960 acres of freshwater marsh is to be created by October 2019, with 320 acres created by October 2009 and another 320 by October 2014. This project, which is part of the Habitat Conservation Plan, is being developed as mitigation for the QSA transfer program and operations and maintenance impacts on drains. The water demand for the habitat is 12 acre-feet per acre (af/ac) and it must be equivalent to Colorado River water quality. Water from the marsh complex is to be discharged to the IID drain system and cannot be recovered under the current program requirement. Additional mitigation efforts include a 50-acre salt marsh (does not use freshwater); 50-acre tamarisk mitigation (will use 500 af of fresh water); and desert mitigation (which has no water demand). For 2009, EDP includes 1,500 af for environmental resources water. Using the marsh complex development schedule, water demand for 320 acres should be

3,840 afy and this grows to 11,520 afy by October 2019. With a fully developed tamarisk mitigation area, the environmental resource water requirement should be 12,020 afy by 2020.

Additional water is provided to the Salton Sea to mitigate for the impacts of the IID/SDCWA transfer. A temporary fallowing program was included in the QSA/Transfer Agreements to provide water for this mitigation. In 2010, 35,000 af water will be discharged to the Salton Sea. This will increase to 110,000 af in 2015 and 150,000 af in 2017, after which there are no further mitigation requirements for the Salton Sea. Total Salton Sea mitigation of 800,000 af consists of water discharged from the All-American Canal into the New River via the New River Spillway.

Cumulative Future Water Demand

Three scenarios were developed to show the cumulative future water demand. The scenarios, low future water demand, medium water demand, and high water demand are composites of different estimates of future water demand. The low forecasted water demand estimate is comprised of the Per Capita model, and no future development in geothermal resources. The second scenario is comprised of relatively medium future water demand based on development of half of the known geothermal resources and municipal growth based on the forecasts included in the 2005 UWMPs. The third scenario is comprised high future water demand based on full development of geothermal energy resources and municipal growth based on the land use model. Figures 4 through 6 show the cumulative water demand with each scenario. Tables 21 through 23 show the data associated with Figures 10 through 12.

Table 21. Low Future Water Demand Scenario

	Municipal	Geothermal	Industrial	Feedlot/Dairies	Environmental Resources
2005	**32,088**	16,274	7,092	20,000	0
2010	**36,529**	16,274	7,092	20,000	3,840
2015	**41,843**	16,274	7,092	20,000	7,930
2020	**47,156**	16,274	7,092	20,000	12,020
2025	**50,944**	16,274	7,092	20,000	12,020
2030	**54,730**	16,274	7,092	20,000	12,020
2035	**56,613**	16,274	7,092	20,000	12,020
2040	**58,497**	16,274	7,092	20,000	12,020
2045	**64,857**	16,274	7,092	20,000	12,020
2050	**68,759**	16,274	7,092	20,000	12,020

Table 22. Medium Future Water Demand Scenario

	UWMP	Geothermal	Industrial	Feedlot/Dairies	Environmental Resources
2005	40,495	16,274	7,092	20,000	0
2010	42,303	23,817	7,092	20,000	3,840
2015	46,991	31,360	7,092	20,000	7,930
2020	52,081	38,903	7,092	20,000	12,020
2025	57,605	46,446	7,092	20,000	12,020
2030	61,195	53,989	7,092	20,000	12,020
2035	65,261	61,532	7,092	20,000	12,020
2040	69,563	69,075	7,092	20,000	12,020
2045	73,391	76,618	7,092	20,000	12,020
2050	77,385	84,161	7,092	20,000	12,020

Table 23. High Future Water Demand Scenario

	Land Use Model	Geothermal	Industrial	Feedlot/Dairies	Environmental Resources
2005	31,144	16,274	7,092	20,000	0
2010	47,281	33,685	7,092	20,000	3,840
2015	63,417	51,096	7,092	20,000	7,930
2020	79,554	68,507	7,092	20,000	12,020
2025	95,690	85,917	7,092	20,000	12,020
2030	111,827	103,328	7,092	20,000	12,020
2035	127,963	120,739	7,092	20,000	12,020
2040	144,100	138,150	7,092	20,000	12,020
2045	160,236	155,561	7,092	20,000	12,020
2050	176,373	172,971	7,092	20,000	12,020

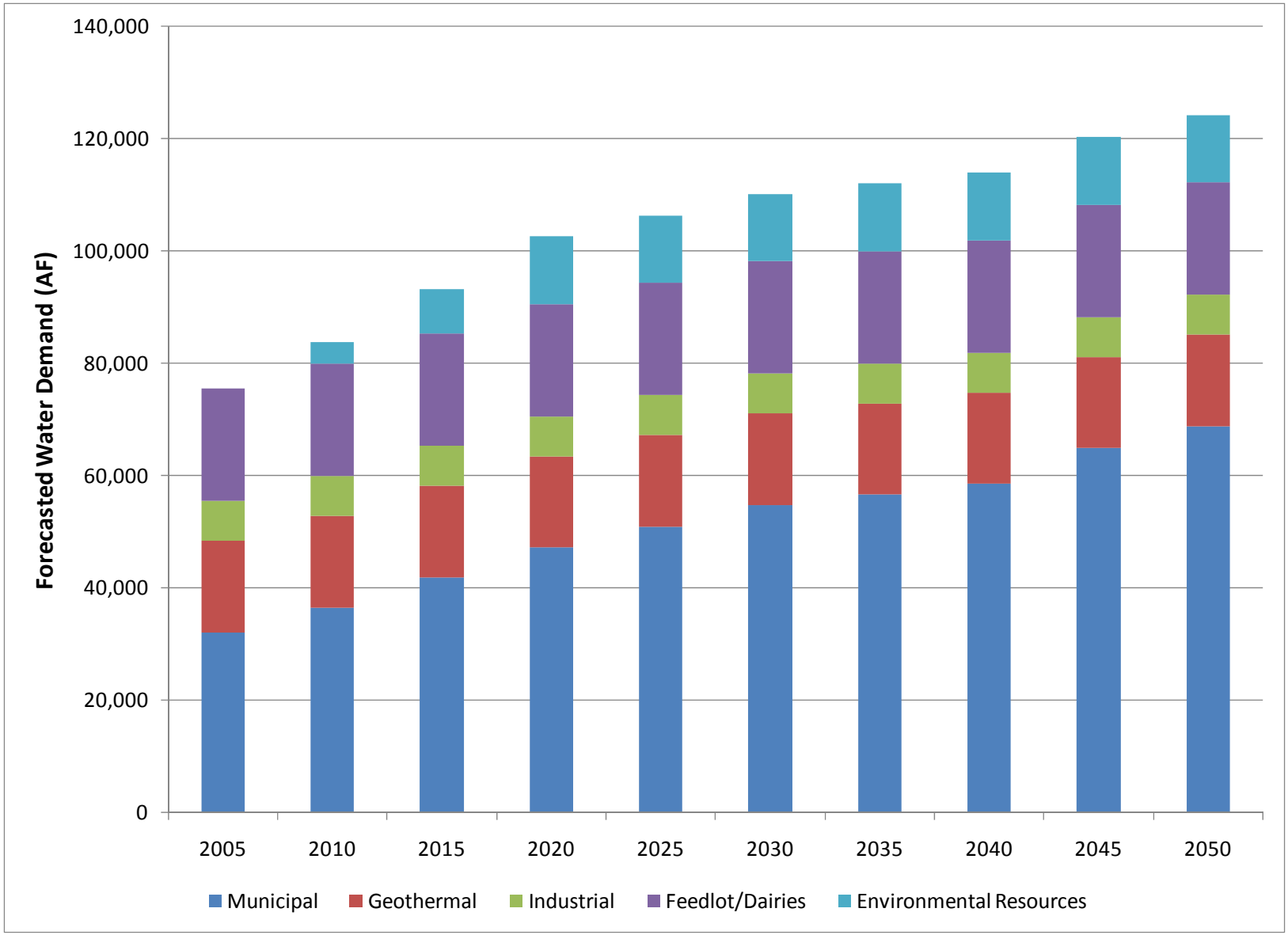

Figure 10. Low Future Water Demand Scenario

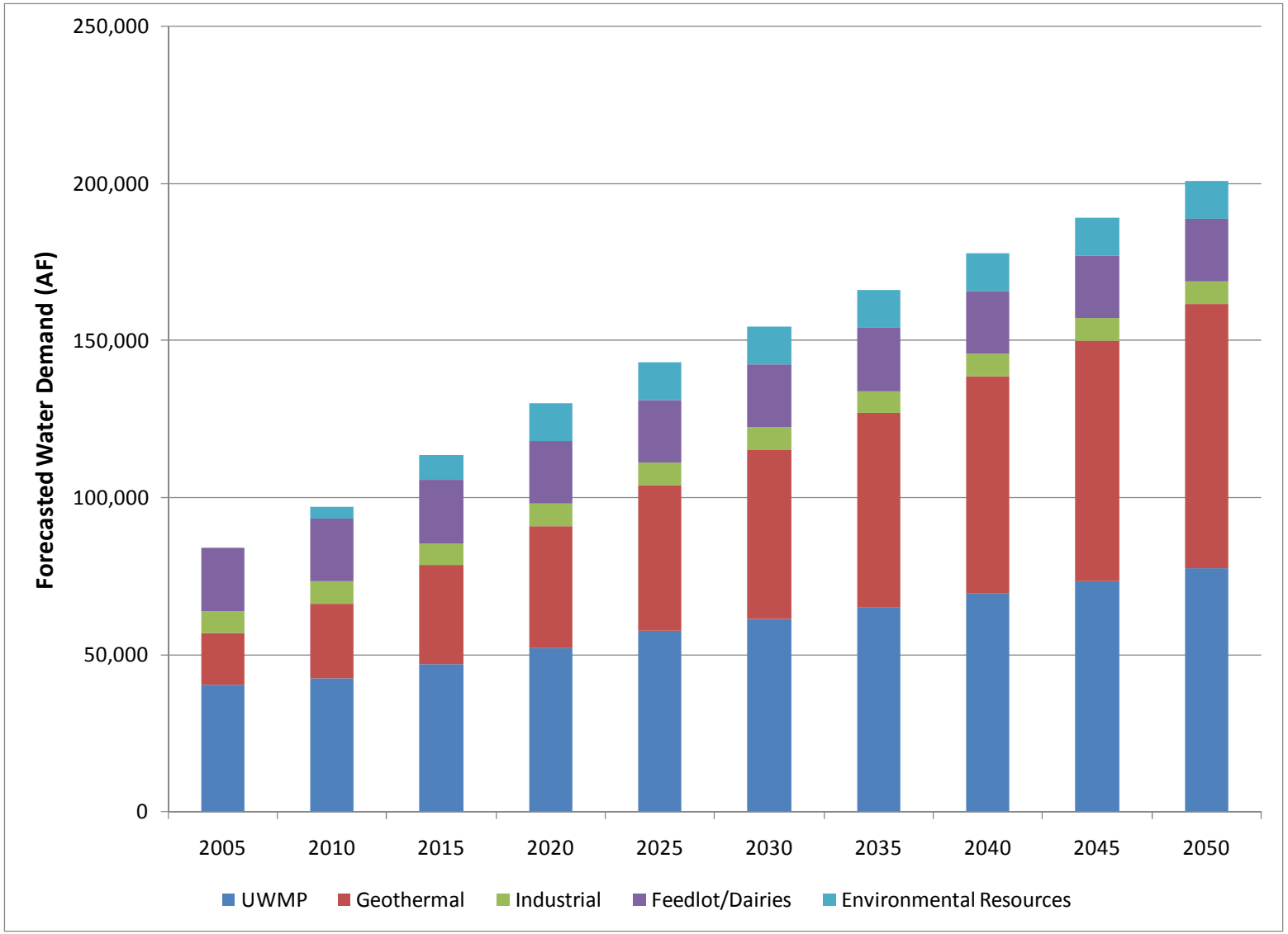

Figure 11. Medium Future Water Demand Scenario

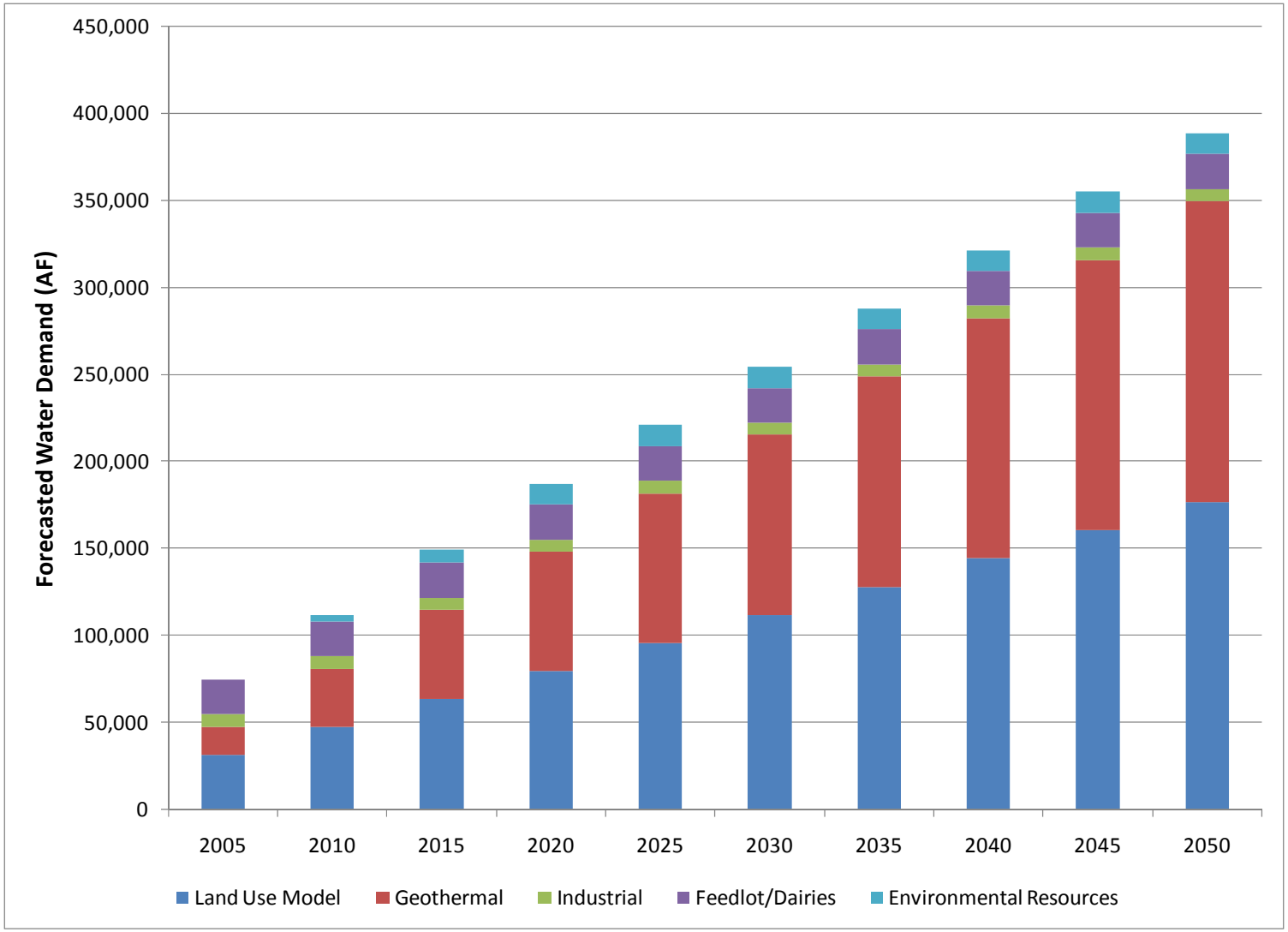

Figure 12. High Future Water Demand Scenario

It should be noted that UWMP values shown in Figure 5 include values developed from the SDI Apportionment model for the cities that did not develop an UWMP. These municipalities are: Holtville, Westmorland, Heber PUD, Seeley CWD, Centinela – CDCR, and Golden State WC. From Figure 6, total MCI demand nearly exceeds 350,000 by 2040.

Water Demand Outside the IID Boundary

Data were collected to estimate future water demand outside the IID boundary but within the Imperial Region planning boundary. However, data relating to water use were not readily available. In particular, groundwater pumping data were not available. Land use data were obtained from Imperial County as part of the 2009 IID water planning effort. This land use data were compared with data from aerial photographs and there was agreement between the two data sources (land use type per parcel). Using water use factors listed in Table 18, estimates of water use outside the boundary were determined. Table 24 lists the area per land use type outside the IID but within the planning boundary.

Table 24. Land Use Outside the IID

Land Use	Area (ac)
Agriculture	376
Commercial	743
Government/Special Public	1,826
Industrial	3,765
Open Space/Recreation	976,830
Residential	307
Vacant/Unidentified Use	2,902

It is assumed that commercial and residential have the same water use factor. From Table 18, this value was 2.7 acre-feet per acre. Government/Special Public refers to schools, roads, and maintenance areas. In the area outside the IID, this is nearly all roads. It is assumed for this analysis that water demand for this land use type is zero. Vacant and open space land use types are also assumed to have no water demand. The industrial land use category is not well suited for estimating water demand through this approach since industrial water use can vary greatly and is not related to acreage. Estimation of industrial water is excluded from this analysis. For agriculture, it is assumed that the 2009 IID Apportionment for agricultural users (5.25 acre-feet) is a reasonable factor for use in this analysis. Using these factors, the estimated water demand outside the IID but within the planning area is 4,809 acre-feet (2.7 ac-ft/ac * 743 ac + 2.7 ac-ft/ac * 307 ac + 5.25 ac-ft/ac * 376 ac).

The groundwater systems outside the IID service area in the West Mesa are in a state of overdraft. As part of the Water Element of the Imperial County General Plan, Imperial County is to "regulate land development and natural resource management to protect the limited but important areas of the County which contribute to groundwater recharge (Water Element of the Imperial County General Plan, 2009)." To be effective in this effort, Imperial County would need to limit or stop all future growth that depends on groundwater. As such, no forecasts of future demands for West Mesa were calculated and it is assumed that demand would remain the same in accordance with Imperial County policy. An exception

to this would be new demands for existing legal lots of record with presumed overlying rights to groundwater. The number of vacant parcels was not evaluated but if is believed that this increase in water demand would to be relatively small. Any new wells would be subject to the Imperial County groundwater ordinance, require County permits, and be consistent with the County General Plan policies. Likewise, future development would require a conditional use permit and would need to be consistent with the County General Plan.

Appendix A – Water Use Demand Estimated by per Capita Model using DoF Population Data

Table A-1 lists percentage demand per water use category for each urban area. Water use for 2007 and 2008 form the basis of the percentages for El Centro, Calexico, and Brawley. The City of Imperial 2005 UWMP is the basis for the remaining cities. Tables A-2 through A-11 list the water demand for each city.

Table A-1. Percentage of Demand per Water Use Category
Estimated Water Use by Category (%)

	Brawley	El Centro	Calexico	Imperial	Heber	Calipatria/ Niland	Holtville	Westmorland	Seeley
Residential	66	69	70	95	95	95	95	90	90
Commercial	9	21	15	3	3	3	3	10	10
Industrial	13	2	10	2	2	2	2	0	0
Parks	12	8	5	0	0	0	0	0	0

Table A-2. Water Use Demand for Brawley (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	4,600	4,720	5,800	5,908	6,881	7,005	8,124
Multi Family Res	244	250	308	314	365	372	431
Commercial	5,008	5,139	6,315	6,432	7,491	7,626	8,844
Industrial	495	508	624	636	740	754	874
Parks	5	5	6	6	7	8	9
Other	268	275	338	345	401	409	474
Total	10,621	10,898	13,391	13,640	15,885	16,172	18,755

Table A-3. Water Use Demand for El Centro (per Capital Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	5,941	6,096	7,490	7,630	8,885	9,046	10,491
Multi Family Res	1,018	1,045	1,284	1,307	1,523	1,550	1,798
Commercial	2,221	2,279	2,800	2,853	3,322	3,382	3,922
Industrial	131	135	166	169	197	200	232
Parks	285	292	359	366	426	434	503
Other	627	643	790	805	938	955	1,107
Total	10,223	10,490	12,890	13,130	15,290	15,567	18,053

Table A-4. Water Use Demand for Calexico (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	4,145	4,253	5,226	5,323	6,199	6,311	7,319
Multi Family Res	1,079	1,107	1,360	1,386	1,614	1,643	1,905
Commercial	826	847	1,041	1,061	1,235	1,258	1,458
Industrial	2	3	3	3	4	4	4
Parks	1,241	1,274	1,565	1,594	1,857	1,890	2,192
Other	49	51	62	63	74	75	87
Total	7,343	7,534	9,258	9,430	10,982	11,181	12,966

Table A-5. Water Use Demand for Imperial (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	2,410	2,473	3,039	3,096	3,605	3,670	4,257
Multi Family Res	452	464	570	580	676	688	798
Commercial	45	46	57	58	68	69	80
Industrial	45	46	57	58	68	69	80
Parks	-	-	-	-	-	-	-
Other	60	62	76	77	90	92	106
Total	3,013	3,092	3,799	3,870	4,507	4,588	5,321

Table A-6. Water Use Demand for Heber (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	1,041	1,176	1,329	1,502	1,697	1,918	2,167
Multi Family Res	195	221	249	282	318	360	406
Commercial	20	22	25	28	32	36	41
Industrial	20	22	25	28	32	36	41
Parks	-	-	-	-	-	-	-
Other	26	29	33	38	42	48	54
Total	1,301	1,470	1,661	1,877	2,121	2,397	2,709

Table A-7. Water Use Demand for Calipatria/Niland (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	2,417	2,524	3,054	3,172	3,672	3,817	4,403
Multi Family Res	453	473	573	595	689	716	826
Commercial	45	47	57	59	69	72	83
Industrial	45	47	57	59	69	72	83
Parks	-	-	-	-	-	-	-
Other	60	63	76	79	92	95	110
Total	3,021	3,155	3,818	3,965	4,590	4,771	5,503

Table A-8. Water Use Demand for Holtville (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	1,110	1,139	1,400	1,426	1,661	1,691	1,961
Multi Family Res	208	214	262	267	311	317	368
Commercial	21	21	26	27	31	32	37
Industrial	21	21	26	27	31	32	37
Parks	-	-	-	-	-	-	-
Other	28	28	35	36	42	42	49
Total	1,388	1,424	1,750	1,782	2,076	2,113	2,451

Table A-9. Water Use Demand for Westmorland (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	608	624	767	781	909	926	1,074
Multi Family Res	75	77	94	96	112	114	132
Commercial	62	64	78	80	93	95	110
Industrial	-	-	-	-	-	-	-
Parks	-	-	-	-	-	-	-
Other	15	16	19	20	23	23	27
Total	760	780	958	976	1,137	1,157	1,342

Table A-10. Water Use Demand for Seeley (per Capita Model with DoF Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	245	277	313	354	400	452	511
Multi Family Res	30	34	39	44	49	56	63
Commercial	25	28	32	36	41	46	52
Industrial	-	-	-	-	-	-	-
Parks	-	-	-	-	-	-	-
Other	6	7	8	9	10	11	13
Total	307	347	392	443	500	565	639

Appendix B – Water Use Demand Estimated by per Capita Model using IVAG Population Data

Table B-1. Water Use Demand for Brawley (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	4,141	4,489	5,200	6,097	6,798	7,309	7,641
Multi Family Res	220	238	276	324	361	388	405
Commercial	4,508	4,887	5,661	6,638	7,400	7,957	8,319
Industrial	446	483	559	656	731	786	822
Parks	4	5	6	7	7	8	8
Other	241	262	303	356	396	426	446
Total	9,560	10,364	12,005	14,077	15,694	16,875	17,641

Table B-2. Water Use Demand for El Centro (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	5,475	5,475	6,187	7,033	7,673	8,116	8,375
Multi Family Res	938	938	1,060	1,205	1,315	1,391	1,435
Commercial	2,047	2,047	2,313	2,630	2,869	3,034	3,131
Industrial	121	121	137	156	170	180	185
Parks	263	263	297	337	368	389	402
Other	605	605	684	777	848	897	925
Total	9,450	9,450	10,678	12,139	13,242	14,007	14,454

Table B-3. Water Use Demand for Calexico (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	4,050	4,050	4,488	5,239	5,801	6,187	6,409
Multi Family Res	1,054	1,054	1,168	1,364	1,510	1,610	1,668
Commercial	807	807	894	1,044	1,156	1,233	1,277
Industrial	2	2	3	3	3	4	4
Parks	1,213	1,213	1,344	1,569	1,738	1,853	1,919
Other	48	48	53	62	69	74	76
Total	7,175	7,175	7,951	9,281	10,277	10,961	11,353

Table B-4. Water Use Demand for Imperial (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	2,434	2,434	3,108	3,475	3,753	3,946	4,059
Multi Family Res	456	456	583	652	704	740	761
Commercial	46	46	58	65	70	74	76
Industrial	46	46	58	65	70	74	76
Parks	0	0	0	0	0	0	0
Other	61	61	78	87	94	99	101
Total	3,043	3,043	3,885	4,344	4,691	4,933	5,073

Table B-5. Water Use Demand for Heber (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	1,045	1,191	1,358	1,548	1,765	2,012	2,293
Multi Family Res	196	223	255	290	331	377	430
Commercial	20	22	25	29	33	38	43
Industrial	20	22	25	29	33	38	43
Parks	0	0	0	0	0	0	0
Other	26	30	34	39	44	50	57
Total	1,306	1,489	1,697	1,935	2,206	2,515	2,867

Table B-6. Water Use Demand for Calipatria/Niland (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	2,338	2,515	2,737	2,921	3,074	3,199	3,338
Multi Family Res	438	472	513	548	576	600	626
Commercial	44	47	51	55	58	60	63
Industrial	44	47	51	55	58	60	63
Parks	0	0	0	0	0	0	0
Other	58	63	68	73	77	80	83
Total	2,923	3,144	3,421	3,652	3,843	3,999	4,172

Table B-7. Water Use Demand for Holtville (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	1,041	1,041	1,093	1,169	1,226	1,263	1,281
Multi Family Res	195	195	205	219	230	237	240
Commercial	20	20	20	22	23	24	24
Industrial	20	20	20	22	23	24	24
Parks	0	0	0	0	0	0	0
Other	26	26	27	29	31	32	32
Total	1,301	1,301	1,366	1,462	1,532	1,578	1,602

Table B-8. Water Use Demand for Westmorland (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	602	602	676	770	842	893	923
Multi Family Res	113	113	127	144	158	167	173
Commercial	11	11	13	14	16	17	17
Industrial	11	11	13	14	16	17	17
Parks	0	0	0	0	0	0	0
Other	15	15	17	19	21	22	23
Total	752	752	845	963	1,053	1,116	1,154

Table B-9. Water Use Demand for Seeley (per Capita Model with IVAG Population)

	Estimated Demand (AF)						
	2010	2015	2020	2025	2030	2035	2040
Single Family Res	246	281	320	365	416	474	541
Multi Family Res	46	53	60	68	78	89	101
Commercial	5	5	6	7	8	9	10
Industrial	5	5	6	7	8	9	10
Parks	0	0	0	0	0	0	0
Other	6	7	8	9	10	12	14
Total	308	351	400	456	520	593	676