



# **APPENDIX A**

## **Water Demand Forecasting**



**Rainbow MWD SDCWA Water Deliveries -- Total District -- 2007-2015**

**DRAFT 1/15/16**

	Calendar Years (AF)												Calendar Years (MGD)											
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2007	2008	2009	2010	2011	2012	2013	2014	2015						
Jan	2,329	557	1,541	637	836	1,222	717	1,860	788	24.5	5.9	16.2	6.7	8.8	12.8	7.5	19.6	8.3						
Feb	911	398	925	384	855	1,124	785	1,304	1,303	10.6	4.5	10.8	4.5	10.0	12.6	9.1	15.2	15.2						
Mar	2,173	1,619	1,990	886	548	952	1,428	978	1,489	22.8	17.0	20.9	9.3	5.8	10.0	15.0	10.3	15.7						
Apr	2,569	2,372	2,439	1,132	1,414	1,114	2,283	2,131	1,960	27.9	25.8	26.5	12.3	15.4	12.1	24.8	23.1	21.3						
May	3,195	2,186	2,713	1,968	1,973	2,017	1,977	2,540	1,380	33.6	23.0	28.5	20.7	20.7	21.2	20.8	26.7	14.5						
Jun	3,363	2,741	2,387	2,500	2,055	2,795	2,218	2,286	1,617	36.5	29.8	25.9	27.2	22.3	30.4	24.1	24.8	17.6						
Jul	3,755	2,786	3,119	2,476	2,615	2,461	2,813	2,483	1,767	39.5	29.3	32.8	26.0	27.5	25.9	29.6	26.1	18.6						
Aug	3,982	2,858	3,091	2,573	2,644	2,748	2,440	2,663	1,965	41.9	30.0	32.5	27.0	27.8	28.9	25.6	28.0	20.7						
Sep	3,461	2,746	3,005	2,573	2,424	2,790	2,393	2,209	1,919	37.6	29.8	32.6	27.4	26.3	30.3	26.0	24.0	20.8						
Oct	3,069	2,992	2,573	1,310	1,931	2,288	1,854	2,300	1,510	32.3	31.5	27.0	13.8	20.3	24.0	19.5	24.2	15.9						
Nov	2,498	2,024	2,371	1,229	866	1,650	1,315	1,385	1,272	27.1	22.0	25.8	13.3	9.4	17.9	14.3	15.0	13.8						
Dec	561	850	740	699	1,117	759	1,303	486	898	5.9	8.9	7.8	7.4	11.7	8.0	13.7	5.1	9.4						
<b>Year</b>	<b>31,865</b>	<b>24,128</b>	<b>26,894</b>	<b>18,322</b>	<b>19,276</b>	<b>21,918</b>	<b>21,526</b>	<b>22,625</b>	<b>17,868</b>	<b>28.4</b>	<b>21.5</b>	<b>24.0</b>	<b>16.4</b>	<b>17.2</b>	<b>19.5</b>	<b>19.2</b>	<b>20.2</b>	<b>16.0</b>						

**Fiscal Year (AF)**

**Fiscal Year (MGD)**

	Fiscal Year (AF)												Fiscal Year (MGD)											
	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15						
Jul	4,024	3,755	2,786	3,119	2,476	2,615	2,461	2,813	2,483	42.3	39.5	29.3	32.8	26.0	27.5	25.9	29.6	26.1						
Aug	3,782	3,982	2,858	3,091	2,573	2,644	2,748	2,440	2,663	39.8	41.9	30.0	32.5	27.0	27.8	28.9	25.6	28.0						
Sep	3,598	3,461	2,746	3,005	2,527	2,424	2,790	2,393	2,209	39.1	37.6	29.8	32.6	27.4	26.3	30.3	26.0	24.0						
Oct	2,932	3,069	2,992	2,573	1,310	1,931	2,288	1,854	2,300	30.8	32.3	31.5	27.0	13.8	20.3	24.0	19.5	24.2						
Nov	3,117	2,498	2,024	2,371	1,229	866	1,650	1,315	1,385	33.9	27.1	22.0	25.8	13.3	9.4	17.9	14.3	15.0						
Dec	1,193	561	850	740	699	1,117	759	1,303	486	12.5	5.9	8.9	7.8	7.4	11.7	8.0	13.7	5.1						
Jan	2,329	557	1,541	637	836	1,222	717	1,860	788	24.5	5.9	16.2	6.7	8.8	12.8	7.5	19.6	8.3						
Feb	911	398	925	384	855	1,124	785	1,304	1,303	10.2	4.6	10.8	4.5	9.6	13.1	9.1	15.2	14.6						
Mar	2,173	1,619	1,990	886	548	952	1,428	978	1,489	22.8	17.0	20.9	9.3	5.8	10.0	15.0	10.3	15.7						
Apr	2,569	2,372	2,439	1,132	1,414	1,114	2,283	2,131	1,960	27.9	25.8	26.5	12.3	15.4	12.1	24.8	23.1	21.3						
May	3,195	2,186	2,713	1,968	1,973	2,017	1,977	2,540	1,380	33.6	23.0	28.5	20.7	20.7	21.2	20.8	26.7	14.5						
Jun	3,363	2,741	2,387	2,500	2,055	2,795	2,218	2,286	1,617	36.5	29.8	25.9	27.2	22.3	30.4	24.1	24.8	17.6						
<b>Year</b>	<b>33,186</b>	<b>27,198</b>	<b>26,251</b>	<b>22,407</b>	<b>18,495</b>	<b>20,819</b>	<b>22,104</b>	<b>23,217</b>	<b>20,062</b>	<b>29.5</b>	<b>24.3</b>	<b>23.4</b>	<b>20.0</b>	<b>16.5</b>	<b>18.6</b>	<b>19.7</b>	<b>20.7</b>	<b>17.9</b>						

Source: Monthly delivery data provided by SDCWA

Rainbow MWD Water District -- Non-Revenue Water -- 2007-2015

DRAFT 1/15/16

Fiscal Year SDCWA DELIVERIES (MGD)								
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Jul	39.5	29.3	32.8	26.0	27.5	25.9	29.6	26.1
Aug	41.9	30.0	32.5	27.0	27.8	28.9	25.6	28.0
Sep	37.6	29.8	32.6	27.4	26.3	30.3	26.0	24.0
Oct	32.3	31.5	27.0	13.8	20.3	24.0	19.5	24.2
Nov	27.1	22.0	25.8	13.3	9.4	17.9	14.3	15.0
Dec	5.9	8.9	7.8	7.4	11.7	8.0	13.7	5.1
Jan	5.9	16.2	6.7	8.8	12.8	7.5	19.6	8.3
Feb	4.6	10.8	4.5	9.6	13.1	9.1	15.2	14.6
Mar	17.0	20.9	9.3	5.8	10.0	15.0	10.3	15.7
Apr	25.8	26.5	12.3	15.4	12.1	24.8	23.1	21.3
May	23.0	28.5	20.7	20.7	21.2	20.8	26.7	14.5
Jun	29.8	25.9	27.2	22.3	30.4	24.1	24.8	17.6
Year	24.3	23.4	20.0	16.5	18.6	19.7	20.7	17.9

Fiscal Year Potable SALES (MGD)								
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Jul	34.5	26.8	22.9	23.9	23.4	23.0	22.7	22.8
Aug	36.3	28.8	29.2	24.0	22.0	25.5	24.7	26.0
Sep	43.1	29.7	29.0	29.0	25.2	30.1	26.3	23.0
Oct	27.3	25.1	26.5	21.0	20.6	24.0	21.9	23.5
Nov	30.3	29.0	23.2	11.2	18.5	22.0	18.7	20.2
Dec	16.6	13.7	15.0	10.4	7.9	14.1	10.2	12.5
Jan	6.0	7.0	8.1	5.4	11.8	5.1	13.6	4.7
Feb	5.0	13.5	4.4	11.5	12.0	9.0	16.2	9.6
Mar	5.6	6.8	2.8	5.3	10.3	8.7	12.3	10.3
Apr	17.9	18.4	13.5	9.6	9.7	14.2	12.6	18.4
May	22.2	23.4	12.7	15.7	10.4	18.5	21.2	18.8
Jun	21.1	22.4	21.0	18.1	24.0	22.0	24.6	11.2
Year	22.2	20.4	17.4	15.4	16.3	18.0	18.8	16.8

NON-REVENUE WATER (MGD)								
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Jul	5.0	2.5	9.9	2.1	4.0	2.9	6.9	3.3
Aug	5.6	1.2	3.3	3.1	5.8	3.4	0.9	2.0
Sep	(5.5)	0.1	3.6	(1.5)	1.1	0.2	(0.3)	1.0
Oct	4.9	6.3	0.5	(7.2)	(0.3)	0.1	(2.4)	0.7
Nov	(3.2)	(7.0)	2.6	2.1	(9.1)	(4.1)	(4.5)	(5.1)
Dec	(10.7)	(4.8)	(7.2)	(3.1)	3.9	(6.1)	3.5	(7.4)
Jan	(0.1)	9.2	(1.4)	3.3	1.0	2.4	6.0	3.5
Feb	(0.3)	(2.7)	0.1	(1.9)	1.1	0.1	(1.1)	5.1
Mar	11.4	14.1	6.5	0.5	(0.3)	6.3	(2.0)	5.4
Apr	7.8	8.1	(1.2)	5.7	2.4	10.6	10.6	2.9
May	0.8	5.1	8.0	5.1	10.8	2.3	5.5	(4.3)
Jun	8.7	3.5	6.2	4.2	6.3	2.1	0.2	6.4
Year	2.1	3.1	2.6	1.0	2.3	1.7	2.0	1.1

NON-REVENUE WATER (as % of Deliveries)									
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	Avg.'11-15
Jul	13%	8%	30%	8%	15%	11%	23%	13%	14%
Aug	13%	4%	10%	11%	21%	12%	4%	7%	11%
Sep	-15%	0%	11%	-6%	4%	1%	-1%	4%	1%
Oct	15%	20%	2%	-53%	-2%	0%	-13%	3%	-13%
Nov	-12%	-32%	10%	16%	-97%	-23%	-31%	-34%	-34%
Dec	-181%	-54%	-92%	-42%	33%	-77%	26%	-144%	-41%
Jan	-2%	57%	-21%	38%	8%	32%	30%	43%	30%
Feb	-7%	-25%	3%	-19%	8%	1%	-7%	35%	4%
Mar	67%	67%	70%	9%	-3%	42%	-20%	34%	13%
Apr	30%	30%	-10%	37%	20%	43%	46%	13%	32%
May	3%	18%	39%	24%	51%	11%	21%	-30%	15%
Jun	29%	13%	23%	19%	21%	9%	1%	36%	17%
Year	9%	13%	13%	6%	12%	9%	10%	6%	8.6%

Fiscal Year SDCWA DELIVERIES, 2-month trailing average (MGD)								
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Jul	38.0	29.5	29.4	26.6	24.9	28.1	26.8	25.5
Aug	40.7	29.7	32.6	26.5	27.6	27.4	27.6	27.0
Sep	39.7	29.9	32.6	27.2	27.1	29.6	25.8	26.0
Oct	34.9	30.6	29.8	20.6	23.3	27.2	22.7	24.1
Nov	29.7	26.7	26.4	13.6	14.9	21.0	16.9	19.6
Dec	16.5	15.5	16.8	10.3	10.6	12.9	14.0	10.1
Jan	5.9	12.6	7.2	8.1	12.3	7.8	16.6	6.7
Feb	5.2	13.5	5.6	9.2	13.0	8.3	17.4	11.5
Mar	10.8	15.8	6.9	7.7	11.5	12.1	12.7	15.1
Apr	21.4	23.7	10.8	10.6	11.0	19.9	16.7	18.5
May	24.4	27.5	16.5	18.0	16.6	22.8	24.9	17.9
Jun	26.4	27.2	23.9	21.5	25.8	22.4	25.8	16.0
Year	24.4	23.5	19.8	16.6	18.2	19.9	20.6	18.1

Fiscal Year Potable SALES (MGD)								
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Jul	34.5	26.8	22.9	23.9	23.4	23.0	22.7	22.8
Aug	36.3	28.8	29.2	24.0	22.0	25.5	24.7	26.0
Sep	43.1	29.7	29.0	29.0	25.2	30.1	26.3	23.0
Oct	27.3	25.1	26.5	21.0	20.6	24.0	21.9	23.5
Nov	30.3	29.0	23.2	11.2	18.5	22.0	18.7	20.2
Dec	16.6	13.7	15.0	10.4	7.9	14.1	10.2	12.5
Jan	6.0	7.0	8.1	5.4	11.8	5.1	13.6	4.7
Feb	5.0	13.5	4.4	11.5	12.0	9.0	16.2	9.6
Mar	5.6	6.8	2.8	5.3	10.3	8.7	12.3	10.3
Apr	17.9	18.4	13.5	9.6	9.7	14.2	12.6	18.4
May	22.2	23.4	12.7	15.7	10.4	18.5	21.2	18.8
Jun	21.1	22.4	21.0	18.1	24.0	22.0	24.6	11.2
Year	22.2	20.4	17.4	15.4	16.3	18.0	18.8	16.8

NON-REVENUE WATER (2-mn. trailing avg. deliveries less sales) (MGD)								
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Jul	3.5	2.7	6.4	2.7	1.5	5.1	4.2	2.7
Aug	4.4	0.8	3.4	2.5	5.7	1.9	2.9	1.0
Sep	(3.3)	0.2	3.5	(1.7)	1.9	(0.5)	(0.5)	3.0
Oct	7.6	5.5	3.3	(0.4)	2.7	3.2	0.8	0.6
Nov	(0.6)	(2.2)	3.2	2.3	(3.7)	(1.0)	(1.9)	(0.6)
Dec	(0.0)	1.7	1.8	(0.1)	2.7	(1.1)	3.8	(2.4)
Jan	(0.1)	5.6	(0.9)	2.6	0.5	2.7	3.0	2.0
Feb	0.3	0.0	1.2	(2.3)	0.9	(0.7)	1.1	1.9
Mar	5.2	9.0	4.1	2.4	1.3	3.4	0.4	4.9
Apr	3.5	5.3	(2.7)	0.9	1.3	5.7	4.1	0.0
May	2.2	4.1	3.8	2.4	6.2	4.3	3.7	(0.9)
Jun	5.3	4.8	2.9	3.4	1.8	0.5	1.1	4.9
Year	2.2	3.1	2.4	1.2	1.9	1.9	1.9	1.4

NON-REVENUE WATER (as % of Deliveries)									
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	Avg.'11-15
Jul	9%	9%	22%	10%	6%	18%	15%	11%	12%
Aug	11%	3%	10%	10%	21%	7%	10%	4%	10%
Sep	-8%	1%	11%	-6%	7%	-2%	-2%	12%	2%
Oct	22%	18%	11%	-2%	11%	12%	4%	3%	6%
Nov	-2%	-8%	12%	17%	-25%	-5%	-11%	-3%	-5%
Dec	0%	11%	11%	-1%	26%	-9%	27%	-24%	4%
Jan	-2%	44%	-12%	33%	4%	34%	18%	29%	24%
Feb	5%	0%	22%	-25%	7%	-8%	7%	17%	-1%
Mar	48%	57%	59%	32%	11%	28%	3%	32%	15%
Apr	16%	22%	-25%	9%	12%	28%	25%	0%	21%
May	9%	15%	23%	13%	38%	19%	15%	-5%	16%
Jun	20%	18%	12%	16%	7%	2%	4%	30%	12%
Year	9%	13%	12%	7%	10%	9%	9%	7%	8.7%

<b>SUMMARY</b>	
Average Non-Revenue Water FY2010-15, as percent of Deliveries:	8.6%
Average Non-Revenue Water FY2010-15, as percent of Sales:	9.5%

Source: Delivery data provided by SDCWA. Sales data from District billing system.

## Rainbow MWD Monthly Peaking Factors -- CY 2007-2014

DRAFT 1/15/16

	SDCWA Deliveries (MGD)												Monthly Peaking Factor				
	2007	2008	2009	2010	2011	2012	2013	2014	2007	2008	2009	2010	2011	2012	2013	2014	Avg.
Jan	24.5	5.9	16.2	6.7	8.8	12.8	7.5	19.6	0.86	0.27	0.67	0.41	0.51	0.66	0.39	0.97	0.54
Feb	10.6	4.5	10.8	4.5	10.0	12.6	9.1	15.2	0.37	0.21	0.45	0.27	0.58	0.65	0.48	0.75	0.43
Mar	22.8	17.0	20.9	9.3	5.8	10.0	15.0	10.3	0.80	0.79	0.87	0.57	0.33	0.51	0.78	0.51	0.67
Apr	27.9	25.8	26.5	12.3	15.4	12.1	24.8	23.1	0.98	1.20	1.10	0.75	0.89	0.62	1.29	1.15	0.98
May	33.6	23.0	28.5	20.7	20.7	21.2	20.8	26.7	1.18	1.07	1.19	1.26	1.21	1.09	1.08	1.32	1.15
Jun	36.5	29.8	25.9	27.2	22.3	30.4	24.1	24.8	1.28	1.39	1.08	1.66	1.30	1.56	1.25	1.23	1.36
Jul	39.5	29.3	32.8	26.0	27.5	25.9	29.6	26.1	1.39	1.36	1.37	1.59	1.60	1.33	1.54	1.29	1.45
Aug	41.9	30.0	32.5	27.0	27.8	28.9	25.6	28.0	1.47	1.40	1.35	1.65	1.61	1.48	1.33	1.39	1.47
Sep	37.6	29.8	32.6	27.4	26.3	30.3	26.0	24.0	1.32	1.39	1.36	1.68	1.53	1.55	1.35	1.19	1.45
Oct	32.3	31.5	27.0	13.8	20.3	24.0	19.5	24.2	1.13	1.46	1.13	0.84	1.18	1.23	1.01	1.20	1.14
Nov	27.1	22.0	25.8	13.3	9.4	17.9	14.3	15.0	0.95	1.02	1.07	0.82	0.55	0.92	0.74	0.74	0.87
Dec	5.9	8.9	7.8	7.4	11.7	8.0	13.7	5.1	0.21	0.42	0.32	0.45	0.68	0.41	0.71	0.25	0.46
Year	28.4	21.5	24.0	16.4	17.2	19.5	19.2	20.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

## Rainbow Municipal Water District Demand Forecast Model

Hello -- Here are a few notes on what you have here:

### GENERAL DESCRIPTION:

This spreadsheet calculates future potable water demand by Pressure Zone (PZ) and for the District as a whole, and allows sensitivity analysis for alternative base condition demand rates, and future conservation levels.

Forecasts are based on the following:

- 1) **Existing unit use per account type**, by PZ, per District sales data. A key assumption of the default forecast settings is that CY 2013 water use represents Normal condition use for the District, and therefore is a suitable basis determining unit use per account type. The base demand condition is user-adjustable on a percentage-adjustment basis.
- 2) **Projected growth in population, housing, and employment**, by PZ, per SANDAG Series 13 Regional Growth Forecast (Final 2015 data). The forecast data is for 2020, 2035, and 2050.
- 3) **Estimated unit use adjustments over time, by causative factor**, as selected by the user. The user-adjustable factors account for various conservation programs, as well as pricing, and climate, and differentiate between factors affecting existing customers and those affecting new customers only. The default assumptions, subject to revision by the user, assume additional conservation program implementation over the course of the forecast period.

### ARCHITECTURE:

The Spreadsheet is structured into worksheets as follows. Additional Development Notes are included in the main worksheets.

- **Hello:** Description, architecture, and general instructions.
- **Unit Use Adjustments:** Calculates unit use adjustments for various factors driving reductions and increases in unit water use, and sums these by customer category and service area, for Existing and New customer categories.
- **Scale Factors:** Calculates growth factors for each account category by PZ, based on the S13 growth forecasts and on user-adjustable growth rates and conservation factors.
- **Forecast:** Generates forecasts by PZ, and for the District as a whole. Also calculates resulting per capita use in GPCD.
- **Forecast Range / Chart:** Using the forecast tool, the Forecast Range worksheet allows What-If analysis of Low, Median, and High forecasts, and graphs the results. The Chart worksheet is formatted to print the graph.
- **Config:** Contains VLookup tables used by drop-down menus.
- **SANDAG S13:** This contains the custom SANDAG Series 13 (Final) data by District PZ.
- **Sum MGD, Sum GPD:** These worksheets provide static summaries of recent historical use by PZ and customer class.

### INSTRUCTIONS:

- 1) **General:** The pale green shaded cells designate user inputs. Use these, and the drop-down boxes, to adjust the forecast parameters. Development Notes included with key calculation worksheets provide additional instruction and documentation.
- 2) **Interface with Sales Data and SANDAG Data:** The spreadsheet utilizes data on historical sales and per account sales contained in the ZB Sum worksheets. The data in these worksheets is static, and has been pasted in (as Values) from billing system data sorted in the companion Sales Query spreadsheet. If the data in the Sales Query worksheet is updated, those new values will need to be pasted into the Demand Forecast spreadsheet. Also, both worksheets utilize the same SANDAG S13 worksheet. Any changes to the S13 data will need to be entered into both spreadsheets.

### VERSION NOTES:

V1 -- 01/04/16: Original version for distribution.

**V1a -- 01/08/16:** Updated to reflect District reclassification of some accounts to Ag, pere new RWQCB-consistent District account codes.

Unit Use Factor Adjustments -- Individual Component Detail

2013 Approximate Use per account (gpd):		
District Avg.	SFR -- Total	778
" "	PPH	2.57
" "	SFR -- Outdoor	611
" "	SFR % Outdoor	79%
MFR -- Total		150
MFR -- Outdoor		20
SFR/MFR Indoor Per Cap. -- Typical		65

Landscape Ordinance	
Outdoor change - New SFR (%)	-20%
Outdoor change - New SFR (gpd)	-122
New SFR 2050 change (scale factor):	0.843
New C/AG 2050 change (%)	0.0%
New C/AG 2050 change (scale factor)	1.000

**Source:** Reduction percentages are District estimates based on the requirements of the Landscape Ordinance and based on the extensive use of turf in District developments pre-dating the

Price Response / Additional Behavioral		
Price-Elasticity Coefficients		
RES	COM	AG
-0.20	-0.05	-0.20
Real price Δ by 2050: Increased 50%		50%
Residential Price-Elasticity		-0.20
COM Price-Elasticity		-0.05
AG Price-Elasticity		-0.20
Expected 2050 response - RES		-10.0%
Expected 2050 response - COM		-2.5%
Expected 2050 response - AG		-10.0%
Estimated RES behavioral component		40%
Adjusted RES 2050 response		-4.0%
RES 2050 change (scale factor)		0.960
COM 2050 change (scale factor)		0.975
C/AG 2050 change (scale factor)		0.900

**Source / Notes:** Price Increase: District estimate based on SDCWA projections;  
P-E: District estimate based on SDCWA Board memo December 2011;  
Behavioral Component: This is the non-hardware, behavioral portion of conservation not already accounted for by the other factors. District estimate.

Weather-Based C/AGigation Controllers	
Δ SFR Penetration by 2050 (change vs. 2013):	50%
Outdoor change per controller:	-6%
SFR 2050 change District Avg. (gpd):	-18
SFR 2050 change (scale factor):	0.976
C/AG 2050 change (%)	-3.0%
C/AG 2050 change (scale factor)	0.970

**Source:** Savings rate: MWDSC/EBMUD for DWR: "Evaluation of California Weather-Based 'Smart' Irrigation Programs", July 2009  
Penetration rate: District estimate

Turf Retirement (Existing Customers)	
Δ Front yard retirements by 2050 (vs. 2013):	15%
Outdoor usage change per:	-25%
SFR 2050 reduction (gpd):	-23
SFR 2050 reduction (scale factor):	0.971
C/AG retrofits by 2050	0%
C/AG Usage change per:	-20%
C/AG 2050 reduction (scale factor):	1.000

**Source:** District estimates

Warming Temperatures	
ETo change by 2050:	2.9%
SFR 2050 change (gpd):	18
SFR 2050 change (scale factor):	1.023
C/AG 2050 change (scale factor)	1.029

**Source:** SDCWA 2013 Water Facilities Master Plan, Appendix E: "Analysis of Potential Climate Effects on Water Authority Demands." The ETo percentage increase for 2050 is derived from Table 2, which shows a 1.8% increase for the District

High-Efficiency Clothes Washers	
SFR Δ Penetration by 2050 (vs. 2013):	35%
MFR Δ Penetration by 2050 (vs. 2013):	10%
Usage change per (gpd):	-10
SFR 2050 change (gpd):	-4
SFR 2050 change (scale factor):	0.996
MFR 2050 change (gpd):	-1
MFR 2050 change (scale factor):	0.993

**Source:** Savings rate: EPA WaterSense, adjusted downward from 16 gpd for a four person household, to District PPH = 2.5.

High-Efficiency Toilets	
Δ Penetration by 2050 (vs. 2013):	25%
New customer penetration:	100%
Usage change per SFR/MFR (gpd):	-4
Exist. SFR/MFR 2050 change (scale factor):	0.999
New SFR/MFR 2050 change (scale factor):	0.995

**Source:** Savings rate: Based on District PPH of 2.5, 5 flushes per day per person (AWWARF "Residential End Uses of Water", 1999), and savings of 0.32 gpf (1.28 gpf vs. 1.6 gpf for 1992 Code)

Rainbow Water Demand Forecast Worksheet				
Unit Use Factor Adjustments	Total District			
	2020	2035	2050	
<b>SUMMARY</b>				
<b>EXISTING ACCOUNTS</b>				
RES	0.99	0.95	0.92	
COM	1.00	1.00	1.00	
AG	0.99	0.96	0.93	
<b>NEW ACCOUNTS</b>				
RES	0.79	0.78	0.77	
COM				
AG				

SUMMARY -- BY COMPONENT				
2013 SFR Total per Account (gpd):		778		
2013 SFR Outdoor per Account (gpd):		611		
<b>EXISTING ACCOUNTS</b>				
<b>RES CUSTOMERS</b>				
Weather-Based Irr. Controllers	1.00	0.99	0.98	
Turf Retirement	0.99	0.98	0.97	
Warming Temperatures	1.00	1.01	1.02	
<i>Subtotal Irrigation (multiplicative)</i>	<i>0.99</i>	<i>0.98</i>	<i>0.97</i>	
HE Clothes Washers	1.00	1.00	1.00	
HE Toilets	1.00	1.00	1.00	
Price Response / Adtl. Behavioral	0.99	0.98	0.96	
<i>Subtotal Indoor (additive)</i>	<i>0.99</i>	<i>0.97</i>	<i>0.95</i>	
<b>TOTAL</b>	<b>0.99</b>	<b>0.95</b>	<b>0.92</b>	
<b>COM CUSTOMERS</b>				
Price Response	1.00	0.99	0.98	
Warming Temperatures	1.01	1.02	1.03	
<b>TOTAL</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	
<b>AG CUSTOMERS</b>				
Price Response	0.98	0.94	0.90	
Warming Temperatures	1.01	1.02	1.03	
<b>TOTAL</b>	<b>0.99</b>	<b>0.96</b>	<b>0.93</b>	
<b>NEW ACCOUNTS</b>				
<b>RES CUSTOMERS</b>				
Landscape Ordinance	0.84	0.84	0.84	
Weather-Based Irr. Controllers	0.95	0.95	0.95	
Warming Temperatures	1.00	1.01	1.02	
<i>Subtotal Irrigation (multiplicative)</i>	<i>0.81</i>	<i>0.81</i>	<i>0.82</i>	
HE Clothes Washers	1.00	1.00	1.00	
HE Toilets	0.99	0.99	0.99	
Price Response / Adtl. Behavioral	0.99	0.98	0.96	
<i>Subtotal Indoor (additive)</i>	<i>0.98</i>	<i>0.97</i>	<i>0.95</i>	
<b>TOTAL</b>	<b>0.79</b>	<b>0.78</b>	<b>0.77</b>	



Adjusted SANDAG Series 13 Growth Forecast, by PZ					per SANDAG		DRAFT 01/08/16			
Pressure Zone	Year	Total Pop	HH Pop	GQ Pop	Total Housing Units	SFR Units	MFR Units	Mobile Home Units	Total Employment	PPH (HH pop)
North	2012	962	962	-	326	319	-	7	1,050	2.95
	2020	1,011	1,011	-	350	343	-	7	1,048	2.89
	2035	1,074	1,074	-	364	357	-	7	1,261	2.95
	2050	1,080	1,080	-	361	354	-	7	1,466	2.99
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
	*2020	1.05	1.05	-	1.07	1.08	-	1.00	1.00	0.98
	*2035	1.12	1.12	-	1.12	1.12	-	1.00	1.20	1.00
*2050	1.12	1.12	-	1.11	1.11	-	1.00	1.40	1.01	
U1	2012	337	337	-	181	76	-	105	14	1.86
	2020	552	552	-	276	171	-	105	18	2.00
	2035	869	869	-	430	325	-	105	18	2.02
	2050	993	993	-	487	382	-	105	18	2.04
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
	*2020	1.64	1.64	-	1.52	2.25	-	1.00	1.29	1.07
	*2035	2.58	2.58	-	2.38	4.28	-	1.00	1.29	1.09
*2050	2.95	2.95	-	2.69	5.03	-	1.00	1.29	1.10	
Vallecitos	2012	153	153	-	44	44	-	-	60	3.48
	2020	131	131	-	44	44	-	-	96	2.98
	2035	141	141	-	45	45	-	-	99	3.13
	2050	140	140	-	47	47	-	-	242	2.98
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
	*2020	0.86	0.86	-	1.00	1.00	-	-	1.60	0.86
	*2035	0.92	0.92	-	1.02	1.02	-	-	1.65	0.90
*2050	0.92	0.92	-	1.07	1.07	-	-	4.03	0.86	
Rainbow Heights	2012	493	404	89	146	146	-	-	60	2.77
	2020	519	433	86	147	147	-	-	68	2.95
	2035	665	578	87	191	191	-	-	68	3.03
	2050	712	625	87	205	205	-	-	75	3.05
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
	*2020	1.05	1.07	0.97	1.01	1.01	-	-	1.13	1.06
	*2035	1.35	1.43	0.98	1.31	1.31	-	-	1.13	1.09
*2050	1.44	1.55	0.98	1.40	1.40	-	-	1.25	1.10	
Magee	2012	172	172	-	57	57	-	-	11	3.02
	2020	193	193	-	57	57	-	-	22	3.39
	2035	192	192	-	57	57	-	-	22	3.37
	2050	190	190	-	57	57	-	-	22	3.33
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
	*2020	1.12	1.12	-	1.00	1.00	-	-	2.00	1.12
	*2035	1.12	1.12	-	1.00	1.00	-	-	2.00	1.12
*2050	1.10	1.10	-	1.00	1.00	-	-	2.00	1.10	
Gomez	2012	262	262	-	105	105	-	-	27	2.50
	2020	324	324	-	114	114	-	-	25	2.84
	2035	419	419	-	141	141	-	-	25	2.97
	2050	451	451	-	151	151	-	-	26	2.99
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
	*2020	1.24	1.24	-	1.09	1.09	-	-	0.93	1.14
	*2035	1.60	1.60	-	1.34	1.34	-	-	0.93	1.19
*2050	1.72	1.72	-	1.44	1.44	-	-	0.96	1.20	
Northside	2012	938	938	-	345	345	-	-	158	2.72
	2020	952	952	-	346	346	-	-	97	2.75
	2035	1,065	1,065	-	385	385	-	-	99	2.77
	2050	1,054	1,054	-	383	383	-	-	99	2.75
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
	*2020	1.01	1.01	-	1.00	1.00	-	-	0.61	1.01
	*2035	1.14	1.14	-	1.12	1.12	-	-	0.63	1.02
*2050	1.12	1.12	-	1.11	1.11	-	-	0.63	1.01	

Pressure Zone	Year	Total Pop	HH Pop	GQ Pop	Total Housing Units	SFR Units	MFR Units	Mobile Home Units	Total Employment	PPH (HH pop)
Canonita	2012	2,144	2,144	-	961	853	-	108	400	2.23
	2020	2,490	2,490	-	1,086	978	-	108	384	2.29
	2035	2,948	2,948	-	1,233	1,125	-	108	384	2.39
	2050	2,895	2,895	-	1,233	1,125	-	108	384	2.35
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
		*2020	1.16	1.16	-	1.13	1.15	-	1.00	0.96
	*2035	1.38	1.38	-	1.28	1.32	-	1.00	0.96	1.07
	*2050	1.35	1.35	-	1.28	1.32	-	1.00	0.96	1.05
Pala Mesa	2012	4,927	4,918	9	2,011	1,771	10	230	450	2.45
	2020	6,781	6,777	4	2,682	2,442	10	230	650	2.53
	2035	7,634	7,624	10	3,020	2,780	10	230	1,311	2.52
	2050	7,749	7,736	13	3,074	2,834	10	230	1,820	2.52
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
		*2020	1.38	1.38	0.44	1.33	1.38	1.00	1.00	1.44
	*2035	1.55	1.55	1.11	1.50	1.57	1.00	1.00	2.91	1.03
	*2050	1.57	1.57	1.44	1.53	1.60	1.00	1.00	4.04	1.03
South	2012	2,769	2,769	-	1,228	1,062	-	166	1,000	2.25
	2020	3,006	3,006	-	1,265	1,099	-	166	975	2.38
	2035	3,395	3,395	-	1,399	1,233	-	166	1,064	2.43
	2050	3,440	3,440	-	1,423	1,257	-	166	1,239	2.42
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
		*2020	1.09	1.09	-	1.03	1.03	-	1.00	0.98
	*2035	1.23	1.23	-	1.14	1.16	-	1.00	1.06	1.08
	*2050	1.24	1.24	-	1.16	1.18	-	1.00	1.24	1.07
Morro	2012	5,967	5,868	99	2,348	2,028	320	-	1,750	2.50
	2020	6,939	6,851	88	2,678	2,358	320	-	1,655	2.56
	2035	8,917	8,807	110	3,396	3,076	320	-	1,661	2.59
	2050	8,978	8,853	125	3,444	3,124	320	-	1,849	2.57
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
		*2020	1.16	1.17	0.89	1.14	1.16	1.00	-	0.95
	*2035	1.49	1.50	1.11	1.45	1.52	1.00	-	0.95	1.04
	*2050	1.50	1.51	1.26	1.47	1.54	1.00	-	1.06	1.03
Morro Tank	2012	869	869	-	362	362	-	-	180	2.40
	2020	891	891	-	369	369	-	-	67	2.41
	2035	900	900	-	371	371	-	-	67	2.43
	2050	888	888	-	368	368	-	-	67	2.41
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
		*2020	1.03	1.03	-	1.02	1.02	-	-	0.37
	*2035	1.04	1.04	-	1.02	1.02	-	-	0.37	1.01
	*2050	1.02	1.02	-	1.02	1.02	-	-	0.37	1.01
TOTAL DISTRICT	2012	19,993	19,796	197	8,114	7,168	330	616	5,160	2.44
	2020	23,789	23,611	178	9,414	8,468	330	616	5,105	2.51
	2035	28,219	28,012	207	11,032	10,086	330	616	6,079	2.54
	2050	28,570	28,345	225	11,233	10,287	330	616	7,307	2.52
		<b>Ratios vs. 2012 (Scale Factors, Sf)</b>								
		*2020	1.19	1.19	0.90	1.16	1.18	1.00	1.00	0.99
	*2035	1.41	1.42	1.05	1.36	1.41	1.00	1.00	1.18	1.04
	*2050	1.43	1.43	1.14	1.38	1.44	1.00	1.00	1.42	1.03

Demand Forecast Scale Factors, by Pressure Zone					With Conservation Factors x 1	DRAFT 01/08/16
Pressure Zone		2020	2035	2050	2013 % of Total Use	Notes
North	Net Δ Unit Use -- RES	-3%	-6%	-9%		<p><b>Net Change Unit Use:</b> These cells calculate the weighted average of the Existing and New Customer adjustments from the Unit Use Adjustments worksheet, using the appropriate factors from the Scaling Factor table (SFR Units, MFR Units, and Employment). For example, for an SFR growth scaling factor of 1.38 (Zone B, 2050), the calculation is <math>\{(1 \times \text{Existing}) + (0.38 \times \text{New})\} / 1.38</math>. The MFR and COM calculation cells do the same calculation (using Employment for COM) but check to see if the scaling factor is &gt; 1 and adjust accordingly. The IRR calculates its own scaling factor as the weighted average of the SFR, MFR, and COM scaling factors, weighted by 2013 % of total water use, and uses this to calculate the weighted average of Existing and New. These cells adjust according to the selected Conservation Factor Index selected in the drop-down box in the title bar, e.g., they all go to 0% if the conservation index is set to "Without Conservation."</p> <p><b>2013 % of Total Water Use:</b> Calculated from data in the ZB Sum MGD worksheet. The percentages are used in the Net Change in Unit Use calculation for COM customers as described above.</p> <p><b>Demand Scale Factors (blue-shaded cells):</b> These calculate the demand increase relative to 2013 for each customer type and service area. For SFR and MFR, the calculation sequence is Growth Scale Factor, x Net Change Unit Use (1 minus the Change %), x a factor to account for any change in the Persons Per Household (PPH) data. The application of the PPH adjustment assumes the change in household size affects only indoor water use, and so applies to the ratio of indoor to outdoor use for account type (SFR, MFR) and service area.</p>
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.04	1.05	1.01		
	COM	1.00	1.00	1.00		
	AG	0.99	0.96	0.93		
U1	Net Δ Unit Use -- RES	-8%	-15%	-17%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.41	2.05	2.25		
	COM	1.00	1.00	1.00		
	AG	0.99	0.96	0.93		
Vallecitos	Net Δ Unit Use -- RES	-1%	-5%	-9%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	0.92	0.93	0.91		
	COM	1.00	1.00	1.00		
	AG	0.99	0.96	0.93		
Rainbow Heights	Net Δ Unit Use -- RES	-2%	-9%	-12%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.01	1.23	1.27		
	COM	1.00	1.00	1.00		
	AG	0.99	0.96	0.93		
Magee	Net Δ Unit Use -- RES	-1%	-5%	-8%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.03	0.99	0.96		
	COM	1.00	1.00	1.00		
	AG	0.99	0.96	0.93		
Gomez	Net Δ Unit Use -- RES	-3%	-9%	-12%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.08	1.27	1.31		
	COM	1.00	1.00	1.00		
	AG	0.99	0.96	0.93		
Northside	Net Δ Unit Use -- RES	-1%	-6%	-9%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	0.99	1.05	1.01		
	COM	1.00	1.00	1.00		
	AG	0.99	0.96	0.93		

Pressure Zone		2020	2035	2050	2013 % of Total Use	Notes
Canonita	Net Δ Unit Use -- RES	-4%	-8%	-11%		For error checking only. Not used in forecast calculations. (The forecast for Total District is the sum of the individual ZBs.)
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.09	1.19	1.15		
COM	1.00	1.00	1.00			
AG	0.99	0.96	0.93			
Pala Mesa	Net Δ Unit Use -- RES	-6%	-10%	-13%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.26	1.36	1.34		
COM	1.00	1.00	1.00			
AG	0.99	0.96	0.93			
South	Net Δ Unit Use -- RES	-2%	-7%	-10%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.02	1.08	1.06		
COM	1.00	1.00	1.00			
AG	0.99	0.96	0.93			
Morro	Net Δ Unit Use -- RES	-4%	-10%	-12%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.10	1.31	1.29		
COM	1.00	1.00	1.00			
AG	0.99	0.96	0.93			
Morro Tank	Net Δ Unit Use -- RES	-2%	-5%	-8%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	RES	1.00	0.98	0.94		
COM	1.00	1.00	1.00			
AG	0.99	0.96	0.93			
TOTAL DISTRICT	Net Δ Unit Use -- RES	-4%	-9%	-12%		
	Net Δ Unit Use -- COM	0%	0%	0%		
	Net Δ Unit Use -- AG	-1%	-4%	-7%		
	Net Δ Unit Use -- TEMP					
	SFR	1.11	1.24	1.22		
	MFR	1.00	1.00	1.00		
COM	0.99	0.96	0.93			
IRR						

Rainbow MWD DEMAND FORECAST BY PZ								DRAFT 01/08/16		
Baseline Unit Use Adj.		Growth Rate Adj.		Real Price Increase (2050)		Price-Elasticity Coefficients				
-5.0% Adjustment ▼		per SANDAG ▼		Increased 50% ▼		RES	COM	AG		
						-0.20 ▼	-0.05 ▼	-0.20 ▼		
Calendar Year	2013		2020	2035	2050	2020	2035	2050		
	MGD		MGD	MGD	MGD	Factor	Factor	Factor		
<b>North</b> -- SALES (MGD)										
RES	0.09		0.09	0.09	0.08	1.04	1.05	1.01		
COM	0.04		0.04	0.04	0.04	1.00	1.00	1.00		
AG	1.71		1.61	1.56	1.51	0.99	0.96	0.93		
TEMP	-		-	-	-					
TOTAL	1.84		1.73	1.68	1.63	-6%	-9%	-11%		
<b>U1</b> -- SALES (MGD)										
RES	0.06		0.08	0.11	0.12	1.41	2.05	2.25		
COM	0.01		0.01	0.01	0.01	1.00	1.00	1.00		
AG	0.10		0.09	0.09	0.09	0.99	0.96	0.93		
TEMP	-		-	-	-					
TOTAL	0.16		0.17	0.21	0.21	8%	27%	32%		
<b>Vallecitos</b> -- SALES (MGD)										
RES	0.01		0.01	0.01	0.01	0.92	0.93	0.91		
COM	0.00		0.00	0.00	0.00	1.00	1.00	1.00		
AG	0.23		0.22	0.21	0.21	0.99	0.96	0.93		
TEMP	-		-	-	-					
TOTAL	0.25		0.23	0.23	0.22	-7%	-9%	-12%		
<b>Rainbow Heights</b> -- SALES (MGD)										
RES	0.06		0.05	0.06	0.07	1.01	1.23	1.27		
COM	0.00		0.00	0.00	0.00	1.00	1.00	1.00		
AG	0.42		0.39	0.38	0.37	0.99	0.96	0.93		
TEMP	-		0.01	0.01	0.01					
TOTAL	0.48		0.46	0.46	0.45	-4%	-4%	-6%		
<b>Magee</b> -- SALES (MGD)										
RES	0.03		0.02	0.02	0.02	1.03	0.99	0.96		
COM	-		-	-	-	1.00	1.00	1.00		
AG	0.01		0.01	0.01	0.01	0.99	0.96	0.93		
TEMP	-		-	-	-					
TOTAL	0.03		0.03	0.03	0.03	-3%	-6%	-10%		
<b>Gomez</b> -- SALES (MGD)										
RES	0.04		0.04	0.05	0.05	1.08	1.27	1.31		
COM	0.00		0.00	0.00	0.00	1.00	1.00	1.00		
AG	0.49		0.46	0.44	0.43	0.99	0.96	0.93		
TEMP	-		-	-	-					
TOTAL	0.53		0.50	0.49	0.48	-6%	-7%	-9%		
<b>Northside</b> -- SALES (MGD)										
RES	0.14		0.13	0.14	0.13	0.99	1.05	1.01		
COM	0.01		0.01	0.01	0.01	1.00	1.00	1.00		
AG	0.94		0.88	0.86	0.83	0.99	0.96	0.93		
TEMP	-		-	-	-					
TOTAL	1.09		1.02	1.00	0.97	-6%	-8%	-11%		
<b>Canonita</b> -- SALES (MGD)										
RES	0.45		0.47	0.51	0.49	1.09	1.19	1.15		
COM	0.04		0.04	0.04	0.04	1.00	1.00	1.00		
AG	1.25		1.17	1.14	1.10	0.99	0.96	0.93		
TEMP	-		0.01	0.01	0.01					
TOTAL	1.74		1.69	1.69	1.64	-3%	-3%	-6%		
<b>Pala Mesa</b> -- SALES (MGD)										
RES	0.86		1.03	1.11	1.10	1.26	1.36	1.34		
COM	0.05		0.05	0.05	0.05	1.00	1.00	1.00		
AG	1.04		0.98	0.95	0.92	0.99	0.96	0.93		
TEMP	-		0.01	0.01	0.01					
TOTAL	1.96		2.07	2.12	2.08	6%	8%	6%		

**Rainbow MWD DEMAND FORECAST BY PZ** DRAFT 01/08/16

<u>Baseline Unit Use Adj.</u>	<u>Growth Rate Adj.</u>	<u>Real Price Increase (2050)</u>	<u>Price-Elasticity Coefficients</u>		
-5.0% Adjustment ▼	per SANDAG ▼	Increased 50% ▼	RES	COM	AG
			-0.20 ▼	-0.05 ▼	-0.20 ▼

Calendar Year	2013	2020	2035	2050	2020	2035	2050
<b>South</b>	-- SALES (MGD)						
RES	0.22	0.21	0.23	0.22	1.02	1.08	1.06
COM	0.22	0.21	0.21	0.21	1.00	1.00	1.00
AG	4.28	4.01	3.89	3.77	0.99	0.96	0.93
TEMP	-	0.01	0.01	0.01			
<b>TOTAL</b>	<b>4.72</b>	<b>4.44</b>	<b>4.34</b>	<b>4.21</b>	<b>-6%</b>	<b>-8%</b>	<b>-11%</b>

<b>Morro</b>	-- SALES (MGD)						
RES	1.11	1.16	1.38	1.36	1.10	1.31	1.29
COM	0.15	0.14	0.14	0.14	1.00	1.00	1.00
AG	2.40	2.25	2.18	2.11	0.99	0.96	0.93
TEMP	-	0.01	0.01	0.01			
<b>TOTAL</b>	<b>3.65</b>	<b>3.56</b>	<b>3.71</b>	<b>3.62</b>	<b>-3%</b>	<b>2%</b>	<b>-1%</b>

<b>Morro Tank</b>	-- SALES (MGD)						
RES	0.13	0.12	0.12	0.11	1.00	0.98	0.94
COM	0.00	0.00	0.00	0.00	1.00	1.00	1.00
AG	0.29	0.27	0.26	0.25	0.99	0.96	0.93
TEMP	-	-	-	-			
<b>TOTAL</b>	<b>0.42</b>	<b>0.39</b>	<b>0.38</b>	<b>0.37</b>	<b>-6%</b>	<b>-8%</b>	<b>-12%</b>

TOTAL DISTRICT -- SALES					% Change vs. 2013		
RES	3.19	3.42	3.84	3.78	7%	20%	19%
COM	0.52	0.49	0.50	0.50	-5%	-5%	-5%
AG	13.16	12.33	11.96	11.58	-6%	-9%	-12%
TEMP	-	0.05	0.05	0.05	0%	0%	0%
<b>TOTAL</b>	<b>16.87</b>	<b>16.30</b>	<b>16.34</b>	<b>15.90</b>	<b>-3%</b>	<b>-3%</b>	<b>-6%</b>

TOTAL DISTRICT -- DELIVERIES (MGD)					% Change vs. 2013		
RES	3.63	3.90	4.37	4.31	7%	20%	19%
COM	0.59	0.56	0.56	0.57	-5%	-5%	-5%
AG	14.99	14.04	13.62	13.19	-6%	-9%	-12%
TEMP	0.00	0.06	0.06	0.06	0%	0%	0%
<b>TOTAL</b>	<b>19.21</b>	<b>18.56</b>	<b>18.61</b>	<b>18.12</b>	<b>-3%</b>	<b>-3%</b>	<b>-6%</b>

TOTAL DISTRICT -- DELIVERIES (AF/yr)					% Change vs. 2013		
RES	4,070	4,370	4,890	4,820	7%	20%	18%
COM	660	630	630	630	-5%	-5%	-5%
AG	16,780	15,730	15,260	14,770	-6%	-9%	-12%
TEMP	-	60	60	60	0%	0%	0%
<b>TOTAL</b>	<b>21,500</b>	<b>20,800</b>	<b>20,800</b>	<b>20,300</b>	<b>-3%</b>	<b>-3%</b>	<b>-6%</b>

GPCD (Deliveries)					% Change vs. 2013		
Employment	5,160	5,105	6,079	7,307	-1%	18%	42%
Population	19,993	23,789	28,219	28,570	19%	41%	43%
<b>GPCD</b>	<b>961</b>	<b>780</b>	<b>660</b>	<b>634</b>	<b>SB7 2020 target = 1,168</b>		
Deliveries @ SB7 Target	26,200	31,100	36,900	37,400	<b>GPCD</b>		

Notes:

Rainbow MWD PEAK DELIVERY FORECAST BY PZ						DRAFT 01/08/16
Zone	Adjusted to 2035 Deliveries MGD	Peak Week Factor	Peak Day Factor	2035 Peak Week Deliveries MGD	2035 Peak Day Deliveries MGD	
<b>North</b>						
RES	0.10	1.60	1.80	0.16	0.18	
COM	0.04	1.80	2.00	0.07	0.08	
AG	1.77	1.80	2.00	3.19	3.55	
TEMP	-	2.00	2.50	-	-	
<b>TOTAL</b>	<b>1.91</b>	1.79	1.99	<b>3.42</b>	<b>3.81</b>	
<b>U1</b>						
RES	0.13	1.60	1.80	0.20	0.23	
COM	0.01	1.80	2.00	0.01	0.01	
AG	0.10	1.80	2.00	0.19	0.21	
TEMP	-	2.00	2.50	-	-	
<b>TOTAL</b>	<b>0.24</b>	1.69	1.89	<b>0.40</b>	<b>0.44</b>	
<b>Vallecitos</b>						
RES	0.01	1.60	1.80	0.02	0.02	
COM	0.00	1.80	2.00	0.01	0.01	
AG	0.24	1.80	2.00	0.44	0.49	
TEMP	-	2.00	2.50	-	-	
<b>TOTAL</b>	<b>0.26</b>	1.79	1.99	<b>0.46</b>	<b>0.52</b>	
<b>Rainbow Heights</b>						
RES	0.07	1.60	1.80	0.12	0.13	
COM	0.00	1.80	2.00	0.00	0.00	
AG	0.44	1.80	2.00	0.78	0.87	
TEMP	0.01	2.00	2.50	0.02	0.03	
<b>TOTAL</b>	<b>0.52</b>	1.78	1.98	<b>0.92</b>	<b>1.03</b>	
<b>Magee</b>						
RES	0.03	1.60	1.80	0.04	0.05	
COM	-	1.80	2.00	-	-	
AG	0.01	1.80	2.00	0.01	0.01	
TEMP	-	2.00	2.50	-	-	
<b>TOTAL</b>	<b>0.03</b>	1.64	1.84	<b>0.06</b>	<b>0.06</b>	
<b>Gomez</b>						
RES	0.06	1.60	1.80	0.09	0.10	
COM	0.00	1.80	2.00	0.00	0.00	
AG	0.50	1.80	2.00	0.91	1.01	
TEMP	-	2.00	2.50	-	-	
<b>TOTAL</b>	<b>0.56</b>	1.78	1.98	<b>1.00</b>	<b>1.11</b>	
<b>Northside</b>						
RES	0.16	1.60	1.80	0.25	0.29	
COM	0.01	1.80	2.00	0.02	0.02	
AG	0.97	1.80	2.00	1.75	1.95	
TEMP	-	2.00	2.50	-	-	
<b>TOTAL</b>	<b>1.14</b>	1.77	1.97	<b>2.03</b>	<b>2.26</b>	
<b>Canonita</b>						
RES	0.58	1.60	1.80	0.93	1.04	
COM	0.04	1.80	2.00	0.08	0.09	
AG	1.29	1.80	2.00	2.33	2.59	
TEMP	0.01	2.00	2.50	0.02	0.03	
<b>TOTAL</b>	<b>1.93</b>	1.74	1.94	<b>3.36</b>	<b>3.75</b>	
<b>Pala Mesa</b>						
RES	1.27	1.60	1.80	2.03	2.28	
COM	0.06	1.80	2.00	0.10	0.12	
AG	1.08	1.80	2.00	1.94	2.16	
TEMP	0.01	2.00	2.50	0.02	0.03	
<b>TOTAL</b>	<b>2.42</b>	1.70	1.90	<b>4.10</b>	<b>4.58</b>	

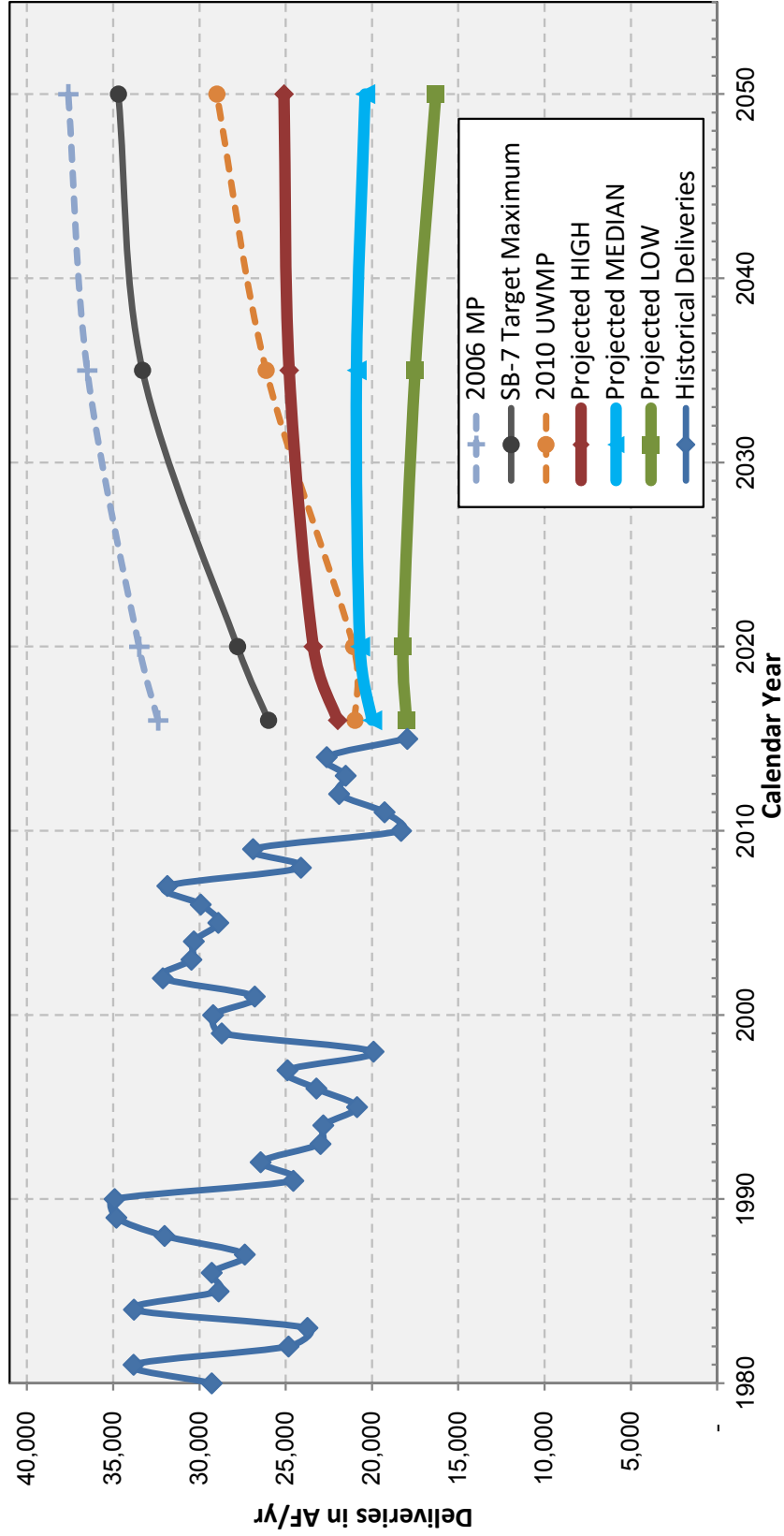
Rainbow MWD PEAK DELIVERY FORECAST BY PZ					DRAFT 01/08/16	
Zone	Adjusted to 2035 Deliveries	Peak Week	Peak Day	2035 Peak Week Deliveries	2035 Peak Day Deliveries	
<b>South</b>						
RES	0.26	1.60	1.80	0.41	0.47	
COM	0.24	1.80	2.00	0.43	0.47	
AG	4.43	1.80	2.00	7.98	8.86	
TEMP	0.01	2.00	2.50	0.02	0.03	
<b>TOTAL</b>	<b>4.94</b>	<b>1.79</b>	<b>1.99</b>	<b>8.84</b>	<b>9.83</b>	
<b>Morro</b>						
RES	1.57	1.60	1.80	2.52	2.83	
COM	0.16	1.80	2.00	0.29	0.32	
AG	2.48	1.80	2.00	4.47	4.96	
TEMP	0.01	2.00	2.50	0.02	0.03	
<b>TOTAL</b>	<b>4.23</b>	<b>1.73</b>	<b>1.93</b>	<b>7.29</b>	<b>8.14</b>	
<b>Morro Tank</b>						
RES	0.13	1.60	1.80	0.21	0.24	
COM	0.01	1.80	2.00	0.01	0.01	
AG	0.30	1.80	2.00	0.53	0.59	
TEMP	-	2.00	2.50	-	-	
<b>TOTAL</b>	<b>0.43</b>	<b>1.74</b>	<b>1.94</b>	<b>0.76</b>	<b>0.84</b>	
<b>TOTAL DISTRICT</b>						
RES	4.37	1.60	1.80	6.99	7.87	
COM	0.56	1.80	2.00	1.02	1.13	
AG	13.62	1.80	2.00	24.52	27.24	
TEMP	0.06	2.00	2.50	0.11	0.14	
<b>TOTAL</b>	<b>18.61</b>	<b>1.75</b>	<b>1.95</b>	<b>32.64</b>	<b>36.38</b>	



Rainbow MWD DEMAND FORECAST RANGE (DELIVERIES, AF/yr)						DRAFT 01/08/16		
						% Change vs. 2013		
		2016	2020	2035	2050	2020	2035	2050
LOW	TOTAL	18,000	18,200	17,500	16,300	-1%	-3%	-9%
	Baseline Adjustment:		-15%	Real Price Increase:		100%		
	Growth Rate:	Reduced -25%		P-E (R/C/A):		-0.20	-0.05	-0.20
MEDIAN	TOTAL	20,000	20,700	20,900	20,400	2%	3%	0%
	Baseline Adjustment:		-5%	Real Price Increase:		50%		
	Growth Rate:	per SANDAG		P-E (R/C/A):		-0.20	-0.05	-0.20
HIGH	TOTAL	22,000	23,400	24,800	25,100	4%	11%	12%
	Baseline Adjustment:		5%	Real Price Increase:		0%		
	Growth Rate:	Increased 25%		P-E (R/C/A):		-0.20	-0.05	-0.20
HIGH (SB7 gpcd)	TOTAL	22,100	24,000	27,500	28,800	18%	35%	41%
	Other: Water use set at SB7 2020 Target Rate of					900	gpcd.	-1,000
2010 UWMP	TOTAL	21,000	21,070	26,137	29,000	3%	28%	42%
2006 MP	TOTAL	32,400	33,500	36,500	37,600	64%	79%	84%

# Rainbow MWD Historical and Projected Water Deliveries (AF/yr)

DRAFT 01/08/16



Rainbow MWD -- SANDAG Series 13 Report by Pressure Zone													DRAFT 01/08/16	
year	population	household population	group quarters population	total housing units	single family housing units	multi-family housing units	home housing units	total households	single family households	multi-family households	mobile home households	employment	PPH	
NORTH	2012	962	962	0	326	319	0	7	326	319	0	7	2.95	
	2020	1,011	1,011	0	350	343	0	7	350	343	0	7	2.89	
	2035	1,074	1,074	0	364	357	0	7	359	352	0	7	2.95	
	2050	1,080	1,080	0	361	354	0	7	354	348	0	6	2.99	
	Δ	118	118	0	35	35	0	0	28	29	0	-1	0.04	
Δ (%)	12%	12%	--	11%	11%	--	0%	9%	9%	--	-14%	40%	1%	
U1TANK	2012	337	337	0	181	76	0	105	181	76	0	105	1.86	
	2020	552	552	0	276	171	0	105	276	171	0	105	2.00	
	2035	869	869	0	430	325	0	105	430	325	0	105	2.02	
	2050	993	993	0	487	382	0	105	486	381	0	105	2.04	
	Δ	656	656	0	306	306	0	0	305	305	0	0	0.18	
Δ (%)	195%	195%	--	169%	403%	--	0%	169%	401%	--	0%	0%	10%	
VALLECITOS	2012	153	153	0	44	44	0	0	44	44	0	0	3.48	
	2020	131	131	0	44	44	0	0	44	44	0	0	2.98	
	2035	141	141	0	45	45	0	0	45	45	0	0	3.13	
	2050	140	140	0	47	47	0	0	47	47	0	0	2.98	
	Δ	-13	-13	0	3	3	0	0	3	3	0	0	-0.50	
Δ (%)	-8%	-8%	--	7%	7%	--	--	7%	7%	--	--	152%	-14%	
RAINBOW HEIGHTS	2012	493	404	89	146	146	0	0	146	146	0	0	3.38	
	2020	519	433	86	147	147	0	0	147	147	0	0	3.53	
	2035	665	578	87	191	191	0	0	191	191	0	0	3.48	
	2050	712	625	87	205	205	0	0	205	205	0	0	3.47	
	Δ	656	656	0	306	306	0	0	305	305	0	0	0.18	
Δ (%)	195%	195%	--	169%	403%	--	0%	169%	401%	--	0%	0%	10%	
MAGEE	2012	172	172	0	57	57	0	0	57	57	0	0	3.02	
	2020	193	193	0	57	57	0	0	57	57	0	0	3.39	
	2035	192	192	0	57	57	0	0	57	57	0	0	3.37	
	2050	190	190	0	57	57	0	0	57	57	0	0	3.33	
	Δ	-13	-13	0	3	3	0	0	3	3	0	0	-0.50	
Δ (%)	-8%	-8%	--	7%	7%	--	--	7%	7%	--	--	152%	-14%	
GOMEZ CREEK	2012	262	262	0	105	105	0	0	105	105	0	0	2.50	
	2020	324	324	0	114	114	0	0	114	114	0	0	2.84	
	2035	419	419	0	141	141	0	0	141	141	0	0	2.97	
	2050	451	451	0	151	151	0	0	151	151	0	0	2.99	
	Δ	219	221	-2	59	59	0	0	59	59	0	0	7	0.10
Δ (%)	44%	55%	-2%	40%	40%	--	--	40%	40%	--	--	10%	3%	
NORTHSIDE	2012	938	938	0	345	345	0	0	345	345	0	0	2.72	
	2020	952	952	0	346	346	0	0	345	345	0	0	2.75	
	2035	1,065	1,065	0	385	385	0	0	382	382	0	0	2.77	
	2050	1,054	1,054	0	383	383	0	0	379	379	0	0	2.75	
	Δ	18	18	0	0	0	0	0	0	0	0	0	0	0.32
Δ (%)	10%	10%	--	0%	0%	--	--	0%	0%	--	--	0%	10%	
CANONITA	2012	2,144	2,144	0	961	853	0	108	924	816	0	108	2.23	
	2020	2,490	2,490	0	1,086	978	0	108	1,023	916	0	107	2.29	
	2035	2,948	2,948	0	1,233	1,125	0	108	1,208	1,101	0	107	2.39	
	2050	2,895	2,895	0	1,233	1,125	0	108	1,190	1,085	0	105	2.35	
	Δ	189	189	0	46	46	0	0	46	46	0	0	1	0.49
Δ (%)	72%	72%	--	44%	44%	--	--	44%	44%	--	--	4%	20%	
PALA MESA	2012	4,927	4,918	9	2,011	1,771	10	230	1,945	1,706	9	230	2.45	
	2020	6,781	6,777	4	2,682	2,442	10	230	2,573	2,336	9	229	2.53	
	2035	7,634	7,624	10	3,020	2,780	10	230	2,892	2,655	9	228	2.53	
	2050	7,749	7,736	13	3,074	2,834	10	230	2,943	2,710	9	224	2.52	
	Δ	116	116	0	38	38	0	0	34	34	0	0	2	0.03
Δ (%)	12%	12%	--	11%	11%	--	--	10%	10%	--	--	2%	1%	
SOUTH	2012	2,769	2,769	0	1,228	1,062	0	166	1,139	973	0	166	2.25	
	2020	3,006	3,006	0	1,265	1,099	0	166	1,172	1,006	0	166	2.38	
	2035	3,395	3,395	0	1,399	1,233	0	166	1,305	1,139	0	166	2.43	
	2050	3,440	3,440	0	1,423	1,257	0	166	1,319	1,154	0	165	2.42	
	Δ	751	751	0	272	272	0	0	266	269	0	-3	0	0.12
Δ (%)	35%	35%	--	28%	32%	--	0%	29%	33%	--	-3%	0%	5%	

Rainbow MWD -- SANDAG Series 13 Report by Pressure Zone													DRAFT 01/08/16	
year	population	household population	group quarters population	total housing units	single family housing units	multi-family housing units	home housing units	total households	single family households	multi-family households	mobile home households	employment	PPH	
MORRO	2012	5,967	5,868	99	2,348	2,028	320	0	2,235	1,917	318	0	0	2.54
	2020	6,939	6,851	88	2,678	2,358	320	0	2,565	2,245	320	0	1,655	2.59
	2035	8,917	8,807	110	3,396	3,076	320	0	3,284	2,964	320	0	1,661	2.63
	2050	8,978	8,853	125	3,444	3,124	320	0	3,309	2,989	320	0	1,849	2.61
	Δ	2,822	2,818	4	1,063	1,063	0	0	998	1,004	0	-6	1,170	0.07
Δ (%)	57%	57%	44%	53%	60%	0%	0%	51%	59%	0%	-3%	180%	3%	
MORRO TANK	2012	869	869	0	362	362	0	0	343	343	0	0	0	2.40
	2020	891	891	0	369	369	0	0	350	350	0	0	67	2.41
	2035	900	900	0	371	371	0	0	355	355	0	0	67	2.43
	2050	888	888	0	368	368	0	0	348	348	0	0	67	2.41
	Δ	671	671	0	195	195	0	0	180	181	0	-1	264	0.16
Δ (%)	24%	24%	--	16%	18%	--	0%	16%	19%	--	-1%	27%	7%	
TOTAL DISTRICT	2012	19,993	19,796	197	8,114	7,168	330	616	7,790	6,847	327	616	--	2.46
	2020	23,789	23,611	178	9,414	8,468	330	616	9,016	8,074	329	614	5,105	2.53
	2035	28,219	28,012	207	11,032	10,086	330	616	10,649	9,707	329	613	6,079	2.56
	2050	28,570	28,345	225	11,233	10,287	330	616	10,788	9,854	329	605	7,307	2.54
	Δ	8,577	8,549	28	3,119	3,119	0	0	2,998	3,007	2	-11	2,202	0.08
Δ (%)	43%	43%	14%	38%	44%	0%	0%	38%	44%	1%	-2%	43%	3%	

Notes:

- 1) Custom data sort provided by SANDAG 4/8/15, per boundary shape files provided by District
- 2) Total employment data for 2012 not provided by SANDAG. Delta values for employment are relative to 2020