S A W P A

SANTA ANA WATERSHED PROJECT AUTHORITY

BASIN MONITORING PROGRAM TASK FORCE

Wednesday, October 19, 2016
10:00 a.m. – 12:30 p.m.
At SAWPA, 11615 Sterling Avenue, Riverside, CA 92503

AGENDA

1. Introductions
2. Public Comments
3. **Approval of September 14, 2016 Meeting Summary**
4. Scoping Committee Report – SAR WLAM Update - SAWPA
5. Elsinore Basin Maximum Benefit Proposal Presentation– WE Inc.
6. **Triennial Ambient Water Quality Update – CDM Smith, Inc.**
7. Substitute Environmental Document & CEQA Scoping Mtg Update – CDM Smith/Regional Board
8. **SAR Wasteload Allocation Basin Plan Amendment – Risk Sciences**
9. Schedule Future Meeting
10. Adjournment

Basin Monitoring Program Task Force

September 14, 2016

ATTENDEES:

Al Javier, EMWD
Andy Campbell, IEUA
Chipper Greene, Veolia Water
Cindy Li, Regional Board
Greg Herzog, City of Riverside PU
Jane Joy, EMWD
Jennifer Torres, City of Corona
Jesus Gastelum, EVMWD
Keith Person, RWQCB
Lyndy Lewis, IRWD
Margie Armstrong, EVMWD
Marissa Flores-Acosta, SBMWD
Mike Roberts, City of Riverside RWQCP
Marsha Westropp, OCWD
Robert Eland, City of Riverside RWQCP
Roger Turner, City of Rialto
Samantha Adams, WEI/CBWM
Mark Norton, SAWPA
Zyanya Blancas, SAWPA

Call to Order/Introductions

The Basin Monitoring Program Task Force (Task Force) meeting was called to order at 1:31 p.m. at the Santa Ana Watershed Project Authority (SAWPA) office located at 11615 Sterling Avenue, Riverside, California. Brief introductions were made.

Public Comments

There were no public comments.

Approval of July 27, 2016 Meeting Summary

Meeting summary was approved as posted.

Triennial Ambient Water Quality Update – CDM Smith

Joe LeClaire provided a status update PowerPoint presentation on the data collection efforts for the Triennial Ambient Water Quality Recomputation for the Santa Ana River Water for the Period 1996-2015 (AWQ). On July 19, 2016, SAWPA Commission approved Task Order No. CDM374-01 authorizing CDM Smith to prepare the AWQ update. Data request letters from the Regional Board were emailed on August 17, 2016 to the stakeholders. CDM Smith received the data from the last AWQ from SAWPA on August 10, 2016.

Discussion ensued on how to improve the data density in Riverside A near the Riverside Narrows, Central/Eastern portions of Arlington Management Zone, and Central/Western portions of Riverside B by adding wells to the data set.

MOVED, to approve Change Order to Work Order CDM374-01 in which CDM Smith will collect and compile additional well information to more accurately characterize estimates of current ambient TDS and nitrate concentrations in certain groundwater management zones.

Result: **Adopted (Unanimously)**
Motion/Second: Joy/Campbell

SAR Wasteload Allocation Basin Plan Amendment – Risk Sciences

Tim Moore stated that he is in the process of developing the Wasteload Allocation Basin Plan Amendment (WLA) for its approval in early 2017. A draft of the WLA BPA will be available in October. Discussion ensued about Table 3 – "2020 WLA for TIN & TDS Discharges to Surface Water" from the Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8 Final Memorandum prepared by Wildermuth Environmental Inc.

Tim Moore asked the Task Force agencies to double-check the values shown in the table for the Maximum Discharge values for their respective agency's treatment plant. Stakeholders need to make sure that the estimated maximum annual average discharge from now through 2020 will be less than or equal to the value shown in Table 3. A complete update of Table 3 will be part of the next WLA update, which will is estimated to commence work in early 2017.

Regional Board Triennial Item – TDS Management Response Update – Risk Sciences

Tim Moore provided a verbal update on the letter proposal to coordinate a technical study of TDS trends in the Southern California with the Southern California Salinity Coalition (SCSC).

The SCSC approved Tim Moore to develop the Conceptual Study Design and the draft Scope of Work and will commence work on October 1, 2016. An RFP for the technical work will be distributed in early January 2017 and a consultant to conduct the technical analysis is expected to be selected by mid-February 2017. Once the technical analysis is complete, this information will be used to conduct the necessary policy implementation steps through the Basin Monitoring Program Task Force and the Santa Ana Regional Board.

Scheduled Future Meeting

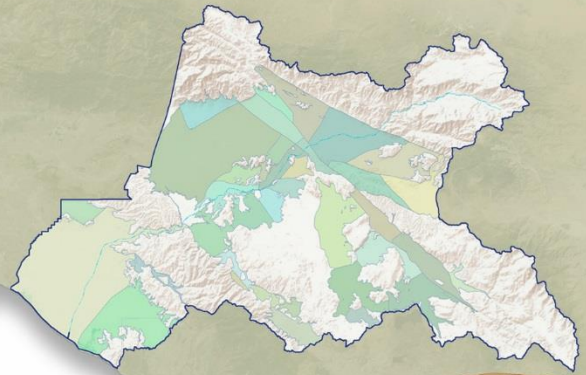
The next Basin Monitoring Program Task Force meeting is scheduled for Wednesday, October 19, 2016 at 10:00 a.m. The BMP TF Scoping Committee will meet one hour earlier at 9 am that same day.

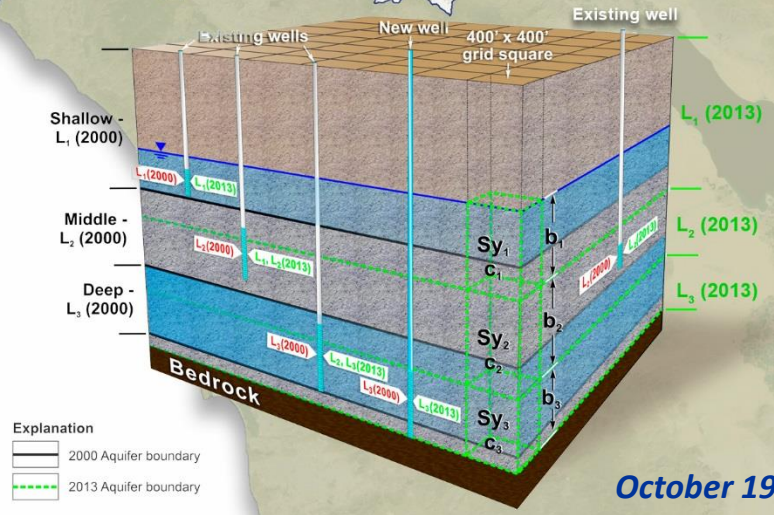
Adjournment

11:46 p.m.

TDS/Nitrogen Management
Plan for the Santa Ana River Basin
Groundwater Monitoring Requirements

Status Update for the Recomputation of Ambient Water Quality in the Santa Ana River Watershed for the Period 1996-2015





CDM Smith

DBESA

October 19, 2016

Status Update

- **Data Collection Status**
- **Optional Task 2**
  - **GeoTracker GAMA**
  - **Other stakeholders, *e.g.*, City of Riverside**
- **High Priority Wells from the 2012 Attrition Analysis**

Data Collection Status

Agency	Received Data	Ready for Upload	Comments
Beaumont Cherry Valley Water District	YES	Processing	
Colton, City of	YES	READY	*New well*
Corona, City of	YES	READY	*New wells*
East Valley Water District	YES	Processing	*Follow up with WL*
Eastern Municipal Water District	YES	READY	*New wells*
Elsinore Valley Municipal Water District	YES	READY	*New wells*
Home Gardens County Water District	YES	READY	
Irvine Ranch Water District	NA	NA	
Muscoy Mutual Water Company	YES	READY	
Orange County Water District	YES	READY	
Redlands, City of	YES	READY	*New wells*
Rialto, City of	YES	Processing	
Riverside County Landfills	YES	Processing	
Riverside, City of (Public Utilities)	YES	READY	*New wells*
Riverside-Highland Water Company	YES	READY	
Rubidoux Community Services District	YES	READY	
San Bernardino County Landfills	YES	READY	*New wells*
San Bernardino Municipal Water Department	YES	READY	
San Bernardino Valley Municipal Water District	YES	NA	
South Mesa Water Company	YES	READY	*New wells*
Temescal Valley Water District (formerly known as Lee Lake Water District)	YES	READY	
West Valley Water District	YES	READY	*New wells(?)*
Western Heights Water Company	YES	READY	
Western Municipal Water District	YES	READY	
Western Riverside County Regional Wastewater Authority	YES	NA	

Data Collection Status

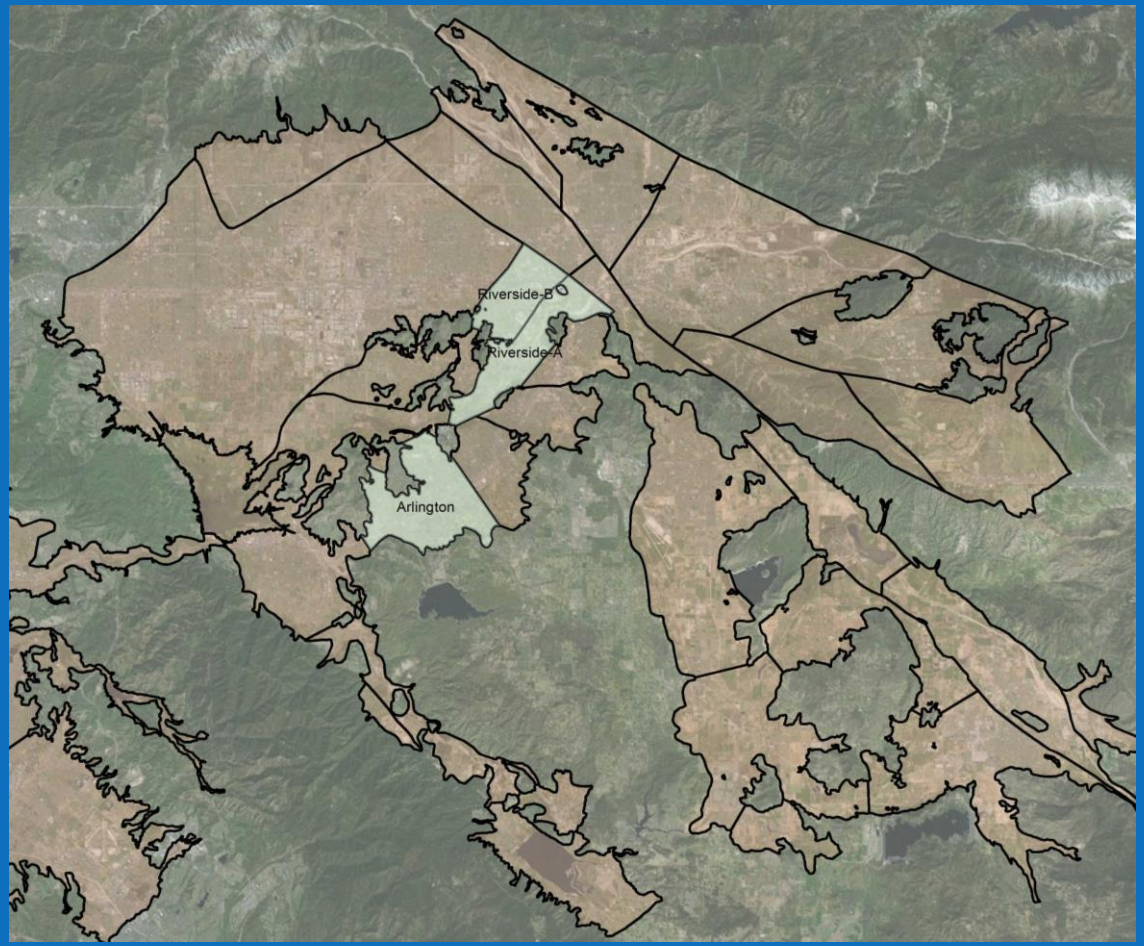
Agency	Received Data	Ready for Upload	Comments
Banning, City of	No response		Multiple attempts to contact the City
Jurupa Community Services District	No response		Multiple attempts to contact the District
Yucaipa Valley Water District	No response		Multiple attempts to contact the District
Beaumont, City of	Pending		
Chino Basin Watermaster	Pending*		*Non-Disclosure Agreement for private ag wells
Inland Empire Utilities Agency	Pending*		
Loma Linda, City of	Pending		
San Gorgonio Pass Water Agency	Pending		

Optional Task 2

- Downgradient portion of Riverside-A near Riverside Narrows.
  - Few wells with data in this area
  - Riverside-A is an important GMZ that is receiving water for POTW discharge
- Central and western portions of Riverside-B
  - Few wells with data in these areas that are representative of regional groundwater quality
  - Most wells in these areas are shallow monitoring wells associated with point-source releases
- Central and eastern portions of the Arlington GMZ
  - Few wells with data in these areas
  - Areas considering recycled water reuse projects

Optional Task 2

- Riverside A
- Riverside B
- Arlington



Optional Task 2 Available Sources

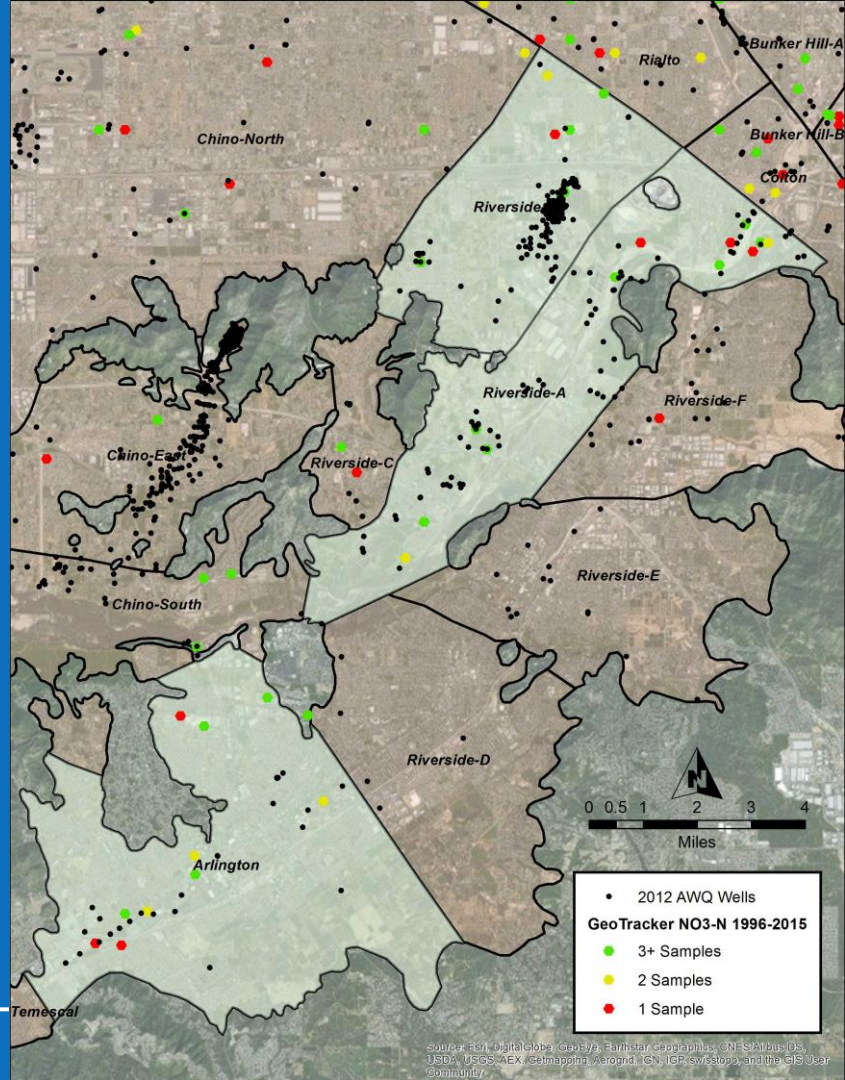
- GeoTracker/GAMA
- EnviroStor
- USGS
- Division of Drinking Water
- Other stakeholders
- New well data from agencies

GeoTracker GAMA: Nitrate

GeoTracker Monitored Groundwater Wells with Nitrate Data between 1993-2015

Number of Samples	Arlington	Riverside-A	Riverside-B	Total
3+ Samples	4	7	7	18
2 Samples	3	2	1	6
1 Sample	3	4	1	8
Grand Total	10	13	9	32

- Well owner
- Well status
- Perforated intervals
- Historical water quality

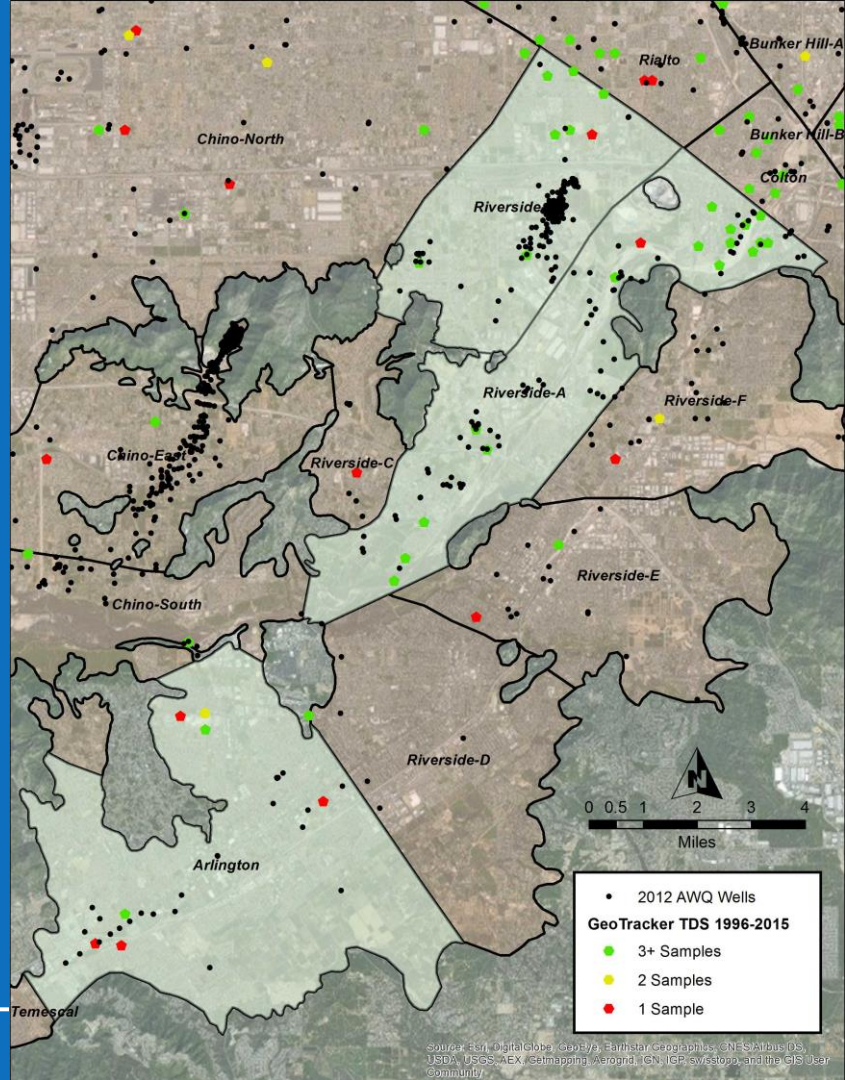


GeoTracker GAMA: TDS

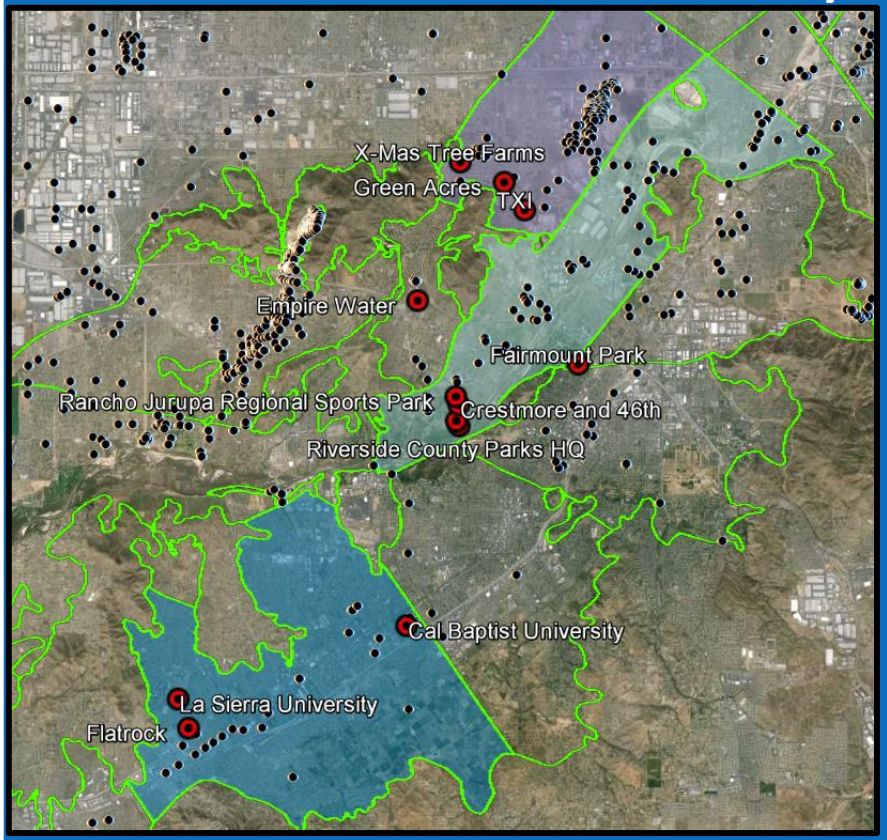
GeoTracker Monitored Groundwater Wells with TDS Data between 1993-2015

Number of Samples	Arlington	Riverside-A	Riverside-B	Total
3+ Samples	2	17	6	25
2 Samples	1	0	0	1
1 Sample	4	1	2	7
Grand Total	7	18	8	33

- Well owner
- Well status
- Perforated intervals
- Historical water quality

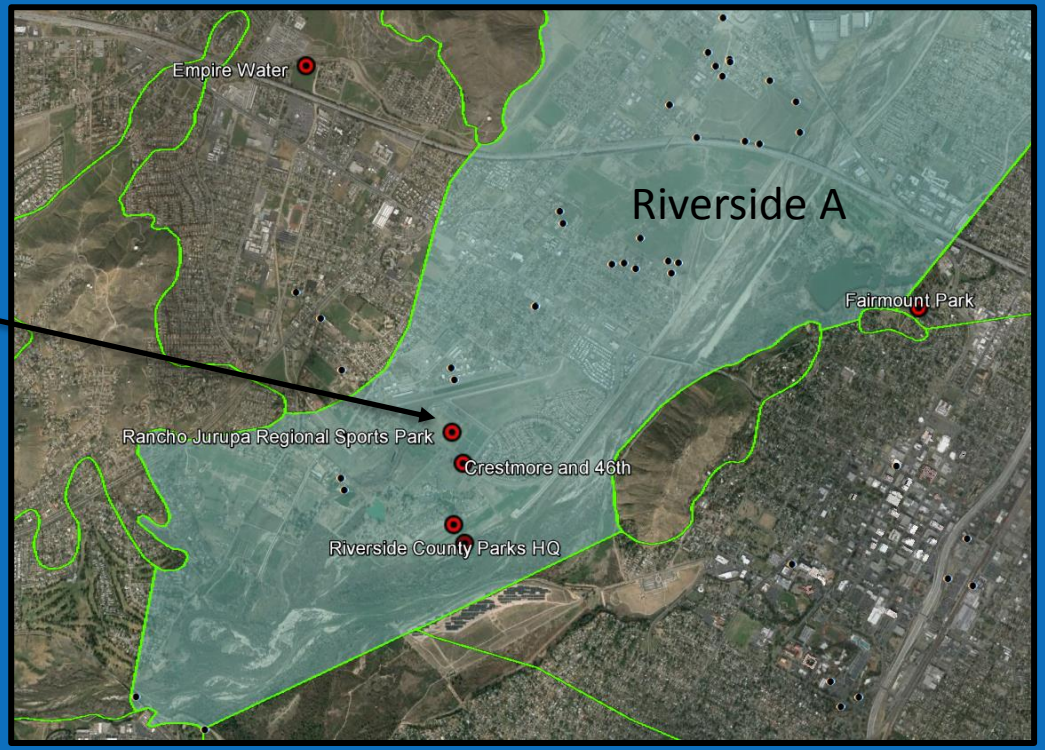


Well Site Visit with City of Riverside

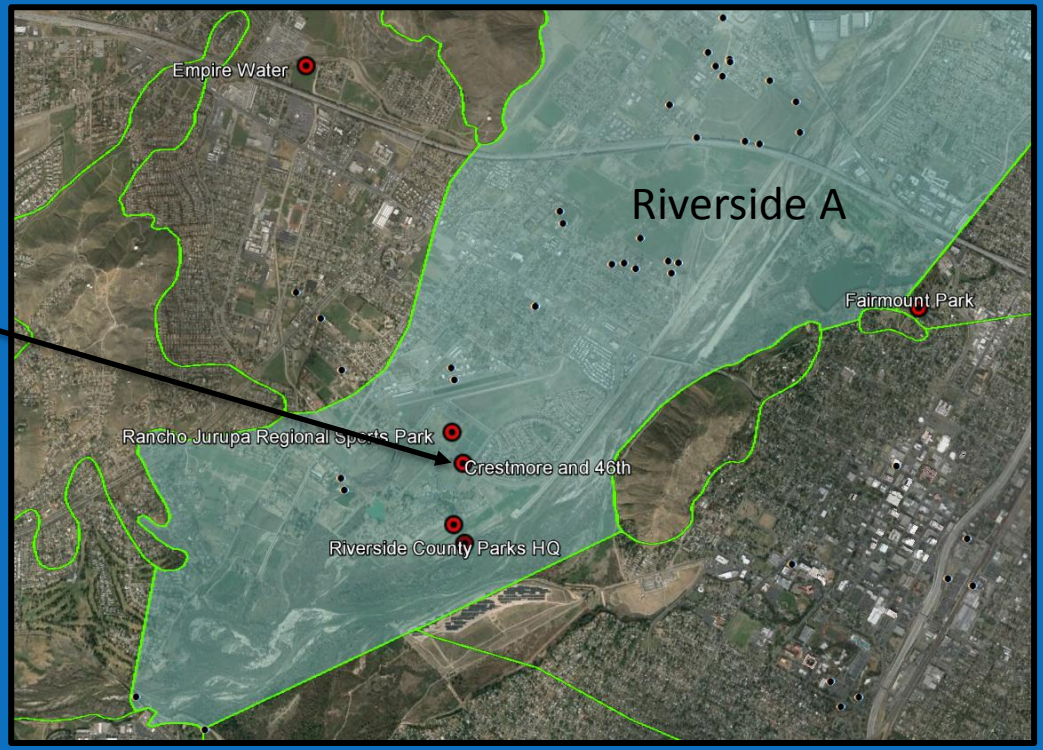


Basin	Name	Comment
Arlington	Loving Homes	Irrigation well.
	Flatrock	Two wells in complex.
	Cal Baptist well (new)	New well located on property
	La Sierra University	At Least one well
Riverside B	Green Acres	Multiple wells located on property
	X-Mas Tree Farm	Well located on this property
	TXI	Multiple wells located on property
Riverside A	Riv. County Flood Control	
	City of Riverside Fairmount Park	Multiple wells located on property
	County of Riverside	4 wells locations know. Park HQ best one for sampling
	USGS	USGS NAWQA well

City of Riverside



City of Riverside



High Priority Wells

- Well-attrition analysis is a forward-looking tool that provides an opportunity for the BMPTF to prevent the loss of water-quality point statistics at wells in the next triennial recomputation of ambient water quality

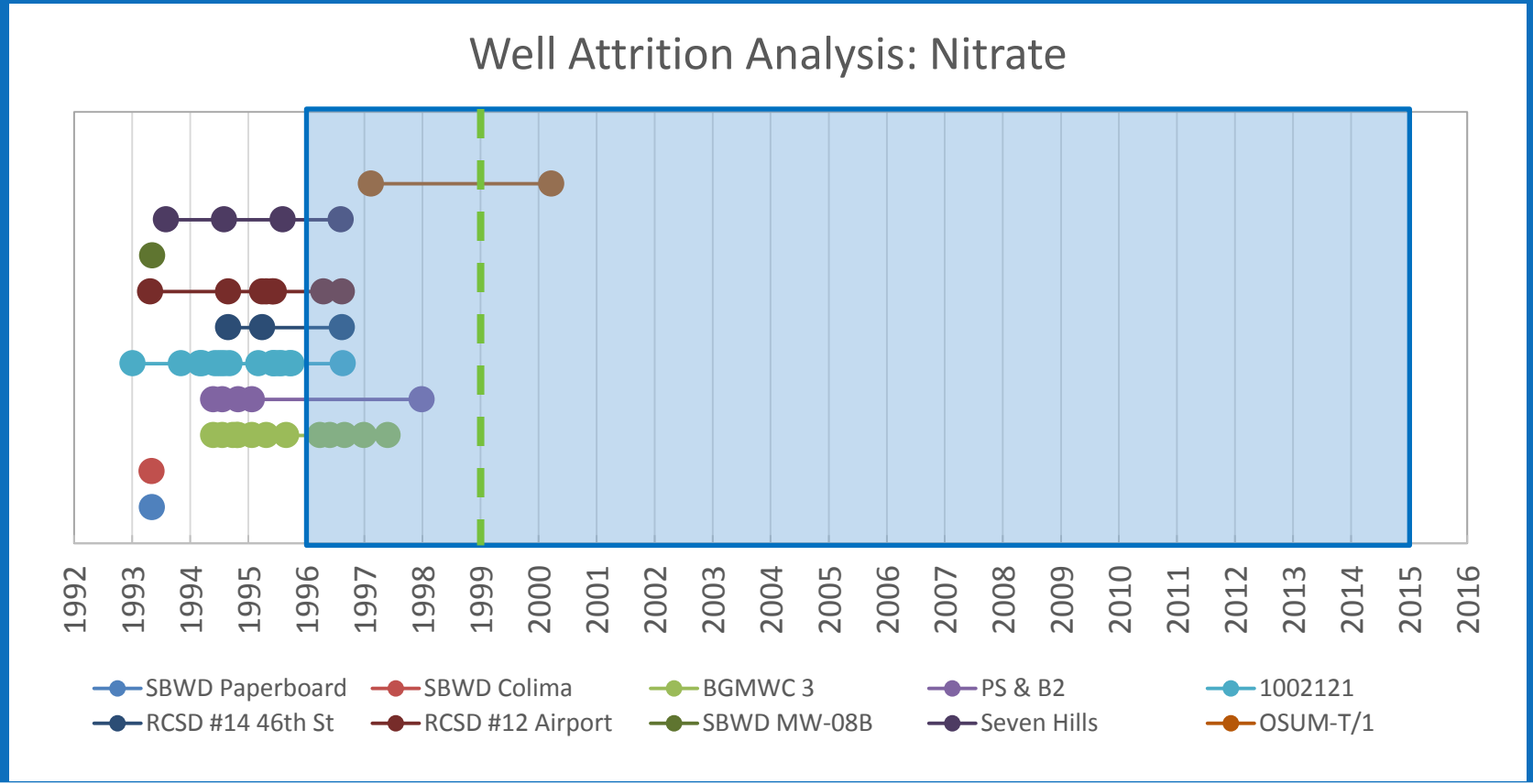
High Priority Wells

- In 2012 well-attrition analysis identified:
  - 131 wells for nitrate-N and 133 wells for TDS that would be removed from the AWQ program if no water quality samples were collected during the 2013 to 2015 period
  - 185 unique wells (TDS or nitrate) that would be removed from the AWQ program absent sampling in the 2013 to 2015 period
  - 69 assumed to be destroyed or cannot otherwise be sampled
  - 2012 AWQ report identified 12 “High Priority” wells that – if removed from the AWQ program – may result in significant changes to the mapping of regional groundwater quality

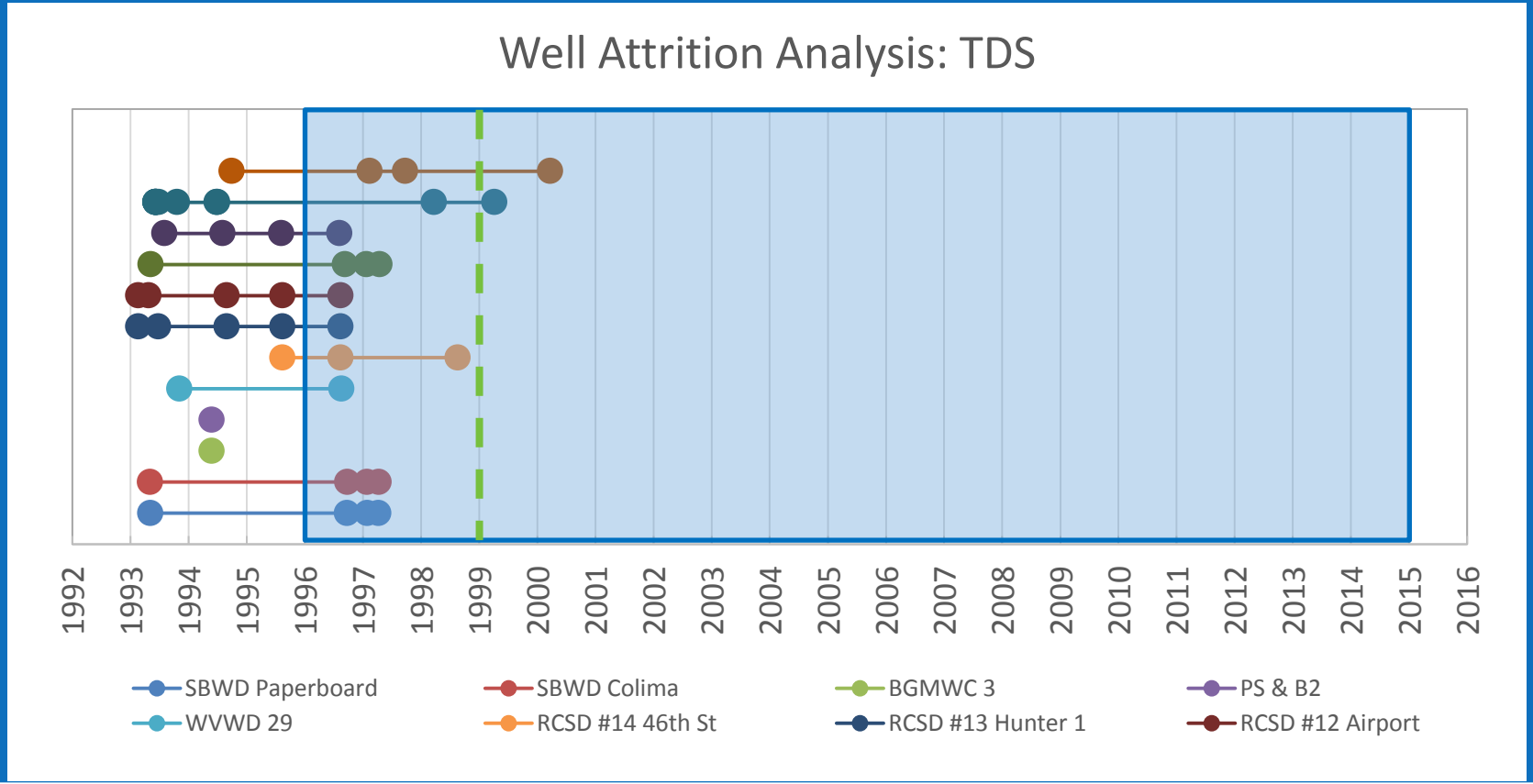
High Priority Wells

Well_ID	Well_Name	Well_Owner	Management	State_Well	Longitude	Latitude	Status	TDS Loss	Nitrate Loss
1000336	3	Baseline Gardens Mutual Water Company	Bunker Hill A	01N04W35R01	-117.2627	34.12462	**Active**	Yes	Yes
1000365	PS & B 2	Baseline Gardens Mutual Water Company	Bunker Hill B	01N04W36M01	-117.2582	34.12823	Inactive	Yes	Yes
1000151	SBWD Paperboard	City of San Bernardino	Bunker Hill A	01N04W20N01	-117.3275	34.15121	**Active**	Yes	Yes
1000249	SBWD Colima	City of San Bernardino	Bunker Hill A	01N04W29F01	-117.3254	34.14454	Inactive	Yes	Yes
1203809	SBWD MW-08B	City of San Bernardino	Bunker Hill A		-117.3291	34.17303	**Active**	Yes	Yes
1212109	Seven Hills	Eastern Municipal Water District	South Hemet	05S01W21M01	-116.9936	33.72163	**Active**	Yes	Yes
1213875	IDP-3/1	Orange County Water District	Irvine		-117.7465	33.66696	**Active**	Yes	No
1214564	OSUM-T/1	Orange County Water District	Irvine		-117.8334	33.7015	**Active**	Yes	Yes
1003378	RCSD #14 46th St	Rubidoux Community Services District	Riverside C	02S05W20A01	-117.4195	33.99016	Inactive	Yes	No
1003384	RCSD #13 Hunter 1	Rubidoux Community Services District	Riverside A	02S05W20H04	-117.4192	33.98575	Inactive	Yes	Yes
1003396	RCSD #12 Airport	Rubidoux Community Services District	Riverside A	02S05W21C01	-117.4107	33.9903	Inactive	Yes	Yes
1002121	WVWD 29	West Valley Water District	Riverside B	01S05W23Q01	-117.3723	34.06357	**Active**	Yes	Yes

High Priority Wells



High Priority Wells



Questions?

2020 Waste Load Allocation for TIN & TDS Discharges to Surface Water[1]

Permittee	Discharge Outfall	Discharge	Average TIN[2]	Average TDS[3]
Beaumont WWTP #1	-001	1.8 mgd	6 mg/L[4]	400 mg/L
	-007	0.7 mgd		330 mg/L
	-008, -009, -010, -011	1.25 mgd		
YVWD		4.25 mgd	6 mg/L[5]	540 mg/L[6]
Rialto		8.8 mgd	10 mg/L	550 mg/L
RIX		31.8 mgd	10 mg/L	550 mg/L
Riverside		33.9 mgd	10 mg/L	650 mg/L
WMWD	via WRCRWA outfall	0.95 mgd	6 mg/L	550 mg/L
WRCRWA		12.0 mgd	10 mg/L	625 mg/L
IEUA's RP-1		84 mgd	8 mg/L[7]	550 mg/L[8]
IEUA's Carbon Canyon				
IEUA's RP-5				
IEUA's RP-4				
Corona-WWTP #1		7.6 mgd	10 mg/L	700 mg/L
Corona-WWTP #3[9]		0.5 mgd	10 mg/L	700 mg/L
Lee Lake		0.7 mgd	13 mg/L	650 mg/L
EVMWD @ Temescal	-001, -004, -005	6.4 mgd	13 mg/L	700 mg/L
EMWD @ Temescal[10]	-001	52.5 mgd	10 mg/L	650 mg/L

[1] All data was reproduced from Table 3 in Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8 - Final Memorandum. (WEI; Jan. 5, 2015)
[2] Effluent limit expressed as a volume-weighted 12-month running average (except for EMWD, Beaumont & YVWD)
[3] Effluent limit expressed as a volume-weighted 12-month running average (except for EMWD, Beaumont & YVWD)
[4] Per R8-2014-0005, Beaumont's effluent limit for nitrate-nitrogen is 6.7 mg/L (as a 10-year volume-weighted average); however, 6 mg/L was used in WLAM-Scenario 8.
[5] Per R8-2014-0005, YVWD's effluent limit for nitrate-nitrogen is 6.7 mg/L (as a 10-year volume-weighted average); however, 6 mg/L was used in WLAM-Scenario 8.
[6] Per R8-2014-0005, YVWD's effluent limit for TDS is 400 mg/L (as a 10-year volume-weighted average); however, 540 mg/L was used in WLAM-Scenario 8.
[7] IEUA's effluent limits for TIN is expressed as the volume-weighted collective average of all four discharges.
[8] IEUA's effluent limits for TDS is expressed as the volume-weighted collective average of all four discharges.
[9] Corona WWTP #3 is scheduled to be decommissioned before 2021.
[10] Effluent limits for EMWD are expressed as a monthly average due to intermittent flows that allow up to 6 months of discharge.

California Regional Water Quality Control Board
Santa Ana Region

[DATE-TBD]

ITEM: **[TBD]**

SUBJECT: **Public Hearing to Consider Proposed Basin Plan Amendment to Revise the Water Quality Objective for Nitrate in the Chino-South Groundwater Management Zone**

EXECUTIVE SUMMARY

Federal law requires states to establish water quality standards (beneficial uses, water quality criteria, and an antidegradation policy for all surface water bodies within the state's jurisdiction and to review those standards at least once every three years. The Porter-Cologne Water Quality Control Act (Division 7, "Water Quality," of the California Water Code) establishes similar requirements in state law for both surface waters and groundwaters. For the Santa Ana Region, these standards are established in the Water Quality Control Plan for the Santa Ana River Basin (aka "Basin Plan"). In California, water quality criteria portion of water quality standards are called "water quality objectives."

Regional Board staff recommends that Table 4-1 in the Basin Plan be amended to revise the water quality objective for Nitrate in the Chino-South Groundwater Management Zone (GMZ) from its current value of 4.2 mg/L (nitrate as nitrogen) to a new value of 5.0 mg/L (nitrate as nitrogen). No other changes to the Basin Plan are being proposed or recommended. Nor would approval of the proposed Basin Plan amendment result in effluent limitation less stringent than those currently in place for permitted wastewater discharges.

The current nitrate objective of 4.2 mg/L was established by the Regional Board as part of a larger Basin Plan update in 2004 and is intended to represent the best water quality attained since state Antidegradation Policy was established in 1968. It was computed as the volume-weighted average nitrate concentration in the Chino-South GMZ using water quality sampling data collected between 1954 and 1973.

As part of the same 2004 Basin Plan amendment, the Regional Board approved a Waste Load Allocation (WLA) to prevent degradation of water quality in the Chino-South GMZ by strictly regulating the discharge of treated municipal effluent to those segments of the Santa Ana River that overlie this aquifer. Since then, all affected NPDES permits have been issued with effluent limitations that are consistent with the approved WLA.

Nevertheless, over time, the average nitrate concentration in the Chino-South GMZ has been rising. The most recent estimate, based on sampling data collected between 1993 and 2012, indicates the volume-weighted average nitrate concentration now stands at about 28 mg/L. The long-term increase is caused by legacy loads of nitrogen, from past agricultural/livestock practices, moving through the vadose zone. Urbanization has since displaced most of these former agricultural operations but water quality in the Chino-South GMZ may continue to be adversely affected for many years until nitrates are flushed from the vadose zone.

Until then, discharging of large quantities of treated municipal effluent to Reach 3 of the Santa Ana River will help reduce the average nitrate concentration in the Chino-South GMZ. The proposed Basin Plan Amendment is designed to ensure that these discharges continue by reducing the complexity and uncertainty of the permitting process.

At present, a detailed fate and transport analysis is required to demonstrate that the current effluent limits controlling the average nitrogen concentration in recycled water are adequate to prevent water quality degradation in the Chino-South GMZ. A sophisticated Wasteload Allocation Model (WLAM), that was reviewed and approved by the Regional Board when the Basin Plan was updated in 2004, is used to make this demonstration.

The WLAM keeps track of all the recycled water discharged to the Santa Ana River system and accounts for all of the added runoff from precipitation in the watershed. The model also makes appropriate adjustments for natural physical and biological processes that tend to reduce nitrate concentrations as water flows downstream or percolates to groundwater.

In the area of the Santa Ana River that overlies the Chino-South GMZ, the Regional Board has determined that 50% of the nitrogen measured at the surface is lost as the water seeps beneath the streambed and into the groundwater. Thus, recycled water which is discharged with an average nitrate concentration of 10 mg/L will have an average concentration no greater than 5 mg/L by the time it reaches the Chino-South GMZ. Dischargers must show that dilution from stormwater runoff provides enough additional dilution to ensure the volume-weighted average nitrate concentration of all water recharged is less than 4.2 mg/L in order to comply with the historical antidegradation objective. However, prolonged drought and enhanced conservation efforts (e.g. stormwater capture and harvesting) have made it more difficult to demonstrate that there will continue to be adequate natural dilution available.

If the nitrate objective for the Chino-South GMZ is increased to 5 mg/L, dischargers will no longer need to rely dilution to meet that objective. Given the 50% nitrogen loss that occurs as water from the Santa Ana River percolates to the Chino-South GMZ, the average nitrogen concentration in recycled water reaching the aquifer will be no greater than 5 mg/L (with or without dilution) as long as the municipal effluent continues to meet the current NPDES permit limits which prohibit discharges with an average nitrogen concentration greater than 10 mg/L.

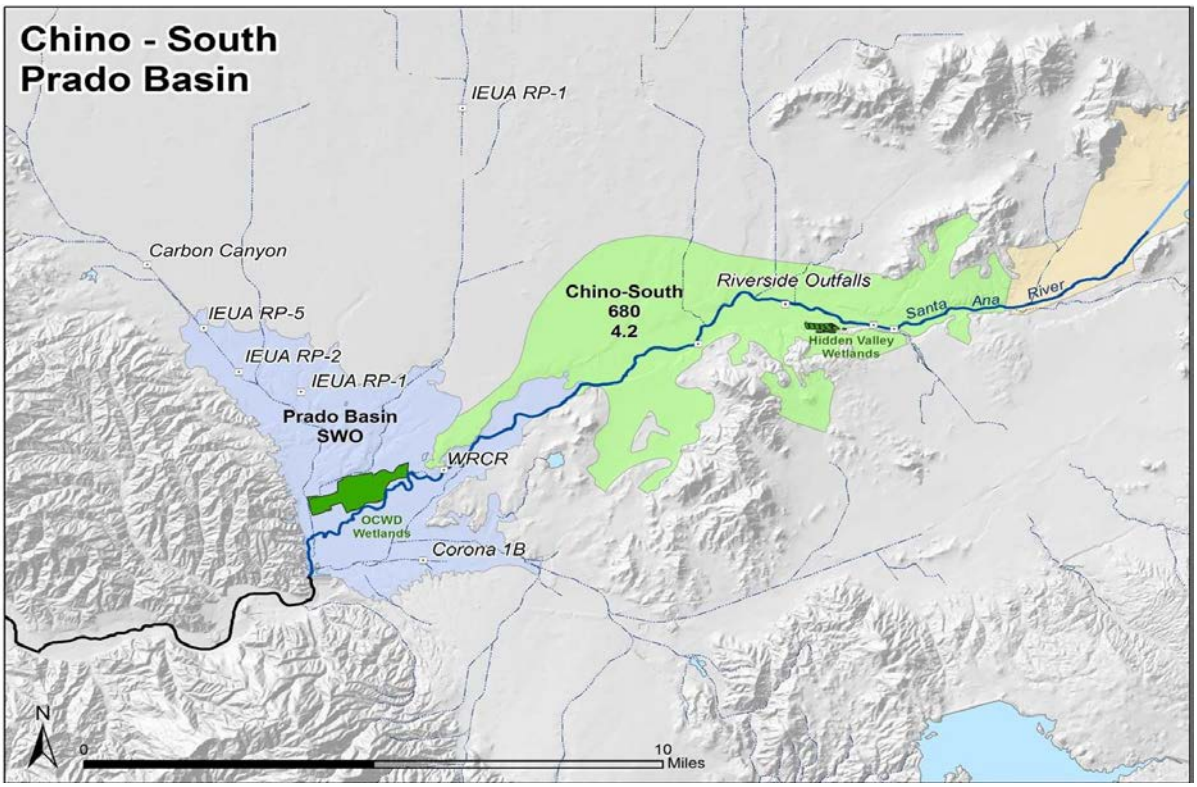
The Chino-South GMZ is designated MUN in the Basin Plan because groundwater from this area is beneficially used as a source for domestic and municipal water supply. The Primary Maximum Contaminant Level (MCL) for nitrate in drinking water is 10 mg/L. The proposed water quality objective of 5 mg/L is less than one-half this value and, therefore, provides a 100% safety factor. Existing and potential beneficial uses will remain fully protected.

Since the current average nitrate concentration in the Chino-South GMZ is already 28 mg/L, raising the water quality objective to 5 mg/L will not cause existing water quality to degrade. Rather, discharges that can comply with the proposed water quality objective of 5 mg/L will help mitigate and reverse the long-term degradation trend caused by other legacy sources of nitrate contaminating the vadose zone. For these reasons, staff recommends adoption of the proposed Basin Plan amendment to revise the water quality objective for nitrate in the Chino-South GMZ.

1. INTRODUCTION

The Chino-South Groundwater Management Zone (GMZ) is located in the extreme northwest corner of Riverside County directly under Reach 3 of the Santa Ana River (see Fig. 1). The Chino-South GMZ was established by the Santa Ana Regional Water Quality Control Board ("Regional Board") when groundwater boundaries were realigned and the Basin Plan was updated in 2004.[1] The GMZ is designated MUN to acknowledge the fact that the aquifer serves as a source of domestic or municipal drinking water supply.

Fig.1 Chino-South Groundwater Management Zone[2]



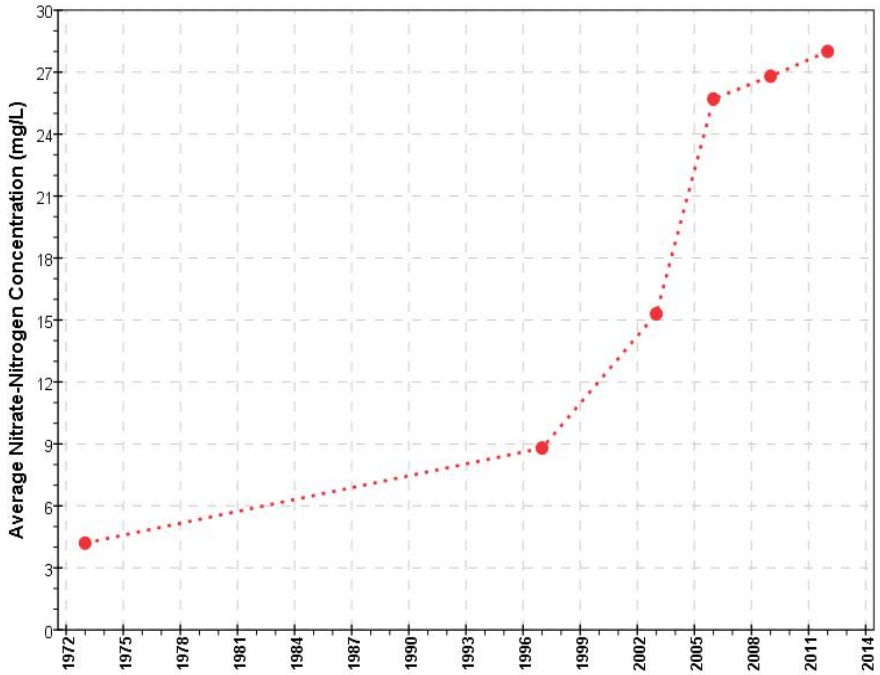
In 2004, the Regional Board also adopted a water quality objective of 4.2 mg/L for nitrate in the Chino-South GMZ. The objective is was computed as the volume-weighted average concentration of nitrate based on all sampling data collected beginning for in 1954 and ending in 1973 (e.g. the baseline evaluation period).[3]

[1] Res. No. 2004-0001 (January 22, 2004).
[2] Map provided courtesy of Wildermuth Environmental, Inc.
[3] Wildermuth Environmental, Inc. TIN/TDS Study Phase 2A of the Santa Ana Watershed, Development of Groundwater Management Zones, Estimation of Historic and Current TDS and Nitrogen Concentrations in Groundwater, Final Technical Memorandum. July 27, 2000.

To minimize the risk of methemoglobinemia (aka "blue baby syndrome"), California has established a Primary Maximum Contaminant Level (MCL) of 10 mg/L nitrate-nitrogen for drinking water.[4] This MCL is commonly applied as a water quality objective where surface or groundwaters are designated MUN. However, because water quality in the Chino-South GMZ, during the baseline evaluation period, was better than necessary to protect the designed beneficial use, the nitrate objective was set to 4.2 mg/L in order to preserve and maintain this higher quality as is required by the Antidegradation Policy.[5]

In 2004, when the Chino-South GMZ and 4.2 mg/L nitrate objective were first established, more recent data showed water quality was already degrading. Groundwater samples collected for the 20-year period beginning in 1978 and ending in 1997 showed nitrate concentration had increased by more than 100% to a volume-weighted average of 8.8 mg/L. Routine reassessments, performed every three years, indicate that nitrate levels continue to rise in the Chino-South GMZ (see Fig. 2). The most recent computation, using data collected in the 20-year period from 1993 to 2012, indicates that the volume-weighted average nitrate concentration is now approximately 28 mg/L.

Fig. 2: Long-term Trend for Average Nitrate Concentrations in the Chino-South GMZ[6]



[4] 22 CCR §64431(a); see Table 64431-A: Maximum Contaminant Levels for Inorganic Chemicals.

[5] State Water Resources Control Board Resolution No. 68-16: Statement of Policy with Respect to Maintaining High Quality Waters in California. (October 28, 1968).

[6] Wildermuth Environmental, Inc. Recomputation of Ambient Water Quality in the Santa Ana Watershed for the Period 1993 to 2012. Technical Memorandum prepared for the Santa Ana Watershed Project Authority Basin Monitoring Program Task Force. August, 2014. (see Table 3-2 in original).

The pattern of nitrate concentrations evident from comprehensive well monitoring data throughout the Chino-South GMZ indicates that the long-term degradation of water quality is most likely due to past land use practices in the area. Nitrates that originated from widespread use of fertilizer or the dairy operations which were once prevalent in the area have been slowly seeping into the groundwater for many years. Most of these legacy nitrate loads occurred when there was little or no regulatory control over such discharges. Today, most of these agricultural operations have been displaced by urbanization. But, the problem will continue until the excess nitrates are finally flushed from the vadose zone.

Because the current ambient average concentration (28 mg/L) is greater than the applicable water quality objective (4.2 mg/L), the Regional Board has determined that there is no assimilative capacity for nitrate in the Chino-South GMZ. And, when permitting waste discharges to such basins, the State Water Board has declared that:

> "Where the constituent in a groundwater basin is already at or exceeding the water quality objective, the Regional Board must set [effluent] limitations no higher than the objectives set forth in the Basin Plan. Exceptions to this rule may be granted where it can be shown that a higher discharge limitation is appropriate due to system mixing or removal of the constituent through percolation through the ground to the aquifer."[7]

The Regional Board relies on a Waste Load Allocation Model (WLAM) to derive appropriate discharge limitations while taking into the nitrate reductions which occur through system mixing or as a result of percolation through the streambed sediments.[8] The Regional Board accepted and approved the WLAM as part of the 2004 Basin Plan update.[9]

The WLAM takes into account system mixing using more than 60 years of daily precipitation and streamflow data to estimate the volume and quality of stormwater runoff draining to the Santa Ana River. The WLAM also accounts for the nitrate removal that occurs as water flows downstream and percolates through the vadose zone. The Regional Board has approved a site-specific nitrogen loss coefficient of 50% for streambed recharge to groundwater where the Santa Ana River overlies the Chino-South GMZ.[10]

[7] SWRCB Order No. WQ-81-5: In the Matter of the Petition of the City of Lompoc for Review of Order No. 80-03 (NPDES Permit No. CA 0048127), California Regional Water Quality Control Board, Central Coast Region. (March 19, 1981).

[8] Wildermuth Environmental, Inc. TIN/TDS Study - Phase 2B of the Santa Ana Watershed, Wasteload Allocation Investigation Technical Memorandum. October, 2002.

[9] Res. No. R8-2004-0001 (January 22, 2004).

[10] See pg. 5-21 of the Basin Plan (Jan. 24, 1995; updated Feb., 2016).

The WLAM is periodically updated and re-run to adjust for changes in land use, wastewater discharges and precipitation patterns. The most recent update, completed in early 2015, shows that the long-term (63-year) average concentration of Total Inorganic Nitrogen (TIN) in water recharging to the Chino-South GMZ from Reach 3 of the Santa Ana River ranges from 4.03 mg/L to 4.14 mg/L depending on the how much recycled water is discharged.[11] This suggests that the current NPDES permit limits, which specify an average annual TIN concentration no greater than 10 mg/L, would assure compliance with the nitrate objective for the Chino-South GMZ.[12]

However, results from the most recent WLAM analysis also show that, during prolonged periods of below average rainfall (droughts), the maximum average concentration of TIN in water recharging to the Chino-South GMZ from Reach 3 of the Santa Ana River ranges from 4.25 mg/L to 4.34 mg/L depending on how much recycled water is discharged (see Table 1).[13]

Table 1: Average TIN Concentrations in Water Recharged to the Chino-South GMZ from Reach-3 of the Santa Ana River (2020 land use conditions)

Metric	Scenario 8d: Max. Recycle	Scenario 8e: Intermediate	Scenario 8f: Max. Discharge
Long-term Average (63 years)	4.03 mg/L	4.10 mg/L	4.14 mg/L
Single Highest 10-year Average	4.25 mg/L	4.31 mg/L	4.34 mg/L
Probability that average recharge quality will exceed 4.2 mg/L in any 10-yr. period	11.1%	30.2%	44.4%
Maximum amount the Basin Plan objective is exceeded	0.05 mg/L 1.1%	0.11 mg/L 2.6%	0.14 mg/L 3.3%

Although the exceedance is relatively small when it occurs, and the long-term average still complies with the Basin Plan objective, results from the WLAM complicate the process of issuing permits for wastewater discharges flowing into Reach 3 of the Santa Ana River. Federal and state law require the Regional Board to establish effluent limits which will ensure that these discharges will not cause or contribute to an exceedance of water quality objectives. At the time the permit is issued, there is no way to accurately predict what the future rainfall pattern will be. Nevertheless, permit limits must ensure compliance under all conditions that may reasonably occur including multiple years of lower than normal precipitation.

[11] Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8. Technical Memorandum. January 5, 2015.

[12] NPDES permits limit the Total Inorganic Nitrogen (TIN) concentrations in wastewater discharges. On average, nitrate comprises approximately 85% of the TIN measured in municipal effluent. Comparing TIN concentrations to nitrate objectives is a conservative approach that provides a 15% safety factor.

[13] Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8. Technical Memorandum. January 5, 2015.

At present, all of the NPDES permits for wastewater discharges to Reach 3 of the Santa Ana River restrict the average TIN concentration to not more than 10 mg/L[14]. However, because the WLAM indicates that imposition of this current effluent limit does not assure consistent short-term compliance with the water quality objective in the Chino-South GMZ during droughts, the Regional Board may be obligated to impose more stringent effluent limits unless some other adjustment is made to address the short-term compliance issue. All of the available options are evaluated in the following Alternatives Analysis.

2. ALTERNATIVES ANALYSIS[15]

In order to ensure that wastewater discharges to Reach 3 of the Santa Ana River do not cause or contribute to an exceedance of the nitrate objective in the Chino-South GMZ, the Regional Board may elect to use one or more of the following options:

Option 1: Impose more stringent effluent limits for TIN in the NPDES permits.

Results from the WLAM indicate that an exceedance is most likely to occur during prolonged periods of below average rainfall when there is less instream dilution available. At such times, the maximum average TIN concentration in water percolating from the Santa Ana River to the Chino-South GMZ will be about 3.3% (0.14 mg/L) higher than the nitrate objective.

Short-term compliance could be restored, without relying on dilution from runoff that occurs during subsequent wetter-than-normal years (e.g. El Niño winters), by reducing the current effluent limit for TIN to 8.4 mg/L. Since 50% of the nitrogen is lost through biological transformation as the water percolates through the vadose zone, wastewater discharged at 8.4 mg/L TIN will enter the underlying groundwater with an average TIN concentration no greater than 4.2 mg/L even if there is zero stormwater dilution available.

This option would likely require some permittees discharging to the Santa Ana River to upgrade their wastewater treatment plants to assure consistent compliance with the more stringent effluent limits. [16] An economic analysis, undertaken as part of this Alternatives Analysis, indicates the total cost to implement the necessary improvements would likely exceed $XXX million.[17]

[14] NPDES permits specify the TIN limitation as a running 12-month flow-weighted average.
[15] This Alternatives Analysis summarizes a review of the regulatory policy issues. A separate CEQA-type Alternatives Analysis is presented in the Substitute Environmental Document (SED) prepared for the proposed Basin Plan Amendment.
[16] Permittees most likely to be affected include: The cities of Colton, Rialto, Riverside and San Bernardino.
[17] [ADD CITATION TO ECON ANALYSIS]

Regional Board staff do not believe this cost bears a reasonable relationship to the water quality benefit that would result. While the volume-weighted average TIN concentration in the recharge water may be reduced by about one-half of a milligram per liter, these reductions would hardly be noticeable in a groundwater basin where the current average nitrate concentration is already 28 mg/L.

More important, there be no water quality benefit if the permittees elect to bypass the Chino-South GMZ by relocating their wastewater outfalls to a point further downstream. Economic analysis indicates that the installing the necessary pipelines would cost much less than upgrading the treatment plant.[18] If this were to occur, more stringent effluent limits might actually result in poorer average water quality in the Chino-South GMZ because recharge from existing wastewater treatment facilities is currently helping to dilute excess nitrate, from legacy sources, that is seeping out of the vadose zone.

Option 2: Use a longer averaging period to evaluate compliance with the nitrate objective.

The WLAM indicates that exceedances which may occur during periods of drought are balanced by dilution that occurs during extremely wet years. So, over the long-run, the current effluent limits may be deemed adequate to cause or contribute to the on-going nitrate degradation which is occurring in the Chino-South GMZ. The long-term (63-year) volume-weighted average nitrate concentration in the combined recharge of wastewater and stormwater that percolates from the Santa Ana River into the Chino-South GMZ is only 4.02 mg/L - a value that is more than 4% below and complies with the 4.2 mg/L water quality objective.

Technically, the Regional Board could rely on this finding to conclude that the current effluent limits are adequate, particularly since the existing ambient nitrate concentration in the Chino-South is already 28 mg/L. However, to do so, the Regional Board must assume that average rainfall over the next several decades will be similar to that observed during the last 60 years. In light of statewide concern over potential climate change, it seems imprudent to make such assumptions.

There may also may be legal issues using a very long averaging period (e.g. 60+ years) to demonstrate compliance with a water quality objective that is, itself, computed using only 20 years of sampling data. Additionally, there may problems relying on conditions which occur long after the permit has expired to demonstrate contemporary compliance during the actual 5-year period where the permit is in-effect. Given the inherent vagaries of weather, and the uncertainty associated with accurately predicting rain, staff cannot recommend Option 2 to the Regional Board.

[18] [ADD CITATION TO ECON ANALYSIS]

Option 3: Increase the site-specific nitrogen loss coefficient to 56%.

The Regional Board relied on site-specific studies to approve the current nitrogen-loss coefficient of 50% for areas of the Chino-South GMZ that underlie Reach 3 of the Santa Ana River.[19] These studies indicated that the average measured nitrogen loss was actually closer to 56%. That value was rounded-down because the 2004 WLAM showed that a 50% nitrogen loss coefficient was sufficient to assure compliance with the nitrate objective in the Chino-South GMZ.

It is likely that the lower nitrogen loss coefficient was adequate in 2004 because the City of Riverside was operating a series of treatment wetlands which significantly reduced the average TIN concentration in their discharge. However, these wetlands were destroyed when the Santa Ana River flooded them in the winter of 2005. Today, the 50% nitrogen loss coefficient is not quite large enough to assure compliance with the Chino-South nitrate objective despite the large investments the City of Riverside has made to reduce the average TIN concentration in its recycled water from 13 mg/L down to 10 mg/L.

If the site-specific nitrogen loss coefficient were revised to reflect the true average value documented by the original studies, then effluent discharged in accordance with the current TIN limit of 10 mg/L would be expected to enter the Chino-South GMZ at concentrations no greater than 4.4 mg/L. Some small amount of stormwater dilution would still be needed to meet the 4.2 mg/L water quality objective.

Staff is reluctant to recommend abandoning the 10% safety factor that was created when the nitrogen loss coefficient was rounded down from 56% to 50% in 2004. Moreover, revising the nitrogen loss coefficient is a relatively obscure way to restore regulatory compliance and may be perceived, by the public, as "manipulating the data." For these reasons, and to assure greater public transparency, staff prefers Option 4 (below) over Option 3.

Option 4) Raise the water quality objective for nitrate in the Chino-South GMZ to 5 mg/L.

Since 50% of the nitrogen measured in the Santa Ana River overlying the Chino-South GMZ is biologically-transformed and lost before reaching the groundwater, wastewater discharged at an average TIN concentration of 10 mg/L would enter the aquifer at the no more than 5 mg/L. Thus, continuing to meet the current effluent limits would assure that recycled water could meet a 5 mg/L nitrate objective without needing to rely on any stormwater dilution to make this demonstration.

[19] Wildermuth Environmental, Inc. Demonstration of Nitrogen Loss in Reach 3 of the Santa Ana River - Technical Memorandum. October, 2005.

Raising the nitrate objective to 5 mg/L would not result in less stringent effluent limitations for the wastewater treatment plants because the anti-backsliding regulations would prevent this.[20] Raising the objective would, however, avoid the need to impose more restrictive permit limits in order to address the short-term compliance issues described above and the extraordinary cost associated with meeting such limits.

Raising the objective to 5 mg/L openly acknowledges that nitrate concentrations in the Chino-South GMZ greatly exceed the current water quality objective and are unlikely to return to levels at or below 4.2 mg/L for many decades. Imposing more restrictive effluent limits nominally intended to prevent degradation that has already occurred, on dischargers that bear no responsibility for this trend, is not reasonable.

Raising the nitrate objective from 4.2 mg/L to 5 mg/L makes it admittedly makes it slightly easier to comply. However, this small change greatly simplifies the regulatory analysis required to re-authorize NPDES permits without imposing more stringent effluent limits. This, in turn, makes it more likely that the permittees will continue discharging high quality recycled water to Reach 3 of the Santa Ana River.

Comprehensive water quality sampling data reveals that the lowest nitrate concentrations measured in the Chino-South GMZ are found in those areas of the aquifer closest to the Santa Ana River.[21] The discharge of large volumes of recycled water to Reach 3 of the River is not causing or contributing to the problem, it is part of the long-term solution for improving groundwater quality.

3. ANTIDEGRATION ANALYSIS

Raising the nitrate objective would authorize lower water quality compared to the 1954-73 baseline condition. Therefore, it is necessary to demonstrate that allowing lower water quality is comports with the Antidegradation Policy established by the State Water Quality Control Board in 1968. The policy states, in relevant part:

> *"Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial uses of such water and will not result in water quality less than that prescribed in the policies."*[22]

[20] 40 CFR §122.15(i) implementing 33 U.S.C. §1342(o) [§402(o) of the Clean Water Act]

[21] Wildermuth Environmental, Inc. Recomputation of Ambient Water Quality in the Santa Ana Watershed for the Period 1993 to 2012. Technical Memorandum prepared for the Santa Ana Watershed Project Authority Basin Monitoring Program Task Force. August, 2014.

[22] Resolution No. 68-16

The following analysis addresses each of the three required Antidegradation demonstrations.

(a) Will raising nitrate objective for the Chino-South GMZ to 5 mg/L result in water quality less than that prescribed in policies?

No. Current state policy was established when California established a Primary MCL of 10 mg/L for nitrate as nitrogen.[23] The proposed objective of 5 mg/L for the Chino-South GMZ considerably less than the maximum concentration allowed by state policy and maintains a 100% safety factor.

The proposed Basin Plan amendment authorizes no changes to the current effluent limits for treated wastewater discharged to the Santa Ana River. These limits, which are imposed as a requirement in the NPDES permits, require the volume-weighted annual average concentration of Total Inorganic Nitrogen (TIN) to be at or below 10 mg/L. On average, nitrate comprises only 85% of TIN. So, compliance with the TIN limit assures that the wastewater itself will not exceed the Primary MCL for drinking water even if 100% of the measured TIN is in the form of nitrate.

Since 50% of the nitrogen discharged in the surface stream will be biologically-transformed and lost through the process of percolation, the average TIN concentration in municipal wastewater that recharges the Chino-South GMZ will be no greater than 5 mg/L even if there is no dilution provided by stormwater runoff. Therefore, raising the nitrate objective to 5 mg/L will not result in water quality less than that prescribed in policies.

(b) Will raising the nitrate objective for the Chino-South GMZ to 5 mg/L unreasonably affect present or anticipated beneficial uses of the water?

No. As noted above, the proposed water quality objective of 5 mg/L is well below the level required to assure safe drinking water and, in fact, provides a 100% safety factor.

The Regional Board will continue to impose whatever effluent limits are needed to ensure that municipal wastewater discharged to Reach 3 of the Santa Ana River will comply with the 5 mg/L nitrate objective by the time that water percolates into the Chino-South GMA. The current permit limits for TIN are adequate to meet this requirement. And, federal antibacksliding regulation effectively preclude the Regional Board from issuing new permits with less stringent effluent limits for TIN.

[23] 22 CCR §64431(a); see Table 64431-A: Maximum Contaminant Levels for Inorganic Chemicals.

Finally, it should be noted that, in accordance with the state Sources of Drinking Water Policy, Reach 3 of the Santa Ana River is not designated MUN.[24] As such, it is not required to meet drinking water standards. Nevertheless, by meeting with the existing TIN limits in the current permits, the average nitrate concentration in recycled water discharged to Reach 3 will also comply with the Primary MCL for drinking water.

Reach 2 of the Santa Ana River (below Prado Dam) was also exempted from the MUN designation pursuant to the state Sources of Drinking Water Policy. However, surface water in this segment does recharge the Orange County Groundwater Management Zone which is designated MUN. Results from recent analyses performed using the WLAM indicate that the average TIN concentration below Prado Dam is not expected to exceed 7 mg/L in the surface water even during drought conditions.[25] And, after applying the 25% nitrogen loss coefficient approved for Reach 2, nitrate in river water recharging into the Orange County GMZ will rarely exceed 5 mg/L.

Therefore, raising the nitrate objective to 5 mg/L will not unreasonably affect present or anticipated beneficial uses of the water in the Chino-South GMZ or the Orange County GMA further downstream.

(c) Is raising the nitrate objective for the Chino-South GMZ to 5 mg/L consistent with maximum benefit to the people of the State?

Yes. The current average nitrate concentration in the Chino-South GMZ is 28 mg/L. This is substantially higher than the current water quality objective, the proposed water quality objective or the Primary MCL for drinking water. As a result, the Chino Desalter Authority (CDA) operates an extraction and treatment system designed to pump and treat the degraded aquifer so that it meets drinking water standards. The CDA system remediates both nitrate and excess salt in the Chino-South GMZ.

Raising the nitrate objective to 5 mg/L makes it easier to authorize the discharge of recycled water that will: 1) help reduce the current high nitrate concentrations and improve existing water quality in the Chino-South GMZ by providing a significant source of high quality dilution water, and 2) preserves groundwater yield by helping replace the groundwater that is extracted by the CDA's groundwater remediation project. The latter benefit is especially noteworthy following the legislature's enactment of the Sustainable Groundwater Management Act in 2014.[26]

[24] State Water Resources Control Board Resolution No. 88-63.

[25] Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8. Technical Memorandum. January 5, 2015 (See Tables 8d-BP, 8e-BP, and 8f-BP in Appendix A of the original document).

[26] AB 1739 and SB 1168 and SB 1319; Sept. 16, 2014

Discharging high quality recycled water not only helps reduce the high nitrate concentrations, it also helps dilute the rising salinity that is occurring in the Chino-South GMZ. The water quality objective for Total Dissolved Solids (TDS) in this aquifer is 660 mg/L. As with nitrate, this objective was established based on the highest water quality that has been attained since 1968 and represents the average TDS concentration during the 1954-73 baseline period. Today, the average TDS concentration is 50% higher and now stands at 990 mg/L. The long-term (63-year) average TDS concentration recharging to the Chino-South GMZ from Reach 3 of the Santa Ana River is 590 mg/L. And, does not exceed 625 mg/L even during a decade of below normal rainfall.[27] Raising the nitrate objective makes it easier to continue permitting existing wastewater discharges which are necessary to improve the average concentration of both nitrate and TDS in the Chino-South GMZ.

Raising the nitrate objective to 5 mg/L will avoid the need to impose more restrictive effluent limits and, therefore, the extraordinary expense associated with upgrading wastewater treatment plants to meet such limits. Upgrading the treatment processes to provide more efficient nitrogen removal would assure strict compliance with the current nitrate objective but it would do very little to improve existing water quality in the Chino-South GMZ. The high cost of compliance bears no reasonable relationship to the probable water quality improvements. Avoiding this type of inefficient allocation of scarce public resources provides maximum benefit to the People of the state.

4. REFERENCES

[TO BE INSERTED]

APPENDIX A: ENVIRONMENTAL CHECKLISH AND SUBSTITUTE ENVIRONMENTAL DOCUMENT

[TO BE ATTACHED WHEN COMPLETED BY CDM-SMITH]

APPENDIX B: ECONOMIC ANALYSIS

[TO BE ATTACHED WHEN COMPLETED BY CDM-SMITH]

[27] Wildermuth Environmental, Inc. Addendum to the 2008 Santa Ana River Wasteload Allocation Model Report: Scenario 8. Technical Memorandum. January 5, 2015 (see Tables 8d-CS, 8e-CS and 8f-CS in original report).