RECYCLED WATER DEMANDS

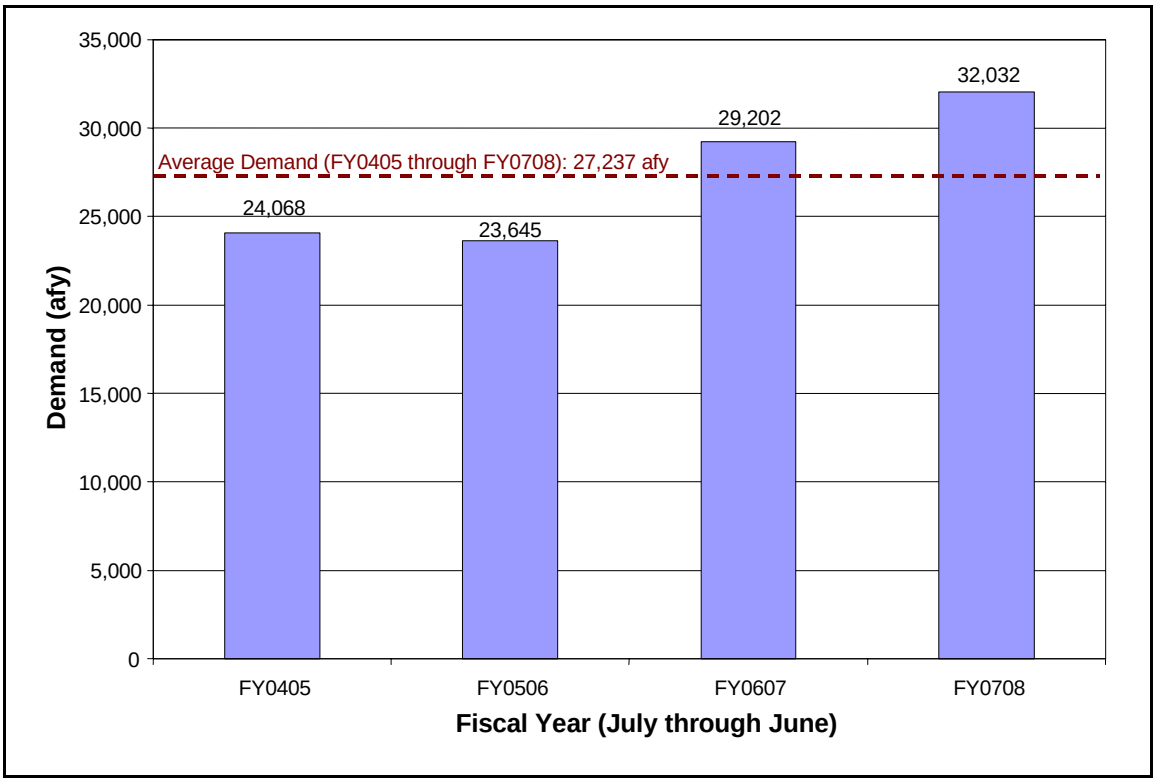
This chapter presents a discussion of the West Basin Municipal Water District (West Basin) recycled water demands. West Basin's historical recycled water demand is presented first, followed by a discussion of the recycled water demand factors and peaking factors that are used to estimate the recycled water demands of potential future recycled water customers. The projected recycled water demands are included at the end of the chapter.

3.1 HISTORICAL RECYCLED WATER DEMANDS

West Basin's existing recycled water customer sites and the existing recycled water distribution system are shown on Figure 3.2. The current recycled water customers can be divided into four user types: industrial, irrigation, mixed use, and barrier customers. Mixed use refers to customer that use recycled water for more than one usage type (e.g., irrigation and cooling towers).

The historical demand presented on Figure 3.1 is derived from West Basin's historical recycled water usage records for the last four years, fiscal year (FY) 2004/05 through FY 2007/08.

Figure 3.1
Historical Recycled Water Usage



As shown on Figure 3.1, the recycled water demands have increased from 24,068 to 32,032 acre-feet per year (afy) during this period, which equates to an average increase of nearly 7.5 percent per year. Based on FY2007/08, the existing average annual demand is 32,032 afy or 28.6 million gallons per day (mgd).

3.2 EXISTING CUSTOMERS

West Basin's customer database summarizes the historical consumption of all existing customers, and lists the customer type, water purveyor, and address information for each customer.

As of September 2008, West Basin serves over 200 customer connections with various types of recycled water qualities. The existing customer demands and usage types are summarized in Table 3.1. The distribution of the existing recycled water demand by customer type is also shown on Figure 3.3.

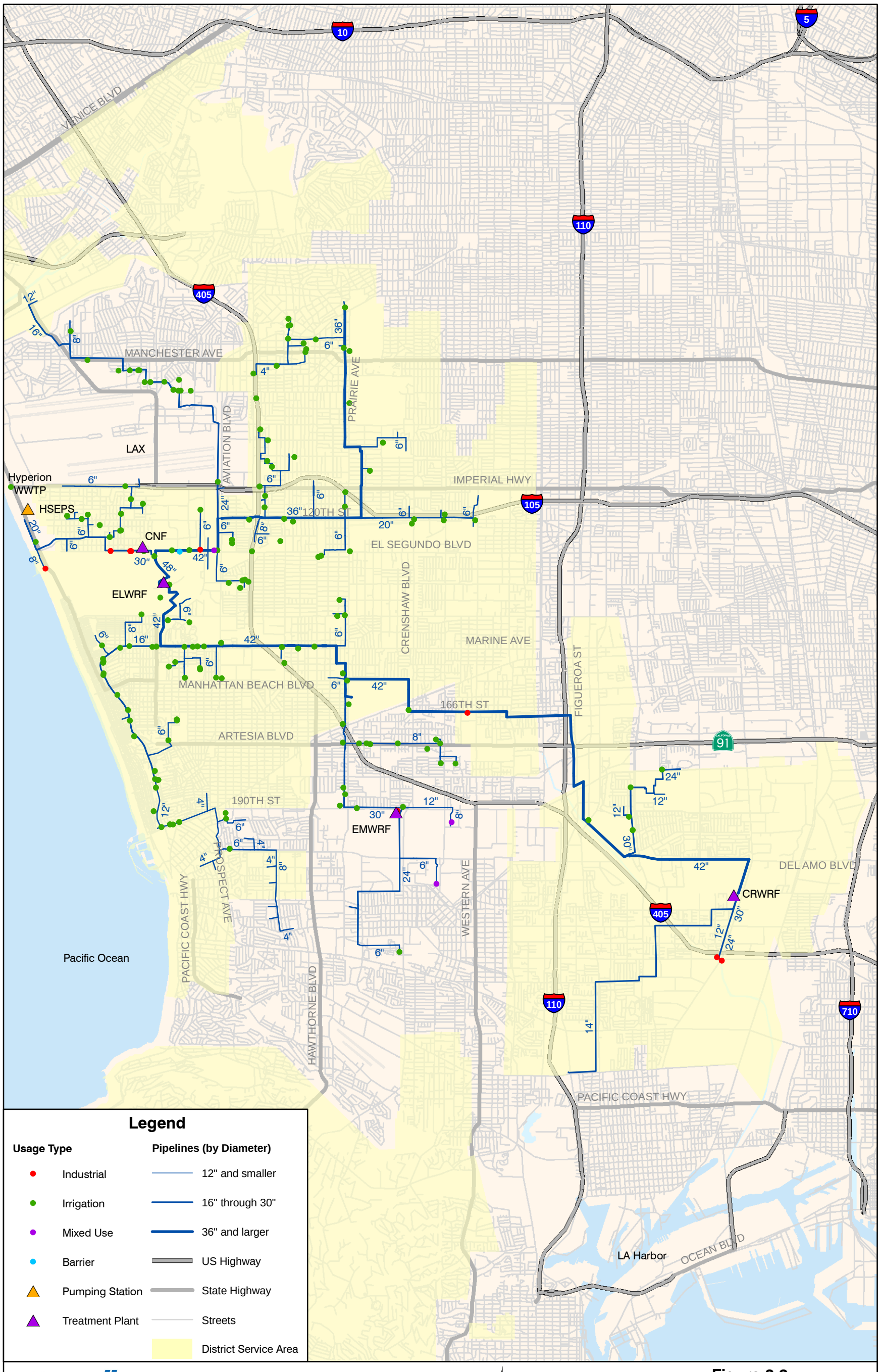
Table 3.1 Existing Demand by Usage Type
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Type	Usage Type Code	Customers	Demand[(1)] (afy)	Percent of Total (%)
Barrier	B	1	11,380	36
Industrial	IN	5	17,018	53
Irrigation	IR	165	3,257	10
Mixed Use	MU	4	205	<1
Total		**175**	**31,860**	**100**

Note:
(1) Based on the planning average demand (from Table 3.2)

As shown on Table 3.1 and Figure 3.3, the majority of the existing demand is categorized as Industrial, representing approximately 53 percent of the existing demand while the majority of customers are categorized as irrigation usage. This indicates that the industrial demands present a significant portion of overall recycled water usage and provide a solid baseline of usage within the West Basin's customer base.

The existing customers and their respective usage type and average annual demands are listed in Table 3.2. Table 3.2 also indicates the Database IDs that correspond with the detailed customer maps that are included in Appendix B. The customers listed in Table 3.2 are sorted based on the Database IDs to allow easy referencing with the customer maps.



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West Basin Municipal Water District
Capital Implementation Master Plan For Recycled Water Systems

Figure 3.2
Existing Recycled Water Customer by User Type

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E1	ExxonMobil Torrance Refinery - Cooling Towers	IN	No	4,136	408	1.2	4,135	4.38
E2	Chevron Nitrification Plant	IN	Yes	3,487	399	1.4	3,500	4.27
E3	bp Carson Refinery - Industrial RO Component	IN	Yes	2,783	394	1.7	2,800	4.22
E4	Chevron El Segundo Refinery - High Pressure Boiler Feed	IN	Yes	2,804	250	1.1	2,800	2.68
E5	ExxonMobil Torrance Refinery - Boiler Feed	IN	No	2,015	223	1.3	2,015	2.38
E6	Chevron El Segundo Refinery - Low Pressure Boiler Feed	IN	Yes	1,107	139	1.5	1,100	1.49
E7	bp Carson Refinery - Nitrified Component	IN	Yes	571	65	1.3	600	0.69
E8	Inglewood Park Cemetery	IR	Yes	469	89	2.3	470	0.96
E9	Victoria Golf Course	IR	Yes	235	59	2.8	250	0.63
E10	Chester Washington Golf Course	IR	Yes	227	50	2.6	230	0.53
E11	Cal State Univ Dominguez	IR	Yes	121	26	2.1	150	0.28
E12	Chevron El Segundo Refinery - Irrigation	IR	Yes	131	20	1.8	130	0.21
E13	Anschutz So Cal Sports (Home Depot Center)	IR	Yes	109	18	2.0	109	0.20
E14	Centinela (Vincent) Park	IR	Yes	105	18	2.1	105	0.20
E15	Toyota	MU	No	94	15	1.9	95	0.16
E16	LAX @ 6400 Westchester Parkway	IR	No	89	16	2.2	89	0.17
E17	Columbia Park	IR	No	88	19	2.6	96	0.22

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E18	So Cal Edison - El Segundo Generating Station	IN	Yes	67	11	1.9	67	0.11
E19	Hyperion Treatment Plant	IR	No	58	18	3.7	58	0.19
E20	American Honda	MU	No	50	8	2.2	50	0.10
E21	El Segundo Golf Course	IR	Yes	49	10	2.4	50	0.11
E22	Morningside School	IR	Yes	47	10	2.4	50	0.11
E23	Goodyear Airship Station	IR	Yes	44	12	3.4	44	0.13
E24	Loyola Marymount University	IR	No	21	16	4.5	43	0.17
E25	Westchester Park	IR	No	42	10	3.0	42	0.11
E26	Mira Costa High School	IR	Yes	38	6	1.9	38	0.06
E27	Dominguez Park	IR	Yes	36	7	2.2	36	0.07
E28	Recreation Park - El Segundo	IR	Yes	34	6	2.2	34	0.07
E29	Polliwog Park	IR	Yes	33	10	3.6	33	0.11
E30	LA Airforce Base Area B	MU	Yes	29	7	2.7	30	0.07
E31	ExxonMobil Torrance Refinery - Irrigation	IR	No	29	7	2.9	29	0.08
E32	Glasgow Park	IR	Yes	73	10	4.9	24	0.10
E33	Hermosa Greenbelt	IR	Yes	23	5	2.3	23	0.05
E34	Hawthorne Blvd/Marine	IR	Yes	22	4	2.1	22	0.04
E35	Alondra Park (West)	IR	Yes	20	5	2.9	20	0.05
E36	Avalon Median N/Elsmere	IR	Yes	20	3	1.9	20	0.03
E37	Hawthorne High School	IR	Yes	21	6	3.4	20	0.06

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E38	LAX @ 6662 West 88th St	IR	No	20	3	1.9	20	0.03
E39	Washington Park	IR	Yes	20	4	2.6	20	0.05
E40	Hermosa Valley Park II	IR	Yes	19	4	2.7	19	0.05
E41	Marine Avenue Park	IR	Yes	19	4	2.5	19	0.04
E42	Rogers Park	IR	Yes	19	3	2.0	19	0.03
E43	Grandview Elementary / Ladera	IR	Yes	6	1	2.0	18	0.03
E44	Pennekamp Elementary School	IR	Yes	13	2	1.5	18	0.02
E45	Center Elementary School	IR	Yes	17	5	3.2	17	0.05
E46	Scattergood Power Plant	IR	No	3	1	5.0	17	0.08
E47	Carl Neilson Youth Park	IR	No	16	3	2.2	16	0.03
E48	Condon Park (Lennox Park)	IR	Yes	8	2	1.1	16	0.02
E49	Hawthorne Medians	IR	Yes	16	2	1.5	16	0.02
E50	Holly Park	IR	Yes	16	3	2.3	16	0.03
E51	Middle School (prev LA Raiders Headquarters)	IR	Yes	16	4	2.9	16	0.04
E52	El Segundo High School	IR	Yes	15	3	2.3	15	0.03
E53	Lennox Middle School	IR	Yes	15	4	3.1	15	0.04
E54	Plaza El Segundo	IR	Yes	12	3	2.5	15	0.03
E55	Sports Park	IR	Yes	15	3	2.0	15	0.03
E56	Caltrans (I-405/La Cienega)	IR	Yes	14	11	3.8	14	0.05
E57	Guenser Park	IR	No	14	3	2.6	14	0.03

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E58	Mar Brad Middle School - La Marina Field	IR	Yes	14	3	2.1	14	0.03
E59	Rogers Anderson Park	IR	Yes	14	4	3.8	14	0.05
E60	Valley/Ardmore Greenbelt @ 19th St	IR	Yes	14	3	2.4	14	0.03
E61	Caroline Coleman Stadium	IR	Yes	13	3	2.9	13	0.03
E62	Lawndale Union High School District	IR	Yes	13	3	2.9	13	0.03
E63	Caltrans (I-405/Imperial)	IR	Yes	12	4	3.8	12	0.04
E64	Dana-Burnett Elementary School	IR	Yes	12	5	5.4	12	0.06
E65	Del Air Park	IR	Yes	12	3	2.6	12	0.03
E66	Federal Building - Hawthorne	IR	Yes	12	3	2.5	12	0.03
E67	Hughes Way Storm Drain Plant # 18	IR	Yes	12	6	5.6	12	0.06
E68	Leuzinger High School	IR	Yes	12	5	4.8	12	0.05
E69	Manhattan Studios	IR	Yes	12	2	1.6	12	0.02
E70	MB Middle School (Bell Ave South of Park)	IR	Yes	12	2	2.0	12	0.02
E71	Sunny Glenn Park	IR	No	12	2	2.2	12	0.02
E72	Caltrans (I-405/117th)	IR	Yes	10	3	3.4	10	0.03
E73	Manhattan Village Park	IR	Yes	9	2	2.4	10	0.02
E74	Marine Avenue Median	IR	Yes	4	1	2.0	10	0.02
E75	South Park - Hermosa Beach	IR	Yes	10	2	2.4	10	0.02
E76	Torrance Business Center	IR	No	10	2	1.9	10	0.02
E77	Valley/Ardmore Greenbelt @ 2nd	IR	Yes	10	2	2.6	10	0.02

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E78	Anza Elementary School	IR	Yes	13	4	5.1	9	0.04
E79	Clark Park	IR	Yes	9	2	2.2	9	0.02
E80	Hawthorne Memorial Park	IR	Yes	9	1	1.9	9	0.01
E81	Inglewood City Hall	IR	Yes	9	1	1.6	9	0.01
E82	Magruder Middle School	IR	No	9	2	3.1	9	0.02
E83	Sepulveda Elementary School	IR	Yes	9	2	2.5	9	0.02
E84	Valley/Ardmore Greenbelt @ Ardmore	IR	Yes	9	3	3.6	9	0.03
E85	Aviation Park	IR	Yes	9	2	3.3	8	0.02
E86	Caltrans (I-105/Van Ness)	IR	Yes	6	2	3.3	8	0.02
E87	Caltrans (I-105/York St)	IR	Yes	8	5	7.7	8	0.05
E88	Casimir School	IR	No	8	3	3.7	8	0.03
E89	The Edge at Campus El Segundo	IR	Yes	N/A	N/A	2.5	8	0.02
E90	Hermosa Valley Elementary School	IR	Yes	8	2	2.7	8	0.02
E91	Imperial Ave. Parkway	IR	Yes	8	1	2.1	8	0.02
E92	LAX @ 5985 Westchester Parkway	IR	No	8	1	1.8	8	0.01
E93	11310 Aviation Blvd	IR	No	7	2	2.9	7	0.02
E94	Begg Elementary School	IR	Yes	7	2	3.0	7	0.02
E95	Caltrans (I-405/135th)	IR	Yes	7	3	5.1	7	0.03
E96	El Segundo Library Park	IR	Yes	7	1	2.1	7	0.01
E97	Eucalyptus Avenue School	IR	Yes	7	1	2.3	7	0.01

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E98	Inglewood Water Treatment Plant	IR	Yes	7	1	1.7	7	0.01
E99	Jane Addams Park	IR	Yes	7	2	2.8	7	0.02
E100	McMaster Park	IR	No	7	2	3.1	7	0.02
E101	Robinson Elementary School	IR	Yes	7	2	3.9	7	0.02
E102	Valley/Ardmore Greenbelt @ M.B.B.S.	IR	Yes	7	1	2.2	7	0.01
E103	Center Park	IR	Yes	6	1	2.3	6	0.01
E104	Eucalyptus Park	IR	Yes	6	1	2.7	6	0.01
E105	LAX @ 6100 Will Rogers Street	IR	No	6	2	4.1	6	0.02
E106	Meadows Elementary School	IR	Yes	6	1	2.7	6	0.01
E107	Nash & Continental Medians	IR	Yes	6	1	2.1	6	0.01
E108	Richmond School	IR	Yes	6	2	3.3	6	0.02
E109	Arlington School	IR	No	5	1	3.4	5	0.02
E110	Buford Elementary School	IR	Yes	5	2	5.6	5	0.02
E111	Crozier Jr. High	IR	Yes	7	2	2.9	5	0.01
E112	Descanso Park	IR	No	5	1	2.9	5	0.01
E113	Hawthorne Intermediate School	IR	Yes	5	1	2.9	5	0.01
E114	Hughes Way Median	IR	Yes	5	1	2.3	5	0.01
E115	LAX @ 6100 Westchester Parkway Park	IR	No	6	1	2.5	5	0.01
E116	Market Street Medians	IR	Yes	5	1	1.3	5	0.01
E117	Valley/Ardmore Greenbelt @ 8th St	IR	Yes	5	1	3.2	5	0.01

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E118	York Avenue School	IR	Yes	5	1	3.2	5	0.01
E119	Marine & Sepulveda Median	IR	Yes	5	1	2.9	4	0.01
E120	Bell Industries	IR	Yes	4	1	2.5	4	0.01
E121	Cabrillo Elementary School	IR	Yes	4	2	4.7	4	0.02
E122	Caltrans (I-405/Redondo Beach)	IR	Yes	4	3	2.4	4	0.01
E123	Florence Median	IR	Yes	4	1	2.0	4	0.01
E124	Hermosa Beach Community Center	IR	Yes	4	1	2.6	4	0.01
E125	LAX @ 5990 Westchester Parkway	IR	No	4	1	2.9	4	0.01
E126	Marine Avenue Median	IR	Yes	1	1	2.0	4	0.01
E127	MB Fire & Police Landscape	IR	Yes	1	1	3.2	4	0.01
E128	Queen Park	IR	Yes	4	1	2.5	4	0.01
E129	Caltrans (I-405/El Segundo)	IR	Yes	3	2	6.0	3	0.02
E130	El Segundo Medians	IR	Yes	3	1	2.6	3	0.01
E131	LAX @ 6101 Westchester Parkway Park	IR	No	3	1	4.7	3	0.01
E132	Lowe's	IR	Yes	3	1	3.4	3	0.01
E133	Maryland Hilltop Park	IR	Yes	2	1	1.8	3	<0.01
E134	Valley/Ardmore Greenbelt @ 15th St	IR	Yes	3	1	2.8	3	0.01
E135	190th St./Prospect Ave Medians	IR	Yes	2	0	2.1	2	<0.01
E136	Artesia Blvd / Kornblum	IR	No	2	1	3.4	2	0.01
E137	Artesia Blvd / Prairie	IR	No	2	0	2.4	2	<0.01

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E138	Artesia Blvd / Van Ness	IR	No	2	1	3.2	2	0.01
E139	Artesia Blvd median	IR	No	2	1	4.6	2	0.01
E140	Caltrans (I-405/Century)	IR	Yes	2	2	11.6	2	0.02
E141	Caltrans (I-405/Inglewood)	IR	Yes	2	2	12.0	2	0.02
E142	Del Taco DT895	IR	Yes	2	2	11.0	2	0.02
E143	Felton Elementary School	IR	Yes	1	1	4.2	2	0.01
E144	Holly Glen Park	IR	Yes	2	0	2.2	2	<0.01
E145	Jefferson School	IR	Yes	2	1	4.0	2	0.01
E146	LAX @ 6440 West 88th St Median	IR	No	2	1	2.7	2	<0.01
E147	LAX @ 6450 West 88th St Sound Wall	IR	No	2	0	2.2	2	<0.01
E148	Live Oak Park	IR	Yes	2	1	3.3	2	0.01
E149	Marine & Herrin Median	IR	Yes	2	0	2.0	2	<0.01
E150	MB Unified School District Admin	IR	Yes	2	1	2.5	2	<0.01
E151	Rosecrans Medians @ Pine	IR	Yes	2	1	3.4	2	0.01
E152	Sycamore Park	IR	Yes	2	1	2.9	2	0.01
E153	Washington Avenue School	IR	Yes	2	1	3.5	2	0.01
E154	190th St, 3403 - Median	IR	No	<1	<1	7.1	1	0.01
E155	Crenshaw Lumber	IN	Yes	1	1	8.8	1	0.01
E156	Del Aire Assembly of God	IR	Yes	1	1	8.0	1	0.01
E157	Falda Ave	IR	Yes	1	2	3.6	1	<0.01

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E158	Hermosa Beach Library And City Hall	IR	Yes	1	0	2.4	1	<0.01
E159	Herondo/Francisca Median	IR	Yes	1	0	3.2	1	<0.01
E160	LAX @ 6147 Westchester Parkway Park	IR	No	1	0	2.0	1	<0.01
E161	LAX @ 6525 West 88th St	IR	No	1	0	4.3	1	<0.01
E162	Marine Triangle Median	IR	Yes	1	0	4.1	1	<0.01
E163	PCH/Herondo-King Harbor Park	IR	Yes	1	1	9.7	1	0.01
E164	The Parking Spot	IR	No	1	0	1.7	1	<0.01
E165	Redondo Union High School	IR	Yes	N/A	N/A	2.7	34	0.08
E166	Aerospace	MU	Yes	N/A	N/A	2.5	30	0.07
E167	Hawthorne Municipal Airport	IR	Yes	<1	0	6.8	0	<0.01
E168	PCH/190th Street Median	IR	Yes	<1	<1	3.6	0	<0.01
E169	Redondo Technology Center	IR	Yes	4	1	2.6	4	0.01
E170	City Storm Water Detention	IR	Yes	<1	0	3.3	0	<0.01
E171	Storm Drain Plant 17	IR	Yes	<1	0	1.9	1	<0.01
E172	Caltrans (1-105 / Crenshaw)	IR	Yes	6	4	4.4	10	0.04
E173	City Service Yard	IR	Yes	<1	0	4.8	0	<0.01
E174	Grevillea Mall Park	IR	Yes	4	1	2.9	4	0.01
E175	Hollywood Park	IR	Yes	18	3	1.8	18	0.03
E176	1508 Aviation	IR	Yes	<1	0	2.1	0	<0.01
E177	2202 Aviation	IR	Yes	<1	0	2.4	1	<0.01

Table 3.2 Existing Customers
Capital Implementation Master Plan
West Basin Municipal Water District

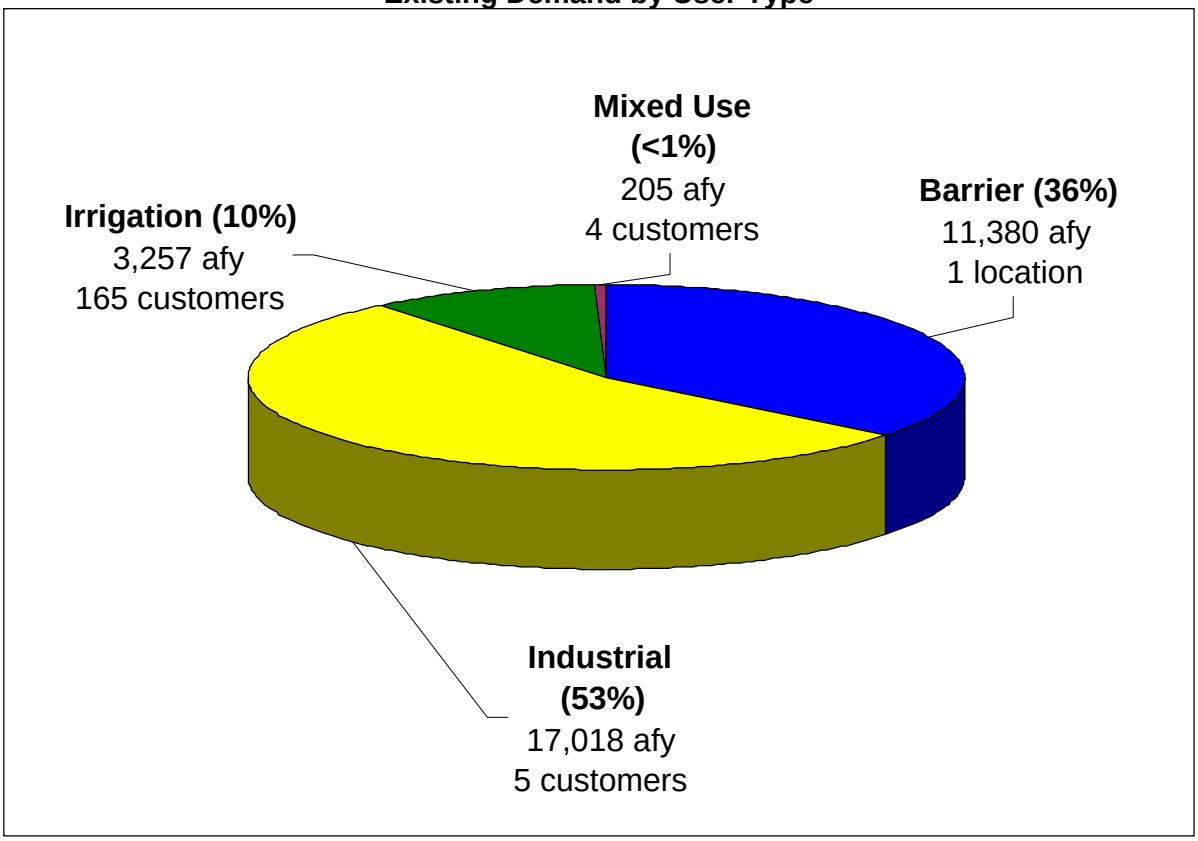
Database ID[1]	Customer Name	Usage Type Code[2]	Service Area	Average Historic Demand (afy)[3]	Maximum Month Demand[3] (acre-feet)	Seasonal Peaking Factor[4]	Planning Average Annual Demand[5] (afy)	Planning Maximum Month Demand (mgd)
E178	Dorsey Field	IR	Yes	8	2	2.2	8	0.02
E179	Voorhees Sump	IR	Yes	<1	<1	2.6	1	<0.01
E180	City of Lawndale	IR	Yes	<1	1	11.5	1	0.01
E181	West Coast Barrier	B	Yes	7,104	1,075	1.0	11,380	10.16
Total (Customers in Service Area[7])				20,495	2,910		25,037	30.01
Total (Customers Outside Service Area[7])				6,723	769		6,824	8.41
Total				**27,218**	**3,680**	**1.4[6]**	**31,860**	**38.42**

Notes:
(1) The locations of these customers are depicted on detailed customer maps in Appendix B.
(2) IR = Irrigation; IN = Industrial; MU = Mixed Use; B = Barrier
(3) Calculated using historical monthly billing records from FY2004/05 through FY 2007/08. For customers which were connected after FY2004/05, average was only calculated for period of connection. Source: Historical Usage by Customer (West Basin, 2008). N/A indicates no historical data available.
(4) Maximum Month Demand divided by Average Historic Demand, corrected for variation in the number of days in each month. In some cases, peaking factors were adjusted to correct erroneous billing data. For future planning years, seasonal peaking factors over 3.0 were reduced to 3.0.
(5) Existing Demand established in the customer database through consultation with West Basin staff. Customer Database can be found in Appendix C.
(6) Based on weighted demand of all customers by historical average use.
(7) Service area designation is included in the customer database in Appendix C and was established based on consultation with West Basin staff.

The seasonal peaking factors listed in Table 3.2 are based on the average maximum month peaking factor obtained from historical records of the last four fiscal years.

As shown in Table 3.2, the total planning demand of the existing customers is 31,860 afy or 28.4 mgd. Using the seasonal peaking factors of each customer, this corresponds to a maximum day demand of 38.4 mgd. As shown in Table 3.2, the aggregate seasonal peaking factor representing maximum month demand for all existing customers is calculated to be 1.4. In this study, it is assumed that the seasonal peaking factors, which are based on the maximum month demand also represent the maximum day demands. Based on discussions with West Basin staff, it was determined that this was reasonable since high demand periods in West Basin's recycled water systems extend over longer periods than those experienced in potable water systems. A more detailed discussion on the use of maximum month versus maximum day demand is provided in Section 3.4.2.1.

Figure 3.3
Existing Demand by User Type



It should be noted that the number of Database IDs shown in Table 3.2 does not exactly correspond to the number of customers served by West Basin, since demands for customers receiving multiple types of recycled water are listed individually by water quality type in Table 3.2.

West Basin provides five different types of recycled water qualities specifically processed to accommodate its existing customer needs. Customers historically receiving multiple types of recycled water, as well as customers using recycled water for multiple applications, are listed in Table 3.3. Table 3.3 lists four types of recycled water qualities. The fifth type is Barrier Water, a specific water quality for injection into the West Coast Seawater Barrier.

Table 3.3 Existing Multi-Use Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Title 22			Nitrified (afy)	Industrial RO (afy)	Industrial RO Ultra (afy)
	Irrigation (afy)	Non-Potable (afy)	Cooling (afy)			
bp Carson Refinery	0	0	0	571	2,783	0
Chevron El Segundo Refinery	131	0	0	3,487	1,107	2,804
Los Angeles Air Force Base (Area B)(1)	12	17	0	0	0	0
American Honda(1)	18	3	30	0	0	0
Toyota Campus(1)	24	14	56	0	0	0
ExxonMobil Torrance Refinery	29	0	0	4,136	2,015	0
Total	**213**	**34**	**86**	**8,194**	**5,905**	**2,804**

Note:
(1) Approximate breakdown. Exact usage for different types is not metered for billing.

As shown in Table 3.3, of the customers using multiple types of recycled water, the Nitrified water is the most significant, with nearly 8,200 afy used on average. Industrial RO water is the second most significant type, with approximately 5,900 afy used on average. Water demands shown in Table 3.3 are calculated using historical monthly billing records from FY2004/05 through FY 2007/08.

3.3 POTENTIAL FUTURE CUSTOMERS

West Basin staff provided a list of potential customers and their estimated demands. The potential demands, along with the probability and potential timing of providing recycled water services to these customers were determined in collaboration with the West Basin staff. A total of 120 potential new customers were identified, as presented in Table 3.4. The locations of these potential customers are shown on Figure 3.4, and detailed maps can be found in Appendix B showing Database IDs for all existing and potential customers. The Database IDs for the potential new customers are indicated with prefix “P”, while the Database IDs for the existing customers are indicated with a prefix “E”. Customers with an estimated demand greater than 100 afy are indicated with their Database ID on Figure 3.4. The potential customers in Table 3.4 are sorted based on Likelihood of Service from highest probability to lowest probability of service connection, then by year of anticipated service and Database ID.

The estimated demand for the potential customers is based on historical potable water usage, as available. For customers without proper historical data, demands are estimated based on discussions with the potential customer and/or water demand factors discussed in Section 3.4. The seasonal peaking factors listed Table 3.4 are based on analysis conducted on historical billing records from existing customers of similar types. It is assumed that seasonal peaking factors for existing customers with current seasonal peaking factors over 3.0 will be reduced to 3.0, based on efforts by West Basin to work with customers to manage the hours of operation to reduce excessive peaking in the system. Seasonal peaking factors were assigned by usage type and are further discussed in Section 3.4.2.1.

As shown in Table 3.4, the total estimated demand of all potential customers is 50,413 afy. However, when the likelihood of service for these customers is multiplied with the estimated demand, the combined demand of all potential customers is reduced to 33,216 afy. As it is unknown at this time which customers will not receive recycled water, the proposed systems are sized for all potential customers.

As shown in Table 3.4, the estimated demand of potential customers is evenly distributed between customers within (25,826 afy) and outside (24,587 afy) West Basin’s service area.

Table 3.4 Potential Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Database ID[1]	Usage Type Code[2]	Likelihood of Service	Anticipated Year of Service	Estimated Future Demand[3] (afy)	Seasonal Peaking Factor
Entradero Park	P1A-1	IR	90%	2009	25	2.5
West Torrance High School	P1A-2	IR	90%	2009	30	2.5
Victor Elementary School	P1A-3	IR	90%	2009	13	2.5
St. James Catholic School	P1A-4	IR	90%	2009	5	2.5
Victor Park	P1A-5	IR	90%	2009	15	2.5
Paradise Park	P1A-6	IR	90%	2009	9	2.5
Anza Elementary School	P1A-7	IR	90%	2009	9	2.5
Jefferson Middle School	P1A-8	IR	90%	2009	7	2.5
Raytheon (Hughes)	P2	IR	90%	2009	80	2.5
El Camino College	P3	IR	90%	2009	40	2.5
Inglewood High School	P41	IR	90%	2009	23	2.5
Monroe Jr High School	P49	IR	90%	2009	11	2.5
Clyde Woodworth Elem	P54	IR	90%	2009	8	2.5
Ashwood Park	P57	IR	90%	2009	5	2.5
Vincent Park	P58	IR	90%	2009	2	2.5
Cal Trans I-405 / Hillcrest (near Manchester)	P60	IR	90%	2009	10	2.5
The Pointe at South Bay	P66	IR	90%	2009	10	2.5
Jim Thorpe Park	P70	IR	90%	2009	19	2.5

Table 3.4 Potential Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Database ID[1]	Usage Type Code[2]	Likelihood of Service	Anticipated Year of Service	Estimated Future Demand[3] (afy)	Seasonal Peaking Factor
Pier Avenue	P72	IR	90%	2009	5	2.5
El Segundo Power Plant	P13A	IN	90%	2010	325	1.0
Imperial Ave	P36	IR	90%	2010	26	2.5
Equinix	P61A	IN	90%	2010	100	1.0
Mattel Lateral	P73	IN	90%	2010	15	1.0
Chevron Expansion - Nitrification Component	P10A	IN	90%	2011	1,706	1.4
Chevron Expansion - High Pres Boiler Feed Component	P10B	IN	90%	2011	419	1.1
Chevron Expansion - Low Pres Boiler Feed Component	P10C	IN	90%	2011	210	1.5
Hollywood Park Development	P15	IR	90%	2011	200	2.5
Playa Vista	P59	IR	90%	2011	150	2.5
Equinix	P61B	IN	90%	2011	100	1.0
West Coast Barrier	P7	B	90%	2011	5,600	1.0
bp Carson Refinery - Industrial RO Component	P5	IN	90%	2012	5,980	1.3
LADWP Harbor Area	P6A-1	IN	90%	2012	9,000	1.4
LADWP Harbor Area	P6A-2	IR	90%	2012	300	2.5
bp Carson Refinery - Nitrified Component	P8	IN	90%	2012	7,111	1.3
Bishop Montgomery High School	P1B-1	IR	90%	2013	14	2.5
Lomita Park Extension	P1B-10	IR	90%	2013	5	2.5
Lomita Blvd Median	P1B-11	IR	90%	2013	1	2.5

Table 3.4 Potential Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Database ID[1]	Usage Type Code[2]	Likelihood of Service	Anticipated Year of Service	Estimated Future Demand[3] (afy)	Seasonal Peaking Factor
Bishop Montgomery Retention Basin	P1B-2	IR	90%	2013	20	2.5
Ocean Avenue Retention Basin	P1B-3	IR	90%	2013	18	2.5
La Paloma Park	P1B-4	IR	90%	2013	2	2.5
Arnold Elementary School	P1B-5	IR	90%	2013	5	2.5
Seaside Elementary	P1B-6	IR	90%	2013	6	2.5
Sea Aire Golf Course	P1B-7	IR	90%	2013	15	2.5
Calle Mayor Middle School	P1B-8	IR	90%	2013	5	2.5
South Torrance High School	P1B-9	IR	90%	2013	25	2.5
El Segundo Power Plant	P13B	IN	90%	2015	300	1.0
Kobata Nursery	P69	IR	75%	2008	20	2.5
Marriott Golf Course	P30	IR	75%	2009	42	2.5
Pet Haven	P78	IR	75%	2009	8	2.5
Cal Trans I-105 / Western	P65	IR	75%	2010	10	2.5
Grammercy Toyota	P71	IR	75%	2010	8	2.5
Carson Mall Development	P37	IR	75%	2011	25	2.5
Campus El Segundo	P62	MU	75%	2011	100	1.7
LA Southwest College	P64	IR	75%	2011	50	2.5
Victoria Park	P29	IR	75%	2014	50	2.5
Carson Medians	P99	IR	50%	2009	2	2.5
Virco	P101	IN	50%	2010	10	1.3
Alondra Golf Course	P14	IR	50%	2010	300	2.5
USD Redondo Beach	P26	IR	50%	2010	10	2.5

Table 3.4 Potential Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Database ID[1]	Usage Type Code[2]	Likelihood of Service	Anticipated Year of Service	Estimated Future Demand[3] (afy)	Seasonal Peaking Factor
Torrance USD West Torrance High School	P39	IR	50%	2010	25	2.5
Toyota - North Campus	P45	IR	50%	2010	20	2.5
Toyota - North Campus Cooling Towers	P46	IN	50%	2010	20	1.3
Dominguez Tech Center	P79	IR	50%	2010	100	2.5
Del Amo Park	P48	IR	50%	2011	11	2.5
Mills Park	P52	IR	50%	2011	10	2.5
Kilroy Airport Center	P74	IN	50%	2011	30	1.0
Texollini	P17	IN	50%	2013	200	1.3
Manhattan Heights Park	P56	IR	50%	2013	4	2.5
Boeing	P67	IN	50%	2013	70	1.3
Del Amo Medians	P68	IR	30%	2010	5	2.5
Peters Nursery	P38	IR	30%	2012	25	2.5
Caltrans (110/190th St)	P50	IR	30%	2013	10	2.5
Caltrans (405/Main St)	P51	IR	30%	2013	10	2.5
Cal Trans I-405 / Artesia Blvd	P53	IR	30%	2013	8	2.5
Carson Community Center	P86	IR	30%	2013	21	2.5
City of Carson	P87	IR	30%	2013	21	2.5
Andrew Carnegie Middle School	P88	IR	30%	2013	20	2.5
Caltrans (91/Fig)	P25	IR	30%	2014	69	2.5
Caltrans (110/182nd St)	P31	IR	30%	2015	36	2.5
Rowley Park	P102	IR	30%	2018	31	2.5

Table 3.4 Potential Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Database ID[1]	Usage Type Code[2]	Likelihood of Service	Anticipated Year of Service	Estimated Future Demand[3] (afy)	Seasonal Peaking Factor
City of Carson Police Station	P85	IR	30%	2018	21	2.5
Rhodia	P12A	IN	30%	2020	457	1.0
Solec	P19	IN	30%	2020	174	1.0
Marriot Textile Service (Sodexho)	P22	IN	30%	2020	100	1.2
Western Tube Corporation	P28	IN	30%	2020	56	1.3
SAMYANG USA	P32	IN	30%	2020	33	1.3
Edmund Kim Productions	P33	IN	30%	2020	31	1.3
Caltrans (D07)	P47	IR	30%	2020	13	2.5
Dominguez Gap Barrier	P9A	B	30%	2025	2,000	1.0
LADWP Westside Demand	P100	IR	30%	2030	4,000	2.5
Kenneth Hahn State Park	P117	IR	30%	2030	1,500	2.5
Dominguez Gap Barrier	P9B	B	30%	2030	1,500	1.0
Pete's Nursery	P76	IR	25%	2012	25	2.5
MB Nursery	P77	IR	25%	2012	25	2.5
Anderson Park	P91	IR	20%	2010	19	2.5
Carson Park	P92	IR	20%	2013	15	2.5
City of Carson Corporate Maintenance Yard	P96	IR	20%	2013	10	1.5
Dolphin Park	P97	IR	20%	2013	16	2.5
Fukai (Recreation) Park	P103	IR	20%	2018	7	2.5
Freeman Park	P104	IR	20%	2018	3	2.5
Bell Park	P105	IR	20%	2018	3	2.5

Table 3.4 Potential Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Database ID[1]	Usage Type Code[2]	Likelihood of Service	Anticipated Year of Service	Estimated Future Demand[3] (afy)	Seasonal Peaking Factor
Arthur Lee Johnson Memorial Park	P106	IR	20%	2018	33	2.5
Thornburg Park	P107	IR	20%	2018	4	2.5
Gardena High School	P108	IR	20%	2018	27	2.5
Serra High School	P109	IR	20%	2018	18	2.5
Vermont Medians	P114	IR	20%	2018	24	2.5
LAUSD - Peary Jr High	P44	IR	20%	2018	20	2.5
Calas Park	P89	IR	20%	2018	20	2.5
Caltrans I-405/190th St.	P93	IR	20%	2018	14	1.5
General Scott Park	P94	IR	20%	2020	14	2.5
Dominguez Hills Golf Course	P75	IR	10%	2012	25	2.5
Stephen M White Middle School	P80	IR	10%	2013	29	2.5
Caltrans I-405/Figueroa St.	P81	IR	10%	2013	28	1.5
Caltrans I-405/Edgar St.	P84	IR	10%	2013	23	1.5
LACMTA	P34	IN	10%	2017	30	1.3
Prime Wheel	P35	IN	10%	2018	27	1.3
Carson High School	P98	IR	10%	2018	41	2.5
One Hundred Fifty Third Street E	P110	IR	10%	2020	3	2.5
Crescendo Charter School	P111	IR	10%	2020	1	2.5
Roosevelt Cemetery	P112	IR	10%	2020	93	2.5
C Star Nursery	P113	IR	10%	2020	14	2.5
Rosecrans Recreation Center	P115	IR	10%	2020	24	2.5
Moneta Nursery	P116	IR	10%	2020	8	2.5

Table 3.4 Potential Customers
Capital Implementation Master Plan
West Basin Municipal Water District

Customer Name	Database ID[1]	Usage Type Code[2]	Likelihood of Service	Anticipated Year of Service	Estimated Future Demand[3] (afy)	Seasonal Peaking Factor
Palos Verdes - Palos Verdes Golf Course	P11A	IR	10%	2020	188	2.5
Palos Verdes - Landfill	P11B	IR	10%	2020	150	2.5
Palos Verdes - Rolling Hills Country Club	P11C	IR	10%	2020	100	2.5
Palos Verdes - Green Hills Memorial	P11D	IR	10%	2020	233	2.5
Palos Verdes - Naval Reservation	P56	IR	10%	2020	50	2.5
Veterans Park and Sports Complex	P82	IR	10%	2020	27	2.5
Caltrans I-110 & Del Amo Blvd.	P83	IR	10%	2020	23	1.5
Stevenson Park	P90	IR	10%	2020	19	2.5
Carriage Crest Park	P95	IR	10%	2020	10	1.5
LADWP Harbor Area	P6B	IN	10%	2030	5,700	1.4
TRW - E/D Sector (Northrop Grumman Space Technology)	P18	IR	5%	2020	20	2.5
Total (Customers Located Inside Service Area[8])					**25,826**	**1.3**
Total (Customers Located Outside Service Area[8])					**24,587**	**1.6**
Total					**50,413**	**1.5**

Notes:
(1) The locations of these customers are depicted on detailed customer maps in Appendix B. Additional details are shown in the customer database in Appendix C.
(2) IR = Irrigation; IN = Industrial; MU = Mixed Use; B = Barrier
(3) Source: Customer Database Development Workshop.

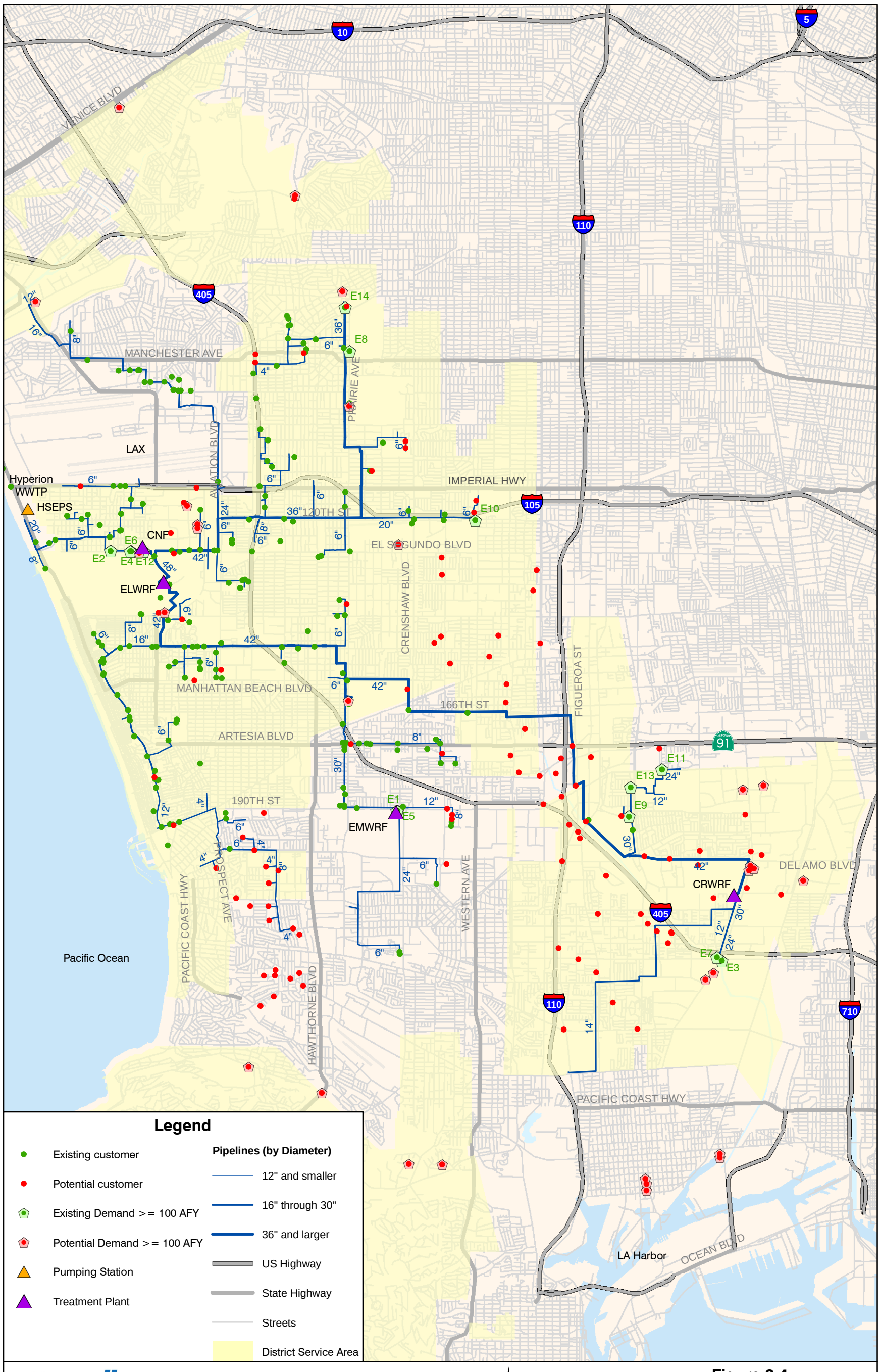


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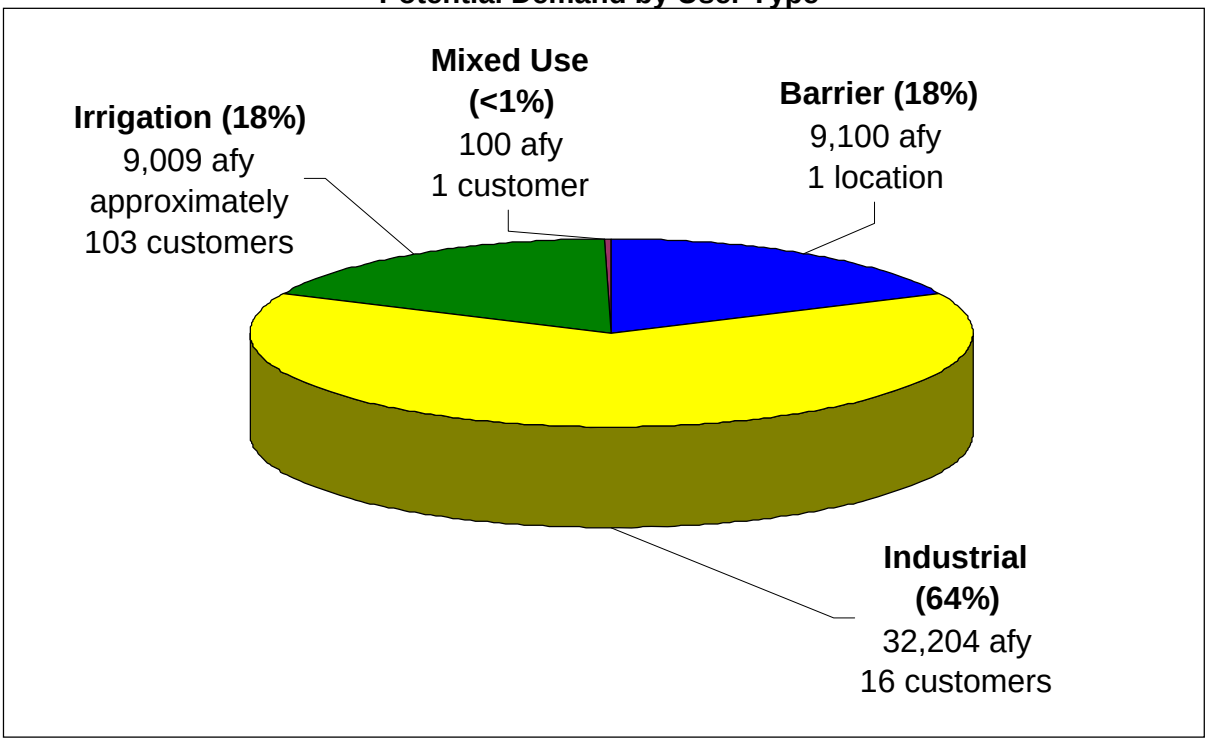
Figure 3.4
Existing and Potential Recycled Water Customers

West Basin Municipal Water District
Capital Implementation Master Plan For Recycled Water Systems

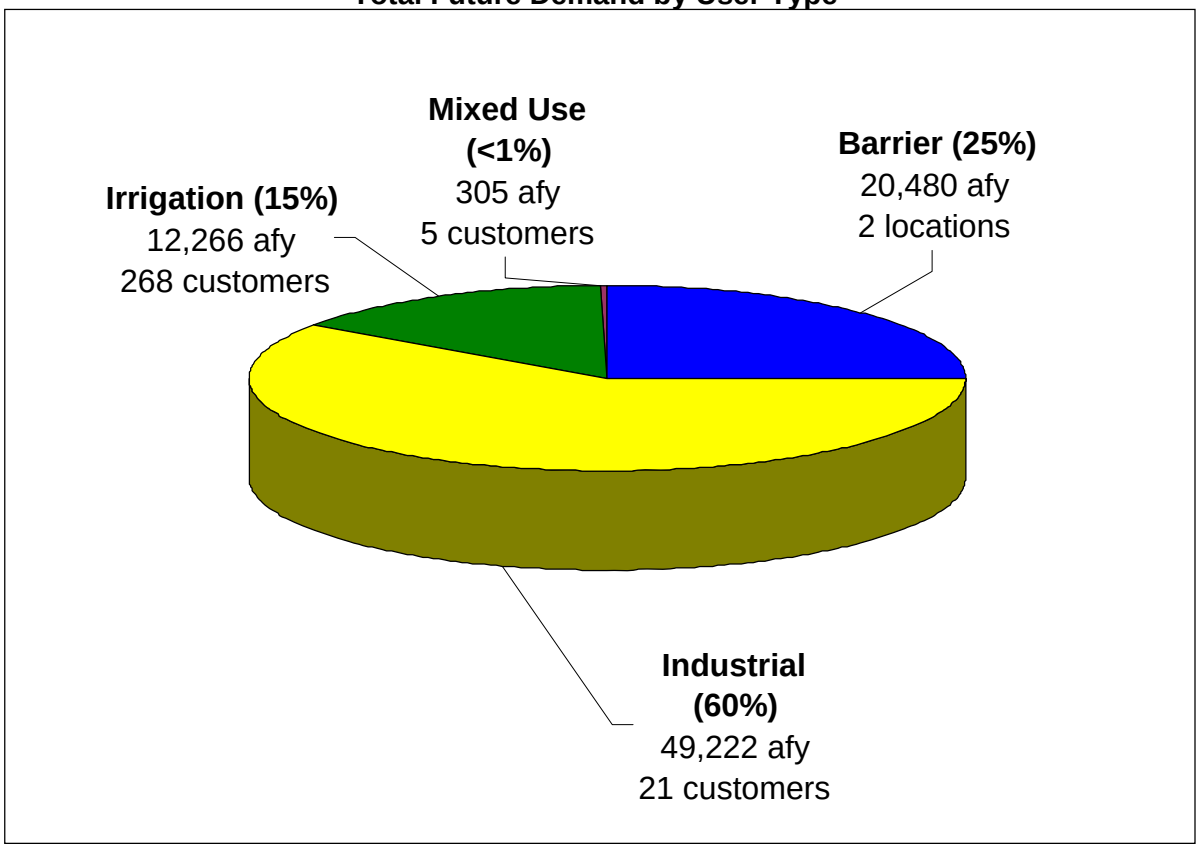
The distribution of potential demands by customer type is illustrated on Figure 3.5, which indicates that the majority of the potential demand is categorized as Industrial, representing approximately 64 percent of the potential demand. It should be noted that this figure represents the potential customers only, and excludes the existing demand distribution shown in Figure 3.3.

Figure 3.5
Potential Demand by User Type



The combined distribution of recycled water, including both existing and potential demands, by customer type is shown on Figure 3.6. This figure indicates that the majority of the demand in the future will most likely remain categorized as Industrial, representing approximately 60 percent of the future system demand. The total combined ultimate demand of all usage categories is estimated to be 82,273 afy (31,860 afy for existing customers plus 50,413 afy for potential customers).

Figure 3.6
Total Future Demand by User Type



3.4 WATER DEMAND AND PEAKING FACTORS

This section discusses the water demand factors and peaking factors that were used to estimate future recycled water demands. The definitions of these factors are discussed below.

3.4.1 Water Demand Factors

A water demand factor (WDF) is defined as the estimated amount of water usage per area of a certain land use type. WDFs are typically expressed in gallons per day per acre (gpd/ac). These factors are used to estimate the Average Day Demand (ADD) for existing and potential customer sites by multiplying the WDF with the total number of acres of the corresponding land use category. WDFs are typically determined from a combination of historical billing records and land use information using spatial GIS routines. WDFs can also be obtained and/or verified with WDFs from other agencies with similar land use and climate conditions.

3.4.1.1 Climate

Irrigation demand is dependent on climate. The climate in the West Basin service area is influenced by Santa Monica Mountains to the north and the Pacific Ocean to the south and west. The year-round highs range from the 60s to 70s and lows between the 40s and 50s. The warmest months are June through October. The average monthly precipitation and average monthly temperature from years 1944 to 2007 are presented in Table 3.5. As shown, the average precipitation for the area is 1.01 inches per month, which equates to an average annual rainfall of 12 inches.

Table 3.5 Average Monthly Precipitation and Temperature Data
Capital Implementation Master Plan
West Basin Municipal Water District

Month	Average Precipitation (inches)	Average. High Temperature (°F)	Average Low Temperature (°F)
January	2.71	65.0	47.4
February	2.72	65.4	48.9
March	1.90	65.3	50.4
April	0.79	67.4	52.9
May	0.17	69.2	56.3
June	0.05	72.0	59.6
July	0.02	75.3	62.9
August	0.07	76.4	63.8
September	0.17	76.1	62.6
October	0.36	73.6	58.5
November	1.43	70.3	52.3
December	1.72	66.1	47.9
Average:	**1.01**	**70.2**	**55.3**

Note:
Source: Western Regional Climate Center, Station No. 045114. Period of Record from August 1944 to December 2007.

3.4.1.2 Irrigation Requirements

Expected landscape irrigation requirements for the West Basin service area can be based on evapotranspiration and rainfall data for all sites where irrigable acreage was available. Calculated irrigation requirements, as defined below, were used to estimate irrigation for all existing and future sites.

The amount of irrigation water required for the potential irrigation customers is directly dependent on precipitation and evapotranspiration quantities in the region. To calculate the

amount of evapotranspiration occurring in the study area, the following formula can be used:

$$ET_L = K_L * ET_o \quad (1)$$

Where:

ET_L = Evapotranspiration of landscaped areas (in inches)

K_L = Landscape coefficient

ET_o = Reference Evapotranspiration (in inches)

The reference evapotranspiration used was based on the value for the Los Angeles Basin, which was obtained from the California Irrigation Management Information System (CIMIS).

To calculate the landscape evapotranspiration, the landscaped area crop coefficient was estimated using information contained in the Guide to Estimating Irrigation Water Needs of Landscape Plantings in California by the California Department of Water Resources. The landscape coefficient is the product of an average species factor (k_s), density factor (k_d), and microclimate factor (k_{mc}). These were estimated to be 0.7, 1, and 1, respectively. The landscape coefficient was then multiplied by the reference evapotranspiration to determine the average landscape evapotranspiration for the study area. The amount of precipitation, evapotranspiration, and irrigation required for irrigation customers are listed in Table 3.6.

As listed in Table 3.6, the net annual average landscape irrigation requirement in the study area is approximately 30.1 inches or about 2.5 feet per year. Based on this data, recycled water demands for potential customers could be estimated by multiplying the irrigated area in acre by 2.5 to obtain an annual demand estimate in afy. However, as part of this study, demand estimates were provided by West Basin staff and are mostly based on historical potable water demand usage and where not available using the following rule of thumb:

- 2.0-2.5 afy/acre for irrigating areas with turf
- 1.0 afy/acre for irrigating areas with shrubs

It can be concluded that the irrigation requirements listed in Table 3.6 confirm the demand factors that are typically applied to the West Basin service area when estimating potential irrigation demands.

It should be noted that as a part of this study, demands for individual potential customers were estimated by West Basin staff and historical potable water demand usage was typically available and considered more accurate than the above methodology.

Table 3.6 Average Annual Landscape Irrigation Requirements Capital Implementation Master Plan West Basin Municipal Water District				
Month	**Evapo-transpiration[1] (inches)**	**Average Rainfall[2] (inches)**	**Net Irrigation Requirement[3] (inches)**	**Percent of Annual Net Irrigation Requirement[4] (%)**
January	1.25	2.71	0.00	0%
February	1.48	2.72	0.00	0%
March	2.31	1.9	0.55	2%
April	3.14	0.79	3.18	11%
May	3.31	0.17	4.25	14%
June	3.52	0.05	4.70	16%
July	3.78	0.02	5.09	17%
August	3.77	0.07	5.00	17%
September	2.76	0.17	3.50	12%
October	2.38	0.36	2.73	9%
November	1.69	1.43	0.36	1%
December	1.55	1.72	0.00	0%
Total	**31.0 inches**	**12.1 inches**	**29.4 inches**	**100%**
			2.5 feet	

Notes:
(1) Source: The data was obtained from the California Irrigation Management Information System [2]. The ET values are adjusted for the landscape irrigation coefficient K_L, where $K_L = K_s * K_{mc} * K_d$ which accounts for the species, microclimate and vegetation density.
(2) Source: Western Regional Climate Center [1].
(3) [Evapotranspiration - Rainfall]*1.15/0.85. Where 0.85 = 85% Irrigation Factor (Average value from Carlos and Guitjens, University of Nevada) and 1.15 = 15% Leaching Fraction [3].
(4) Current month net irrigation requirement divided by total net irrigation requirement.

3.4.2 Peaking Factors

In addition to WDFs, peaking factors are used to estimate water demands for conditions other than average annual demand (AAD) conditions. Peaking factors account for fluctuations in demands on a seasonal or hourly basis.

3.4.2.1 Seasonal Peaking Factor

During hot summer days, water use is typically higher than on a cold winter day because of increased irrigation demands. Common peaking factors include Maximum Day Demands (MDD), Maximum Month Demands (MMD), and Minimum Day Demands (MinDD). In recycled water systems, the MDD factors is typically similar to the MMD factor as irrigation sprinkler systems are often changed on a seasonal basis, rather than a daily basis, unless moisture sensors are used. Because of the significant industrial demands present in West Basin's recycled water system, a comparison between MMD and MDD seasonal peaking factors for large industrial water customers is presented in Table 3.7.

Table 3.7 Comparison of MMD and MDD Seasonal Peaking Factors
Capital Implementation Master Plan
West Basin Municipal Water District

Large Industrial User	AAD (mgd)	MMD Peaking Factor	MMD (Peak Month)	MDD Peaking Factor	MDD (Peak Day)
E6 - Chevron Industrial RO	0.98	1.5	Aug 2004	1.7	19 Jul 2005
E4 - Chevron Industrial RO Ultra	2.50	1.1	Jun 2008	1.2	25 Aug 2007
E2 - Chevron Nitrified	3.12	1.4	Mar 2008	1.6	29 Sep 2005
E3 – bp Carson Refinery Industrial RO	2.50	1.7	Sep 2007	1.7	9 Feb 2006
E7 - bp Carson Refinery Nitrified	0.54	1.3	Dec 2007	1.5	9 Feb 2006
E1 - ExxonMobil Nitrified	3.69	1.2	Jul 2007	1.5	21 Nov 2006
E5 - ExxonMobil Industrial RO	1.80	1.3	Oct 2004	1.5	17 Dec 2007
Total Large Industrial User Demand(1)	**15.1**	**20.3 mgd**		**23.0 mgd**	
Total Large Industrial User Weighted Peaking Factor		1.3		1.5	

Note:

(1) The sum of each Average Annual Demand multiplied by the corresponding peaking factor.

As seen in Table 3.7, the weighted MDD seasonal peaking factor for all of the large industrial customers exceeds the MMD seasonal peaking factor by approximately 20 percent, as compared to the AAD. However, historic data suggests the likelihood of simultaneous peaking of all large industrial seasonal peaking is rather low, as the MDD and MMD of all major industrial customers did not even occur in the same month. Table 3.7 also shows that the occurrence of MMD and MDD between the customers greatly varies. Based on the peaking shown in Table 3.7, it was determined that the MMD peaking represents a

conservative estimate of seasonal peaking across the industrial customers in the system. For the purpose of this master plan, the MMD/ADD ratio is used to estimate the maximum demand conditions that West Basin needs to plan for.

The seasonal variation in demand of existing customers, as listed in Table 3.3, was used to estimate the average seasonal peaking factors by user type. These factors are listed in Table 3.8 and are used to estimate the maximum month demands of the potential customers, except for those customers that have a specific peaking factor (as listed in Table 3.4).

Table 3.8 Seasonal Peaking Factors Based on Historic Data
Capital Implementation Master Plan
West Basin Municipal Water District

Usage Type	Historical Seasonal Peaking Factor (Weighted Average)	Historical Seasonal Peaking Factor (Average)	Planning Seasonal Peaking Factor
Irrigation	2.5	3.1	2.5
Industrial	1.3	2.2	1.3
Mixed Use	1.7	1.7	1.7
Barrier	1.0	1.0	1.0
Aggregate	**1.4(1)**	**2.0**	**1.4(1)**

Note:
(1) Based on the demand weighted average of all usage types.

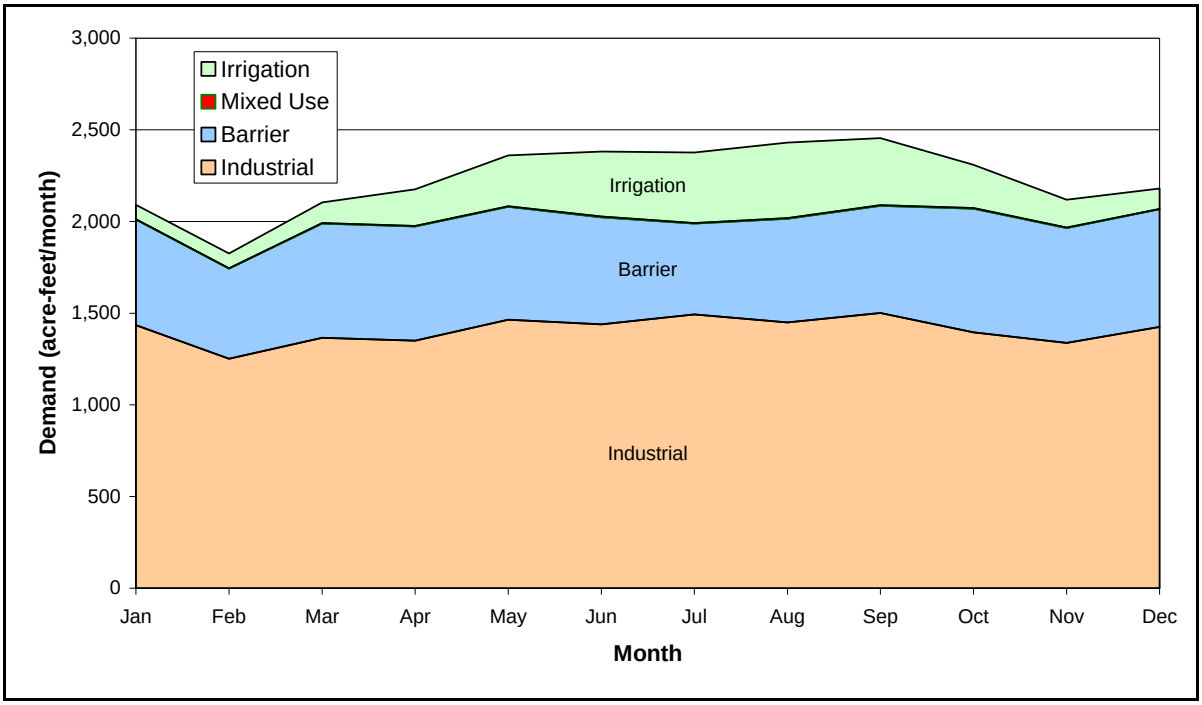
Based on historical data, the weighted average of seasonal peaking factors for irrigation customers was 2.5. This indicates that, on average, the maximum monthly demand for typical irrigation customers is 2.5 times the average annual demand. This same seasonal peaking factor was selected for analysis of future systems. This factor will be applied to all potential irrigation customers for the future system analysis. For existing customers, the historical seasonal peaking factors are used for each individual customer, with the exception of existing customers with seasonal peaking factors over 3.0, which are assumed to be reduced to 3.0 for future planning years through efforts conducted by West Basin to work with customers to reduce excessive seasonal peaking. Seasonal peaking factors for both existing and future analysis are listed in the customer database in Appendix C.

Based on historical data, the weighted average of seasonal peaking factors for industrial customers is 1.3. This indicates that, on average, the maximum monthly demand for typical industrial customers is 1.3 times the average annual demand. This factor will be applied to all potential industrial customers for the future system analysis. For existing customers, the historical seasonal peaking factors are used for each individual customer, as listed in the customer database in Appendix C. Thus, for the existing and potential customers, the

overall seasonal peaking factor corresponds to the weighted average industrial factor of 1.3, as shown in Table 3.8.

It should be noted that the factors presented in Table 3.8 are based on the maximum month peaking factors of each individual customer and that these factors do not always coincide with the same calendar month. As a result, the average seasonal peaking factor per usage type may result in an overly conservative maximum monthly demand. The aggregate peaking factor listed in Table 3.8 is based on the demand weighted average of all peaking factors. Due to the large contribution of industrial and barrier water demands, the aggregate peaking factor is relatively low. This effect is also illustrated on Figure 3.7.

Figure 3.7
Seasonal Variations by Usage Type



As shown on Figure 3.7, the peak irrigation demand occurs in the summer months, while for the demand of barrier and industrial customers are relatively constant throughout the year. Figure 3.7 illustrates that the significant peaking of irrigation demand is buffered by the much more significant industrial "anchor" customers, whose low seasonal variability provide a consistent baseline of required demand throughout the year.

3.4.2.2 Hourly Peaking Factors / Diurnal Curves

Variations in water demands also occur during a 24-hour period. Customers irrigating non-restricted areas typically experience peak demand periods late at night through the early morning hours, while industrial customers experience peaking consistent with their industrial production patterns.

Recycled water systems are characterized by substantial variations in demand during the day. The demand patterns, which are also referred to as diurnal curves, were developed for each of the large customers based on field measurements obtained for the hydraulic model calibration. The flow monitoring conducted as part of this study provided customer specific diurnal curves for the 15 customers listed in Table 6.1 of Chapter 6 and shown in Appendix E. For other smaller and potential customers, generic diurnal curves were developed for each user type. Figure 3.8 depicts the generic curve developed for golf course, school, and park irrigation customers. Figure 3.9 depicts the generic curve developed for greenbelt irrigation customers.

Figure 3.8
Irrigation (Golf Course, School, and Park) Diurnal Curve

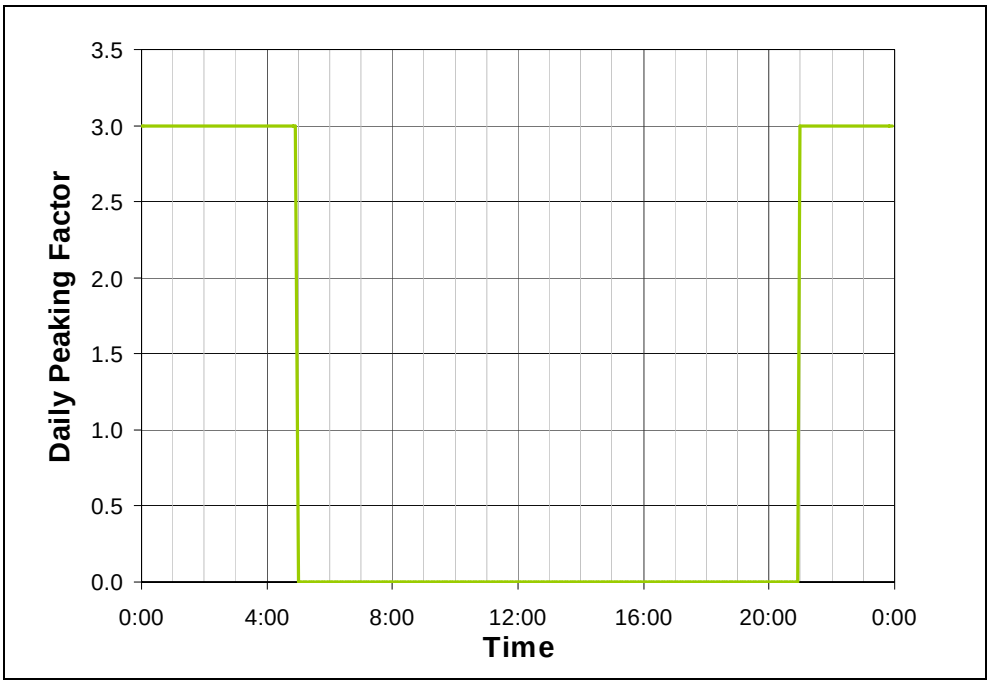
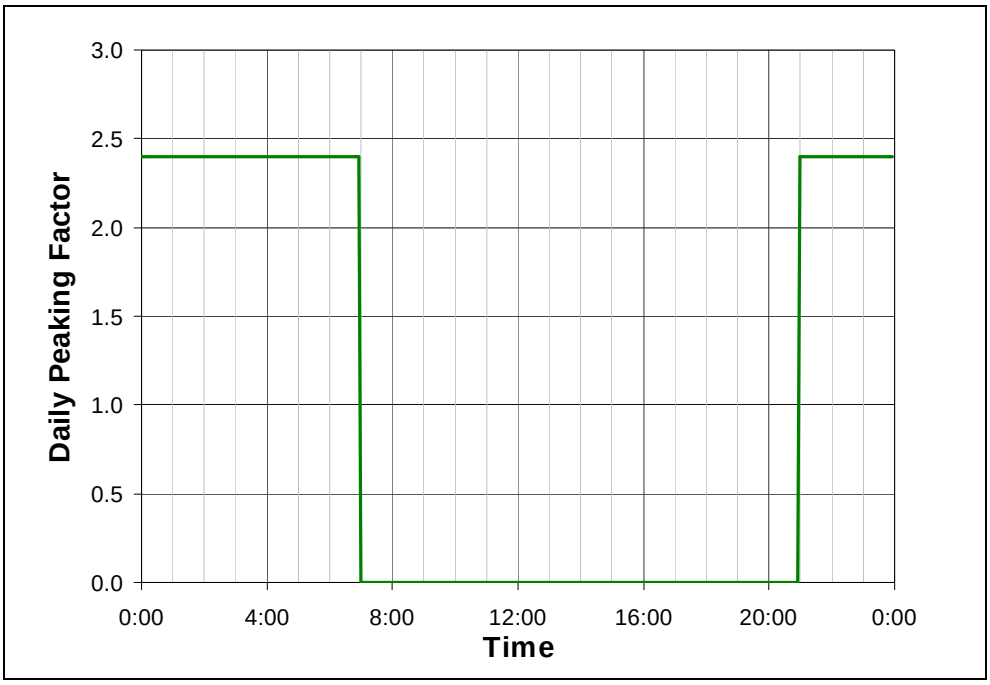


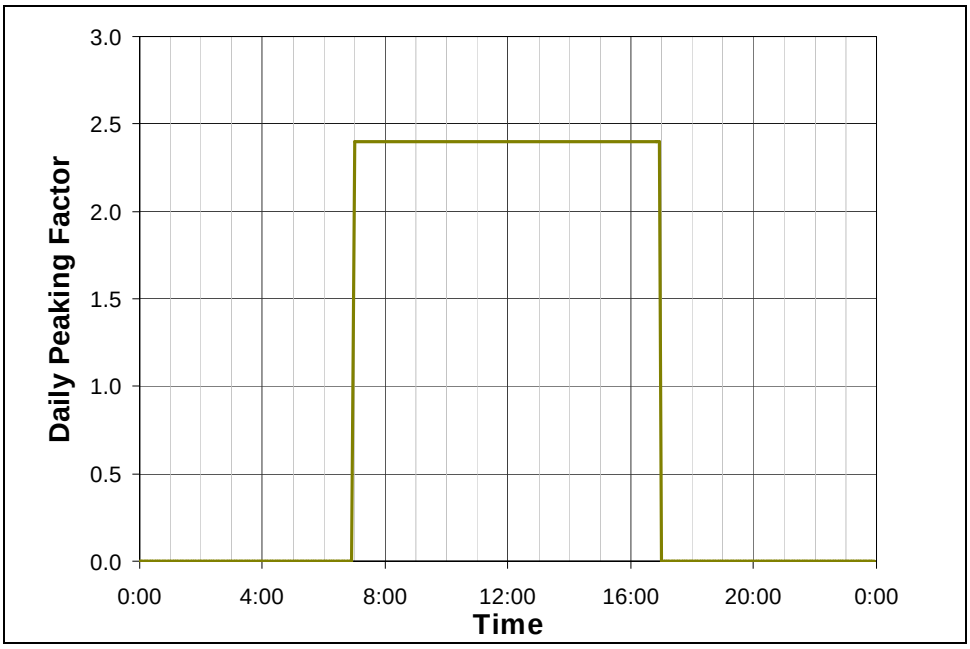
Figure 3.9
Irrigation (Greenbelt) Diurnal Curve



The irrigation demand patterns shown on Figure 3.8 and Figure 3.9 were developed based on observations of cycles in the calibration data. In Los Angeles County, irrigation customers are generally required to limit irrigation to the hours of 10 pm through 6 am (LACRWAC 2005) on sites open to the public. Existing usage patterns observed for golf courses, schools, and parks generally seemed to operate for about 4 hours starting around 9 pm. However, West Basin is planning to work with customers in the future to extend the demand pattern to limit the significant peaking placed on the distribution system when irrigation is only conducted for 4 hours, which results in a peaking factor of 6.0. Figure 3.8 shows a demand pattern for 8 hours, starting around 9 pm and ending at 5 am, incorporating estimates for future usage patterns. Usage patterns observed for greenbelt customers (transportation landscaping) generally ran for longer periods of time, starting around 9 pm and ending around 7 am.

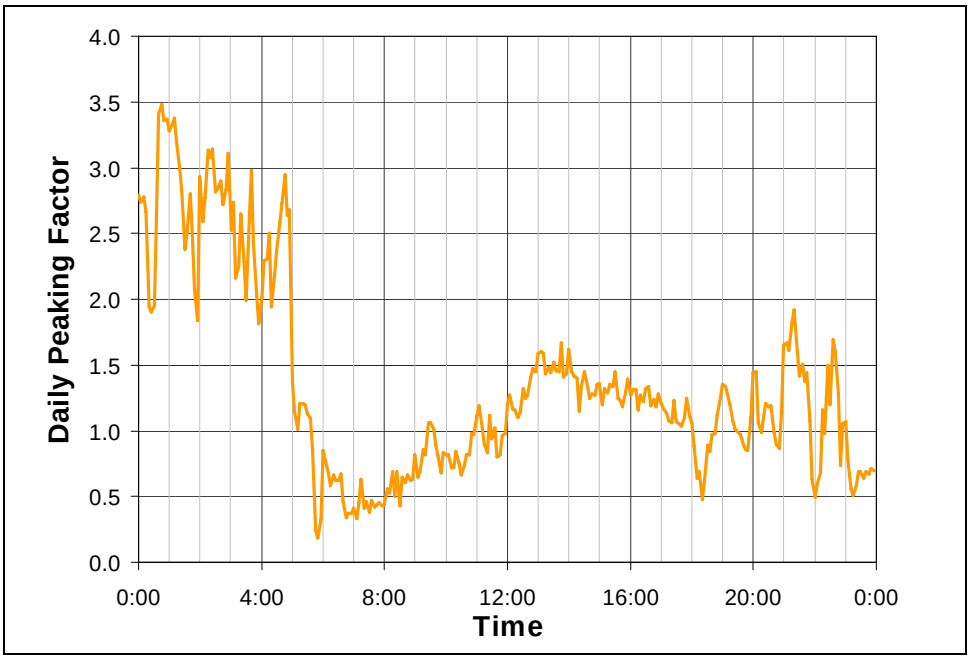
Other than the large refineries that were given user-specific demand patterns due to their size, only one existing user is classified as an industrial customer (Crenshaw Lumber). Based on typical operation of industrial customers, a generic demand pattern was developed that was assumed to begin at 7 am and run until 5 pm. This demand pattern is shown on Figure 3.10.

Figure 3.10
Industrial Diurnal Curve



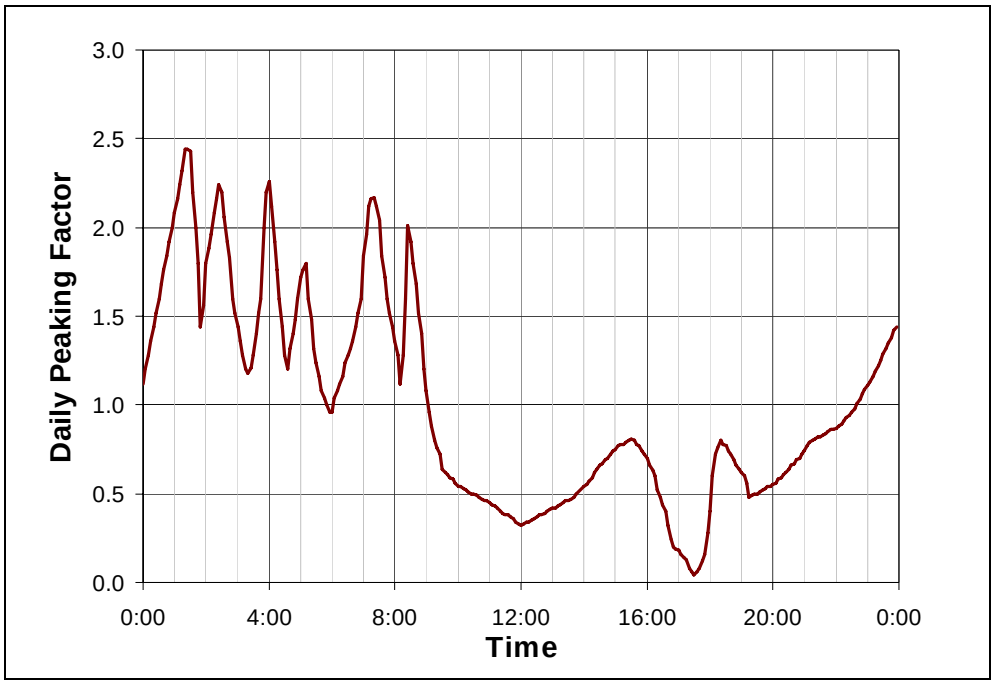
Based upon the demand pattern at Toyota, a separate generic diurnal curve was developed for the Mixed Use (MU) customers, who use recycled for multiple purposes including irrigation, dual plumbing, and cooling towers, based upon the demand pattern at Toyota. This demand pattern is shown on Figure 3.11.

Figure 3.11
Mixed Use Diurnal Curve



The “other” demand pattern, shown on Figure 3.12, was developed from a mass balance of the flow entering the system during the calibration period. The resulting pattern was adjusted to represent a relatively consistent use period reflecting the demands for the calibration day. This pattern is intended to represent all customers that do not fall into any of the other specific categories.

Figure 3.12
Other Diurnal Curve



3.5 FUTURE DEMAND ESTIMATES

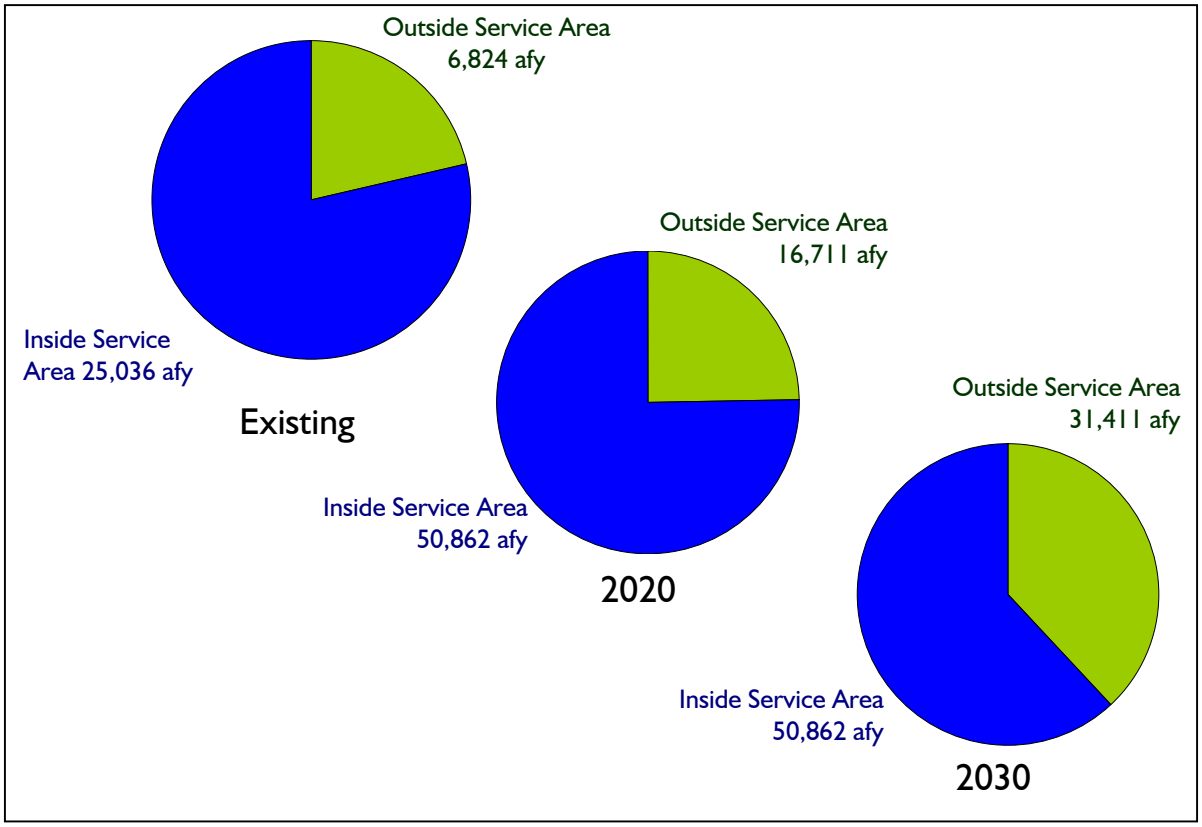
To project the development of future demands, the anticipated phasing of potential customers was forecasted in collaboration with West Basin staff. The “Anticipated Year of Service” listed in Table 3.4 was used to summarize the potential demands by planning period in Table 3.9.

Table 3.9 Phasing of Potential Demand Capital Implementation Master Plan West Basin Municipal Water District			
	Demand (afy))		
Planning Period	Inside Service Area	Outside Service Area	Total
Existing	25,036	6,824	31,860
FY2008/10	1,273	118	1,391
FY2010/15	22,575	9,583	32,158
FY2015/20	1,978	186	2,164
FY2020/25		2,000	2,000
FY2025/30		12,700	12,700
Total Potential (FY2008/10 – FY2025-30)	25,826	24,587	50,413
Total Ultimate Demand (Existing and Potential)	**50,862**	**31,411**	**82,273**

As listed in Table 3.9, the recycled water demands are projected to increase from 31,860 afy to 82,273 afy. This equates to an average demand increase of about 4.4 percent per year through 2030. As stated earlier, this projection assumes that all existing customers maintain their current usage and all potential customers will be connected to future system expansions of the recycled water system and use the estimated amounts of recycled water. When the likelihood of service as listed in Table 3.9 is taken into consideration for the potential customers only, the projected demand (including both existing and potential users) will be reduced from 82,273 afy to 64,231 afy, a 3.3 percent per year growth rate. A few very large potential customers with a low likelihood of service primarily cause this significant demand reduction. These customers are LADWP Harbor (5,700 afy with 10% likelihood), LADWP Westside (4,000 afy with 30% likelihood), and the Dominguez Gap Barrier (3,500 afy with 30%). Due to the low likelihood, these customers are all phased in the period 2020-2030.

As shown in Table 3.9, the majority of West Basin's demand growth is anticipated to occur within West Basin's service area. Figure 3.13 presents a projected breakdown of West Basin's demands with respect to West Basin's service area boundary under the existing system, at the year 2020, and at the planning horizon of 2030.

Figure 3.13
Demand Breakdown by Location



As shown in Figure 3.13, the demand portion from customers located outside West Basin's service area is anticipated to increase from 21 percent to 38 percent of the total demand.

The projected AAD and MDD for the primary planning years are summarized in Table 3.10. The numbers presented in this table assume that all potential customers will be connected, and the likelihood of service is not taken in to consideration.

As shown in Table 3.10, the total potential future demand of all existing and potential customers listed in Table 3.2 and Table 3.10 is 82,273 afy. When the seasonal peaking factors for each of the usage types are applied, the MDD is estimated at 105 mgd.

Table 3.10 Potential Future Recycled Water Demand
Capital Implementation Master Plan
West Basin Municipal Water District

Usage Type	2008		2010		2020		2030	
	AAD (afy)	MMD (mgd)	AAD (afy)	MMD (mgd)	AAD (afy)	MMD (mgd)	AAD (afy)	MMD (mgd)
Irrigation	3,257	7.6	4,178	9.1	6,766	14.8	12,266	27.1
Industrial	17,018	20.2	17,488	20.7	43,522	51.4	49,222	58.6
Mixed Use	205	0.4	205	0.4	305	0.6	305	0.6
Barrier	11,380	10.2	11,380	10.2	16,980	15.2	20,480	18.3
Total	**31,860**	**38.4**	**33,251**	**40.4**	**67,573**	**82.0**	**82,273**	**104.5**

Note:
(1) MMD is calculated by applying the peaking factor for each individual customer, as detailed in the customer database presented in Appendix C.

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