



November 13, 2008

Chino Basin Watermaster  
Attention: Kenneth R. Manning  
Chief Executive Officer  
9641 San Bernardino Road  
Rancho Cucamonga, CA 91730

**Subject: Response to Condition Subsequent Number 7**

Dear Mr. Manning:

Pursuant to your request, Wildermuth Environmental, Inc. (WEI) reviewed the December 20, 2007 Special Referee's Report and the Honorable Judge Gunn's December 21, 2007 Court Order with regard to Condition Subsequent No. 7 (CS7). Specifically, you asked WEI to develop and recommend a response to CS7 for the Watermaster's consideration and use in the Watermaster's response to the Court. Our review and recommendations are summarized below.

**Condition Subsequent No. 7**

CS7 reads:

By December 31, 2008, Watermaster shall prepare and submit to the Court for approval a revised schedule to replace the initial corrected schedule, which submittal shall include a reconciliation of new yield and storm water estimates for 2000/01 through 2006/07, and a discussion of how Watermaster will account for un-replenished overproduction for that period.

There are two issues posed by the CS7. The first issue relates to under-replenishment of the Chino Basin desalters during the 2000/01 through 2006/07 period. The following questions need to be answered to resolve this issue:

- What was the magnitude of said under-replenishment?
- How will the Watermaster fulfill the replenishment obligation?

The second issue relates to how Watermaster accounts for the new yield created by the operation of the recently constructed recharge improvements, referred to as the Chino Basin Facilities Improvement Program (CBFIP). To resolve this issue, the following questions need to be answered:

- What was the volume of storm water recharge over the 2000/01 through 2006/07 period?
- What part of this recharge is "new" and how will the Watermaster account for this new recharge?

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## Under-Replenishment of the Chino Desalters During the 2000/01 through 2006/07

The *Chino Basin Water Resources Management Study* (MW, 1993) and the subsequent early desalter engineering studies used groundwater flow models to evaluate groundwater basin response to desalter proposals and concluded that the inducement of new Santa Ana River inflow to the Chino Basin would occur from the then proposed Chino desalters. Subsequent investigations during the development of the Optimum Basin Management Program (OBMP) produced a similar result. One of the conditions necessary to generate new yield with the desalters is to assume that new yield will occur and to conduct replenishment operations with that assumption. At the time of the desalter startup, around 2000, WEI used Watermaster's *Rapid Assessment Model* (RAM) of the Chino Basin to determine how much new yield could be obtained from the Santa Ana River. (RAM is a steady state model that produces an equilibrium response to any prescribed groundwater management plan.) Through the application of RAM, it was determined that Watermaster should assume that about half of the desalter production would come from the River.

Our current models are, by contrast, very detailed transient models. The recent modeling work done for the Peace II process suggests a very different answer for the new yield associated with the desalters and the reoperation authorized by the Peace II Agreement. In analyzing future reoperation alternatives, it was determined that the induced Santa Ana River recharge lagged the dedication of groundwater storage to desalter replenishment by several years. Table 1 shows the Initial Corrected Schedule<sup>1</sup> referred to in CS7. The planning simulation for this schedule started in July 2006. This table contains the estimated new yield from the Santa Ana River and the time history of withdrawals from the reoperation accounts used to satisfy the desalter replenishment obligation. Note that new yield from the river appears to start in fiscal year 2011/12 and rises to about 5,000 acre-ft/yr by 2021/2022. The column titled "Residual Replenishment Obligation" is the desalter replenishment obligation that must be satisfied through either physical recharge, other sources provided for in the Peace II Agreement, water acquired from other storage accounts, or a combination of these sources. One of the take aways from Table 1 is that the induced Santa Ana River recharge originally projected to occur in the 2000/01 through 2006/07 period did not occur.

Table 2 shows desalter production during the 2000/01 through 2006/07 period, which totals to about 91,200 acre-ft. This production must be fully replenished. The table shows that 36,400 acre-ft of replenishment obligation was provided by the Desalter Account, that 25,700 acre-ft was provided by the CDA reoperation account, and that about 29,100 acre-ft was provided projected new Santa Ana River recharge. However, as mentioned above, the new modeling results strongly suggest that new Santa Ana River recharge did not occur; thus, there is an outstanding replenishment obligation of about 29,100 acre-ft.

There are four water sources that can be used to make up the outstanding replenishment obligation, including 1) physical (wet-water) recharge with supplemental water, 2) a debit from the non-Western Municipal Water District (WMWD) reoperation account<sup>2</sup>, 3) other sources provided for in the Peace

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<sup>1</sup> The term *Initial Corrected Schedule* refers to the specific schedule of desalter production, projected new yield, use of reoperation water for desalter replenishment, and other desalter replenishment that was requested by the Court during the Peace II process.

<sup>2</sup> It is likely that the WMWD will become a member of the CDA before the end of 2008. The WMWD reoperation account refers to the water in storage that is dedicated to desalter capacity that will be constructed by the WMWD

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II Agreement, 4) water acquired from other storage accounts, or a combination of these sources. Physical recharge is the least desirable alternative because it will retard the projected buildup in new yield (as shown in Table 1), it works counter to hydraulic control, and it will come at a great cost. Figure 1 shows the time history of projected Santa Ana River recharge attributed to desalter production with reoperation and the estimated retardation of the projected buildup in new yield if the 29,100 acre-ft were replenished with physical recharge. A better approach is acquire the replenishment water either from the non-WMWD reoperation account, other sources provided for in the Peace II Agreement, other water from existing storage accounts if available, or a combination thereof. Table 3 presents a modified version of the Initial Corrected Schedule, extended back to fiscal 2000/01, that shows historical and projected desalter production, projected new yield, the time history of withdrawals from the Desalter Account, projected withdrawals from the reoperation accounts, and the historical and projected residual replenishment obligation. In this schedule, it was assumed that the Watermaster would debit the non-WMWD reoperation account in fiscal 2009/10; although it could be done this year as well. If the replenishment water was supplied from the non-WMWD reoperation account, the non-WMWD reoperation account would be depleted one year earlier than initially projected in Table 1.

#### **Reconciliation of Storm Water Recharge for the 2000/01 through 2006/07 Period**

In addition to the new yield created by new Santa Ana River recharge, the Peace Agreement provides for new yield created by new storm water recharge. New storm water recharge refers to the additional storm water recharge that results from the CBFIP and subsequent storm water recharge enhancements. New storm water recharge is equal to the total volume of storm water recharge minus the storm water recharge that would have occurred without the CBFIP and subsequent storm water recharge enhancements.

The CBFIP was mostly completed during fiscal 2004/05. The Inland Empire Utilities Agency (IEUA) managed CBFIP construction and currently operates the CBFIP facilities. These facilities are operated pursuant to an agreement between the Watermaster, the IEUA, the Chino Basin Water Conservation District, and the County of San Bernardino. The IEUA collects data and prepares storm water recharge estimates for each of the recharge basins in the Chino Basin. The IEUA reviews its calculations with the Groundwater Recharge Coordinating Committee and provides the final estimates to the Watermaster. Recently, we developed pre-CBFIP storm water recharge estimates for use in our groundwater modeling work for both the Peace II Agreement and, more recently, the material physical injury analysis of the Dry Year Yield Program Expansion. The WEI and IEUA estimates are provided in Table 4. The recharge facility locations are shown in Figure 2.

In contrast to the new yield developed by the desalters, the new recharge from recharge improvements varies significantly from year to year as a function of precipitation, storm water management practices, and the state of the recharge facilities. In 2003, Watermaster investigated two methods for computing new storm water recharge. The first method involves preparing estimates of the long-term average annual storm water recharge with and without the CBFIP and calculating the new yield as the difference. Modeling tools would be used to estimate recharge, and

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and will be exclusively available to the WMWD. The non-WMWD reoperation account refers to the other water in the reoperation account.

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the new yield estimate would be refined over time if historical observations demonstrated that the assumptions, data, and/or models needed to be refined. With this approach, the new yield estimate is more stable over time, providing certainty to the members of the Appropriative Pool. Moreover, the yield of the Chino Basin is based on recharge components, some of which are highly variable over time (stormwater recharge and the deep percolation of precipitation), yet the yield is a constant value. This occurs because the Chino Basin is a large storage reservoir that buffers the effects of wet and dry periods. The use of a long-term average annual estimate of new recharge is consistent with the notion of the safe yield of the Chino Basin and other basins that are managed to a safe yield.

The second method would be to estimate actual recharge annually, based on observed data, and what would have recharged had the CBFIP not been implemented. The difference would equal the new yield. With this approach, the new yield estimate would be highly variable over time.

In April 2003, Watermaster adopted the first approach. The procedures for implementing this approach are as follows:

1. The volume of recharge provided by the pre-CBFIP facilities was assumed to be 5,600 acre-ft/yr (baseline) per the Peace Agreement implementation plan.
2. Assumptions were made about the additional recharge that would result from the CBFIP.
3. It was assumed that the CBFIP would produce a long-term average new recharge of 12,000 acre-ft/yr.
4. This assumed long-term average recharge (12,000 acre-ft/yr) would be used for the first five years of new recharge facility operations.
5. Each year, the performance characteristics and actual additional recharge would be determined.
6. At the end of five years, a new long-term average estimate of new recharge would be computed, based on the actual performance characteristics of the facilities
7. Any credit or debit that results from the initial estimate of additional recharge being too low or high, respectively, would be spread evenly over the next five-year period.
8. Repeat items 5 through 7 every five years.

This process started in fiscal 2004/05; thus, the five-year period will end in June 2009. The Watermaster is charged with developing a new long-term average recharge estimate using the recharge monitoring and performance data collected by the IEUA. The Watermaster should be able to prepare this estimate by the end of August 2009 and will then be in a position to execute step 7 listed above. Table 5 and Figure 3 show how such a calculation will be performed. In this example, the initial long-term average of new recharge was assumed to be 12,000 acre-ft/yr through 2008/09. A new long-term average of new recharge of 6,000 acre-ft/yr is computed in the summer of 2009 and is used for the next five years. Note that this estimate of new storm water recharge means that the Watermaster overestimated new storm water recharge by 6,000 acre-ft/yr for the first five years, resulting a cumulative overestimate of 30,000 acre-ft through the end of 2008/09. This overestimate is debited from the new recharge estimates for the 2009/10 through 2013/14 period and, in this example, results in a new recharge credit of zero acre-ft/yr through 2013/14. And, the initial overestimate is completely debited from the appropriators.

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## Recommended Responses to CS7

In response to the questions posed by CS7 as they relate to the under-replenishment of the Chino Basin desalters during the 2000/01 to 2006/07 period, our recommended answers are as follows:

1. What was the magnitude of the desalter under replenishment during this period? The estimated under replenishment is 29,070 acre-ft as shown in Table 2 and is numerically equal to the projected new Santa Ana River recharge.
2. How will Watermaster fulfill the replenishment obligation? Our recommendation is that Watermaster use either water from the non-WMWD reoperation account, other water that it can acquire from sources provided for in the Peace II Agreement, water acquired from other storage accounts, or a combination of these sources. Physical recharge will retard full acquisition of hydraulic control and will lead to reduced Santa Ana River recharge of about 5,000 acre-ft through 2030. There are no hydrologic or economic advantages to replenishing with physical recharge, only disadvantages.

In response to the questions posed by CS7 as they relate to the reconciliation of the new storm water recharge, our recommended answers are as follows:

1. What was the storm water recharge over the 2000/01 through 2006/07 period? The volume of storm water recharged during this period is provided in Table 4. The period through 2003/04 represents the pre-CBFIP period, as does the first part of the fiscal 2004/05. Thereafter, the storm water recharge totals include new storm water recharge.
2. What part of this recharge is "new" and how will the Watermaster account for this new recharge? The Watermaster will use the process described above, specifically steps 6 and 7, to account for new recharge. Watermaster will perform its first reconciliation in fiscal 2009/10 pursuant to the new storm water recharge policy it adopted in April 2003.

Please call me if you have any questions or need further assistance.

**Wildermuth Environmental, Inc.**



Mark J. Wildermuth  
Chairman

cc.  
Sheri Rojo, Chino Basin Watermaster  
Ben Pak, Chino Basin Watermaster  
Scott Slater, Brownstein Hyatt Farber Schreck  
Michael Fife, Brownstein Hyatt Farber Schreck

Encl.

**Table 1**  
**Initial Corrected Schedule**  
(acre-ft)

Fiscal Year	Desalter Pumping	New Yield	Re-Operation			Residual Replenishment Obligation
			Replenishment Allocation for Desalter III	Replenishment Allocation to CDA	Balance	
					400,000	0
2006 / 2007	26,350	0	0	26,350	373,650	0
2007 / 2008	26,350	0	0	26,350	347,300	0
2008 / 2009	26,356	0	0	26,356	320,944	0
2009 / 2010	26,356	0	0	26,356	294,588	0
2010 / 2011	28,965	0	0	28,965	265,622	0
2011 / 2012	31,574	75	0	31,500	234,123	0
2012 / 2013	34,182	442	5,000	28,740	200,383	0
2013 / 2014	36,791	962	10,000	25,829	164,554	0
2014 / 2015	39,320	1,629	10,000	4,554	150,000	23,137
2015 / 2016	39,320	2,255	10,000	0	140,000	27,065
2016 / 2017	39,320	2,771	10,000	0	130,000	26,549
2017 / 2018	39,320	3,275	10,000	0	120,000	26,045
2018 / 2019	39,320	3,767	10,000	0	110,000	25,553
2019 / 2020	39,320	4,283	10,000	0	100,000	25,037
2020 / 2021	39,320	4,764	10,000	0	90,000	24,556
2021 / 2022	39,320	5,198	10,000	0	80,000	24,122
2022 / 2023	39,320	5,570	10,000	0	70,000	23,750
2023 / 2024	39,320	5,854	10,000	0	60,000	23,466
2024 / 2025	39,320	5,959	10,000	0	50,000	23,361
2025 / 2026	39,320	5,834	10,000	0	40,000	23,486
2026 / 2027	39,320	5,698	10,000	0	30,000	23,622
2027 / 2028	39,320	5,546	10,000	0	20,000	23,774
2028 / 2029	39,320	5,479	10,000	0	10,000	23,841
2029 / 2030	39,320	5,594	10,000	0	0	23,726
Totals	866,045	74,953	175,000	225,000		391,091

1 -- Note that the new yield projection shown above relates only to the storage reduction caused by the use of the reoperation water listed in this schedule. There was over 60,000 acre-ft of additional storage reduction that occurred during 2000/01 and 2005/06 that is not reflected in the new yield schedule. In the near future, Watermaster will determine the additional new yield created by the Pre Peace II reductions in storage and will include a new schedule for yield.

**Table 2**  
**Desalter Production and Replenishment 2000/01 through 2006/07**  
 (acre-ft)

Fiscal Year	Desalter Production	Desalter Replenishment		
		Initial Projection of SAR Recharge	Desalter (aka Kaiser) Account	Re-operation Account
2000/01	7,989	3,995	3,995	
2001/02	9,458	4,729	4,729	
2002/03	10,439	5,220	5,220	
2003/04	10,605	5,303	5,303	
2004/05	9,854	4,927	4,927	
2005/06	16,476	4,897	11,579	
2006/07	26,356	0	608	25,748
Totals	91,177	<u>29,070</u>	36,360	25,748

**Table 3**  
**Initial Corrected Schedule Updated to Show Desalter Replenishment Accounting and Santa Ana River Inflow**  
**From 2000/01 through 2029/30, Shortfall Deducted from Non-WMWD Reoperation Account**

(acre-ft)

Fiscal Year	Desalter Pumping	New Yield <sup>1</sup>	Desalter Replenishment				Residual Replenishment Obligation
			Desalter (aka Kaiser) Account	Re-Operation		Balance	
				Replenishment Allocation for Desalter III	Replenishment Allocation to CDA		
2000 / 2001	7,989	0	3,995				3,995
2001 / 2002	9,458	0	4,729				4,729
2002 / 2003	10,439	0	5,220				5,220
2003 / 2004	10,605	0	5,303				5,303
2004 / 2005	9,854	0	4,927				4,927
2005 / 2006	16,476	0	11,579			400,000	4,897
2006 / 2007	26,356	0	608	0	25,748	374,252	0
2007 / 2008	26,356	0	0	0	26,356	347,896	0
2008 / 2009	26,356	0	0	0	55,426	292,470	-29,070
2009 / 2010	26,356	0	0	0	26,356	266,114	0
2010 / 2011	28,965	0	0	0	28,965	237,149	0
2011 / 2012	31,574	75	0	0	31,500	205,649	0
2012 / 2013	34,182	442	0	5,000	28,740	171,909	0
2013 / 2014	36,791	962	0	10,000	1,909	160,000	23,920
2014 / 2015	39,320	1,629	0	10,000	0	150,000	27,691
2015 / 2016	39,320	2,255	0	10,000	0	140,000	27,065
2016 / 2017	39,320	2,771	0	10,000	0	130,000	26,549
2017 / 2018	39,320	3,275	0	10,000	0	120,000	26,045
2018 / 2019	39,320	3,767	0	10,000	0	110,000	25,553
2019 / 2020	39,320	4,283	0	10,000	0	100,000	25,037
2020 / 2021	39,320	4,764	0	10,000	0	90,000	24,556
2021 / 2022	39,320	5,198	0	10,000	0	80,000	24,122
2022 / 2023	39,320	5,570	0	10,000	0	70,000	23,750
2023 / 2024	39,320	5,854	0	10,000	0	60,000	23,466
2024 / 2025	39,320	5,959	0	10,000	0	50,000	23,361
2025 / 2026	39,320	5,834	0	10,000	0	40,000	23,486
2026 / 2027	39,320	5,698	0	10,000	0	30,000	23,622
2027 / 2028	39,320	5,546	0	10,000	0	20,000	23,774
2028 / 2029	39,320	5,479	0	10,000	0	10,000	23,841
2029 / 2030	39,320	5,594	0	10,000	0	0	23,726
Totals	930,877	74,953	36,360	175,000	225,000		419,565

1 -- Note that the new yield projection shown above relates only to the storage reduction caused by the use of the reoperation water listed in this schedule. There was over 60,000 acre-ft of additional storage reduction that occurred during 2000/01 and 2005/06 that is not reflected in the new yield schedule. In the near future, Watermaster will determine the additional new yield created by the Pre Peace II reductions in storage and will include a new schedule for yield.

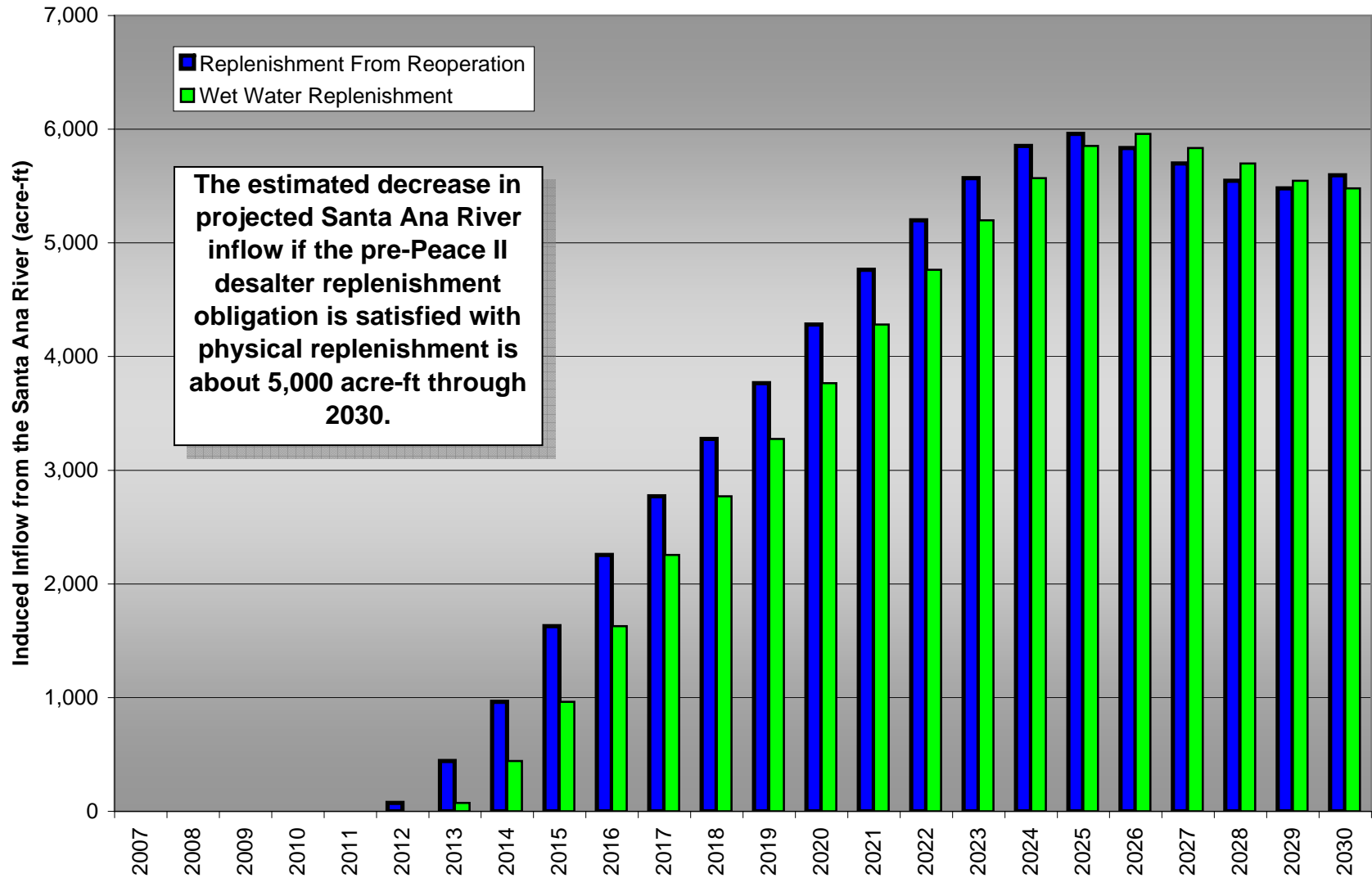
**Table 4**  
**Estimates of Historical Storm Water Recharge in the Chino Basin During the Peace Agreement Period**  
(acre-ft)

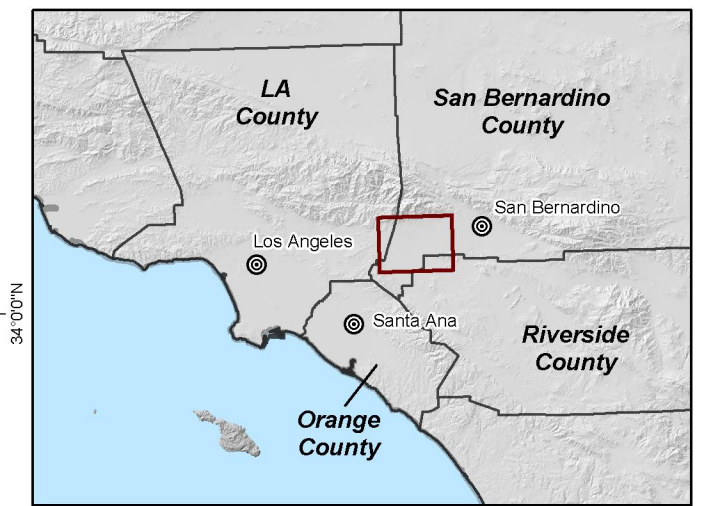
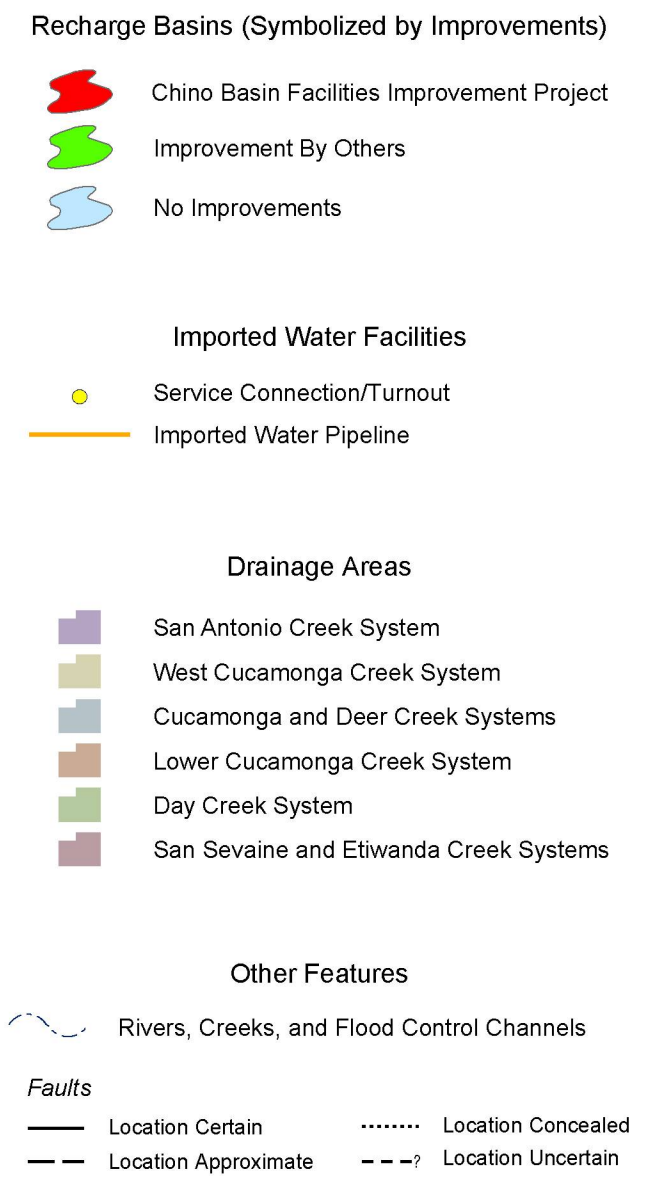
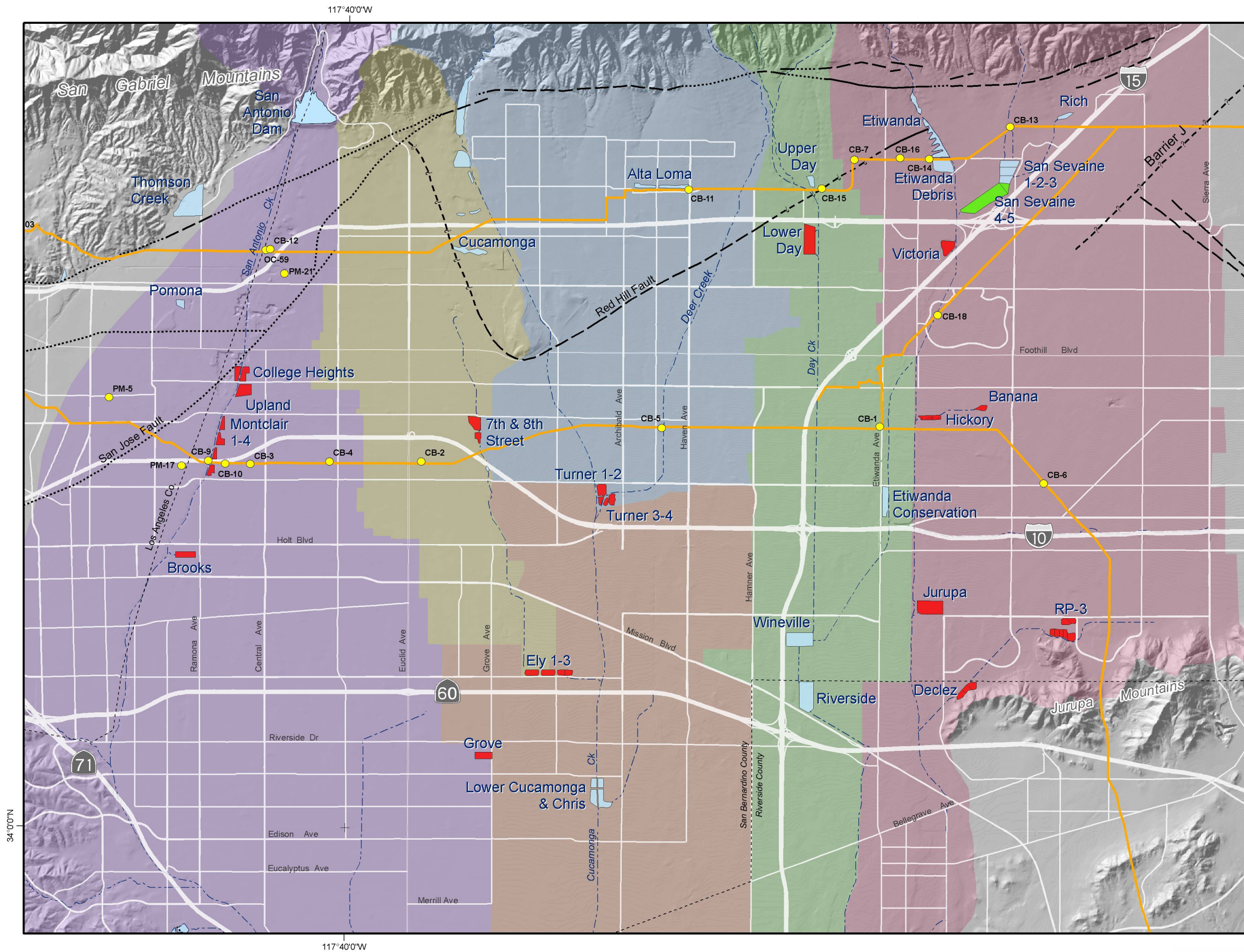
Channel/Recharge Basin	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
<b>San Antonio Channel / CB-59</b>								
College Heights East (MZ1)	0	0	0	0	0	0	1	171
College Heights West (MZ1)	0	0	0	0	0	108	0	1
Upland (MZ1)	572	94	910	397	989	214	195	312
Montclair 1, 2, 3, 4 (MZ1)	1,982	837	3,757	1,296	3,350	1,296	355	859
Brooks (MZ1)	794	133	1,276	563	1,776	524	205	475
<b>West Cucamonga Channel</b>								
15th Street (MZ1)	0	0	0	0	0	0	0	0
8th Street (MZ1)	0	0	0	0	240	918	398	959
7th Street (MZ1)	0	0	0	0	380	353	242	0
Ely 1 (MZ2)	605	446	575	587	2,010	1,409	631	1,603
Ely 2 (MZ2)	0	0	0	0	0	0	0	0
Ely 3 (MZ2)	0	0	0	0	0	122	0	0
<b>Riverside Drive Drain</b>								
Grove (MZ2)	0	0	0	0	0	133	166	326
<b>Cucamonga/Deer Creek Ch / CB-11</b>								
Turner 1 & 2 (MZ2)	167	100	192	0	452	1,870	250	1,166
Turner 3 & 4 (MZ2)	0	0	0	0	976	705	156	376
<b>Day Creek Channel / CB-15</b>								
Lower Day (MZ2)	0	0	0	0	2,798	624	78	303
Wineville (MZ3)	0	0	0	0	0	0	0	0
Riverside (MZ3)	0	0	0	0	0	0	0	0
<b>Etiwanda Channel / CB-14</b>								
Etiwanda Debris Basin (MZ2)	0	0	0	0	0	20	0	10
Victoria (MZ2)	0	0	0	0	0	330	260	427
Conservation Ponds (MZ3)	0	0	0	0	0	0	0	0
<b>San Sevaine Channel / CB-13</b>								
San Sevaine #1 (MZ2)	190	250	1,364	512	768	2,072	244	749
San Sevaine #2 (MZ2)	0	0	68	11	0	0	0	0
San Sevaine #3 (MZ2)	66	70	461	157	0	0	0	0
San Sevaine #4 & 5 (MZ2)	0	0	168	38	2,062	0	0	0
San Sevaine Reach (MZ3)	0	0	0	0	0	0	0	0
Jurupa (MZ3)	0	0	0	0	0	0	0	0
<b>West Fontana Channel / CB-18</b>								
Hickory (MZ2)	37	105	551	224	298	438	536	949
Banana (MZ3)	390	184	366	188	425	300	226	278
<b>Declez Channel</b>								
RP3 Cell 1a (MZ3)	0	0	0	0	1,105	507	237	511
RP3 Cell 3b (MZ3)	0	0	0	0	0	260	565	0
DeClez (MZ3)	0	0	0	0	19	737	0	730
<b>Total Recharge</b>	<b>4,803</b>	<b>2,218</b>	<b>9,688</b>	<b>3,973</b>	<b>17,648</b>	<b>12,940</b>	<b>4,745</b>	<b>10,205</b>
Index Precipitation 1192 Cucamonga (inches)	16.58	7.96	21.6	11.67	33.87	3.15	5.66	14.71
Index Precipitation 2206 Fontana (inches)	12.39	4.52	17.3	7.67	27.6	12.09	4.52	12.35

**Table 5**  
**Example of New Storm Water Recharge Calculation**  
(acre-ft)

Fiscal Year Ending	Pre CBFIP Recharge	Estimated Total Recharge	Projected New Storm Water Recharge	Over Estimate of New Recharge	Cumulative Over (Under) Estimate of New Recharge
2005	5,600	17,600	12,000	6,000	6,000
2006	5,600	17,600	12,000	6,000	12,000
2007	5,600	17,600	12,000	6,000	18,000
2008	5,600	17,600	12,000	6,000	24,000
2009	5,600	17,600	12,000	6,000	30,000
2010	5,600	11,600	0	0	24,000
2011	5,600	11,600	0	0	18,000
2012	5,600	11,600	0	0	12,000
2013	5,600	11,600	0	0	6,000
2014	5,600	11,600	0	0	0
2015	5,600	11,600	6,000	0	0
2016	5,600	11,600	6,000	0	0
2017	5,600	11,600	6,000	0	0
2018	5,600	11,600	6,000	0	0
2019	5,600	11,600	6,000	0	0
2020	5,600	11,600	6,000	0	0
2021	5,600	11,600	6,000	0	0
2022	5,600	11,600	6,000	0	0
2023	5,600	11,600	6,000	0	0
2024	5,600	11,600	6,000	0	0
2025	5,600	11,600	6,000	0	0
2026	5,600	11,600	6,000	0	0
2027	5,600	11,600	6,000	0	0
2028	5,600	11,600	6,000	0	0
2029	5,600	11,600	6,000	0	0
2030	5,600	11,600	6,000	0	0
Totals	145,600	331,600	156,000	30,000	na
Estimated Total Recharge					<u>331,600</u>
Pre Improvement Recharge				-	145,600
Over Estimate of New Recharge				-	30,000
Assumed New Recharge				=	<u>156,000</u>

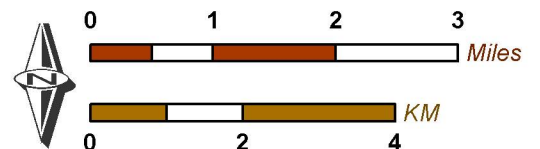
**Figure 1**  
**The Effect of Desalter Replenishment on Santa Ana River Inflow**





Produced by:  
**WILDERMUTH**  
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Author: AEM  
 Date: 20081112  
 File: Figure\_2.mxd



Condition Subsequent 7 Report

**Groundwater Recharge and Imported Water Facilities**

**Figure 2**

**Figure 3**  
**Example Comparison of Projected and Actual New Recharge**

