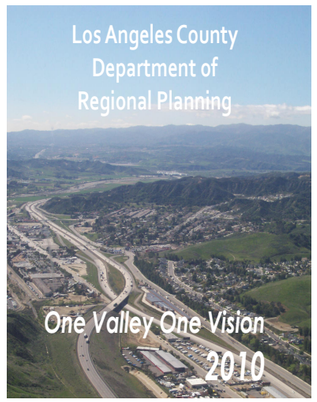

Revised Draft Program EIR
for the
County of Los Angeles'
Proposed
Santa Clarita Valley
Area Plan

Volume III
Appendix 3.13 (continued)

November 2010

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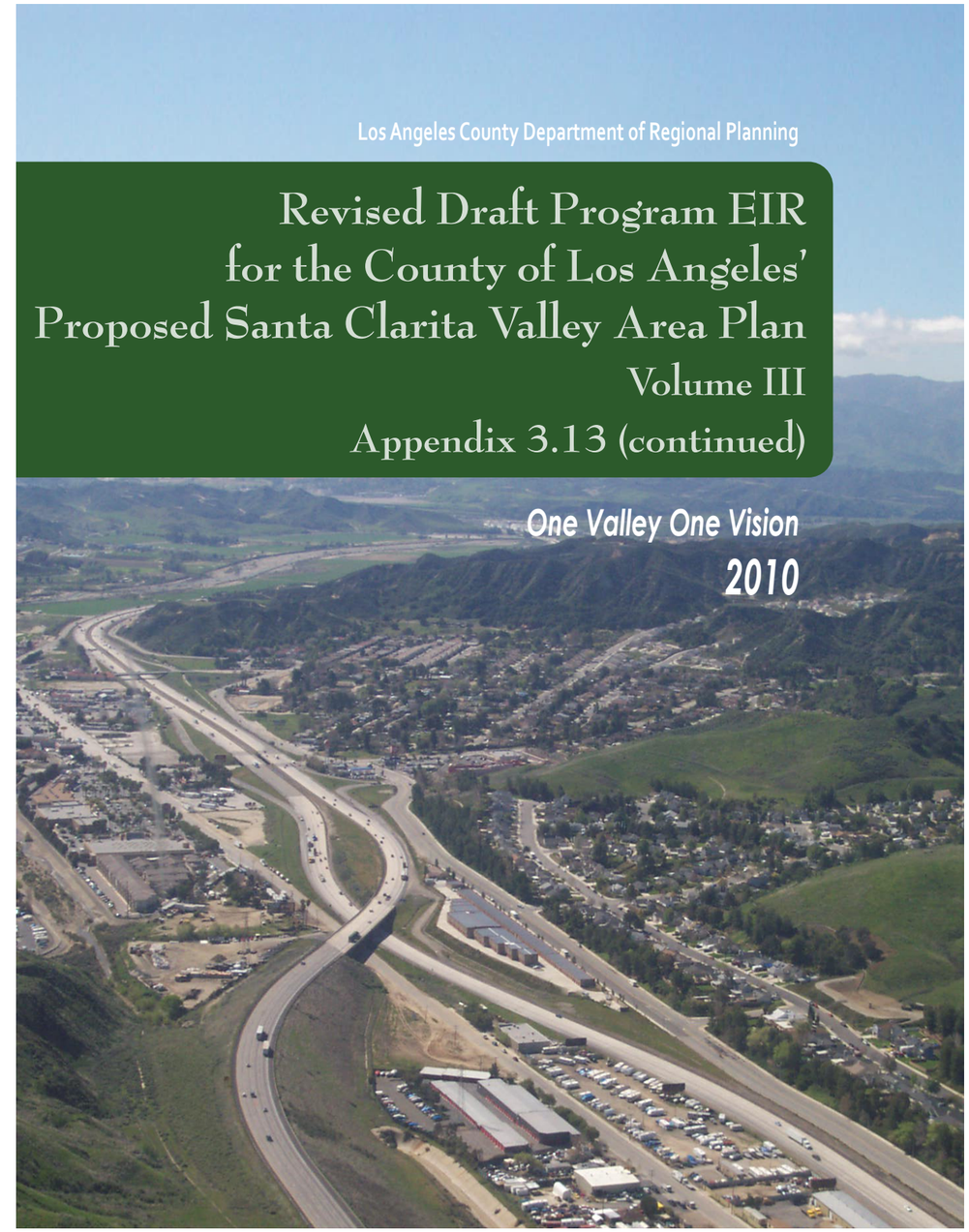
Los Angeles County Department of Regional Planning

Revised Draft Program EIR for the County of Los Angeles' Proposed Santa Clarita Valley Area Plan

Volume III
Appendix 3.13 (continued)

One Valley One Vision
2010



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November 2010

Revised Draft Program EIR for the County of Los Angeles' Proposed Santa Clarita Valley Area Plan

Volume III

Appendix 3.13 (continued)

Submitted to:

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November 2010

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Scoping Meeting Notes Summary of Verbal Comments and Flyer; dated August 12, 2008
Ventura County Office of Agricultural Commissioner Comment on NOP; dated August 8, 2008
OVOV Noise Element Questions, submitted by Bob Werner; dated February 17, 2009
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3.2 One Valley One Vision Valley-wide Traffic Study, prepared by Austin-Foust Associates, Inc.; dated June 2010

3.3 Air Quality Emission Calculations

3.4 Global Climate Change Documentation
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3.9 Soil Types and Characteristics of the County's Planning Area

3.13 Water Service Information
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Luhdorff & Scalmanini Consulting Engineers, "Impact and Response to Perchlorate Contamination, Valencia Water Company, Well Q2" (April 2005)

CH2MHill, "Analysis of Near-Term Groundwater Capture Areas for Production Wells Located Near the Whittaker-Bermite Property (Santa Clarita, California)" (December 21, 2004)

Geomatrix, "Letter to the Department of Toxic Substances Control Regarding the Former Whittaker-Bermite Facility, Santa Clarita, CA – Summary Report for Month of November 2007" (January 15, 2008)

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3.13 Water Service Information (continued)

Carollo Engineers, "Treatment of Perchlorate Contaminated Groundwater from the Saugus Aquifer, Technical Memorandum No. 3 Bench and Pilot Test Results" (February 2004)

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United States District Court, Eastern District of California, "*Natural Resources Defense Council v. Kempthorne*, 506 F.Supp.2d 322 (E.D. Cal. 2007)" ("2007 Wanger decision")

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CM2MHill, "Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley" (February 22, 2004)

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CLWA Letter to the Los Angeles County Department of Regional Planning Regarding Availability of Future Water Supplies in the Santa Clarita Valley, February 5, 2008

2009 Basin Yield Update

California Court of Appeal, Second District, Division Five, *California Water Impact Network, Inc., v. Castaic Lake Water Agency*, Case No. B205622

Castaic Lake Water Agency Litigation Settlement Agreement

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3.13 Water Service Information (continued)

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DWR, 2009 Comprehensive Water Package, Special Session Policy Bills and Bond Summary, November 2009

Office of the Governor's release regarding passage of history comprehensive water package, November 4, 2009

3.18 Draft City of Santa Clarita General Plan Noise Element, February 2009

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Global Climate Change Documentation

Greenhouse Gas Emission Calculations

Greenhouse Gas Emissions Calculations

for Existing Conditions

Existing Conditions - OVOV Planning Area
Indirect GHG Emissions from Electrical Demand

Land Use	Units		Electrical Demand Factor[1] (kW-hr/unit/yr)	Annual Demand Factor (10^6 kW-hr/yr)	CO_2E Emission Factor[2] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Residential	72,638	Unit	5,656.50	410.88	399	**164,005.60**
FoodStore	1,341,840	Sq.Ft.	53.30	71.52	399	**28,547.95**
Restaurant	212,030	Sq.Ft.	47.45	10.06	399	**4,015.88**
Hospital	149,900	Sq.Ft.	21.70	3.25	399	**1,298.40**
Retail	2,576,562	Sq.Ft.	13.55	34.91	399	**13,935.64**
Movie Theater (3)	82,500	Sq.Ft.	13.55	1.12	399	**446.21**
College/University	459,475	Sq.Ft.	11.55	5.31	399	**2,118.32**
High School	262,500	Sq.Ft.	10.50	2.76	399	**1,100.18**
Elementary School	747,550	Sq.Ft.	5.90	4.41	399	**1,760.51**
Daycare	11,500	Sq.Ft.	5.90	0.07	399	**27.08**
Office	2,704,040	Sq.Ft.	12.95	35.02	399	**13,977.51**
Hotel/Motel	390,000	Sq.Ft.	9.95	3.88	399	**1,548.94**
Warehouse	0	Sq.Ft.	4.35	-	399	**-**
Miscellaneous	19,195,560	Sq.Ft.	10.50	201.55	399	**80,452.05**
					Projected GHG Emissions from Electrical Demand	**313,234.28**

Sources:
1. South Coast Air Quality Management District, *CEQA Air Quality Handbook*, (1993) Table A9-11-A.

2. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006), http://www.climateregistry.org/CARROT/public/Reports.aspx.

Where:

CO_2E	Carbon dioxide equivalent
GWP	Global warming potential
kW-hr	Kilowatt-hour
lbs	Pounds
MT	Metric ton
yr	Year

Impact Sciences, Inc.
Prepared by R. Mamaghani
12 March 2009

Existing Conditions - OVOV Planning Area
GHG Emissions from Solid Waste Generation

Land Use	Size	Unit	Rate (Tons/yr)	Solid Waste Generation (Tons/yr)	CO_2E Emission Factor[2] (MT CO_2E/MT waste)	Annual CO_2E Emissions (MT CO_2E/yr)
Single Family Detached	46,071	du	1.0200	46,992.42	0.11	**4,689.39**
Multi-Family or Attached	24,387	du	0.5850	14,266.40	0.11	**1,423.65**
Mobile Home	2,180	du	0.5850	1,275.30	0.11	**127.26**
General Retail	7,811,260	sq. ft.	0.0012	9,373.51	0.11	**935.39**
Eating/Drnkng Establ.	212,030	sq. ft.	0.0054	1,144.96	0.11	**114.26**
Food & Drug Stores	1,341,840	sq. ft.	0.0036	4,830.62	0.11	**482.05**
Auto Dlr/Service Sta.	399,500	sq. ft.	0.0026	1,018.73	0.11	**101.66**
Hotel & Motel	390,000	sq. ft.	0.0027	1,033.50	0.11	**103.13**
Warehouse	0	sq. ft.	0.0006	0.00	0.11	**-**
Medical Offices	133,730	sq. ft.	0.0014	180.54	0.11	**18.02**
Hospitals	149,900	sq. ft.	0.0028	412.23	0.11	**41.14**
Business Park	16,441,130	sq. ft.	0.0007	11,508.79	0.11	**1,148.47**
Office	2,162,420	sq. ft.	0.0007	1,513.69	0.11	**151.05**
Library 3	53,730	sq. ft.	0.0007	37.61	0.11	**3.75**
Education & Schools	1,021,550	sq. ft.	0.0007	664.01	0.11	**66.26**
College	459,475	sq. ft.	0.0007	298.66	0.11	**29.80**
Trans., Comm., Utilities	903,440	sq. ft.	0.0040	3,568.59	0.11	**356.11**
Special Generator 4	0	sq. ft.	0.0040	0.00	0.11	**-**
Golf Course/Park	872	acres	0.1000	87.19	0.11	**8.70**
Manufacturing	1,850,990	sq. ft.	0.0025	4,627.48	0.11	**461.78**
Church 3	487,890	sq. ft.	0.0007	341.52	0.11	**34.08**
					Projected GHG Emissions From Solid Waste Disposal	**10,295.94**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

Sources:

1. Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. Assumes 50% diversion.

2. US Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Greenhouse Gas Emission Factors for Management of Selected Materials in Municipal Solid Waste (EPA-530-R-98-013)*, (1998). The factor is based on mixed municipal solid waste as disposed in landfills without landfill gas recovery.

Where:

CO_2E	Carbon dioxide equivalent
MT	Metric ton
yr	Year

3. Assumes same generation rate as for office.
4. Conservatively assumes same generation rate as utilities.

Existing Conditions - OVOV Planning Area
GHG Emission from Potable Water Treatment and Conveyance

Land Use	Action	Net Potable Water Needs Estimate[1] (MG/yr)	Electrical Demand Factor[2,3] (kW-hr/MG)	Annual Electrical Demand (10^6 kW-hr/year)	CO_2E Emission Factor[4] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	Supply & Conveyance	32,780.61	9,727	318.857	290	92,468.53
Net Project	Treatment	32,780.61	111	3.639	290	1,055.21
Net Project	Distribution	32,780.61	1,272	41.697	290	12,092.11
					Projected GHG Emissions From Water Demand	**105,615.85**

Sources:

1. Section 3.13, Water Services
2. California Energy Commission, *California's Water-Energy Relationship, Final Staff Report (CEC-700-2005-011-SF)*, (2005) 26.
3. California Energy Commission, *Refining Estimates of Water-Related Energy Use in California, PIER Final Project Report (CEC-500-2006-118)*, (2006) 22. Prepared by Navigant Consulting, Inc.
4. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006), http://www.climateregistry.org/CARROT/public/Reports.aspx.

Where:

CO_2E	Carbon dioxide equivalent
GWP	Global warming potential
kW-hr	Kilowatt-hour
lbs	Pounds
MG	Million gallons
MT	Metric ton
N_2O	Nitrous oxide
yr	Year

Existing Conditions, OVOV Planning Area
GHG Emission from Wastewater Collection and Treatment

Wasterwater Treatment Electrical Demand GHG Emissions

Land Use	Net Wastewater Generation Rate[1] (MG/yr)	Electrical Demand Factor[2] (kW-hr/MG)	Annual Demand Factor (10^6 kW-hr/yr)	CO_2E Emision Factor[3] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	19,668.37	1,911	37.59	399	**15,002.93**

Sources:
1. Section 3.13, Water Service. Assumes that 60% of water demand would be wastewater.
2. California Energy Commission, *Refining Estimates of Water-Related Energy Use in California, PIER Final Project Report (CEC-500-2006-118)*. Prepared
3. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006),

Wastewater Treatment Process GHG Emissions[1]

Project	Maximum Population	Pounds BOD5 per Capita per Day[2] (lbs BOD5/capita/day)	Pounds CH_4 per Pound BOD5[3] (lbs CH_4/BOD5)	Fraction Anaerobically Digested[4]	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	252,000	0.13	0.22	0.15	**3,758.68**

Sources:
1. US Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I, Chapter 4.3.5*, (1998). Data is not available to determine CO_2
2. The US EPA recommends a default value of 0.13 lb BOD5/capita/day.
3. The US EPA recommends a default value of 0.22 lb CH_4/BOD5.
4. The US EPA recommends a default value of 15% for the fraction anaerobically digested for domestic wastewater.

Where:

BOD5	Biological oxygen demand using a standard 5 day test	18,761.61
CH_4	Methane	
CO_2	Carbon dioxide	
CO_2E	Carbon dioxide equivalent	
GWP	Global warming potential	
kW-hr	Kilowatt-hour	
lbs	Pounds	
MG	Million gallons	
MT	Metric ton	
N_2O	Nitrous oxide	
yr	Year	

Greenhouse Gas Emissions Calculations

for Existing General Plan and Area Plan

Existing General Plan
Indirect GHG Emissions from Electrical Demand

Land Use	Units	Electrical Demand Factor[1] (kW-hr/unit/yr)	Annual Demand Factor (10^6 kW-hr/yr)	CO_2E Emission Factor[2] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Residential	151,916 Unit	5,656.50	859.31	399	**343,003.32**
FoodStore	3,182,757 Sq.Ft.	53.30	169.64	399	**67,713.88**
Restaurant	343,270 Sq.Ft.	47.45	16.29	399	**6,501.58**
Hospital	345,840 Sq.Ft.	21.70	7.50	399	**2,995.59**
Retail	3,923,329 Sq.Ft.	13.55	53.16	399	**21,219.79**
Movie Theater (3)	82,500 Sq.Ft.	13.55	1.12	399	**446.21**
College/University	833,400 Sq.Ft.	11.55	9.63	399	**3,842.22**
High School	586,100 Sq.Ft.	10.50	6.15	399	**2,456.45**
Elementary School	1,218,575 Sq.Ft.	5.90	7.19	399	**2,869.80**
Daycare	13,500 Sq.Ft.	5.90	0.08	399	**31.79**
Office	8,917,970 Sq.Ft.	12.95	115.49	399	**46,098.07**
Hotel/Motel	678,400 Sq.Ft.	9.95	6.75	399	**2,694.36**
Warehouse	0 Sq.Ft.	4.35	-	399	**-**
Miscellaneous	50,950,550 Sq.Ft.	10.50	534.98	399	**213,542.93**
				Projected GHG Emissions from Electrical Demand	**713,415.99**

Sources:
1. South Coast Air Quality Management District, *CEQA Air Quality Handbook*, (1993) Table A9-11-A.

2. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006), http://www.climateregistry.org/CARROT/public/Reports.aspx.

Where:

CO_2E	Carbon dioxide equivalent
GWP	Global warming potential
kW-hr	Kilowatt-hour
lbs	Pounds
MT	Metric ton
yr	Year

Impact Sciences, Inc.
Prepared by R. Mamaghani
12 March 2009

Existing General Plan
GHG Emissions from Solid Waste Generation

Land Use	Size	Unit	Rate (Tons/yr)	Solid Waste Generation (Tons/yr)	CO_2E Emission Factor[2] (MT CO_2E/MT waste)	Annual CO_2E Emissions (MT CO_2E/yr)
Single Family Detached	86,808	du	1.0200	88,544.16	0.11	**8,835.85**
Multi-Family or Attached	62,543	du	0.5850	36,587.66	0.11	**3,651.09**
Mobile Home	2,565	du	0.5850	1,500.53	0.11	**149.74**
General Retail	18,243,123	sq. ft.	0.0012	21,891.75	0.11	**2,184.59**
Eating/Drnkng Establ.	343,270	sq. ft.	0.0054	1,853.66	0.11	**184.98**
Food & Drug Stores	3,182,757	sq. ft.	0.0036	11,457.93	0.11	**1,143.39**
Auto Dlr/Service Sta.	441,500	sq. ft.	0.0026	1,125.83	0.11	**112.35**
Hotel & Motel	678,400	sq. ft.	0.0027	1,797.76	0.11	**179.40**
Warehouse	0	sq. ft.	0.0006	0.00	0.11	**-**
Medical Offices	412,290	sq. ft.	0.0014	556.59	0.11	**55.54**
Hospitals	345,840	sq. ft.	0.0028	951.06	0.11	**94.91**
Business Park	45,656,650	sq. ft.	0.0007	31,959.66	0.11	**3,189.27**
Office	8,240,680	sq. ft.	0.0007	5,768.48	0.11	**575.64**
Library 3	71,400	sq. ft.	0.0007	49.98	0.11	**4.99**
Education & Schools	1,818,175	sq. ft.	0.0007	1,181.81	0.11	**117.93**
College	833,400	sq. ft.	0.0007	541.71	0.11	**54.06**
Trans., Comm., Utilities	1,250,240	sq. ft.	0.0040	4,938.45	0.11	**492.81**
Special Generator 4	0	sq. ft.	0.0040	0.00	0.11	**-**
Golf Course/Park	1,791	acres	0.1000	179.07	0.11	**17.87**
Manufacturing	4,043,660	sq. ft.	0.0025	10,109.15	0.11	**1,008.80**
Church 3	605,890	sq. ft.	0.0007	424.12	0.11	**42.32**
					Projected GHG Emissions From Solid Waste Disposal	**22,095.51**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

Sources:

1. Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. Assumes 50% diversion.

2. US Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Greenhouse Gas Emission Factors for Management of Selected Materials in Municipal Solid Waste (EPA-530-R-98-013)*, (1998). The factor is based on mixed municipal solid waste as disposed in landfills without landfill gas recovery.

Where:

CO_2E	Carbon dioxide equivalent
MT	Metric ton
yr	Year

3. Assumes same generation rate as for office.
4. Conservatively assumes same generation rate as utilities.

OVOV
GHG Emissions from Solid Waste Generation

Land Use	Size	Unit	Rate (Tons/yr)	Solid Waste Generation (Tons/yr)	CO_2E Emission Factor[2] (MT CO_2E/MT waste)	Annual CO_2E Emissions (MT CO_2E/yr)
Single Family Detached	77,975	du	1.0200	79,534.50	0.11	**7,936.78**
Multi-Family or Attached	67,679	du	0.5850	39,592.22	0.11	**3,950.92**
Mobile Home	3,420	du	0.5850	2,000.70	0.11	**199.65**
General Retail	19,974,282	sq. ft.	0.0012	23,969.14	0.11	**2,391.89**
Eating/Drnkng Establ.	354,140	sq. ft.	0.0054	1,912.36	0.11	**190.83**
Food & Drug Stores	3,484,638	sq. ft.	0.0036	12,544.70	0.11	**1,251.84**
Auto Dlr/Service Sta.	530,000	sq. ft.	0.0026	1,351.50	0.11	**134.87**
Hotel & Motel	1,010,800	sq. ft.	0.0027	2,678.62	0.11	**267.30**
Warehouse	0	sq. ft.	0.0006	0.00	0.11	**-**
Medical Offices	730,560	sq. ft.	0.0014	986.26	0.11	**98.42**
Hospitals	365,160	sq. ft.	0.0028	1,004.19	0.11	**100.21**
Business Park	44,484,350	sq. ft.	0.0007	31,139.05	0.11	**3,107.38**
Office	10,344,450	sq. ft.	0.0007	7,241.12	0.11	**722.59**
Library 3	91,400	sq. ft.	0.0007	63.98	0.11	**6.38**
Education & Schools	1,767,675	sq. ft.	0.0007	1,148.99	0.11	**114.66**
College	901,550	sq. ft.	0.0007	586.01	0.11	**58.48**
Trans., Comm., Utilities	1,032,440	sq. ft.	0.0040	4,078.14	0.11	**406.96**
Special Generator 4	0	sq. ft.	0.0040	0.00	0.11	**-**
Golf Course/Park	2,378	acres	0.1000	237.82	0.11	**23.73**
Manufacturing	3,268,690	sq. ft.	0.0025	8,171.73	0.11	**815.46**
Church 3	997,460	sq. ft.	0.0007	698.22	0.11	**69.68**
					Projected GHG Emissions From Solid Waste Disposal	**21,848.02**

du = dwelling unit; sq.ft. - square feet; tpy = tons per year; lbs. = pounds

Sources:

1. Ventura County Solid Waste Management Department's Guidelines for Preparation of Environmental Assessments for Solid Waste Impacts. Assumes 50% diversion.

2. US Environmental Protection Agency, Office of Solid Waste and Emergency Response, *Greenhouse Gas Emission Factors for Management of Selected Materials in Municipal Solid Waste (EPA-530-R-98-013)*, (1998). The factor is based on mixed municipal solid waste as disposed in landfills without landfill gas recovery.

Where:

CO_2E	Carbon dioxide equivalent
MT	Metric ton
yr	Year

3. Assumes same generation rate as for office.
4. Conservatively assumes same generation rate as utilities.

Existing General Plan
GHG Emission from Potable Water Treatment and Conveyance

Land Use	Action	Net Potable Water Needs Estimate[1] (MG/yr)	Electrical Demand Factor[2,3] (kW-hr/MG)	Annual Electrical Demand (10^6 kW-hr/year)	CO_2E Emission Factor[4] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	Supply & Conveyance	44,934.85	9,727	437.081	290	126,753.58
Net Project	Treatment	44,934.85	111	4.988	290	1,446.45
Net Project	Distribution	44,934.85	1,272	57.157	290	16,575.57
					Projected GHG Emissions From Water Demand	**144,775.60**

Sources:

1. Section 3.13, Water Services
2. California Energy Commission, *California's Water-Energy Relationship, Final Staff Report (CEC-700-2005-011-SF)*, (2005) 26.
3. California Energy Commission, *Refining Estimates of Water-Related Energy Use in California, PIER Final Project Report (CEC-500-2006-118)*, (2006) 22. Prepared by Navigant Consulting, Inc.
4. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006), http://www.climateregistry.org/CARROT/public/Reports.aspx.

Where:

CO_2E	Carbon dioxide equivalent
GWP	Global warming potential
kW-hr	Kilowatt-hour
lbs	Pounds
MG	Million gallons
MT	Metric ton
N_2O	Nitrous oxide
yr	Year

Existing General Plan
GHG Emission from Wastewater Collection and Treatment

Wasterwater Treatment Electrical Demand GHG Emissions

Land Use	Net Wastewater Generation Rate[1] (MG/yr)	Electrical Demand Factor[2] (kW-hr/MG)	Annual Demand Factor (10^6 kW-hr/yr)	CO_2E Emision Factor[3] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	26,960.91	1,911	51.52	399	**20,565.64**

Sources:
1. Section 3.13, Water Service. Assumes that 60% of water demand would be wastewater.
2. California Energy Commission, *Refining Estimates of Water-Related Energy Use in California, PIER Final Project Report (CEC-500-2006-118)*. Prepared
3. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006),

Wastewater Treatment Process GHG Emissions[1]

Project	Maximum Population	Pounds BOD5 per Capita per Day[2] (lbs BOD5/capita/day)	Pounds CH_4 per Pound BOD5[3] (lbs CH_4/BOD5)	Fraction Anaerobically Digested[4]	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	448,310	0.13	0.22	0.15	**6,686.73**

Sources:
1. US Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I, Chapter 4.3.5*, (1998). Data is not available to determine CO_2
2. The US EPA recommends a default value of 0.13 lb BOD5/capita/day.
3. The US EPA recommends a default value of 0.22 lb CH_4/BOD5.
4. The US EPA recommends a default value of 15% for the fraction anaerobically digested for domestic wastewater.

Where:

BOD5	Biological oxygen demand using a standard 5 day test	
CH_4	Methane	
CO_2	Carbon dioxide	
CO_2E	Carbon dioxide equivalent	
GWP	Global warming potential	27,252.37
kW-hr	Kilowatt-hour	
lbs	Pounds	
MG	Million gallons	
MT	Metric ton	
N_2O	Nitrous oxide	
yr	Year	

Greenhouse Gas Emissions Calculations

for Proposed General Plan and Area Plan

OVOV
Indirect GHG Emissions from Electrical Demand

Land Use	Units	Electrical Demand Factor[1] (kW-hr/unit/yr)	Annual Demand Factor (10^6 kW-hr/yr)	CO_2E Emission Factor[2] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Residential	149,074 Unit	5,656.50	843.24	399	**336,586.51**
FoodStore	3,484,638 Sq.Ft.	53.30	185.73	399	**74,136.47**
Restaurant	354,140 Sq.Ft.	47.45	16.80	399	**6,707.46**
Hospital	365,160 Sq.Ft.	21.70	7.92	399	**3,162.93**
Retail	4,905,463 Sq.Ft.	13.55	66.47	399	**26,531.77**
Movie Theater (3)	90,000 Sq.Ft.	13.55	1.22	399	**486.78**
College/University	901,550 Sq.Ft.	11.55	10.41	399	**4,156.41**
High School	462,500 Sq.Ft.	10.50	4.86	399	**1,938.42**
Elementary School	1,291,675 Sq.Ft.	5.90	7.62	399	**3,041.95**
Daycare	13,500 Sq.Ft.	5.90	0.08	399	**31.79**
Office	11,133,310 Sq.Ft.	12.95	144.18	399	**57,549.44**
Hotel/Motel	1,010,800 Sq.Ft.	9.95	10.06	399	**4,014.54**
Warehouse	0 Sq.Ft.	4.35	-	399	**-**
Miscellaneous	48,785,480 Sq.Ft.	10.50	512.25	399	**204,468.73**
				Projected GHG Emissions from Electrical Demand	**722,813.21**

Sources:
1. South Coast Air Quality Management District, *CEQA Air Quality Handbook*, (1993) Table A9-11-A.

2. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006), http://www.climateregistry.org/CARROT/public/Reports.aspx.

Where:

CO_2E	Carbon dioxide equivalent
GWP	Global warming potential
kW-hr	Kilowatt-hour
lbs	Pounds
MT	Metric ton
yr	Year

Impact Sciences, Inc.
Prepared by R. Mamaghani
12 March 2009

OVOV
GHG Emission from Potable Water Treatment and Conveyance

Land Use	Action	Net Potable Water Needs Estimate[1] (MG/yr)	Electrical Demand Factor[2,3] (kW-hr/MG)	Annual Electrical Demand (10^6 kW-hr/year)	CO_2E Emission Factor[4] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	Supply & Conveyance	44,934.85	9,727	437.081	290	126,753.58
Net Project	Treatment	44,934.85	111	4.988	290	1,446.45
Net Project	Distribution	44,934.85	1,272	57.157	290	16,575.57
					Projected GHG Emissions From Water Demand	**144,775.60**

Sources:

1. Section 3.13, Water Services
2. California Energy Commission, *California's Water-Energy Relationship, Final Staff Report (CEC-700-2005-011-SF)*, (2005) 26.
3. California Energy Commission, *Refining Estimates of Water-Related Energy Use in California, PIER Final Project Report (CEC-500-2006-118)*, (2006) 22. Prepared by Navigant Consulting, Inc.
4. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006), http://www.climateregistry.org/CARROT/public/Reports.aspx.

Where:

CO_2E	Carbon dioxide equivalent
GWP	Global warming potential
kW-hr	Kilowatt-hour
lbs	Pounds
MG	Million gallons
MT	Metric ton
N_2O	Nitrous oxide
yr	Year

OVOV
GHG Emission from Wastewater Collection and Treatment

Wasterwater Treatment Electrical Demand GHG Emissions

Land Use	Net Wastewater Generation Rate[1] (MG/yr)	Electrical Demand Factor[2] (kW-hr/MG)	Annual Demand Factor (10^6 kW-hr/yr)	CO_2E Emision Factor[3] (MT $CO_2E/10^6$ kW-hr)	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	26,960.91	1,911	51.52	399	**20,565.64**

Sources:
1. Section 3.13, Water Service. Assumes that 60% of water demand would be wastewater.
2. California Energy Commission, *Refining Estimates of Water-Related Energy Use in California, PIER Final Project Report (CEC-500-2006-118)*. Prepared
3. California Climate Action Registry, "Reporting Online Tool, Public Annual Entity Emissions," *Southern California Edison, PUP Report*, (2006),

Wastewater Treatment Process GHG Emissions[1]

Project	Maximum Population	Pounds BOD5 per Capita per Day[2] (lbs BOD5/capita/day)	Pounds CH_4 per Pound BOD5[3] (lbs CH_4/BOD5)	Fraction Anaerobically Digested[4]	Annual CO_2E Emissions (MT CO_2E/yr)
Net Project	439,923	0.13	0.22	0.15	**6,561.63**

Sources:
1. US Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I, Chapter 4.3.5*, (1998). Data is not available to determine CO_2
2. The US EPA recommends a default value of 0.13 lb BOD5/capita/day.
3. The US EPA recommends a default value of 0.22 lb CH_4/BOD5.
4. The US EPA recommends a default value of 15% for the fraction anaerobically digested for domestic wastewater.

Where:

BOD5	Biological oxygen demand using a standard 5 day test	
CH_4	Methane	
CO_2	Carbon dioxide	
CO_2E	Carbon dioxide equivalent	
GWP	Global warming potential	27,127.28
kW-hr	Kilowatt-hour	
lbs	Pounds	
MG	Million gallons	
MT	Metric ton	
N_2O	Nitrous oxide	
yr	Year	

Comparison of CAPCOA Greenhouse Gas Policies with One Valley One Vision

COMPARISON OF CAPCOA GREENHOUSE GAS MODEL POLICIES WITH ONE VALLEY ONE VISION:

KEY:

Boxes in RED = OVOV has similar policy language as strong as CAPCOA language.
Boxes in BLUE = OVOV has no similar policy but the City is currently implementing a similar policy or OVOV includes similar language in the body but has no similar policy.
Boxes in GREEN = OVOV has similar policy language with "should" or "encourage" based policies.
Boxes in PURPLE = OVOV has no similar language but an explanation or information has been provided.
Boxes in WHITE = OVOV has no similar language or policy.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
GHG-1 **pg. 70**	**Objective GHG-1:** By 2020, the City/County will reduce greenhouse gas emissions from within its boundaries to a level 30% less than the level that would otherwise occur if all activities continued under a "business as usual" scenario[1].	**CO 8.1** **pg. CO-92** **(Con/OS 8/09)**	**Objective CO 8.1:** Comply with the requirements of State law, including AB 32, SB 375 and implementing regulations, to reach targeted reductions of greenhouse gas (GHG) emissions.
GHG-1.1 & 1.2 **pg. 70**	**GHG-1.1 Emission Inventories:** The City/County will establish GHG emissions inventories including emissions from all sectors within the City/County, using methods approved by, or consistent with guidance from, the ARB; the City/County will update inventories every 3 years to incorporate improved methods, better data, and more accurate tools and methods, and to assess progress. **GHG-1.2 Climate Action Plans:** The City/County will establish plans to reduce or encourage reductions in GHG emissions from all sectors within the City/County.[2]	**CO 8.1.1** **pg. CO-92** **(Con/OS 8/09)**	**Policy CO 8.1.1:** Create and adopt a Climate Action Plan within 18 months of the OVOV adoption date that meets State requirements and includes the following components:
GHG-1.1.1 **pg. 70**	**1.1.1** The City/County will establish a baseline inventory of GHG emissions including municipal emissions, and emissions from all business sectors and the community.	***None***	*OVOV has no similar language, however establishing a GHG inventory is implied as part of the CAP process described in CO 8.1.1.*
GHG-1.1.2 **pg. 70**	**1.1.2** The City/county will define a "business as usual" scenario of municipal, economic, and community activities, and prepare a projected inventory for 2020 based on that scenario.	***None***	*OVOV has no similar language, however establishing a baseline is implied as part of the CAP process described in CO 8.1.1.*

[1] Note that the goal is not to reduce GHG emissions by 30% from the base year but at some time in the future - "if all activities continued under a 'business as usual' scenario." The CAPCOA provides two different alternatives for this goal. GHG 1.1A and 1.2A are below.
[2] The CAPCOA plan under GHG1.2 seems to define a need for three distinct elements of the CAP – a municipal, business and community plan.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
GHG-1.2.1 pg. 70	**1.2.1** The City/County will establish a Municipal Climate Action Plan which will include measures to reduce GHG emissions from municipal activities by at least 30% by 2020 compared to the "business as usual" municipal emissions.	**CO 8.1.1.a pg. CO-92 (Con/OS 8/09)**	a. Plans and programs to reduce GHG emissions to State-mandated targets, including enforceable reduction measures
GHG-1.2.2 pg. 70	**1.2.2** The City/County will, in collaboration with the business community, establish a Business Climate Action Plan, which will include measures to reduce GHG emissions from business activities, and which will seek to reduce emissions by at least 30% by 2020 compared to "business as usual" business emissions.	**CO 8.1.1.a pg. CO-92 (Con/OS 8/09)**	a. Plans and programs to reduce GHG emissions to State-mandated targets, including enforceable reduction measures
GHG 1.2.3 pg. 70	**1.2.3** The City/County will, in collaboration with the stakeholders from the community at large, establish a Community Climate Action Plan, which will include measures reduce GHG emissions from community activities, and which will seek to reduce emissions by at least 30% by 2020 compared to "business as usual" community emissions.	**CO 8.1.1.a pg. CO-92 (Con/OS 8/09)**	a. Plans and programs to reduce GHG emissions to State-mandated targets, including enforceable reduction measures
GHG 1.2.4 pg. 71	**1.2.4** Or: The City / County will, in collaboration with the stakeholders from the community at large, establish a CCAP, which will include measures to reduce GHG from community, municipal and business activities by at least 30% by 2020, compared to "business as usual".[3]	**CO 8.1.1.a-e pg. CO-92 (Con/OS 8/09)**	a. Plans and programs to reduce GHG emissions to State-mandated targets, including enforceable reduction measures b. Mechanisms to ensure regular review of progress towards the emission reduction targets established by the Climate Action Plan; c. Procedures for reporting on progress to officials and the public; d. Procedures for revising the plan as needed to meet GHG emissions reduction targets; e. Allocation of funding and staffing for Plan implementation;

[3] As an option to having three elements to the CAP (municipal, business and community), the CAPCOA document gives the option of having a single, all-encompassing element provided that collaboration with stakeholders occurs.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
GHG-2 **pg. 71**	**Objective GHG-2** The City/County will ensure that its local Climate Action, Land Use, Housing, and Transportation Plans are aligned with, support, and enhance any regional plans that have been developed consistent with state guidance to achieve reductions in GHG emissions.	**CO 8.1.2** **pg. CO-92** **(Con/OS 8/09)**	**Policy CO 8.1.2:** Participate in the preparation of a regional Sustainable Communities Strategy (SCS) Plan to meet regional targets for greenhouse gas emission reductions, as required by SB 375.
GHG-2.1 **pg. 71**	**GHG-2.1 Sustainable Communities Strategy/Regional Blueprint Planning:** The City/County will participate in the Sustainable Communities Strategy/Regional Blueprint Planning effort and will ensure that local plans are consistent with the Regional Plan.	**CO 8.1.2** **pg. CO-92** **(Con/OS 8/09)**	**Policy CO 8.1.2:** Participate in the preparation of a regional Sustainable Communities Strategy (SCS) Plan to meet regional targets for greenhouse gas emission reductions, as required by SB 375.
GHG-1.1A & 1.2A **pg. 71**	***GHG-1.1A Emission Inventories:*** *(Alternative form) The City/County will establish GHG emissions inventories including emissions from all sectors within the City/County, using methods approved by, or consistent with guidance from, the ARB; the City/County will update inventories every 4 years to incorporate improved methods, better data, and more accurate tools and methods, and to assess progress.* ***GHG-1.2A Climate Action Plans:*** *(Alternative form) The City/County will establish plans to reduce or encourage reductions in GHG emissions from all sectors within the City/County.*	**See CO 8.1.1 a-e above** **(Con/OS 8/09)**	See Above.
GHG-1.2.1A **pg. 71**	***1.2.1*** *The City/County will establish a Municipal Climate Action Plan which will include measures to reduce GHG emissions from municipal activities by at least 15% by 2020 compared to the baseline municipal emissions inventory (including any reductions required by ARB under AB 32).*	**See CO 8.1.1 a-e above** **(Con/OS 8/09)**	See Above.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
GHG-1.2.2A **pg. 71**	***1.2.2*** *The City/County will, in collaboration with the business community, establish a Business Climate Action Plan, which will include measures to incentivize and support reductions in GHG emissions from business activities, and which will seek to reduce emissions by at least 15% by 2020 compared to the baseline business emissions inventory (including any reductions required by ARB under AB-32).*	**See OC 8.1.1 a-e above (Con/OS 8/09)**	See Above .
GHG-1.2.3A **pg. 71**	***1.2.3*** *The City/County will, in collaboration with the stakeholders from the community at large, establish a Community Climate Action Plan, which will include measures to incentivize and support reductions in GHG emissions from community activities, and which will seek to reduce emissions by at least 15% by 2020 compared to the baseline community emissions inventory.*[4]	**See CO 8.1.1 a-e above (Con/OS 8/09)**	See Above
CAPCOA – Land Use and Urban Design		**OVOV**	
Reference	**Language**	**Reference**	**Language**
LU-1 **pg. 73**	**Objective LU-1:** The City/County will adopt and implement a development pattern that utilizes existing infrastructure; reduces the need for new roads, utilities and other public works in new growth areas; and enhances non-automobile transportation.	**LU 1.1** **pg. L-70** **(Land Use 8/09)**	**Objective LU 1.1:** Maintain an urban form for the Santa Clarita Valley that preserves an open space greenbelt around the developed portions of the Valley, protects significant resources from development, and directs growth to urbanized areas served with infrastructure.

[4] Note that there is no alternative language for 1.2.4.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-1.1 **pg. 73**	**LU-1.1 Urban Growth Boundary:** The City will establish an urban growth boundary (UBG) with related ordinances or programs to limit suburban sprawl; the City/County will restrict urban development beyond the UGB and streamline entitlement processes within the UGB for consistent projects.	**LU 1.1** **pg. L-70** **(Land Use 8/09)**	**Objective LU 1.1:** Maintain an urban form for the Santa Clarita Valley that preserves an open space greenbelt around the developed portions of the Valley, protects significant resources from development, and directs growth to urbanized areas served with infrastructure.
LU-1.1.1 **pg. 73**	**1.1.1** Urban development should occur only where urban public facilities and services exist or can be reasonably made available.	**LU 1.1** **pg. L-70** **(Land Use 8/09)**	**Objective LU 1.1:** Maintain an urban form for the Santa Clarita Valley that preserves an open space greenbelt around the developed portions of the Valley, protects significant resources from development, and directs growth to urbanized areas served with infrastructure.
LU-1.1.2 **pg. 73**	**1.1.2** The improvement and expansion of one urban public facility or service should not stimulate development that significantly precedes the City's, or other affected jurisdiction's, ability to provide all other necessary urban public facilities and services at adequate levels.	**LU 9.1** **pg. L-86** **(Land Use 8/09)**	**Objective LU 9.1:** Coordinate land use planning with provision of adequate public services and facilities to support development.
LU-1.2 **pg. 73**	**LU-1.2 Reserve Limits:** The City/County will redirect new growth into existing city/urban reserve areas.	**LU 1.1** **pg. L-70** **(Land Use 8/09)**	**Objective LU 1.1:** Maintain an urban form for the Santa Clarita Valley that preserves an open space greenbelt around the developed portions of the Valley, protects significant resources from development, and directs growth to urbanized areas served with infrastructure.
LU-1.3 **pg. 73**	**LU-1.3 Infill:** The City/County will encourage high-density, mixed-use, infill development and creative reuse of brownfield, under-utilized and/or defunct properties within the urban core.	**LU 1.1.5** **pg. L-70** **(Land Use 8/09)**	**Policy LU 1.1.5:** Promote infill development and re-use of underutilized sites within and adjacent to developed urban areas to achieve maximum benefit from existing infrastructure and minimize loss of open space, through redesignation of vacant sites for higher density or mixed uses, where appropriate.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-1.4 **pg. 73**	**LU-1.4 Urban Service Lines:** The City/County will maintain a one dwelling unit per 10 acre minimum lot size or lower density in areas outside designated urban service lines.	***None***	*OVOV has no similar policy, however the Non-Urban 1(NU 1) and Non-Urban 2 (NU 2) zones define a density of 1 unit per 10 acres and 1 unit per 20 acres respectively. These zones are proposed for the outermost, rural locations of the planning area.*[5]
LU-1.4.1 **pg. 73**	**1.4.1** Adopt an urban-rural transition zone along the urban service line to ensure that land uses within the City / County are compatible with adjacent open space and agricultural uses.		*OVOV has no similar policy, however the Non-Urban 1(NU 1) and Non-Urban 2 (NU 2) zones define a density of 1 unit per 10 acres and 1 unit per 20 acres respectively. These zones are proposed for the outermost, rural locations of the planning area.*
LU-1.5 **pg. 73**	**LU-1.5 Density:** The City/County will increase densities in urban core areas to support public transit.	**LU 5.2 & 5.2.1** **pg. L-80** **(Land Use 8/09)**[6]	**Objective LU 5.2:** Coordinate land use designations with support services and public transit in order to encourage vehicle trip reduction. **Policy LU 5.2.1:** Designate higher-density residential uses in areas served by public transit and a full range of support services.
LU-1.5.1 **pg. 73**	**1.5.1** Remove barriers to the development of accessory dwelling units in existing residential neighborhoods inside urban service lines.	**H 5.5** **pg. H-135** **(Housing 9/09)**	**H 5.5:** The City will amend the Unified Development Code to allow second dwelling units on individual residential lots with primary dwellings, provided that said lots are between 5,000 square feet and 19,999 square feet in area, subject to a conditional use permit. This action is in addition to the City's existing allowance for second dwelling units on lots of 20,000 square feet or larger, subject to an Administrative Permit.

[5] Land Use Element pp. 50-51 (Draft 8/09).
[6] OVOV defines several mixed use zones that range in density from a minimum of 6 units per acre to 50 units per acre. *The City Santa Clarita Green Team Report – Review of Policies and Programs* suggests an average density for Transit Oriented Development of 18 units per acre.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-1.6 **pg. 74**	**LU-1.6 Road Width:** The City/County will reduce required road width standards wherever feasible to calm traffic and encourage alternative modes of transportation.	**LU 2.3.5** **pg. L-75** **(Land Use 8/09)** **C 2.2.5** **pg. C-62** **(Circ 8/09)**	**Policy LU 2.3.5:** Mixed-use developments shall be designed to create a pedestrian-scale environment through appropriate street and sidewalk widths, block lengths, relationship of buildings to streets, and use of public spaces. **Policy C 2.2.5:** Adopt common standards for pavement width in consideration of capacity needs to serve projected travel demand, provided that a reduction in pavement width may be allowed in order to reduce traffic speeds, protect resources, enhance pedestrian mobility, or as otherwise deemed appropriate by the reviewing authority.
LU-1.7 **pg. 74**	**LU-1.7 Parking Spaces:** The City/County will reduce parking space requirements, unbundle parking from rents and charge for parking in new developments.	**LU 2.3.6** **pg. LU-75** **(Land Use 8/09)** **C 1.2.6 & 3.3.4** **pg. C-60, 65** **(Circ 8/09)**	**Policy LU 2.3.6:** Provide parking alternatives in mixed-use developments, including subterranean parking and structured parking to limit the amount of surface area devoted to vehicle storage. **Policy C 3.3.4:** Within transit-oriented development projects, provide incentives such as higher floor area ratio and/or lower parking requirements for commercial development that provides transit and ride-share programs. **Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate.
LU-1.8 **pg. 74**	**LU-1.8 Bicycle Facilities:** The City/County will add bicycle facilities to city streets and public spaces.	**C 1.1.6** **pg. C-59** **(Circ 8/09)**	**Policy C 1.1.6:** Provide adequate facilities, including but not limited to bicycle parking and storage, expansion of park-and-ride lots, and provision of adequate station and transfer facilities in appropriate locations.[7]

[7] Note that UDC Section 17.18.105 currently requires on-site bicycle parking for all commercial, office, industrial and multi-family uses.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-1.9 **pg. 74**	**LU-1.9 Levels of Service:** The City/County will discourage the extension of urban levels of service for new development beyond existing urban service lines, and, if necessary, use zoning to assure that development occurs only if public services are adequate.	**LU 1.1** **pg. L-70** **(Land Use 8/09)**	**Objective LU 1.1:** Maintain an urban form for the Santa Clarita Valley that preserves an open space greenbelt around the developed portions of the Valley, protects significant resources from development, and directs growth to urbanized areas served with infrastructure.
LU-2 **pg. 74**	**Objective LU-2**: Promote infill, mixed-use, and higher density development, and provide incentives to support the creation of affordable housing in mixed use zones.	**LU 1.1.5 & 3.1.5** **pg. L-70, 75** **(Land Use 8/09)**	**Policy LU 1.1.5:** Promote infill development and re-use of underutilized sites within and adjacent to developed urban areas to achieve maximum benefit from existing infrastructure and minimize loss of open space, through redesignation of vacant sites for higher density or mixed uses, where appropriate. **Policy LU 3.1.5:** Promote development of housing affordable to residents, including households with incomes in the very low, low, and moderate income classifications, through provision of adequate sites on the Land Use Map, density bonuses and other development incentives.
LU-2.1 **pg. 74**	**LU-2.1 Mixed-Use Development:** The City/County will plan for and create incentives for mixed-use development.	**LU 1.1.5** **pg. L-70** **(Land Use 8/09)**	**Policy LU 1.1.5:** Increase infill development and re-use of underutilized sites within and adjacent to developed urban areas to achieve maximum benefit from existing infrastructure and minimize loss of open space, through redesignation of vacant sites for higher density and mixed uses, where appropriate.[8]
LU-2.1.1 **pg. 74**	**2.1.1** The City/County will identify sites suitable for mixed-use development within an existing urban service line and will establish appropriate site specific standards to accommodate the mixed uses.	**LU 2.3** **pg. L-74** **(Land Use 8/09)**	**Objective LU 2.3:** Increase mixed-use development to create more livable neighborhoods, walkable business districts, and to reduce vehicle trips, while ensuring land use compatibility through mixed use zoning[9]

[8] Mixed use development under OVOV provides a variety of incentives. For example, the Mixed Use Urban Village Zone's minimum density is 19 units per acre and maximum density is 50 units per acre. This maximum density is 20 units per acre higher than the most dense residential zone, Urban Residential 5.
[9] A description of ideal locations for each mixed use zone is included in the body of the Land Use Element, pages L-57 and 58.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-2.1.1.1 pg. 74	**2.1.1.1** Increasing allowable building height or allowing height limit bonuses;	***None***	*OVOV has no similar policy, however both the Mixed Use Corridor and Mixed Use Urban Village zones have no maximum height. A maximum height of 50 feet has been established for the Mixed Use Neighborhood zone which is comparable with the Community Commercial (50 ft.) and Regional Commercial (55 ft.) zones and exceeds the Neighborhood Commercial (35 ft.) zone.*[10]
LU-2.1.1.2 pg. 74	**2.1.1.2** Allowing flexibility in applying development standards (such as FAR and lot coverage) based on the location, type, and size of the units, and the design of the development;	***None***	*OVOV has no similar policy, however the maximum floor area ratio allowed in a Mixed Use zone is 3.0. This exceeds the Regional Commercial and Business Park zone maximum floor area ratios of 2.0.*[11]
LU-2.1.1.3 pg. 74	**2.1.1.3** Allowing the residential component to be additive rather than within the established FAR for that zone, and eliminating maximum density requirements for residential uses in mixed use zones;	**LU 2.3.1 pg. L-75 (Land Use 8/09)**	**Policy LU 2.3.1:** In a mixed-use development, residential densities at the higher end of the allowed range should be allowed only if the development incorporates a robust mix of non-residential uses. *The residential density in MX districts shall range from a minimum of six (6) to a maximum of fifty (50) dwelling units per acre, and the maximum floor area ratio (FAR) for non-residential uses shall range from .5 to 3.0, depending on the location of the mixed-use project*[12]
LU-2.1.1.4 pg. 74	**2.1.1.4** Allowing reduced and shared parking based on the use mix, and establishing parking maximums where sites are located within 0.25 miles of a public transit stop;	**C 1.2.6 pg. C-60 (Circ 8/09)**	**Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate.
LU-2.1.1.5 pg. 74	**2.1.1.5** Allowing for tandem parking, shared parking and off-site parking leases;	**C 1.2.6 pg. C-60 (Circ 8/09)**	**Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate.

[10] Land Use Element pp. 57-60 (draft 8/09).
[11] Land Use Element pp. 57-61 (draft 8/09).
[12] Land Use Element pg. 58 (draft 8/09).

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-2.1.1.6 pg. 75	**2.1.1.6** Requiring all property owners in mixed-use areas to unbundle parking from commercial and residential leases;	**C 1.2.6 pg. C-60 (Circ 8/09)**	**Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate.
LU-2.1.1.7 pg. 75	**2.1.1.7** Creating parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities;	**NEW LU POLICY**	**NEW LAND USE ELEMENT POLICY:** Create parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities wherever feasible.;
LU-2.1.1.8 pg. 75	**2.1.1.8** Establishing performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times.	**NEW LU POLICY**	**NEW LAND USE ELEMENT POLICY:** Establish performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times wherever feasible.
LU-2.1.2 pg. 75	**2.1.2** The City/County will seek funding to prepare specific plans and related environmental documents to facilitate mixed-use development at selected sites, and to allow these areas to serve as receiver sites for transfer of development rights away from environmentally sensitive lands and rural areas outside established urban growth boundaries.	***None***	*OVOV has no similar language.*
LU-2.1.3 pg. 75	**2.1.3** The City/County will enable prototype mixed-use structures for use in neighborhood center zones that can be adapted to new uses over time with minimal internal remodeling.	***None***	*OVOV has no similar language.*
LU-2.1.4 pg. 75	**2.1.4** The City/County will identify and facilitate the inclusion of complementary land uses not already present in local zoning districts, such as supermarkets, parks and recreational fields, schools in neighborhoods, and residential uses in business districts, to reduce the vehicle miles traveled and promote bicycling and walking to these uses.	**LU 2.3 pg. L-74 (Land Use 8/09)**	**Objective LU 2.3:** Provide mixed-use development where appropriate to create more livable neighborhoods, walkable business districts, and to reduce vehicle trips, while ensuring land use compatibility.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-2.1.5 **pg. 75**	**2.1.5** The City/County will work with employers developing larger projects to ensure local housing opportunities for their employees, and engage employers to find ways to provide housing assistance as part of their employee benefits packages; major projects in mixed-use areas should include work-force housing where feasible.	***None***	*OVOV has no similar language.*
LU-2.1.6 **pg. 75**	**2.1.6** The City/County will revise zoning ordinance(s) to allow local-serving businesses, such as childcare centers, restaurants, banks, family medical offices, drug stores, and other similar services near employment centers to minimize midday vehicle use.	**LU 2.3 & 4.5.4** **pg. L-74, 81 (Land Use 8/09)**	**Objective LU 2.3:** Provide mixed-use development where appropriate to create more livable neighborhoods, walkable business districts, and to reduce vehicle trips, while ensuring land use compatibility **Policy LU 4.5.4:** Encourage the provision of support services for employees within business park areas, such as dining and personal services where appropriate, to reduce vehicle trips and promote pedestrian-friendly work environments.
LU-2.1.7 **pg. 76**	**2.1.7** The City / County will develop form-based community design standards to be applied to development projects and land use plans, using a comprehensive community outreach, for areas designated mixed-use	**LU 1.2.1** **pg. L-72 (Land Use 8/09)**	**Policy LU 1.2.1:** In Newhall, provide opportunities for new business and housing by implementing the Downtown Newhall Specific Plan, provide incentives to promote infill development and re-use of underutilized sites, and continue to plan for the future development of North Newhall.
LU-2.1.8 **pg. 76**	**2.1.8** Mix affordable housing units with market rate units as opposed to building segregated affordable housing developments.	**LU 3.1.2** **pg. L-75 (Land Use 8/09)**	**Policy LU 3.1.2:** Provide a mix of housing types within neighborhoods that accommodate households with varied income levels.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-3 **pg. 76**	**Objective LU-3**: Promote greater linkage between land uses and transit, as well as other modes of transportation.	**LU 5.2** **pg. L-80** **(Land Use 8/09)** **C 1.2.1** **pg. 59** **(Circ 8/09)**	**Objective LU 5.2:** Coordinate land use designations with support services and public transit in order to encourage vehicle trip reduction. **Policy C 1.2.1:** Develop coordinated plans for land use, circulation, and transit to promote transit-oriented development that concentrates higher density housing, employment, and commercial areas in proximity to transit corridors.
LU-3.1 **pg. 76**	**LU-3.1 Transit-Supportive Density:** The City/County will implement a Housing Overlay Zone for transit centers and corridors. This shall include average minimum residential densities of 25 units per acre within one quarter mile of transit centers; average minimum densities of 15 units per acre within one quarter mile of transit corridors; and minimum FAR of 0.5:1 for nonresidential uses within a quarter mile of transit centers or corridors.	***None***	*OVOV has no similar policy, however OVOV defines several mixed use zones that range in density from a minimum of 6 units per acre to 50 units per acre. Also, OVOV defines a range of FAR's allowed in Mixed Use zones between .5 and 3.0.*[13]
LU-3.2 **pg. 76**	**LU-3.2 Transit-Oriented Development:** The City/County will identify transit centers appropriate for mixed-use development, and will promote transit oriented, mixed use development within these targeted areas	**LU 2.3** **pg. L-74** **(Land Use 8/09)**	**Objective LU 2.3:** Provide mixed-use development where appropriate to create more livable neighborhoods, walkable business districts, and to reduce vehicle trips, while ensuring land use compatibility[14]

[13] Land Use Element pp. L-57-60 (draft 8/09).
[14] A description of ideal locations for each mixed use zone are included in the body of the Land Use Element, pages L-57 and 58.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-3.2.1 **pg. 76**	**3.2.1** Amending the Development Code to encourage mixed-use development within one-half mile of intermodal hubs and future rail stations; to offer flexible standards for affordable housing; and to establish minimum residential densities and non-residential FAR	**LU 5.2** **pg. L-80** **(Land Use 8/09)** **C 1.2.1** **pg. 59** **(Circ 8/09)**	**Objective LU 5.2:** Coordinate land use designations with support services and public transit in order to encourage vehicle trip reduction. **Policy C 1.2.1:** Develop coordinated plans for land use, circulation, and transit to promote transit-oriented development that concentrates higher density housing, employment, and commercial areas in proximity to transit corridors.
LU-3.2.2 **pg. 76**	**3.2.2** Rezoning commercial properties to residential and/or mixed-use where appropriate;	***None***	*OVOV has no similar policy, however the draft Land Use Map include in OVOV illustrates areas that have been rezoned pursuant to LU-3.2.2.*
LU-3.2.3 **pg. 76**	**3.2.3** Providing expanded zoning for multi-family housing;	**H 1** **pg.H-121** **(Housing 9/2009)**	**Objective H1:** Provide adequate sites at a range of densities to accommodate future housing needs.
LU-3.2.4 **pg. 76**	**3.2.4** Providing maximum parking standards and flexible building height limitations;	**C 1.2.6** **pg. C-60** **(Circ 8/09)**	**Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate. *Both the Mixed Use Corridor and Mixed Use Urban Village zones have no maximum height. A maximum height of 50 feet (permitted by right) has been established for the Mixed Use Neighborhood zone which is comparable with the Community Commercial (50 ft.) and Regional Commercial (55 ft.) zones and exceeds the Neighborhood Commercial (35 ft.) zone. These heights can be exceeded with a conditional use permit.*[15]

[15] Land Use Element pp. 57-60 (draft 8/09).

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-3.2.5 pg. 76	**3.2.5** Providing density bonus programs;	**LU 3.1.5 pg. L-75 (Land Use 8/09)**	**Policy LU 3.1.5:** Provide adequate sites on the Land Use Map, density bonuses and other development incentives,.
LU-3.2.6 pg. 76	**3.2.6** Establishing guidelines for private and public spaces;	***Land Use Element***	*OVOV has established numerous requirements and guidelines for the development of public and private spaces. These are described in detail in the draft Land Use Element.*
LU-3.2.7 pg. 76	**3.2.7** Providing incentives for redevelopment of underutilized areas, such as surface parking lots;	**LU 1.1.5 pg. L-70 (Land Use 8/09)**	**Policy LU 1.1.5:** Increase infill development and re-use of underutilized sites within and adjacent to developed urban areas to achieve maximum benefit from existing infrastructure and minimize loss of open space, through redesignation of vacant sites for higher density or mixed uses, where appropriate.
LU-3.2.8 pg. 76	**3.2.8** Establishing a minimum pedestrian and bicycle connectivity standard;	**LU 5.1.2 pg. L-80 (Land Use 8/09)**	**Policy LU 5.1.2:** Require connectivity between walkways and bikeways serving neighborhoods and nearby commercial areas, schools, parks, and other supporting services and facilities.
LU-3.2.9 pg. 76	**3.2.9** Creating parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities;	**NEW CIRC POLICY**	**NEW CIRC ELEMENT POLICY:** Create parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities wherever feasible.
LU-3.2.10 pg. 77	**3.2.10** Establishing performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times;	***None***	*OVOV has no similar language.*
LU-3.2.11 pg. 77	**3.2.11** Discouraging auto-oriented development.	**C 1 pg. C-58 (Circ 8/09)**	**Goal C 1:** An inter-connected network of circulation facilities that integrates all travel modes, provides viable alternatives to automobile use, and conforms with regional plans

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Reference	**Language**	**Reference**	**Language**
LU-3.3 **pg. 77**	**LU-3.3 Transit-oriented Brownfield Development:** The City/County will promote the development of brownfield sites and other underused or defunct properties near existing public transportation.	**LU 1.2.7** **pg. L-71** **(Land Use 8/09)**	**Policy LU 1.2.7:** On the Whittaker-Bermite site, continue to work with the property owner to facilitate master planning, remediation, and the economic re-use of the property to include roadway infrastructure and transit-oriented development around the Metrolink station.
LU-3.4 **pg. 77**	**LU-3.4 Public Transit Development Focus:** The City/County will ensure new development is designed to make public transit a viable choice for residents, including:	**C 1.1.1** **pg. C-58** **(Circ 8/09)**	**Policy C 1.1.1:** Reduce dependence on the automobile, particularly single-occupancy vehicle use, by providing safe and convenient access to transit, bikeways, and walkways.
LU-3.4.1 **pg. 77**	**3.4.1** Locating medium-high density development near activity centers that can be served efficiently by public transit and alternative transportation modes;	**LU 5.2.1** **pg. L-80** **(Land Use 8/09)**	**Policy LU 5.2.1:** Designate higher-density residential uses in areas served by public transit and a full range of support services.
LU-3.4.2 **pg. 77**	**3.4.2** Locating medium-high density development near streets served by public transit whenever feasible;	**LU 5.2.1** **pg. L-80** **(Land Use 8/09)**	**Policy LU 5.2.1:** Designate higher-density residential uses in areas served by public transit and a full range of support services.
LU-3.4.3 **pg. 77**	**3.4.3** Linking neighborhoods to bus stops by continuous sidewalks or pedestrian paths.	**C 1.2.2** **pg. C-58** **(Circ 8/09)**	**Policy C 1.2.2:** Create walkable communities, with paseos and walkways connecting residential neighborhoods to multi-modal transportation services such as bus stops and rail stations.
LU-3.5 **pg. 77**	**LU-3.5 City-centered Corridors:** The City/County will establish city-centered corridors, directing development to existing transportation corridors.	**LU 1.1 & 4.1.3** **pp. L-70 & 77** **(Land Use 8/09)**	**Objective LU 1.1:** Maintain an urban form for the Santa Clarita Valley that preserves an open space greenbelt around the developed portions of the Valley, protects significant resources from development, and directs growth to urbanized areas served with infrastructure. **Policy LU 4.1.3:** Direct business creation and expansion for larger companies within and adjacent to existing and planned business centers and major transportation corridors

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-3.6 **pg. 77**	**LU-3.6 Transit-oriented Development Design Standards:** The City / County will develop form-based community design standards to be applied to development projects and land use plans, using a comprehensive community outreach program, for areas designated mixed-use	**LU 1.2.1** **pg. L-72** **(Land Use 8/09)**	**Policy LU 1.2.1:** In Newhall, provide opportunities for new business and housing by implementing the Downtown Newhall Specific Plan, provide incentives to promote infill development and re-use of underutilized sites, and continue to plan for the future development of North Newhall.
LU-3.7 **pg. 77**	**LU-3.7 Affordable Housing:** Affordable housing will be located in transit-oriented development whenever feasible.	**C 1.2.1** **pg. C-59** **(Circ 8/09)**	**Policy C 1.2.1:** Develop coordinated plans for land use, circulation, and transit to promote transit-oriented development that concentrates higher density housing, employment, and commercial areas in proximity to transit corridors.
			Mixed residential densities will be allowed, to permit housing alternatives at all income levels and age preferences in proximity to transit jobs, and services. Through design of the Land Use Map in consideration of circulation patterns and needs, this General Plan will result in projected traffic impacts that are less significant than the previous General Plan, which was largely based on the separation of land uses.[16]
LU-4 **pg. 77**	**Objective LU-4:** Promote development and preservation of neighborhood characteristics that encourage walking and bicycle riding in lieu of automobile-based travel.	**LU 5.1.2** **pg. L-80** **(Land Use 8/09)**	**Policy LU 5.1.2:** Require connectivity between walkways and bikeways serving neighborhoods and nearby commercial areas, schools, parks, and other supporting services and facilities.

[16] Land Use Element, p. L-3 (draft 8/09).

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-4.1 **pg. 77**	**LU-4.1 Pedestrian-oriented Character:** The City/County will create and preserve distinct, identifiable neighborhoods whose characteristics support pedestrian travel, especially within, but not limited to, mixed-use and transit-oriented development areas,	**LU 1.2, 2.1.3 & 5.1** **pg. L-71, 74 & 80** **(Land Use 8/09)**	**Objective LU 1.2:** Maintain the distinctive community character of villages and neighborhoods throughout the planning area by establishing uses, densities, and design guidelines appropriate to the particular needs and goals of each area **Policy LU 2.1.3:** Provide a range of land use types and densities to reflect the special characteristics, lifestyles, and opportunities that differentiate various communities and villages in the Santa Clarita Valley, including urban, suburban, and rural living environments. **Objective LU 5.1:** Provide for alternative travel modes linking neighborhoods, commercial districts, and job centers.
LU-4.1.1 **pg. 78**	**4.1.1** Designing or maintaining neighborhoods where the neighborhood center can be reached in approximately five minutes of walking;	***None***	*OVOV has no similar language, however neighborhood design is outlined in the Land Use Element in the description of Urban Residential zones.*[17]
LU-4.1.2 **pg. 78**	**4.1.2** Increasing housing densities from the perimeter to the center of the neighborhood;	***None***	*OVOV has no similar policy, however the proposed Land Use Map calls for greater central densities.*
LU-4.1.3 **pg. 78**	**4.1.3** Directing retail, commercial, and office space to the center of the neighborhood;	***None***	*OVOV has no similar policy, however the proposed Land Use Map calls for greater central densities.*
LU-4.1.4 **pg. 78**	**4.1.4** Encouraging pedestrian-only streets and/or plazas within developments, and destinations that may be reached conveniently by public transportation, walking, or bicycling;	**C 1.2.2, 1.2.3 & 7.1.7** **pg. C-59 & 70** **(Circ 8/09)**	**Policy C 1.2.2:** Create walkable communities, with paseos and walkways connecting residential neighborhoods to multi-modal transportation services such as bus stops and rail stations. **Policy C 1.2.3:** Require that new commercial and industrial development provide walkway connections to public sidewalks and transit stops, where available. **Policy C 7.1.7:** Use pedestrian-oriented scale and design features in areas intended for pedestrian use.

[17] Land Use Element pp. L-53 to L-55.

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Reference	**Language**	**Reference**	**Language**
LU-4.1.5 **pg. 78**	**4.1.5** Allowing flexible parking strategies in neighborhood activity centers to foster a pedestrian-oriented streetscape;	**C 1.2.6** **pg. C-60** **(Circ 8/09)**	**Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate.
LU-4.1.6 **pg. 78**	**4.1.6** Providing continuous sidewalks with shade trees and landscape strips to separate pedestrians from traffic;	**LU 3.4.9** **pg. L-77** **(Land Use 8/09)**	**Policy LU 3.4.9:** Encourage street cross-sections that locate landscaped parkways between the curb and the sidewalk to create a visually pleasing streetscape and provide pedestrian protection.
LU-4.1.7 **pg. 78**	**4.1.7** Encouraging neighborhood parks and recreational centers near concentrations of residential areas (preferably within one quarter mile) and include pedestrian walkways and bicycle paths that encourage nonmotorized travel.	**LU 5.1.2** **pg. L-80** **(Land Use 8/09)**	**Policy LU 5.1.2:** Require connectivity between walkways and bikeways serving neighborhoods and nearby commercial areas, schools, parks, and other supporting services and facilities.
LU-4.2 **pg. 78**	**LU-4.2 Pedestrian Access:** The City/County will ensure pedestrian access to activities and services, especially within, but not limited to, mixed-use and transit-oriented development areas,	**LU 5.1.2 & 7.1.7** **pg. L-70, 80** **(Land Use 8/09)**	**Policy LU 5.1.2:** Require connectivity between walkways and bikeways serving neighborhoods and nearby commercial areas, schools, parks, and other supporting services and facilities. **Policy C 7.1.7:** Use pedestrian-oriented scale and design features in areas intended for pedestrian use.

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Reference	**Language**	**Reference**	**Language**
LU-4.2.1 **pg. 78**	**4.2.1** Ensuring new development that provides pedestrian connections in as many locations as possible to adjacent development, arterial streets, thoroughfares;	**C 1.2.2, 1.2.3, 1.2.5 & 1.2.7** **pg. C-59, 60** **(Circ 8/09)**	**Policy C 1.2.2:** Create walkable communities, with paseos and walkways connecting residential neighborhoods to multi-modal transportation services such as bus stops and rail stations. **Policy C 1.2.3:** Require that new commercial and industrial development provide walkway connections to public sidewalks and transit stops, where available. **Policy C 1.2.7:** In pedestrian-oriented areas, provide a highly connected circulation grid with relatively small blocks to encourage walking. **Policy C 1.2.5:** In mixed use projects, require compact development and mixed uses to locate housing, workplaces, and services within walking or bicycling distance of each other.
LU-4.2.2 **pg. 78**	**4.2.2** Ensuring a balanced mix of housing, workplaces, shopping, recreational opportunities, and institutional uses, including mixed-use structures;	**LU 2.1.2** **pg. L-74** **(Land Use 8/09)**	**Policy LU 2.1.2:** On the Land Use Map, integrate land use designations in a manner that promotes healthy, walkable communities, by providing an appropriate mix of residential and service uses in proximity to one another.
LU-4.2.3 **pg. 78**	**4.2.3** Locating schools in neighborhoods, within safe and easy walking distances of residences served;	**LU 5.1.2** **pg. L-80** **(Land Use 8/09)**	**Policy LU 5.1.2:** Require connectivity between walkways and bikeways serving neighborhoods and nearby commercial areas, schools, parks, and other supporting services and facilities.
LU-4.2.4 **pg. 78**	**4.2.4** For new development, primary entrances shall be pedestrian entrances, with automobile entrances and parking located to the rear;	**C 3.3.6** **pg. C-65** **(Circ 8/09)**	**Policy C 3.3.6:** In the development review process, prioritize direct pedestrian access between building entrances, sidewalks and transit stops, by placing parking behind buildings where possible, to the sides of buildings when necessary, and always away from street intersections.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-4.2.5 **pg. 78**	**4.2.5** Support development where automobile access to buildings does not impede pedestrian access, by consolidating driveways between buildings or developing alley access;	**C 7.1.5** **pg. C-70** **(Circ 8/09)**	**Policy C 7.1.5:** In new commercial development, provide for direct, clearly delineated, and preferably landscaped pedestrian walkways from transit stops and parking areas to building entries, and avoid placement of uses (such as drive-through facilities) in locations that would obstruct pedestrian pathways.
LU-4.2.6 **pg. 79**	**4.2.6** Street parking provided shall be utilized as a buffer between sidewalk pedestrian traffic and the automobile portion of the roadway;	**C 2.2.6** **pg. C-70** **(Circ 8/09)**	**Policy C 2.2.6:** Within residential neighborhoods, promote the design of "healthy streets" which may include reduced pavement width, shorter block length, provision of on-street parking, traffic-calming devices, bike routes and pedestrian connectivity, landscaped parkways, and canopy street trees.
LU-4.2.7 **pg. 79**	**4.2.7** Establish pedestrian and bicycle connectivity standards for new development, with block sizes between 1 and 2 acres;	**C 1.2.2** **pg. C-59** **(Circ 8/09)**	**Policy C 1.2.2:** Create walkable communities, with paseos and walkways connecting residential neighborhoods to multi-modal transportation services such as bus stops and rail stations.
LU-4.2.8 **pg. 79**	**4.2.8** For existing areas that do not meet established connectivity standards, prioritize the physical development of pedestrian connectors;	**C 7.1.2** **pg. C-75** **(Circ 8/09)**	**Policy C 7.1.2:** For existing walled subdivisions, extend pedestrian access to connect these neighborhoods to transit and services through public education and by facilitating retrofitted improvements where feasible.
LU-4.2.9 **pg. 79**	**4.2.9** Prioritizing grade-separated bicycle / pedestrian crossings where appropriate to enhance connectivity or overcome barriers such as freeways, railways and waterways.	**C 1.1.12** pg. C-60 (Circ 8/09)	**Policy C 1.1.12:** Implement recommendations of the City's Non-Motorized Transportation Plan to expand opportunities for alternative travel modes.
LU-5 **pg. 79**	**Objective LU-5:** Review fee structures and other opportunities to provide financial and administrative incentives to support desired land uses, development patterns, and alternative modes of transportation.	**NEW LU POLICY**	**NEW LAND USE ELEMENT POLICY:** Evaluate fee schedules on an ongoing basis to determine fee incentives to attract development
LU-5.1 **pg. 79**	**LU-5.1 Developer Fees:** The City/County will promote desired land uses by scaling developer fees based on desired criteria	***None***	*OVOV has no similar language.*

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Reference	**Language**	**Reference**	**Language**
LU-5.1.1 **pg. 79**	**5.1.1** Increasing or reducing fees proportionally with distance from the city center or preferred transit sites;	***None***	*OVOV has no similar language.*
LU-5.1.2 **pg. 79**	**5.1.2** Increasing or reducing fees based on the degree to which mixed uses are incorporated into the project;	**None**	*OVOV has no similar language.*
LU-5.1.3 **pg. 79**	**5.1.3** Reducing fees for creative re-use of brownfield sites;	***None***	*OVOV has no similar language.*
LU-5.1.4 **pg. 79**	**5.1.4** Increasing fees for the use of greenfield sites.	***None***	*OVOV has no similar language.*
LU-5.2 **pg. 79**	**LU-5.2 Administrative Fees and Streamlining:** The City/County will provide fast-track permitting and reductions in processing fees for desired projects. The City/County will research and implement a program of incentives for development projects that are fully consistent with the Sustainable Communities Strategy / Regional Plan.	***None***	*OVOV has no similar language.*
LU-5.3 **pg. 79**	**LU-5.3 Incentives and Loans:** The City/County will provide incentive funding and/or infrastructure loans to support desired projects.	***None***	*OVOV has no similar language.*
LU-5.4 **pg. 79**	**LU-5.4 Infrastructure Preference:** The City/County will give preference for infrastructure improvements that support or enhance desired land uses and projects.	***None***	*OVOV has no similar language.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-6 **pg. 79**	**Objective LU-6:** The City/County will mitigate climate change by decreasing heat gain from pavement and other hard surfaces associated with infrastructure.	**LU 7.1.1** **pg. L-99** **(Land Use 8/09)** **CO 3.1.8 & 8.1.3.d** **pg. CO-95, 106** **(Con/OS 8/09)**	**Policy LU 7.1.1:** Require shade trees within parking lots and adjacent to buildings to reduce the heat island effect, in consideration of Fire Department fuel modification restrictions. **Policy CO 3.1.8:** On development sites, require tree planting to provide habitat and shade to reduce the heat island effect caused by pavement and buildings. d. Encourage mitigation of the "heat island" effect through use of cool roofs, light-colored paving, and shading to reduce energy consumption for air conditioning.
LU-6.1 **pg. 80**	**LU-6.1 Hardscape Heat Gain:** The City/County will reduce heat gain from pavement and other hardscaping,	**LU 7.1.1** **pg. L-99** **(Land Use 8/09)** **CO 3.1.8 & 8.1.3.d** **pg. CO-95, 106** **(Con/OS 8/09)**	**Policy LU 7.1.1:** Require shade trees within parking lots and adjacent to buildings to reduce the heat island effect, in consideration of Fire Department fuel modification restrictions. **Policy CO 3.1.8:** On development sites, require tree planting to provide habitat and shade to reduce the heat island effect caused by pavement and buildings. d. Encourage mitigation of the "heat island" effect through use of cool roofs, light-colored paving, and shading to reduce energy consumption for air conditioning.
LU-6.1.1 **pg. 80**	**6.1.1** Reduce street rights-of-way and pavement widths to pre-World War II widths (typically 22 to 34 feet for local streets, and 30 to 35 feet for collector streets, curb to curb), unless landscape medians or parkway strips are allowed in the center of roadways;	**None**	*OVOV has no similar language. Local emergency services have been resistant to allowing a policy similar to LU 6.1.1.*
LU-6.1.2 **pg. 80**	**6.1.2** Reinstate the use of parkway strips to allow shading of streets by trees;	**CO 3.5.1 pg. CO-97** **(Con/OS 8/09)**	**Policy CO 3.5.1:** Continue to plant and maintain trees on public lands and within the public right-of-way to provide shade and walkable streets, incorporating measures to ensure that roots have access to oxygen at tree maturity, such as use of porous concrete.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
LU-6.1.3 pg. 80	**6.1.3** Include shade trees on south- and west-facing sides of structures;	**CO 8.3.6 pg. CO-108 (Con/OS 8/09)**	**Policy CO 8.3.6:** Require new development to use passive solar heating and cooling techniques in building design and construction, which may include but are not be limited to building orientation, clerestory windows, skylights, placement and type of windows, overhangs to shade doors and windows, and use of light colored roofs, shade trees and paving materials.
LU-6.1.4 pg. 80	**6.1.4** Include low-water landscaping in place of hardscaping around transportation infrastructure and in parking areas;	**CO 4.1.3 pg. CO-87 (Con/OS 8/09)**	**Policy CO 4.1.3:** Require low water use landscaping in new residential subdivisions and other private development projects, including a reduction in the amount of turf-grass.
LU-6.1.5 pg. 80	**6.1.5** Install cool roofs, green roofs, and use cool paving for pathways, parking, and other roadway surfaces;	**CO 8.1.3.d pg. CO-106 (Con/OS 8/09)**	d. Require mitigation of the "heat island" effect through use of cool roofs, light-colored paving, and shading to reduce energy consumption for air conditioning.
LU-6.1.6 pg. 80	**6.1.6** Establish standards that provide for pervious pavement options;	**CO 4.3 pg. CO-100 (Con/OS 8/09)**	**Objective CO 4.3:** Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, and managing stormwater runoff at the source.
LU-6.1.7 pg. 80	**6.1.7** Remove obstacles to xeriscaping, edible landscaping and low-water landscaping.	**None**	*OVOV has no similar language.*
CAPCOA – Transportation Policies		**OVOV**	
Reference	**Language**	**Reference**	**Language**
TR-1 pg. 81	**Objective TR-1:** The City/County will reduce VMT-related emissions by encouraging the use of public transit through adoption of new development standards that will require improvements to the transit system and infrastructure, increase safety and accessibility, and provide other incentives.	**CO 8.1 pg. CO-92 (Con/OS 8/09)**	**Objective CO 8.1:** Comply with the requirements of State law, including AB 32, SB 375 and implementing regulations, to reach targeted reductions of greenhouse gas (GHG) emissions.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-1.1 **pg. 81**	**TR-1.1 Transportation Planning:** The City/County will ensure that new developments incorporate both local and regional transit measures into the project design that promote the use of alternative modes of transportation.	**C 1.1.12** **pg. C-60** **(Circ 8/09)**	**Policy C 1.1.12:** Implement recommendations of the City's Non-Motorized Transportation Plan to expand opportunities for alternative travel modes.
TR-1.1.1 **pg. 81**	**TR-1.1.1 Project Selection:** The City / County shall give priority to transportation projects that will contribute to a reduction in vehicle miles traveled per capita, while maintaining economic vitality and sustainability.	***None***	*OVOV has no similar policy. Refer to the Highway Plan Map. OVOV does not call for any new roads in the rural areas. Some roads are actually scheduled for removal.*
TR-1.1.2 **pg. 81**	**TR-1.1.2 Equal Pedestrian Access:** The City / County shall include sidewalks, separated sidewalks whenever possible, on both sides of all new street improvement projects, except where there are severe topographic or natural resource constraints.	***None***	*OVOV has no similar policy, however all but two of the standard roadway cross sections (excluding Rural Major and Rural Secondary Highway) included in the draft Circulation element require a sidewalk*[18].
TR-1.1.3 **pg. 81**	**TR-1.1.3 Public Involvement:** Carry out a comprehensive public involvement and input process that provides information about transportation issues, projects, and processes to community members and other stakeholders, especially to those traditionally underserved by transportation services.	**None**	*OVOV has no similar language, however the City's Traffic, CIP and Transit Divisions regularly engage the public on all transportation and circulation improvement projects.*
TR-1.2 **pg. 81**	**TR-1.2 System Interconnectivity:** The City/County will create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, carsharing, bicycling and walking.	**C 1** **pg. C-58** **(Circ 8/09)**	**Goal C 1:** An inter-connected network of circulation facilities that integrates all travel modes, provides viable alternatives to automobile use, and conforms to regional plans.

[18] Circulation Element pp. C-28 to C-34 (draft 8/09).

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-1.2.1 **pg. 81**	**1.2.1** Ensure transportation centers are multi-modal to allow transportation modes to intersect	**C 1.1.6** **pg. C-59** **(Circ 8/09)**	**Policy C 1.1.6:** Ensure multi-modal travel through provision of adequate facilities, including but not limited to bicycle parking and storage, expansion of park-and-ride lots, and provision of adequate station and transfer facilities in appropriate locations.
TR-1.2.2 **pg. 81**	**1.2.2** Provide adequate and affordable public transportation choices, including expanded bus routes and service, as well as other transit choices such as shuttles, light rail, and rail;	**C 1.1.1** **pg. C-59** **(Circ 8/09)**	**Policy C 1.1.1:** Reduce dependence on the automobile, particularly single-occupancy vehicle use, by providing safe and convenient access to transit, bikeways, and walkways.
TR-1.2.3 **pg. 81**	**1.2.3** To the extent feasible, extend service and hours of operation to underserved arterials and population centers or destinations such as colleges;	***None***	*OVOV has no similar language, however existing local bus service operates generally from as early as 5 AM to as late as 11 PM. The City is constantly evaluating demand and making adjustments to service provision.*[19]
TR-1.2.3A **pg. 82**	**1.2.3A** Focus transit resources on high-volume corridors and high-boarding destinations such as colleges, employment centers and regional destinations;	**C 5.3.1** **pg. C-68** **(Circ 8/09)**	**Policy C 5.3.1:** Continue to provide fixed route service to significant activity areas and neighborhoods with moderate to high density, and serve low-density and rural areas with dial-a-ride, flexible fixed routes, or other transit services as deemed appropriate.
TR-1.2.4 **pg. 82**	**1.2.4** Coordinate schedules and routes across service lines with neighboring transit authorities;	**C 1.1.3** **pg. C-58** **(Circ 8/09)**	**Policy C 1.1.3:** Work with local and regional agencies and employers to promote an integrated, seamless transportation system that meets access needs, including local and regional bus service, dial-a-ride, taxis, rail, van pools, car pools, bus pools, bicycling, walking, and automobiles.
TR-1.2.5 **pg. 82**	**1.2.5** Support programs to provide "station cars" for short trips to and from transit nodes (e.g., neighborhood electric vehicles);	***None***	*OVOV has no similar language.*
TR-1.2.6 **pg. 82**	**1.2.6** Study the feasibility of providing free transit to areas with residential densities of 15 dwelling units per acre or more, including options such as removing service from less dense, underutilized areas to do so;	***None***	*OVOV has no similar policy. The City will continue to analyze transit fees as a part of the Regional Transportation Plan analysis.*

[19] Schedules for Santa Clarita Transit are available at http://www.santaclaritatransit.com/Index.aspx?page=3

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-1.2.7 **pg. 82**	**1.2.7** Employ transit-preferential measures, such as signal priority and bypass lanes. Where compatible with adjacent land use designations, right-of-way acquisition or parking removal may occur to accommodate transit-preferential measures or improve access to transit. The use of access management should be considered where needed to reduce conflicts between transit vehicles and other vehicles;	**C 5.1.6 &** **C 1.1.8** **pp. C-67 & 59** **(Circ 8/09)**	**Policy 5.1.6:** Evaluate the feasibility of giving buses priority at signalized intersections to maintain transit service level standards, where appropriate. **Policy C 1.1.8:** Acquire and/or reserve adequate right-of-way in transportation corridors to accommodate multiple travel modes, including bus turnouts, bus rapid transit (BRT), bikeways, walkways, and linkages to trail systems.
TR-1.2.8 **pg. 82**	**1.2.8** Provide safe and convenient access for pedestrians and bicyclists to, across, and along major transit priority streets;	**C 1.1.7 &** **C 1.2.8** **pp. C-59 & 60** **(Circ 8/09)**	**Policy C 1.1.7:** Consider the safety and convenience of the traveling public, including pedestrians and cyclists, in design and development of all transportation systems. **Policy C 1.2.8:** Provide safe pedestrian connections across barriers, which may include but are not limited to major traffic corridors, drainage and flood control facilities, utility easements, grade separations, and walls.
TR-1.2.9 **pg. 82**	**1.2.9** Use park-and-ride facilities to access transit stations only at ends of regional transit-ways or where adequate feeder bus service is not feasible.	***None***	*OVOV has n o similar policy. Although the Circulation Element does discuss park-and-ride facilities at length, the intent of OVOV is to expand the number of park-and-rides throughout the planning area whereas the intent of TR-1.2.9 seems to be to limit them.*
TR-1.3 **pg. 82**	**TR-1.3 Transit System Infrastructure:** The City/County will upgrade and maintain transit system infrastructure to enhance public use,	***See Below***	*See Below.*
TR-1.3.1 **pg. 82**	**1.3.1** Ensure transit stops and bus lanes are safe, convenient, clean and efficient;	**C 5.2** **pg. C-67** **(Circ 8/09)**	**Objective C 5.2:** Maximize the accessibility, safety, convenience, and appeal of transit stops.
TR-1.3.2 **pg. 82**	**1.3.2** Ensure transit stops have clearly marked street-level designation, and are accessible;	**C 5.2.4** **pg. C-67** **(Circ 8/09)**	**Policy C 5.2.4:** Enhance way-finding signage along walkways and paseos to direct pedestrians to transit stops.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-1.3.3 **pg. 82**	**1.3.3** Ensure transit stops are safe, sheltered, benches are clean, and lighting is adequate;	**C 5.2.2** **pg. C-67** **(Circ 8/09)**	**Policy C 5.2.2:** Adopt and implement consistent design standards for use in both City and County areas for bus shelters, bus benches, trash receptacles, lighting, and other improvements for transit stops that are aesthetically pleasing and consistent with community character.
TR-1.3.4 **pg. 82**	**1.3.4** Place transit stations along transit corridors within mixed-use or transit-oriented development areas at intervals of three to four blocks, or no less than one-half mile.	***None***	*OVOV has no similar policy that requires transit stations at intervals of three to four blocks,, however Policy 5.1.4 does require a bus stop to be placed within ¼ mile of residential neighborhoods.*
TR-1.4 **pg. 82**	**TR-1.4 Customer Service:** The City/County will enhance customer service and system ease-of-use,	***None***	*OVOV has no similar language, however the City Council adopted the Transit Development Plan (TDP) in 2006. Several of the programs included in the TDP involve maximizing customer convenience to enhance ridership.*
TR-1.4.1 **pg. 83**	**1.4.1** Develop a Regional Pass system to reduce the number of different passes and tickets required of system users;	***None***	*OVOV has no similar language, however the City Council adopted the Transit Development Plan (TDP) in 2006. One of the programs included in the TDP which currently in the implementation process is the Transit Access Pass (TAP) program. This program will replace all existing passes into a single, paperless system. For more information visit the City of Santa Clarita's Transit website at http://santaclarita.taptogo.net/main.php?cn=santaclarita.*
TR-1.4.2 **pg. 83**	**1.4.2** Implement "Smart Bus" technology, using GPS and electronic displays at transit stops to provide customers with "real-time" arrival and departure time information (and to allow the system operator to respond more quickly and effectively to disruptions in service);	***None***	*OVOV has no similar language, however the City Council adopted the Transit Development Plan (TDP) in 2006. Several of the programs included in the TDP involve maximizing customer convenience to enhance ridership. A system of real-time, GPS based transit information similar to that described in TR-1.4.1 is currently being evaluated by the City.*
TR-1.4.3 **pg. 83**	**1.4.3** Investigate the feasibility of an on-line trip planning program.	***None***	*OVOV has no similar policy, however the City of Santa Clarita Transit Division currently operates an on-line trip planning program.*[20]

[20] The Trip Planner is available on the City of Santa Clarita's Transit Division website at http://www.santaclaritatransit.com/Index.aspx?page=27

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-1.5 **pg. 83**	**TR-1.5 Transit Funding:** The City/County will prioritize transportation funding to support a shift from private passenger vehicles to transit and other modes of transportation,	***None***	*OVOV has no similar policy that prioritizes funding to support transit over passenger vehicles, however Policy C 1.1.9 would Incorporate funding for all modes of transportation in the capital improvement program, and seek funding from all available sources for multi-modal system development.*
TR-1.5.1 **pg. 83**	**1.5.1** Give funding preference to improvements in public transit over other new infrastructure for private automobile traffic;	***None***	*OVOV has no similar language. It is inappropriate given the gaps in the existing right-of-way infrastructure to place public transit improvements as a higher priority in all cases than automobile traffic.*
TR-1.5.2 **pg. 83**	**1.5.2** Before funding transportation improvements that increase roadway capacity and VMT, evaluate the feasibility and effectiveness of funding projects that support alternative modes of transportation and reduce VMT, including transit, and bicycle and pedestrian access.	***None***	*OVOV has no similar language, however all cities in California will be subject to the priorities established by SB 375 for funding transportation projects.*
TR-1.6 **pg. 83**	**TR-1.6 Transit and Multimodal Impact Fees:** The City/County will assess transit and multimodal impact fees on new developments to fund public transportation infrastructure, bicycle infrastructure, pedestrian infrastructure and other multimodal accommodations.	**C 5.4.1** **pg. C-68** **(Circ 8/09)**	**Policy C 5.4.1:** Establish transit impact fee rates that are based on the actual impacts of new development on the transit system, and regularly monitor and adjust these fees as needed to ensure adequate mitigation.
TR-2 **pg. 83**	**Objective TR-2:** The City/County will implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions.	**C 2.1** **pg. C-61** **(Circ 8/09)**	**Objective C 2.1:** Implement the Circulation Plan (as shown on Exhibit C-2) for streets and highways to meet existing and future travel demands for mobility, access, connectivity, and capacity.
TR-2.1 **pg. 83**	**TR-2.1 System Monitoring:** The City/County will monitor traffic and congestion to determine when and where the city needs new transportation facilities in order to increase access and efficiency.	**C 1.2** **pg. C-59** **(Circ 8/09)**	**Objective C 1.2:** Coordinate land use and circulation planning to achieve greater accessibility and mobility for users of all travel modes.
TR-2.2 **pg. 83**	**TR-2.2 Arterial Traffic Management:** The City/County will modify arterial roadways to allow more efficient bus operation, including bus lanes and signal priority/ preemption where necessary.	**C 5.1.6 &** **C 1.1.8** **pp. C-67 &** **59**	**Policy 5.1.6:** Evaluate the feasibility of giving buses priority at signalized intersections to maintain transit service level standards, where appropriate.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
		(Circ 8/09)	**Policy C 1.1.8:** Acquire and/or reserve adequate right-of-way in transportation corridors to accommodate multiple travel modes, including bus turnouts, bus rapid transit (BRT), bikeways, walkways, and linkages to trail systems.
TR-2.3 **pg. 83**	**TR-2.3 Signal Synchronization:** The City/County will expand signal timing programs where emissions reduction benefits can be demonstrated, including maintenance of the synchronization system, and will coordinate with adjoining jurisdictions as needed to optimize transit operation while maintaining a free flow of traffic.	**C 3.2.2** **pg. C-65** **(Circ 8/09)**	**Policy C 3.2.2:** Continue to enhance signal timing and synchronization to allow for free traffic flow, minimizing idling and vehicle emissions.
TR-2.4 **pg. 84**	**TR-2.4 HOV Lanes:** The City/County will encourage the construction of high occupancy vehicle (HOV) lanes or similar mechanisms whenever necessary to relieve congestion and reduce emissions.	***None***	*OVOV has no similar language.*
TR-2.5 **pg. 84**	**TR-2.5 Delivery Schedules:** The City/County will establish ordinances or land use permit conditions limiting the hours when deliveries can be made to off-peak hours in high traffic areas.	***None***	*OVOV has no similar language. However, the City does require all heavy commercial vehicles to receive a permit prior to entering or travelling through the City.*
TR-3 **pg. 84**	**Objective TR-3:** The City/County will reduce VMT related-emissions by implementing and supporting trip reduction programs.	**C 3** **pg. C-64** **(Circ 8/09)**	**Goal C 3:** Reduction of vehicle trips and emissions through effective management of travel demand, transportation systems, and parking.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-3.1 **pg. 84**	**TR-3.1 Ride-Share Programs:** The City/County will promote ride sharing programs,	**C 3.3.4, 3.1.4 & 3.1.5** **pg. C-65** **(Circ 8/09)**	**Policy C 3.3.4:** Within transit-oriented development projects, consider providing incentives such as higher floor area ratio and/or lower parking requirements for commercial development that provides transit and ride-share programs. **Policy C 3.1.4:** Promote the use of employee incentives to encourage alternative travel modes to work. **Policy C 3.1.5:** Promote the use of van pools, car pools, and shuttles to encourage trip reduction.
TR-3.1.1 **pg. 84**	**3.1.1** Designate a certain percentage of parking spaces for ride-sharing vehicles;	***None***	*OVOV has no similar language.*
TR-3.1.2 **pg. 84**	**3.1.2** Designate adequate passenger loading, unloading, and waiting areas for ride-sharing vehicles;	***None***	*OVOV has no similar language.*
TR-3.1.3 **pg. 84**	**3.1.3** Provide a web site or message board for coordinating shared rides;	***None***	*OVOV has no similar policy. However, the City of Santa Clarita's Environmental Services Division currently maintains rideshare information on its website: http://www.santa-clarita.com/cityhall/cmo/environment/get_involved_environmental.asp*
TR-3.1.4 **pg. 84**	**3.1.4** Encourage private, for-profit community car-sharing, including parking spaces for car share vehicles at convenient locations accessible by public transit;	***None***	*OVOV has no similar language.*
TR-3.1.5 **pg. 84**	**3.1.5** Hire or designate a rideshare coordinator to develop and implement ridesharing programs.	***None***	*OVOV has no similar language. However, a regular, full-time employee position is maintained in the City's Environmental Services Division to coordinate both in-house and community wide ride sharing programs.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-3.2 **pg. 84**	**TR-3.2 Employer-based Trip Reduction:** The City/County will support voluntary, employer-based trip reduction programs,	**C 3.1, 3.1.2, 3.1.4, 3.1.5** **pg. C-64 & 65** **(Circ 8/09)**	**Objective C 3.1:** Promote the use of travel demand management strategies to reduce vehicle trips. **Policy C 3.1.2:** Promote home-based businesses and live-work units as a means of reducing home-to-work trips. **Policy C 3.1.4:** Promote the use of employee incentives to encourage alternative travel modes to work. **Policy C 3.1.5:** Promote the use of van pools, car pools, and shuttles to encourage trip reduction.
TR-3.2.1 **pg. 84**	**3.2.1** Provide assistance to regional and local ridesharing organizations;	***None***	*OVOV has no similar language. OVOV has no similar language. However, a regular, full-time employee position is maintained in the City's Environmental Services Division to coordinate both in-house and community wide ride sharing programs.*
TR-3.2.2 **pg. 84**	**3.2.2** Advocate for legislation to maintain and expand incentives for employer ridesharing programs;	***None***	*OVOV has no similar language.*
TR-3.2.3 **pg. 84**	**3.2.3** Require the development of Transportation Management Associations for large employers and commercial/ industrial complexes;	***None***	*OVOV has no similar language, however the City of Santa Clarita Municipal Code Section 17.14.050.H.5 requires all development in Commercial and Industrial zones with 50 or more employees develop a Transportation Development Management Plan.*
TR-3.2.4 **pg. 84**	**3.2.4** Provide public recognition of effective programs through awards, top ten lists, and other mechanisms.	***None***	*OVOV has no similar language.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-3.3 **pg. 84**	**TR-3.3 Ride Home Programs:** The City/County will implement a city/county wide "guaranteed ride home" program for those who commute by public transit, ride-sharing, or other modes of transportation, and encourage employers to subscribe to or support the program.	***None***	*OVOV has no similar policy, however the draft Circulation Element (August, 2009), page 36, discusses the concept of "Travel Demand Management"(TDM) at length. The discussion contains a number of examples of TDM programs include "Guaranteed Ride Home programs for employees who use alternative travel modes to work".*
TR-3.4 **pg. 85**	**TR-3.4 Local Area Shuttles:** The City/County will encourage and utilize shuttles to serve neighborhoods, employment centers and major destinations.	**C 5** **pg. C-64** **(Circ 8/09)**	**Goal C 5:** Bus transit service as a viable choice for all residents, easily accessible and serving destinations throughout the Valley.[21]
TR-3.4.1 **pg. 85**	**3.4.1** The City/County will create a free or low-cost local area shuttle system that includes a fixed route to popular tourist destinations or shopping and business centers;	**C 5** **pg. C-64** **(Circ 8/09)**	**Goal C 5:** Bus transit service as a viable choice for all residents, easily accessible and serving destinations throughout the Valley.
TR-3.4.2 **pg. 85**	**3.4.2** The City/County will work with existing shuttle service providers to coordinate their services.	***None***	*OVOV has no similar policy, however the City currently contracts with a private organization to provide all bus-related transit services.*[22]
TR-3.5 **pg. 85**	**TR-3.5 Low- and No-Travel Employment Opportunities:** The City/County will facilitate employment opportunities that minimize the need for private vehicle trips.	**C 1.2.1** **pg. C-65** **(Circ 8/09)**	**Policy C 1.2.1:** Develop coordinated plans for land use, circulation, and transit to promote transit-oriented development that concentrates higher density housing, employment, and commercial areas in proximity to transit corridors.
TR-3.5.1 **pg. 85**	**3.5.1** Amend zoning ordinances and the Development Code to include live/work sites and satellite work centers in appropriate locations;	***None***	*OVOV has no similar policy, however the UR4 and UR5 zones are proposed to include live work units.*[23]
TR-3.5.2 **pg. 85**	**3.5.2** Encourage telecommuting options with new and existing employers, through project review and incentives, as appropriate.	**C 3.1.3** **pg. C-70** **(Circ 8/09)**	**Policy C 3.1.3:** Promote the use of flexible work schedules and telecommuting to reduce home to work trips.

[21] The City currently operates a fixed route and dial-a-ride bus service to destinations throughout the Santa Clarita Valley. Ridership has increased almost 600% since 1991. Services are described in the Circulation Element (draft 8/09), pages C-42 through C-45.
[22] Services are described in the Circulation Element (draft 8/09), pages C-42 through C-45.
[23] Land Use Element (draft 8/09) pg LU-55.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-3.6 **pg. 85**	**TR-3.6 Congestion Pricing:** Advocate for a regional, market-based system to price or charge for auto trips during peak hours	***None***	*OVOV has no similar language.*
TR-4 **pg. 85**	**Objective TR-4:** The City/County will support bicycle use as a mode of transportation by enhancing infrastructure to accommodate bicycles and riders, and providing incentives.	**C 6** **pg. C-74** **(Circ 8/09)**	**Goal C 6:** A unified and well-maintained bikeway system with safe and convenient routes for commuting, recreational use and utilitarian travel, connecting communities and the region.
TR-4.1 **pg. 85**	**TR-4.1 Development Standards for Bicycles:** The City/County will establish standards for new development and redevelopment projects to support bicycle use.	**C 6.1** **pg. C-74** **(Circ 8/09)**	**Objective C 6.1:** Adopt and implement a coordinated master plan for bikeways for the Valley, including both City and County areas, to make cycling an attractive and feasible mode of transportation.[24]
TR-4.1.1 **pg. 85**	**4.1.1** Amending the Development Code to include standards for safe pedestrian and bicyclist accommodations.	**C 1.1.1** **pg. C-59** **(Circ 8/09)**	**Policy C 1.1.1:** Reduce dependence on the automobile, particularly single-occupancy vehicle use, by providing safe and convenient access to transit, bikeways, and walkways.
TR-4.1.1.1 **pg. 85**	**4.1.1.1** "Complete Streets" policies that foster equal access by all users in the roadway design	**C 1.1** **pg. C-59** **(Circ 8/09)**	**Objective C 1.1:** Provide multi-modal circulation systems that move people and goods efficiently while protecting environmental resources and quality of life.
TR-4.1.1.2 **pg. 85**	**4.1.1.2** Bicycle and pedestrian access internally and in connection to other areas through easements;	**C 1.2.8 &** **6.1.3** **pp. C-65, 75** **(Circ 8/09)**	**Policy C 1.2.8:** Provide safe pedestrian connections across barriers, which may include but are not limited to major traffic corridors, drainage and flood control facilities, utility easements, grade separations, and walls. **Policy C 6.1.3:** Continue to acquire or reserve right-of-way and/or easements needed to complete the bicycle circulation system as development occurs.

[24] The City Council of the City of Santa Clarita adopted the *Non-Motorized Master Plan* in 2008.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-4.1.1.3 **pg. 85**	**4.1.1.3** Safe access to public transportation and other non-motorized uses through construction of dedicated paths;	**C 1.1.1 & 1.1.7** **pp. C-64** **(Circ 8/09)**	**Policy C 1.1.1:** Reduce dependence on the automobile, particularly single-occupancy vehicle use, by providing safe and convenient access to transit, bikeways, and walkways. **Policy C 1.1.7:** Consider the safety and convenience of the traveling public, including pedestrians and cyclists, in design and development of all transportation systems.
TR-4.1.1.4 **pg. 86**	**4.1.1.4** Safe road crossings at major intersections, especially for school children and seniors;	***None***	*OVOV has no similar policy, however the safety mechanisms and procedures currently used by the City are identified in the Circulation Element, page C-56 (draft 8/09).*
TR-4.1.1.5 **pg. 86**	**4.1.1.5** Adequate, convenient and secure bike parking at public and private facilities and destinations in all urban areas;	**C 1.1.6** **pp. C-64** **(Circ 8/09)**	**Policy C 1.1.6:** Ensure multi-modal travel through provision of adequate facilities, including but not limited to bicycle parking and storage, expansion of park-and-ride lots, and provision of adequate station and transfer facilities in appropriate locations.[25]
TR-4.1.1.6 **pg. 86**	**4.1.1.6** Street standards will include provisions for bicycle parking within the public right of way	**C 5.2.5** **pp. C-74** **(Circ 8/09)**	**Policy C 5.2.5:** Complementary transportation modes should be interconnected at intermodal transit centers, including provisions for bicycles on buses, bicycle parking at transit centers, and park-and-ride at transit stops.
TR-4.1.2 **pg. 86**	**4.1.2** Require new development and redevelopment projects to include bicycle facilities, as appropriate with the new land use.	**C 6.2.1** **pp. C-75** **(Circ 8/09)**	**Policy C 6.2.1:** Require bicycle parking, which can include bicycle lockers and sheltered areas at commercial sites and multi-family housing complexes for use by employees and residents, as well as customers and visitors.

[25] Note that UDC Section 17.18.105 currently requires on-site bicycle parking for all commercial, office, industrial and multi-family uses.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-4.1.2.1 **pg. 86**	**4.1.2.1** Construction of weatherproof bicycle facilities where feasible, and at a minimum, bicycle racks or covered, secure parking near the building entrances;	**C 6.2.1** **pp. C-75** **(Circ 8/09)**	**Policy C 6.2.1:** Require bicycle parking, which can include bicycle lockers and sheltered areas at commercial sites and multi-family housing complexes for use by employees and residents, as well as customers and visitors.
TR-4.1.2.2 **pg. 86**	**4.1.2.2** Provision and maintenance of changing rooms, lockers, and showers at large employers or employment centers.	**C 3.1.6** **pp. C-70** **(Circ 8/09)**	**Policy C 3.1.6:** Promote the provision of showers and lockers within businesses and employment centers, in order to encourage opportunities for employees to bicycle to work.[26]
TR-4.1.3 **pg. 86**	**4.1.3** Prohibit projects that impede bicycle and pedestrian access, such as large parking areas that cannot be safely crossed by non-motorized vehicles, and developments that block through access on existing or potential bicycle and pedestrian routes	**C 7.1.5** **pp. C-76** **(Circ 8/09)**	**Policy C 7.1.5:** In new commercial development, provide for direct, clearly delineated, and preferably landscaped pedestrian walkways from transit stops and parking areas to building entries, and avoid placement of uses (such as drive-through facilities) in locations that would obstruct pedestrian pathways.
TR-4.1.4 **pg. 86**	**4.1.4** Encourage the development of bicycle stations at intermodal hubs, with attended or "valet" bicycle parking, and other amenities such as bicycle rental and repair, and changing areas with lockers and showers;	**C 5.2.5** **pp. C-74** **(Circ 8/09)**	**Policy C 5.2.5:** Complementary transportation modes should be interconnected at intermodal transit centers, including provisions for bicycles on buses, bicycle parking at transit centers, and park-and-ride at transit stops. *OVOV has no similar language regarding "valet" parking, bicycle rental and repair.*

[26] Consider adding Metrolink or multi-modal hubs to the potential locations of shower facilities.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-4.1.5 pg. 86	**4.1.5** Conduct a connectivity analysis of the existing bikeway network to identify gaps, and prioritize bikeway development where gaps exist.	***None***	*OVOV has no similar policy, however within the Santa Clarita Valley, four gaps in the inter-jurisdictional bikeway network were identified by the Metro plan. These are summarized in Table C-4. Funds are available from the Bicycle Transportation Account program to help improve bicycle facilities, provided local agencies have adopted Bicycle Transportation Plans. The City of Santa Clarita's Non-Motorized Transportation Plan will fulfill this funding requirement.*[27] *The Non-Motorized Master Plan also examines gaps within the City and identifies strategies to fill them.*
TR-4.2 pg. 86	**TR-4.2 Bicycle and Pedestrian Trails:** The City/County will establish a network of multi-use trails to facilitate safe and direct off-street bicycle and pedestrian travel, and will provide bike racks along these trails at secure, lighted locations.		**Policy C 1.1.7:** Consider the safety and convenience of the traveling public, including pedestrians and cyclists, in design and development of all transportation systems.
TR-4.3 pg. 86	**R-4.3 Bicycle Safety Program:** The City/County will develop and implement a bicycle safety educational program to teach drivers and riders the laws, riding protocols, routes, safety tips, and emergency maneuvers.	***None***	*OVOV has no similar policy, however the City currently implements the Safe Routes to School program and a Share the Road program for bicycle safety.*
TR-4.4 pg. 86	**TR-4.4 Bicycle and Pedestrian Project Funding:** The City/County will pursue and provide enhanced funding for bicycle and pedestrian facilities and access projects, including, as appropriate.	***None***	*OVOV has no similar language, however the City's Non-Motorized Master Plan seeks to acquire funding for all potential non-motorized improvements. The City will continue to pursue regional funding for area wide transportation projects..*
TR-4.4.1 pg. 87	**4.4.1** Apply for regional, State, and federal grants for bicycle and pedestrian infrastructure projects;	***None***	**NEW CIRC ELEMENT POLICY**: Apply for regional, State, and federal grants for bicycle and pedestrian infrastructure projects
TR-4.4.2 pg. 87	**4.4.2** Establish development exactions and impact fees to fund bicycle and pedestrian facilities;	***None***	*OVOV has no similar language, however the City currently collects Bridge and Thoroughfare fees on new development. These fees pay for right-of-way improvements including bike paths.*

[27] Circulation Element, p. C-52 (draft 8/09).

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-4.4.3 **pg. 87**	**4.4.3** Use existing revenues, such as state gas tax subventions, sales tax funds, and general fund monies for projects to enhance bicycle use and walking for transportation.	***None***	*OVOV has no similar language, however the City currently uses these types of funds to enhance bicycle us and walking transportation.*
TR-4.5 **pg. 87**	**TR-4.5 Bicycle Parking:** Adopt bicycle parking standards that ensure bicycle parking sufficient to accommodate 5 to 10% of projected use at all public and commercial facilities, and at a rate of at least one per residential unit in multiple-family developments *(suggestion: check language with League of American Bicyclists).*	**C 6.2.1** **pp. C-75** **(Circ 8/09)**	**Policy C 6.2.1:** Require bicycle parking, which can include bicycle lockers and sheltered areas at commercial sites and multi-family housing complexes for use by employees and residents, as well as customers and visitors. The current City of Santa Clarita Municipal Code Section 17.18.105 defines the requirement for bicycle parking as follows: <u>Retail/Commercial Uses</u>: 1 space per each 25 vehicle parking stalls <u>Office Uses</u>: 1 space per each 30 vehicle parking stalls <u>Industrial Uses</u>: 1 space per each 40 vehicle parking stalls <u>Multifamily Residential Uses</u>: 1 space per each 5 residential units
TR-5 **pg. 87**	**Objective TR-5:** The City/County will establish parking policies and requirements that capture the true cost of private vehicle use and support alternative modes of transportation.	***None***	*OVOV has no similar language.*
TR-5.1 **pg. 87**	**TR-5.1 Parking Policy:** The City/County will adopt a comprehensive parking policy to discourage private vehicle use and encourage the use of alternative transportation,	***None***	*OVOV has no similar language.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-5.1.1 pg. 87	**5.1.1** Reduce the available parking spaces for private vehicles while increasing parking spaces for shared vehicles, bicycles, and other alternative modes of transportation;	***None***	*OVOV has no similar language.*
TR-5.1.2 pg. 87	**5.1.2** Eliminate or reduce minimum parking requirements for new buildings;	***None***	*OVOV has no similar language.*
TR-5.1.3 pg. 87	**5.1.3** "Unbundle" parking (require that parking is paid for separately and is not included in the base rent for residential and commercial space);	**C 1.2.6 pg. C-60 (Circ 8/09)**	**Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate.
TR-5.1.4 pg. 87	**5.1.4** Use parking pricing to discourage private vehicle use, especially at peak times;	***None***	*OVOV has no similar policy, however the Circulation Element does address using pricing strategies on pages C-39 and C-40.*
TR-5.1.5 pg. 87	**5.1.5** Create parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities;	**NEW LU POLICY**	**NEW LAND USE ELEMENT POLICY:** Create parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities wherever feasible;
TR-5.1.6 pg. 87	**5.1.6** Establish performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times;	**NEW LU POLICY**	**NEW LAND USE ELEMENT POLICY:** Establish performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times wherever feasible.
TR-5.1.7 pg. 87	**5.1.7** Encourage shared parking programs in mixed-use and transit-oriented development areas.	**C 1.2.6 pp. C-65 (Circ 8/09)**	**Policy C 1.2.6:** Provide flexible standards for parking and roadway design in transit-oriented development areas to promote transit use, where appropriate.
TR-5.2 pg. 88	**TR-5.2 Event Parking Policies:** The City/County will establish policies and programs to reduce onsite parking demand and promote ride-sharing and public transit at large events	***None***	*OVOV has no similar language, however the City provides coordinated parking and shuttle services as needed for all major events.*
TR-5.2.1 pg. 88	**5.2.1** Promote the use of peripheral parking by increasing on-site parking rates and offering reduced rates for peripheral parking;	***None***	*OVOV has no similar language.*
TR-5.2.2 pg. 88	**5.2.2** Encourage special event center operators to advertise and offer discounted transit passes with event tickets;	**NEW CIRC POLICY**	**NEW CIRC ELEMENT POLICY:** Encourage special event center operators to advertise and offer discounted transit passes with event tickets

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-5.2.3 **pg. 88**	**5.2.3** Encourage special event center operators to advertise and offer discount parking incentives to carpooling patrons, with four or more persons per vehicle for on-site parking;	**NEW CIRC POLICY**	**NEW CIRC ELEMENT POLICY:** Encourage special event center operators to advertise and offer discount parking incentives to carpooling patrons, with four or more persons per vehicle for on-site parking
TR-5.2.4 **pg. 88**	**5.2.4** Promote the use of bicycles by providing space for the operation of valet bicycle parking service.	***None***	*OVOV has no similar language.*
TR-5.3 **pg. 88**	**TR-5.3 Parking "Cash-out" Program:** The City/County will require new office developments with more than 50 employees to offer a Parking "Cash-out" Program to discourage private vehicle use.	***None***	*OVOV has no similar language.*
TR-5.4 **pg. 88**	**TR-5.4 Electric/Alternative Fuel Vehicle Parking:** The City/County will require new commercial and retail developments to provide prioritized parking for electric vehicles and vehicles using alternative fuels.	**NEW LU POLICY**	**NEW LAND USE ELEMENT POLICY:** The City/County will encourage new commercial and retail developments to provide prioritized parking for electric vehicles and vehicles using alternative fuels.
TR-6 **pg. 88**	**Objective TR-6:** The City/County will support and promote the use of low- and zero-emission vehicles, and alternative fuels, and other measures to directly reduce emissions from motor vehicles.	**C 3.2.3** **pp. C-71** **(Circ 8/09)**	**Policy C 3.2.3:** When available and feasible, provide opportunities and infrastructure to support use of alternative fuel vehicles and travel devices.
TR-6.1 **pg. 88**	**TR-6.1 Low and Zero Emission Vehicles:** The City/County will support and promote the use of low- and zero-emission vehicles,	**C 3.2.3** **pp. C-71** **(Circ 8/09)**	**Policy C 3.2.3:** When available and feasible, provide opportunities and infrastructure to support use of alternative fuel vehicles and travel devices.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
TR-6.1.1 **pg. 88**	**6.1.1** Develop the necessary infrastructure to encourage the use of zero-emission vehicles and clean alternative fuels, such as development of electric vehicle charging facilities and conveniently located alternative fueling stations;	**C 3.2.3** **pp. C-71** **(Circ 8/09)**	**Policy C 3.2.3:** When available and feasible, provide opportunities and infrastructure to support use of alternative fuel vehicles and travel devices.
TR-6.1.2 **pg. 88**	**6.1.2** Encourage new construction to include vehicle access to properly wired outdoor receptacles to accommodate ZEV and/or plug in electric hybrids (PHEV);	**C 3.2.3** **pp. C-71** **(Circ 8/09)**	**Policy C 3.2.3:** When available and feasible, provide opportunities and infrastructure to support use of alternative fuel vehicles and travel devices.
TR-6.1.3 **pg. 88**	**6.1.3** Encourage transportation fleet standards to achieve the lowest emissions possible, using a mix of alternate fuels, PZEV or better fleet mixes;	**CO 8.2.7** **pp. CO-107** **(Con/OS 8/09)**	**Policy CO 8.2.7:** Support the use of sustainable alternative fuel vehicles for machinery and fleets, where practical, by evaluating fuel sources, manufacturing processes, maintenance costs and vehicle lifetime use.
TR-6.1.4 **pg. 89**	**6.1.4** Establish incentives, as appropriate, to taxicab owners to use alternative fuel or gas-electric hybrid vehicles.	***None***	*OVOV has no similar language.*
TR-6.2 **pg. 89**	**TR-6.2 Vehicle Idling:** The City/County will enforce State idling laws for commercial vehicles, including delivery and construction vehicles.	***None***	*OVOV has no similar language, however the Los Angeles County Sheriff's Department is currently enforcing the existing State idling regulations.*
CAPCOA – Energy Efficiency Policies[28]		**OVOV**	
Reference	**Language**	**Reference**	**Language**
EE-1 **pg. 90**	**Objective EE-1** The City/County will establish green building requirements and standards for new development and redevelopment projects, and will work to provide incentives for green building practices and remove barriers that impede their use.	**CO 8.1.3** **pg. CO-92** **(Con/OS 8/09)**	**Policy CO 8.1.3**: Revise codes and ordinances as needed to address energy conservation.0

[28] The new California Green Building Standards Code Sections 406, 503, 504, and 511 deal with energy efficiency. Many of these sections may become mandatory in 2011.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-1.1 **pg. 90**	**EE-1.1 Green Building Ordinance:** The City/County will adopt a Green Building Ordinance that requires new development and redevelopment projects for both residential and commercial buildings to incorporate sufficient green building methods and techniques to qualify for the equivalent of a current LEED Certified rating, GreenPoints, or equivalent rating system.	**CO 8.1.3.a** **pg. CO-93** **(Con/OS 8/09)**	a. Strengthen building codes for new construction and renovation to achieve a higher level of energy efficiency, with a goal of exceeding energy efficiency beyond that required by Title 24;
EE-1.2 **pg. 90**	**EE-1.2 Green Building Flexibility:** The City/County will allow increased height limits and/or flexibility in other standards for projects that incorporate energy efficient green building practices.	***None***	*OVOV has no similar language, however OVOV generally requires increased building heights throughout the planning area although not as an incentive for green building projects.*
EE-1.3 **pg. 90**	**EE-1.3 Green Building Barriers:** The City/County will identify and remove regulatory or procedural barriers to implementing green building practices within its jurisdiction, such as updating codes, guidelines, and zoning, and will ensure that all plan review and building inspection staff are trained in green building materials, practices, and techniques.	**CO 8.1.3.b & CO 8.2.12** **pg. CO-93 & 94** **(Con/OS 8/09)**	b. Adopt a Green Building Program to encourage green building practices and materials, along with appropriate ordinances and incentives **Policy CO 8.2.12:** Provide ongoing training to appropriate City employees on sustainable planning, building, and engineering practices.
EE-1.4 **pg. 90**	**EE-1.4 Green Building Incentives:** The City/County will support the use of green building practices	**CO 8.1.3.b & CO 8.3.10** **pg. CO-93 & 95** **(Con/OS 8/09)**	b. Adopt a Green Building Program to encourage green building practices and materials, along with appropriate ordinances and incentives; **Policy CO 8.3.10:** Provide incentives and technical assistance for installation of energy-efficient improvements in existing and new buildings.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-1.4.1 **pg. 90**	**1.4.1** Providing information, marketing, training, and technical assistance about green building practices;	**CO 8.1.4 & CO 8.1.5** **pg. CO-93** **(Con/OS 8/09)**	**Policy CO 8.1.4:** Provide information and education to the public about energy conservation and local strategies to address climate change. **Policy CO 8.1.5:** Coordinate various activities within the community and appropriate agencies related to GHG emissions reduction activities.
EE-1.4.2 **pg. 90**	**1.4.2** Establishing guidelines for green building practices in residential and commercial development;	**CO 8.1.3.b** **pg. CO-93** **(Con/OS 8/09)**	b. Adopt a Green Building Program to encourage green building practices and materials, along with appropriate ordinances and incentives;
EE-1.4.3 **pg. 90**	**1.4.3** Providing financial incentives, including reduction in development fees, administrative fees, and expedited permit processing for projects that use green building practices.	**OC 8.1.1.e & CO 8.3.10** **pg. CO-92 & 95** **(Con/OS 8/09)**	e. Allocation of funding and staffing for Plan implementation; **Policy CO 8.3.10:** Provide incentives and technical assistance for installation of energy-efficient improvements in existing and new buildings.
EE-2 **pg. 90**	**Objective EE-2** The City/County will establish policies and standards to increase energy efficiency at new developments.	**CO 8.1.3.a** **pg. CO-93** **(Con/OS 8/09)**	a. Strengthen building codes for new construction and renovation to achieve a higher level of energy efficiency, with a goal of exceeding energy efficiency beyond that required by Title 24;
EE-2.1[29] **pg. 90**	**EE-2.1 Improved Building Standards:** The City/County will adopt energy efficiency performance standards for buildings that achieve a greater reduction in energy and water use than otherwise required by state law.	**CO 8.1.3.a & CO 4.1.1** **pp. CO-93 & 86** **(Con/OS 8/09)**	a. Strengthen building codes for new construction and renovation to achieve a higher level of energy efficiency, with a goal of exceeding energy efficiency beyond that required by Title 24; **Policy CO 4.1.1:** In coordination with applicable water suppliers, adopt and implement a water conservation strategy for public and private development.

[29] Items contained in EE-2.1 seem too specific for General Plan use. These appear to be more appropriate for either a green building program or a Climate Action Plan.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-2.1.1 pg. 91	**2.1.1** Standards for the installation of "cool roofs";	**CO 8.1.3.d & CO 8.2.9 pp. CO-93 & 94 (Con/OS 8/09)**	d. Encourage mitigation of the "heat island" effect through use of cool roofs, light-colored paving, and shading to reduce energy consumption for air conditioning. **Policy CO 8.2.9:** Reduce heat islands through installation of trees to shade parking lots and hardscapes, and use of light-colored reflective paving and roofing surfaces.
EE-2.1.2 pg. 91	**2.1.2** Performance standards for heat transfer across the building envelope that result in increased insulation and the use of low emissive windows;	**CO 8.2.1, 8.2.2, 8.3.1 & 8.3.2[30] pp. CO-93&94 (Con/OS 8/09)**	**Policy CO 8.2.1:** Ensure that all new City buildings, and all major renovations and additions, meet adopted green building standards, with a goal of achieving the LEED (Leadership in Energy and Environmental Design) Silver rating or above, or equivalent where appropriate. **Policy CO 8.2.2:** Ensure energy efficiency of existing public buildings through energy audits and repairs, and retrofit buildings with energy efficient heating and air conditioning systems and lighting fixtures, with a goal of completing energy repairs in City facilities by 2012.[31] **Policy CO 8.3.1:** Evaluate site plans proposed for new development based on energy efficiency pursuant to LEED (Leadership in Energy and Environmental Design) standards for New Construction and Neighborhood Development, including the following: a) location efficiency; b) environmental preservation; c) compact, complete, and connected neighborhoods; and d) resource efficiency, including use of recycled materials and water.

[30] Improvements to the building envelope are included in LEED for New Development v.3.
[31] Note that CO 8.2 requires 8.2.1 and 8.2.2 of new public buildings.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
			Policy CO 8.3.2: Promote construction of energy efficient buildings through requirements for LEED certification or through comparable alternative requirements as adopted by local ordinance.[32]
EE-2.1.3 pg. 91	**2.1.3** Requirements to install high-efficiency plumbing fixtures and tankless water heaters;	**CO 4.1.5 & 4.1.6 pp. CO-87 (Con/OS 8/09)**	**Policy CO 4.1.5:** Promote the use of low-flow and/or waterless plumbing fixtures and appliances in all new residential and non-residential development and residential development of five or more dwelling units. **Policy CO 4.1.6:** Support amendments to the building code that would promote upgrades to water and energy efficiency when issuing permits for renovations or additions to existing buildings.
EE-2.1.4 pg. 91	**2.1.4** Performance standards that specify high-efficiency space heating and cooling systems;	***None***	*OVOV has no similar language and LEED does not require high-efficiency space heating but does have minimum energy standards.*
EE-2.1.5 pg. 91	**2.1.5** Requirements for improved overall efficiency of lighting systems;	**See CO 8.2.1, 8.2.2, 8.3.1 and 8.3.2 above**	*OVOV has no similar language and LEED does not require high-efficiency space heating but does have minimum energy standards..*[33]

[32] Note that 8.3 describes 8.3.1 and 8.3.2 as "encouraged" for private development.
[33] LEED does have minimum standards for Energy in new and existing buildings. EE-2.1.5 is unclear regarding whether the requirements defined by LEED will stratify their requirement for "improved overall efficiency of lighting systems."

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-2.1.6 pg. 91	**2.1.6** Requirements for the use of Energy Star® appliances and fixtures in discretionary new development;	**CO 8.3.8**	**Policy CO 8.3.8:** Encourage energy-conserving heating and cooling systems and appliances, and energy-efficiency in windows and insulation, in all new construction.
EE-2.1.7 pg. 91	**2.1.7** New lots shall be arranged and oriented to maximize effective use of passive solar energy.	**CO 8.1.3.c pg. CO-93 (Con/OS 8/09)**	c. Maximize orientation of buildings to maximize passive solar heating during cool seasons, avoid solar heat gain during hot periods, enhance natural ventilation, promote effective use of daylight, and optimize opportunities for on-site solar generation;
EE-2.2 pg. 91	**EE-2.2 Affordable Housing Energy Efficiency:** Affordable housing development shall incorporate energy efficient design and features to the maximum extent feasible.	*None*	*OVOV has no similar policy, however all policies included in OVOV regarding green building apply to all types of housing, including affordable housing.*
EE-2.2.1 pg. 91	**2.2.1** The City/County will target local funds, including redevelopment and community development block grant resources, to assist affordable housing developers in meeting the energy efficiency requirements.	*None*	*OVOV has no similar language.*
EE-2.3[34] pg. 91	**EE-2.3 Outdoor Lighting:** The City/County will establish outdoor lighting standards in the Zoning Ordinance	**CO 8.3.9 pg. CO-95 (Con/OS 8/09)**	**Policy CO 8.3.9:** Limit excessive lighting levels, and encourage a reduction of lighting when businesses are closed to a level required for security.
EE-2.3.1 pg. 91	**2.3.1** Requirements that all outdoor lighting fixtures be energy efficient	**CO 8.3.9 pg. CO-95 (Con/OS 8/09)**	**Policy CO 8.3.9:** Limit excessive lighting levels, and encourage a reduction of lighting when businesses are closed to a level required for security.
EE-2.3.1.1 pg. 91	**2.3.1.1** Full cut-off light fixtures at parking lots and on buildings;	***None***	*OVOV has no similar language.*
EE-2.3.1.2 pg. 91	**2.3.1.2** Photocells or astronomical time switches on all permanently installed exterior lighting;	***None***	*OVOV has no similar language.*

[34] Some items contained in EE-2.3 seem too specific for General Plan use. These appear to be more appropriate for either a green building program or a Climate Action Plan.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-2.3.1.3 pg. 91	**2.3.1.3** Directional and shielded LED lights for exterior lighting *(for example, see: www.nightwise.org)*, and install exterior and security lights with motion detectors.	***None***	*OVOV has no similar language.*
EE-2.3.2 pg. 91	**2.3.2** Requirements that light levels in all new development, parking lots, and street lighting not exceed state standards	**CO 8.3.9 pg. CO-95 (Con/OS 8/09)**	**Policy CO 8.3.9:** Limit excessive lighting levels, and encourage a reduction of lighting when businesses are closed to a level required for security.
EE-2.3.3 pg. 91	**2.3.3** Requirements that lighting at the urban-rural boundary be designed to provide one-half the light standard for urban areas;[35]	***None***	*OVOV has no similar language.*
EE-2.3.4 pg. 92	**2.3.4** Prohibition against continuous all-night outdoor lighting in sports stadiums, construction sites, and rural areas unless required for security reasons.	**CO 8.3.9 pg. CO-95 (Con/OS 8/09)**	**Policy CO 8.3.9:** Limit excessive lighting levels, and encourage a reduction of lighting when businesses are closed to a level required for security.
EE-3 pg. 92	**Objective EE-3:** The City/County will establish policies and standards to reduce exterior heat gain and heat island effects.	**CO 8.2.9 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.9:** Reduce heat islands through installation of trees to shade parking lots and hardscapes, and use of light-colored reflective paving and roofing surfaces.
EE-3.1[36] pg. 92	**EE-3.1 Exterior Heat Gain:** The City/County will establish standards for new development and for large redevelopment or rehabilitation (for example, additions of more than 25,000 square feet commercial or 100,000 square feet industrial), to reduce exterior heat gain for 50% of non-roof impervious site landscape (roads, sidewalks, courtyards, parking lots, and driveways)	***None***	*OVOV has no similar language.*

[35] This seems odd because, in the absence of a definite Urban Growth Boundary, the urban-rural boundary would not be a fixed location over time.
[36] Some items contained in EE-3.1 seem too specific for General Plan use. These appear to be more appropriate for either a green building program or a Climate Action Plan.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-3.1.1 pg. 92	**3.1.1** Achieving 50% paved surface shading with vegetation within 5 years, in consultation with city/county arborist	***None***	*Santa Clarita Unified Development Code Section 17.18.070.E.(10) states "The applicant shall be required to plant tree species that will achieve a parking lot coverage canopy to the satisfaction of the Director of Community Development…". In general the City's standard has been 50% at 5 years.*
EE-3.1.2 pg. 92	**3.1.2** Use of paving materials with a Solar Reflective Index (SRI) of at least 29, or open grid paving systems	**NEW CON/OS POLICY**	**NEW CON/OS ELEMENT POLICY:** Reduce extensive heat gain from paved surfaces wherever feasible.
EE-3.1.3 pg. 92	**3.1.3** Covered parking (underground, beneath decking or roofs, or beneath a building), where any roof-covered parking uses roofing material with SRI of at least 29.	**NEW CON/OS POLICY**	**NEW CON/OS ELEMENT POLICY:** Reduce extensive heat gain from paved surfaces wherever feasible.
EE-3.2 pg. 92	**EE-3.2 Heat Island Mitigation:** The City/County will adopt a Heat Island Mitigation Plan that requires cool roofs, cool pavements, and strategically placed shade trees, and will actively inspect and enforce	**NEW CON/OS POLICY**	**NEW CON/OS ELEMENT POLICY:** Reduce extensive heat gain from paved surfaces wherever feasible.
EE-4 pg. 92	**Objective EE-4:** The City/County will pursue policies and programs to improve energy efficiency of existing buildings.	**CO 8.2.2 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.2.2:** Ensure energy efficiency of existing public buildings through energy audits and repairs, and retrofit buildings with energy efficient heating and air conditioning systems and lighting fixtures, with a goal of completing energy repairs in City facilities by 2012.[37]
EE-4.1 pg. 92	**EE-4.1 Energy Audits:** The City/County will require the performance of energy audits for residential and commercial buildings prior to completion of sale, and that audit results and information about opportunities for energy efficiency improvements be presented to the buyer.	***None***	*OVOV has no similar language.*

[37] Note that 8.2.2 only refers to Public buildings. There is no similar language for private structures.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-4.2 **pg. 93**	**EE-4.2 Energy Efficiency Funding:** The City/County will pursue incentives, grants, and creative financing for projects that improve energy efficiency, including, for example, the option for property owners to pay for such improvements through long-term assessments on their property tax bills.	**CO 8.3.10** **pg. CO-95** **(Con/OS 8/09)**	**Policy CO 8.3.10:** Provide incentives and technical assistance for installation of energy-efficient improvements in existing and new buildings.
EE-4.3 **pg. 93**	**EE-4.3 Community Energy Program:** The City/County will implement an outreach and incentive program to promote energy efficiency and conservation in the community	**CO 8.1.4 & CO 8.1.5** **pg. CO-93** **(Con/OS 8/09)**	**Policy CO 8.1.4:** Provide information and education to the public about energy conservation and local strategies to address climate change. **Policy CO 8.1.5:** Coordinate various activities within the community and appropriate agencies related to GHG emissions reduction activities.
EE-4.3.1 **pg. 93**	**4.3.1** Launch an "energy efficiency challenge" campaign for community residents;	***None***	*OVOV has no similar language. However, a program such as this could easily be implemented through the City's green website, www.greensantaclarita.com.*
EE-4.3.2 **pg. 93**	**4.3.2** Implement a low-income weatherization assistance program;	***None***	*OVOV has no similar language. However, the City currently advertises the existing Federal weatherization assistance program on the City's green website, http://www.greensantaclarita.com/resEnergyefficiency.asp.*
EE-4.3.3 **pg. 93**	**4.3.3** Implement conservation campaigns specifically targeted to residents, and separately to businesses;	***None***	*OVOV has no similar language. However, the City currently promotes energy efficiency for residents and business on the City's green website: http://www.greensantaclarita.com/resEnergyefficiency.asp and http://www.greensantaclarita.com/businessEnergyEffeciency.asp*
EE-4.3.4 **pg. 93**	**4.3.4** Promote the purchase of Energy Star® appliances, including, where feasible, incentive grants and vouchers	***None***	*OVOV has no similar language. However, a Energy Star products are currently advertised on the City's green website, http://greensantaclarita.com/energystar.asp*
EE-4.3.5 **pg. 93**	**4.3.5** Promote participation in the local "Green Business" program;	***None***	*OVOV has no similar language. However, several programs exist that encourage the local green economy at the "Green Store" on the City's green website, http://greensantaclarita.com/*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EE-4.3.6 **pg. 93**	**4.3.6** Distribute free CFL bulbs or other efficiency fixtures to community members;	***None***	*OVOV has no similar language. However, the City partners with Southern California Edison and the Energy Coalition to provide community members with free CFL's and other upgrades. Information is available on the City's green website, http://www.greensantaclarita.com/resEnergyefficiency.asp*
EE-4.3.7 **pg. 93**	**4.3.7** Offer exchange programs for high-energy-use items, such as halogen torchiere lamps;	***None***	*OVOV has no similar language. However, the City partners with Southern California Edison and the Energy Coalition to exchange high-energy-use items for more efficient ones.. Information is available on the City's green website, http://www.greensantaclarita.com/resEnergyefficiency.asp*
EE-4.3.8 **pg. 93**	**4.3.8** Adopt an ordinance requiring energy upgrades at time of property sale.	***None***	*OVOV has no similar language.*

CAPCOA – Alternative Energy Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
AE-1.1 **pg. 94**	**Objective AE-1:** The City/County will establish policies and programs that facilitate the siting of new renewable energy generation.	**CO 10.1.17** **pg. CO-100** **(Con/OS** **8/09)**	**Policy CO 10.1.17:** Allow alternative energy projects in areas designated for open space, where consistent with other uses and values.
AE-1.1.1 **pg. 94**	**1.1.1** Designate suitable sites to prioritize their development for renewable energy generation;	**CO 10.1.17** **pg. CO-100** **(Con/OS** **8/09)**	**Policy CO 10.1.17:** Allow alternative energy projects in areas designated for open space, where consistent with other uses and values.
AE-1.1.2 **pg. 94**	**1.1.2** Evaluate potential land use, environmental, economic, and other constraints on that use, and mitigate such constraints, as feasible;	**CO 10.1.17** **pg. CO-100** **(Con/OS** **8/09)**	**Policy CO 10.1.17:** Allow alternative energy projects in areas designated for open space, where consistent with other uses and values.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
AE-1.1.3 pg. 94	**1.1.3** Adopt measures to protect the renewable energy use of the sites and their resources, such as utility easements, rights-of-way, and land setasides.	**CO 10.1.17 pg. CO-100 (Con/OS 8/09)**	**Policy CO 10.1.17:** Allow alternative energy projects in areas designated for open space, where consistent with other uses and values.
AE-1.2 pg. 94	**AE-1.2 Removing Barriers:** The City/County will identify and remove or otherwise address barriers to renewable energy production	**NEW LU POLICY**	**NEW LU ELEMENT POLICY:** Work with existing utilities, agencies and renewable energy companies to remove barriers to renewable energy production.
AE-1.2.1 pg. 94	**1.2.1** Review and revise building and development codes, design guidelines, and zoning ordinances to remove such barriers	***None***	*OVOV has no similar language. In addition, the City of Santa Clarita may not have the authority to establish such protocols.*
AE-1.2.2 pg. 94	**1.2.2** Work with related agencies, such as fire, water, health and others that may have policies or requirements that adversely impact the development or use of renewable energy technologies;	**NEW LU POLICY**	**NEW LU ELEMENT POLICY:** Work with existing utilities, agencies and renewable energy companies to remove barriers to renewable energy production.
AE-1.2.3 pg. 94	**1.2.3** Develop protocols for safe storage of renewable and alternative energy products with the potential to leak, ignite or explode, such as biodiesel, hydrogen, and/or compressed air.	**S 4.2.2 pg. S-45 (Safety 8/09)**	**Policy S 4.2.2:** Through the development review process, ensure that any new development proposed in the vicinity of a use that stores or generates large amounts of hazardous materials provides adequate design features, setbacks, and buffers to mitigate impacts to sensitive receptors in the event of a hazardous materials incident.
AE-1.3 pg. 94	**AE-1.3 Zoning Flexibility:** The City/County will allow renewable energy projects in areas zoned for open space, where consistent with the Open Space element, and other uses and values.	**CO 10.1.17 pg. CO-100 (Con/OS 8/09)**	**Policy CO 10.1.17:** Allow alternative energy projects in areas designated for open space, where consistent with other uses and values.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
AE-2 **pg. 94**	**Objective AE-2** The City/County will promote and require renewable energy generation, and co-generation projects where feasible and appropriate.	**CO 8.3.4 & 8.3.5** **pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.3.4:** Encourage new residential development to include on-site solar photovoltaic systems, or pre-wiring, in at least 50% of the residential units, in concert with other significant energy conservation efforts. **Policy CO 8.3.5:** Encourage on-site solar generation of electricity in new retail and office commercial buildings and associated parking lots, carports, and garages, in concert with other significant energy conservation efforts.
AE-2.1 **pg. 94**	**AE-2.1 On-site Renewable Energy Generation:** The City/County will require that new office/retail/commercial or industrial development, or major rehabilitation (e.g., additions of 25,000 square feet commercial, or 100,000 square feet industrial) incorporate renewable energy generation either on-or off-site to provide 15% or more of the project's energy needs.	**CO 8.3.5.** **pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.3.5:** Encourage on-site solar generation of electricity in new retail and office commercial buildings and associated parking lots, carports, and garages, in concert with other significant energy conservation efforts.
AE-2.2 **pg. 94**	**AE-2.2 Co-generation Projects:** The City/County will promote and encourage cogeneration projects for commercial and industrial facilities, provided they meet all applicable air quality standards and provide a net reduction in GHG emissions associated with energy production.	**NEW CON/OS POLICY**	**NEW CON/OS ELEMENT POLICY:** Promote and encourage cogeneration projects for commercial and industrial facilities, provided they meet all applicable air quality standards and provide a net reduction in GHG emissions associated with energy production.
AE-2.3 **pg. 94**	**AE-2.3 Green Utilities:** The City/County will promote and support green utilities, and will evaluate the creation of a locally or regionally owned green utility, perhaps in coordination with other regional strategies.	***None***	*OVOV has no similar language.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
AE-3 **pg. 95**	**Objective AE-3:** The City/County will promote, support, and require, as appropriate, the development of solar energy.	**CO 8.3.4 & 8.3.5** **pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.3.4:** Encourage new residential development to include on-site solar photovoltaic systems, or pre-wiring, in at least 50% of the residential units, in concert with other significant energy conservation efforts. **Policy CO 8.3.5:** Encourage on-site solar generation of electricity in new retail and office commercial buildings and associated parking lots, carports, and garages, in concert with other significant energy conservation efforts.
AE-3.1 **pg. 95**	**AE-3.1 Solar-ready Buildings:** The City/County will require that, where feasible, all new buildings be constructed to allow for easy, cost-effective installation of solar energy systems in the future, using such "solar-ready" features as:	***See above***	*See above*.
AE-3.1.1 **pg. 95**	**3.1.1** Designing the building to include optimal roof orientation (between 20 to 55 degrees from the horizontal), with sufficient south-sloped roof surface;	***None***	*OVOV has no similar language, however in order for homes to satisfy CO 8.3.4 they would need to have the proper orientation to take advantage of a photovoltaic system.*
AE-3.1.2 **pg. 95**	**3.1.2** Clear access without obstructions (chimneys, heating and plumbing vents, etc.) on the south sloped roof;	***None***	*OVOV has no similar language, however in order for homes to satisfy CO 8.3.4 they would need to be built without these obstructions.*
AE-3.1.3 **pg. 95**	**3.1.3** Designing the roof framing to support the addition of solar panels;	***None***	*OVOV has no similar language.*
AE-3.1.4 **pg. 95**	**3.1.4** Installation of electrical conduit to accept solar electric system wiring;	**CO 8.3.4** **pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.3.4:** Encourage new residential development to include on-site solar photovoltaic systems, or pre-wiring, in at least 50% of the residential units, in concert with other significant energy conservation efforts.
AE-3.1.5 **pg. 95**	**3.1.5** Installation of plumbing to support a solar hot water system and provision of space for a solar hot water storage tank.	***None***	*OVOV has no similar language.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
AE-3.2 **pg. 95**	**AE-3.2 Solar Homes Partnership:** The City/County will require that residential projects of 6 units or more participate in the California Energy Commission's New Solar Homes Partnership, which provides rebates to developers who offer solar power in at least 50% of new units, or a program with similar provisions.	**CO 8.3.4** **pg. CO-94** **(Con/OS 8/09)**	**Policy CO 8.3.4:** Encourage new residential development to include on-site solar photovoltaic systems, or pre-wiring, in at least 50% of the residential units, in concert with other significant energy conservation efforts.
AE-3.3 **pg. 95**	**AE-3.3 Passive Solar Design:** The City/County will require that any building constructed in whole or in part with City/County funds incorporate passive solar design features, such as daylighting and passive solar heating, where feasible.	**CO 8.3.6** **pg. CO-95** **(Con/OS 8/09)**	**Policy CO 8.3.6:** Encourage new development to use passive solar heating and cooling techniques in building design and construction, which may include but are not be limited to building orientation, clerestory windows, skylights, placement and type of windows, overhangs to shade doors and windows, and use of light colored roofs and paving materials.
AE-3.4 **pg. 96**	**AE-3.4 Protection of Solar Elements:** The City/County will protect active and passive solar design elements and systems from shading by neighboring structures and trees, as consistent with existing tree shading requirements.[38]	***None***	*OVOV has no similar language.*
AE-4 **pg. 96**	**Objective AE-4:** The City/County will pursue and provide economic incentives and creative financing for renewable energy projects, as well as other support for community members or developers seeking funding for such projects.	**CO 8.3.10** **pg. CO-95** **(Con/OS 8/09)**	**Policy CO 8.3.10:** Provide incentives and technical assistance for installation of energy-efficient improvements in existing and new buildings.

[38] It is unclear what "existing tree shading requirements" are in relation to AE-3.4. Public administration of a tree trimming program on private property would be challenging.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
AE-4.1 **pg. 96**	**AE-4.1 Renewable Energy Incentives:** The City/County will provide, where possible, grants, rebates, and incentives for renewable energy projects, including reduced fees and expedited permit processing.	**CO 8.3.10** **pg. CO-95** **(Con/OS 8/09)**	**Policy CO 8.3.10:** Provide incentives and technical assistance for installation of energy-efficient improvements in existing and new buildings.
AE-4.2 **pg. 96**	**AE-4.2 Creative Financing:** The City/County will provide, where feasible, creative financing for renewable energy projects, including subsidized or other low-interest loans, and the option to pay for system installation through long-term assessments on individual property tax bills.	***None***	*OVOV has no similar language. However, the City is participating in the ongoing County AB811 program.*
AE-4.3 **pg. 96**	**AE-4.3 Partnerships:** The City/County will pursue partnerships with other governmental entities and with private companies and utilities to establish incentive programs for renewable energy.	***None***	*OVOV has no similar language. However, the City is participating in the ongoing County AB811 program.*
AE-4.4 **pg. 96**	**AE-4.4 Information and Support:** The City/County will establish and maintain a clearinghouse of information on available funding alternatives for renewable energy projects, rates of return, and other information to support developers and community members interested in pursuing renewable energy projects.	***None***	*OVOV has no similar language. However, several programs to assist local developers, businesses and residents with finding funding support exist on the City's green website, http://greensantaclarita.com/*
AE-5 **pg. 96**	**Objective AE-5:** The City/County will implement measures to support the purchase and use of renewable and alternative energy.	**CO 8.2.3** **pg. CO-93** **(Con/OS 8/09)**	**Policy CO 8.2.3:** Support purchase of renewable energy for public buildings, which may include installing solar photovoltaic systems to generate electricity for city buildings and operations and other methods as deemed appropriate and feasible, in concert with significant energy conservation efforts.[39]

[39] CO 8.2.3 applies to public buildings only.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
AE-5.1 **pg. 96**	**AE-5.1 Green Electricity Purchasing:** The City/County will establish targets for the purchase of renewable energy, in excess of the state Renewable Portfolio Standards, using such mechanisms as green tags or renewable energy certificates.	***None***	*OVOV has no similar language.*
AE-5.2 **pg. 96**	**AE-5.2 Community Choice Aggregation:** The City/County will evaluate the feasibility and effectiveness of using Community Choice Aggregation as a model for providing renewable energy to meet the community's electricity needs, including potential partnerships with other jurisdictions.	***None***	*OVOV has no similar language, however the City conducted a study on aggregation in 2002 and decided not to pursue it.*
CAPCOA – Municipal Operations Policies		**OVOV**	
Reference	**Language**	**Reference**	**Language**
MO-1 **pg. 97**	**Objective MO-1:** The City/County will enhance the energy efficiency of its facilities.	**CO 8.2** **pg. CO-93** **(Con/OS 8/09)**	**Objective 8.2:** Reduce energy and materials consumption and greenhouse gas emissions in public uses and facilities.
MO-1.1 **pg. 97**	**MO-1.1 Energy Efficiency Plan:** The City/County will prepare and implement a comprehensive plan to improve energy efficiency of municipal facilities	***None***	*OVOV has no similar language, however the City Council has adopted an Environmentally Preferable Purchasing Plan that captures many elements of what MO-1.1 refers to as an "Energy Efficiency Plan".*
MO-1.1.1 **pg. 97**	**1.1.1** Conduct energy audits for all municipal facilities;	**CO 8.2.2** **pg. CO-93** **(Con/OS 8/09)**	**Policy CO 8.2.2:** Ensure energy efficiency of existing public buildings through energy audits and repairs, and retrofit buildings with energy efficient heating and air conditioning systems and lighting fixtures, with a goal of completing energy repairs in City facilities by 2012.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-1.1.2 **pg. 97**	**1.1.2** Retrofit facilities for energy efficiency where feasible and when remodeling or replacing components, including increased insulation, installing green or reflective roofs and low-emissive window glass;	**CO 8.2.2** **pg. CO-93** **(Con/OS 8/09)**	**Policy CO 8.2.2:** Ensure energy efficiency of existing public buildings through energy audits and repairs, and retrofit buildings with energy efficient heating and air conditioning systems and lighting fixtures, with a goal of completing energy repairs in City facilities by 2012.
MO-1.1.3 **pg. 97**	**1.1.3** Implement an energy tracking and management system;	***None***	*OVOV has no similar language, however the Environmentally Preferable Purchasing Policy generates an annual report that tracks the progress of each element within the plan, including the installation and retrofit of energy efficient products.*
MO-1.1.4 **pg. 97**	**1.1.4** Install energy-efficient exit signs, street signs, and traffic lighting;	**CO 8.2.10** **pg. CO-94** **(Con/OS 8/09) and** **C 3.2.2** **pg. C-65** **(Circ 8/09)**	**Policy CO 8.2.10:** Support installation of energy-efficient traffic control devices, street lights, and parking lot lights. *The City has been transitioning to LED lighting in all traffic signals since 2007 and will be 100% LED by the end of 2010.* **Policy C 3.2.2:** Continue to enhance signal timing and synchronization to allow for free traffic flow, minimizing idling and vehicle emissions.
MO-1.1.5 **pg. 97**	**1.1.5** Install energy-efficient lighting retrofits and occupancy sensors, and institute a "lights out at night" policy;	**CO 8.2.2 &** **8.2.4** **pg. CO-93** **(Con/OS 8/09)**	**Policy CO 8.2.2:** Ensure energy efficiency of existing public buildings through energy audits and repairs, and retrofit buildings with energy efficient heating and air conditioning systems and lighting fixtures, with a goal of completing energy repairs in City facilities by 2012. **Policy CO 8.2.4:** Establish maximum lighting levels for public facilities, and encourage reduction of lighting levels to the level needed for security purposes after business hours, in addition to use of downward-directed lighting and use of low-reflective paving surfaces.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-1.1.6 pg. 97	**1.1.6** Retrofit heating and cooling systems to optimize efficiency (e.g., replace chillers, boilers, fans, pumps, belts, etc.);	**CO 8.2.2 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.2.2:** Ensure energy efficiency of existing public buildings through energy audits and repairs, and retrofit buildings with energy efficient heating and air conditioning systems and lighting fixtures, with a goal of completing energy repairs in City facilities by 2012.
MO-1.1.7 pg. 97	**1.1.7** Install Energy Star® appliances and energy-efficient vending machines;	**CO 8.2.8 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.8:** Promote the purchase of energy-efficient and recycled products, and vendors and contractors who use energy-efficient vehicles and products, consistent with adopted purchasing policies.
MO-1.1.8 pg. 97	**1.1.8** Improve efficiency of water pumping and use at municipal facilities, including a schedule to replace or retrofit system components with high-efficiency units (i.e., ultra-low-flow toilets, fixtures, etc.);	**CO 8.2.1 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.2.1:** Ensure that all new City buildings, and all major renovations and additions, meet adopted green building standards, with a goal of achieving the LEED (Leadership in Energy and Environmental Design) Silver rating or above, or equivalent where appropriate.[40]
MO-1.1.9 pg. 97	**1.1.9** Provide chilled, filtered water at water fountains and taps in lieu of bottled water;[41]	***None***	*OVOV has no similar language.*
MO-1.1.10 pg. 97	**1.1.10** Install a central irrigation control system and time its operation for off-peak use;	**CO 4.1.2 pg. CO-86 (Con/OS 8/09)**	**Policy CO 4.1.2:** Provide examples of water conservation in landscaping through use of low water use landscaping in public spaces such as parks, landscaped medians and parkways, plazas, and around public buildings.
MO-1.1.11 pg. 97	**1.1.11** Adopt an accelerated replacement schedule for energy inefficient systems and components.	***None***	*Although CO 8.2.2 does call for a retrofit program, there is no similar language in OVOV regarding an "accelerated replacement schedule."*
MO-1.2 pg. 97	**MO-1.2 Efficiency Requirement for New Facilities:** The City/County will require that any newly constructed, purchased, or leased municipal space meet minimum standards as appropriate,	***See below***	*See Below.*

[40] Note that LEED Silver certification requires a variety of efficient water fixtures.
[41] MO-1.1.10 is another example, similar to Notes 11 and 13, of items that seem too specific for General Plan use.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-1.2.1 pg. 98	**1.2.1** Requirements for new commercial buildings to meet LEED criteria established by the U.S. Green Building Council;	**CO 8.2.1 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.2.1:** Ensure that all new City buildings, and all major renovations and additions, meet adopted green building standards, with a goal of achieving the LEED (Leadership in Energy and Environmental Design) Silver rating or above, or equivalent where appropriate.
MO-1.2.2 pg. 98	**1.2.2** Requirements for new residential buildings to meet criteria of the Energy Star® New Homes Program established by U.S. EPA;	**CO 8.2.8 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.8:** Promote the purchase of energy-efficient and recycled products, and vendors and contractors who use energy-efficient vehicles and products, consistent with adopted purchasing policies.[42]
MO-1.2.3 pg. 98	**1.2.3** Incorporation of passive solar design features in new buildings, including daylighting and passive solar heating;	***None***	*Although OVOV has similar language for privately owned buildings (CO 8.3.6), there is no similar language for public buildings. However, new city buildings are required to meet LEED Sliver standards.*
MO-1.2.4 pg. 98	**1.2.4** Retrofitting of existing buildings to meet standards under Title 24 of the California Building Energy Code, or to achieve a higher performance standard as established by the City/County;	***None***	*OVOV has no similar language for the retrofit of existing buildings other than that included in CO 8.2.2.*
MO-1.2.5 pg. 98	**1.2.5** Retrofitting of existing buildings to decrease heat gain from non-roof impervious surfaces with cool paving, landscaping, and other techniques.	**CO 8.2.9 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.9:** Reduce heat islands through installation of trees to shade parking lots and hardscapes, and use of light-colored reflective paving and roofing surfaces.[43]
MO-1.3 pg. 98	**MO-1.3 Training & Support:** The City/County will ensure that staff receives appropriate training and support to implement objectives and policies to reduce GHG emissions	***See Below***	*See Below.*

[42] CO 8.2.8 implies that energy efficient products should be purchased for all publicly-owned buildings, residential or otherwise.
[43] Note that 8.2.9 does not specify if this item is for new or existing (or both).

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-1.3.1 pg. 98	**1.3.1** Provide energy efficiency training to design, engineering, building operations, and maintenance staff;	**CO 8.2.12 pg. CO-95 (Con/OS 8/09)**	**Policy CO 8.2.12:** Provide ongoing training to appropriate City employees on sustainable planning, building, and engineering practices.
MO-1.3.2 pg. 98	**1.3.2** Provide information on energy use and management, including data from the tracking and management system, to managers and others making decisions that influence energy use;	**CO 8.2.12 pg. CO-95 (Con/OS 8/09)**	**Policy CO 8.2.12:** Provide ongoing training to appropriate City employees on sustainable planning, building, and engineering practices.
MO-1.3.3 pg. 98	**1.3.3** Provide energy design review services to departments undertaking new construction or renovation projects, to facilitate compliance with LEED standards.	**CO 8.2.12 pg. CO-95 (Con/OS 8/09)**	**Policy CO 8.2.12:** Provide ongoing training to appropriate City employees on sustainable planning, building, and engineering practices.
MO-2 pg. 98	**Objective MO-2:** The City/County will improve efficiency at municipal systems and reduce GHG emissions from vehicle and equipment engines.	***See Below***	*See Below.*
MO-2.1 pg. 98	**MO-2.1 Wastewater System Efficiency:** The City/County will maximize efficiency of wastewater treatment and pumping equipment.	***None***	*OVOV has no similar language. The City does not handle wastewater treatment. However, two water pipelines that run through Santa Clarita to service LA City are gravity fed and use no pumping equipment.*
MO-2.2 pg. 98	**MO-2.2 Drinking Water System Efficiency:** The City/County will maximize efficiency at drinking water treatment, pumping, and distribution facilities, including development of off-peak demand schedules for heavy commercial and industrial users.	***None***	*OVOV has no similar language. The City does not handle water treatment or distribution facilities.*
MO-2.3 pg. 98	**MO-2.3 Fleet Replacement:** The City/County will establish a replacement policy and schedule to replace fleet vehicles and equipment with the most fuel-efficient vehicles practical, including gasoline	**CO 8.2.7 pg. CO-94 (Con/OS 8/09) and**	**Policy CO 8.2.7:** Support the use of sustainable alternative fuel vehicles for machinery and fleets, where practical, by evaluating fuel sources, manufacturing processes, maintenance costs and vehicle lifetime use.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
	hybrid and alternative fuel or electric models.	**C 3.2.1 pg. C-65 (Circ 8/09)**	**Policy C 3.2.1:** Adopt clean vehicle purchase policies for City and County fleets.[44]
MO-2.4 pg. 99	**MO-2.4 Small Tools and Equipment:** Install outdoor electrical outlets on buildings to support the use of electric lawn and garden equipment, and other tools that would otherwise be run with small gas engines or portable generators.	***None***	*OVOV has no similar language.*
MO-3 pg. 99	**Objective MO-3:** The City/County will implement measures to reduce employee vehicle trips and to mitigate emissions impacts from municipal travel.	**CO 8.2.13 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.13:** Support trip reduction strategies for employees as described in the Circulation Element.
MO-3.1 pg. 99	**MO-3.1 Trip Reduction Program:** The City/County will implement a program to reduce vehicle trips by employees	***See Below***	*See Below.*
MO-3.1.1 pg. 99	**3.1.1** Providing incentives and infrastructure for vanpooling and carpooling, such as pool vehicles, preferred parking, and a website or bulletin board to facilitate ride-sharing;	**C 1.1.3 & 1.1.6 Pg. C-59 (Circ 8/09)**	**Policy C 1.1.3:** Work with local and regional agencies and employers to promote an integrated, seamless transportation system that meets access needs, including local and regional bus service, dial-a-ride, taxis, rail, van pools, car pools, bus pools, bicycling, walking, and automobiles. **Policy C 1.1.6:** Encourage multi-modal travel through provision of adequate facilities, including but not limited to bicycle parking and storage, expansion of park-and-ride lots, and provision of adequate station and transfer facilities in appropriate locations.
MO-3.1.2 pg. 99	**3.1.2** Providing subsidized passes for mass transit;	***None***	*OVOV has no similar language, however any City employee is able to access local bus service free of charge, and employees who ride the train receive a $60 monthly voucher, good for approximately 10 rides.*

[44] The City of Santa Clarita has already adopted an alternative fuel vehicle purchasing program as part of its Environmentally Preferable Purchasing Policy.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-3.1.3 pg. 99	**3.1.3** Offering compressed work hours, off-peak work hours, and telecommuting, where appropriate;	**C 3.1.3 pg. C-64 (Circ 8/09)**	**Policy C 3.1.3:** Promote the use of flexible work schedules and telecommuting to reduce home to work trips.
MO-3.1.4 pg. 99	**3.1.4** Offer a guaranteed ride home for employees who use alternative modes of transportation to commute.	**C 3.1 pg. C-64 (Circ 8/09)**	**Objective C 3.1:** Promote the use of travel demand management strategies to reduce vehicle trips.[45]
MO-3.2 pg. 99	**MO-3.2 Bicycle Transportation Support:** The City/County will promote and support the use of bicycles as transportation	***See Below***	*See Below.*
MO-3.2.1 pg. 99	**3.2.1** Providing bicycle stations with secure, covered parking, changing areas with storage lockers and showers, as well as a central facility where minor repairs can be made;	**C 3.1.6 pg. C-65 (Circ 8/09)**	**Policy C 3.1.6:** Promote the provision of showers and lockers within businesses and employment centers, in order to encourage opportunities for employees to bicycle to work.
MO-3.2.2 pg. 99	**3.2.2** Providing bicycles, including electric bikes, for employees to use for short trips during business hours;	***None***	*OVOV has no similar language.*
MO-3.2.3 pg. 99	**3.2.3** Implementing a police-on-bicycles program;	***None***	*OVOV has no similar language. Program implementation would require an agreement with the Los Angeles County Sheriff's Department, who already operate a police-on-bicycles program.*
MO-3.2.4 pg. 99	**3.2.4** Providing a bicycle safety program, and information about safe routes to work.	***None***	*OVOV has no similar language, however the City currently operates a Share the Road safety program and OVOV will be consistent with the safety guidelines in the Non-Motorized Master Plan.*
MO-3.3 pg. 99	**MO-3.3 Municipal Parking Management:** The City/County will implement a Parking Management Program to discourage private vehicle use,	**C 3.3 pg. C-65 (Circ 8/09)**	**Objective C 3.3:** Make more efficient use of parking and maximize economic use of land, while decreasing impervious surfaces in urban areas, through parking management strategies.
MO-3.3.1 pg. 99	**3.3.1** Encouraging carpools and vanpools with preferential parking and a reduced parking fee;	**C 3.1.5 pg. C-65 (Circ 8/09)**	**Policy C 3.1.5:** Promote the use of van pools, car pools, and shuttles to encourage trip reduction.[46]

[45] The draft Circulation Element (August, 2009), page 36, discusses the concept of "Travel Demand Management"(TDM) at length. The discussion contains a number of examples of TDM programs include "Guaranteed Ride Home programs for employees who use alternative travel modes to work".
[46] Preferential parking and a reduced parking fee could be included within these programs, although C 3.1.5 does not specifically identify them.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-3.3.2 pg. 100	**3.3.2** Institute a parking cash-out program;	***None***	*OVOV has no similar language.*
MO-3.3.3 pg. 100	**3.3.3** Renegotiate employee contracts, where possible, to eliminate parking subsidies;	***None***	*OVOV has no similar language. The City does not use employee contracts.*
MO-3.3.4 pg. 100	**3.3.4** Install on-street parking meters with fee structures designed to discourage private vehicle use;	**NEW LU POLICY**	**NEW LAND USE ELEMENT POLICY:** Establish performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times wherever feasible.
MO-3.3.5 pg. 100	**3.3.5** Establish a parking fee for all single-occupant vehicles.	***None***	*OVOV has no similar language.*
MO-3.4 pg. 100	**MO-3.4 Travel Mitigation:** The City/County will mitigate business-related travel, especially air travel, through the annual purchase of verified carbon offsets.	***None***	*OVOV has no similar language.*[47]
MO-3.5 pg. 100	**MO-3.5 Transit Access to Municipal Facilities:** Municipal employment and service facilities shall be located on major transit corridors, unless their use is plainly incompatible with other uses located along major transit corridors.	***None***	*OVOV has no similar language, although most City buildings are already located on major transit corridors (City Hall on Valencia Blvd, etc).*
MO-4 pg. 100	**Objective MO-4:** The City/County will enhance renewable energy generation, and implement programs for load management and demand response.	***None***	*OVOV has no similar language. The City is not a utility and does not control energy generation, load management, or demand response programs.*

[47] CO 8.3.11 states that carbon offsets should be considered as mitigation for large development projects, but there is no language about using carbon offsets to mitigate for municipal business travel.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-4.1 pg. 100	**MO-4.1 Load Management and Demand Response:** The City/County will design and implement peak load management and demand response programs for water pollution control, supply and treatment, and distribution, including interface with existing automated systems for building energy management and SCADA systems.	***None***	*OVOV has no similar language. The City is not a utility and does not control load management or demand response programs.*
MO-4.2 pg. 100	**MO-4.2 Renewable Energy Installation:** The City/County will install renewable energy systems at its facilities where feasible	***See Below***	*See Below.*
MO-4.2.1 pg. 100	**4.2.1** Solar collection systems on municipal roofs;	**CO 8.2.3 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.2.3:** Support purchase of renewable energy for public buildings, which may include installing solar photovoltaic systems to generate electricity for city buildings and operations and other methods as deemed appropriate and feasible, in concert with significant energy conservation efforts.
MO-4.2.2 pg. 100	**4.2.2** Solar water heating for municipal pools;	**CO 8.2.5 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.2.5:** Support installation of photovoltaic and other renewable energy equipment on public facilities, in concert with significant energy conservation efforts.
MO-4.2.3 pg. 100	**4.2.3** Waste-to-energy systems at waste handling operations.	***None***	*OVOV has no similar language. The City does not operate waste handling facilities and none exist in the city.*
MO-5 pg. 100	**Objective MO-5:** The City/County will manage its stock of vegetation to reduce GHG emissions.	***See Below***	*See below.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
MO-5.1 pg. 100	**MO-5.1 Urban Tree Management:** The City/County will conduct a comprehensive inventory and analysis of the urban forest, and coordinate tree maintenance responsibilities with all responsible departments, consistent with best management practices.	**CO 3.5 pg. CO-85 (Con/OS 8/09)**	**Objective CO 3.5:** Maintain, enhance, and manage the urban forest throughout developed portions of the Santa Clarita Valley to provide habitat, reduce energy consumption, and create a more livable environment.
MO-5.2 pg. 100	**MO 5.2 Landscaping:** The City/County will evaluate existing landscaping and options to convert reflective and impervious surfaces to landscaping, and will install or replace vegetation with drought-tolerant, low-maintenance native species or edible landscaping that can also provide shade and reduce heat-island effects.	**CO 4.1.2 pg. CO-86 (Con/OS 8/09)**	**Policy CO 4.1.2:** Provide examples of water conservation in landscaping through use of low water use landscaping in public spaces such as parks, landscaped medians and parkways, plazas, and around public buildings.[48]
MO-6 pg. 101	**Objective MO-6:** The City/County will use its purchasing power to promote reductions in GHG emissions by the suppliers of its goods and services.	***See Below***	*See below.*
MO-6.1 pg. 101	**MO-6.1 Purchasing Practices:** The City/County will adopt purchasing practices and standards to support reductions in GHG emissions, including preferences for energy-efficient office equipment, and the use of recycled materials and manufacturers that have implemented green management practices.	**CO 8.2.8 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.8:** Promote the purchase of energy-efficient and recycled products, and vendors and contractors who use energy-efficient vehicles and products, consistent with adopted purchasing policies.
MO-6.2 pg. 101	**MO-6.2 Contracting Practices:** The City/County will establish bidding standards and contracting practices that encourage GHG emissions reductions, including preferences or points for the use of low or zero emission vehicles and equipment, recycled materials, and provider implementation of other green management practices.	**CO 8.2.8 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.8:** Promote the purchase of energy-efficient and recycled products, and vendors and contractors who use energy-efficient vehicles and products, consistent with adopted purchasing policies.
CAPCOA – Waste Reduction Policies		**OVOV**	

[48] The City, and all cities and counties throughout California, will be subject to the requirements of AB1881 on January 1, 2010.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	Language	Reference	Language
Reference	Language	Reference	Language
WRD-1 **pg. 102**	**Objective WRD-1:** The City/County will improve emissions control at waste handling facilities.	***None***	*OVOV has no similar language. There are no waste-handling facilities in the city.*
WRD-1.2 **pg. 102**	**WRD-1.1 Methane Recovery:** The City/County will establish methane recovery at all wastewater and solid waste treatment facilities.	***None.***	*OVOV has no similar language, however Chiquita Canyon Landfill presently operates a methane recovery system.*[49]
WRD-1.3 **pg. 102**	**WRD-1.3 Best Management Practices:** The City/County will utilize best management practices at all waste handling facilities.	***None***	*OVOV has no similar language. The City does not operate waste handling facilities. Currently, franchisees are required to recycle 50% or more of what they collect, however the City does not tell them how to accomplish this requirement.*
WRD-2 **pg. 102**	**Objective WRD-2:** The City/County will implement enhanced programs to divert solid waste from landfill operations.	***See Below***	*See below.*
WRD-2.1 **pg. 102**	**WRD-2.1 Diversion Targets:** The City/County will achieve a solid waste diversion of 75% of the waste stream by 2020.	***None***	*OVOV has no similar language.*
WRD-2.2 **pg. 102**	**WRD-2.2 Diversion Services:** The City/County will expand jurisdiction-wide waste diversion services to include, for example, single stream curbside recycling, and curbside recycling of food and greenwaste.	**CO 8.4.2** **pg. CO-95** **(Con/OS 8/09)**	**Policy CO 8.4.2:** Adopt mandatory residential recycling programs for all residential units, including single-family and multi-family dwellings. *The City of Santa Clarita currently offers residential and commercial/industrial recycling programs including requiring C&D recycling and greenwaste collection as part of the Construction and Demolition Ordinance.*
WRD-2.3 **pg. 102**	**WRD-2.3 Construction and Demolition Waste:** The City/County will adopt a Construction and Demolition Waste Recovery Ordinance, requiring building projects to recycle or reuse a minimum percentage of unused or leftover building materials	***See Below***	*See below.*

[49] Chiquita Canyon Landfill is located within the unincorporated Los Angeles County.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
WRD-2.3.1 pg. 102	**2.3.1** Require all new development and major rehabilitation projects (additions of 25,000 square feet commercial or 100,000 square feet industrial) to recycle or salvage XX% of non-hazardous construction and demolition debris (excluding excavated soil and land-clearing debris);	***None***	*The City currently requires C&D recycling as part of the Construction and Demolition Ordinance.*
WRD-2.3.2 pg. 102	**2.3.2** Require preparation of a construction waste management plan identifying materials to be diverted from disposal, and how material will be stored and handled;	***See above***	*See above.*
WRD-2.3.3 pg. 102	**2.3.3** Establish clear and consistent guidelines for calculation methods, recordkeeping, and reporting to document compliance with the plan;	***See above***	*See above.*
WRD-2.3.4 pg. 103	**2.3.4** Establish clear and consistent guidelines for how and when used construction materials can be used in new or remodel construction.	***See above***	*See above.*
WRD-2.4 pg. 103	**WRD-2.4 Reuse Center:** The City/County will establish a reuse/recycling center where furniture, appliances, building materials, and other useful, nonhazardous items may be dropped off or purchased for a nominal fee.	***None***	*OVOV has no similar language.*
WRD-2.5 pg. 103	**WRD-2.5 Program Promotion:** The City/County will promote and expand recycling programs, purchasing policies, and employee education to reduce the amount of waste produced.	**CO 8.2.8 & 8.2.11 pg. CO-94 (Con/OS 8/09)**	**Policy CO 8.2.8:** Promote the purchase of energy-efficient and recycled products, and vendors and contractors who use energy-efficient vehicles and products, consistent with adopted purchasing policies. **Policy CO 8.2.11:** Implement recycling in all public buildings, parks, and public facilities, including for special events.
WRD-3 pg. 103	**Objective WRD-3:** The City/County will enhance regional coordination on waste management.	***None***	*OVOV has no similar language, however the City does participate in the Los Angeles County Solid Waste Management Committee/Integrated Waste Management Task Force.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
WRD-3.1 **pg. 103**	**WRD-3.1 Regional Coordination:** The City/County will coordinate with other agencies in its region to develop and implement effective waste management strategies and waste-to-energy technologies.	***None***	*OVOV has no similar language, however the City does participate in the Los Angeles County Solid Waste Management Committee/Integrated Waste Management Task Force.*

CAPCOA – Conservation & Open Space Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
COS-1 **pg. 104**	**Objective COS-1:** The City/County will adopt and implement a comprehensive strategy to increase water conservation and the use of recycled water.	***None***	*OVOV has no similar language, however the City, and all cities and counties throughout California, will be subject to the requirements of AB1881 on January 1, 2010.*[50]
COS-1.1 **pg. 104**	**COS-1.1 Water Consumption Reduction Target:** The City/County will reduce per capita water consumption by 20% by 2020.	***None***	*OVOV has no similar language, however the City, and all cities and counties throughout California, will be subject to the requirements of AB1881 on January 1, 2010.*
COS-1.2 **pg. 104**	**COS-1.2 Water Conservation Plan:** The City/County will establish a water conservation plan that may include such policies and actions as:	**CO 4.1.1** **pg. CO-86** **(Con/OS 8/09)**	**Policy CO 4.1.1:** In coordination with applicable water suppliers, adopt and implement a water conservation strategy for public and private development.

[50] *In 2008 the Governor called for the State Water Resources Control Board to develop a plan that will reduce the statewide consumption of water by 20% by 2020 (called "20x2020"). The State Model Water Efficient Landscape Ordinance (AB1881) represents only a portion of this plan.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
COS-1.2.1 pg. 104	**1.2.1** Tiered rate structures for water use;	**CO 4.1.1 pg. CO-86 (Con/OS 8/09)**	**Policy CO 4.1.1:** In coordination with applicable water suppliers, adopt and implement a water conservation strategy for public and private development.
COS-1.2.2 pg. 104	**1.2.2** Restrictions on time of use for landscape watering, and other demandmanagement strategies;	**CO 4.1.1 pg. CO-86 (Con/OS 8/09)**	**Policy CO 4.1.1:** In coordination with applicable water suppliers, adopt and implement a water conservation strategy for public and private development.
COS-1.2.3 pg. 104	**1.2.3** Performance standards for irrigation equipment and water fixtures;	**CO 4.1.1 pg. CO-86 (Con/OS 8/09)**	**Policy CO 4.1.1:** In coordination with applicable water suppliers, adopt and implement a water conservation strategy for public and private development.[51]
COS-1.3 pg. 104	**COS-1.3 Recycled Water Use:** The City/County will establish programs and policies to increase the use of recycled water	**CO 4.2.1 pg. CO-87 (Con/OS 8/09)**	**Policy CO 4.2.1:** In cooperation with the Sanitation District and other affected agencies, expand opportunities for use of recycled water for the purposes of landscape maintenance, construction, water recharge, and other uses as appropriate.
COS-1.3.1 pg. 104	**1.3.1** Create an inventory of non-potable water uses within the jurisdiction that could be served with recycled water;	***None***	*OVOV has no similar language, however the Urban Water Management Plan does address "historical water usage" and identifies potential future users of recycled water.*
COS-1.3.2 pg. 104	**1.3.2** Produce and promote the use of recycled water for agricultural, industrial, and irrigation purposes, including grey water systems for residential irrigation;	**CO 4.2.3 pg. CO-88 (Con/OS 8/09)**	**Policy CO 4.2.3:** Promote the installation of rainwater capture and gray water systems in new development for irrigation, where feasible and practicable.
COS-1.3.3 pg. 104	**1.3.3** Produce and promote the use of treated, recycled water for potable uses where GHG emissions from producing such water are lower than from other potable sources.	***None***	*OVOV has no similar language, however the UWMP comprehensively addresses water conservation and recycling opportunities and includes a recycled water comparison.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
COS-1.4 **pg. 104**	**COS-1.4 Water Conservation Outreach:** The City/County will implement a public education and outreach campaign to promote water conservation, and will highlight specific water-wasting activities to discourage, such as the watering of non-vegetated surfaces and using water to clean sidewalks and driveways.	**CO 4.1.4** **pg. CO-86** **(Con/OS 8/09)**	**Policy CO 4.1.4:** Provide informational materials to applicants and contractors on the Castaic Lake Water Agency's Landscape Education Program, and/or other information on xeriscape, native California plants, and water-conserving irrigation techniques as materials become available.[52]
COS-2 **pg. 105**	**Objective COS-2:** The City/County will ensure that building standards and permit approval processes promote and support water conservation.[53]	***See below***	*See below.*
COS-2.1 **pg. 105**	**COS-2.1 Water-Efficient Design:** The City/County will establish building design guidelines and criteria to promote water-efficient building design, including minimizing the amount of non-roof impervious surfaces around the building(s).	**CO 4.1.5, 4.1.6, 4.1.7 & 4.2.3** **pg. CO-87** **(Con/OS 8/09)**	**Policy CO 4.1.5:** Promote the use of low-flow and/or waterless plumbing fixtures and appliances in all new residential and non-residential development and residential development of five or more dwelling units. **Policy CO 4.1.6:** Support amendments to the building code that would promote upgrades to water and energy efficiency when issuing permits for renovations or additions to existing buildings. **Policy CO 4.2.3:** Promote the installation of rainwater capture and gray water systems in new buildings for irrigation, where feasible and practicable.
			Policy CO 4.1.7: Apply water conservation policies to all pending development projects, including approved tentative subdivision maps to the extent permitted by law; where precluded from adding requirements by vested entitlements, encourage water conservation in construction and landscape design.

[52] Note that a public outreach campaign on water efficiency exists at the City of Santa Clarita's green website, http://www.greensantaclarita.com/greenfriendlytips.asp#water. Additional resources can be found at the CLWA website http://www.clwa.org/ .

[53] The new California Green Building Standards Code Sections 603 and 604 deal with indoor and outdoor water use. These sections may become mandatory in 2011.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
COS-2.2 pg. 105	**COS-2.2 Water-Efficient Infrastructure and Technology:** The City/County will establish menus and check-lists for developers and contractors to ensure water-efficient infrastructure and technology are used in new construction, including low-flow toilets and shower heads, moisture-sensing irrigation, and other such advances.	**CO 4.1.5 pg. CO-87 (Con/OS 8/09)**	**Policy CO 4.1.5:** Promote the use of low-flow and/or waterless plumbing fixtures and appliances in all new residential and non-residential development and residential development of five or more dwelling units.
COS-2.2 pg. 105	**COS-2.3 Gray Water System Standards:** The City/County will establish criteria and standards to permit the safe and effective use of gray water (on-site water recycling), and will review and appropriately revise, without compromising health and safety, other building code requirements that might prevent the use of such systems.	**CO 4.2.3 pg. CO-88 (Con/OS 8/09)**	**Policy CO 4.2.3:** Promote the installation of rainwater capture and gray water systems in new development for irrigation, where feasible and practicable.
COS-3 pg. 105	**Objective COS-3:** The City/County will establish programs and policies to ensure landscaping and forests are installed and managed to optimize their climate benefits.	***See Below***	*See Below.*
COS-3.1 pg. 105	**COS-3.1 Water-Efficient Landscapes:** The City/County will install water efficient landscapes and irrigation.[54]	**CO 4.1.3 pg. CO-87 (Con/OS 8/09)**	**Policy CO 4.1.3:** Promote low water use landscaping in new residential subdivisions and other private development projects, including a reduction in the amount of turf-grass. *For any landscape review process, the city employs a consultant who reviews all landscape plans for water efficiency and vegetation suitability, among other criteria.*
COS-3.1.1 pg. 105	**3.1.1** Planting drought-tolerant and native species, and covering exposed dirt with moisture-retaining mulch;	**CO 10.2.1 pg. CO-100 (Con/OS 8/09)**	**Policy CO 10.2.1:** Encourage provision of vegetated open space on a development project's site, which may include shallow wetlands and ponds, drought tolerant landscaping, and pedestrian hardscape that includes vegetated areas.

[54] The City, and all cities and counties throughout California, will be subject to the requirements of AB1881 on January 1, 2010.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
			For any landscape review process, the city employs a consultant who reviews all landscape plans for water efficiency and vegetation suitability, among other criteria.
COS-3.1.2 pg. 105	**3.1.2** Installing water-efficient irrigation systems and devices, including advanced technology such as moisture-sensing irrigation controls;	***None***	*OVOV has no similar language, however this kind of technology is required as part of AB1881.*
COS-3.1.3 pg. 105	**3.1.3** Installing edible landscapes that provide local food.	***None***	*OVOV has no similar language.*
COS-3.2 pg. 105	**COS-3.2 Shade Tree Planting:** The City/County will promote the planting of shade trees and will establish shade tree guidelines and specifications	**CO 3.6.2.d pg. CO-86 (Con/OS 8/09)**	**Policy CO 3.6.2:** Reduce impervious surfaces and provide more natural vegetation to enhance microclimates and provide habitat. In implementing this policy, consider the following design concepts: d. Breaking up large expanses of paving with natural landscaped areas planted with shade trees to reduce the heat island effect, along with shrubs and groundcover to provide diverse vegetation for habitat.
COS-3.2.1 pg. 105	**3.2.1** Recommendations for tree planting based on the land use (residential, commercial, parking lots, etc.);	***None***	*OVOV has no similar language, however the City currently has design standards for tree planting based on land use in the Community Character and Design Guidelines.*
COS-3.2.2 pg. 105	**3.2.2** Recommendations for tree types based on species size, branching patterns, whether deciduous or evergreen, whether roots are invasive, etc.	***None***	*OVOV has no similar language, however the City currently has design standards for tree types in the Community Character and Design Guidelines.*
COS-3.2.3 pg. 106	**3.2.3** Recommendations for placement, including distance from structures, density of planting, and orientation relative to structures and the sun.	***None***	*OVOV has no similar language.*
COS-3.3 pg. 106	**COS-3.3 Urban Forestry Management:** The City/County will develop an Urban Forestry Program to consolidate policies and ordinances regarding tree planting, maintenance, and removal.	**CO 3.5 pg. CO-85 (Con/OS 8/09)**	**Objective CO 3.5:** Maintain, enhance, and manage the urban forest throughout developed portions of the Santa Clarita Valley to provide habitat, reduce energy consumption, and create a more livable environment.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
COS-3.3.1 pg. 106	**3.3.1** Establish a tree-planting target and schedule to support the goals of the California Climate Action Team to plant 5 million trees in urban areas by 2020;	***None***	*OVOV has no similar language; however the City of Santa Clarita has been recognized as a Tree City USA since 1990.*
COS-3.3.1 pg. 106	**3.3.2** Establish guidelines for tree planting, including criteria for selecting deciduous or evergreen trees low-VOC-producing trees, and emphasizing the use of drought-tolerant native trees and vegetation.	***None***	*OVOV has no similar language; however, the City, and all cities and counties throughout California, will be subject to the requirements of AB1881 on January 1, 2010.*
COS-4 pg. 106	**Objective COS-4:** The City/County will establish policies and programs to develop and preserve conservation areas, including forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, and groundwater recharge areas, that remove and sequester carbon from the atmosphere.	**CO 10.1.3 pg. CO-98 (Con/OS 8/09)**	**Policy CO 10.1.3:** Through dedications and acquisitions, obtain open space needed to preserve and protect wildlife corridors and habitat, which may include land within SEA's, wetlands, woodlands, water bodies, and areas with threatened or endangered flora and fauna.
COS-4.1 pg. 106	**COS-4.1 Conservation Area Development:** The City/County will establish programs and funding mechanisms to create protected conservation areas,	**CO 10.1.3 pg. CO-98 (Con/OS 8/09)**	**Policy CO 10.1.3:** Through dedications and acquisitions, obtain open space needed to preserve and protect wildlife corridors and habitat, which may include land within SEA's, wetlands, woodlands, water bodies, and areas with threatened or endangered flora and fauna.
COS-4.1.1 pg. 106	**4.1.1** Imposing mitigation fees for development on lands that would otherwise be conservation areas, and use the funds generated to protect other areas from development;	***None***	*OVOV has no similar language.*
COS-4.1.2 pg. 106	**4.1.2** Proposing for voter approval a small tax increment (e.g., a quarter cent sales tax, perhaps for a finite time period that could be renewed) to fund the purchase of development rights in conservation areas, or purchase of the land outright.	**CO 10.1.10 pg. CO-99 (Con/OS 8/09)**	**Policy CO 10.1.10:** Ensure that the open space acquisition plan developed pursuant to the 2007 Open Space District formation conforms to General Plan goals and objectives.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
COS-4.1.2 pg. 106	**COS-4.2 Conservation Area Preservation:** The City/County will establish policies to preserve existing conservation areas, and to discourage development in those areas.	**CO 10.1.3 pg. CO-98 (Con/OS 8/09)**	**Policy CO 10.1.3:** Through dedications and acquisitions, obtain open space needed to preserve and protect wildlife corridors and habitat, which may include land within SEA's, wetlands, woodlands, water bodies, and areas with threatened or endangered flora and fauna.

CAPCOA – Education & Outreach Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EO-1 pg. 107	**Objective EO-1:** The City/County will establish a coordinated, creative public outreach campaign, including publicizing the importance of reducing GHG emissions and steps community members can take to reduce their individual impacts.	**CO 1.2.1 & 1.5.4 pg. CO-78, 80 (Con/OS 8/09)**	**Policy CO 1.2.1:** Improve the community's understanding of renewable resource systems that occur naturally in the Santa Clarita Valley, including systems related to hydrology, energy, ecosystems, and habitats, and the interrelationships between these systems. **Policy CO 1.5.4:** Seek ways to discourage human behavior that may be detrimental to natural systems and to encourage environmental responsibility, through education, incentives, removing barriers, enforcement, and other means as practicable and feasible.
EO-1.1 pg. 107	**EO-1.1 Outreach Methods:** The City/County will use a variety of media and methods to promote climate awareness and GHG reduction	**CO 8.1.5 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.1.5:** Coordinate various activities within the community and appropriate agencies related to GHG emissions reduction activities
EO-1.1.1 pg. 107	**1.1.1** TV and radio spots with local celebrities and community leaders;	***None***	*OVOV has no similar language, however the City currently uses KHTS (local AM radio) and SCTV (local cable) as outreach platforms.*
EO-1.1.2 pg. 107	**1.1.2** Advertising "Green Tips" in the local paper;	***None***	*OVOV has no similar language, however the City already promotes "Green Tips" in the local newspaper.*
EO-1.1.3 pg. 107	**1.1.3** Collaborating with utilities, business associations, civic groups, and nonprofits to place tips and articles in billing materials or newsletters;	***None***	*OVOV has no similar language, however the City could use its existing green website, www.greensantaclarita.com. as a platform.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EO-1.1.4 pg. 107	**1.1.4** Designing and maintaining an interactive Climate Protection website and collaborating with other organizations to link to the website.	***None***	*OVOV has no similar language, however the City currently maintains a green website that addresses climate change prevention at http://www.greensantaclarita.com/climatechange.asp*
EO-1.2 pg. 107	**EO-1.2 Outreach Topics:** The City/County will coordinate with other agencies and outreach efforts to align messages on topics	**CO 8.1.5 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.1.5:** Coordinate various activities within the community and appropriate agencies related to GHG emissions reduction activities
EO-1.2.1 pg. 107	**1.2.1** Energy efficiency and conservation, and green energy;	**CO 8.1.4 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.1.4:** Provide information and education to the public about energy conservation and local strategies to address climate change.
EO-1.2.2 pg. 107	**1.2.2** Trip reduction, public transit, carpooling, vanpooling, and alternative modes of transportation;	**C 1.1.3 pg. C-59 (Circ 8/09)**	**Policy C 1.1.3:** Work with local and regional agencies and employers to promote an integrated, seamless transportation system that meets access needs, including local and regional bus service, dial-a-ride, taxis, rail, van pools, car pools, bus pools, bicycling, walking, and automobiles.
EO-1.2.3 pg. 107	**1.2.3** Green building and energy-efficient design;	**CO 8.1.4 pg. CO-93 (Con/OS 8/09)**	**Policy CO 8.1.4:** Provide information and education to the public about energy conservation and local strategies to address climate change.
EO-1.2.4 pg. 107	**1.2.4** Waste reduction, recycling, and composting;	**CO 8.4.7 pg. CO-96 (Con/OS 8/09)**	**Policy CO 8.4.7:** Provide information to the public on recycling opportunities and facilities, and support various locations and events to promote public participation in recycling.
EO-1.2.5 pg. 107	**1.2.5** Water conservation and water-efficient design and products;	**CO 4.1.4 pg. CO-86 (Con/OS 8/09)**	**Policy CO 4.1.4:** Provide informational materials to applicants and contractors on the Castaic Lake Water Agency's Landscape Education Program, and/or other information on xeriscape, native California plants, and water-conserving irrigation techniques as materials become available.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EO-1.2.6 **pg. 107**	**1.2.6** The benefits of buying local, and information about locally grown, prepared, and manufactured goods and local services.	**LU 4.2.2 – 4.2.5** **pg. LU-78 (Land Use 8/09)**	**Policy LU 4.2.2:** Achieve a balanced ratio of jobs to housing through business expansion and economic development programs, with a goal of at least 1.5 jobs per household. **Policy LU 4.2.3:** Encourage businesses to locate in all appropriate areas of the community to encourage job creation in closer proximity to workforce housing. **Policy LU 4.2.4:** Coordinate with local colleges to promote job training programs for Santa Clarita Valley residents. **Policy LU 4.2.5:** Promote development of uses that create job opportunities for residents through the Santa Clarita Enterprise Zone and other business assistance programs as appropriate.
EO-2 **pg. 107**	**Objective EO-2:** The City/County will work with local businesses and energy providers on specific, targeted outreach campaigns and incentive programs.	**CO 1.5.4** **pg. CO-80 (Con/OS 8/09)**	**Policy CO 1.5.4:** Seek ways to discourage human behavior that may be detrimental to natural systems and to encourage environmental responsibility, through education, incentives, removing barriers, enforcement, and other means as practicable and feasible.
EO-2.1 **pg. 107**	**EO-2.1 Energy Efficiency Campaigns:** The City/County will collaborate with local energy suppliers and distributors to establish energy conservation programs, Energy Star® appliance change-out programs, rebates, vouchers, and other incentives to install energy-efficient technology and products and to cooperate on advertising.	***None***	*OVOV has no similar language, however the City could use its existing green website, www.greensantaclarita.com as a platform. The site currently advertises Energy Star products and appliance change-out programs.*
EO-2.2 **pg. 108**	**EO-2.2 Pedestrian and Bicycle Promotion:** The City/County will work with local community groups and downtown business associations to organize and publicize walking tours and bicycle events, and to encourage pedestrian and bicycle modes of transportation.	***None***	*OVOV has no similar language, however the City currently runs the annual Bike to Work Day event, and operates more than 60 miles of trails and paseos designed for commuting and recreational use, including walking, running, biking, and skating. The City promotes these programs across city websites, including on www.greensantaclarita.com.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EO-3 **pg. 108**	**Objective EO-3:** The City/County will organize events and workshops to promote GHG-reducing activities.	**CO 8.1.5** **pg. CO-93** **(Con/OS** **8/09)**	**Policy CO 8.1.5:** Coordinate various activities within the community and appropriate agencies related to GHG emissions reduction activities
EO-3.1 **pg. 108**	**EO-3.1 Waste Reduction:** The City/County will organize workshops on waste reduction activities for the home or business, such as backyard composting, or office paper recycling, and will schedule recycling dropoff events and neighborhood chipping/mulching days.	**CO 8.4.7** **pg. CO-96** **(Con/OS** **8/09)**	**Policy CO 8.4.7:** Provide information to the public on recycling opportunities and facilities, and support various locations and events to promote public participation in recycling.
EO-3.2 **pg. 108**	**EO-3.2 Water Conservation:** The City/County will organize workshops on water conservation activities, such as selecting and planting drought-tolerant, native plants in landscaping, and installing advanced irrigation systems.	**CO 4.1.4** **pg. CO-86** **(Con/OS**	**Policy CO 4.1.4:** Provide informational materials to applicants and contractors on the Castaic Lake Water Agency's Landscape Education Program, and/or other information on xeriscape, native California plants, and water-conserving irrigation techniques as materials become available.
EO-3.3 **pg. 108**	**EO-3.3 Energy Efficiency:** The City/County will organize workshops on steps to increase energy efficiency in the home or business, such as weatherizing the home or building envelope, installing smart lighting systems, and how to conduct a self-audit for energy use and efficiency.	**CO 8.1.4** **pg. CO-93** **(Con/OS** **8/09)**	**Policy CO 8.1.4:** Provide information and education to the public about energy conservation and local strategies to address climate change.
EO-3.4 **pg. 108**	**EO-3.4 Climate Protection Summit/Fair:** The City/County will organize an annual Climate Protection Summit or Fair, to educate the public on current climate science, projected local impacts, and local efforts and opportunities to reduce GHG emissions, including exhibits of the latest technology and products for conservation and efficiency.	***None***	*OVOV has no similar language, however the City's annual Earth Day, River Rally, and Arbor Day events do address climate change.*

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EO-3.5 **pg. 108**	**EO-3.5 Schools Programs:** The City/County will develop and implement a program to present information to school children about climate change and ways to reduce GHG emissions, and will support school-based programs for GHG reduction, such as school based trip reduction and the importance of recycling.	***None***	*OVOV has no similar language, however the City's existing green website does have information on climate change for school children at http://www.greensantaclarita.com/climatechange.asp*
EO-4 **pg. 108**	**Objective EO-4:** The City/County will sponsor competitions and awards to encourage GHG reductions and recognize success.[55]	***None***	*OVOV has no similar language. However, a program such as this could easily be implemented through the City's green website, www.greensantaclarita.com.*
EO-4.1 **pg. 108**	**EO-4.1 Climate Champions Awards:** The City/County will establish a Climate Champions Awards program to acknowledge outstanding private and public efforts to reduce GHG emissions.	***None***	*OVOV has no similar language.*
EO-4.2 **pg. 109**	**EO-4.2 GHG Reduction / Climate Protection Competitions:** The City/County will sponsor competitions and contests with prizes for promoting climate protection and reducing GHG emissions, including such contests as:	***None***	*OVOV has no similar language.*
EO-4.2.1 **pg. 109**	**4.2.1** Poster contests at schools, with winning entrants receiving scholarship grants and recognition at the Climate Protection Summit/Fair, and posters used in outreach campaigns or compiled in calendars;	***None***	*OVOV has no similar language, however the Transit Department is currently running one annual student art competition relating to the environmental benefits of public transportation and one "recycled work of art" competition.*

[55] Items contained in EO-4 seem too specific for General Plan use. These appear to be more appropriate for either a green building program or a Climate Action Plan.

CAPCOA – GHG Reduction Policies		OVOV	
Reference	**Language**	**Reference**	**Language**
EO-4.2.2 pg. 109	**4.2.2** Waste diversion contests between schools, businesses, civic organizations, and Scout troops or other groups, with prizes for the greatest percent waste diverted and recognition at the Climate Protection Summit/Fair, and similar contests for planting trees, reducing vehicle trips, or other desired behaviors;	***None***	*OVOV has no similar language.*
EO-4.2.3 pg. 109	**4.2.3** Walkathons, relays, or other similar fundraising challenges, with funds raised to support community climate protection programs and activities.	***None***	*OVOV has no similar language.*

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APPENDIX 3.9

Soil Types and Characteristics of the County's Planning Area

SOIL TYPES AND CHARACTERISTICS OF THE COUNTY'S PLANNING AREA

The following is a short description of each of the soils that are found within the County's Planning Area. Additionally, **Table 1, Soil Characteristics of the County's Planning Area,** further describes the types of soils and their characteristic types within the County's Planning Area.

Agua Dulce stony loam, 30 to 50 percent slopes (AgF)

This soil is located in mountainous areas in the southern part of Agua Dulce Canyon. Permeability is moderately slow in this soil. Available water-holding capacity is 3 to 4 inches. Fertility is moderate, runoff is rapid, and the erosion hazard is high. Roots can penetrate to a depth between 36 and 60 inches. Thin lenses of sandstone conglomerate generally limit the depth to which plant roots can penetrate. Agua Dulce stony loam, 30 to 50 percent slopes, is used for range, wildlife habitat, and watershed. Capability unit VIIe-1 (19) dryland; range site 2. There are approximately 6,118 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Amargosa rocky coarse sandy loam, 9 to 55 percent slopes, eroded (AmF2)

This soil is located on hilly uplands. In most places about 25 to 40 percent of the original surface soil has been removed through moderate sheet and rill erosion. Rock outcrops cover 2 to 20 percent of the surface, and many areas are cut by shallow gullies. Permeability is moderately rapid in this soil. Available water-holding capacity is 1 to 1.5 inches. Fertility is very low, runoff is medium to rapid, and the hazard of water erosion is moderate to high. In most places roots can penetrate to a depth of about 14 to 20 inches. Amargosa rocky coarse sandy loam, 9 to 55 percent slopes, eroded, is used as range and for recreation, wildlife, and water supply purposes. Capability Class VIIe-1 (19) dryland; range site 4. There are approximately 4,271 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Anaverde loam, 15 to 30 percent slopes (AnE)

Some of this soil is located on Pelona Ridge, and others are located along the upper reaches of Cottonwood Creek, west and south of White Oak Lodge. Permeability is moderate in this soil. Available water-holding capacity is 5.5 to 9 inches, depending on soil depth. Fertility is high, runoff is medium, and the erosion hazard is moderate. This Anaverde soil is used for range, wildlife, and recreation. Capability Class VIe-1 (20) dryland; range site 2. There are approximately 2 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Anaverde rocky loam, 30 to 50 percent slopes (ApF)

Some of this soil is located along the upper reaches of Cottonwood Creek and others are on Pelona Ridge. Slopes are dominantly 35 to 45 percent, and outcrops of bedrock cover from 5 to 10 percent of the areas. Runoff is rapid, and the erosion hazard is high. This Anaverde soil is used for range, wildlife, habitat, and watershed. Capability Class VIIe-1 (20) dryland; range site 2. There are approximately 10 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Castaic silty clay loam, 2 to 9 percent slopes (CkC)

This soil is located on toe slopes. Some areas are along Davenport Road and others are near the communities of Vincent and Acton. Fertility is low in this soil. Available water holding capacity is 5 to 7.5 inches. Roots extend to a depth of 30 to 44 inches. Runoff is slow to medium, and the erosion hazard is slight to moderate. This soil is used only for limited grazing. Dryland farming has not been successful. A few areas are used as homesites. Capability Class IIIe-1 (19) irrigated. There are approximately 130 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Castaic silty clay loam, 9 to 15 percent slopes (CkD)

On this soil, runoff is medium, and the erosion hazard is moderate. This soil is used for range and as homesites. Capability Class IIIe-1 irrigated. There are approximately 196 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Castaic-Balcom silty clay loams, 9 to 15 percent slopes (CmD)

This complex is on toe slopes in Romero Canyon. Runoff is medium, and the erosion hazard is moderate. In most places, slopes range from 12 to 14 percent. Included with these soils are a few areas less than 10 acres in size where sheet and rill erosion is moderate. Also included are small areas of Saugus loam and Millsholm rocky loam. This complex is used primarily for Dryland small grains and pasture and for range. Capability unit IIIe-1 irrigated. There are approximately 172 acres of this soil located within the Los Angeles County portion of the OVOV Planning Area.

Castaic-Balcom silty clay loams, 15 to 30 percent slopes (CmE)

The soils in this complex are less sloping and less eroded than Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded (CmF2), but otherwise they are similar. Slopes are commonly about 25 percent. Runoff is medium to rapid, and the hazard of further erosion is moderate to high. Landslips are common. Included with this soil some areas 10 to 20 acres in size where sheet and rill erosion are moderate. Also included are small areas of Saugus loam, Gazos clay loam, and Millsholm rocky loam. This complex is

used for range as wildlife habitat. Capability unit IVe-1 irrigated. There are approximately 2,642 acres of this soil located within the Los Angeles County portion of the OVOV Planning Area.

Castaic-Balcom silty clay loams, 30 to 50 percent slopes (CmF)

These soils are slightly eroded, and their surface layer is 10 to 12 inches thick. Included with these soils areas 10 to 20 acres in size where rill and sheet erosion are moderate. Also included are small areas of Saugus loam. Areas of this complex are used for range, wildlife habitat, and watershed. Capability unit VIe-1 dryland. There are approximately 9,160 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded (CmF2)

This complex is in the area near Castaic Junction. It is 60 percent Castaic silty clay loam and 40 percent Balcom silty clay loam. Permeability is moderately slow in these soils. Available water-holding capacity is 5 to 7 inches. Fertility is moderate, runoff is rapid, and the hazard of erosion is high. Plant roots generally penetrate to a depth of about 26 to 36 inches, but can reach a depth of 40 inches in some places. The Balcom soil, not the Castaic soil, contains lime at a depth of 10 to 20 inches. Included with these soils are small areas of Gazos clay loam, of Saugus loam, and of Gaviota sandy loam. Also included are narrow areas of soils that have a reddish-brown surface layer. Castaic-Balcom silty clay loams, 30 to 50 percent eroded, are used chiefly for range. They also are used for watershed purposes and for wildlife habitat and recreation. Capability unit VIe-1 dryland. There are approximately 11,897 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Castaic-Balcom silty clay loams, 50 to 65 percent slopes, eroded (CmG2)

This soil is located on mountainous uplands northwest of Castaic Junction, adjacent to the boundaries of Los Angeles and Ventura Counties. Moderate sheet and rill erosion have occurred in nearly all places where this soil is located. Runoff is very rapid, and the hazard of further erosion is very high. This soil is used mainly for wildlife habitat and watershed purposes, but some areas are grazed. Capability Class VIIe-1 dryland. There are approximately 2,669 acres of this soil located within the Los Angeles County portion of the OVOV Planning Area.

Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded (CnG3)

This undifferentiated group of soils is 35 percent Castaic silty clay loam and 30 percent Saugus loam. Included in mapping this unit are exposed areas of soft shale and conglomerate that make up as much as 10 percent of the unit and areas of Balcom silty clay loam that make up as much as 25 percent. Areas of this unit are cut by many intermittent, very deep drainage channels that have narrow v-shaped valleys and between them sharp, tortuous divides. Soil slipping is common, and geological erosion is active. During heavy rainstorms much silt is washed away from these soils. Because of repeated burning of brush, the vegetation on these soils now consists mainly of thick stands of chamise. The Castaic soil in this unit is steeper and more eroded than the Castaic soil in Cataic-Balcom silty clay loams, 30 to 50 percent slopes, eroded (CmF2), but otherwise is similar. Also, depth to soft shale generally is less, about 20 to 30 inches. The Saugus soil is steeper and more eroded than Saugus loam, 30 to 50 percent slopes, eroded (ScF2), but otherwise it is similar. In addition, depth to weakly consolidated sediment is 24 to 44 inches. Slopes are dominantly 45 to 65 percent. Available water-holding capacity is 4 to 6 inches in the Castaic soil, and 4 to 7 inches in the Saugus soil. In both soils, fertility is very low, runoff is very rapid, and the hazard of further erosion is very high. Most of this unit is inaccessible to man and livestock because the brush is dense, the soils are steep or very steep, and the valleys are narrow and v-shaped. These soils are used for watershed and for wildlife habitat. Capability unit VIIIe-1 dryland. There are approximately 8,136 acres of this soil within the Los Angeles County portion of the OVOV Planning Area.

Chino loam (Co)

This soil is nearly level and generally is located in the Leona Valley, but many areas are located along the Tehachapi Range. Permeability is moderately slow. Available water-holding capacity is 10 to 12 inches. Present fertility is moderate, but when the soil is reclaimed, fertility is high. Runoff is very slow, and the soil is likely to be ponded in places in spring. The hazard of erosion is none to slight. Roots can penetrate to a depth of 60 inches or more, depending on the height of the fluctuating water table. Chino loam is wet and is in meadow. It is used only as pasture. Capability Class IIw-2 irrigated. There are approximately 57 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Cortina sandy loam, 0 to 2 percent slopes (CyA)

This soil occupies narrow alluvial fans in side canyons along tributaries of the Santa Clara River. The surface layer lacks cobblestones, but the soil otherwise is similar to Cortina cobbly sandy loam, 2 to 9 percent slopes (CzC). Thickness of the surface layer ranges from 12 to 16 inches. In most places, slopes range from about 3 to 5 percent and are quite long. A few stones and pebbles are in the soil, but they do not interfere with tillage. Runoff is slow, and the hazard of erosion is moderate. Included with this soil in

mapping are small areas of Cortina cobbly sandy loam, Metz loamy sand, and Sorrento loam. Also included are small areas that have a surface layer of loam, which are mainly the result of land leveling and smoothing. In the past, loamy soil material from adjacent uplands was moved onto the areas to square fields and eliminate point rows. This Cortina soil is used for range and for dryland small grains. It is also used for irrigated alfalfa, small grains, and pasture. Capability unit IVs-0. There are approximately 888 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Cortina sandy loam, 2 to 9 percent slopes (CyC)

This soil occupies narrow alluvial fans in side canyons along tributaries of the Santa Clara River. The surface layer lacks cobblestones, but the soil is otherwise similar to Cortina cobbly sandy loam, 2 to 9 percent slopes (CzC). Thickness of the surface layer ranges from 12 to 16 inches. In most places, slopes range from about 3 to 5 percent and are quite long. A few stones and pebbles are in the soil, but they do not interfere with tillage. Runoff is slow, and the hazard of erosion is moderate. Included with this soil are small areas of Cortina cobbly sandy loam, Metz loamy sand, and Sorrento loam. Also included are small areas that have a surface layer of loam, which are mainly the result of land leveling and smoothing. In the past, loamy soil material from adjacent uplands was moved onto the areas to square fields and eliminate point rows. This Cortina soil is used for range and for dryland small grains. It is also used for irrigated alfalfa, small grains, and pasture. Capability unit IVs-0. There are approximately 646 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Cortina cobbly sandy loam, 2 to 9 percent slopes (CzC)

This soil is on narrow alluvial fans along Castaic Creek, in Agua Dulce Canyon, and in Mint Canyon. Permeability is rapid in this Cortina soil. Available water-holding capacity is 2 to 3 inches. Runoff is slow, and the hazard of erosion is slight. Fertility is low. Roots can penetrate to a depth of 60 inches or more. Included with this soil type are small areas of Cortina sandy loam and Metz sandy loam. This Cortina soil is used for range, as wildlife habitat, and for watershed purposes. The areas are likely to be flooded for a short period after a heavy rain. Capability unit VIIs-7 dryland. There are approximately 562 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Gaviota rocky sandy loam, 15 to 30 percent slopes, eroded (GaE2)

This soil is well drained. Permeability is moderately rapid. Available water-holding capacity is 1 to 2 inches. Runoff is medium, and the hazard of erosion is moderate. Fertility is low. Roots can penetrate to a depth of 14 to 20 inches. This soil is used for range, wildlife habitat, and watershed. Capability Class

VIIe-1 dryland. There are approximately 29 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Gaviota rocky sandy loam, 30 to 50 percent slopes, eroded (GaF2)

This soil is on mountains. Some areas located south of Castaic Junction are fairly large. Smaller areas are south of Solemint and northeast of Quail Lake. Slopes commonly are 45 percent. In most places sheet and rill erosion is moderate, and a few areas are cut by deep gullies. Outcrops of rock cover from about 5 to 10 percent of the total area. The dominant vegetation is chamise brush and an understory of annual grasses. Runoff is rapid on this soil, and the hazard of erosion is high. Drainage is somewhat excessive. Included with this soil in mapping are small areas of Millsholm rocky loam and Saugus loam. Also included are about 500 acres of a very rocky Gaviota soil near Vasquez Rocks. This Gaviota soil is used for range, wildlife, and watershed. Capability unit VIIe-1 dryland. There are approximately 6,128 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Gazos clay loam, 30 to 50 percent slopes (GbF)

Permeability of this soil is moderately slow. Available water-holding capacity is 3 to 6 inches. Runoff is rapid, and the hazard from erosion is high. Fertility is moderate. This soil is used mainly for grazing. Capability Class VIe-1 dryland. There are approximately 512 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Godde rocky loam, 30 to 50 percent slopes (GdF)

This soil occupies mountainous areas on Pelona Ridge and in other areas of the Leona Valley. In places, outcrops of rock occupy 5 to 10 percent of the area covered by this soil. Permeability of this soil is moderate. Available water-holding capacity is 2 to 3 inches. Fertility is low. Runoff is rapid, and the hazard of erosion is high. This soil is used for range, as wildlife habitat, and for recreation and watershed purposes. Capability Class VIIe-1 dryland. There are approximately 1,970 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Greenfield sandy loam, 0 to 2 percent slopes (GsA)

This soil is on long, smooth, broad alluvial fans near Fairmont. In places, the surface layer is coarse sandy loam. Runoff is very slow, and the hazard of erosion is slight. This soil is used for irrigated crops, dryland small grains, and pasture and range. Capability Class I-1 irrigated and IVec-1 dryland. There are approximately 24 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Greenfield sandy loam, 2 to 9 percent slopes (GsC)

This soil is on alluvial fans near Fairmont. Permeability is moderately rapid in this soil. Available water-holding capacity is 7.5 to 9 inches. Fertility is moderate. Roots can penetrate to a depth of 60 inches or more. Runoff is slow to medium, and the hazard of erosion is slight to moderate. This soil is used for irrigated crops, dryland small grains, and pasture and range. Capability Class IIe-1 irrigated and IVec-1 dryland. There are approximately 459 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Greenfield sandy loam, 9 to 15 percent slopes, eroded (GsD2)

This soil occupies narrow fans and terraces near Fairmont. Slopes commonly range from 10 to 14 percent. Runoff is medium to rapid, and the hazard of further erosion is moderate to high. This soil is used for dryland small grains, dryland pasture, and range. Capability Class IIIe-1 irrigated and IVec-1 dryland. There are approximately 277 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Hanford coarse sandy loam, 2 to 9 percent slopes (HbC)

In most places, this soil ranges from 2 to 5 percent slopes. Runoff is slow to medium, and the hazard of erosion is slight to moderate. This soil is used for irrigated crops, dryland small grains, and range. Capability Class IIe-1 irrigated and IVec-1 dryland. There are approximately 723 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Hanford coarse sandy loam, 9 to 15 percent slopes (HbD)

This soil occupies alluvial fans in narrow side canyons along Portal Ridge. Sheet and rill erosion are slight. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight to moderate. This soil is used for dryland small grains, dryland pasture, and range. Capability Class IIIe-1 irrigated and IVec-1 dryland. There are approximately 50 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Hanford sandy loam, 0 to 2 percent slopes (HcA)

This soil occurs throughout the area near Fairmont. It is dominantly sandy loam and fine sandy loam throughout, but otherwise it is similar to Hanford coarse sandy loam, 0 to 2 percent slopes (HbC). Runoff is slow on this soil, and the hazard of erosion is slight. Available water-holding capacity is 6 to 7.5 inches. Fertility is moderate. Roots can penetrate to a depth of 60 inches or more. Included with this soil in mapping are small areas of Hanford coarse sandy loam and of Greenfield sandy loam. This Hanford soil

is used for irrigated crops, pasture, and range. Capability unit IIs-4 irrigated and IVec-1 dryland. There are approximately 1,227 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Hanford sandy loam, 2 to 9 percent slopes (HcC)

This soil is on alluvial fans near Fairmont. It is dominantly sandy loam and fine sandy loam throughout, but it is otherwise similar to Hanford coarse sandy loam, 0 to 2 percent slopes, though with more pronounced slopes. In most places slopes range from 2 to 6 percent. Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. Available water-holding capacity is 6 to 7.5 inches. Fertility is moderate. Included with this soil are small areas of Greenfield coarse sandy loam and of Hanford coarse sandy loam. Also included are small areas where rill and sheet erosion are moderate. Other included small areas are on fans where slopes range from 10 to 12 percent. This Hanford soil is used for purposed similar to those of Hanford coarse sandy loam, 0 to 2 percent slopes. Capability unit IIe-1 irrigated and IVec-1 dryland. There are approximately 3,960 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Hanford sandy loam, calcareous variant, 2 to 9 percent slopes (HeC)

Slopes for this soil are dominantly about 2 to 4 percent. Permeability is moderately rapid in this soil. Available water holding capacity is 7.5 to 9.9 inches. Fertility is moderate. Runoff is slow, and the hazard of erosion is slight. This soil is used for dryland small grains and range. Capability Class IIe-1 irrigated and IVec-1 dryland. There are approximately 46 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Las Posas loam, 9 to 30 percent slopes (LaE)

This soil occupies toe slopes and foothills west of Agua Dulce. Slopes are fairly long and smooth. Runoff is medium to rapid on this soil. The hazard of erosion is moderate to high. Available water-holding capacity is 4 to 7 inches. This soil is used for range in spring. Capability Class IVe-1 irrigated. There are approximately 348 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Las Posas-Toomes rocky loams, 30 to 50 percent slopes (LdF)

Some areas of this soil are on steep mountains, and other areas are on moderately steep foothills. The soils are most prevalent near Acton, Agua Dulce, and Vincent. Permeability is moderately slow. Runoff is rapid, and the hazard of erosion is high. Available water-holding capacity is 4 to 7 inches. Fertility is low.

This soil is used for range and as wildlife habitat. Capability Class VIIe-1 dryland. There are approximately 3,403 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Metz loamy sand, 0 to 2 percent slopes (MfA)

This soil is on alluvial fans near Castaic Junction. Permeability of this soil is rapid. Available water-holding capacity is 4 to 5 inches. Fertility is low. Runoff is very slow, and the hazard of water erosion is slight to moderate. Roots can penetrate to a depth of 60 inches or more. Included with this soil in mapping are small areas of Sorrento sandy loam and of Yolo sandy loam. Also included are a few small areas of Metz soils in lower-lying areas that are subject to occasional flooding. This Metz soil is used for irrigated crops, dryland farming, and wildlife habitat. Capability unit IIIs-4 irrigated. There are approximately 302 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Metz loamy sand, 2 to 9 percent slopes (MfC)

This soil is on alluvial fans along the Santa Clara River and its major tributaries. In most places slopes range from 2 to 5 percent. Runoff is slow, and the hazard of erosion is slight. Included with this soil in mapping are some areas at the head of narrow canyons that have slopes of 12 to 14 percent. Also included are small areas of Cortina sandy loam, Cortina cobbly sandy loam, and Yolo loam. In many places in Sand Canyon, the soil has been mixed, leveled, and shaped by earthmoving equipment. In these places much of the soil has been roughly bench terraced. This Metz soil is used for purposed similar to those of Metz loamy sand, 0 to 2 percent slopes (MfA). Capability unit IIIs-4 irrigated. There are approximately 828 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Metz loam, 0 to 2 percent slopes (MgA)

This soil is on flood plains north of Saugus. The surface layer is loam about 8 to 16 inches thick, but otherwise this soil is similar to Metz loamy sand, 0 to 2 percent slopes (MfA). In many places, reaction is mildly alkaline. Runoff is very slow on this soil, and the hazard of erosion is slight to none. Available water-holding capacity is 5 to 6 inches. Fertility is moderate. Included with this soil in mapping are small areas of Metz loamy sand. This Metz soil is used mainly for alfalfa and for row crops. Capability unit IIs-4 irrigated. There are approximately 31 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Metz loam, 2 to 5 percent sloes (MgB)

The surface layer of this soil is loam that is about 8 to 10 inches thick. Slopes range from 2 to 3 percent in most places. Sheet and rill erosion are minor. Runoff is slow on this soil, and the hazard of erosion is slight. Fertility is moderate. Included with this soil in mapping are small areas of Metz loamy sand. This Metz soil is used for irrigated alfalfa and small grains. Capability unit IIs-4 irrigated. There are approximately 271 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Millsholm rocky loam, 15 to 30 percent slopes, eroded (MhE2)

Slopes of this soil range from about 20 to 24 percent in most places. Sheet and rill erosion are moderate in most of the area. Runoff is medium to rapid, and the hazard of further erosion is moderate to high. This soil is used for range, wildlife, and recreation. Capability Class VIIe-1 dryland. There are approximately 816 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Millsholm rocky loam, 30 to 50 percent slopes, eroded (MhF2)

This soil is moderately permeable. Available water-holding capacity is 2 to 3 inches. Fertility is low. Runoff is rapid, and the hazard of erosion is high. This soil is used for range, wildlife, and watershed purposes. Capability Class VIIe-1 dryland. There are approximately 6,591 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Mocho sandy loam, 0 to 2 percent slopes (MoA)

This soil is near Castaic Junction. The surface layer is brown sandy loam that generally is massive and slightly hard. It is 10 to 12 inches thick. The hazard of erosion is slight on this soil, and runoff is very slow. Available water-holding capacity is 7.5 to 9.5 inches. Included with this soil are small areas of Metz loamy sand, Sorrento loam, and Yolo loam. This Mocho soil is used for purposed similar to those of Mocho loam, 0 to 2 percent slopes (MpA). Capability unit I-1 irrigated. There are approximately 37 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Mocho loam, 0 to 2 percent slopes (MpA)

This soil is on alluvial fans south of Castaic Junction. This soil is moderately permeable. Available water-holding capacity is 8 to 10 inches. Fertility is high. Runoff is very slow, and the hazard of erosion is none to slight. Roots can penetrate to a depth of 60 inches or more. Included with this soil are small areas of Metz loamy sand, Sorrento loam, and Yolo loam. This soil is used for dryland and irrigated crops.

Capability unit I-1 irrigated. There are approximately 304 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Mocho sandy loam, 2 to 9 percent slopes (MpC)

This soil occupies fairly narrow alluvial fans near Castaic Junction. In most places slopes range from 2 to 5 percent. In places at the heads of fans, a few pebbles or cobblestones are on the surface. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Included with this soil are small areas of Metz loamy sand, Sorrento loam, and Yolo loam. Also included are areas 5 to 10 acres in size where sheet and rill erosion are moderate. This Mocho soil is used about the same as Mocho loam, 0 to 2 percent slopes (MpA). Capability unit IIe-1 irrigated. There are approximately 603 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Oak Glen sandy loam, 2 to 9 percent slopes (ObC)

This soil is typically found on long, smooth alluvial fans. Permeability is moderately rapid in this soil. Available water-holding capacity is 6 to 7.5 inches. Fertility is high. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Roots penetrate to a depth of 60 inches or more. This soil is used for dryland small grains and range. Capability Classification is IIIe-1 dryland. There are approximately 5 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Oak Glen gravelly sandy loam, 2 to 9 percent slopes (OcC)

Except that this soil is gravelly throughout, it is similar to Oak Glen sandy loam, 2 to 9 percent slopes (ObC). The gravel consists of rounded granitic material that is about 2 inches or less in diameter, which makes up from 15 to about 35 percent, by volume, of the mass. Because of the gravel, available water-holding capacity is less than in Oak Glen sandy loam, 2 to 9 percent slopes, and tillage is more difficult. Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. Available water-holding capacity is about 4 to 6 inches. Included with this soil are small areas of Oak Glen sandy loam. Also included are areas of unnamed soil in which the content of gravel ranges from 35 to 65 percent, by volume. This unnamed soil occupies up to 15 or 20 percent of each soil area. A few areas of a soil that has slopes of 12 to 14 percent are also included. This Oak Glen soil is used for range and as wildlife habitat. Capability unit IIIe-1 dryland. There are approximately 54 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Oak Glen loam, 0 to 2 percent slopes (OdA)

Most areas of this soil are in Oso Canyon. The surface layer is dark-gray light loam about 46 inches thick. The substratum is pale brown and ranges from heavy sandy loam to heavy coarse sandy loam and light loam. It is less than 18 percent clay. This soil is moderately permeable. Available water-holding capacity is high, but the growing season is shorter than in other areas of Oak Glen soils. Runoff is very slow, and the hazard of erosion is none to slight. Roots can penetrate to a depth of 60 inches or more. Included with this soil are small areas of Oak Glen sandy loam. Here cattle have trampled the surface, and the soil is hard and massive when dry. This Oak Glen soil is used for range and as wildlife habitat. Capability unit IIIc-1 dryland. There are approximately 4 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ojai loam, 2 to 9 percent slopes (OgC)

This soil is on terraces near Saugus. This soil has moderately slow permeability. Available water-holding capacity is 9 to 11 inches. Fertility is low. Tilth is poor. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Roots can penetrate to a depth of about 60 inches. Included with this soil in mapping are small areas of Ojai loam, 9 to 15 percent slopes (OgD). Also included are small areas of Zamora loam. This Ojai soil is used for irrigated alfalfa, row crops, and range. It also is increasingly being used as site for homes and industries. Some areas on terraces northwest of Solemint and south of the Saugus-Ventura Road near the power substation have been shaped and altered by earthmoving equipment. These areas now have houses on them or are used as golf courses. Capability unit IIIe-1 irrigated. There are approximately 451 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ojai loam, 9 to 15 percent slopes (OgD)

This soil is on foothills. Most areas are strongly sloping, but some areas are rolling. Slopes range from 10 to 15 percent in most places. Runoff is medium, and the hazard of erosion is moderate. Included with this soil in mapping are small areas where sheet and rill erosion are moderate. Also included are a few deep gullies. Other included small areas consist of Ojai loam, 15 to 30 percent slopes (OgE). This Ojai soil is used mostly for range, but some areas are used for dryland small grains. The areas also provide habitat for wildlife. Capability unit IVe-1 irrigated. There are approximately 181 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ojai loam, 15 to 30 percent slopes (OgE)

This soil is on foothills near Solemint. Slopes range from 20 to 26 percent in most places. Runoff is medium to rapid, and the hazard of erosion is moderate to high. Included with this soil in mapping are some areas 10 to 20 acres in size where sheet and rill erosions are moderate. Also included are a few deep loam, thin surface variant, 30 to 50 percent slopes, and Ojai loam, 30 to 50 percent slopes, eroded (OgF2). This Ojai soil is used for range, wildlife habitat, and watershed. The slopes severely limit suitability for cultivation. Capability unit VIe-1 dryland. There are approximately 157 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ojai loam, 30 to 50 percent slopes (OgF)

This soil is on foothills near Castaic, Saugus, and Solemint. Slopes generally range from 35 to 45 percent. Runoff is rapid, and the hazard of erosion is high. Included with this soil are small areas of Ojai loam, 15 to 30 percent slopes (OgE). Also included are about 280 acres at the head of Plum Canyon that consist of Ojai soils and have a surface layer of clay loam. Small areas cut by sheet and rill erosion are also included. This Ojai soil is used for range, wildlife habitat, and watershed. Capability unit VIIe-1 dryland. There are approximately 2,516 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ojai loam, 30 to 50 percent slopes, eroded (OgF2)

Much of the original surface layer of this soil has been removed through sheet and rill erosion. The present surface layer is 16 to 18 inches thick in most places. Slopes commonly are about 40 percent. The areas are cut by a few deep gullies and by many shallow gullies. Runoff is rapid, and the hazard of further erosion is high. This Ojai soil is suitable for range, wildlife, habitat, and watershed purposes. Capability unit VIIe-1 dryland. There are approximately 18 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ojai loam, thin surface variant, 30 to 50 percent slopes (OhF)

This is the only variant from this type of normal Ojai soil series. It is found on terraces. Permeability is moderately slow in this soil. Runoff is rapid, and the hazard of erosion is high. Available water-holding capacity is 8 to 10 inches. Fertility is low. Included with this soil in mapping are some small areas of Agua Dulce stony loam. Ojai loam, thin surface variant, 30 to 50 percent slopes, is used only for range. Capability unit VIIe-1 dryland. There are approximately 1,791 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ojai-Zamora loams, 15 to 30 percent slopes (OzE)

This soil is under grasses and oaks on short, hilly side slopes near Saugus. Runoff is medium to rapid, and the hazard of erosion is moderate to high. This soil is used for range. Capability Class is VIe-1 dryland. There are approximately 314 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ramona coarse sandy loam, 2 to 5 percent slopes (RcB)

This type of soil is found on long, broad, smooth terraces. Soil blowing is a slight to moderate hazard. Runoff is slow, and the hazard of water erosion is slight. This soil is used for dryland crops and range, dryland and irrigated orchards, and wildlife habitat. Capability Class is IIIe-1 irrigated and IVec-1 dryland. There are approximately 168 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ramona coarse sandy loam, 5 to 9 percent slopes (RcC)

This type of soil is found on terraces. Permeability is moderately slow in this soil. Available water-holding capacity is 8 to 10 inches. Fertility is moderate, runoff is slow to medium, and the hazard of erosion is slight to moderate. Roots can penetrate to a depth of 60 inches. This soil is used for dryland crops and range, dryland and irrigated orchards, and wildlife habitat. Capability Class is IIIe-1 irrigated and IVec-1 dryland. There are approximately 461 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ramona coarse sandy loam, 9 to 15 percent slopes (RcD)

This soil is found on terraces. In many places, the topography is rolling. Soil blowing is a slight to moderate hazard. Runoff is medium, and the hazard of water erosion is moderate. This soil is used for dryland small grains and range. Because rainfall is unreliable, growth of dryland crops is poor. Capability Class is IVe-1 irrigated and IVec-1 dryland. There are approximately 611 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ramona sandy loam, 9 to 30 percent slopes, eroded (RdE2)

This soil is formed in old granitic alluvium laid down in a series of fairly narrow fingerlike rides that face northeast. Runoff is medium to rapid on this soil, and the hazard of erosion is moderate to high. This soil is used for range, wildlife habitat, and watershed. Capability Class is VIe-1 dryland. There are approximately 197 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ramona gravelly sandy loam, 9 to 30 percent slopes (ReE)

The available water-holding capacity of this soil is 5.5 to 7.5 inches. Runoff is medium to rapid, and the hazard of erosion is moderate to high. This soil is used only for range and wildlife habitat. Capability Class is VIe-1 dryland. There are approximately 258 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ramona loam, 2 to 5 percent slopes (RfB)

Runoff for this soil is slow, and the hazard of erosion is slight. This soil is used for dryland small grains. Capability Class is IIe-1 irrigated and IVec-1 dryland. There are approximately 99 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Ramona loam, 5 to 9 percent slopes (RfC)

Runoff for this soil is slow to medium, and the hazard of erosion is slight to moderate. This soil is used for dryland crops and range, dryland and irrigated orchards, and wildlife habitat. Capability Class IIIe-1 irrigated and IVec-1 dryland. There are approximately 41 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Riverwash (Rg)

Riverwash consists of sandy material in the beds of intermittent streams. Narrow stringers of gravelly sand occupy many of the areas. During each flood, fresh deposits of alluvium are laid down and removed as a result of stream-bank erosion. The hazard of soil blowing is slight to moderate. Little or no vegetation is on the areas. This land type has no value for farming. The areas are used for wildlife and watershed purposes. Capability unit VIIIw-4 dryland. There are approximately 1,308 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Sandy Alluvial Land (Sa)

Sandy alluvial land (Sa) is mostly on flood plains along the Santa Clara River and its larger tributaries. It consists of unconsolidated alluvium that generally is stratified and ranges in texture from sand to loamy sand. The soil material has been recently deposited by streams. Flooding is frequent and, during each flood, resorting of the soil material occurs. The plant cover is willows and cottonwoods that have an understory of annual grasses and forbs. Soil blowing is a moderate hazard. This land type is used for grazing, wildlife habitat, and watershed purposes. Frequent flooding severely limits use for cultivated crops. Protection from flooding is needed. Capability unit VIIw-4. There are approximately 2,127 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Saugus loam, 15 to 30 percent slopes (ScE)

In most places this soil has slopes that range from 20 to 24 percent. Runoff is medium, and the hazard of erosion is moderate. Included with this slope are small areas on toe slopes that have slopes of 5 to 15 percent. Also included are areas 5 to 10 acres in size where sheet and rill erosion are moderate. Other included small areas consist of Balcom silty clay loams and of Saugus loam, 30 to 50 percent slopes (ScF). Thus, Saugus soil is used mainly for range. Some areas are used for homesites and subdivisions, though much grading is required. Capability unit VIe-1. There are approximately 652 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Saugus loam, 30 to 50 percent slopes (ScF)

In most places, the slope of this soil is about 45 percent, though on north slopes the slope may be as steep as 55 percent. Runoff is rapid, and the hazard of erosion is high. Included with this soil in mapping are small areas of Castaic-Balcom silty clay loams, 30 to 50 percent slopes (CmF), and of Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded (CnG3). Also included are small areas cut by sheet and gully erosion. This Saugus soil is used mainly for range. Many areas, however, have been reshaped and graded by earthmoving equipment for use as homesites and subdivisions. Capability unit VIIe-1 dryland. There are approximately 3,080 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Saugus loam, 30 to 50 percent slopes, eroded (ScF2)

This soil is on uplands in Romero Canyon and in other places near Castaic Junction. Permeability is moderate in this soil. Available water-holding capacity is 5 to 7.5 inches. Fertility is low, runoff is rapid, and the hazard of erosion is high. Included with this soil in mapping are small areas of Castaic-Balcom silty clay loams and of Castaic and Saugus soils. Also included are small areas of Gaviota rocky sandy loam and of Rough broken land. This Saugus soil is used for range, wildlife habitat, and watershed. Capability unit VIIe-1 dryland. There are approximately 22,781 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Sorrento loam, 0 to 2 percent slopes (SsA)

This soil is on alluvial fans along the Santa Clara River and its major tributaries. Runoff is very slow, and the hazard of erosion is slight. Included with this soil in mapping are small areas that have a surface layer of sandy loam. Also included are small areas of Metz loamy sand, Mocho loam, and Yolo loam. This Sorrento soil is used for many kinds of irrigated crops. Capability unit I-1 irrigated. There are

approximately 181 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Sorrento loam, 2 to 5 percent slopes (SsB)

This soil is on long, smooth alluvial fans along drainage ways of the Santa Clara River, near Castaic Junction. Permeability of this soil is moderate. Available water-holding capacity is 8.5 to 10 inches. Fertility is high. Runoff is slow, and the hazard of erosion is slight. Roots can penetrate to a depth of 60 inches or more. Included with this soil in mapping are small areas of Metz loamy sand, Mocho loam, and Yolo loam. Also included are small areas that have a surface of sandy loam. This Sorrento soil is used for such irrigated crops as alfalfa, green onions, carrots, walnuts, and pasture. Capability unit IIe-1. There are approximately 802 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Temescal-Rock land complex, 30 to 50 percent slopes (TrF)

The permeability of this soil is moderate. Available water-holding capacity is 2 to 3 inches. Fertility is low, runoff is rapid, and the hazard of erosion is high. In most places roots can penetrate to a depth of 14 to 20 inches. This soil is used for range, wildlife, and watershed. Capability unit for the Temescal part is VIIe-1 dryland, and for the Rock land, VIIIs-1 dryland. There are approximately 140 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Terrace Escarpments (TsF)

Terrace escarpments is a type of land that consists of short, moderately steep to steep faces or breaks that separate the terraces from the lower-lying alluvial fans. The surface layer is generally coarse sandy loam. Slopes generally are about 35 percent, but they range from 15 to 45 percent. Annual grasses and forbs make up the vegetation. Runoff is medium to rapid, and the hazard of erosion is moderate to high. Included with this land type are small areas where rill and gully erosion are severe. Also included are a few large, deep gullies that are actively eroding. Terrace escarpments are used for grazing. The areas are used mainly to provide cover for wildlife. Capability Class is VIIe-1 dryland. There are approximately 1,829 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Vernalis loam, 2 to 5 percent slopes (VbB)

This soil is more sloping, but it otherwise is similar to Vernalis clay loam, 0 to 2 percent slopes (VcA). The dominant slope ranges from 2 to 4 percent. Runoff is slow on this soil, and the hazard of erosion is slight. Available water-holding capacity is 9 to 10 inches. This soil is used for irrigated crops and dryland crops.

It is also used for range. Capability Class is I-1 irrigated and IVec-1 dryland. There are approximately 77 acres of this soil within the County of Los Angeles portion of the OVOV Planning Area.

Vernalis clay loam, 0 to 2 percent slopes (VcA)

Runoff is very slow in this soil, and the hazard of erosion is none to slight. Available water-holding capacity is 9.5 to 10.5 inches. This soil is used for sugar beets, irrigated small grains, dryland small grains, and range. Capability Class is I-1 irrigated and IVec-1 dryland. There are approximately 15 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Vista coarse sandy loam, 15 to 30 percent slopes (VsE)

This soil is located on hilly uplands. Slopes commonly range from 18 to 26 percent. Runoff is medium to rapid, and the hazard of erosion is moderate to high. This soil is used for range, wildlife habitat, and watershed. Capability Class VIe-1 dryland. There are approximately 214 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Vista coarse sandy loam, 30 to 50 percent slopes (VsF)

This soil is located in the uplands on Pelona Ridge. The permeability of this soil is moderately rapid. Available water-holding capacity is 2.5 to 3.5 inches. Fertility is low. Runoff is rapid, and the hazard of erosion is high. In most places, roots can penetrate to a depth of about 28 to 38 inches. This soil is used for range, wildlife habitat, and watershed. Capability Class is VIIe-1 dryland. There are approximately 1,456 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Vista coarse sandy loam, 30 to 50 percent slopes, eroded (VsF2)

Much of the original surface layer of this soil has been removed through sheet and rill erosion. Many areas are cut by shallow gullies, and a few areas are cut by deep gullies. The present surface layer is 8 to 12 inches thick. Slopes range from 35 to 45 percent in most places, but they are as steep as 55 percent in a few places. Runoff is rapid, and the hazard of further erosion is high. Included with this soil are small areas that have a surface layer of sandy loam. Also included are small, slightly eroded areas. Other included small areas consist of Amargosa rocky coarse sandy loam. This Vista soil is used for range, wildlife habitat, and watershed. Capability Class is VIIe-1 dryland. There are approximately 402 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Water (W)

These are areas that are covered by water. These areas include lakes, rivers, streams, ponds, wetland areas, etc. These areas have no use in agricultural activity. There are approximately 2,159 acres of this type of land located within the County of Los Angeles portion of the OVOV Planning Area.

Wyman gravelly loam, 2 to 9 percent slopes (WgC)

This soil is located on terraces near Acton and Vincent. Permeability of this soil is moderate. Available water holding capacity is 8.5 to 9.5 inches. Fertility is moderate. The gravel in the soil does not significantly interfere with tillage, but it reduces the available water-holding capacity somewhat. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Roots can penetrate to a depth of 60 inches or more. This soil is used for dryland small grains and range. It is also used for wildlife habitat. Capability Class is IIe-1 irrigated and IVec-1 dryland. There are approximately 1,283 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Wyman gravelly loam, 9 to 15 percent slopes (WgD)

This soil is located on alluvial fans and terraces. Slopes range from 10 to 14 percent in most places. Runoff is medium, and the hazard of erosion is moderate. This soil is used for dryland small grain and range. It is also used for wildlife habitat. Capability Class is IIIe-1 irrigated and IVec-1 dryland. There are approximately 157 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Wyman cobbly loam, 5 to 9 percent slopes (WoC)

Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. Available water holding capacity is 5.5 to 7 inches. Fertility is low. This soil is used for range in spring and for wildlife habitat year round. Capability Class VIe-7 dryland. There are approximately 252 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Yolo loam, 0 to 2 percent slopes (YoA)

This soil occurs on alluvial fans near Newhall and Saugus. Permeability is moderate in this soil. Available water-holding capacity is 8.5 to 10.5 inches. Fertility is high. Runoff is very low, and the hazard of erosion is none to slight. Roots can penetrate to a depth of 60 inches or more. Included with this soil are small areas of Metz loamy sand and of Sorrento loam. Also included are small areas that have a surface layer of sandy loam. This Yolo soil is used for irrigated crops. Capability unit I-1 irrigated. There are

approximately 645 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Yolo loam, 2 to 9 percent slopes (YoC)

This soil occurs on fairly narrow alluvial fans near Newhall and Saugus. Slopes range from 2 to 6 percent in most places. Runoff is slight to moderate, and the hazard of erosion is slow to medium. Included with this soil are areas at the upper edge of the alluvial fans that have slopes as steep as 10 to 12 percent, by volume, and fine gravel throughout. Also included are small areas that have a surface layer of sandy loam or that have a few pebbles and stones on the surface. Other included small areas consist of Metz loamy sand and of Sorrento loam. This Yolo soil is used mainly for irrigated crops and for range, but use for homesites is rapidly increasing. Capability unit IIe-1 irrigated. There are approximately 2,195 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Zamora Loam, 2 to 9 percent slopes (ZaC)

This soil is on long, smooth, convex terraces near Castaic Junction. Permeability of this soil is moderately slow. Available water-holding capacity is 10 to 11 inches. Fertility is moderate. Runoff is slow to medium, and the hazard of erosion is slight to moderate. Roots can penetrate to a depth of 60 inches of more. Included with this soil mapping are small areas that have a surface layer of sandy loam or clay loam. Also included are about 75 acres where slopes are 0 to 2 percent. This Zamora soil is used for dryland grains and range. It also is used for wildlife habitat. Capability unit IIe-1 irrigated. There are approximately 592 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Zamora loam, 9 to 15 percent slopes (ZaD)

This soil is located on strongly sloping to nearly rolling terraces. In most places, slopes range from 10 to 14 percent. Runoff is medium, and the hazard of erosion is moderate. This soil is used for range. It is also used as pump sites for oil fields, which occupy a large part of this soil. Capability Class is IIIe-1 irrigated. There are approximately 94 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

Zamora clay loam, 2 to 9 percent slopes (ZcC)

In most places where this soil is located, slopes range from 5 to 7 percent. Runoff is slow to medium on this soil, and the hazard of erosion is slight to moderate. Available water-holding capacity is 10.5 to 11.5 inches. Fertility is moderate. This soil is used primarily for range. It also is used as pump sites for oil

fields, which occupy much of the acreage. Capability Class is IIe-1 irrigated. There are approximately 8 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

129 – Saugus loam, 30 to 50 percent slopes

The Saugus component makes up 85 percent of this soil. Slopes are 30 to 50 percent. This component occurs on mountains. The parent material consists of soft residuum weathered sandstone and shale. Depth to a root restrictive layer, bedrock, paralithic, is 40 to 60 inches. The natural drainage class is well drained. Water movement is moderately high. Available water to depth of 60 inches is low. Nonirrigated land capability classification is VIe. There are approximately 285 acres of this soils located within the County of Los Angeles portion of the OVOV Planning Area.

143 – Xerorthents – Urban Land – Saugus Complex, 15 to 30 percent slopes

The Xerorthents component makes up 45 percent of this soil complex. Slopes are usually 15 to 30 percent, and this soil is found on hills. The parent material consists of human-altered residuum. Depth to a root restrictive layer, bedrock, lithic, is 10 to 60 inches. Well drained. Available water depth of 60 inches is very low. Nonirrigated land capability classification is VIII.

The Saugus component makes up 15 percent of this soil. Slopes are 15 to 30 percent. The parent material consists of residuum weathered sandstone and shale. Depth to a root restrictive layer is 40 to 60 inches. Well drained. Water movement is moderately high. Available water to a depth of 60 inches is low. Land Capability Class IVe nonirrigated and IVe irrigated. There are approximately 61 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

19 – Trigo family – Calcixerollic Xerochrepts-Vista family complex, 30 to 70 percent slopes

The Trigo family component makes up to 35 percent of this soil complex. Slopes are 30 to 70 percent. This component occurs on mountains. The parent material consists of residuum weathered from sandstone and shale. Depth to a root restrictive layer is 3 to 19 inches. Drainage is excessive. Available water to a depth of 60 inches is very low. Capability class VIIe nonirrigated.

The Calcixerollic Xerochrepts component of this soil makes up 30 percent. Slopes are 30 to 70 percent. This complex is found on mountains. The parent material consists of residuum weathered sandstone and shale. Depth to a restrictive layer is 15 to 42 inches. Water movement is relatively high. Available water to a depth of 60 inches is moderate. Capability class VIIe nonirrigated.

The Vista family component makes up 20 percent of unit. Slopes are 30 to 70 percent. Found on mountains. The parent material consist of residuum weathered sandstone and shale. Depth to a root restrictive layer is 60 inches. Well drained. Water movement is high. Available water to a depth of 60 inches is moderate. Capability unit VIIe nonirrigated. There are approximately 200 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

54 – Caperton-Trigo, granitic substratum – Lodo families complex, 50 to 85 percent slopes

The Caperton family component makes up 45 percent of this soil complex. This component occurs on mountains. The parent material consists of residuum weathered from gneiss. Depth to a root restrictive layer is 4 to 20 inches. Well drained. Water movement is relatively high. Available water to a depth of 60 inches is very low. Capability class is VIIe nonirrigated.

The Trigo family, granitic substratum component makes up 25 percent. Slopes are 50 to 85 percent. Found on mountains. Parent material consists of residuum weathered from granodiorite. Depth to a root restrictive layer is 3 to 19 inches. Natural drainage is excessively drained. Water movement is high. Available water to a depth of 60 inches is very low. Capability unit VIIe nonirrigated.

The Lodo family component makes up 15 percent of this soil complex. Slopes are 50 to 85 percent. Found on mountains. Parent material consists of residuum weathered from schist. Depth to a root restrictive layer is 6 to 19 inches. Excessively drained. Water movement is moderately high. Available water to a depth of 60 inches is very low. Capability unit VIIe non-irrigated. There are approximately 220 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

1 – Exchequer family, 30 to 60 percent slopes

This soil is located on mountains. Slopes are 30 to 60 percent. The parent material consists of residuum weathered from granite. Depth to a root restrictive layer, bedrock, lithic, is 5 to 18 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Capability Classification VIIe nonirrigated. There are approximately 20 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

102 – Badland

This type of soil is not used for agricultural activities. There are approximately 46 acres of this type located within the County of Los Angeles portion of the OVOV Planning Area.

115 – Friant fine sandy loam, 50 to 75 percent slopes

This soil is located on mountains and has slopes of 50 to 75 percent. The parent material consists of residuum weathered from slate. Depth to a root restrictive layer, bedrock, lithic, is 6 to 20 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-well potential is low. This soil is not flooded. There is no zone of water saturation within a depth of 72 inches. Land Capability Class VIIe nonirrigated. There are approximately 58 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

117 – Gaviota sandy loam, 30 to 50 percent slopes

This soil is found on mountains and slopes are 30 to 50 percent. The parent material consists of residuum weathered from sandstone. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. This soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Land Capability Class VIIe nonirrigated. There are approximately 9 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

122 – Millsholm loam, 30 to 50 percent slopes

This soil is located on hills and have slopes between 30 to 50 percent. The parent material consists of residuum weathered from sandstone and shale. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. The soil is not flooded nor is it ponded. There is no zone of water saturation within a depth of 72 inches. Land Capability Class VIIe nonirrigated. There are approximately 126 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

125 – Rock outcrop-Friant complex, 50 to 75 percent

The rock outcrop portion of this soil is not used in any agricultural activities. It is composed mostly of rocky, boulder areas along steep hilly, mountainous areas. The Friant portion of this soil is usually found on slopes that are 50 to 75 percent. The parent material consists of residuum weathered from metamorphic and sedimentary rock. Depth to a root restrictive layer is 6 to 20 inches. The natural drainage class is somewhat excessively drained. Available water to a depth of 60 inches is very low. Shrink-swell potential is low. The soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Nonirrigated land Capability Class is VIIe. There are approximately 24 acres of this soil located within the County of Los Angeles portion of the OVOV Planning Area.

128 – Saugus loam, 15 to 30 percent slopes

This soil is found on mountains in areas with slopes of 15 to 30 percent. The parent material consists of soft residuum weather from sandstone and shale. Depth to a root restrictive layer, bedrock, lithic is 40 to 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded or ponded.

Table 1
On-Site Soil Characteristics

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Soil Survey of the Antelope Valley Area, California[1]								
Agua Dulce stony loam, 30 to 50 percent slopes	Ojai-Agua Dulce Association/Agua Dulce Series	rapid	high	30 to 50	range, wildlife habitat, and watershed	VIIe-1	moderately slow	moderate
Amargosa rocky coarse sandy loam, 9 to 55 percent slopes	Vista-Amargosa Association/Amargosa Series	medium to rapid	moderate to high	9 to 55	range, recreation, wildlife, and water supply purposes	VIIe-1	moderately rapid	very low
Anaverde loam, 15 to 30 percent slopes	Anaverde-Godde Association/Anaverde Series	medium	moderate	15 to 30	range, wildlife, and recreation.	VIe-1	moderate/ 5.5 to 9 inches	high
Anaverde rocky loam, 30 to 50 percent slopes	Anaverde-Godde Association/Anaverde Series	rapid	high	35 to 45	range, wildlife habitat, watershed	VIIe-1	NA	NA
Castaic silty clay loam, 2 to 9 percent slopes	Saugus-Castaic-Balcom Association/Castaic Series	slow to medium	slight to moderate	2 to 9	limited grazing, homesites	IIIe-1 irrigated	NA/ 5 to 7.5 inches	NA
Castaic silty clay loam, 9 to 15 percent slopes	Saugus-Castaic-Balcom Association/Castaic Series	medium	moderate	9 to 15	range and homesites	IIIe-1	NA	NA
Castaic-Balcom silty clay loams, 9 to 15 percent slopes	Saugus-Castaic-Balcom Association/Castaic Series	medium	moderate	12 to 14	dryland small grains/pasture/range	IIIe-1 irrigated	NA	NA
Castaic-Balcom silty clay loams, 15 to 30 percent slopes	Saugus-Castaic-Balcom Association/Castaic Series	medium to rapid	moderate to high	25	range as wildlife habitat	IVe-1 irrigated	NA	NA

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Castaic-Balcom silty clay loams, 30 to 50 percent slopes	Saugus-Castaic-Balcom Association/Castaic Series	NA	moderate	NA	range/wildlife habitat/watershed	VIe-1 dryland	NA	NA
Castaic-Balcom silty clay loams, 30 to 50 percent slopes, eroded	Saugus-Castaic-Balcom Association/Castaic Series	rapid	high	30 to 50	range/watershed/ wildlife habitat/ recreation	VIe-1 dryland	Slow/5 to 7 inches	moderate
Castaic-Balcom silty clay loams, 50 to 65 percent slopes, eroded	Saugus-Castaic-Balcom Association/Castaic Series	very rapid	very high	50 to 65	wildlife habitat, watershed purposes, and graze land	VIIe-1	NA	NA
Castaic and Saugus soils, 30 to 65 percent slopes, severely eroded	Saugus-Castaic-Balcom Association/Castaic Series	rapid	very high	45 to 65	watershed/wildlife habitat	VIIIe-1 dryland	NA / 4 to 6 inches (Castaic soil) and 4 to 7 inches (Saugus soil)	low
Chino loam	Hanford-Ramona-Greenfield Association/Chino Series	very slow	none to slight	NA	wet and in meadow, used for pasture	IIw-2 irrigated	moderately slow/ 10 to 12 inches	moderate, but high when reclaimed
Cortina sandy loam, 0 to 2 percent slopes	Yolo-Metz-Cortina Association/Cortina Series	slow	moderate	3 to 5	dryland small grains/irrigated alfalfa/pasture	IVs-0	NA	NA
Cortina sandy loam, 2 to 9 percent slopes	Yolo-Metz-Cortina Association/Cortina Series	slow	moderate	3 to 5	dryland small grains/irrigated alfalfa/pasture	IVs-0	NA	NA
Cortina cobbly sandy loam, 2 to 9 percent slopes	Yolo-Metz-Cortina Association/Cortina Series	slow	slight	2 to 9	range, wildlife habitat, and watershed purposes	VIIs-7	rapid/2 to 3 inches	low
Gaviota rocky sandy loam, 15 to 30 percent slopes, eroded	Gaviota-Millsholm Association/Gaviota Series	medium	moderate	15 to 30	range, wildlife habitat, and watershed	VIIe-1	moderately rapid/ 1 to 2 inches	low

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Gaviota rocky sandy loam, 30 to 50 percent slopes, eroded	Gaviota-Millsholm Association/Gaviota Series	rapid	high	45	range, wildlife, and watershed	VIIe-1 dryland	NA	NA
Gazos clay loam, 30 to 50 percent slopes	Gaviota-Millsholm Association/Gazos Series	rapid	high	30 to 50	grazing	VIe-1	moderately slow/ 3 to 6 inches	moderate
Godde rocky loam, 30 to 50 percent slopes	Anaverde-Godde Association/Godde Series	rapid	high	30 to 50	range, wildlife habitat, recreation, watershed purposes	VIIe-1	moderate/ 2 to 3 inches	low
Greenfield sandy loam, 0 to 2 percent slopes	Hanford-Ramona-Greenfield Association/Greenfield Series	slow	slight	0 to 2	irrigated crops, dryland small grains, pasture, and range	IIe-1 irrigated	NA	NA
Greenfield sandy loam, 2 to 9 percent slopes	Hanford-Ramona Greenfield Association/Greenfield Series	slow to medium	slight to moderate	2 to 9	irrigated crops, dryland small grains, pasture, and range	IIe-1 irrigated	moderately rapid/7.5 to 9 inches	moderate
Greenfield sandy loam, 9 to 15 percent slopes, eroded	Hanford-Ramona-Greenfield Association/Greenfield Series	medium to rapid	moderate to high	10 to 14	dryland small grains, dryland pasture, range	IIIe-1 irrigated	NA	NA
Hanford coarse sandy loam, 9 to 15 percent slopes	Hanford-Ramona-Greenfield Association/Hanford Series	medium	moderate	9 to 15	dryland small grains, dryland pasture, range	IIIe-1 irrigated	NA	NA
Hanford sandy loam, 0 to 2 percent slopes	Hanford-Ramona-Greenfield Association/Hanford Series	slow	slight	0 to 2	irrigated crops/pasture/range	IIs-4 irrigated/ IVec-1 dryland	NA / 6 to 7.5 inches	moderate

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Hanford sandy loam, 2 to 9 percent slopes	Hanford-Ramona-Greenfield Association/Hanford Series	slow to medium	slight to moderate	2 to 6	irrigated crops/pasture/range	IIe-1 irrigated/IVec-1 dryland	NA / 6 to 7.5 inches	moderate
Hanford sandy loam, calcareous variant, 2 to 9 percent slopes	Hanford-Ramona-Greenfield Association/Hanford Series	slow	slight	2 to 9	dryland small grains and range	IIe-1 irrigated	moderately rapid/ 7.5 to 9.9 inches	moderate
Las Posas loam, 9 to 30 percent slopes	Las Posas-Toomes-Temescal Association/Las Posas Series	medium to rapid	moderate to high	9 to 30	range in spring	IVe-1	NA/4 to 7 inches	NA
Las Posas-Toomes rocky loams, 30 to 50 percent slopes	Las Posas-Toomes-Temescal Association/Las Posas Series	rapid	high	30 to 50	range and wildlife habitat	VIIe-1	moderately slow/ 4 to 7 inches	low
Metz loamy sand, 0 to 2 percent slopes	Yolo-Metz-Cortina Association/Metz Series	slow	slight to moderate	0 to 2	irrigated crops/dryland farming/wildlife habitat	IIIs-4 irrigated	rapid/ 4 to 5 inches	low
Metz loamy sand, 2 to 9 percent slopes	Yolo-Metz-Cortina Association/Metz Series	slow	slight	2 to 5	irrigated crops	IIIs-4 irrigated	NA / NA	NA
Metz loam, 0 to 2 percent slopes	Yolo-Metz-Cortina Association/Metz Series	slow	slight to none	0 to 2	alfalfa/row crops	IIs-4 irrigated	NA / 5 to 6 inches	moderate
Metz loam, 2 to 5 percent slopes	Yolo-Metz-Cortina Association/Metz Series	slow	slight	2 to 3	irrigated alfalfa/small grains	IIs-4 irrigated	NA / NA	moderate
Millsholm rocky loam, 15 to 30 percent slopes, eroded	Gaviota-Millsholm Association/Millsholm Series	medium to rapid	moderate to high	20 to 24	range, wildlife, and recreation.	VIIe-1	NA	NA
Millsholm rocky loam, 30 to 50 percent slopes, eroded	Gaviota-Millsholm Association/Millsholm Series	rapid	high	30 to 50	range, wildlife, and watershed	VIIe-1	moderate/ 2 to 3 inches	NA

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Mocho sandy loam, 0 to 2 percent slopes	Yolo-Metz-Cortina Association/Mocho Series	slow	slight	0 to 2	dryland/irrigated crops	I-1 irrigated	NA/ 7.5 to 9.5 inches	NA
Mocho loam, 0 to 2 percent slopes	Yolo-Metz-Cortina Association/Mocho Series	slow	none to slight	0 to 2	dryland/irrigated crops	I-1 irrigated	moderate/ 8 to 10 inches	high
Mocho loam, 2 to 9 percent slopes	Yolo-Metz-Cortina Association/Mocho Series	slow to medium	slight to moderate	2 to 5	dryland/irrigated crops	IIe-1 irrigated	NA / NA	NA
Oak Glen sandy loam, 2 to 9 percent slopes	Oak Glen-Gorman Association/Oak Glen Series	slow to medium	slight to moderate	2 to 9	dryland small grains, and range	IIIe-1	moderately rapid/ 6 to 7.5 inches	high
Oak Glen gravelly sandy loam, 2 to 9 percent slopes	Oak Glen-Gorman Association/Oak glen Series	slow to medium	slight to moderate	2 to 9	range/wildlife habitat	IIIe-1 dryland	NA/ 4 to 6 inches	NA
Oak Glen loam, 0 to 2 percent slopes	Oak Glen-Gorman Association/Oak Glen Series	very slow	none to slight	0 to 2	range/wildlife habitat	IIIc-1 dryland	moderate/ high	NA
Ojai loam, 2 to 9 percent slope	Ojai-Agua Dulce Association/Ojai Series	slow to medium	slight to moderate	2 to 9	irrigated alfalfa/row crops/ range/home sites/industry sites	IIIe-1 irrigated	moderate/ 9 to 11 inches	low
Ojai loam, 9 to 15 percent slopes	Ojai-Agua Dulce Association/Ojai Series	medium	moderate	10 to 15	range/dryland small grains/wildlife habitat	IVe-1 irrigated	NA / NA	NA
Ojai loam, 15 to 30 percent slopes	Ojai-Agua Dulce Association/Ojai Series	medium to rapid	moderate to high	20 to 26	range/wildlife habitat/watershed/severely limit suitability for cultivation	VIe-1 dryland	NA / NA	NA
Ojai loam, 30 to 50 percent slopes	Ojai-Agua Dulce Association/Ojai Series	rapid	high	35 to 45	range/wildlife habitat/watershed	VIIe-1 dryland	NA / NA	NA

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Ojai loam, 30 to 50 percent slopes, eroded	Ojai-Agua Dulce Association/Ojai Series	rapid	high	40	range/wildlife habitat/watershed	VIIe-1 dryland	NA / NA	NA
Ojai loam, thin surface variant, 30 to 50 percent slopes	Ojai-Agua Dulce Association/Ojai Series	rapid	high	30 to 50	range	VIIe-1 dryland	moderate/ 8 to 10 inches	low
Ojai-Zamora loams, 15 to 30 percent slopes	Ojai-Agua Dulce Association/Ojai Series	medium to rapid	moderate	15 to 30	range	VIe-1	NA	NA
Ramona coarse sandy loam, 2 to 5 percent slopes	Hanford-Ramona-Greenfield Association/Ramona Series	slow	slight	2 to 5	dryland crops, dryland and irrigated orchards, and wildlife habitat	IIe-1 irrigated	NA	NA
Ramona coarse sandy loam, 5 to 9 percent	Hanford-Ramona-Greenfield Association/Ramona Series	slow to medium	slight to moderate	5 to 9	dryland crops, dryland and irrigated orchards, and wildlife habitat	IIIe-1 irrigated	moderately slow/ 8 to 10 inches	moderate
Ramona coarse sandy loam, 9 to 15 percent	Hanford-Ramona-Greenfield Association/Ramona Series	medium	moderate	9 to 15	small grains and range	IVe-1	NA	NA
Ramona sandy loam, 9 to 30 percent slopes, eroded	Hanford-Ramona-Greenfield Association/Ramona Series	medium to rapid	moderate to high	25	range, wildlife habitat, and watershed	VIe-1	NA	NA
Ramona gravelly sandy loam, 9 to 30 percent slopes	Hanford-Ramona-Greenfield Association/Ramona Series	medium to rapid	moderate to high	9 to 30	range and wildlife habitat	VIe-1	NA/ 5.5 to 7.5 inches	NA
Ramona loam, 2 to 5 percent slopes	Hanford-Ramona-Greenfield Association/Ramona Series	slow	slight	2 to 5	dryland small grains	IIe-1 irrigated	NA	NA

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Ramona loam, 5 to 9 percent slopes	Hanford-Ramona-Greenfield Association/Ramona Series	slow to medium	slight to moderate	5 to 9	dryland crops, range, dryland and irrigated orchards, and wildlife habitat	IIIe-1 irrigated	NA	NA
Riverwash	N/A	NA	moderate	NA	wildlife habitat/watershed/no value for farming	VIIIw-4 dryland	NA / NA	NA
Sandy alluvial land	N/A	NA	moderate	NA	grazing/wildlife habitat/watershed/limited use for cultivated crops	VIIw-4	NA / NA	NA
Saugus loam, 15 to 30 percent slopes	Saugus-Castaic-Balcom Association/Saugus Series	medium	moderate	20 to 24	range/homesites and subdivisions	VIe-1	NA / NA	NA
Saugus loam, 30 to 50 percent slopes	Saugus-Castaic-Balcom Association/Saugus Series	rapid	high	45 to 55	range/homesites and subdivisions	VIIe-1 dryland	NA / NA	NA
Saugus loam, 30 to 50 percent slopes, eroded	Saugus-Castaic-Balcom Association/Saugus Series	rapid	high	30 to 50	range/wildlife habitat/watershed	VIIe-1 dryland	moderate/ 5 to 7.5 inches	low
Sorrento loam, 0 to 2 percent slopes	Yolo-Metz-Cortina Association/Sorrento Series	slow	slight	0 to 2	many kinds of irrigated crops	I-1 irrigated	NA / NA	NA
Sorrento loam, 2 to 5 percent slopes	Yolo-Metz-Cortina Association/Sorrento Series	slow	slight	2 to 5	irrigated crops such as alfalfa/green onions/carrots/walnuts/ pasture	IIe-1	moderate/ 8.5 to 10 inches	high
Temescal-Rock land complex, 30 to 50 percent slopes	Las Posas-Toomes-Temescal Association/Temescal Series	rapid	high	30 to 50	range, wildlife and watershed	Temescal part: VIIe-1 Rock Land: VIIIs-1	moderate/ 2 to 3 inches	low

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Terrace Escarpments	N/A	medium to rapid	moderate to high	35	incidentally for grazing. Cover for wildlife	VIIe-1	NA	NA
Vernalis loam, 2 to 5 percent slopes	Hanford-Ramona-Greenfield Association/Vernalis Series	slow	slight	2 to 5	irrigated crops, dryland crops, range	IIe-1 irrigated	NA/ .5 to 9.5 inches	NA
Vernalis clay loam, 0 to 2 percent slopes	Hanford-Ramona-Greenfield Association/Vernalis Series	very slow	none to slight	0 to 2	sugar beets, irrigated small grains, dryland small grains, and range	I-1 irrigated	NA/ 9.5 to 10.5 inches	NA
Vista coarse sandy loam, 15 to 30 percent slopes	Vista-Amargosa Association/Vista Series	medium to rapid	moderate to high	15 to 30	range, wildlife habitat, and watershed	VIe-1	NA	NA
Vista coarse sandy loam, 30 to 50 percent slopes	Vista-Amargosa Association/Vista Series	rapid	high	30 to 50	range, wildlife habitat, watershed	VIIe-1	moderately rapid/ 2.5 to 3.5 inches	low
Vista coarse sandy loam, 30 to 50 percent slopes, eroded	Vista-Amargosa Association/Vista Series	rapid	high	35 to 45	range/wildlife habitat/watershed	VIIe-1 dryland	NA / NA	NA
Wyman gravelly loam, 2 to 9 percent slopes	Las Posas-Toomes-Temescal Association/Wyman Series	slow to medium	slight to moderate	2 to 9	dryland small grains and range, and wildlife habitat	IIe-1 irrigated	moderate/ 8.5 to 9.5 inches	moderate
Wyman gravelly loam, 9 to 15 percent slopes	Las Posas-Toomes-Temescal Association/Wyman Series	medium	moderate	9 to 15	dryland small grain, range, and wildlife habitat	IIIe-1 irrigated	NA	NA
Wyman cobbly loam, 5 to 9 percent slopes	Las Posas-Toomes-Temescal Association/Wyman Series	slow to medium	slight to moderate	5 to 9	range in spring, and wildlife habitat	VIe-7	NA/5.5 to 7 inches	NA

Soil	Association and Series	Runoff	Erosion Hazard	Slope (percent)	Soil Use	Capability Classification	Permeability/ Water-Holding Capacity	Fertility
Yolo loam, 0 to 2 percent slopes	Yolo-Metz-Cortina Association/Yolo Series	very low	none to slight	0 to 2	irrigated crops	I-1 irrigated	moderate/ 8.5 to 10.5 inches	high
Yolo loam, 2 to 9 percent slopes	Yolo-Metz-Cortina Association/Yolo Series	slight to moderate	slow to medium	2 to 6	irrigated crops/range/homesites	IIe-1 irrigated	NA / NA	NA
Zamora loam, 2 to 9 percent slopes	Yolo-Metz-Cortina Association/Zamora Series	slow to medium	slight to moderate	2 to 9	dryland grains/range/wildlife habitat	IIe-1 irrigated	moderate/ 10 to 11 inches	moderate
Zamora loam, 9 to 15 percent slopes	Yolo-Metz-Cortina Association/Zamora Series	medium	moderate	9 to 15	range and pump-sites for oil fields	IIIe-1	NA	NA
Zamora clay loam, 2 to 9 percent slopes	Yolo-Metz-Cortina Association/Zamora Series	slow to medium	slight to moderate	5 to 7	range and pump-sites for oil fields	IIe-1 irrigated	NA/10.5 to 11.5 inches	NA

Soil	Depth to a Restrictive Layer, Bedrock or Lithic (inches)	Water Movement	Drainage	Available Water Depth of 60 inches	Capability Class	Parent Material	Slopes (Percent)
Soil Survey of Los Angeles County, California, West San Fernando Valley Area[2]							
102 – Badland[4]	NA	NA	NA	NA	NA	NA	NA
115 – Friant fine sandy loam, 50 to 75 percent slopes	6 to 20	high	somewhat excessively drained	very low	VIIe	residuum weathered from slate	50 to 75
117 – Gaviota sandy loam, 30 to 50 percent slopes	10 to 20	high	well drained	very low	VIIe	residuum weathered from sandstone	30 to 50
122 – Millsholm loam, 30 to 50 percent slopes	10 to 20	moderately high	well drained	very low	VIIe	residuum weathered from sandstone and shale	30 to 50

Soil	Depth to a Restrictive Layer, Bedrock or Lithic (inches)	Water Movement	Drainage	Available Water Depth of 60 inches	Capability Class	Parent Material	Slopes (Percent)
125 – Rock-outcrop[4]-Friant complex, 50 to 75 percent slopes	Rock: NA Friant: 6 to 20	Rock: NA Friant: NA	Rock: NA Friant: excessively drained	Rock: NA Friant: very low	Rock: NA Friant: VIIe	Rock: NA Friant: residuum weathered from metamorphic and sedimentary rock	Rock: NA Friant: 50 to 75
Soil Survey of Los Angeles County, California, West San Fernando Valley Area[2] (continued)							
128 – Saugus loam, 15 to 30 percent slopes	40 to 60	moderately high	well drained	low	IVe	soft residuum weathered from sandstone and shale	30 to 50
129 – Saugus loam, 30 to 50 percent slopes	40 to 60	NA	well drained	low	VIe non-irrigated	soft residuum, weathered sandstone, shale	30 to 50
143 – Xerorthents-Urban land-Saugus complex, 15 to 30 percent slopes	10 to 60 (Xerorthents) 40 to 60 (Saugus)	moderately high (Saugus)	well drained (Xerorthents and Saugus)	very low (Xerorthents) low (Saugus)	VIII non-irrigated (Xerorthents), IVe non-irrigated and IVe irrigated (Saugus)	human-altered residuum (Xerorthents), residuum weathered sandstone and shale (Saugus)	15 to 30

Soil	Depth to a Restrictive Layer, Bedrock or Lithic (inches)	Water Movement	Drainage	Available Water Depth of 60 inches	Capability Class	Parent Material	Slopes (Percent)
Soil Survey of the Angeles National Forest Area, California[3]							
1-Exchequer family, 30 to 60 percent slopes	5 to 18	moderately high	excessively drained	very low	VIIe	residuum weathered granite	30 to 60
19 – Trigo family-Calcixerollic Xerochrepts-Vista family complex, 30 to 70 percent slopes	3 to 19 (Trigo) 15 to 42 (Calcixerollic Xerochrepts), 60 (Vista)	relatively high (Calcixerollic Xerochrepts), high (Vista)	Excessive (Trigo Family), well drained (Vista)	very low (Trigo), moderate (Calcixerollic Xerochrepts), moderate (Vista)	VIIe non-irrigated (Trigo), VIIe non-irrigated (Calcixerollic Xerochrepts), VIIe (Vista)	residuum weathered sandstone and shale (all three components)	30 to 70
Soil Survey of the Angeles National Forest Area, California[3] (continued)							
54 – Caperton-Trigo, granitic substratum-Lodo families complex, 50 to 85 percent slopes	4 to 20 (Caperton), 3 to 19 (Trigo), 6 to 19 (Lodo)	moderately high (Caperton), high (Trigo), moderately high (Lodo)	well drained (Caperton), excessively drained (Trigo), excessively drained (Lodo)	very low (Caperton), very low (Trigo), very low (Lodo)	VIIe non-irrigated (Caperton), VIIe non-irrigated (Trigo), VIIe non-irrigated (Lodo)	residuum weathered from gneiss (Caperton), residuum weathered from granodiorite (Trigo), residuum weathered from schist (Lodo)	50 to 85

[1] *United States Department of Agriculture Soil Conservation Service In Cooperation with University of California Agricultural Experiment Station, Soil Survey Antelope Valley Area, California, January 1970.*

[2] *United States Department of Agriculture Soil Conservation Service In Cooperation with University of California Agricultural Experiment Station, Soil Survey Los Angeles County, California, West San Fernando Valley Area.*

[3] *United States Department of Agriculture Soil Conservation Service In Cooperation with University of California Agricultural Experiment Station, Soil Survey Angeles National Forest Area, California.*

[4] *Generated brief soil descriptions are created for major soil components. The Badland and Rock outcrop is a miscellaneous area.*

APPENDIX 3.13

Water Service Information

APPENDIX 3.13

Water Service Information (continued)

DEPARTMENT OF WATER RESOURCES

BULLETIN 118 - UPDATE 2003

CALIFORNIA'S GROUNDWATER

Cover photograph:
A typical agricultural well with the water discharge pipe and the electric motor that drives the pump.

Inset photograph:
Groundwater recharge ponds in the Upper Coachella Valley near the Whitewater River that use local and imported water. Recharge ponds are also called spreading basins or recharge basins.

State of California
The Resources Agency
Department of Water Resources

CALIFORNIA'S GROUNDWATER

BULLETIN 118 *Update 2003*

October 2003

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If you need this publication in an alternate form, contact the Department's Office of Water Education at 1-800-272-8869.

Foreword

Groundwater is one of California's greatest natural resources. In an average year, groundwater meets about 30 percent of California's urban and agricultural water demands. In drought years, this percentage increases to more than 40 percent. In 1995, an estimated 13 million Californians, nearly 43 percent of the State's population, were served by groundwater. The demand on groundwater will increase significantly as California's population grows to a projected 46 million by the year 2020. In many basins, our ability to optimally use groundwater is affected by overdraft and water quality impacts, or limited by a lack of data, management, and coordination between agencies.

Over the last few years, California voters and the Legislature have provided significant funding to local agencies for conjunctive use projects, groundwater recharge facilities, groundwater monitoring, and groundwater basin management activities under Proposition 13 and the Local Groundwater Management Assistance Act of 2000. Most recently, the 2002 passage of Proposition 50 will result in additional resources to continue recent progress toward sustaining our groundwater resources through local agency efforts. We are beginning to see significant benefits from these investments.

The State Legislature recognizes the need for groundwater data in making sound local management decisions. In 1999, the Legislature approved funding and directed the Department of Water Resources (DWR) to update the inventory of groundwater basins contained in Bulletin 118 (1975), *California's Ground Water* and Bulletin 118-80 (1980), *Ground Water Basins in California.* In 2001, the Legislature passed AB 599, requiring the State Water Resources Control Board to establish a comprehensive monitoring program to assess groundwater quality in each groundwater basin in the State and to increase coordination among agencies that collect groundwater contamination information. In 2002, the Legislature passed SB 1938, which contains new requirements for local agency groundwater management plans to be eligible for public funds for groundwater projects.

Effective management of groundwater basins is essential because groundwater will play a key role in meeting California's water needs. DWR is committed to assisting local agencies statewide in developing and implementing effective, locally planned and controlled groundwater management programs. DWR is also committed to federal and State interagency efforts and to partnerships with local agencies to coordinate and expand data monitoring activities that will provide necessary information for more effective groundwater management. Coordinated data collection at all levels of government and local planning and management will help to ensure that groundwater continues to serve the needs of Californians.

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California Department of Pesticide Regulation
California Department of Toxic Substances Control
California Department of Health Services
California State Water Resources Control Board
California Regional Water Quality Control Boards
United States Geological Survey
United States Bureau of Reclamation

We also wish to thank numerous reviewers who provided valuable comments on the April 2003 public review draft of this bulletin.

Acronyms and abbreviations

AB Assembly Bill
BMO Basin management objective
CAS California Aquifer Susceptibility
CVP Central Valley Project
DBCP Dibromochloropropane
DCE Dichloroethylene
DHS California Department of Health Services
DPR California Department of Pesticide Regulation
DTSC California Department of Toxic Substances Control
DWR California Department of Water Resources
DWSAP Drinking Water Source Assessment Program
EDB Ethylene dibromide
EC Electrical conductivity
EMWD Eastern Municipal Water District
EWMP Efficient water management
EPA U.S. Environmental Protection Agency
ESA Federal Endangered Species Act
ET Evapotranspiration
ETAW Evapotranspiration of applied water
EWA Environmental Water Account
GAMA Groundwater Ambient Monitoring and Assessment
GIS Geographic information system
GMA Groundwater Management Agency
gpm Gallons per minute
GRID Groundwater Resources Information Database
GRIST Groundwater Resources Information Sharing Team
H & S Health and Safety Code
HR Hydrologic region
ISI Integrated Storage Investigations
ITF Interagency Task Force
JPA Joint powers agreement
maf Million acre-feet
MCL Maximum contaminant level
mg/L Milligrams per liter
MOU Memorandum of understanding
MTBE Methyl tertiary-butyl ether
OCWD Orange County Water District
PAC Public Advisory Committee
PCE Tetrachloroethylene
PCA Possible contaminating activity
PPIC Public Policy Institute of California
ROD Record of Decision
RWQCB Regional Water Quality Control Board
SB Senate Bill
SGA Sacramento Groundwater Authority
SVOC Semi-volatile organic compound
SVWD Scotts Valley Water District
SWRCB State Water Resources Control Board

taf Thousand acre-feet
TCE Trichloroethylene
TDS Total dissolved solids
UWMP Urban water management plan
USACE U.S. Army Corps of Engineers
USBR U.S. Bureau of Reclamation
USC United States Code
USGS U.S. Geological Survey
VOC Volatile organic compound
WQCP Water Quality Control Plan

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Findings

Major Findings

1. **Groundwater provides about 30% of the State's water supply in an average year, yet in many basins the amount of groundwater extracted annually is not accurately known.**
   - In some regions, groundwater provides 60% or more of the supply during dry years.
   - Many small- to moderate-sized towns and cities are entirely dependent on groundwater for drinking water supplies.
   - 40% to 50% of Californians rely on groundwater for part of their water supply.
   - In many basins, groundwater use is indirectly estimated by assuming crop evapotranspiration demands and surveying the acreage of each crop type.

2. **Opportunities for local agencies to manage their groundwater resources have increased significantly since the passage of Assembly Bill 3030 in 1992. (Water Code § 10750 et seq.). In the past several years more agencies have developed management programs to facilitate conjunctive use, determine the extent of the resource, and protect water quality.**
   - The act provides the authority for many local agencies to manage groundwater.
   - The act has resulted in more than 200 local agencies adopting groundwater management plans to date.
   - The act encourages regional cooperation in basins and allows private water purveyors to participate in groundwater management through memoranda of understanding with public agencies.
   - Many local agencies are recognizing their responsibility and authority to better manage groundwater resources.

3. **Agencies in some areas have not yet developed groundwater management plans.**
   - Concerns about cooperative management, governance, and potential liabilities have kept some agencies from developing management plans.
   - Development of management programs to maintain a sustainable groundwater supply for local use has not been accomplished throughout the State.

4. **A comprehensive assessment of overdraft in the State's groundwater basins has not been conducted since Bulletin 118-80, but it is estimated that overdraft is between 1 million and 2 million acre-feet annually.**
   - Historical overdraft in many basins is evident in hydrographs that show a steady decline in groundwater levels for a number of years.
   - Other basins may be subject to overdraft in the future if current water management practices are continued.
   - Overdraft can result in increased water production costs, land subsidence, water quality impairment, and environmental degradation.
   - Few basins have detailed water budgets by which to estimate overdraft.
   - While the most extensively developed basins tend to have information, many basins have insufficient data for effective management or the data have not been evaluated.
   - The extent and impacts of overdraft must be fully evaluated to determine whether groundwater will provide a sustainable water supply.
   - Modern computer hardware and software enable rapid manipulation of data to determine basin conditions such as groundwater storage changes or groundwater extraction, but a lack of essential data limits the ability to make such calculations.
   - Adequate statewide land use data for making groundwater extraction estimates are not available in electronic format.

5. **Surface water and groundwater are connected and can be effectively managed as integrated resources.**
   - Groundwater originates as surface water.
   - Groundwater extraction can affect flow in streams.
   - Changes in surface water flow can affect groundwater levels.
   - Legal systems for surface water and groundwater rights can make coordinated management complex.

6. **Groundwater quality and groundwater quantity are interdependent and are increasingly being considered in an integrated manner.**
   - Groundwater quantity and groundwater quality are inseparable.
   - Groundwater in some aquifers may not be usable because of contamination with chemicals, either from natural or human sources.
   - Unmanaged groundwater extraction may cause migration of poor quality water.
   - Monitoring and evaluating groundwater quality provides managers with the necessary data to make sound decisions regarding storage of water in the groundwater basin.
   - State agencies conduct several legislatively mandated programs to monitor different aspects of groundwater quality.
   - California Department of Water Resources (DWR) monitors general groundwater quality in many basins throughout the State for regional evaluation.

7. **Land use decisions affecting recharge areas can reduce the amount of groundwater in storage and degrade the quality of that groundwater.**
   - In many basins, little is known about the location of recharge areas and their effectiveness.
   - Protection and preservation of recharge areas are seldom considered in land use decisions.
   - If recharge areas are altered by paving, channel lining, or other land use changes, available groundwater will be reduced.
   - Potentially contaminating activities can degrade the quality of groundwater and require wellhead treatment or aquifer remediation before use.
   - There is no coordinated effort to inform the public that recharge areas should be protected against contamination and preserved so that they function effectively.

Additional Important Findings

8. **Funding to assist local groundwater management has recently been available in unprecedented amounts.**
   - Proposition 13 (Water Code, § 79000 et seq.) authorized $230 million in loans and grants for local groundwater programs and projects, almost all of which has been allocated.
   - The Local Groundwater Management Assistance Act of 2000 (Water Code, § 10795) has resulted in more than $15 million in grants to local agencies in fiscal years 2001, 2002, and 2003.
   - Proposition 50 (Water Code, § 79500 et seq) will provide funding for many aspects of water management, including groundwater management and groundwater recharge projects.
   - Funding for the California Bay-Delta program has provided technical and facilitation assistance to numerous local groundwater planning efforts.

9. **Local governments are increasingly involved in groundwater management.**
   - Twenty-four of the 27 existing county groundwater management ordinances have been adopted since 1990.
   - Most ordinances require the proponents of groundwater export to demonstrate that a proposed project will not cause subsidence, degrade groundwater quality, or deplete the water supply before the county will issue an export permit.
   - While the ordinances generally require a permit for export of groundwater, most do not require a comprehensive groundwater management plan designed to ensure a sustainable water resource for local use.
   - Some local governments are coordinating closely with local water agencies that have adopted groundwater management plans.
   - Many local governments are monitoring and conducting studies in an effort to better understand groundwater resources.

10. **Despite the increased groundwater management opportunities and activities, the extent of local efforts is not well known.**
    - There is no general requirement that groundwater management plans be submitted to DWR, so the number of adopted plans and status of groundwater management throughout the State are not currently known.
    - There are no requirements for evaluating the effectiveness of adopted plans, other than during grant proposal review.
    - No agency is responsible for tracking implementation of adopted plans.
    - Unlike urban water management plans, groundwater management plans are not required to be submitted to DWR, making the information unavailable for preparing the California Water Plan.

11. **Despite the fact that several agencies often overlie each groundwater basin, there are few mechanisms in place to support and encourage agencies to manage the basin cooperatively.**
    - Some local agencies have recognized the benefits of initiating basinwide and regional planning for groundwater management and have recorded many successes.
    - Regional cooperation and coordination depends on the ability of local agencies to fund such efforts.
    - There is no specific State or federal program to fund and support coordination efforts that would benefit all water users in a region and statewide.

12. **The State Legislature has recognized the need to consider water supplies as part of the local land use planning process.**
    - Three bills—Senate Bill 221[1], SB 610[2], and AB 901[3]—were enacted in 2001 to improve the assessment of water supplies. The new laws require the verification of sufficient water supply as a condition for approving certain developments and compel urban water suppliers to provide more information on the reliability of groundwater as an element of supply.
    - The Government Code does not specifically require local governments to include a water resources element in their general plans.

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[1] Business and Professions Code Section 11010, Government Code Sections 65867.5, 66455.3, and 66473.7.
[2] Public Resources Code Section 21151.9, Water Code Sections 10631, 10656, 10657, 10910-10912, 10915.
[3] Water Code Sections 10610.2, 10631, 10634.

13. **The need to monitor groundwater quality and contamination of groundwater continues to grow.**
    - As opportunities for developing additional surface water supplies become more limited, subsequent growth will increasingly rely on groundwater.
    - Human activities are likely the cause of more than half the exceedances of maximum contaminant levels in public water supply wells.
    - New contaminants are being regulated and standards are becoming more stringent for others, requiring increased monitoring and better management of water quality.

14. **Monitoring networks for groundwater levels and groundwater quality have not been evaluated in all basins to ensure that the data accurately represent conditions in the aquifer(s).**
    - Groundwater levels are monitored in about 10,000 active wells including those basins where most of the groundwater is used.
    - Groundwater levels are not monitored in approximately 200 basins, where population is sparse and groundwater use is generally low.
    - Groundwater quality monitoring networks are most dense near population centers and may not be representative of the basin as a whole.
    - Many of the wells being monitored are not ideally constructed to provide water level or water quality information that is representative of a specific aquifer.
    - Many wells are too deep to monitor changes in the unconfined (water table) portion of basins.

15. **The coordination of groundwater data collection and evaluation by local, State, and federal agencies is improving.**
    - The State Water Resources Control Board (SWRCB) recently formed the Groundwater Resources Information Sharing Team (GRIST) consisting of several State and federal agencies with groundwater-related programs.
    - DWR established a website in 1996 that has provided water-level data and hydrographs for more than 35,000 active and inactive wells monitored by DWR and cooperating agencies.
    - DWR collects and maintains water level data in part through partnerships with local agency cooperators.
    - DWR staff collaborated with many local, State, and federal agencies in developing this update of Bulletin 118.
    - SWRCB recently formed an interagency task force to develop a comprehensive groundwater quality monitoring program for assessing every groundwater basin in the State as required by the Groundwater Quality Monitoring Act of 2001 (AB 599; Water Code, § 10780 et seq.).
    - Water purveyors have concerns about balancing public access to data with water supply security.

16. **Boundaries of groundwater basins have been determined using the best available geologic and hydrologic information. These boundaries are important in determining the availability of local water supplies.**
    - Basin boundaries were derived primarily by identifying alluvial sediments on geologic maps using the best available information, but are subject to change when new information becomes available.
    - The Water Code requires the use of basin boundaries defined in Bulletin 118 in groundwater management plans and urban water management plans.
    - The location of basin boundaries will become more critical as the demand for water continues to increase.
    - Subbasin boundaries may be delineated for management convenience rather than based on hydrogeologic conditions.

17. **Little is known about the stream-aquifer interaction in many groundwater basins.**
    - Groundwater and surface water are closely linked in the hydrologic cycle.
    - The relationship between streamflow and extraction of groundwater is not fully understood in most basins and is generally not monitored.
    - Groundwater extraction in many basins may affect streamflow.
    - Interaction of groundwater flow and surface water may affect environmental resources in the hyporheic zone.
    - An understanding of stream-aquifer interaction will be essential to evaluating water transfers in many areas of the State.

18. **Although many new wells are built in fractured rock areas, insufficient hydrogeologic information is available to ensure the reliability of groundwater supplies.**
    - Population is increasing rapidly in foothill and mountain areas in which groundwater occurs in fractured rock.
    - The cumulative effect of groundwater development may reduce the yield of individual wells, lower the flow of mountain streams, and impact local habitat.
    - Characterization of groundwater resources in fractured rock areas can be very expensive and complex.
    - Many groundwater users in these areas have no other water supply alternatives.
    - Recent dry years have seen many wells go dry in fractured rock areas throughout the State.
    - Groundwater management in these areas is beginning, but there is insufficient data to support quantitative conclusions about the long-term sustainable yield.

19. **When new wells are built, drillers are required to file a Well Completion Report with DWR. That report contains a lithologic log, the usability of which varies considerably from driller to driller.**
    - The Well Completion Reports are confidential and not available to the public, as stipulated by the Water Code, unless the owner's permission is obtained.
    - The usefulness of the information in Well Completion Reports varies but is not fully realized.
    - Public access to Well Completion Reports would increase understanding of groundwater conditions and issues.
    - There is no provision in the Water Code that requires submission of geophysical logs, which would provide an accurate log of the geologic materials within the aquifer.
    - Geophysical logs would provide a greatly improved database for characterization of aquifers.

Recommendations

Major Recommendations

1. **Local or regional agencies should develop groundwater management plans if groundwater constitutes part of their water supply. Management objectives should be developed to maintain a sustainable long-term supply for multiple beneficial uses. Management should integrate water quantity and quality, groundwater and surface water, and recharge area protection.**
   - Groundwater management in California is a local agency responsibility.
   - In basins where there is more than one management agency, those agencies should coordinate their management objectives and program activities.
   - A water budget should be completed that includes recharge, extraction and change in storage in the aquifer(s).
   - Changes in groundwater quality should be monitored and evaluated.
   - Stakeholders should be identified and included in development of groundwater management plans.

2. **The State of California should continue programs to provide technical and financial assistance to local agencies to develop monitoring programs, management plans, and groundwater storage projects to more efficiently use groundwater resources and provide a sustainable supply for multiple beneficial uses. DWR should:**
   - Post information about projects that have successfully obtained funding through various grant and loan programs.
   - Provide additional technical assistance to local agencies in the preparation of grant and loan applications.
   - Continue outreach efforts to inform the public and water managers of grant and loan opportunities.
   - Participate, when requested, in local efforts to develop and implement groundwater management plans.
   - Continue to assess, develop, and modify its groundwater programs to provide the greatest benefit to local agencies.
   - Develop grant criteria to ensure funding supports local benefits as well as Statewide priorities, such as development of the California Water Plan and meeting Bay-Delta objectives.

3. **DWR should continue to work with local agencies to more accurately define historical overdraft and to more accurately predict future water shortages that could result in overdraft.**
   - A water budget should be developed for each basin.
   - The annual change in storage should be determined for each basin.
   - The amount of annual recharge and discharge, including pumping, should be determined.
   - Changes in groundwater quality that make groundwater unusable or could allow additional groundwater to be used should be included in any evaluation of overdraft.

4. **Groundwater management agencies should work with land use agencies to inform them of the potential impacts various land use decisions may have on groundwater, and to identify, prioritize, and protect recharge areas.**
   - Local planners should consider recharge areas when making land use decisions that could reduce recharge or pose a risk to groundwater quality.
   - Recharge areas should be identified and protected from land uses that limit recharge rates, such as paving or lining of channels.

- Both local water agencies and local governments should pursue education and outreach to inform the public of the location and importance of recharge areas.
- DWR should inform local agencies of the availability of grant funding and technical assistance that could support these efforts.

5. **DWR should publish a report by December 31, 2004 that identifies those groundwater basins or subbasins that are being managed by local or regional agencies and those that are not, and should identify how local agencies are using groundwater resources and protecting groundwater quality.**
   - Such information will be necessary to confirm whether agencies are meeting the requirements of SB 1938 (Water Code Section 10753.7).
   - Collection and summary of existing groundwater management plans will provide a better understanding of the distribution and coordination of groundwater management programs throughout the State.
   - Successful strategies employed by specific local agencies should be highlighted to assist others in groundwater management efforts.
   - Similarly, the impact of groundwater management ordinances throughout the State should be evaluated to provide a better understanding of the effect of ordinances on groundwater management.

6. **Water managers should include an evaluation of water quality in a groundwater management plan, recognizing that water quantity and water quality are inseparable.**
   - Local water managers should obtain groundwater quality data from federal, state, and local agencies that have collected such data in their basin.
   - Local agencies should evaluate long-term trends in groundwater quality.
   - Local agencies should work closely with the SWRCB and DWR in evaluating their groundwater basins.
   - Local agencies should establish management objectives and monitoring programs that will maintain a sustainable supply of good quality groundwater.

7. **Water transfers that involve groundwater (or surface water that will be replaced with groundwater) should be consistent with groundwater management in the source area that will assure the long term sustainability of the groundwater resource.**

8. **Continue to support coordinated management of groundwater and surface water supplies and integrated management of groundwater quality and groundwater quantity.**
   - Future bond funding should be provided for conjunctive use facilities to improve water supply reliability.
   - Funding for feasibility and pilot studies, in addition to construction of projects will help maximize the potential for conjunctive use.
   - DWR should continue and expand its efforts to form partnerships with local agencies to investigate and develop locally controlled conjunctive use programs.

9. **Local, State, and federal agencies should improve data collection and analysis to better estimate groundwater basin conditions used in Statewide and local water supply reliability planning. DWR should:**
   - Assist local agencies in the implementation of SB 221, SB 610, and AB 901 to help determine water supply reliability during the local land use planning process.
   - Provide and continue to update information on groundwater basins, including basin boundaries, groundwater levels, monitoring data, aquifer yield, and other aquifer characteristics.

- Identify areas of rapid development that are heavily reliant on groundwater and prioritize monitoring activities in these areas to identify potential impacts on these basins.
- Evaluate the existing network of wells monitored for groundwater elevations, eliminate wells of questionable value from the network, and add wells where data are needed.
- Work cooperatively with local groundwater managers to evaluate the groundwater basins of the State with respect to overdraft and its potential impacts, beginning with the most heavily used basins.
- Expand DWR and local agency monitoring programs to provide a better understanding of the interaction between groundwater and surface water.
- Work with SWRCB to investigate temporal trends in water quality to identify areas of water quality degradation that should receive additional attention.
- Estimate groundwater extraction using a land use based method for over 200 basins with little or no groundwater budget information.
- Integrate groundwater budgets into the California Water Plan Update process.

10. **Increase coordination and sharing of groundwater data among local, State, and federal agencies and improve data dissemination to the public. DWR should:**
    - Use the established website to continually update new groundwater basin data collected after the publication of California's Groundwater (Bulletin 118-Update 2003).
    - Publish a summary update of Bulletin 118 every five years coincident with the California Water Plan (Bulletin 160).
    - Publish, in cooperation with SWRCB, a biennial groundwater report that addresses current groundwater quantity and quality conditions.
    - Coordinate the collection and storage of its groundwater quality monitoring data with programs of SWRCB and other agencies to ensure maximum coverage statewide and reduce duplication of effort.
    - Make groundwater basin information more compatible with other Geographic Information System-based resource data to improve local integrated resources planning efforts.
    - Compile data collected by projects funded under grant and loan programs and make data available to the public on the DWR website.
    - Encourage local agency cooperators to submit data to the DWR database.
    - Maximize the accuracy and usefulness of data and develop guidelines for quality assurance and quality control, consistency, and format compatibility.
    - Expand accessibility of groundwater data by the public after considering appropriate security measures.
    - State, federal and local agencies should expand accessibility of groundwater data by the public after considering appropriate security measures.
    - Local agencies should submit copies of adopted groundwater management plans to DWR.

Additional Important Recommendations

11. **Local water agencies and local governments should be encouraged to develop cooperative working relationships at basinwide or regional levels to effectively manage groundwater. DWR should:**
    - Provide technical and financial assistance to local agencies in the development of basinwide groundwater management plans.
    - Provide a preference in grant funding for groundwater projects for agencies that are part of a regional or basinwide planning effort.
    - Provide Proposition 50 funding preferences for projects that are part of an integrated regional water management plan.

12. **Groundwater basin boundaries identified in Bulletin 118 should be updated as new information becomes available and the basin becomes better defined. DWR should:**
    - Identify basin boundaries that are based on limited data.
    - List the kind of information that is necessary to better define basin boundaries.
    - Develop a systematic procedure to obtain and evaluate stakeholder input on groundwater basin boundaries.

13. **Improve the understanding of groundwater resources in fractured rock areas of the State.**
    - DWR, in cooperation with local and federal agencies, should conduct studies to determine the amount of groundwater that is available in fractured rock areas, including water quality assessment, identification of recharge areas and amounts, and a water budget when feasible.
    - Local agencies and local governments should conduct studies in their areas to quantify the local demands on groundwater and project future demands.
    - The Legislature should consider expanding the groundwater management authority in the Water Code to include areas outside of alluvial groundwater basins
    - DWR should include information on the most significant fractured rock groundwater sources in future updates of Bulletin 118.

14. **Develop a program to obtain geophysical logs in areas where additional data are needed.**
    - DWR should encourage submission of geophysical logs, when they are conducted, as a part of the Well Completion Report.
    - The geophysical logs would be available for use by public agencies to better understand the aquifer, but would be confidential as stipulated by the Water Code.
    - DWR should seek funding to work with agencies and property owners to obtain geophysical logs of new wells in areas where additional data are needed.
    - Geophysical logs would be used to better characterize the aquifers within each groundwater basin.

15. **Educate the public on the significance of groundwater resources and on methods of groundwater management.**
    - DWR should continue to educate the public on statewide groundwater issues and assist local agencies in their public education efforts.
    - Local agencies should expand their outreach efforts during development of groundwater management plans under AB 3030 and other authority.
    - DWR should develop educational materials to explain how they quantify groundwater throughout the State, as well as the utility and limitations of the information.
    - DWR should continue its efforts to educate individual well owners and small water systems that are entirely dependent on groundwater.

Introduction

Introduction

Groundwater is one of California's greatest natural resources. In an average water supply year, groundwater meets about 30 percent of California's urban and agricultural demand. In drought years, this percentage increases to 40 percent or even higher (DWR 1998). Some cities, such as Fresno, Davis, and Lodi, rely solely on groundwater for their drinking water supply. In 1995, an estimated 13 million Californians (nearly 43 percent of the State's population) used groundwater for at least a portion of their public supply needs (Solley and others 1998). With a projected population of nearly 46 million by the year 2020, California's demand on groundwater will increase significantly. In many basins, our ability to optimally use groundwater is affected by overdraft and water quality, or limited by a lack of data, lack of management, and coordination between agencies.

In the last few years, California has provided substantial funds to local agencies for groundwater management. For example, the nearly $2 billion Water Bond 2000 (Proposition 13) approved by California voters in March 2000 specifically authorizes funds for two groundwater programs: $200 million for grants for feasibility studies, project design, and the construction of conjunctive use facilities; and $30 million for loans for local agency acquisition and construction of groundwater recharge facilities and grants for feasibility studies for recharge projects. Additionally, the Local Groundwater Management Assistance Act of 2000 (AB 303) resulted in $15 million in fiscal years 2001, 2002, and 2003 for groundwater studies and data collection intended to improve basin and subbasin groundwater management. These projects focus on improving groundwater monitoring, coordinating groundwater basin management, and conducting groundwater studies.

The State Legislature has increasingly recognized the importance of groundwater and the need for monitoring in making sound groundwater management decisions. Significant legislation was passed in 2000, 2001 and 2002. AB 303 authorizes grants to help local agencies develop better groundwater management strategies. AB 599 (2001) requires, for the first time, that the State Water Resources Control Board (SWRCB), in cooperation with other agencies, develop a comprehensive monitoring program capable of assessing groundwater quality in every basin in the State with the intent of maintaining a safe groundwater supply. SB 610 (2001) and SB 901 (2001) together require urban water suppliers, in their urban water management plans, to determine the adequacy of current and future supplies to meet demands. Detailed groundwater information is required for those suppliers that use groundwater. SB 221 (2001) prohibits approval of certain developments without verification of an available water supply. These bills are significant with respect to groundwater because much of California's new development will rely on groundwater for its supply.

Finally, SB 1938 (2002) was enacted to provide incentives to local agencies for improved groundwater management. The legislation modified the Water Code to require that specific elements be included in a groundwater management plan for an agency to be eligible for certain State funding administered by the Department of Water Resources for groundwater projects. AB 303 is exempt from that requirement.

History of Bulletin 118

DWR has long recognized the need for collection, summary, and evaluation of groundwater data as tools in planning optimal use of the groundwater resource. An example of this is DWR's Bulletin 118 series. Bulletin 118 presents the results of groundwater basin evaluations in California. The Bulletin 118 series was preceded by Water Quality Investigations Report No. 3, *Ground Water Basins in California* (referred to in this bulletin as Report No. 3), published in 1952 by the Department of Public Works, Division of Water Resources (the predecessor of DWR). The purpose of Report No. 3 was to create a base index map of the "more important ground water basins" for carrying out DWR's mandate in Section 229 of the Water Code. Section 229 directed Public Works to:

> …investigate conditions of the quality of all waters within the State, including saline waters, coastal and inland, as related to all sources of pollution of whatever nature and shall report thereon to the Legislature and to the appropriate regional water pollution control board annually, and may recommend any steps which might be taken to improve or protect the quality of such waters.

Report No. 3 identified 223 alluvium-filled valleys that were believed to be basins with usable groundwater in storage. A statewide numbering system was created in cooperation with the State Water Pollution Control Board (now the State Water Resources Control Board) based on the boundaries of the nine Regional Water Quality Control Boards. In 1992, Water Code Section 229 was amended, resulting in the elimination of the annual reporting requirements.

In 1975, DWR published Bulletin 118, *California's Ground Water*, (referred to in this report as Bulletin 118-75). Bulletin 118-75 summarized available information from DWR, U.S. Geological Survey, and other agencies for individual groundwater basins to "help those who must make decisions affecting the protection, additional use, and management of the State's ground water resources."

Bulletin 118-75 contains a summary of technical information for 248 of the 461 identified groundwater basins, subbasins, and what were referred to as "areas of potential ground water storage" in California as well as maps showing their location and extent. The Bulletin 118-75 basin boundaries were based on geologic and hydrogeologic conditions except where basins were defined by a court decision.

In 1978, Section 12924 was added to the California Water Code:

> The Department shall, in conjunction with other public agencies, conduct an investigation of the State's groundwater basins. The Department shall identify the State's groundwater basins on the basis of geologic and hydrogeologic conditions and consideration of political boundary lines whenever practical. The Department shall also investigate existing general patterns of groundwater pumping and groundwater recharge within such basins to the extent necessary to identify basins which are subject to critical conditions of overdraft.

DWR published the report in 1980 as *Ground Water Basins in California: A Report to the Legislature in Response to Water Code Section 12924* (referred to in this report as Bulletin 118-80). The bulletin included 36 groundwater basins with boundaries different from Bulletin 118-75. The changed boundaries resulted by combining several basins based on geologic or political considerations and by dividing the San Joaquin Valley groundwater basin into many smaller subbasins based primarily on political boundaries. These changes resulted in the identification of 447 groundwater basins, subbasins, and areas of potential groundwater storage. Bulletin 118-80 also identified 11 basins as subject to critical conditions of overdraft.

Box A Which Bulletin 118 Do You Mean?

Mention of an update to Bulletin 118 causes some confusion about which Bulletin 118 the California Department of Water Resources (DWR) has updated. In addition to the statewide Bulletin 118 series (Bulletin 118-75, Bulletin 118-80, and Bulletin 118-03), DWR released several other publications in the 118 series that evaluate groundwater basins in specific areas of the State. Region-specific Bulletin 118 reports are listed below.

- Bulletin 118-1. Evaluation of Ground Water Resources: South San Francisco Bay
  Appendix A. Geology, 1967
  Volume 1. Fremont Study Area, 1968
  Volume 2. Additional Fremont Study Area, 1973
  Volume 3. Northern Santa Clara County, 1975
  Volume 4. South Santa Clara County, 1981
- Bulletin 118-2. Evaluation of Ground Water Resources: Livermore and Sunol Valleys, 1974
  Appendix A. Geology, 1966
- Bulletin 118-3. Evaluation of Ground Water Resources: Sacramento County, 1974
- Bulletin 118-4. Evaluation of Ground Water Resources: Sonoma County
  Volume 1. Geologic and Hydrologic Data, 1975
  Volume 2. Santa Rosa Plain, 1982
  Volume 3. Petaluma Valley, 1982
  Volume 4. Sonoma Valley, 1982
  Volume 5. Alexander Valley and Healdsburg Area, 1983
- Bulletin 118-5. Bulletin planned but never completed.
- Bulletin 118-6. Evaluation of Ground Water Resources: Sacramento Valley, 1978

The Need for Bulletin 118 Update 2003

Despite California's heavy reliance on groundwater, basic information for many of the groundwater basins is lacking. Particular essential data necessary to provide for both the protection and optimal use of this resource is not available. To this end, the California Legislature mandated in the Budget Act of 1999 that DWR prepare:

> ...the statewide update of the inventory of groundwater basins contained in Bulletin 118-80, which includes, but is not limited to, the following: the review and summary of boundaries and hydrographic features, hydrogeologic units, yield data, water budgets, well production characteristics, and water quality and active monitoring data; development of a water budget for each groundwater basin; development of a format and procedures for publication of water budgets on the Internet; development of the model groundwater management ordinance; and development of guidelines for evaluating local groundwater management plans.

The information on groundwater basins presented in Bulletin 118 Update 2003 is mostly limited to the acquisition and compilation of existing data previously developed by federal, State, and local water agencies. While this bulletin is a good starting reference for basic data on a groundwater basin, more recent data and more information about the basin may be available in recent studies conducted by local water management agencies. Those agencies should be contacted to obtain the most recent data.

Report Organization

Bulletin 118 Update 2003 includes this report and supplemental material consisting of individual descriptions and a Geographic Information System-compatible map of each of the delineated groundwater basins in California. The basin descriptions will be updated as new information becomes available, and can be viewed or downloaded at http://www.waterplan.water.ca.gov/groundwater/118index.htm (Appendix A). Basin descriptions will not be published in hard copy.

This report is organized into the following topics:

- Groundwater is one of California's most important natural resources, and our reliance on it has continued to grow (Chapter 1).
- Groundwater has a complex legal and institutional framework in California that has shaped the groundwater management system in place today (Chapter 2).
- Groundwater management occurs primarily at the local water agency level, but may also be instituted at the local government level. At the request of the Legislature, DWR has developed some recommendations for a model groundwater management ordinance and components for inclusion in a groundwater management plan (Chapter 3).
- Groundwater has had a flurry of activity in the Legislature and at the ballot box in recent years that will affect the way groundwater is managed in California (Chapter 4).
- Groundwater programs with a variety of objectives exist in many State and federal agencies (Chapter 5).
- Groundwater concepts and definitions should be made available to a wide audience (Chapter 6).
- Groundwater basins with a wide range of characteristics and concerns exist in each of California's 10 hydrologic regions (Chapter 7).

Chapter 1
Groundwater – California's Hidden Resource

Chapter 1
Groundwater – California's Hidden Resource

In 1975, *California's Ground Water – Bulletin 118* described groundwater as "California's hidden resource." Today, those words ring as true as ever. Because groundwater cannot be directly observed, except under a relatively few conditions such as at a spring or a wellhead, most Californians do not give much thought to the value that California's vast groundwater supply has added to the State. It is unlikely that California could have achieved its present status as the largest food and agricultural economy in the nation and fifth largest overall economy in the world without groundwater resources. Consider that about 43 percent of all Californians obtain drinking water from groundwater. California is not only the single largest user of groundwater in the nation, but the estimated 14.5 million acre-feet (maf) of groundwater extracted in California in 1995 represents nearly 20 percent of all groundwater extracted in the entire United States (Solley and others 1998).

California's Hydrology

California's climate is dominated by the Pacific storm track. Numerous mountain ranges cause orographic lifting of clouds, producing precipitation mostly on the western slopes and leaving a rain shadow on most eastern slopes (Figure 1 and Figure 2). These storms also leave tremendous accumulations of snow in the Sierra Nevada during the winter months. While the average annual precipitation in California is about 23 inches (DWR 1998), the range of annual rainfall varies greatly from more than 140 inches in the northwestern part of the State to less than 4 inches in the southeastern part of the State.

Snowmelt and rain falling in the mountains flow into creeks, streams, and rivers. The average annual runoff in California is approximately 71 maf (DWR 1998). As these flows make their way into the valleys, much of the water percolates into the ground. The vast majority of California's groundwater that is accessible in significant amounts is stored in alluvial groundwater basins. These alluvial basins, which are the subject of this report, cover nearly 40 percent of the geographic area of the State (Figure 3).

This bulletin focuses on groundwater resources, but in reality groundwater and surface water are inextricably linked in the hydrologic cycle. As an example, groundwater may be recharged by spring runoff in streams, but later in the year the base flow of a stream may be provided by groundwater. So, although the land surface is a convenient division for categorizing water resources, it is a somewhat arbitrary one. It is essential that water managers recognize and account for the relationship between groundwater and surface water in their planning and operations.

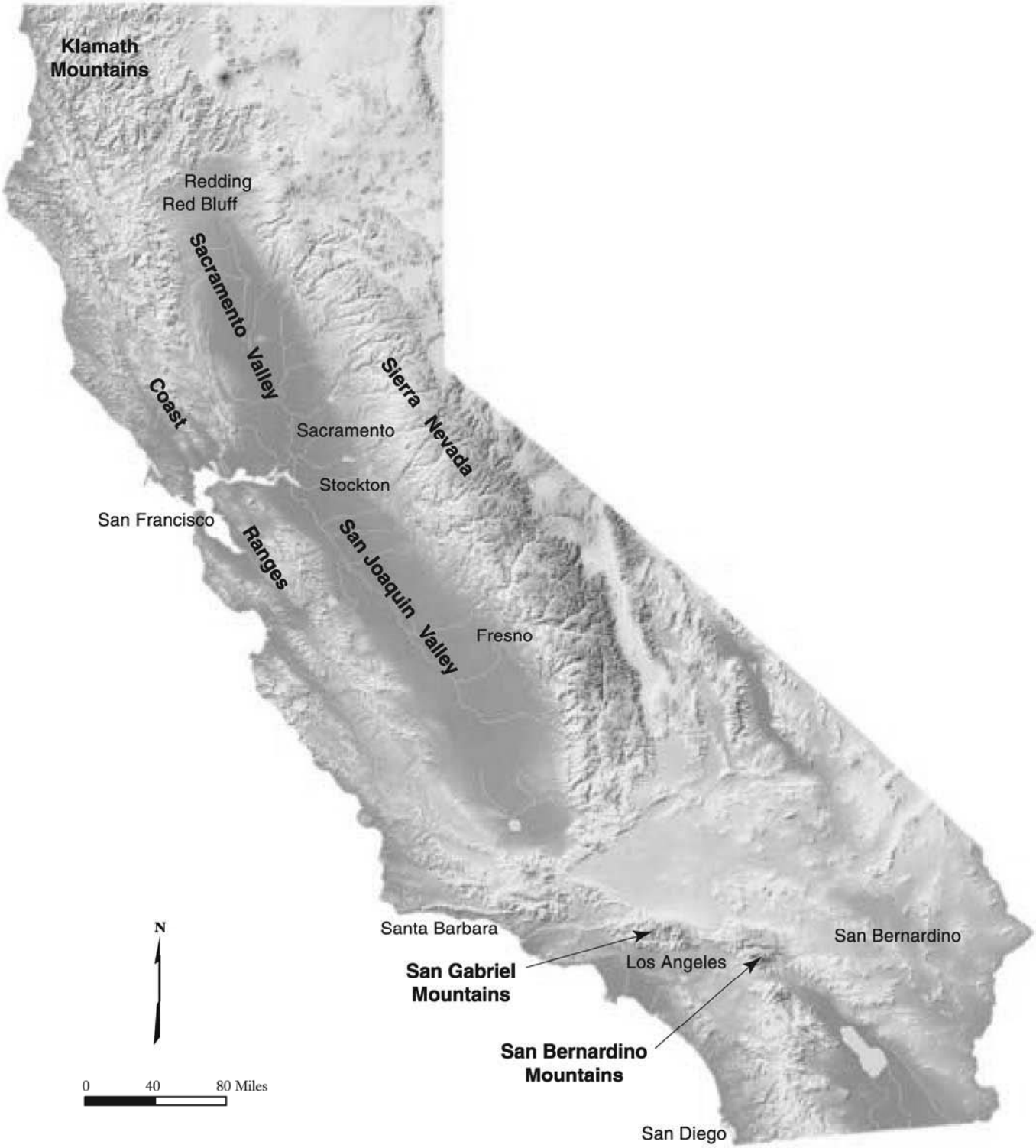

Figure 1 Shaded relief map of California

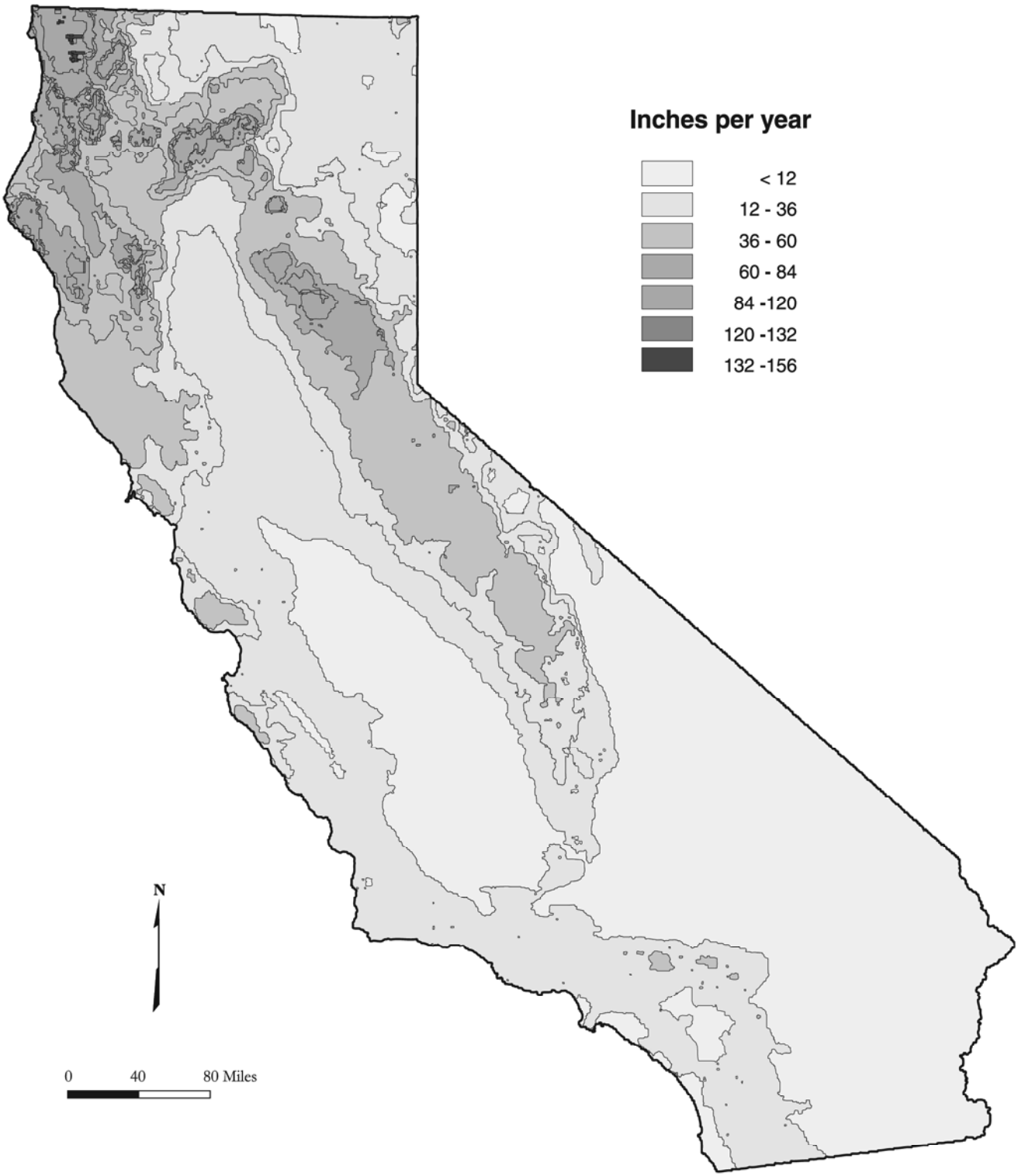

Figure 2 Mean annual precipitation in California, 1961 to 1990

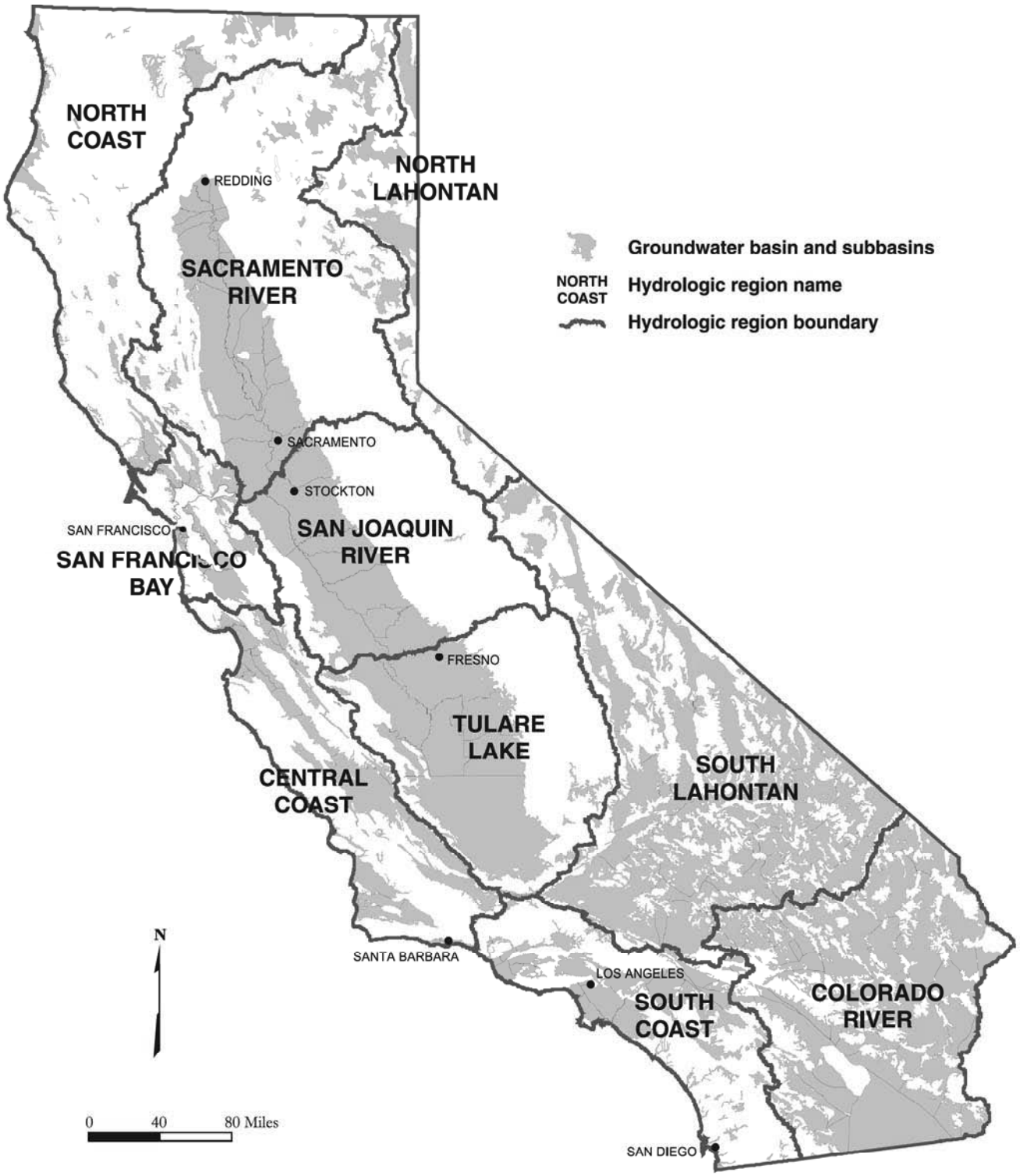

Figure 3 Groundwater basins, subbasins and hydrologic regions

California's Water Supply System

The economic success achieved in California could not have been foreseen a century ago. California's natural hydrologic system appeared too limited to support significant growth in population, industry, and agriculture. The limitations revolved around not only the relative aridity of the State, but the geographic, seasonal, and climatic variability that influence California's water supply. Approximately 70 percent of the State's average annual runoff occurs north of Sacramento, while about 75 percent of the State's urban and agricultural water needs are to the south. Most of the State's precipitation falls between October and April with half of it occurring December through February in average years. Yet, the peak demand for this water occurs in the summer months. Climatic variability includes dramatic deviations from average supply conditions by way of either droughts or flooding. In the 20th century alone, California experienced multiyear droughts in 1912–1913, 1918–1920, 1922–1924, 1929–1934, 1947–1950, 1959–1961, 1976–1977, and 1987–1992 (DWR 1998).

California has dealt with the limitations resulting from its natural hydrology and achieved its improbable growth by developing an intricate system of reservoirs, canals, and pipelines under federal, State and local projects (Figure 4). However, a significant portion of California's water supply needs is also met by groundwater. Typically, groundwater supplies about 30 percent of California's urban and agricultural uses. In dry years, groundwater use increases to about 40 percent statewide and 60% or more in some regions.

The importance of groundwater to the State's development may have been underestimated at the beginning of the 20th century. At that time, groundwater was seen largely as just a convenient resource that allowed for settlement in nearly any part of the State, given groundwater's widespread occurrence. Significant artesian flow from confined aquifers in the Central Valley allowed the early development of agriculture. When the Water Commission Act defined the allocation of surface water rights in 1914, it did not address allocation of the groundwater resource. In the 1920s, the development of the deep-well turbine pump and the increased availability of electricity led to a tremendous expansion of agriculture, which used these high-volume pumps and increased forever the significance of groundwater as a component of water supply in California.

Figure 4 Water projects in California

Box B Will Climate Change Affect California's Groundwater?

California's water storage and delivery system can be thought of as including three reservoir systems—the snowpack of the Sierra Nevada, an extensive system of dams, lakes, and conveyance systems for surface water, and finally the aquifers that store groundwater. Precipitation in the form of snow is stored in the Sierra in winter and early spring and under ideal conditions melts in a manner that allows dams to capture the water for use during California's dry season. When snow melts faster, the dams act as flood control structures to prevent high runoff from flooding lowland areas. Water storage and delivery infrastructure—dams and canals—has been designed largely around the historical snowpack, while aquifers have played a less formal and less recognized role.

What will be the effect of climate change on California's water storage system? How will groundwater basins and aquifers be affected?

The latest report of the Intergovernmental Panel on Climate Change (2001) reaffirms that climate is changing in ways that cannot be accounted for by natural variability and that "global warming" is occurring. Studies by the National Water Assessment Team for the U.S. Global Change Research Program's National Assessment of the Potential Consequences of Climate Variability and Change identify potential changes that could affect water resources systems. For California, these include higher snow levels leading to more precipitation in the form of rain, earlier runoff, a rise in sea level, and possibly larger floods. In addition to affecting the balance between storage and flood control of our reservoirs, such changes in hydrology would affect wildlands, resulting in faunal and floral displacement and resulting in changes in vegetative water consumption. These changes would also affect patterns of both irrigated and dryland farming.

A warmer, wetter winter would increase the amount of runoff available for groundwater recharge; however, this additional runoff in the winter would be occurring at a time when some basins, particularly in Northern California, are either being recharged at their maximum capacity or are already full. Conversely, reductions in spring runoff and higher evapotranspiration because of warmer temperatures could reduce the amount of water available for recharge and surface storage.

The extent to which climate will change and the impact of that change are both unknown. A reduced snowpack, coupled with increased seasonal rainfall and earlier snowmelt may require a change in the operating procedures for existing dams and conveyance facilities. Furthermore, these changes may require more active development of successful conjunctive management programs in which the aquifers are more effectively used as storage facilities. Water managers might want to evaluate their systems to better understand the existing snowpack-surface water-groundwater relationship, and identify opportunities that may exist to optimize groundwater and other storage capability under a new hydrologic regime that may result from climate change. If more water was stored in aquifers or in new or reoperated surface storage, the additional water could be used to meet water demands when the surface water supply was not adequate because of reduced snowmelt.

Recent Groundwater Development Trends

While development of California's surface water storage system has slowed significantly, groundwater development continues at a strong pace. A review of well completion reports submitted to the California Department of Water Resources (DWR) provides data on the number and type of water wells drilled in California since 1987. For the 14-year period, DWR received 127,616 well completion reports for water supply wells that were newly constructed, reconditioned, or deepened—an average of 9,115 annually[1]. Of these, 82 percent were drilled for individual domestic uses; 14 percent for irrigation; and about 4 percent for a combined group of municipal and industrial uses (Figure 5). Although domestic wells predominate, individual domestic use makes up a small proportion of total groundwater use in the State.

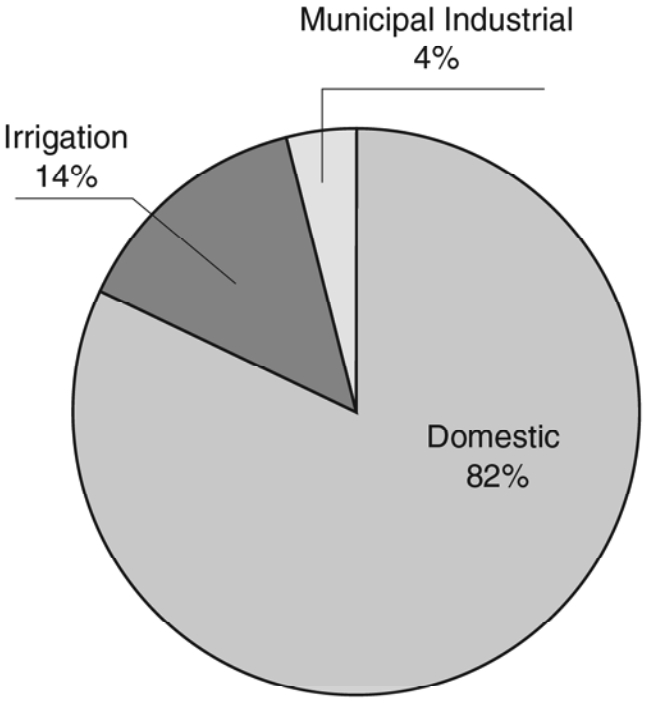

Figure 5 Well completion reports filed with DWR from 1987 through 2000

The most evident influence on the number of wells constructed is hydrologic conditions. The number of wells constructed and modified increases dramatically with drought conditions (Figure 6). The number of wells constructed and modified annually from 1987 through 1992 is more than double the annual totals for 1995 through 2000. Each year from 1987 through 1992 was classified as either dry or critically dry; water years 1995 through 2000 were either above normal or wet, based on measured unimpaired runoff in the Sacramento and San Joaquin valleys. In addition to providing an indication of the growth of groundwater development, well completion reports are a valuable source of information on groundwater basin conditions.

[1] DWR also received an average of 4,225 well completion reports for monitoring, which were not included above because they do not extract groundwater for supply purposes.

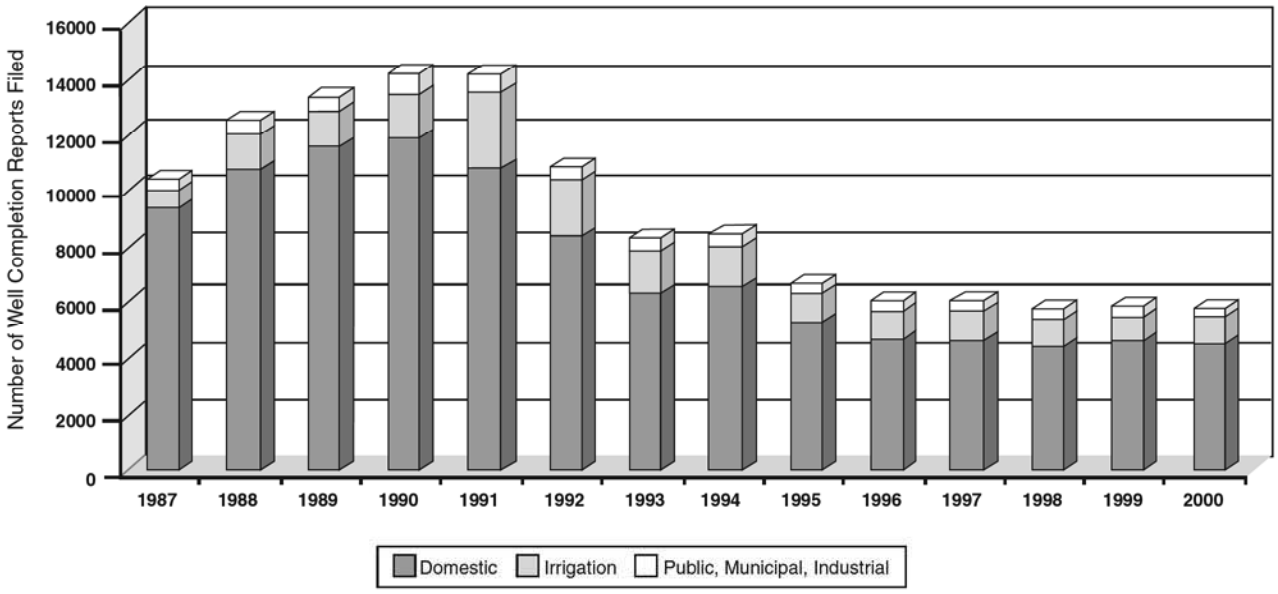

Figure 6 Well completion reports filed annually from 1987 through 2000

The Need for Groundwater Monitoring and Evaluation

Some 34 million people called California their home in the year 2000, and a population of nearly 46 million is expected by 2020. The increased population and associated commercial, industrial, and institutional growth will bring a substantially greater need for water. This need will be met in part by improved water use efficiency, opportunities to reoperate or expand California's surface water system, and increased desalination and recycling of water sources not currently considered usable. This need will also be met by storing and extracting additional groundwater. However, the sustainability of the groundwater resource, both in terms of what is currently used and future increased demand, cannot be achieved without effective groundwater management. In turn, effective groundwater management cannot be achieved without a program of groundwater data collection and evaluation.

Perhaps surprising to many, California does not have a comprehensive monitoring network for evaluating the health of its groundwater resource, including quantity and quality of groundwater. The reasons for this are many with the greatest one being that information on groundwater levels and groundwater quality is primarily obtained by drilling underground, which is relatively expensive. Given that delineated groundwater basins cover about 40 percent of the State's vast area, the cost of a dedicated monitoring network would be prohibitive. The other important reason for the lack of a comprehensive network is that, as will be discussed later in this report, groundwater is a locally controlled resource. State and federal agencies become involved only when a groundwater issue is directly related to the mission of a particular agency or if a local agency requests assistance. For these and other reasons, California lacks a cohesive, dedicated monitoring network.

Box C What about Overdraft?

Overdraft is the condition of a groundwater basin in which the amount of water withdrawn by pumping over the long term exceeds the amount of water that recharges the basin. Overdraft is characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. Overdraft can lead to increased extraction costs, land subsidence, water quality degradation, and environmental impacts.

The California Water Plan Update, Bulletin 160-98 (DWR 1998) estimated that groundwater overdraft in California in 1995 was nearly 1.5 million acre-feet annually, with most of the overdraft occurring in the Tulare Lake, San Joaquin River, and Central Coast hydrologic regions. The regional and statewide estimates of overdraft are currently being revised for the 2003 update of Bulletin 160. While these estimates are useful from a regional and statewide planning perspective, the basin water budgets calculated for this update of Bulletin 118 clearly indicate that information is insufficient in many basins to quantify overdraft that has occurred, project future impacts on groundwater in storage, and effectively manage groundwater. Further technical discussion of overdraft is provided in Chapter 6 of this bulletin.

When DWR and other agencies involved in groundwater began to collect data in the first half of the 20th century, it quickly became evident that there were insufficient funds to install an adequate number of monitoring wells to accurately determine changes in the condition of groundwater basins. Consequently, to create a serviceable monitoring network, the agencies asked owners of irrigation or domestic wells for permission to measure water levels and to a lesser extent to monitor water quality. These have been called "wells of opportunity." In many areas, this approach has led to a network of wells that provide adequate information to gain a general understanding of conditions in the subsurface and to track changes through time. In some areas, groundwater studies were conducted and often included the construction of a monitoring well network. These studies have gradually contributed to a more detailed understanding of some of California's groundwater basins, particularly the most heavily developed basins.

Given the combination of monitoring wells of opportunity and dedicated monitoring wells, it might be assumed that an adequate monitoring network in California will eventually accumulate. However, several factors contribute to reducing the effectiveness of the monitoring network for data collection and evaluation: (1) The funding for data programs in many agencies, which was generally insufficient in the first place, has been reduced significantly. (2) When private properties change ownership, some new owners rescind permission for agency personnel to enter the property and measure the well. (3) The appropriateness of using these private wells is questionable because they are often screened over long intervals encompassing multiple aquifers in the subsurface, and in some cases construction details for the well are unknown. (4) Some wells with long-term records actually reach the end of their usefulness because the casing collapses or something falls into the well, making it unusable. In some cases, groundwater levels may drop below the well depth. (5) As water quality or water quantity conditions change, the monitoring networks may no longer be adequate to provide necessary data to manage groundwater.

The importance of long-term monitoring networks cannot be overstated. Sound groundwater management decisions require observation of trends in groundwater levels and groundwater quality. Only through these long-term evaluations can the question of sustainability of groundwater be answered. For example, this report contains a summary of groundwater contamination in public water supply wells throughout the State collected from 1994 through 2000. While this provides a "snapshot" of the suitability of the groundwater currently developed for public supply needs, it does not address sustainability of groundwater for public uses. Sustainability can only be determined by observing groundwater quality over time. If conditions worsen, local managers will need to take steps to prevent further harm to groundwater quality. Long-term groundwater records require adequate funding and staff to develop groundwater monitoring networks and to collect, summarize, and evaluate the data.

Chapter 2
Groundwater Management in California

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Groundwater management, as defined in this report, is the planned and coordinated monitoring, operation, and administration of a groundwater basin or portion of a groundwater basin with the goal of long-term sustainability of the resource. Throughout the history of water management in California, local agencies have practiced an informal type of groundwater management. For example, since the early 20th century, when excess surface water was available, some agencies intentionally recharged groundwater to augment their total water supply. In 1947, the amount of groundwater used was estimated at 9 million to 10 million acre-feet. By the beginning of the 21st century, the amount of groundwater used had increased to an estimated 15 million acre-feet. Better monitoring would provide more accurate information. This increased demand on California's groundwater resources, when coupled with estimates of population growth, has resulted in a need for more intensive groundwater management.

In 1914, California created a system of appropriating surface water rights through a permitting process (Stats 1913, ch. 586), but groundwater use has never been regulated by the State. Though the regulation of groundwater has been considered on several occasions, the California Legislature has repeatedly held that groundwater management should remain a local responsibility (Sax 2002). Although they are treated differently legally, groundwater and surface water are closely interconnected in the hydrologic cycle. Use of one resource will often affect the other, so that effective groundwater management must consider surface water supplies and uses.

Figure 7 depicts the general process by which groundwater management needs are addressed under existing law. Groundwater management needs are identified at the local water agency level and may be directly resolved at the local level. If groundwater management needs cannot be directly resolved at the local agency level, additional actions such as enactment of ordinances by local governments, passage of laws by the Legislature, or decisions by the courts may be necessary to resolve the issues. Upon implementation, local agencies evaluate program success and identify additional management needs. The State's role is to provide technical and financial assistance to local agencies for their groundwater management efforts, such as through the Local Groundwater Assistance grant program (see Chapter 4, AB 303).

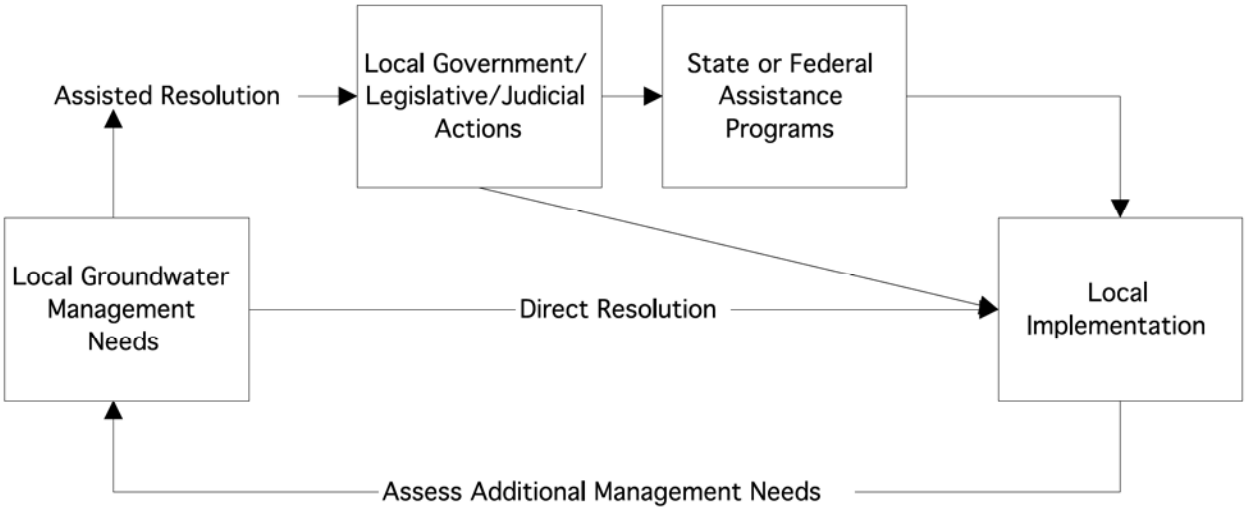

Figure 7 Process of addressing groundwater management needs in California

How Groundwater is Managed in California

There are three basic methods available for managing groundwater resources in California: (1) management by local agencies under authority granted in the California Water Code or other applicable State statutes, (2) local government groundwater ordinances or joint powers agreements, and (3) court adjudications. Table 1 shows how often each of these methods has been used, and each method is discussed briefly below. No law requires that any of these forms of management be applied in a basin. Management is often instituted after local agencies or landowners recognize a specific groundwater problem. The level of groundwater management in any basin or subbasin is often dependent on water availability and demand.

Table 1 Groundwater management methods

Method	Frequency of use[a]
Local water agencies	Undetermined number of agencies with authority to manage some aspect of groundwater under general powers associated with a particular type of district.
	Thirteen agencies with specially legislated authority to limit or regulate extraction.
	Seven agencies with adopted plans under authority from Water Code Section 10750 et seq.[b] (AB 255 of 1991).
	More than 200 agencies with adopted plans under authority from Water Code Section 10750 et seq. (AB 3030 of 1992).
Local groundwater management ordinances	Currently adopted in 27 counties.
Court adjudication	Currently decided in 19 groundwater basins, mostly in Southern California. Three more basins are in court.

a. The numbers for some methods are unknown because reporting to the California Department of Water Resources is not required.
b. Section 10750 *et seq*. was amended in 1992.

Groundwater Management through Authority Granted to Local Water Agencies

More than 20 types of local agencies are authorized by statute to provide water for various beneficial uses. Many of these agencies also have statutory authority to institute some form of groundwater management. For example, a Water Replenishment District (Water Code, § 60000 et seq.) is authorized to establish groundwater replenishment programs and collect fees for that service. A Water Conservation District (Water Code, § 75500 et seq.) can levy groundwater extraction fees. Table 2 lists these and other types of local agencies that deliver water and may have authority to institute some form of groundwater management. Most of these agencies are identified in the Water Code, but their specific authority related to groundwater management varies. The Water Code does not require that the agencies report their activities to the California Department of Water Resources (DWR).

Table 2 Local agencies with authority to deliver water for beneficial uses, which may have authority to institute groundwater management

Local agency	Authority	Number of agencies[a]
Community Services District	Gov. Code § 61000 et seq.	313
County Sanitation District	Health and Safety Code § 4700 et seq.	91
County Service Area	Gov. Code § 25210.1 et seq.	897
County Water Authority	Water Code App. 45.	30
County Water District	Water Code § 30000 et seq.	174
County Waterworks District	Water Code § 55000 et seq.	34
Flood Control and Water Conservation District	Water Code App. 38.	39
Irrigation District	Water Code § 20500 et seq.	97
Metropolitan Water District	Water Code App 109.	1
Municipal Utility District	Pub. Util. Code § 11501 et seq.	5
Municipal Water District	Water Code § 71000 et seq.	40
Public Utility District	Pub. Util. Code § 15501 et seq.	54
Reclamation District	Water Code § 50000 et seq.	152
Recreation and Park District	Pub. Resources Code § 5780 et seq.	110
Resort Improvement District	Pub. Resources Code § 13000 et seq.	-
Resource Conservation District	Pub. Resources Code § 9001 et seq.	99
Water Conservation District	Water Code App. 34; Wat. Code § 74000 et seq.	13
Water District	Water Code § 34000 et seq.	141
Water Replenishment District	Water Code § 60000 et seq.	1
Water Storage District	Water Code § 39000 et seq.	8

a. From State Controller's Office Special Districts Annual Report, 49th Edition.

Greater authority to manage groundwater has been granted to a small number of local agencies or districts created through special acts of the Legislature. For example, the Sierra Valley Groundwater Basin Act of 1980 (Water Code, App. 119) created the first two groundwater management districts in California. Currently, 13 local agencies have specific groundwater management authority as a result of being special act districts. The specific authority of each agency varies, but they can generally be grouped into two categories. Most of the agencies formed since 1980 have the authority to limit export and even control some in-basin extraction upon evidence of overdraft or the threat of overdraft. These agencies can also generally levy fees for groundwater management activities and for water supply replenishment. Agencies formed prior to 1980 do not have authority to limit extraction from a basin. However, the groundwater users in these areas are generally required to report extractions to the agency, and the agency can levy fees for groundwater management or water supply replenishment. Some of these agencies have effectively used a tiered fee

structure to discourage excessive groundwater extraction in the basin. Table 3 lists the names of special act districts with legislative authority to manage groundwater.

Table 3 Special act districts with groundwater management authority in California

District or agency	Water Code citation[a]	Year agency established in Code[b]
Desert Water Agency	App. 100	1961
Fox Canyon Groundwater Management Agency	App. 121.	1982
Honey Lake Groundwater Management District	App. 129.	1989
Long Valley Groundwater Management District	App. 119.	1980
Mendocino City Community Services District	Section 10700 et seq.	1987
Mono County Tri-Valley Groundwater Management District	App. 128.	1989
Monterey Peninsula Water Management District	App. 118.	1977
Ojai Groundwater Management Agency	App. 131.	1991
Orange County Water District	App. 40.	1933
Pajaro Valley Water Management Agency	App. 124.	1984
Santa Clara Valley Water District	App. 60.	1951
Sierra Valley Groundwater Management District	App. 119.	1980
Willow Creek Groundwater Management Agency	App. 135.	1993

a. From West's Annotated California Codes (1999 update)
b. This represents the year the agency was established in the Water Code. Specific authorities, such as those for groundwater management activities, may have been granted through later amendments.

In 1991, AB 255 (Stats. 1991, Ch. 903) was enacted authorizing local agencies overlying basins subject to critical conditions of overdraft, as defined in DWR's Bulletin 118-80, to establish programs for groundwater management within their service areas. Water Code section 10750 et seq. provided these agencies with the powers of a water replenishment district to raise revenue for facilities to manage the basin for the purposes of extraction, recharge, conveyance, and water quality. Seven local agencies adopted plans under this authority.

The provisions of AB 255 were repealed in 1992 with the passage of AB 3030 (Stats. 1992, Ch. 947). This legislation was significant in that it greatly increased the number of local agencies authorized to develop a groundwater management plan and set forth a common framework for management by local agencies throughout California. AB 3030, which is codified in Water Code section 10750 et seq., provides a systematic procedure to develop a groundwater management plan by local agencies overlying the groundwater basins defined by Bulletin 118-75 (DWR 1975) and updates. Upon adoption of a plan, these agencies could possess the same authority as a water replenishment district to "fix and collect fees and assessments for groundwater management" (Water Code, § 10754). However, the authority to fix and collect these fees and assessments is contingent on receiving a majority of votes in favor of the proposal in a local election (Water Code, § 10754.3). More than 200 agencies have adopted an AB 3030 groundwater management plan. None of these agencies is known to have exercised the authority of a Water Replenishment District.

Water Code section 10755.2 expands groundwater management opportunities by encouraging coordinated plans and by authorizing public agencies to enter into a joint powers agreement or memorandum of understanding with public or private entities that provide water service. At least 20 coordinated plans have been prepared to date involving nearly 120 agencies, including cities and private water companies.

Local Groundwater Ordinances

A second general method of managing groundwater in California is through ordinances adopted by local governments such as cities or counties. Twenty-seven counties have adopted groundwater ordinances, and others are being considered (Figure 8). The authority of counties to regulate groundwater has been challenged, but in 1995 the California Supreme Court declined to review an appeal of a lower court decision *Baldwin v. County of Tehama* (1994) that holds that State law does not occupy the field of groundwater management and does not prevent cities and counties from adopting ordinances to manage groundwater under their police powers. However, the precise nature and extent of the police power of cities and counties to regulate groundwater is uncertain.

The Public Policy Institute of California recently performed a study of California's water transfer market, which included a detailed investigation of the nature of groundwater ordinances by counties in California. The report found that 22 counties had adopted ordinances requiring a permit to export groundwater. In all but three cases, restricting out-of-county uses appears to be the only purpose (Hanak 2003). One ordinance, adopted recently in Glenn County (Box D, "Basin Management Objectives for Groundwater Management"), takes a comprehensive approach by establishing management objectives for the county's groundwater basins. Several other counties in Northern California are considering adopting similar management objective based ordinances.

Ordinances are mostly a recent trend in groundwater management, with 24 of the 27 ordinances enacted since 1990. Local ordinances passed during the 1990s have significantly increased the potential role of local governments in groundwater management. The intent of most ordinances has been to hold project proponents accountable for impacts that may occur as a result of proposed export projects. Because adoption of most of these ordinances is recent, their effect on local and regional groundwater management planning efforts is not yet fully known. However, it is likely that future groundwater development will take place within the constraints of local groundwater management ordinances. Table 4 lists counties with groundwater management ordinances and their key elements.

Figure 8 Counties with groundwater ordinances

Box D Basin Management Objectives for Groundwater Management

Most county groundwater management ordinances require that an export proponent prove the project will not deplete groundwater, cause groundwater quality degradation, or result in land subsidence. Although these factors could be part of any groundwater management plan, these ordinances do not require that a groundwater management plan be developed and implemented.

The only ordinance requiring development and adoption of objectives to be accomplished by management of the basin was adopted by the Glenn County Board of Supervisors in 2000. The action came after a citizens committee spent five years working with stakeholders. The process of developing a groundwater management ordinance for Glenn County began in 1995 when local landowners and county residents became concerned about plans to export groundwater or substitute groundwater for exported surface water. Control of exports was the focus of early ordinance discussions.

After long discussions and technical advice from groundwater specialists, the committee realized that goals and objectives must be identified for effective management of groundwater in the county. What did the county want to accomplish by managing groundwater within the county? What did groundwater management really mean?

The concept of establishing basin management objectives emerged (BMOs). BMOs would establish threshold values for groundwater levels, groundwater quality, and land surface subsidence. When a threshold level is reached, the rules and regulations require that groundwater extraction be adjusted or stopped to prevent exceeding the threshold.

The Glenn County Board of Supervisors has adopted BMOs, which were developed by an advisory committee, for groundwater levels throughout the county. While currently there are 17 BMOs representing the 17 management areas in the county, the goal is to begin managing the entire county in a manner that benefits each of the local agencies and their landowners, as well as landowners outside of an agency boundary. The committee is now developing BMOs for groundwater quality and land surface subsidence.

There is no single set of management objectives that will be successful in all areas. Groundwater management must be adapted to an area's political, institutional, legal, and technical constraints and opportunities. Groundwater management must be tailored to each basin or subbasin's conditions and needs. Even within a single basin, the management objectives may change as more is learned about managing the resource within that basin. Flexibility is the key, but that flexibility must operate within a framework that ensures public participation, monitoring, evaluation, feedback on management alternatives, rules and regulations, and enforcement.

Table 4 Counties with ordinances addressing groundwater management

County	Year enacted	Key elements (refer to ordinances for exemptions and other details)
Butte	1996	Export permit required (extraction & substitute pumping), Water Commission and Technical Advisory Committee, groundwater planning reports (county-wide monitoring program)
Calaveras	2002	Export permit required (extraction & substitute pumping)
Colusa	1998	Export permit required (extraction & substitute pumping)
Fresno	2000	Export permit required (extraction & substitute pumping)
Glenn	1990 rev. 2000	Water Advisory Committee and Technical Advisory Committee, basin management objectives and monitoring network, export permit required (1990)
Imperial	1996	Commission established to manage groundwater, including controlling exports (permit required), overdraft, artificial recharge, and development projects
Inyo	1998	Regulates (1) water transfers pursuant to Water Code Section 1810, (2) sales of water to the City of Los Angeles from within Inyo Co., (3) transfer or transport of water from basins within Inyo County to another basin with the County, and (4) transfers of water from basins within Inyo Co. to any area outside the County.
Kern	1998	Conditional use permit for export to areas both outside county and within watershed area of underlying aquifer in county. Only applies to southeastern drainage of Sierra Nevada and Tehachapi mountains.
Lake	1999	Export permit required (extraction & substitute pumping)
Lassen	1999	Export permit required (extraction & substitute pumping)
Madera	1999	Permit required for export, groundwater banking, and import for groundwater banking purposes to areas outside local water agencies
Mendocino	1995	Mining of groundwater regulated for new developments in Town of Mendocino
Modoc	2000	Export permit required for transfers out of basin
Mono	1988	Permit required for transfers out of basin
Monterey	1993	Water Resources Agency strictly regulates extraction facilities in zones with groundwater problems
Napa	1996	Permits for local groundwater extractions; exemptions for single parcels and agricultural use
Sacramento	1952 rev. 1985	Water Agency established to manage and protect groundwater management zones; replenishment charges
San Benito	1995	Mining groundwater (overdraft) for export prohibited; permit required for off-parcel use, injecting imported water; influence of well pumping restrictions
San Bernardino	2002	Permit required for any new groundwater well within the desert region of the county
San Diego	1991	Provides for mapping of groundwater impacted basins (defined); projects within impacted basins require groundwater investigations
San Joaquin	1996	Export permit required (extraction & substitute pumping)
Shasta	1997	Export permit required (extraction & substitute pumping)
Sierra	1998	Export permit required or for off-parcel use
Siskiyou	1998	Permit required for transfers out of basin
Tehama	1992	Mining groundwater (overdraft) for export prohibited; permit required for off-parcel use; influence of well pumping restrictions
Tuolumne	2001	Export permit required (extraction & substitute pumping)
Yolo	1996	Export permit required (extraction & substitute pumping)

Adjudicated Groundwater Basins

A third general form of groundwater management in California is court adjudication. In some California groundwater basins, as the demand for groundwater exceeded supply, landowners and other parties turned to the courts to determine how much groundwater can rightfully be extracted by each user. The courts study available data to arrive at a distribution of the groundwater that is available each year, usually based on the California law of overlying use and appropriation. This court-directed process can be lengthy and costly. As noted in Table 5, the longest adjudication took 24 years. Many of these cases have been resolved with a court-approved negotiated settlement, called a stipulated judgment. Unlike overlying and non-overlying rights to groundwater, such decisions guarantee to each party a proportionate share of the groundwater that is available each year. The intense technical focus on the groundwater supply and restrictions on groundwater extraction for all parties make adjudications one of the strongest forms of groundwater management in California.

There are 19 court adjudications for groundwater basins in California, mostly in Southern California (see Table 5). Eighteen of the adjudications were undertaken in State Superior Court and one in federal court. For each adjudicated groundwater basin, the court usually appoints a watermaster to oversee the court judgment. In 15 of these adjudications, the court judgment limits the amount of groundwater that can be extracted by all parties based on a court-determined safe yield of the basin. The basin boundaries are also defined by the court. The Santa Margarita Basin was adjudicated in federal court. That decision requires water users to report the amount of surface water and groundwater they use, but groundwater extraction is not restricted.

Most basin adjudications have resulted in either a reduction or no increase in the amount of groundwater extracted. As a result, agencies often import surface water to meet increased demand. The original court decisions provided watermasters with the authority to regulate extraction of the quantity of groundwater; however, they omitted authority to regulate extraction to protect water quality or to prevent the spread of contaminants in the groundwater. Because water quantity and water quality are inseparable, watermasters are recognizing that they must also manage groundwater quality.

Box E Adjudication of Groundwater Rights in the Raymond Basin

The first basin-wide adjudication of groundwater rights in California was in the Raymond Basin in Los Angeles County in 1949 (*Pasadena v. Alhambra*). The first water well in Raymond Basin was drilled in 1881; 20 years later, the number of operating wells grew to about 140. Because of this pumping, the City of Pasadena began spreading water in 1914 to replenish the groundwater, and during the next 10 years the city spread more than 20,000 acre-feet.

Pumping during 1930 through 1937 caused water levels to fall 30 to 50 feet in wells in Pasadena. After attempting to negotiate a reduction of pumping on a cooperative basis, the City of Pasadena, on September 23, 1937, filed a complaint in Superior Court against the City of Alhambra and 29 other pumpers to quiet title to the water rights within Raymond Basin. The court ruled that the city must amend its complaint, making defendants of all entities pumping more than 100 acre-feet per year, and that it was not a simple quiet title suit but, a general adjudication of the water rights in the basin.

In February 1939, a court used the reference procedure under the State Water Code to direct the State Division of Water Resources, Department of Public Works (predecessor to the Department of Water Resources) as referee to review all physical facts pertaining to the basin, determine the safe yield, and ascertain whether there was a surplus or an overdraft. The study took 2-1/2 years to complete and cost more than $53,000, which was paid by the parties. The resulting Report of Referee submitted to the court in July 1943 found that the annual safe yield of the basin was 21,900 acre-feet but that the actual pumping and claimed rights were 29,400 acre-feet per year.

Most parties agreed to appoint a committee of seven attorneys and engineers to work out a stipulated agreement. In 1944, the court designated the Division of Water Resources to serve as watermaster for the stipulated agreement, which all but one of the parties supported. On December 23, 1944, the judge signed the judgment that adopted the stipulation.

The stipulation provided that (1) the water was taken by each party openly, notoriously, and under a claim of right, which was asserted to be, and was adverse to each and all other parties; (2) the safe yield would be divided proportionally among the parties; and (3) each party's right to a specified proportion of the safe yield would be declared and protected. It also established an arrangement for the exchange of pumping rights among parties.

Based on the stipulation, the court adopted a program of proportionate reductions. In so doing, the court developed the doctrine of mutual prescription, whereby the rights were essentially based on the highest continual amount of pumping during the five years following the beginning of the overdraft, and under conditions of overdraft, all of the overlying and appropriative water users had acquired prescriptive rights against each other, that is, mutual prescription.*

In 1945, one party appealed the judgment, and in 1947, the District Court of Appeals reversed and remanded *Pasadena v. Alhambra.* However, on June 3, 1949, the State Supreme Court overturned the appellate court's decision and affirmed the original judgment. In 1950, the court granted a motion by the City of Pasadena that there be a review of the determination of safe yield, and in 1955, the safe yield and the total decreed rights were increased to 30,622 acre-feet per year. In 1984, watermaster responsibilities were assigned to the Raymond Basin Management Board.

*In City of Los Angeles v. City of San Fernando (1975) the California Supreme Court rejected the doctrine of mutual prescription and held that a groundwater basin should be adjudicated based on the correlative rights of overlying users and prior appropriation among non-overlying users. For further discussion, see Appendix B.

Table 5 List of adjudicated basins

Court name	Relationship to DWR Bulletin 118 basin name; county	Basin No.	Filed in court	Final decision	Watermaster and/or website
1—Scott River Stream System	Scott River Valley; Siskiyou	1-5	1970	1980	Two local irrigation districts
2—Santa Paula Basin	Subbasin of Santa Clara River; Ventura	4-4	1991	1996	Three-person technical advisory committee from United Water CD, City of Ventura, and Santa Paula Basin Pumpers Association; www.unitedwater.org
3—Central Basin	Northeast part of Coastal Plain of Los Angeles County Basin; Los Angeles	4-11	1962	1965	DWR—Southern District; wwwdpla.water.ca.gov/sd/watermaster/watermaster.html
4—West Coast Basin	Southwest part of Coastal Plain of Los Angeles County Basin; Los Angeles	4-11	1946	1961	DWR—Southern District; wwwdpla.water.ca.gov/sd/watermaster/watermaster.html
5—Upper Los Angeles River Area	San Fernando Valley Basin (entire watershed); Los Angeles	4-12	1955	1979	Superior Court appointee
6—Raymond Basin	Northwest part of San Gabriel Valley Basin; Los Angeles	4-13	1937	1944	Raymond Basin Management Board
7—Main San Gabriel Basin	San Gabriel Valley Basin, excluding Raymond Basin; Los Angeles	4-13	1968	1973	Water purveyors and water districts elect a nine-member board; www.watermaster.org/
Puente Narrows, *Addendum to Main San Gabriel Basin decision*			1972	1972	Two consulting engineers
8—Puente	San Gabriel Valley Basin, excluding Raymond Basin; Los Angeles	4-13	1985	1985	Three consultants
9—Cummings Basin	Cummings Valley Basin; Kern	5-2	1966	1972	Tehachapi-Cummings County Water District; www.tccwd.com/gwm.htm
10—Tehachapi Basin	Tehachapi Valley West Basin and Tehachapi Valley East Basin; Kern	5-28 6-45	1966	1973	Tehachapi-Cummings County Water District; www.tccwd.com/gwm.htm
11—Brite Basin	Brite Valley; Kern	5-80	1966	1970	Tehachapi-Cummings County Water District; www.tccwd.com/gwm.htm

Table 5 List of adjudicated basins (continued)

Court name	Relationship to DWR Bulletin 118 basin name; county	Basin No.	Filed in court	Final decision	Watermaster and/or website
12—Mojave Basin Area Adjuducation	Lower, Middle & Upper Mojave River Valley Basins; El Mirage & Lucerne valleys; San Bernardino	6-40, 6-41, 6-42	1990	1996	Mojave Water Agency; www.mojavewater.org/mwa700.htm
13—Warren Valley Basin	Part of Warren Valley Basin; San Bernardino	7-12	1976	1977	Hi-Desert Water District; www.mojavewater.org
14—Chino Basin	Northwest part of Upper Santa Ana Valley Basin; San Bernardino and Riverside	8-2	1978	1978	Nine people, recommended by producers and appointed by the court; www.cbwm.org/
15—Cucamonga Basin	North central part of Upper Santa Ana Valley Basin; San Bernardino	8-2	1975	1978	Not yet appointed, operated as part of Chino Basin
16—San Bernardino Basin Area	Northeast part of Upper Santa Ana Basin; San Bernardino and Riverside	8-2	1963	1969	One representative each from Western Municipal Water District of Riverside County & San Bernardino Valley Municipal Water District
17—Six Basins	Six subbasins in northwest upper Santa Ana Valley; Upper & Lower Claremont Heights, Canyon, Pomona, Live Oak & Ganesha; Los Angeles. Small portions of Upper Claremont Heights and Canyon are in San Bernardino County	4-14, 8-2	1998	1998	Nine-member board representing all parties to the judgment
18—Santa Margarita River watershed	The Santa Margarita River watershed, including 3 groundwater basins: Santa Margarita Valley, Temecula Valley and Cahuilla Valley Basins; San Diego and Riverside.	9-4, 9-5, 9-6	1951	1966	U.S. District Court appointee
19—Goleta	Goleta Central Basin; judgment includes North Basin; Santa Barbara	3-16	1973	1989	No watermaster appointed; the court retains jurisdiction

How Successful Have Groundwater Management Efforts Been?

This chapter describes the opportunities for local agencies to manage their groundwater resources. Many have questioned whether these opportunities have led to an overall successful system of groundwater management throughout California. How successful groundwater management has been throughout the State is a difficult question and cannot be answered at present. While there are many examples of local agency successes (see Box F, "Managing through a Joint Powers Agreement," Box G, "Managing a Basin through Integrated Water Management," and Box H, "Managing Groundwater Using both Physical and Institutional Solutions"), there are neither mandates to prepare groundwater management plans nor reporting requirements when plans are implemented, so a comprehensive assessment of local planning efforts is not possible. Additionally, many plans have been adopted only recently, during a period of several consecutive wet years, so many of the plan components are either untested or not implemented.

At a minimum, successful groundwater management should be defined as maintaining and maximizing long-term reliability of the groundwater resource, focused on preventing significant depletion of groundwater in storage over the long term and preventing significant degradation of groundwater quality. A review of some of the groundwater management plans prepared under AB 3030 reveals that some plans are simply brief recitations about continuing the agency's existing programs. Not all agencies that enacted groundwater management plans under AB 3030 are actively implementing the plan.

Despite this apparent lack of implementation of groundwater management plans prepared under AB 3030, the bill has certainly increased interest in more effective groundwater management. With more than 200 agencies participating in plans and more than 120 of those involved in coordinated plans with other agencies, AB 3030 has resulted in a heightened awareness of groundwater management. Additionally, annual reports published by a few water agencies indicate that they are indeed moving toward better coordination throughout the basin and more effective management of all water supplies. Given the history of groundwater management in California, these seemingly small steps toward better management may actually represent giant strides forward.

More recently, financial incentives have played a large role in driving groundwater management activities. For example, under grant and loan programs resulting from Proposition 13 of 2000 (see description in Chapter 4), local agencies submitted applications proposing a total increase in annual water yield of more than 300,000 acre-feet through groundwater storage projects. Additional projects and programs would be developed with sufficient funding for feasibility and pilot studies. Unfortunately, not enough funding exists for all of the proposed projects, and many other legal and institutional barriers remain (see Box I, "Impediments to Conjunctive Management Programs in California"). It is clear, however, that further incentives would help agencies move ahead more aggressively in their groundwater management planning efforts.

Additional progress in groundwater management is reflected by passage of amendments to the Water Code (§§ 10753.4 and 10795.4 as amended, §§ 10753.7, 10753.8, and 10753.9 as amended and renumbered, and §§ 10753.1 and 10753.7 as added) through SB 1938 of 2002. The amendments require that groundwater management plans include specific components for agencies to be eligible for some public funds for groundwater projects. The provisions of SB 1938 (2001) are fully described in Chapters 3 and 4.

This evaluation of groundwater management success has not really considered ordinances and adjudications. Adjudications have been successful at maintaining the groundwater basin conditions, often restricting pumping for all basin users. In some cases, adjudication provides the necessary framework for more proactive management as well. Ordinances have successfully restricted exports from basins, but have not

Box F Managing through a Joint Powers Agreement

In 1993, representatives from business, environmental, public, and water purveyor interests formed the Sacramento Area Water Forum to develop a plan to protect the region's water resources from the effects of prolonged drought as the demand for water continues to grow. The Water Forum was founded on two co-equal objectives: (1) to provide a reliable and safe water supply for the region's economic health and planned development to the year 2030 and (2) to preserve the fishery, wildlife, recreational and aesthetic values of the lower American River.

After a six-year consensus-based process of education, analysis and negotiation, the participants signed a Water Forum agreement to meet these objectives. The agreement provides a framework for avoiding future water shortages, environmental degradation, groundwater contamination, threats to groundwater reliability, and limits to economic prosperity.

The Sacramento Groundwater Authority (SGA) was formed to fulfill a key Water Forum goal of protecting and managing the north-area groundwater basin. The SGA is a joint powers authority formed for the purpose of collectively managing the region's groundwater resources. This authority permits SGA to make contractual arrangements required to implement a conjunctive use program, and also provides potential partners with the legal and political certainty for entering into long-term agreements.

SGA's regional banking and exchange program is designed to provide long-term supply benefits for local needs, but also will have the potential to provide broader statewide benefits consistent with American River environmental needs. Water stored in Folsom Lake would be conjunctively used with groundwater in order to reduce surface water diversions in dry years and to achieve in-lieu recharge of the basin in wet years. The conjunctive use program participants include 16 water providers in northern Sacramento and southern Placer counties that serve water to more than half a million people.

Two of three implementation phases of the program are complete. In the first phase, program participants identified long-term water supply needs and conducted an inventory of existing infrastructure that could be used to implement the program. In the second phase, SGA completed two pilot banking and exchange projects, demonstrating the technical, legal, and institutional viability of a regional conjunctive use program. In the first pilot study, water agencies worked with the U.S. Bureau of Reclamation and the Sacramento Area Flood Control Agency to bank 2,100 acre-feet of groundwater, providing additional flood storage capacity in Folsom Lake. In the second pilot study, Citrus Heights and Fair Oaks water districts and the city of Sacramento extracted and used 7,143 acre-feet of groundwater, forgoing a portion of their rights to surface water, making this water available to the Environmental Water Account. The third phase of the SGA program is to further solidify the institutional framework and construct facilities to implement a full-scale regional conjunctive use program. These facilities, that will result in an average annual yield of 21,400 acre-feet, are currently under construction, funded in part by a $21.6 million grant under Proposition 13 of 2000.

Box G Managing a Basin through Integrated Water Management

Orange County Water District (OCWD) was established in 1933 by an uncodified Act (Water Code App. 40) to manage Orange County's groundwater basin and protect the Santa Ana River rights of water users of north-central Orange County. The district manages the groundwater basin, which provides as much as 75 percent of the water supply for its service area. The district strives for a groundwater-based water supply with enough reserves to provide a water supply through drought conditions. An integrated set of water management practices helps achieve this, including the use of recharge, alternative sources, and conservation.

Recharge

The Santa Ana River provides the main natural recharge source for the county's groundwater basin. Increased groundwater use and lower-than-average rainfall during the late 1980s and early 1990s forced the district to rely on an aggressive program to enhance recharge of the groundwater basin. Programs used today to optimize water use and availability include:

- Construction of levees in the river channel to increase infiltration.
- Construction of artificial recharge basins within the forebay.
- Development of an underwater basin cleaning vehicle that removes a clogging layer at the bottom of the recharge basin and extends the time between draining the basin for cleaning by a bulldozer.
- Use of storm water captured behind Prado Dam that would otherwise flow to the ocean.
- Use of imported water from the State Water Project and Colorado River.
- Injection of treated recycled water to form a seawater intrusion barrier.

Alternative Water Use and Conservation

OCWD has successfully used nontraditional sources of water to help satisfy the growing need for water in Orange County. Projects that have added to the effective supply of groundwater are:

- Use of treated recycled water for irrigation and industrial use.
- In-lieu use to reduce groundwater pumping.
- Change to low-flow toilets and showerheads.
- Participation of 70 percent of Orange County hotels and motels in water conservation programs.
- Change to more efficient computerized irrigation.

Since 1975, Water Factory 21 has provided recycled water that meets all primary and secondary drinking water standards set by the California Department of Health Services. OCWD has proposed a larger, more efficient membrane purification project called the Groundwater Replenishment System (GWRS), which is scheduled to begin operating at 70,000 acre-feet per year in 2007. By 2020 the system will annually supply 121,000 acre-feet of high quality water for recharge, for injection into the seawater intrusion barrier, and for direct industrial uses.

This facility will use a lower cost microfiltration and reverse osmosis treatment process that produces water of near distilled quality, which will help reverse the trend of rising total dissolved solids (TDS) in groundwater caused by the recharge of higher TDS-content Santa Ana River and Colorado River waters. The facility will use about half the energy required to import an equivalent amount of water to Orange County from Northern California. The GWRS will be funded, in part, by a $30 million grant under Proposition 13 of 2000.

Source: Orange County Water District

Box H Managing Groundwater using both Physical and Institutional Solutions

Four agencies share responsibility for groundwater management in Ventura County. Coordination and cooperation between these agencies focus on regular meetings, attendance at each other's board meetings, joint projects, watershed committees, and ongoing personal contacts to discuss water-related issues. The agencies and their areas of responsibility are:

- United Water Conservation District – physical solutions, monitoring, modeling, reporting, administering management plans and adjudication;
- Fox Canyon Groundwater Management Agency – pumping allocations, credits and penalties, abandoned well destruction, data for irrigation efficiency;
- County of Ventura – well permits, well construction regulations, tracking abandoned wells; and
- Calleguas Municipal Water District – groundwater storage of imported water.

In Ventura County 75% to 80% of the extracted groundwater is for agriculture; the remainder is for municipal and industrial use. Seawater intrusion into the aquifers was recognized in the 1940s and was the driving force behind a number of groundwater management projects and policies in the county's groundwater basins. As groundwater issues became more complicated at the end of the 20th century, these groundwater management projects and policies were useful in solving a number of problems.

Physical Solutions

Physical solutions substitute supplemental surface water for groundwater pumping near coastal areas, increase basin recharge, and increase the reliability of imported water. Projects include:

- Winter flood-flow storage for dry season release
- Wells and pipelines to move pumping for drinking water away from the coast
- Diversion structures to supply surface water to spreading grounds and irrigation
- Pipelines to convey surface water to coastal areas
- Las Posas Basin Aquifer Storage and Recovery project

Institutional Solutions

Institutional solutions focus on developing and implementing effective groundwater management programs, reducing pumping demands, tracking groundwater levels and water quality, managing groundwater pumping patterns, and destroying abandoned wells to prevent cross-contamination of aquifers. Solutions include:

- Creation of Fox Canyon Groundwater Management Agency (GMA), which represents each major pumping constituency
- Use of irrigation efficiency (agriculture), water conservation, and alternative sources of water (urban) to reduce pumping by 25%
- Manage outside the GMA area through an AB 3030 plan and a court adjudication
- Limit new permits for wells in specific aquifers to avoid seawater intrusion
- Creation of a program to destroy abandoned wells
- Creation of a database of historical groundwater levels and quality information collected since the 1920s
- Development of a regional groundwater flow model and a regional master plan for groundwater projects
- Creation of an irrigation weather station to assist in irrigation efficiency

Implementation of these physical and institutional management tools has resulted in the reversal of seawater intrusion in key coastal monitoring wells. These same tools are being used to mitigate saline intrusion (not seawater) in two inland basins and to reduce seasonal nitrate problems in the recharge area. Work is being expanded to help reduce loading of agricultural pesticides and nutrients. Without close coordination and cooperation of the county's water-related agencies, municipalities, and landowners, it would have been very difficult to implement most of these solutions. Although such coordination takes time, the investment has paid off in solutions that help provide a sustainable water supply for all water users in Ventura County.

Source: United Water Conservation District

necessarily improved groundwater management. The primary intent of most ordinances is to ensure that proponents of projects are held accountable for potential impacts of the proposed export projects. As studies lead to a better understanding of local water resources, development of pilot export and transfer projects, with appropriate monitoring, may lead to greater certainty in managing groundwater resources. Areas managed under adjudications and ordinances will continue to develop more active management approaches. Population growth and its accompanying increased demand on the resources is a certainty. Most geographic areas in California are not immune to this growth, so strategies for more than just maintaining existing groundwater supply through extraction or export restrictions need to be implemented.

Box I Impediments to Conjunctive Management Programs in California

In 1998 the National Water Research Institute, in cooperation with the Association of Ground Water Agencies and the Metropolitan Water District of Southern California, conducted a workshop to determine the biggest impediments to implementing a cost-effective conjunctive water management program in California.

Since that time, some steps have been taken to overcome those impediments, but several important barriers remain. Workshop participants identified the 10 most significant obstacles:

1) Inability of local and regional water management governance entities to build trust, resolve differences (internally and externally), and share control.
2) Inability to match benefits and funding burdens in ways that are acceptable to all parties, including third parties.
3) Lack of sufficient federal, State, and regional financial incentives to encourage groundwater conjunctive use to meet statewide water needs.
4) Legal constraints that impede conjunctive use, regarding storage rights, basin judgments, area of origin, water rights, and indemnification.
5) Lack of statewide leadership in the planning and development of conjunctive use programs as part of comprehensive water resources plans, which recognize local, regional, and other stakeholders' interests.
6) Inability to address quality difference in "put" versus "take"; standards for injection, export, and reclaimed water; and unforeseeable future groundwater degradation.
7) Risk that water stored cannot be extracted when needed because of infrastructure, water quality or water level, politics, and institutional or contractual provisions.
8) Lack of assurances to prevent third-party impacts and assurances to increase willingness of local citizens to participate.
9) Lack of creativity in developing lasting "win-win" conjunctive use projects, agreements, and programs.
10) Supplemental suppliers and basin managers have different roles and expectations in relation to conjunctive use.

[**Editor's note**: The California Department of Water Resources' Conjunctive Water Management program has taken significant steps to overcome several of these impediments, using a combination of California Bay-Delta Authority, DWR, Proposition 13, and AB 303 funds to promote locally planned and controlled conjunctive use programs.]

Future Groundwater Management in California

Trying to predict what will happen with groundwater management in California is difficult given that actions by all of the involved groups—landowners, local governments, local, State, and federal agencies, and the courts—will continue to shape groundwater management in the future. However, the increasing population and its demands on California's water supply will accelerate the rate at which groundwater management issues become critical and require resolution. Some general conclusions are:

- Groundwater management will continue to be a local responsibility with increasing emphasis on how actions in one part of a basin impact groundwater resources throughout the basin. Regional cooperation and coordination of groundwater management activities will increase.

- As the State's population continues to grow, the increased reliance on groundwater will keep the topic of groundwater management at the forefront of legislative interest.

- Coordinated management of groundwater and surface water resources, through further development of conjunctive water management programs and projects, will become increasingly important.

- The increased reliance on groundwater in the future will necessitate a more direct link between land use planning, watershed management, floodplain management, and groundwater management plans.

- Current trends indicate that financial incentives in the form of loans and grants are increasing groundwater management planning and implementation at the local level. These successes will only continue at the current pace with increased funding to local agencies.

- Management of groundwater will increasingly include consideration of groundwater quality and groundwater quantity.

- Groundwater will be an important element in the trend toward an integrated water management approach that considers the full range of demand management and supply alternatives.

- Understanding of the relationship of groundwater and surface water and the role of groundwater in the environment will continue to grow.

Box J Managing Groundwater Quantity and Quality

When people hear the words "groundwater monitoring"' they may think either of measuring groundwater levels or of analyzing for groundwater quality. In reality, monitoring and management of groundwater quantity and groundwater quality are inseparable components of a management plan.

Although the primary focus of the California Department of Water Resources (DWR) is on groundwater quantity and the measures taken by local agencies to manage supply, management must also consider groundwater quality. Natural or anthropogenic contamination and pumping patterns that are not managed to protect groundwater quality may limit the quantity of groundwater that is available for use in a basin.

Several State programs provide useful data as well as regulatory direction on groundwater quality that managers can use in managing their groundwater supply. One program is the Drinking Water Source Assessment and Protection Program prepared by the California Department of Health Services in response to 1996 amendments to the federal Safe Drinking Water Act. The DWSAP requires water purveyors to assess sources of drinking water, develop zones indicating time of travel of groundwater, and identify potentially contaminating activities around supply wells. The goal is to ensure that the quality of drinking water sources is maintained and protected. Other useful water quality data for groundwater managers is collected by the agencies within the California Environmental Protection Agency, including the State Water Resources Control Board, Department of Pesticide Regulation and the Department of Toxic Substances Control, which are discussed in more detail in Chapter 5. Each of these agencies has a specific statutory responsibility to collect groundwater quality information and protect water quality.

Protection of Recharge Areas

Groundwater recharge areas, and the human activities that can render them unusable, are an example of the need to coordinate land use activities to protect both groundwater quality and quantity. Protection of recharge areas, whether natural or man-made, is necessary if the quantity and quality of groundwater in the aquifer are to be maintained. Existing and potential recharge areas must be protected so that they remain functional, that is they continue to provide recharge to the aquifer and they are not contaminated with chemical or microbial constituents. Land-use practices should be implemented so that neither the quantity nor quality of groundwater is reduced. A lack of protection of recharge areas could decrease the availability of usable groundwater and require the substitution of a more expensive water supply.

Many potentially contaminating activities have routinely been practiced in recharge areas, leading to the presence of contaminants in groundwater. In many areas, groundwater obtained from aquifers now requires remediation. Recent studies in some areas show that recharge areas are contaminated, but down-gradient wells are not, indicating that it is only a matter of time before contaminants in wells reach concentrations that require treatment of the groundwater.

In addition to quality impacts, urban development, consisting of pavement and buildings on former agricultural land, lining of flood control channels, and other land use changes have reduced the capacity of recharge areas to replenish groundwater, effectively reducing the safe yield of some basins.

Box J Managing Groundwater Quantity and Quality (continued)

To ensure that recharge areas continue to replenish high quality groundwater, water managers and land use planners should work together to:

- Identify recharge areas so the public and local zoning agencies are aware of the areas that need protection from paving and from contamination;
- Include recharge areas in zoning categories that eliminate the possibility of contaminants entering the subsurface;
- Standardize guidelines for pre-treatment of the recharge water, including recycled water;
- Build monitoring wells to collect data on changes in groundwater quality that may be caused by recharge; and
- Consider the functions of recharge areas in land use and development decisions.

Chapter 3

Groundwater Management Planning and Implementation

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Groundwater Management Planning and Implementation

The 1990s were a very important decade in the history of groundwater management in California. In 1992, the State Legislature provided an opportunity for more formal groundwater management with the passage of AB 3030 (Water Code § 10750 et seq.). More than 200 agencies have adopted an AB 3030 groundwater management plan. Additionally, 24 of the 27 counties with ordinances related to groundwater management adopted those laws during the 1990s. Plans prepared under AB 3030 certainly brought unprecedented numbers of water agencies into the groundwater management arena, and counties are now heavily involved in groundwater management, primarily through ordinances. However, many plans prepared under AB 3030 have had little or no implementation, and many counties focus primarily on limiting exports rather than on a comprehensive management program. As a result, the California Budget Act of 1999 (Stats. 1999, ch. 50), which authorized this update to Bulletin 118, directed the California Department of Water Resources (DWR) to complete several tasks, including developing criteria for evaluating groundwater management plans and developing a model groundwater management ordinance. This chapter presents the results of these directives. The intent is to provide a framework that will assist local agencies in proactively planning and implementing effective groundwater management programs.

Criteria for Evaluating Groundwater Management Plans—Required and Recommended Components

In 2002, the Legislature passed SB 1938 (Stats 2002, ch 603), which amended Water Code section 10750 et seq to require that groundwater management plans adopted by local agencies include certain components to be eligible for public funds administered by DWR for construction of groundwater projects; the statute applies to funds authorized or appropriated after September 1, 2002. In addition to the required components, DWR worked with representatives from local water agencies to develop a list of additional recommended components that are common to effective groundwater management.

Both the "required" and the "recommended" components are tools that local agencies can use either to institute a groundwater management plan for the first time or to update existing groundwater management plans. These components are discussed below and listed in Appendix C, which can be used as a checklist by local agencies to assess whether their groundwater management plans are addressing these issues.

Required Components of Local Groundwater Management Plans

As of January 1, 2003, amendments to Water Code Section 10750 et seq., resulting from the passage of SB 1938, require new groundwater management plans prepared under section 10750, commonly referred to as AB 3030 plans, to include the first component listed below.

Groundwater management plans prepared under any statutory authority must include components 2 through 7 to be eligible for the award of public funds administered by DWR for the construction of groundwater projects or groundwater quality projects. These requirements apply to funds authorized or appropriated after September 1, 2002. Funds appropriated under Water Code section 10795 et seq. (AB 303 – Local Groundwater Assistance Fund) are specifically excluded.

1) Documentation that a written statement was provided to the public "describing the manner in which interested parties may participate in developing the groundwater management plan" (Water Code, § 10753.4 (b)).

2) Basin management objectives (BMOs) for the groundwater basin that is subject to the plan (Water Code, § 10753.7 (a)(1)).
3) Components relating to the monitoring and management of groundwater levels, groundwater quality, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping (Water Code, § 10753.7 (a)(1)).
4) A plan by the managing entity to "involve other agencies that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the groundwater basin" (Water Code, § 10753.7 (a)(2)). A local agency includes "any local public agency that provides water service to all or a portion of its service area" (Water Code, § 10752 (g)).
5) Adoption of monitoring protocols (Water Code, § 10753.7 (a)(4)) for the components in Water Code section 10753.7 (a)(1). Monitoring protocols are not defined in the Water Code, but the section is interpreted to mean developing a monitoring program capable of tracking changes in conditions for the purpose of meeting BMOs.
6) A map showing the area of the groundwater basin as defined by DWR Bulletin 118 with the area of the local agency subject to the plan as well as the boundaries of other local agencies that overlie the basin in which the agency is developing a groundwater management plan (Water Code, § 10753.7 (a)(3)).
7) For local agencies not overlying groundwater basins, plans shall be prepared including the above listed components and using geologic and hydrologic principles appropriate to those areas (Water Code, § 10753.7 (a)(5)).

Recommended Components of Groundwater Management Plans

Although the seven components listed above are required only under certain conditions, they should always be considered for inclusion in any groundwater management planning process. In addition to the required components of a groundwater management plan resulting from the passage of SB 1938, it is recommended that the components listed below be included in any groundwater management plan adopted and implemented by a local managing entity. These additional components were developed in accord with the Budget Act of 1999 and with the assistance of stakeholder groups. The components should be considered and developed for specific application within the basin, subbasin, or agency service area covered by the plan. Additional components will likely be needed in specific areas. The level of detail for each component will vary from agency to agency. None of the suggested data reporting in the components should be construed to require disclosure of information that is confidential under State law. Local agencies should consider both the benefits of public dissemination of information and water supply security in developing reporting requirements.

Manage with the Guidance of an Advisory Committee

The managing entity should establish an advisory committee of interested parties that will help guide the development and implementation of the plan. The committee can benefit management in several ways. First, the committee can bring a variety of perspectives to the management team. As the intent of local groundwater management is to maintain and expand local benefits from the availability of the resource, it makes sense that the intended beneficiaries are a part of the management process. Second, the committee is free to focus on the specifics of groundwater management without being distracted by the many operational activities that the managing entity (such as a water district) must complete. Third, some parties could be negatively impacted by certain groundwater management decisions, and these actions and potential adverse impacts should be a part of the decision-making process to help reduce future conflicts. Finally, the advisory committee helps the managing entity gain the confidence of the local constituency by providing the opportunity for interested parties to participate in the management process.

Many managing entities have already elected to use advisory committees for implementation of their groundwater management plans. The composition of these committees varies widely. Some groups consist entirely of stakeholders, others add local or State government representatives or academic members as impartial third parties, and some have included consultants as technical advisers. Some plans use multiple advisory committees to manage unique subareas. Some plans appoint advisory committees with different objectives, such as one that deals with technical issues and another that deals with policy issues. There is no formula for the composition of an advisory committee because it should ultimately be based on local management needs and should include representation of diverse local interests.

The Tulare Lake Bed Coordinated Management Plan provides an example of the benefit of an advisory committee. The plan includes nine groups of participants, making coordination and communication a complicated issue. To allow for greater communication, an executive committee was established consisting of one voting member from each public agency participating in the plan and one voting member representing a combined group of private landowner plan participants. The committee administers groundwater management activities and programs for the plan (TLBWSD 2002).

Describe the Area to Be Managed under the Plan

The plan should include a description of the physical setting and characteristics of the aquifer system underlying the plan area in the context of the overall basin. The summary should also include a description of historical data, including data related to groundwater levels, groundwater quality, subsidence, and groundwater-surface water interaction; known issues of concern with respect to the above data; and a general discussion of historical and projected water demands and supplies. All of these data are critical to effective groundwater management because they demonstrate the current understanding of the system to be managed and serve as a point of departure for monitoring activities as part of plan implementation.

Create a Link Between Management Objectives and Goals and Actions of the Plan

The major goal of any groundwater management plan is to maintain a reliable supply of groundwater for long-term beneficial uses of groundwater in the area covered by the plan. The plan should clearly describe how each of the adopted management objectives helps attain that goal. Further, the plan should clearly describe how current and planned actions by the managing entity help meet the adopted management objectives. The plan will have a greater chance of success by developing an understanding of the relationship between each action, management objectives, and the goal of the groundwater management plan.

For example, prevention of contamination of groundwater from the land surface is a management objective that clearly supports the goal of groundwater sustainability. Management actions that could help support this objective include (1) educating the public through outreach programs that explain how activities at the surface ultimately impact groundwater, (2) developing wellhead protection programs or re-evaluating existing programs, (3) working with the local responsible agency to ensure that permitted wells are constructed, abandoned, and destroyed according to State well standards, (4) investigating whether local conditions necessitate higher standards than those adopted by the local permitting agency for the construction, abandonment, or destruction of wells, and (5) working with businesses engaged in practices that might impact groundwater to reduce the risks of contamination.

The concept of having a management objective is certainly not new. While many existing plans do not clearly include management objectives nor specifically identify actions to achieve objectives, some plans indirectly include these components. As an example, Eastern Municipal Water District's (EMWD) Groundwater Management Plan states that its goal includes maximizing "the use of groundwater for all beneficial uses in such a way as to lower the cost of water supply and to improve the reliability of the total

water supply for all users." To achieve this goal, EMWD has listed several issues to be addressed. One is the prevention of long-term depletion of groundwater. This can be defined as a management objective even though it is not labeled as such. Where this management objective is currently unmet in the North San Jacinto watershed portion of the plan area, EMWD has identified specific actions to achieve that objective including the reduction of groundwater extraction coupled with pursuing the construction of a pipeline to act as an alternative source of surface water for the impacted area (EMWD 2002).

Describe the Plan Monitoring Program

The groundwater management plan should include a map indicating the locations of any applicable monitoring sites for groundwater levels, groundwater quality, subsidence, stream gaging, and other applicable monitoring. The groundwater management plan should summarize the type of monitoring (for example, groundwater level, groundwater quality, subsidence, streamflow, precipitation, evaporation, tidal influence), type of measurements, and the frequency of monitoring for each location. Site specific monitoring information should be included in each groundwater management plan. The plan should include the well depth, screened interval(s) and aquifer zone(s) monitored and the type of well (public, irrigation, domestic, industrial, monitoring). These components will serve as a tool for the local managing entity to assess the adequacy of the existing monitoring network in tracking the progress of plan activities.

The groundwater management plan developed for the Scotts Valley Water District (SVWD) provides a detailed description of the monitoring program in Santa Cruz County (Todd Engineers 1994) Table 6 is SVWD's monitoring table, which serves as an example of the level of detail that is useful in a plan (Todd Engineers 2003a). Figure 9 shows the locations and types of monitoring points for each monitoring site. The monitoring table specifies in detail the data available and the planned monitoring. These serve as useful tools for SVWD to visualize the types and distribution of data available for their groundwater management activities. In addition to the minimum types of monitoring, SVWD summarizes other types of data that are relevant to their groundwater management effort.

Describe Integrated Water Management Planning Efforts

Water law in California treats groundwater and surface water as two separate resources with the result that they have largely been managed separately. Such management does not represent hydrologic reality. Recently, managers of a number of resources are becoming increasingly aware of how their planning activities could impact or be impacted by the groundwater system. Because of this, the local managing entity should describe any current or planned actions to coordinate with other land use, zoning, or water management planning entities.

Integrated management is addressed in existing groundwater management plans in several ways, including conjunctively managing groundwater with surface water supplies, recharging water from municipal sewage treatment plants, and working with local planning agencies to provide comments when a project is proposed that could impact the groundwater system.

Examples of planning efforts that should be integrated with groundwater management may include watershed management, protection of recharge areas, agricultural water management, urban water management, flood management, drinking water source assessment and protection, public water system emergency and disaster response, general plans, urban development, agricultural land preservation, and environmental habitat protection or restoration. Another example that may appear insignificant is transportation infrastructure. However, local impacts on smaller aquifers could be significant when landscaping of medians and interchanges requires groundwater pumping for irrigation or when paved areas are constructed over highly permeable sediments that act as recharge zones for the underlying aquifer.

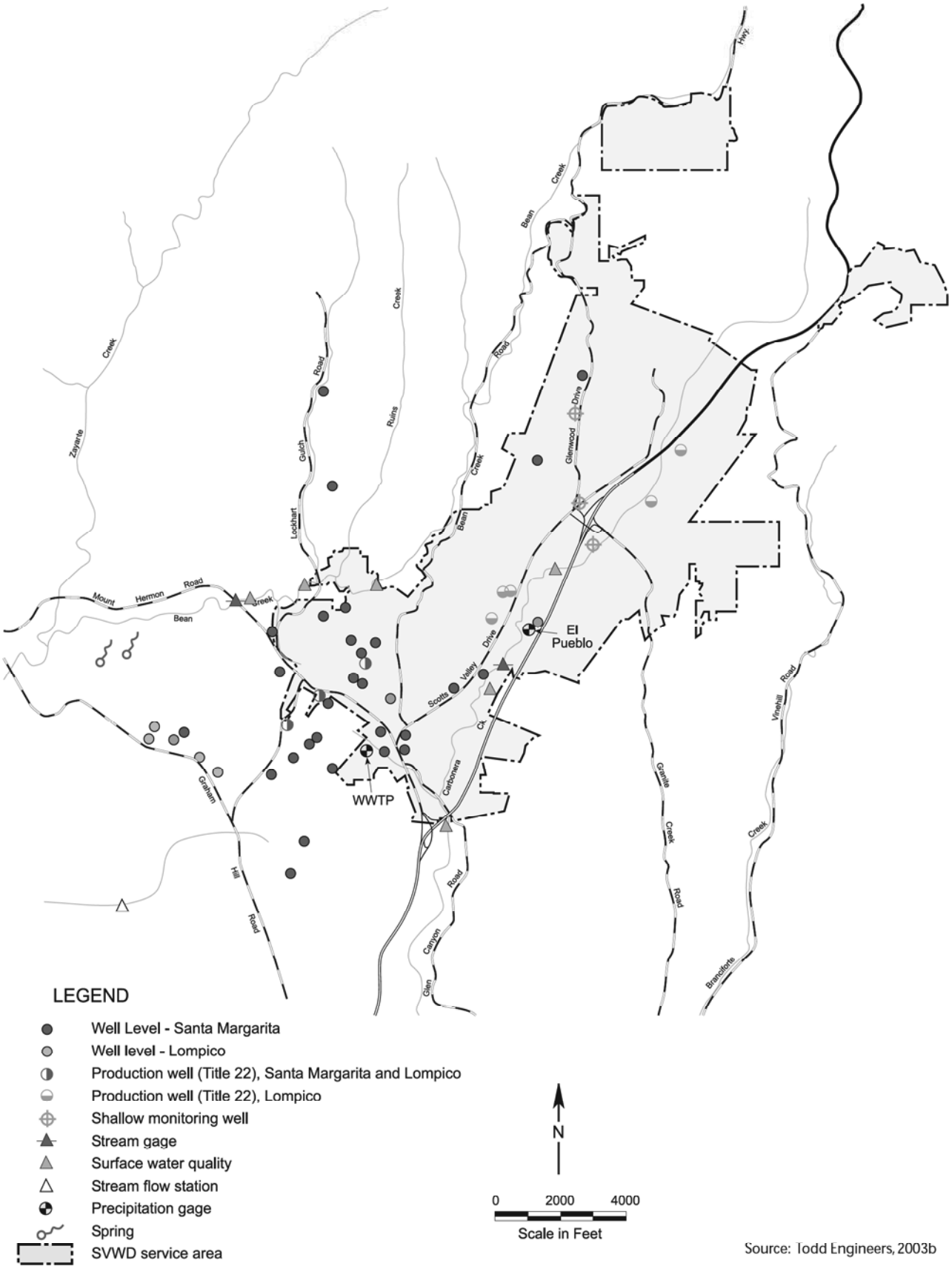
Table 6 Scotts Valley Water District's Groundwater Monitoring Plan

Monitoring type	Location	Measurement type	Date started	Frequency/ maintainer	Notes
Precipitation	El Pueblo Yard	15-minute recording	Feb-85	Daily/District, Monthly/City	Other historic gages:(1) Blair site on Granite Ck. Rd. (Jan. 1975 - Dec. 1980)
	WWTP	5-minute recording	1990	Daily/City	(2) Hacienda Dr. (Jul. 1974 - Mar. 1979) (3) El Pueblo Yard bucket gage (Jan. 1981 - Jan. 1985)
Evaporation	El Pueblo Yard	Pan	Jan-86	Daily/District	Evaporation pan raw data not compiled after July 1990
Evapotranspiration	De Laveaga Park, Santa Cruz	Automated active weather station	Sep-90	California Irrigation Management Information System/Monthly	Data available on-line through CIMIS
Streamflow	Carbonera Ck at Scotts Valley @ Cabonera Way Bridge (#111613000)	15-minute recording	Jan-85	USGS/ Daily	Other historic gages: (1) Carbonera Ck @ Santa Cruz (#11161400) 150 feet upstream from mouth (1974-1976 partial data)
	Bean Ck near Scotts Valley @ Hermon Crossing (#11160430)	15-minute recording	Dec-88	USGS/ Daily	(2) Bean Ck near Felton (#11160320) (1973-1978 partial data), low flows at same location (1983-1988)
	Eagle Creek In Henry Cowell Redwoods State Park	Bucket-Fall, Flow Meter-Spring	Mar-01	Semi-annually/ Todd Engineers	(3) Carbonera Creek @ Glen Canyon (1990-1994?)
Well Inventory	T10S/R01E Sections 6-9, 16-20, 30 and T10S/R02E Sections 1,11-14, 23-26, 36	Over 400 wells: location, log, type, capacity, etc. stored in GIS, and Access database	1950s	Logs from DWR maintained by Todd Engineers	
Groundwater Levels	~34 Santa Magarita aquifer and ~14 Lompico formation wells	Depth to water	1968	Quarterly/ District and cooperators	Data from over 75 wells, as early as 1968, bi-monthly 1983-1989
Pumpage	T10S/R01E Sections 6-9, 16-20, 30 and T10S/R02E Sections 1,11-14, 23-26, 36 District wells in production and on standby	Metered	1975	Monthly/ Scotts Valley Water District, Mt. Hermon Association, Hanson Aggregates West, San Lorenzo Valley Water District	Other historic pumpage data: Manana Woods (1988-1996 partial data)

Table 6 Scotts Valley Water District's Groundwater Monitoring Plan (continued)

Monitoring type	Location	Measurement type	Date started	Frequency/ maintainer	Notes
Groundwater Quality	T10S/R01E Sections 6-9, 16-20, 30 and T10S/R02E Sections 1,11-14,23-26, 36 District wells in production	Title 22 constituents	1963	At least semi-annual/ District and others	Data from over 80 wells, as early as 1963, monitoring frequency similar to groundwater level program
	North Scotts Valley 3 shallow monitoring wells	Metals, nitrogen species, general minerals	Mar-01	Semi-annually/ Todd Engineers	
Surface Water Quality	4 sites on Carbonera and 3 sites on Bean Creek	Grab samples - metals, nitrogen species, general minerals	Mar-01	Semi-annually/ Todd Engineers	
Wastewater Outflows	City of Scotts Valley WWTP @ Lundy Lane	Wastewater outflow volume and effluent quality	1965	Daily/City of Scotts Valley	Plant operational in 1965 (septic systems pre-1965)
Recycled Water Production	Scotts Valley WWTP	Recycled water quantity and quality	2002	At least quarterly/ WWTP	

Source: Todd Engineering 2003a



Source: Todd Engineers, 2003b

Figure 9 Scotts Valley Water District's Groundwater Management Plan monitoring locations

Box K What are Management Objectives?

Management objectives are the local managing entity's way of identifying the most important issues in meeting local resource needs; they can be seen as establishing a "value system" for the plan area. There is no fixed set of management objectives for any given plan area. Some of the more commonly recognized management objectives include the monitoring and managing of groundwater levels, groundwater quality, inelastic land subsidence, and changes in streamflow and surface water quality where they impact or are impacted by groundwater pumping. Management objectives may range from being entirely qualitative to strictly quantified.

Each management objective would have a locally determined threshold value associated with it, which can vary greatly. For example, in establishing a management objective for groundwater quality, one area may simply choose to establish an average value of total dissolved solids as the indicator of whether a management objective is met, while another agency may choose to have no constituents exceeding the maximum contaminant level for public drinking water standards. While there is great latitude in establishing management objectives, local managers should remember that the objectives should serve to support the goal of a sustainable supply for the beneficial use of the water in their particular area.

An example of an alternative management objective is Orange County Water District's (OCWD) objective of maintaining available storage space in its management area at 200,000 acre-feet. The objective does not require that groundwater elevations be fixed at any particular location, although managing to this objective would likely have the net benefit of stabilizing water levels. Groundwater storage is a dynamic value, so attempting to meet this management objective is an ongoing challenge. OCWD has implemented many management actions directly aimed at managing the basin to meet this objective.

The Deer Creek and Tule River Authority provides an excellent example of how groundwater management activities can be coordinated with other resources. The authority, in conjunction with the U.S. Bureau of Reclamation, has constructed more than 200 acres of recharge basins as part of its Deer Creek Recharge-Wildlife Enhancement Project. When available, the project takes surplus water during winter months and delivers it to the basins, which serve as winter habitat for migrating waterfowl, creating a significant environmental benefit. Most of the water also recharges into the underlying aquifer, thereby benefiting the local groundwater system.

Report on Implementation of the Plan

The managing entity should produce periodic reports—annually or at other frequencies determined by the local managing entity—summarizing groundwater basin conditions and groundwater management activities. For the period since the previous update, the reports should include:

- A summary of monitoring results, including historical trends,
- A summary of actual management actions,
- A summary, supported by monitoring results, of whether management actions are achieving progress in meeting management objectives,
- A summary of proposed management actions, and
- A summary of any plan component changes, including addition or modification of management objectives.

Unfortunately, many plans were prepared in the mid-1990s with little or no follow-up documentation of whether the plan is actually being implemented. This makes it difficult to determine what progress has been achieved in managing the groundwater resource. Periodic reports will serve as a tool for the managing entity to organize its many activities to implement the plan, act as a driving force for plan implementation, and help interested parties understand the progress made by local entities in managing their groundwater resource.

Progress reports on SVWD (Todd Engineers 2002) and EMWD (2002) groundwater management plans serve as excellent examples of the value of such an exercise. Both reports effectively portray the results of management actions: progress toward achieving objectives and specific recommendations for future management actions. An example of reporting on the modification of a management objective for water quality can be found in EMWD's 2000 Annual Report (EMWD 2001). A task force of more than 20 water suppliers and wastewater agencies, including EMWD, worked to update the Regional Water Quality Control Board's Region 5 Basin Plan objectives for nitrogen and total dissolved solids in water, effectively changing EMWD's management objectives for those constituents.

Evaluate the Plan Periodically

The managing entity and advisory committee should re-evaluate the entire plan. Periodic evaluation of the entire management plan is essential to define successes and failures under the plan and identify changes that may be needed. Additionally, re-evaluation of the plan should include assessment of changing conditions in the basin that may warrant modification of the plan or management objectives. Adjustment of components in the plan should occur on an ongoing basis if necessary. The re-evaluation of the plan should focus on determining whether the actions under the plan are meeting the management objectives and whether the management objectives are meeting the goal of sustaining the resource.

While there are several examples of existing groundwater management plans that demonstrate ongoing changes to plan activities, there are no known examples of such an approach to entirely re-evaluate an existing plan. This is likely due in part to the occurrence of several consecutive wet years in the mid- and late-1990s. The abundant surface water supplies reduced the need to actively manage groundwater supplies in many cases. More recent dry conditions and the recent passage of SB 1938 will create an excellent opportunity for managing entities to begin a re-evaluation of existing plans.

Model Groundwater Management Ordinance

As discussed in the previous chapter, ordinances are groundwater management mechanisms enacted by local governments through exercise of their police powers to protect the health and safety of their citizens. In Baldwin v. Tehama County (1994), the appellate court declared that State law does not preempt the field of groundwater management.

In the mid- to late-1990s, many counties adopted ordinances that effectively prevented export of groundwater from the county, even though none specifically prohibited export. The intent of each of these ordinances is to sustain groundwater as a viable local resource. To ensure that goal, an export project proponent is required by most of the ordinances to show that the proposed project will not cause depletion of the groundwater, degradation of groundwater quality, or subsidence before a permit to export groundwater can be issued. Although these ordinances do not specifically require threshold limits for each of these potential negative impacts, a project proponent can really only show that these negative effects will not occur if the proponent develops a groundwater management plan.

Many of these ordinances were developed in response to the plans of some agencies or landowners to export groundwater or develop a groundwater substitution project where surface water is exported and groundwater is substituted for local use. In some cases, short-term export actually took place, leading to a number of claims of negative third party impacts. Residents of some counties became concerned because no one knew how much groundwater was available for local use and how much groundwater was available for export. In short, details of the hydrology of the basin, including surface water and groundwater availability, water quality, and the interaction of surface water and groundwater were not known. This lack of detailed knowledge about the operating potential of their groundwater resources led counties to take what they viewed as protective action, which consisted of requiring a permit before anyone could export groundwater from the county.

From the perspective of DWR, groundwater should be managed in a manner that ensures long-term sustainability of the resource for beneficial uses. Those beneficial uses are to be decided by the local stakeholders within the basin. In some areas, there may be an ample supply of water, so groundwater exports or substitution projects are feasible while local beneficial uses of the water supply are maintained. In other areas, limiting exports may be necessary to maintain local beneficial uses. Such determinations can be made only after the data are collected and evaluated and the results are used to develop management objectives for the basin.

While developing both the criteria for evaluating groundwater management plans and the model groundwater management ordinance, DWR staff has borne two principles in mind. First, the goal of groundwater management, whether accomplished by a plan or by an ordinance, is to sustain and often expand a groundwater resource. Second, groundwater management, whether accomplished by a plan or by an ordinance, requires that local agencies address and resolve the same or similar issues within the boundaries of the agencies. To say it in different words, whether it is a plan or an ordinance, good groundwater management should address the same issues and problems and arrive at the same conclusions and solutions to satisfy the needs of the local area. While some areas may allow or promote exports, others may not.

As stated above, the Legislature required a model ordinance as one of the elements of this update of Bulletin 118. The model ordinance is included as Appendix D and can be used by local governments that have identified a need to adopt a groundwater management ordinance. The model is an example of what a local ordinance might include. Local conditions will require some additions, modifications, or deletions. The variety of political, institutional, legal, technical, and economic opportunities and constraints throughout California guarantees that there will be differences to which the model will have to be adapted. Local governments interested in adopting a groundwater management ordinance are encouraged to consider all components included in the model.

Water Code section 10753.7(b)(1)(A) allows an agency to participate in or consent to be subject to a groundwater management plan, a basin-wide management plan, or other integrated regional water management plan in order to meet the funding eligibility requirements that resulted from passage of SB 1938 (2001). A local government that adopts an ordinance should consider whether or not it will have local agencies that do not have their own groundwater management plan, but consent to be managed under the ordinance. If this situation is anticipated, the ordinance should include the required components described in the Water Code so State funding can be pursued.

Chapter 4

Recent Actions Related to Groundwater Management

Chapter 4
Recent Actions Related to Groundwater Management

The past few years have seen significant actions that impact groundwater management in California. Below are several examples of recent actions including legislation, ballot measures, and executive orders that show the State Legislature and the citizens of California clearly recognize the importance of groundwater and its appropriate management in meeting the present and future water supply needs of the State.

Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act of 2000 (Proposition 13)

On March 7, 2000, California voters approved a $1.97-billion general obligation bond known as the Safe Drinking Water, Clean Water, Watershed Protection and Flood Protection Act (Proposition 13). Of the nearly $2 billion, $230 million was earmarked for groundwater programs. The act authorizes $200 million for grants for feasibility studies, project design, and construction of conjunctive use facilities (Water Code, § 79170 et seq.) and $30 million in loans for local agency acquisition and construction of groundwater recharge facilities and feasibility study grants for projects potentially eligible for the loan program (Water Code, § 79161 et seq.). More than $120 million have been awarded in grants and loans to local agencies in the first two years of implementation of these programs.

California Bay-Delta Record of Decision

The goal of the California Bay-Delta (formerly CALFED) program is to restore ecosystem health and improve water management in the Bay-Delta system. The program has four primary objectives:

- Provide good water quality for all beneficial uses
- Improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species
- Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system
- Reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees

The Record of Decision (ROD), released in August 2000, sets forth a 30-year plan to address ecosystem health and water supply reliability problems in the Bay-Delta system. The ROD lays out specific actions and investments over the first seven years to meet program goals. Most important, with respect to groundwater is the California Bay-Delta program's commitment to local groundwater management. The ROD states, "CALFED will work with local governments and affected stakeholders to develop legislation to strengthen AB 3030 and provide technical and financial incentives to encourage more effective basin-wide groundwater management plans…" (CALFED 2000). The ROD encourages basin management that is developed at the subbasin level so that it addresses local needs, but is coordinated at the basin-wide level so that it considers impacts to other users in the basin. The ROD also commits Bay-Delta agencies to "facilitate and fund locally supported, managed, and controlled groundwater and conjunctive use projects with a total of 500,000 acre-feet to 1 million acre-feet (maf) of additional storage capacity by 2007" (CALFED 2000).

Local Groundwater Management Assistance Act of 2000 (AB 303, Water Code Section 10795 et seq.)

The goal of the Local Groundwater Management Assistance Act is to help local agencies better understand how to manage groundwater resources effectively to ensure the safe production, quality, and proper storage of groundwater in the State. The act created the Local Groundwater Assistance Fund, which must be appropriated annually. In three years, more than $15 million in grants were awarded for 71 projects. Grants went to local agencies for groundwater studies and projects that contribute to basin and subbasin management objectives, including but not limited to groundwater monitoring and groundwater basin management. Grants are available to all geographic areas of the State. This act serves to emphasize that groundwater is recognized as an important local resource and, to the extent that groundwater is properly managed at the local level, serves to benefit all Californians.

Groundwater Quality Monitoring Act of 2001 (AB 599, Water Code Section 10780 et seq.)

Assembly Bill 599, known as the Groundwater Quality Monitoring Act of 2001, set a goal to establish comprehensive groundwater monitoring and increase the availability of information about groundwater quality to the public. The objective of the program is to highlight those basins in which contamination has occurred or is likely to occur and provide information that will allow local managers to develop programs to curtail, treat, or avoid additional contamination. The act required the State Water Resources Control Board (SWRCB), in coordination with an Interagency Task Force (ITF) and a Public Advisory Committee (PAC), to integrate existing monitoring programs and design new program elements, as necessary, to establish a comprehensive statewide groundwater quality monitoring program.

Through the ITF and PAC, the Comprehensive Groundwater Quality Monitoring Program was developed. The program will seek to:

- Accelerate the monitoring and assessment program already established by the SWRCB,
- Implement monitoring and assessment in accordance with a prioritization of basins/subbasins,
- Increase coordination and data sharing among groundwater agencies, and
- Maintain groundwater data in a single repository to provide useful access by the public while maintaining appropriate security measures.

The Comprehensive Groundwater Quality Monitoring Program is expected to provide the following key benefits:

- A common base communications medium for agencies to utilize and supply groundwater quality data at multiple levels,
- A mechanism to unite local, regional and statewide groundwater programs in a common effort,
- Better understanding of local, regional and statewide water quality issues and concerns that in turn can provide agencies at all levels with better information to deal with the concerns of consumers and consumer advocate groups,
- Groundwater agencies with trend and long-term forecasting information, essential for groundwater management plan preparation and implementation, and
- The motivation for small- and medium-sized agencies to begin or improve their own groundwater monitoring and management programs.

Water Supply Planning

Three bills enacted by the Legislature to improve water supply planning processes at the local level became effective January 1, 2002. In general, the new laws are intended to improve the assessment of water supplies during the local planning process before land use projects that depend on water are approved. The new laws require the verification of sufficient water supplies as a condition for approving developments, and they compel urban water suppliers to provide more information on the reliability of groundwater if used as a supply.

SB 221 (Bus. and Prof. Code, § 11010 as amended; Gov. Code, § 65867.5 as amended; Gov. Code, §§ 66455.3 and 66473.7) prohibits approval of subdivisions consisting of more than 500 dwelling units unless there is verification of sufficient water supplies for the project from the applicable water supplier(s). This requirement also applies to increases of 10 percent or more of service connections for public water systems with less than 500 service connections. The law defines criteria for determining "sufficient water supply," such as using normal, single-dry, and multiple-dry year hydrology and identifying the amount of water that the supplier can reasonably rely on to meet existing and future planned uses. Rights to extract additional groundwater must be substantiated if used for the project.

SB 610 (Water Code, §§ 10631, 10656, 10910, 10911, 10912, and 10915 as amended; Pub. Resources Code, § 21151.9 as amended) and AB 901 (Water Code, §§ 10610.2 and 10631 as amended; Water Code § 10634) make changes to the Urban Water Management Planning Act to require additional information in Urban Water Management Plans (UWMP) if groundwater is identified as a source available to the supplier. Required information includes a copy of any groundwater management plan adopted by the supplier, proof that the developer or agency has rights to the groundwater, a copy of the adjudication order or decree for adjudicated basins, and if not adjudicated, whether the basin has been identified as being overdrafted or projected to be overdrafted in the most current DWR publication on the basin. If the basin is in overdraft, the UWMP must include current efforts to eliminate any long-term overdraft. A key provision in SB 610 requires that any project subject to the California Environmental Quality Act supplied with water from a public water system be provided a water supply assessment, except as specified in the law. AB 901 requires the plan to include information relating to the quality of existing sources of water available to an urban water supplier over given periods and include the manner in which water quality affects water management strategies and supply reliability.

Emergency Assistance to the Klamath Basin

On May 4, 2001, the Governor proclaimed a State of Emergency in the Klamath Basin in Siskiyou and Modoc counties. The proclamation included disaster assistance of up to $5 million under authority of the State Natural Disaster Assistance Act. This assistance went directly into constructing wells to extract groundwater for use on cover crops to avoid loss of critical topsoil. The Governor's proclamation also included $1 million for a study of the Klamath River Basin to determine the long-term water supply in the California portion of the basin.

Governor's Drought Panel

The Governor's Advisory Drought Planning Panel was formed in 2000 to develop a contingency plan to address the impacts of critical water shortages in California. The panel formed with the recognition that critical water shortages may severely impact the health, welfare, and economy of California. Panel recommendations included securing funding for the Local Groundwater Management Assistance Act (described above), continued support of critical groundwater monitoring in basins with inadequate data, and the formation of a technical assistance and education program for "rural homeowners and small domestic water systems relying on self-supplied groundwater" (GADPP 2000).

Sacramento Valley Water Management Agreement

On May 22, 1995, SWRCB adopted the "Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary" (the 1995 WQCP). Following this action, SWRCB initiated a water rights hearing process with the intent of allocating responsibility for meeting the standards of the 1995 WQCP among water right holders in areas tributary to the Delta. The water rights hearing was conducted in phases with all phases being resolved with the exception of Phase 8, which involved water rights holders in the Sacramento Valley.

Proceeding with Phase 8 may have involved litigation and judicial review for years. That extended process could have resulted in adverse impacts to the environment and undermined progress on other statewide water management initiatives. To avoid the consequences of delay, the Sacramento Valley Water Users, DWR, the U.S. Bureau of Reclamation (USBR), and export water users developed the Sacramento Valley Water Management Agreement. The agreement became effective April 20, 2001. At that time SWRCB issued an order staying the Phase 8 hearing for 18 months. The parties negotiated a short-term settlement agreement that obligated DWR and USBR to continue to fully meet the Bay-Delta water quality standards while providing for the development of conjunctive use and system improvement projects by participating upstream water rights holders that would make water available to help meet water quality standards while improving the reliability of local water supplies. SWRCB has subsequently dismissed the Phase 8 proceedings, and work is being undertaken on both short-term and long-term activities included in the Sacramento Valley Water Management Agreement.

Groundwater Management Water Code Amendments

In September 2002, SB 1938 (Water Code, § 10753.4 and § 10795.4 as amended; Water Code, § 10753.7, § 10753.8 and § 10753.9 as amended and renumbered; Water Code, § 10753.1 and § 10753.7 as added) was signed into law. The act amends existing law related to groundwater management by local agencies. The law requires any public agency seeking State funds administered through DWR for the construction of groundwater projects or groundwater quality projects to prepare and implement a groundwater management plan with certain specified components. Prior to this, there were no required plan components. New requirements include establishing basin management objectives, preparing a plan to involve other local agencies in a cooperative planning effort, and adopting monitoring protocols that promote efficient and effective groundwater management. The requirements apply to agencies that have already adopted groundwater management plans as well as agencies that do not overlie groundwater basins identified in Bulletin 118 and its updates when these agencies apply for state funds. The requirements do not apply to funds administered through the AB 303-Local Groundwater Management Assistance Act (Water Code, § 10795 et seq.) or to funds authorized or appropriated prior to September 1, 2002. Further discussion of the requirements is included in Chapter 3 and Appendix C.

Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Proposition 50)

California voters approved the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Proposition 50; Water Code, § 79500 et seq.) in the November 2002 elections. The initiative provides for more than $3.4 billion of funding, subject to appropriation by the Legislature, for a number of land protection and water management activities.

Several chapters of Proposition 50 allocate funds for specified water supply and water quality projects, including:

- Chapter 3 Water Security. Provides $50 million to protect State, local, and regional drinking water systems from terrorist attack or deliberate acts of destruction or degradation.

- Chapter 4 Safe Drinking Water. Provides $435 million for grants and loans for infrastructure improvements to meet safe drinking water standards.
- Chapter 5 Clean Water and Water Quality. Provides $390 million for a number of water quality and environmental improvements.
- Chapter 6 Contaminant and Salt Removal Technologies. Provides $100 million for desalination of ocean or brackish waters as well as treatment and removal of contaminants.
- Chapter 7 California Bay-Delta program. Provides $825 million for continuing implementation of all elements of the program.
- Chapter 8 Integrated Regional Water Management. Provides $500 million for many categories of water management projects that will protect communities from drought, protect and improve water quality, and reduce dependence on imported water supplies.
- Chapter 9 Colorado River. Provides $70 million for canal-lining projects necessary to reduce water use and to meet commitments related to California's allocation of water from the Colorado River.

Chapter 5

The Roles of State and Federal Agencies in California Groundwater Management

Chapter 5
The Roles of State and Federal Agencies in California Groundwater Management

Even though groundwater management is a local responsibility and mostly voluntary, several State and federal agencies have key roles in California groundwater management. Some of these roles may not be immediately recognized, but because they work toward the goal of maintaining a reliable groundwater supply, they are closely related to groundwater management. Some of the programs available through the California Department of Water Resources (DWR) and other agencies that assist local agencies in managing groundwater resources are described below.

Local Groundwater Management Assistance from DWR

DWR's role in groundwater management begins with the fundamental understanding that groundwater management is locally driven and management programs should respond to local needs and concerns. DWR recognizes that when groundwater is effectively managed at the local level, benefits are realized at a statewide level.

DWR has historically maintained many programs that directly benefit local groundwater management efforts including:

- Providing assistance to local agencies to assess basin hydrogeologic characteristics,
- Assisting local agencies to identify opportunities to develop additional groundwater supply,
- Monitoring groundwater levels and quality,
- Providing watermaster services for court-adjudicated basins,
- Providing standards for well construction and destruction,
- Managing the State's extensive collection of well completion reports, and
- Reviewing proposals and distributing grant funds and low-interest loans for conjunctive use projects, as well as local groundwater management and monitoring programs.

Conjunctive Water Management Program

DWR's Conjunctive Water Management Program consists of a number of integrated efforts to assist local agencies in improving groundwater management and increasing water supply reliability.

One goal of the Integrated Storage Investigations (ISI) Program, an element of the Bay-Delta program, is to increase water supply reliability statewide through the planned, coordinated management and use of groundwater and surface water resources. The effort emphasizes forming working partnerships with local agencies and stakeholders to share technical data and costs for planning and developing locally controlled and managed conjunctive water management projects.

Toward that end, the Conjunctive Water Management Program has:

- Developed a vision in which DWR would assist local agencies throughout the State so that these agencies can effectively manage groundwater resources,
- Adopted a set of working principles to ensure local planning; local control, operation, and management of conjunctive use projects; voluntary implementation of projects; and local benefits from the proposed projects,
- Executed memoranda of understanding with 30 local agency partners and provided technical and financial assistance to study groundwater basins and assess opportunities for conjunctive water management,

- Provided technical assistance in the form of groundwater monitoring, groundwater modeling, and local water management planning, as well as a review of numerous regional and statewide planning efforts on a variety of water issues, and
- Provided facilitation assistance to promote broad stakeholder involvement in regional water management planning processes.

DWR staff review proposals and distribute grants pursuant to the Local Groundwater Management Assistance Act of 2000 (AB 303). To date, DWR has awarded more than $15 million to local agencies to fund 71 projects dealing with groundwater investigation, monitoring, or management.

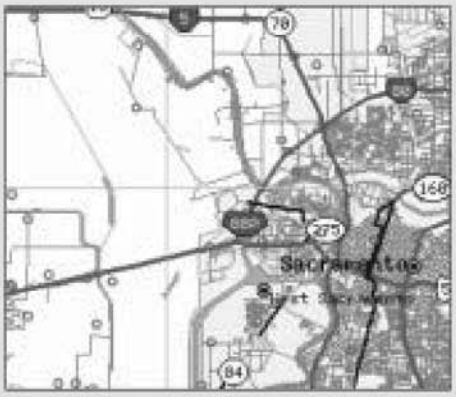
With funds provided under Proposition 13, DWR has awarded more than $170 million in loans and grants for groundwater recharge and storage studies and projects to local agencies throughout the State. Applicant estimates of the water supply reliability increases that will be realized from these projects exceeds 150 thousand acre-feet annually. Recipients of loans and grants must provide progress reports to allow an evaluation of the successes of the various programs. Figure 10 shows the distribution of loan and grant awardees throughout the State.

Both grant programs have active outreach efforts to inform and to assist agencies in preparation of applications. Selection of projects for funding relies in part on input from advisory committees composed of stakeholders from throughout the State.

Box L Providing Data:

The Internet Makes Groundwater Elevation Data Readily Accessible to the Public

In 1996, the California Department of Water Resources (DWR) began providing Internet access to groundwater level data and hydrographs for wells in groundwater basins throughout California. The website, which distributes historical data for more than 35,000 wells monitored by DWR and its many cooperators, has proven very popular, with more than 60,000 visits to date. Options include a form or map interface to locate wells with water level data and the ability to download long-term water levels for specific wells or seasonal measurements for specific areas to create groundwater contour maps. The accessibility of this data makes it a significant resource for local agencies in making sound groundwater management decisions. The address of the site is http://wdl.water.ca.gov/.



Wells can be located with a map interface. By clicking on a well, a hydrograph with the latest data available is automatically generated.

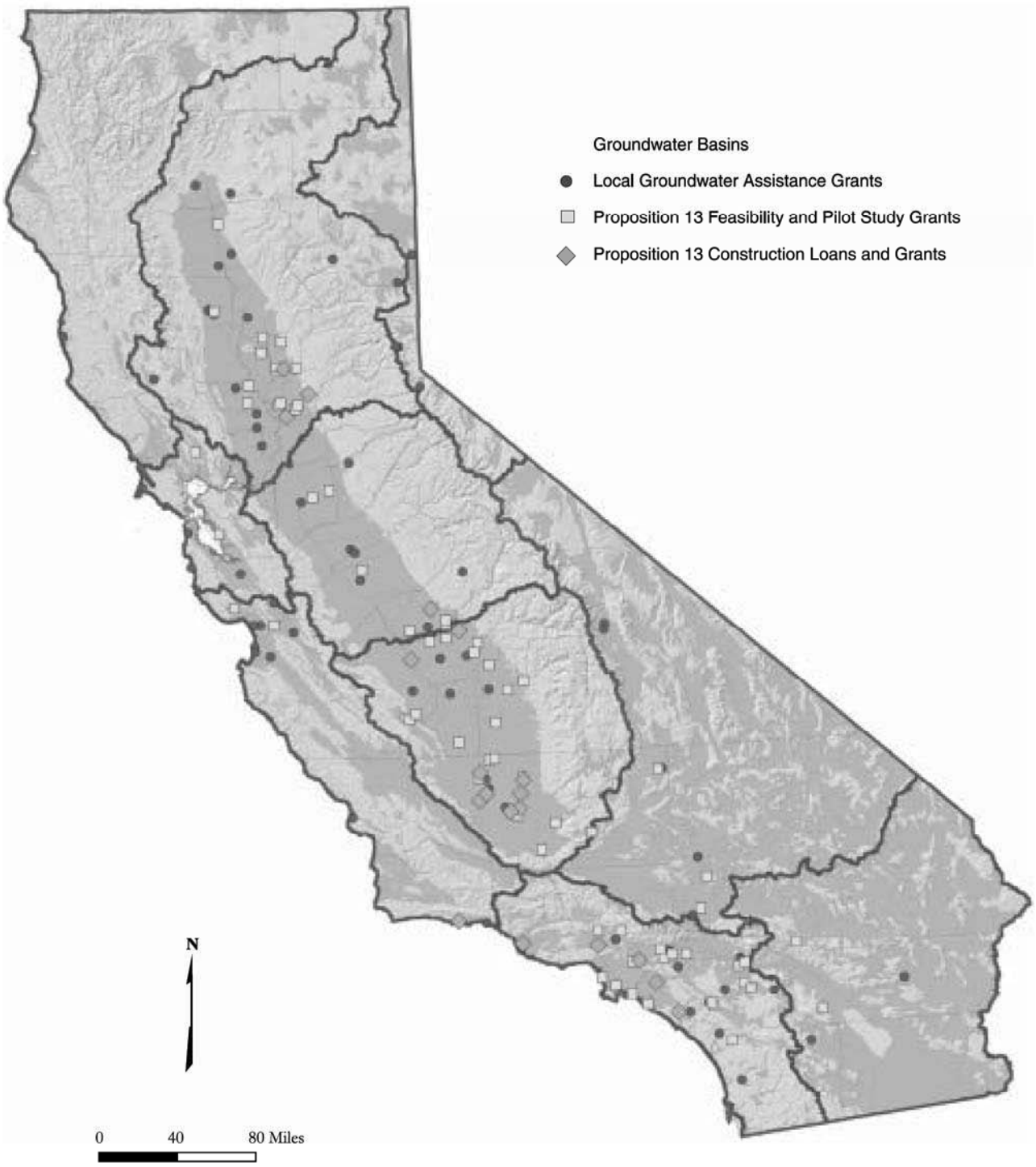


Figure 10 Broad distribution of grant and loan awardees for 2001 through 2003

Assistance from Other State and Federal Agencies

Many other State and federal agencies provide groundwater management assistance to local agencies. Some of those roles are described below. For more information on the roles of various agencies in protecting the groundwater resource, see the California Department of Health Services' Drinking Water Source Assessment and Protection Program Document (DHS 2000), California Groundwater Management (Bachman and others 1997), or the individual agency websites.

State Water Resources Control Board and Regional Water Quality Control Boards

http://www.swrcb.ca.gov The mission of the State Water Resources Control Board (SWRCB) is to ensure the highest reasonable quality of waters of the State, while allocating those waters to achieve the optimum balance of beneficial uses. In turn, the nine Regional Water Quality Control Boards (RWQCB) develop and enforce water quality objectives and implement plans to protect the beneficial uses of the State's waters, recognizing differences in climate, topography, geology, and hydrology.

SWRCB has many responsibilities regarding the protection of the groundwater resource. One of the more notable is the Groundwater Ambient Monitoring and Assessment (GAMA) Program. GAMA is a recently enacted program that will provide a comprehensive assessment of water quality in water wells throughout the state. GAMA has two main components: the California Aquifer Susceptibility (CAS) Assessment and the Voluntary Domestic Well Assessment Project.

The CAS combines age dating of water and sampling for low-level volatile organic compounds (VOCs), such as methyl tertiary-butyl ether (MTBE), to assess the relative susceptibility of all of approximately 16,000 public supply wells throughout the State. Age dating provides a general assessment of how quickly groundwater is moving through the system, while the sampling of low-level VOCs allows greater reaction time for potential remediation strategies before contaminants reach action levels. Sampling is being conducted by staff from the U.S. Geological Survey (USGS) and Lawrence Livermore National Laboratory. The CAS Assessment was developed cooperatively with DHS and DWR.

The Voluntary Domestic Well Assessment Project will provide a previously unavailable sampling of water quality in domestic wells, which will assist in assessing the relative susceptibility of California's groundwater. Because water quality in individual domestic wells is unregulated, the program is voluntary and will focus, as resources permit, on specific areas of the state. Constituents to be analyzed include nitrate, total and fecal coliform bacteria, MTBE, and minerals. Additional constituents will be added in areas with known water quality problems.

Other SWRCB/RWQCB activities related to groundwater protection include developing basin plans that identify existing and potential beneficial uses of marine water, groundwater, and surface waters; regulating the discharge of waste that may affect water quality in California; monitoring of landfills and hazardous waste facilities; establishing standards for the construction and monitoring of underground storage tanks; establishing management plans for control of nonpoint source pollutants; and issuing cleanup and abatement orders that require corrective actions by the responsible party for a surface water or groundwater pollution problem or nuisance.

The Groundwater Quality Monitoring Act of 2001 (AB599, Water Code, § 10780 et seq.) required the SWRCB to develop a comprehensive monitoring program in a report to the Legislature. See Chapter 4 for details.

California Department of Health Services

http://www.dhs.ca.gov/ps/ddwem The DHS Drinking Water Program, part of the Division of Drinking Water and Environmental Management, is responsible for DHS implementation of the federal Safe Drinking Water Act, as well as California statutes and regulations related to drinking water. As part of this responsibility, DHS inspects and provides regulatory oversight of approximately 8,500 public water systems (and approximately 16,000 drinking water wells) to assure delivery of safe drinking water to all California consumers.

Public water system operators are required to regularly monitor their drinking water sources for microbiological, chemical and radiological contaminants to show that drinking water supplies meet regulatory requirements (called primary maximum contaminant levels–MCLs). Among these contaminants are approximately 80 specific inorganic and organic chemical contaminants and six radiological contaminants that reflect the natural environment as well as human activities.

Public water system operators also monitor their water for a number of other contaminants and characteristics that deal with the aesthetic properties of drinking water (known as secondary MCLs). They are also required by regulation to analyze for certain unregulated contaminants (to allow DHS to collect information on emerging contaminants, for example), and to report findings of other contaminants that may be detected during routine monitoring. The DHS water quality monitoring database contains the results of analyses since 1984. These data, collected for purposes of regulatory compliance with drinking water laws, also provide an extensive body of information on the quality of groundwater throughout the State.

California Department of Pesticide Regulation

http://www.cdpr.ca.gov/dprprograms.htm The California Department of Pesticide Regulation (DPR) protects human health and the environment by regulating pesticide sales and use and by promoting reduced-risk pest management. DPR plays a significant role in monitoring for the presence of pesticides and in preventing further contamination of the groundwater resource.

DPR conducts six types of groundwater monitoring:

1) Monitoring for pesticides on a DPR-determined Ground Water Protection List, which lists pesticides with the potential to pollute groundwater;
2) Four-section survey monitoring to verify a reported detection and to help determine if a detected pesticide resulted from legal agricultural use;
3) Areal extent monitoring to identify the extent of contaminated wells;
4) Adjacent section monitoring to identify additional areas sensitive to pesticide movement to groundwater;
5) Monitoring to repeatedly sample a network of wells to determine whether pesticide residues are declining; and
6) Special project monitoring.

When pesticides are found in groundwater, they are normally regulated in one-square mile areas identified in regulation as sensitive to groundwater pollution. These pesticides are subject to permitting by the county agricultural commissioner and to use restrictions specified in regulation. DPR maintains an extensive database of pesticide sampling in groundwater and reports a summary of annual sampling and detections to the State Legislature.

California Department of Toxic Substances Control

http://www.dtsc.ca.gov The California Department of Toxic Substances Control (DTSC) has two programs related to groundwater resources protection: the Hazardous Waste Management Program and the Site Mitigation Program. These programs are authorized under Division 20 of the California Health and Safety Code, and implementing regulations are codified in Title 22 of the California Code of Regulations.

A critical element of both programs is maintaining environmental quality and economic vitality through the protection of groundwater resources. This is accomplished through hazardous waste facility permitting and design; oversight of hazardous waste handling, removal, and disposal; oversight of remediation of hazardous substances releases; funding of emergency removal actions involving hazardous substances, including the cleanup of illegal drug labs; cleanup of abandoned hazardous waste sites; oversight of the closure of military bases; and pollution prevention.

If groundwater is threatened or impacted by a hazardous substance release, DTSC provides technical oversight for the characterization and remediation of soil and groundwater contamination. DTSC and the nine RWQCBs coordinate regulatory oversight of groundwater remediation. To ensure site-specific groundwater quality objectives are met, DTSC consults with RWQCB staff and appropriate groundwater basin plans.

Box M Improving Coordination of Groundwater Information

California's groundwater resources are addressed by an array of different State and federal agencies. Each agency approaches groundwater from a unique perspective, based on its individual statutory mandate. As a result, each agency collects different types of groundwater data and information. To facilitate the effective and efficient exchange of groundwater resource information, the State Water Resources Control Board (SWRCB) is coordinating the Groundwater Resources Information Sharing Team (GRIST), which is composed of representatives from various groundwater agencies. Agencies currently participating in GRIST are:

- State Water Resources Control Board
- Department of Health Services
- Department of Water Resources
- Department of Pesticide Regulation
- Lawrence Livermore National Laboratory
- U.S. Geological Survey

One of the tasks of the GRIST is to identify data relevant to California groundwater resources. A listing of the data, along with the appropriate agency contacts and Internet links, will be maintained by SWRCB on the Groundwater Resources Information Database. In addition, to facilitate effective information sharing and communication among stakeholders, groundwater data will be made available on the SWRCB GeoTracker system. GeoTracker is a geographic information system that provides Internet access to environmental data. The centralization of environmental data through GeoTracker will enable more in-depth geospatial and statistical analyses of groundwater data in the future. For more information about GeoTracker, visit the GeoTracker Internet site at http://geotracker.arsenautlegg.com.

California Bay-Delta Authority

http://calwater.ca.gov The California Bay-Delta program was initiated in 1994 to develop and implement a long-term comprehensive plan that will restore ecological health and improve water management for beneficial uses of the Sacramento-San Joaquin Bay-Delta System. The partnership currently consists of more than 20 State and federal agencies. An important element of the program is to increase storage by developing an additional 500,000 acre-feet to 1.0 million acre-feet of groundwater storage capacity by the year 2007 (CALFED 2000).

Effective January 1, 2003, a newly formed State agency assumed responsibility for overseeing implementation of the Bay-Delta program. The California Bay-Delta Authority provides a permanent governance structure for the collaborative state-federal effort. The authority was established by enactment of Senate Bill 1653 in 2002. The legislation calls for the authority to sunset on January 1, 2006, unless federal legislation has been enacted authorizing the participation of appropriate federal agencies in the authority.

U.S. Environmental Protection Agency

http://www.epa.gov/safewater The U.S. Environmental Protection Agency (EPA) Office of Ground Water and Drinking Water, together with states, tribes, and many partners, protects public health by ensuring safe drinking water and protecting groundwater. The EPA's role in California groundwater is primarily related to protection of the resource and comes in the form of administering several federal programs in close coordination with State agencies such as SWRCB, DHS, and DTSC.

U.S. Geological Survey

http://ca.water.usgs.gov USGS has published results of many studies of California groundwater basins. USGS maintains an extensive groundwater level and groundwater quality monitoring network and has compiled this data in a database. The California District is working on cooperative programs with local, State, and other federal agencies. The most notable programs include three regional studies of the San Joaquin-Tulare Basin, the Sacramento River Basin, and the Santa Ana River basin under the National Water Quality Assessment Program. Results were published for the San Joaquin-Tulare Basin in 1995 and the Sacramento River Basin in 2000. The Santa Ana River basin study is in progress.

U.S. Bureau of Reclamation

http://www.usbr.gov The U.S. Bureau of Reclamation (USBR) operates the Central Valley Project (CVP), an extensive network of dams, canals, and related facilities that delivers about 7 maf during normal years for agricultural, urban, and wildlife use. USBR's role with respect to groundwater is generally limited to monitoring for impacts to the groundwater systems adjacent to its CVP facilities. Through the cooperative efforts of USBR, DWR, irrigation districts, farmers, and other local entities, groundwater level data have been collected continuously since project conception in the 1930s and 1940s.

In addition to CVP monitoring, USBR monitors groundwater levels to identify potential impacts as a result of two other projects in California. That monitoring includes the Santa Ynez basin as part of the Cachuma Project on the central coast, and the Putah Creek Cone as part of the Solano Project in the southwest Sacramento Valley. Both monitoring efforts are required as part of permitting for the projects.

USBR is planning to implement a groundwater information system to collect and distribute to the public the large volume of historical groundwater level data associated with its projects.

Chapter 6

Basic Groundwater Concepts

Chapter 6
Basic Groundwater Concepts

This chapter presents general concepts relating to the origin, occurrence, movement, quantity, and quality of groundwater. The concepts will be useful in providing the nontechnical reader with a basic understanding of groundwater. For more experienced readers, many topics are discussed specifically as they apply to California or as the terms are used in this report. A glossary of terms is included at the end of this report. For additional reading on basic groundwater concepts see *Basic Ground-Water Hydrology* (Heath 1983).

Origin of Groundwater

Groundwater is a component of the hydrologic cycle (Figure 11), which describes locations where water may occur and the processes by which it moves or is transformed to a different phase. In simple terms, water or one of its forms—water vapor and ice—can be found at the earth's surface, in the atmosphere, or beneath the earth's surface. The hydrologic cycle is a continuum, with no beginning or end; however, it is often thought of as beginning in the oceans. Water evaporates from a surface water source such as an ocean, lake, or through transpiration from plants. The water vapor may move over the land and condense to form clouds, allowing the water to return to the earth's surface as precipitation (rain or snow). Some of the snow will end up in polar ice caps or in glaciers. Most of the rain and snowmelt will either become overland flow in channels or will infiltrate into the subsurface. Some of the infiltrated water will be transpired by plants and returned to the atmosphere, while some will cling to particles surrounding the pore spaces in the subsurface, remaining in the vadose (unsaturated) zone. The rest of the infiltrated water will move gradually under the influence of gravity into the saturated zone of the subsurface, becoming groundwater. From here, groundwater will flow toward points of discharge such as rivers, lakes, or the ocean to begin the cycle anew. This flow from recharge areas to discharge areas describes the groundwater portion of the hydrologic cycle.

The importance of groundwater in the hydrologic cycle is illustrated by considering the distribution of the world's water supply. More than 97 percent of all earth's water occurs as saline water in the oceans (Fetter 1988). Of the world's fresh water, almost 75 percent is in polar ice caps and glaciers, which leaves a very small amount of fresh water readily available for use. Groundwater accounts for nearly all of the remaining fresh water (Alley and others 1999). All of the fresh water stored in the world's rivers and lakes accounts for less than 1 percent of the world's fresh water.

Occurrence of Groundwater

Groundwater is the water occurring beneath the earth's surface that completely fills (saturates) the void space of rocks or sediment. Given that all rock has some open space (voids), groundwater can be found underlying nearly any location in the State. Several key properties help determine whether the subsurface environment will provide a significant, usable groundwater resource. Most of California's groundwater occurs in material deposited by streams, called alluvium. Alluvium consists of coarse deposits, such as sand and gravel, and finer-grained deposits such as clay and silt. The coarse and fine materials are usually coalesced in thin lenses and beds in an alluvial environment. In this environment, coarse materials such as sand and gravel deposits usually provide the best source of water and are termed aquifers; whereas, the finer-grained clay and silt deposits are relatively poor sources of water and are referred to as aquitards. California's groundwater basins usually include one or a series of alluvial aquifers with intermingled aquitards. Less frequently, groundwater basins include aquifers composed of unconsolidated marine sediments that have been flushed by fresh water. We include the marine-deposited aquifers in the discussion of alluvial aquifers in this bulletin.

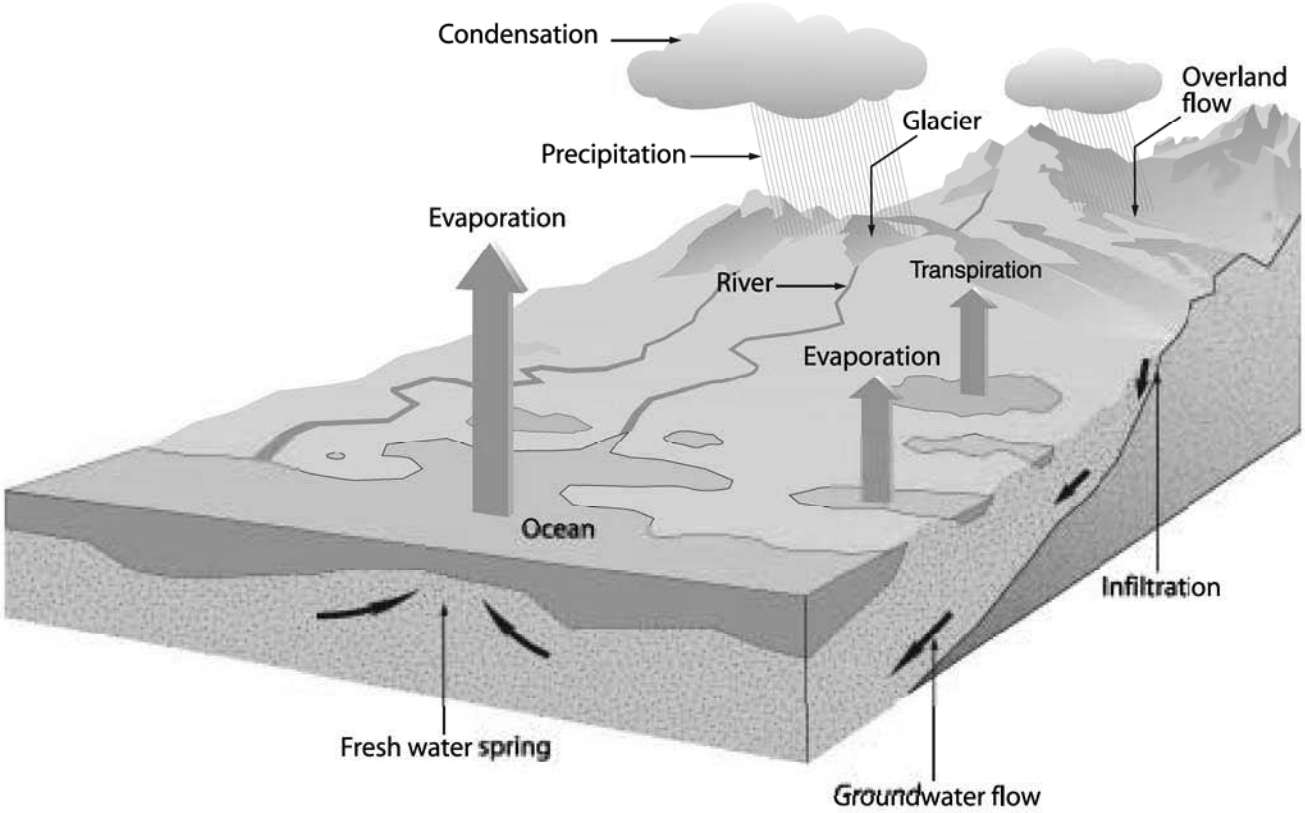


Figure 11 The Hydrologic Cycle

Although alluvial aquifers are most common in California, other groundwater development occurs in fractured crystalline rocks, fractured volcanics, and limestones. For this report, these nonalluvial areas that provide groundwater are referred to as "groundwater source areas," while the alluvial aquifers are called groundwater basins. Each of these concepts is discussed more fully below.

Groundwater and Surface Water Interconnection

Groundwater and surface water bodies are connected physically in the hydrologic cycle. For example, at some locations or at certain times of the year, water will infiltrate the bed of a stream to recharge groundwater. At other times or places, groundwater may discharge, contributing to the base flow of a stream. Changes in either the surface water or groundwater system will affect the other, so effective management requires consideration of both resources. Although this physical interconnection is well understood in general terms, details of the physical and chemical relationships are the topic of considerable research.

These details are the subject of significant recent investigations into the hyporheic zone, the zone of sand and gravel that forms the channel of a stream. As surface water flows downstream it may enter the gravels in the

Box N One Resource, Two Systems of Law

In California, two distinct legal regimes govern the appropriation of surface water and subterranean streams, and percolating groundwater. The California Water Code requires that water users taking water for beneficial use from surface watercourses and "subterranean streams flowing through known and definite channels" obtain water right permits or licenses from the State Water Resources Control Board (SWRCB) (Water Code § 1200 et seq.). Groundwater classified as percolating groundwater is not subject to the Water Code provisions concerning the appropriation of water, and a water user can take percolating groundwater without having a State-issued water right permit or license. Current Water Code section 1200 is derived from a provision in the Water Commission Act of 1913, which became effective on December 19, 1914.

The SWRCB developed a test to identify groundwater that is in a subterranean stream flowing through a known and definite channel and is therefore subject to the SWRCB's permitting authority. The physical conditions that must be present in a subterranean stream flowing in a known and definite channel are: (1) a subsurface channel must be present; (2) the channel must have relatively impermeable bed and banks; (3) the course of the channel must be known or capable of being determined by reasonable inference; and (4) groundwater must be flowing in the channel. Whether groundwater is subject to the SWRCB's permitting authority under this test is a factual determination. Water that does not fit this test is "percolating groundwater" and is not subject to the SWRCB's permitting authority.

The SWRCB has issued decisions that find that groundwater under the following streams constitutes a "subterranean stream flowing through known and definite channels" and is therefore subject to the SWRCB's permitting authority (Murphey 2003 pers com):

Los Angeles River in Los Angeles County
Sheep Creek in San Bernardino County
Mission Basin of the San Luis Rey River in San Diego County
Bonsall Basin of the San Luis Rey River in San Diego County
Pala Basin of the San Luis Rey River in San Diego County
Carmel River in Monterey County
Garrapata Creek in Monterey County
Big Sur River in Monterey County
Russian River
Chorro Creek in San Luis Obispo County
Morro Creek in San Luis Obispo County
North Fork Gualala River in Mendocino County

Contact the SWRCB, Division of Water Rights for specific stream reaches and other details of these decisions.

hyporheic zone, mix with groundwater, and re-enter the surface water in the stream channel. The effects of this interchange between surface water and groundwater can change the dissolved oxygen content, temperature, and mineral concentrations of the water. These changes may have a significant effect on aquatic and riparian biota.

Significantly, the physical and chemical interconnection of groundwater and surface water is not well represented in California's water rights system (see Box N "One Resource, Two Systems of Law").

Physical Properties That Affect Groundwater

The degree to which a body of rock or sediments will function as a groundwater resource depends on many properties, some of which are discussed here. Two of the more important physical properties to consider are porosity and hydraulic conductivity. Transmissivity is another important concept to understand when considering an aquifer's overall ability to yield significant groundwater. Throughout the discussion of these properties, keep in mind that sediment size in alluvial environments can change significantly over short distances, with a corresponding change in physical properties. Thus, while these properties are often presented as average values for a large area, one might encounter different conditions on a more localized level. Determination of these properties for a given aquifer may be based on lithologic or geophysical observations, laboratory testing, or aquifer tests with varying degrees of accuracy.

Porosity

The ratio of voids in a rock or sediment to the total volume of material is referred to as porosity and is a measure of the amount of groundwater that may be stored in the material. Figure 12 gives several examples of the types of porosity encountered in sediments and rocks. Porosity is usually expressed as a percentage and can be classified as either primary or secondary. Primary porosity refers to the voids present when the sediment or rock was initially formed. Secondary porosity refers to voids formed through fracturing or weathering of a rock or sediment after it was formed. In sediments, porosity is a function of the uniformity of grain size (sorting) and shape. Finer-grained sediments tend to have a higher porosity than coarser sediments because the finer-grained sediments generally have greater uniformity of size and because of the tabular shape and surface chemistry properties of clay particles. In crystalline rocks, porosity becomes greater with a higher degree of fracturing or weathering. As alluvial sediments become consolidated, primary porosity generally decreases due to compaction and cementation, and secondary porosity may increase as the consolidated rock is subjected to stresses that cause fracturing.

Porosity does not tell the entire story about the availability of groundwater in the subsurface. The pore spaces must also interconnect and be large enough so that water can move through the ground to be extracted from a well or discharged to a water body. The term "effective porosity" refers to the degree of interconnectedness of pore spaces. For coarse sediments, such as the sand and gravel encountered in California's alluvial groundwater basins, the effective porosity is often nearly equal to the overall porosity. In finer sediments, effective porosity may be low due to water that is tightly held in small pores. Effective porosity is generally very low in crystalline rocks that are not highly fractured or weathered.

While porosity measures the total amount of water that may be contained in void spaces, there are two related properties that are important to consider: specific yield and specific retention. Specific yield is the fractional amount of water that would drain freely from rocks or sediments due to gravity and describes the portion of the groundwater that could actually be available for extraction. The portion of groundwater that is retained either as a film on grains or in small pore spaces is called specific retention. Specific yield and specific retention of the aquifer material together equal porosity. Specific retention increases with decreasing

grain size. Table 7 shows that clays, while having among the highest porosities, make poor sources of groundwater because they yield very little water. Sand and gravel, having much lower porosity than clay, make excellent sources of groundwater because of the high specific yield, which allows the groundwater to flow to wells. Rocks such as limestone and basalt yield significant quantities of groundwater if they are well-weathered and highly fractured.

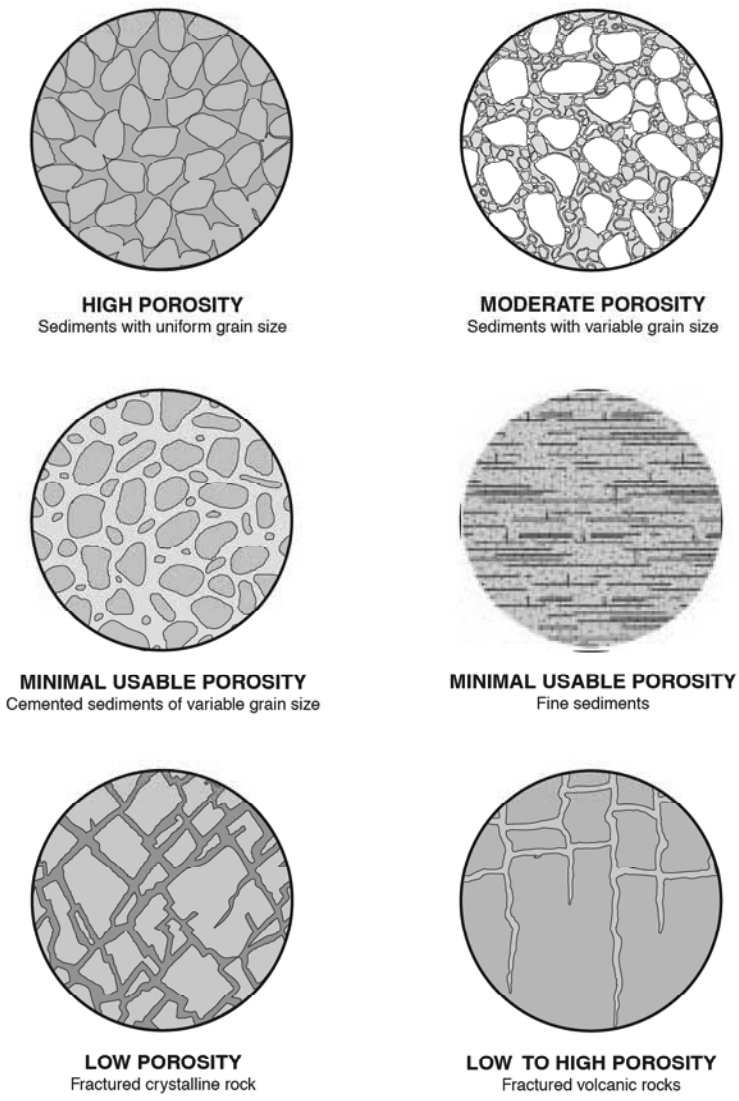


Figure 12 Examples of porosity in sediments and rocks

Table 7 Porosity (in percent) of soil and rock types

Material	Porosity	Specific yield	Specific retention
Clay	50	2	48
Sand	25	22	2
Gravel	20	19	1
Limestone	20	18	2
Sandstone (semiconsolidated)	11	6	5
Granite	0.1	0.09	0.01
Basalt (young)	11	8	3

Modified from Heath (1983)

Hydraulic Conductivity

Another major property related to understanding water movement in the subsurface is hydraulic conductivity. Hydraulic conductivity is a measure of a rock or sediment's ability to transmit water and is often used interchangeably with the term permeability. The size, shape, and interconnectedness of pore spaces affect hydraulic conductivity (Driscoll 1986).

Hydraulic conductivity is usually expressed in units of length/time: feet/day, meters/day, or gallons/day/square-foot. Hydraulic conductivity values in rocks range over many orders of magnitude from a low permeability unfractured crystalline rock at about 10^{-8} feet/day to a highly permeable well-sorted gravel at greater than 10^{4} feet/day (Heath 1983). Clays have low permeability, ranging from about 10^{-3} to 10^{-7} feet/day (Heath 1983). Figure 13 shows hydraulic conductivity ranges of selected rocks and sediments.

Transmissivity

Transmissivity is a measure of the aquifer's ability to transmit groundwater through its entire saturated thickness and relates closely to the potential yield of wells. Transmissivity is defined as the product of the hydraulic conductivity and the saturated thickness of the aquifer. It is an important property to understand because a given area could have a high value of hydraulic conductivity but a small saturated thickness, resulting in limited overall yield of groundwater.

Aquifer

An aquifer is a body of rock or sediment that yields significant amounts of groundwater to wells or springs. In many definitions, the word "significant" is replaced by "economic." Of course, either term is a matter of perspective, which has led to disagreement about what constitutes an aquifer. As discussed previously, coarse-grained sediments such as sands and gravels deposited in alluvial or marine environments tend to function as the primary aquifers in California. These alluvial aquifers are the focus of this report. Other aquifers, such as those found in volcanics, igneous intrusive rocks, and carbonate rocks are described briefly in the section Groundwater Source Areas.

Aquitard

An aquitard is a body of rock or sediment that is typically capable of storing groundwater but does not yield it in significant or economic quantities. Fine-grained sediments with low hydraulic conductivity, such as clays and silts, often function as aquitards. Aquitards are often referred to as confining layers because they retard the vertical movement of groundwater and under the right hydrogeologic conditions confine groundwater that is under pressure. Aquitards are capable of transmitting enough water to allow some flow between adjacent aquifers, and depending on the magnitude of this transfer of water, may be referred to as leaky aquitards.

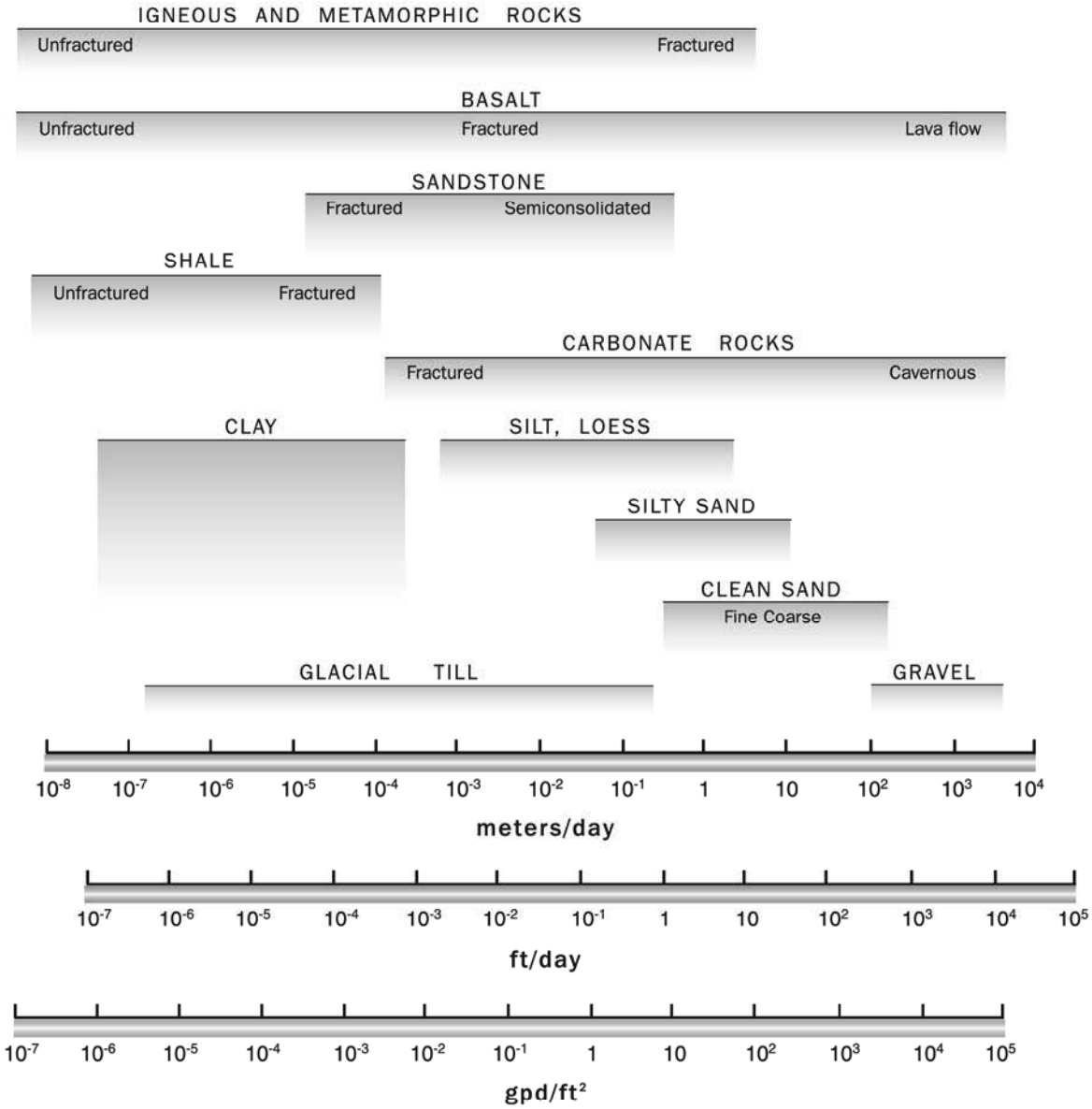


Figure 13 Hydraulic conductivity ranges of selected rocks and sediments

Unconfined and Confined Aquifers

In most depositional environments, coarser-grained deposits are interbedded with finer-grained deposits creating a series of aquifers and aquitards. When a saturated aquifer is bounded on top by an aquitard (also known as a confining layer), the aquifer is called a confined aquifer (Figure 14). Under these conditions, the water is under pressure so that it will rise above the top of the aquifer if the aquitard is penetrated by a well. The elevation to which the water rises is known as the potentiometric surface. Where an aquifer is not bounded on top by an aquitard, the aquifer is said to be unconfined. In an unconfined aquifer, the pressure on the top surface of the groundwater is equal to that of the atmosphere. This surface is known as the water table, so unconfined aquifers are often referred to as water table aquifers. The arrangement of aquifers and aquitards in the subsurface is referred to as hydrostratigraphy.

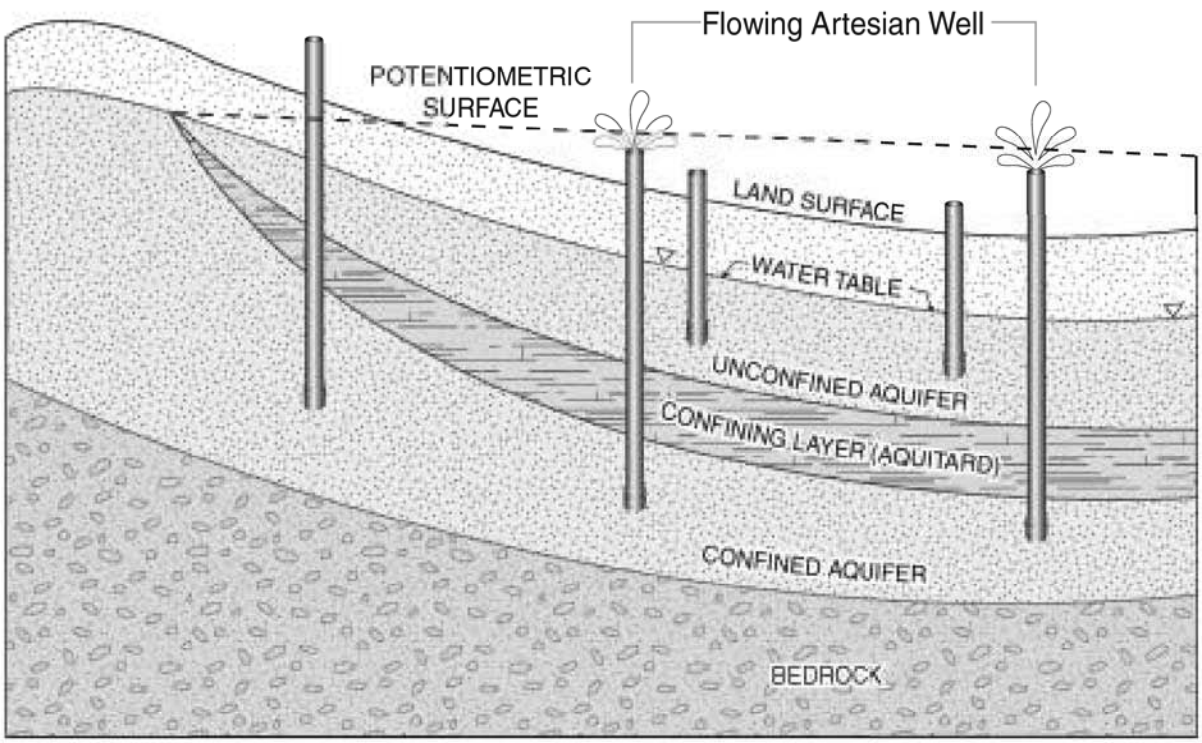


Figure 14 Interbedded aquifers with confined and unconfined conditions

With the notable exception of the Corcoran Clay of the Tulare Formation in the San Joaquin Valley and the aquitard in West Coast Basin in Los Angeles County, there are no clearly recognizable regional aquitards in California alluvial basins. Instead, due to the complexity of alluvial environments, it is the cumulative effect of multiple thin lenses of fine-grained sediments that causes increasing confinement of groundwater with increasing depth, creating what is often referred to as a semiconfined aquifer.

In some confined aquifers groundwater appears to defy gravity, but that is not the case. When a well penetrates a confined aquifer with a potentiometric surface that is higher than land surface, water will flow naturally to the surface. This is known as artesian flow, and results from pressure within the aquifer. The pressure results when the recharge area for the aquifer is at a higher elevation than the point at which discharge is occurring (Figure 14). The confining layer prevents the groundwater from returning to the surface until the confining layer is penetrated by a well. Artesian flow will discontinue as pressure in the aquifer is reduced and the potentiometric surface drops below the land surface elevation.

Groundwater Basin

A groundwater basin is defined as an alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and a definable bottom. Lateral boundaries are features that significantly impede groundwater flow such as rock or sediments with very low permeability or a geologic structure such as a fault. Bottom boundaries would include rock or sediments of very low permeability if no aquifers occur below those sediments within the basin. In some cases, such as in the San Joaquin and Sacramento Valleys, the base of fresh water is considered the bottom of the groundwater basin. Table 8 is a generalized list of basin types and the features that define the basin boundaries.

Table 8 Types and boundary characteristics of groundwater basins

Characteristics of groundwater basins	
Groundwater basin	An aquifer or an aquifer system that is bounded laterally and at depth by one or more of the following features that affect groundwater flow: • Rocks or sediments of lower permeability • A geologic structure, such as a fault • Hydrologic features, such as a stream, lake, ocean, or groundwater divide
Types of basins and their boundaries	
Single simple basin	Basin surrounded on all sides by less permeable rock. Higher permeability near the periphery. Clays near the center. Unconfined around the periphery. Confined near the center. May have artesian flow near the center.
Basin open at one or more places to other basins	Many desert basins. Merged alluvial fans. Topographic ridges on fans. Includes some fault-bounded basins.
Basin open to Pacific Ocean	260 basins along the coast. Water-bearing materials extend offshore. May be in contact with sea water. Vulnerable to seawater intrusion.
Single complex basin	Basin underlain or surrounded by older water-bearing materials and water-bearing volcanics. Quantification is difficult because of unknown contacts between different rock types within the basin.
Groundwater in areas of volcanic rocks	Basin concept is less applicable in volcanic rocks. Volcanic rocks are highly variable in permeability.
Groundwater in weathered crystalline rocks (fractured hard rock)—not considered a basin	Small quantities of groundwater. Low yielding wells. Most wells are completed in the crystalline rock and rely on fractures to obtain groundwater.
Political boundaries or management area boundaries	Usually not related to hydrogeologic boundaries.Formed for convenience, usually to manage surface water storage and delivery.

Although only the upper surface of a groundwater basin can be shown on a map, the basin is three-dimensional and includes all subsurface fresh water-bearing material. These boundaries often do not extend straight down, but are dependent on the spatial distribution of geologic materials in the subsurface. In fact, in a few cases near California's coastal areas, aquifers in the subsurface are known to extend beyond the mapped surface of the basin and may actually be exposed under the ocean. Under natural conditions, fresh water flows from these aquifers into the ocean. If groundwater levels are lowered, sea water may flow into the aquifer. This has occurred in Los Angeles, Orange, Ventura, Santa Cruz and Monterey Counties, and some areas around San Francisco Bay. Depiction of a groundwater basin in three dimensions requires extensive subsurface investigation and data evaluation to delineate the basin geometry. Figure 15 is a cross-section showing how a coastal basin might appear in the subsurface.

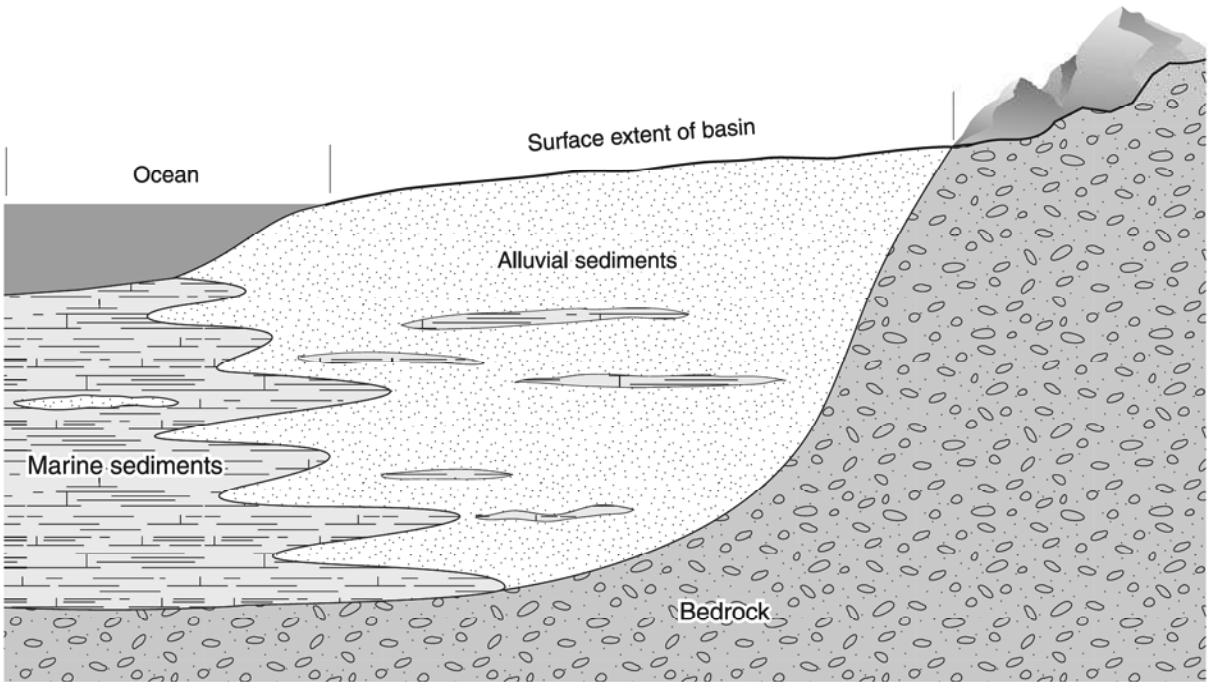


Figure 15 Groundwater basin near the coast with the aquifer extending beyond the surface basin boundary

Groundwater basin and subbasin boundaries shown on the map included with this bulletin are based on evaluation of the best available information. In basins where many studies have been completed and the basin has been operated for a number of years, the basin response is fairly well understood and the boundaries are fairly well defined. Even in these basins, however, there are many unknowns and changes in boundaries may result as more information about the basin is collected and evaluated. In many other basins where much less is known and understood about the basin, boundaries will probably change as a better understanding of the basin is developed. A procedure for collecting information from all the stakeholders should be developed for use statewide so that agreement on basin boundaries can be achieved.

Groundwater Subbasin

A subbasin is created by dividing a groundwater basin into smaller units using geologic and hydrologic barriers or, more commonly, institutional boundaries (see Table 8). These subbasins are created for the purpose of collecting and analyzing data, managing water resources, and managing adjudicated basins. As the definition implies, the designation of a subbasin boundary is flexible and could change in the future. The limiting rule for a subbasin is that it should not cross over a groundwater basin boundary.

An example of a hydrologic subbasin boundary would be a river or stream that creates a groundwater divide. While hydrologic boundaries may limit groundwater flow in the shallow subsurface, data indicate significant groundwater flow may occur across the boundary at greater depths. In addition, the location of the boundary may change over time if pumping or recharge patterns change. Institutional subbasin boundaries could be based on a political boundary, such as a county line or a water agency service area, or a legally mandated boundary such as a court adjudicated basin.

Groundwater Source Areas

Groundwater in California is also found outside of alluvial groundwater basins. Igneous extrusive (volcanic), igneous intrusive, metamorphic, and sedimentary rocks are all potential sources of groundwater. These rocks often supply enough water for domestic use, but in some cases can also yield substantial quantities. In this report the term groundwater source area is used for rocks that are significant in terms of being a local groundwater source, but do not fit the category of basin or subbasin. The term is not intended to imply that groundwater actually originates in these rocks, but that it is withdrawn from rocks underlying a generally definable area. Because of the increased difficulty in defining and understanding the hydrogeologic properties of these rocks, the limited data available for the areas in which these rocks occur, and the relatively small, though rapidly growing, segment of the population served by these water supplies, they are discussed separately from groundwater basins.

Volcanics

Groundwater in volcanics can occur in fractures that result from cooling or changes in stress in the crust of the Earth, lava tubes, tree molds, weathering surfaces, and porous tuff beds. Additionally, the volcanics could overlie other deposits from an alluvial environment. Flow in the fractures may approach the same velocities as that of surface water, but there is often very limited storage potential for groundwater. The tuff beds can act similarly to alluvial aquifers.

Some of the most productive volcanic rocks in the State include the Modoc Plateau volcanics in the northeast and the Napa-Sonoma volcanics northeast of San Francisco Bay (Figure 16). Wells in Modoc Plateau volcanics are commonly reported to yield between 100 and 1,000 gallons per minute, with some yields of 4,000 gpm (Planert and Williams 1995). Bulletin 118-75 assigned identification numbers to these volcanic rocks throughout the State (for example, Modoc Plateau Recent Volcanic Areas, 1-23). The numbers led some to interpret them as being groundwater basins. In this update, the numbers corresponding to the volcanics are being retired to eliminate this confusion.

Figure 16 Significant volcanic groundwater source areas

Igneous Intrusive, Metamorphic, and Sedimentary Rocks

Groundwater in igneous intrusive, metamorphic, and consolidated sedimentary rocks occurs in fractures resulting from tectonism and expansion of the rock as overburden pressures are relieved. Groundwater is extracted from fractured rock in many of the mountainous areas of the State, such as the Sierra Nevada, the Peninsular Range, and the Coast Ranges. Rocks in these areas often yield only enough supply for individual domestic wells, stock water wells, or small community water systems. Availability of groundwater in such formations can vary widely, even over a distance of a few yards. Areas of groundwater production from consolidated rocks were not defined in previous versions of Bulletin 118 and are not included in this update.

As population grows in areas underlain by these rocks, such as the foothills of the Sierra Nevada and southern California mountains, many new wells are being built in fractured rock. However, groundwater data are often insufficient to accurately estimate the long term reliability of groundwater supplies in these areas. Additional investigation, data evaluation, and management will be needed to ensure future sustainable supplies. The Legislature recognized both the complexity of these areas and the need for management in SB 1938 (2002), which amended the Water Code to require groundwater management plans with specific components be adopted for agencies to be eligible for certain funding administered by DWR for construction of groundwater projects. Water Code section 10753.7(a)(5) states:

> Local agencies that are located in areas outside the groundwater basins delineated on the latest edition of the department's groundwater basin and subbasin map shall prepare groundwater management plans incorporating the components in this subdivision, and shall use geologic and hydrologic principles appropriate to those areas.

In carbonate sedimentary rocks such as limestone, groundwater occurs in fractures and cavities formed as a result of dissolution of the rock. Flow in the largest fractures may approach the velocities of surface water, but where these rocks occur in California there is limited storage potential for groundwater. Carbonate rocks occur mostly in Inyo County near the Nevada border (USGS 1995), in the Sierra Nevada foothills, and in some parts of the Sacramento River drainage north of Redding. The carbonates near the Nevada state border in Inyo County are part of a regional aquifer that extends northeastward into Nevada. Springs in Nevada and in the Death Valley region in California are dependent on groundwater flow in this regional aquifer. In other parts of the country, such as Florida, carbonate rocks constitute significant sources of groundwater.

Movement of Groundwater

The movement of groundwater in the subsurface is quite complex, but in simple terms it can be described as being driven by potential energy. At any point in the saturated subsurface, groundwater has a hydraulic head value that describes its potential energy, which is the combination of its elevation and pressure. In an unconfined aquifer, the water table elevation represents the hydraulic head, while in a confined aquifer the potentiometric surface represents the hydraulic head (Figure 14). Water moves in response to the difference in hydraulic head from the point of highest energy toward the lowest. On a regional scale this results in flow of groundwater from recharge areas to discharge areas. In California, pumping depressions around extraction wells often create the discharge points to which groundwater flows. Groundwater may naturally exit the subsurface by flowing into a stream, lake, or ocean, by flowing to the surface as a spring or seep, or by being transpired by plants.

The rate at which groundwater flows is dependent on the hydraulic conductivity and the rate of change of hydraulic head over some distance. In the mid-19th century, Henry Darcy found through his experiments on sand filters that the amount of flow through a porous medium is directly proportional to the difference

between hydraulic head values and inversely proportional to the horizontal distance between them (Fetter 1988). His conclusions extend to flow through aquifer materials. The difference between hydraulic heads divided by the distance between them is referred to as the hydraulic gradient. When combined with the hydraulic conductivity of the porous medium and the cross-sectional area through which the groundwater flows, Darcy's law states:

$$Q = KA(dh/dl) \quad \text{(volume/time)}$$

Where:

Q = flow discharging through a porous medium
K = hydraulic conductivity (length/time)
A = cross-sectional area (length^2)
dh = change in hydraulic head between two points (length)
dl = distance between two points (length)

This version of Darcy's law provides a volumetric flow rate. To calculate the average linear velocity at which the water flows, the result is divided by the effective porosity. The rate of movement of groundwater is very slow, usually less than 1,000 feet per year because of the great amount of friction resulting from movement through the spaces between grains of sand and gravel.

Quantity of Groundwater

Because groundwater is a precious resource, the questions of how much there is and how more can be made available are important. There are many terms and concepts associated with the quantity of groundwater available in a basin, and some controversy surrounding their definition. Some of these include groundwater storage capacity, usable storage capacity, groundwater budget, change in storage, overdraft, and safe yield. This section discusses some of the more common terms used to represent groundwater quantity in California.

Groundwater Storage Capacity

The groundwater storage capacity of an individual basin or within the entire State is one of the questions most frequently asked by private citizens, water resource planners, and politicians alike. Total storage capacity seems easy to understand. It can be seen as how much physical space is available for storing groundwater. The computation of groundwater storage capacity is quite simple if data are available: capacity is determined by multiplying the total volume of a basin by the average specific yield. The total storage capacity is constant and is dependent on the geometry and hydrogeologic characteristics of the aquifer(s) (Figure 17).

Estimates of total groundwater storage capacity in California are staggering. Previous estimates of total storage range from 850 million acre-feet (maf) to 1.3 billion acre-feet (DWR 1975, DWR 1994). However, due to incomplete information about many of the groundwater basins, there has never been an accurately quantified calculation of total storage capacity statewide. Even if such a calculation were possible, the utility of such a number is questionable because total storage capacity might lead to overly optimistic estimates of how much additional groundwater development can contribute to meeting future demands.

Total groundwater storage capacity is misleading because it only takes into account one aspect of the physical character of the basin. Many other factors limit the ultimate development potential of a groundwater basin. These limiting factors may be physical, chemical, economic, environmental, legal, and institutional (Table 9). Some of these factors, such as the economic and institutional ones, can change with time. However, there may remain significant physical and chemical constraints that will limit groundwater development.

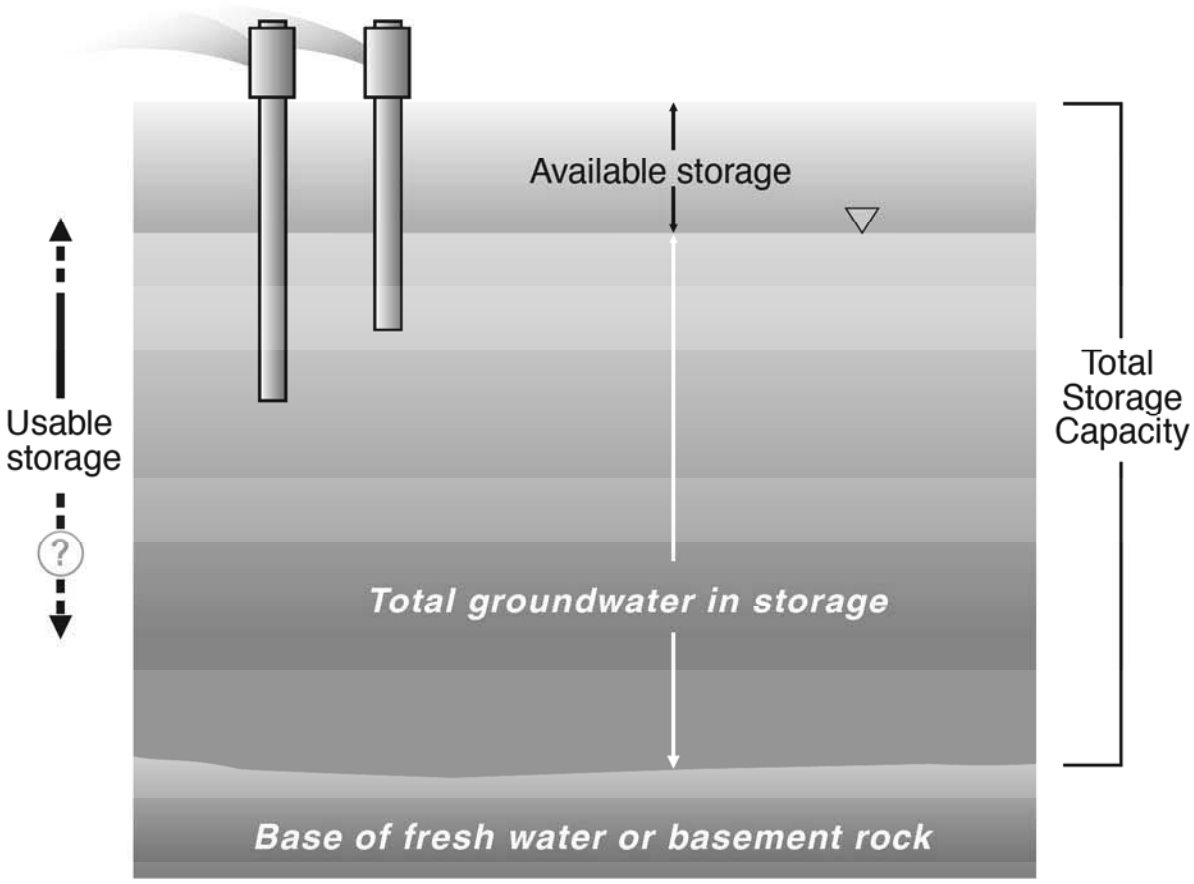


Figure 17 Schematic of total, usable, and available groundwater storage capacity

Table 9 Examples of factors that limit development of a groundwater basin

Limiting factor	Examples
Physical	Basin recharge area not adequate to sustain development; pumping too concentrated in a portion of basin; well yields too low for intended use.
Quality	Water quality not suitable for intended use; increased potential for seawater intrusion in coastal areas; upwelling of poorer quality water in deeper parts of basin.
Economic	Excessive costs associated with increased pump lifts and deepening of wells; cost of treating water if it does meet requirements for intended use.
Environmental	Need to maintain groundwater levels for wetlands, stream base flow, or other habitat.
Institutional	Local groundwater management plans or ordinances restricting use; basin adjudication; impacts on surface water rights of others.

Usable Groundwater Storage Capacity

Usable storage capacity is defined as the amount of groundwater of suitable quality that can be economically withdrawn from storage. It is typically computed as the product of the volume of the basin to some basin-specific depth that is considered economically available and the average specific yield of the basin (see Figure 17).

As more groundwater is extracted, groundwater levels may fall below some existing wells, which may then require replacement or deepening. This may be a consideration in management of the basin and will depend on the cost of replacement, the cost of pumping the water from deeper zones, and whether managers are willing to pay that cost. Other impacts that may increase the cost include subsidence and groundwater quality degradation. The usable storage may change because of changes in economic conditions.

Estimates of usable storage represent only the total volume of groundwater assumed to be usable in storage, not what would be available for sustained use on an annual basis. Previous estimates of usable groundwater storage capacity range from 143 to 450 maf (DWR 1975, DWR 1994). Unfortunately, the term "usable storage" is often used to indicate the amount of water that can be used from a basin as a source of long-term annual supply. However, the many limitations associated with total groundwater storage capacity discussed above may also apply to usable storage.

Available Groundwater Storage Capacity

Available storage capacity is defined as the volume of a basin that is unsaturated and capable of storing additional groundwater. It is typically computed as the product of the empty volume of the basin and the average specific yield of the unsaturated part of the basin (see Figure 17). The available storage capacity does not include the uppermost portion of the unsaturated zone in which saturation could cause problems such as crop root damage or increased liquefaction potential. The available storage will vary depending on the amount of groundwater taken out of storage and the recharge. The total groundwater in storage will change inversely as the available storage changes.

Available storage has often been used as a number to represent the potential for additional yield from a particular basin. Unfortunately, many of the limitations that exist in developing existing supply discussed above also limit taking advantage of available storage. Although limitations exist, looking only at available groundwater storage capacity may underestimate the potential for groundwater development. Opportunities to use groundwater already in storage and create additional storage space would be overlooked by this approach.

Groundwater Budget

A groundwater budget is an analysis of a groundwater basin's inflows and outflows to determine the change in groundwater storage. Alternatively, if the change in storage is known, the value of one of the inflows or outflows could be determined. The basic equation can be expressed as:

INFLOWS – OUTFLOWS = CHANGE IN STORAGE

Typical inflows include:

- natural recharge from precipitation;
- seepage from surface water channels;
- intentional recharge via ponds, ditches, and injection wells;
- net recharge of applied water for agricultural and other irrigation uses;
- unintentional recharge from leaky conveyance pipelines; and
- subsurface inflows from outside basin boundaries.

Outflows include:

- groundwater extraction by wells;
- groundwater discharge to surface water bodies and springs;
- evapotranspiration; and
- subsurface outflow across basin or subbasin boundaries.

Groundwater budgets can be useful tools to understand a basin, but detailed budgets are not available for most groundwater basins in California. A detailed knowledge of each budget component is necessary to obtain a good approximation of the change in storage. Absence or inaccuracy of one or more parameters can lead to an analysis that varies widely from a positive to a negative change in storage or vice versa. Since much of the data needed requires subsurface exploration and monitoring over a series of years, the collection of detailed field data is time-consuming and expensive. A management plan should develop a monitoring program as soon as possible.

Change in Groundwater Storage

As stated above, a groundwater budget is one potential way of estimating the change in storage in a basin, although it is limited by the accuracy and availability of data. There is a simpler way—by determining the average change in groundwater elevation over the basin, multiplied by the area overlying the basin and the average specific yield (or storativity in the case of a confined aquifer). The time interval over which the groundwater elevation change is determined is study specific, but annual spring-to-spring changes are commonly used. A change in storage calculation does not attempt to determine the volume of water in storage at any time interval, but rather the change from a previous period or baseline condition.

A change in storage calculation is a relatively quick way to represent trends in a basin over time. If change in storage is negligible over a representative period, the basin is in equilibrium under current use. Changes in storage calculations are more often available for a groundwater basin than groundwater budgets because water level measurements are available in many basins. Specific yield and storativity are readily estimated based on knowledge of the hydrogeologic setting and geologic materials or through aquifer pumping tests. Although simple, change in storage calculations have potential sources of error, so it is important to treat change in storage as just one of many tools in determining conditions in a groundwater basin. Well data sets must be carefully evaluated before use in these calculations. Mixing of wells constructed in confined and unconfined portions of the basin and measurement of different well sets over time can result in significant errors.

Although the change in storage calculation is a relatively quick and inexpensive method of observing changes in the groundwater system, the full groundwater budget is preferable. A detailed budget describes an understanding of the physical processes affecting storage in the basin, which the simple change in storage calculation does not. For example, the budget takes into account the relationship between the surface water and the groundwater system. If additional groundwater extraction induced additional infiltration of surface water, the calculated change in storage could be minimal. However, if the surface water is used as a source of supply downstream, the impact of reduced flows could be significant.

Overdraft

Groundwater overdraft is defined as the condition of a groundwater basin or subbasin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years, during which the water supply conditions approximate average conditions (DWR 1998). Overdraft can be characterized by groundwater levels that decline over a period of years and never fully recover, even in wet years. If overdraft continues for a number of years, significant adverse impacts may occur, including increased extraction costs, costs of well deepening or replacement, land subsidence, water quality degradation, and environmental impacts.

Despite its common usage, the term overdraft has been the subject of debate for many years. Groundwater management is a local responsibility, therefore, the decision whether a basin is in a condition of overdraft is the responsibility of the local groundwater or water management agency. In some cases local agencies may choose to deliberately extract groundwater in excess of recharge in a basin (known as "groundwater mining") as part of an overall management strategy. An independent analysis of water levels in such a basin might conclude that the basin is in overdraft. In other cases, where basin management is less active or nonexistent, declining groundwater levels are not considered a problem until levels drop below the depth of many wells in the basin. As a result, overdraft may not be reported for many years after the condition began.

Water quality changes and subsidence may also indicate that a basin has been overdrafted. For example, when groundwater levels decline in coastal aquifers, seawater fills the pore spaces in the aquifer that are vacated by the groundwater, indicating that the basin is being overdrafted. Overdraft has historically led to as much as 30 feet of land subsidence in one area of the State and lesser amounts in other areas.

The word "overdraft" has been used to designate two unrelated types of water shortages. The first is "historical overdraft" similar to the type illustrated in Figure 18, which shows that ground water levels began to decline in the mid 1950s and then leveled off in the mid 1980s, indicating less groundwater extraction or more recharge. The second type of shortage is "projected overdraft" as used in the *California Water Plan Update* (DWR 1998). In reality, this is an estimate of future water shortages based on an assumed management program within the basin, including projected supply and projected demand. If water management practices change in those basins in which a water shortage is projected, the amount of projected shortage will change.

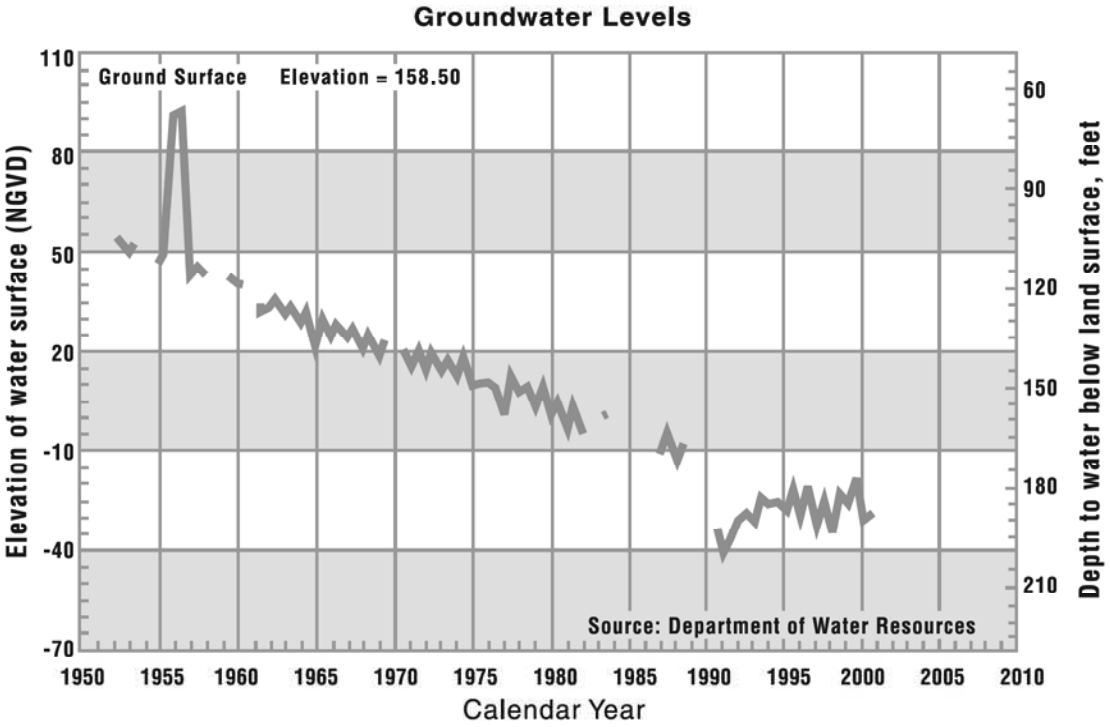


Figure 18 Hydrograph Indicating Overdraft

In some basins or subbasins, groundwater levels declined steadily over a number of years as agricultural or urban use of groundwater increased. In response, managing agencies developed surface water import projects to provide expanded water supplies to alleviate the declining groundwater levels. Increasing groundwater levels, or refilling of the aquifer, demonstrate the effectiveness of this approach in long-term water supply planning. In some areas of the State, the past overdraft is now being used to advantage. When the groundwater storage capacity that is created through historical overdraft is used in coordination with surface water supplies in a conjunctive management program, local and regional water supplies can be augmented.

In 1978 DWR was directed by the legislature to develop a definition of critical overdraft and to identify basins that were in a condition of critical overdraft (Water Code § 12924). The process that was followed and the basins that were deemed to be in a condition of critical overdraft are discussed in Box O, "Critical Conditions of Overdraft." This update to Bulletin 118 did not include similar direction from the legislature, nor funding to undertake evaluation of the State's groundwater basins to determine whether they are in a state of overdraft.

Box O Critical Conditions of Overdraft

In 1978 DWR was directed by the legislature to develop a definition of critical overdraft and to identify those basins in a critical condition of overdraft (Water Code §12924). DWR held public workshops around the state to obtain public and water managers' input on what the definition should include, and which basins were critically overdrafted. Bulletin 118-80, *Ground Water Basins in California* was published in 1980 with the results of that local input. The definition of critical overdraft is:

> *A basin is subject to critical conditions of overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts.*

No time is specified in the definition. Definition of the time frame is the responsibility of the local water managers, as is the definition of significant adverse impacts, which would be related to the local agency's management objectives.

Eleven basins were identified as being in a critical condition of overdraft. They are:

Pajaro Basin	Cuyama Valley Basin
Ventura Central Basin	Eastern San Joaquin County Basin
Chowchilla Basin	Madera Basin
Kings Basin	Kaweah Basin
Tulare Lake Basin	Tule Basin
Kern County Basin	

The task was not identified by the Legislature, nor was the funding for this update (2003) sufficient to consult with local water managers and fully re-evaluate the conditions of the 11 critically overdrafted basins. Funding and duration were not sufficient to evaluate additional basins with respect to conditions of critical overdraft.

If a basin lacks existing information, the cost of a thorough evaluation of overdraft conditions in a single basin could exceed $1 million. In this update of Bulletin 118, DWR has included groundwater budget information for each basin description, where available. In most cases, however, sufficient quantitative information is not available, so conditions of overdraft or critical overdraft were not reported.

While this bulletin does not specifically identify overdrafted basins (other than the 11 basins from Bulletin 118-80), the negative effects of overdraft are occurring or may occur in the future in many basins throughout the State. Declining water levels, diminishing water quality, and subsidence threaten the availability of groundwater to meet current and future demands. A thorough understanding of overdraft can help local groundwater managers minimize the impacts and take advantage of the opportunity created by available groundwater storage capacity. Local groundwater managers and DWR should seek funding and work cooperatively to evaluate the groundwater basins of the State with respect to overdraft and its potential impacts. Beginning with the most heavily used basins and relying to the extent possible on available data collected by DWR and through local groundwater management programs, current or projected conditions of critical overdraft should be identified. If local agencies take the lead in collecting and analyzing data to fully understand groundwater basin conditions, DWR can use the information to update the designations of critically overdrafted basins. This can be a cost effective approach since much of the data needed to update the overdraft designations are the same data that agencies need to effectively manage groundwater.

Safe Yield

Safe yield is defined as the amount of groundwater that can be continuously withdrawn from a basin without adverse impact. Safe yield is commonly expressed in terms of acre-feet per year. Depending on how it is applied, safe yield may be an annual average value, or may be calculated based on changed conditions each year. Although safe yield may be indicated by stable groundwater levels measured over a period of years, a detailed groundwater budget is needed to accurately estimate safe yield. Safe yield has commonly been determined in groundwater basin adjudications.

Proper application of the safe yield concept requires that the value be modified through time to reflect changing practices within the basin. One of the common misconceptions is that safe yield is a static number. That is, once it has been calculated, the amount of water can be extracted annually from the basin without any adverse impacts. An example of a situation in which this assumption could be problematic is when land use changes. In some areas, where urban development has replaced agriculture, surface pavement, storm drains, and sewers have increased runoff and dramatically reduced recharge into the basin. If extraction continued at the predetermined safe yield of the basin, water level decline and other negative impacts could occur.

Figure 19 Photograph of extensometer

An extensometer is a well with a concrete bench mark at the bottom. A pipe extends from the concrete to the land surface. If compaction of the finer sediments occurs, leading to land surface subsidence, the pipe in the well will appear to rise out of the well casing. When this movement is recorded, the data show how much the land surface has subsided.

Subsidence

When groundwater is extracted from some aquifers in sufficient quantity, compaction of the fine-grained sediments can cause subsidence of the land surface. As the groundwater level is lowered, water pressure decreases and more of the weight of the overlying sediments is supported by the sediment grains within the aquifer. If these sediments have not previously been surcharged with an equivalent load, the overlying load will compact them. Compaction decreases the porosity of the sediments and decreases the overall volume of the finer grain sediments, leading to subsidence at the land surface. While the finer sediments within the aquifer system are compacted, the usable storage capacity of the aquifer is not greatly decreased.

Data from extensometers (Figure 19) show that as groundwater levels decline in an aquifer, the land surface falls slightly. As groundwater levels rise, the land surface also rises to its original position. This component of subsidence is called elastic subsidence because it recovers. Inelastic subsidence, the second component of subsidence, is what occurs when groundwater levels decline to the point that the finer sediments are compacted. This compaction is not recoverable.

Conjunctive Management

Conjunctive management in its broadest definition is the coordinated and combined use of surface water and groundwater to increase the overall water supply of a region and improve the reliability of that supply. Conjunctive management may be implemented to meet other objectives as well, including reducing groundwater overdraft and land subsidence, protecting water quality, and improving environmental conditions. Although surface water and groundwater are sometimes considered to be separate resources, they are connected in the hydrologic cycle. By using or storing additional surface water when it is plentiful, and relying more heavily on groundwater during dry periods, conjunctive management can change the timing and location of water so it can be used more efficiently.

Although a specific project or program may be extremely complex, there are several components common to conjunctive management projects. The first is to recharge surplus surface water when it is available to increase groundwater in storage. Recharge may occur through surface spreading, by injection wells, or by reducing groundwater use by substituting surface water. The surplus surface water used for recharge may be local runoff, imported water, stored surface water, or recycled water. The second component is to reduce surface water use in dry years or dry seasons by switching to groundwater. This use of the stored groundwater may take place through direct extraction and use, pumping back to a conveyance facility, or through exchange of another water supply. A final component that should be included is an ongoing monitoring program to evaluate operations and allow water managers to respond to changes in groundwater, surface water, or environmental conditions that could violate management objectives or impact other water users.

Quality of Groundwater

All water contains dissolved constituents. Even rainwater, often described as being naturally pure, contains measurable dissolved minerals and gases. As it moves through the hydrologic cycle, water dissolves and incorporates many constituents. These include naturally occurring and man-made constituents.

Most natural minerals are harmless up to certain levels. In some cases higher mineral content is preferable to consumers for taste. For example, minerals are added to many bottled drinking waters after going through a filtration process. At some level, however, most naturally occurring constituents, along with those introduced by human activities, are considered contaminants. The point at which a given constituent is considered a contaminant varies depending on the intended use of the groundwater and the toxicity level of the constituents.

Beneficial Uses

For this report, water quality is a measure of the suitability of water for its intended use, with respect to dissolved solids and gases and suspended material. An assessment of water quality should include the investigation of the presence and concentration of any individual constituent that may limit the water's suitability for an intended use.

The SWRCB has identified 23 categories of water uses, referred to as beneficial uses. The beneficial use categories and a brief description of each are presented in Appendix E. The actual criteria that are used to evaluate water quality for each of the beneficial uses are determined by the nine Regional Water Quality Control Boards, resulting in a range of criteria for some of the uses. These criteria are published in each of the Regional Boards' Water Quality Control Plans (Basin Plans)[1].

A summary of water quality for all of the beneficial uses of groundwater is beyond the scope of this report. Instead, water quality criteria for two of the most common uses—municipal supply (referred to as public drinking water supply in this report) and agricultural supply—are described below.

Public Drinking Water Supply

Standards for maximum contaminant levels (MCLs) of constituents in drinking water are required under the federal Safe Drinking Water Act of 1974 and its updates. There are primary and secondary standards. Primary standards are developed to protect public health and are legally enforceable. Secondary standards are generally for the protection of aesthetic qualities such as taste, odor, and appearance, and cosmetic qualities, such as skin or tooth discoloration, and are generally non-enforceable guidelines. However, in California secondary standards are legally enforceable for all new drinking water systems and new sources developed by existing public water suppliers (DWR 1997). Under these primary and secondary standards, the U.S. Environmental Protection Agency regulates more than 90 contaminants, and the California Department of Health Services regulates about 100. Federal and State primary MCLs are listed in Appendix F.

Agricultural Supply

An assessment of the suitability of groundwater as a source of agricultural supply is much less straightforward than that for public water supply. An evaluation of water supply suitability for use in agriculture is difficult because the impact of an individual constituent can vary depending on many factors, including soil chemical and physical properties, crop type, drainage, and irrigation method. Elevated levels of constituents usually do not result in an area being taken entirely out of production, but may lower crop yields. Management decisions will determine appropriate land use and irrigation methods.

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[1] Digital versions of these plans are available online at http://www.swrcb.ca.gov/plnspols/index.html

There are no regulatory standards for water applied on agriculture. Criteria for crop water have been provided as guidelines. Many constituents have the potential to negatively impact agriculture, including more than a dozen trace elements (Ayers and Westcot 1985). Two constituents that are commonly considered with respect to agricultural water quality are salinity—expressed as total dissolved solids (TDS)—and boron concentrations.

Increasing salinity in irrigation water inhibits plant growth by reducing a plant's ability to absorb water through its roots (Pratt and Suarez 1996). While the impact will depend on crop type and soil conditions, it is useful to look at the TDS of the applied water as a general assessment tool. A range of values for TDS with their estimated suitability for agricultural uses is presented in Table 10. These ranges are modified from criteria developed for use in the San Joaquin Valley by the San Joaquin Valley Drainage Program. However, they are similar to values presented in Ayers and Westcot (1985).

Table 10 Range of TDS values with estimated suitability for agricultural uses

Range of TDS (mg/L)	Suitability
<500	Generally no restrictions on use
500 – 1,250	Generally slight restrictions on use
1,250 – 2,500	Generally moderate restrictions on use
>2,500	Generally severe restrictions on use

Modified from SJVDP (1990)
TDS = total dissolved solids

High levels of boron can present toxicity problems in plants by damaging leaves. The boron is absorbed through the root system and transported to the leaves. Boron then accumulates during plant transpiration, resulting in leaf burn (Ayers and Westcot 1985). Boron toxicity is highly dependent on a crop's sensitivity to the constituent. A range of values of dissolved boron in irrigation water, with their estimated suitability on various crops is presented in Table 11. These ranges are modified from Ayers and Westcot (1985).

Table 11 Range of boron concentrations with estimated suitability on various crops

Range of dissolved boron (mg/L)	Suitability
<0.5	Suitable on all but most highly boron sensitive crops
0.5 – 1.0	Suitable on most boron sensitive crops
1.0 – 2.0	Suitable on most moderately boron sensitive crops
>2.0	Suitable for only moderately to highly boron tolerant crops

Source: Modified from Ayers and Westcot 1985

Contaminant Groups

Because there are so many potential individual constituents to evaluate, researchers have often summarized contaminants into groups depending on the purpose of the study. Recognizing that there are exceptions to any classification scheme, this update considered groups according to their common sources of contamination—those naturally occurring and those caused by human activities (anthropogenic). Each of these sources includes more than one contaminant group. A listing of the contaminant groups and the individual constituents belonging to those groups, summarized in this report, is included in Appendix F.

Naturally Occurring Sources

In this report, naturally occurring sources include three primary groups: (1) inorganic constituents with primary MCLs, (2) inorganic constituents with secondary MCLs, and (3) radiological constituents. Inorganics primarily include naturally occurring minerals such as arsenic or mercury, although human activities may certainly contribute to observed concentrations. Radiological constituents include primarily naturally occurring constituents such as radon, gross alpha, and uranium. Although radioactivity is not considered a significant contaminant statewide, it can be locally important, particularly in communities in the Sierra Nevada.

Anthropogenic Sources

Anthropogenic contaminants include pesticides, volatile organic compounds (VOCs), and nitrates. Pesticides and VOCs are often grouped together into an organic contaminant group. However, separating the two gives a general idea of which contaminants are primarily from agricultural activities (pesticides) and which are primarily from industrial activities (VOCs). One notable exception to the groupings is dibromochloropropane (DBCP). Even though this compound is a VOC, DBCP is a soil fumigant and is included with pesticides. Nitrates are a surprising anthropogenic class to some observers. Nitrogen is certainly a naturally occurring inorganic constituent. However, because most nitrates are associated with agriculture (see Box P, "Focused on Nitrates: Detailed Study of a Contaminant") and nitrates are among California's leading contaminants, it is appropriate to consider them separately from inorganics.

Box P Focused on Nitrates: Detailed Study of a Contaminant

Because water has so many potential uses, the study of water quality means different things to different people. Thomas Harter, a professor at the University of California at Davis, has chosen to focus on nitrates as one of his research interests. Harter's monitoring network consists of 79 wells on 5 dairies in the San Joaquin Valley.

A common result of dairy activities is the release of nitrogen into the surroundings, which changes to nitrate in groundwater. Nitrates are notorious for their role in interfering with oxygen transport in babies, a condition commonly referred to as "blue baby syndrome." Nitrates are also of interest because more public supply wells have been closed due to nitrate contamination than from any other contaminant (Bachman and others 1997).

Harter's study has focused on two primary activities. The first is a meticulous examination of nitrogen at the surface and nitrates in the uppermost 25 feet of the subsurface. This monitoring has been ongoing since 1993, and has shown that a significant amount of nitrate can reach shallow groundwater. The second focus of the study has been to change management practices to reduce the amount of nitrogen available to reach groundwater, along with continued monitoring. This has occurred since 1998. Results of the study are better management practices that significantly reduce the amount of nitrogen available to groundwater. This will help minimize the potential adverse impacts to groundwater quality from nitrates.

Chapter 7

Inventory of California's Groundwater Information

Chapter 7
Inventory of California's Groundwater Information

The groundwater information in this chapter summarizes the available information on statewide and regional groundwater issues. For more detailed information on specific groundwater basins see the supplement to this report that is available on the California Department of Water Resources (DWR) website, http://www.waterplan.water.ca.gov/groundwater/118index.htm. See Appendix A for information on accessing individual basin descriptions and the map delineating California's groundwater basins.

Statewide Groundwater Information

There is a large amount of data available for many of the State's most heavily developed groundwater basins. Conversely, there is relatively little data available on groundwater in the undeveloped areas. The information in this report is generally limited to a compilation of the information readily available to DWR staff and may not include the most up-to-date data generated by studies that have been completed recently by water management agencies. For this reason, the collection of additional, more recent data on groundwater basins should be continued and integrated into the basin descriptions. Statewide summaries are included below.

Groundwater Basins

There are currently 431 groundwater basins delineated, underlying about 40 percent of the surface area of the State. Of those, 24 basins are subdivided into a total of 108 subbasins, giving a total of 515 distinct groundwater systems described in this report (Figure 20). Basin delineation methods are described in Appendix G. Additionally, many of the subbasin boundaries were developed or modified with public input, but little physical data. These boundaries should not be considered as precisely defining a groundwater basin boundary; the determination of whether any particular area lies within a groundwater basin boundary should be determined only after detailed local study.

Groundwater basin and subbasin boundaries shown on the map included with this bulletin are based on evaluation of the best available information. In basins where many studies have been completed and the basin has been operated for a number of years, the basin response is fairly well understood and the boundaries are fairly well defined. Even in these basins, however, there are many unknowns and changes in boundaries may result as more information about the basin is collected and evaluated.

Groundwater Budgets

Rather than simply providing all groundwater budget data collected during this update, the budget information was classified into one of three categories indicating the relative level of detail of information available. These categories, types A, B, and C, are discussed in Box R, "Explanation of Groundwater Data Tables." A type A budget indicates that much of the information needed to characterize the groundwater budget for the basin or subbasin was available. DWR staff did not verify these type A budgets, so DWR cannot address the accuracy of the data provided by them. Type B indicates that enough data are available to estimate the groundwater extraction to meet local water use needs. This is useful in understanding the reliance of a particular area on groundwater. Type C indicates a low level of knowledge of any of the budget components for the area.

Figure 21 depicts where these type A, B, and C budgets occur. In general, there is a greater level of understanding (type A or B) in the more heavily developed areas in terms of groundwater use. These include the Central Valley and South Coast. The lowest level of knowledge of groundwater budget data is in the southeast desert area. A discussion of groundwater use in each region is included below.

Box Q How Does the Information in This Report Relate to the Recently Enacted Laws Senate Bill 221 and Senate Bill 610 (2002)?

Recently enacted legislation requires developers of certain new housing projects to demonstrate an available water supply for that development. If a part of that proposed water supply is groundwater, urban water suppliers must provide additional information on the availability of an adequate supply of groundwater to meet the projected demand and show that they have the legal right to extract that amount of groundwater. SB 610 (2002) amended the Water Code to require, among other things, the following information (Section 10631(b)(2)):

> *For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.*

The hydrogeologic information contained in the basin descriptions that supplement this update of Bulletin 118 includes only the information that was available in California Department of Water Resources (DWR) files through reference searches and through limited contact with local agencies. Local agencies may have conducted more recent studies that have generated additional information about water budgets and aquifer characteristics. Unless the agency notified DWR, or provided a copy of the recent reports to DWR staff, that recent information has not been included in the basin descriptions. Therefore, although SB 610 refers to groundwater basins identified as overdrafted in Bulletin 118, it would be prudent for local water suppliers to evaluate the potential for overdraft of any basin included as a part of a water supply assessment.

Persons interested in collecting groundwater information in accordance with the Water Code as amended by SB 221 and SB 610 may start with the information in Bulletin 118, but should follow up by consulting the references listed for each basin and contacting local water agencies to obtain any new information that is available. Otherwise, evaluation of available groundwater resources as mandated by SB 221 and SB 610 may not be using the most complete and recent information about water budgets and aquifer characteristics.

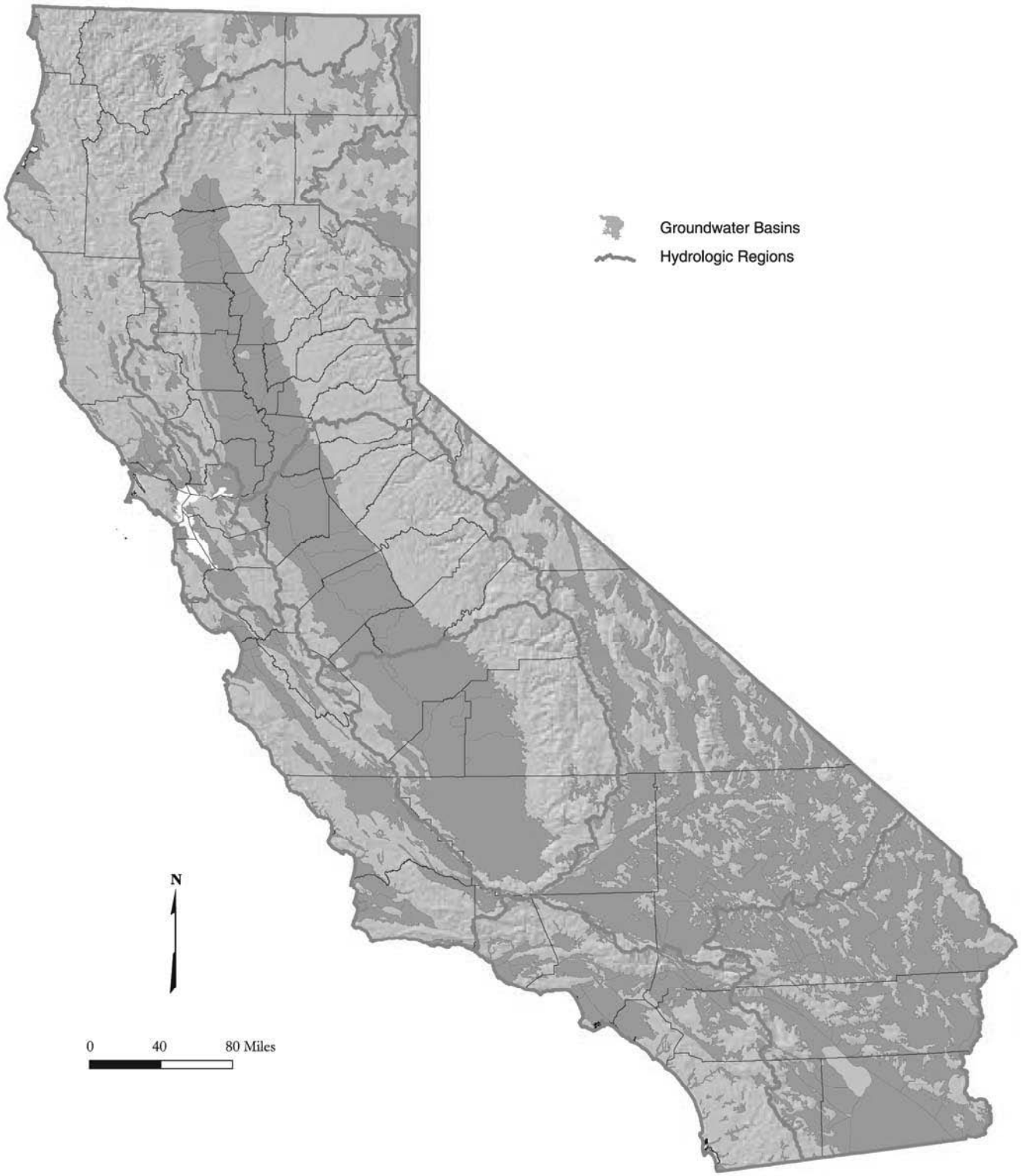

Figure 20 Groundwater basins and subbasins

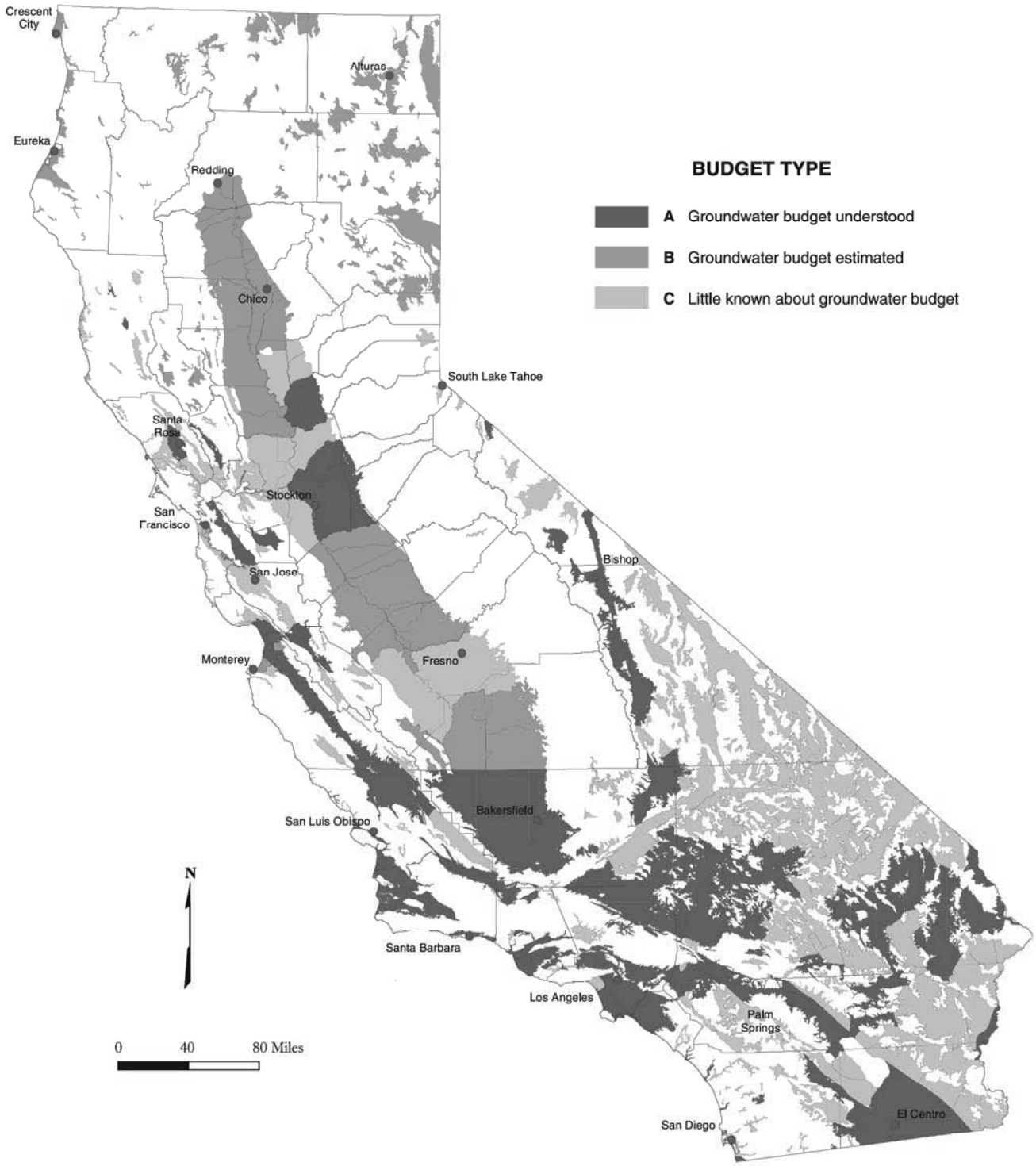

Figure 21 Basin and subbasin groundwater budget types

Box R Explanation of Groundwater Data Tables

A groundwater data table for each hydrologic region is included at the end of each hydrologic region section in Chapter 7. The tables include the following information:

Basin/Subbasin Number. The basin numbering format is x-xxx.xx. The first number in the sequence assigns the basin to one of the nine Regional Water Quality Control Board boundaries. The second number is the groundwater basin number. Any number following the decimal identifies that the groundwater basin has been further divided into subbasins. Reevaluation of available hydrogeologic information resulted in the deletion of some basins and subbasins identified in Bulletins 118-75 and 118-80. Because of this, there are some gaps in the sequence of basin numbers in this report. The methods used for developing the current groundwater basin maps are discussed in Appendix H. The names and numbers of the basins deleted, along with any comments related to their elimination are included in the appropriate region in Chapter 7. Previously unidentified groundwater basins or subbasins that were delineated during this update are assigned new identification numbers that sequentially follow the last number used in Bulletin 118-80 for groundwater basins or subbasins.

Basin or Subbasin Name. Basin names are based on published and unpublished reports, topographic maps, and local terminology. Names of more recently delineated basins or subbasins are based on the principal geographic feature, which in most cases corresponds to the name of a valley. In the case of a subbasin, its formal name should include the name of the basin (for example, Sacramento Valley Groundwater Basin, North American Subbasin). However, both locally and informally, the term subbasin is used interchangeably with basin (for example, North American Basin).

Area. The area for each basin or subbasin is presented in acres rounded to three significant figures (for example, 147,148 acres was rounded to 147,000 acres). The area describes only the upper surface or map view of a basin. The basin underlies the area and may extend beyond the surface expression (discussed in Chapter 6).

Groundwater Budget Type. The type of groundwater budget information available was classified as Type A, B, or C based on the following criteria:

Type A – indicates one of the following: (1) a groundwater budget exists for the basin or enough components from separate studies could be combined to give a general indication of the basin's groundwater budget, (2) a groundwater model exists for the basin that can be used to calculate a groundwater budget, or (3) actual groundwater extraction data exist for the basin.

Type B – indicates that a use-based estimate of groundwater extraction is calculated for the basin. The use-based estimate is determined by calculating the overall use from California Department of Water Resources land use and urban water use surveys. Known surface water supplies are then subtracted from the total demand leaving the rest of the use to be met by groundwater extraction.

Type C – indicates that there are not enough data to provide either an estimate of the basin's groundwater budget or groundwater extraction from the basin.

Well Yields. Maximum and average well yields in gallons per minute (gpm) are reported for municipal supply and agricultural wells where available. Most of the values reported are from initial tests reported during construction of the well, which may not be an accurate indication of the long-term production capacity of the wells.

Box R continued on next page

Box R Explanation of Groundwater Data Tables (continued)

Types of Monitoring. This includes monitoring of both groundwater levels and quality. "Levels" indicate the number of wells actively monitored without consideration of frequency. Most wells are monitored semi-annually, but many are monitored monthly. "Quality" indicates the number of wells monitored for various constituents; these could range from a grab sample taken for a field specific conductance measurement to a full analysis of organic and inorganic constituents. "Title 22" indicates the number of public water system wells that are actively sampled and monitored under the direction of California Department of Health Services (DHS) Title 22 Program.

Total Dissolved Solids. This category includes range and average values of total dissolved solids (TDS). This data primarily represents data from published reports. In some cases, a range of average TDS values is presented.

Active Monitoring

The summary of active monitoring includes wells that are monitored for groundwater elevation or groundwater quality within the delineated groundwater basins as of 1999. Groundwater elevation data collected by DWR and cooperators are available online at http://wdl.water.ca.gov. Most of the water quality data are for public supply wells and were provided by the California Department of Health Services (DHS). Other groundwater level and water quality monitoring activities were reported by local agencies during this update. The summary indicates that there are nearly 14,000 wells monitored for groundwater levels, 10,700[1] wells monitored under DHS water quality monitoring program, and 4,700 wells monitored for miscellaneous water quality by other agencies.

[1] These numbers include the wells in basins and subbasins only; throughout the entire state, DHS has responsibility for more than 16,000 public supply wells.

Box S What Happens When an MCL Exceedance Occurs?

All suppliers of domestic water to the public are subject to regulations adopted by the U.S. Environmental Protection Agency under the Safe Drinking Water Act (42 U.S.C. 300f et seq.) as well as by the California Department of Health Services under the California Safe Drinking Water Plan Act (Health and Safety Code §§ 116270-116750).

These regulations include primary drinking water standards that establish maximum contaminant levels (MCLs) for inorganic and organic chemicals and radioactivity. MCLs are based on health protection, technical feasibility, and economic factors.

California requires public water systems to sample their drinking water sources, analyze for regulated contaminants, and determine compliance with the MCLs on a regular basis. Sampling frequency depends on the contaminant, type of water source, and previous sampling results; frequency can range from monthly to once every nine years, or none at all if sampling is waived because the source is not vulnerable to the contaminant.

Primary MCLs are enforceable standards. In California, compliance is usually determined at the wellhead or the surface water intake. To meet water quality standards and comply with regulations, a water system with a contaminant exceeding an MCL must notify the public and remove the source from service or initiate a process and schedule to install treatment for removing the contaminant.

Notification requirements reflect the severity of the associated health risks; immediate health concerns prompt immediate notice to consumers. Violations that do not pose a significant health concern may use a less immediate notification process. In addition to consumer notification, a water system is required by statute to notify the local governing body (for example, city council or county board of supervisors) whenever a drinking water well exceeds an MCL, even if the well is taken out of service.

Detections of regulated contaminants (and certain unregulated contaminants) must also be reported to consumers in the water system's annual Consumer Confidence Report.

Groundwater Quality

The summary of water quality relied heavily on data from the DHS Title 22 water quality monitoring program. The assessment consisted of querying the DHS database for active wells that have constituents exceeding the maximum contaminant level (MCL) for drinking water. Summaries of this assessment for each of the State's hydrologic regions (HRs) are discussed in this chapter.

DHS data are the most comprehensive statewide water quality data set available, but this data set should not be used as a sole indicator of the groundwater quality in California. Data from these wells are not necessarily representative of any given basin; it only represents the quality of groundwater where a public water supply is extracted.

The Natural Resources Defense Council (NRDC 2001) issued a report that concludes California's groundwater resources face a serious long-term threat from contamination. Despite heavy reliance on groundwater, no comprehensive statewide assessments of groundwater quality were available. In response to the NRDC report, the State Water Resources Control Board (SWRCB) is planning a comprehensive assessment of the State's groundwater quality. This program is discussed in Chapter 4, in the section titled "Groundwater Quality Monitoring Act of 2001 (AB 599)."

Regional Groundwater Use

The importance of groundwater as a resource varies regionally throughout the State. For planning purposes, DWR divides California into 10 hydrologic regions (HRs), which correspond to the State's major drainage areas. HR boundaries are shown in Figure 22. A review of average water year supplies from the California Water Plan (DWR 1998) shows the importance of groundwater as a local supply for agricultural and municipal use throughout the State and in each of California's 10 HRs (Table 12 and Figure 23).

Table 12 Annual agricultural and municipal water demands met by groundwater

Hydrologic region	Total Demand Volume (TAF)	Demand met by Groundwater (TAF)	Demand met by Groundwater (%)
North Coast	1063	263	25
San Francisco Bay	1353	68	5
Central Coast	1263	1045	83
South Coast	5124	1177	23
Sacramento River	8720	2672	31
San Joaquin River	7361	2195	30
Tulare Lake	10556	4340	41
North Lahontan	568	157	28
South Lahontan	480	239	50
Colorado River	4467	337	8

Source: DWR 1998

With more than 80 percent of demand met by groundwater, the Central Coast HR is heavily reliant on groundwater to meet its local needs. The Tulare Lake and South Lahontan HRs meet more than 40 percent of their local demand from groundwater. The South Coast, North Coast, North Lahontan, San Joaquin River, and Sacramento River HRs take between 20 and 40 percent of their supply from groundwater. Groundwater is a relatively minor source of supply in the San Francisco Bay and Colorado River HRs.

Of all the groundwater extracted annually in the state, an estimated 35 percent is produced from the Tulare Lake HR. More than 70 percent of groundwater extraction occurs in the Central Valley (Tulare Lake, San Joaquin River, and Sacramento River HRs combined). Nearly 20 percent is extracted in the highly urbanized South Coast and Central Coast HRs, while less than 10 percent is extracted in the remaining five HRs combined.

Figure 22 California's 10 hydrologic regions

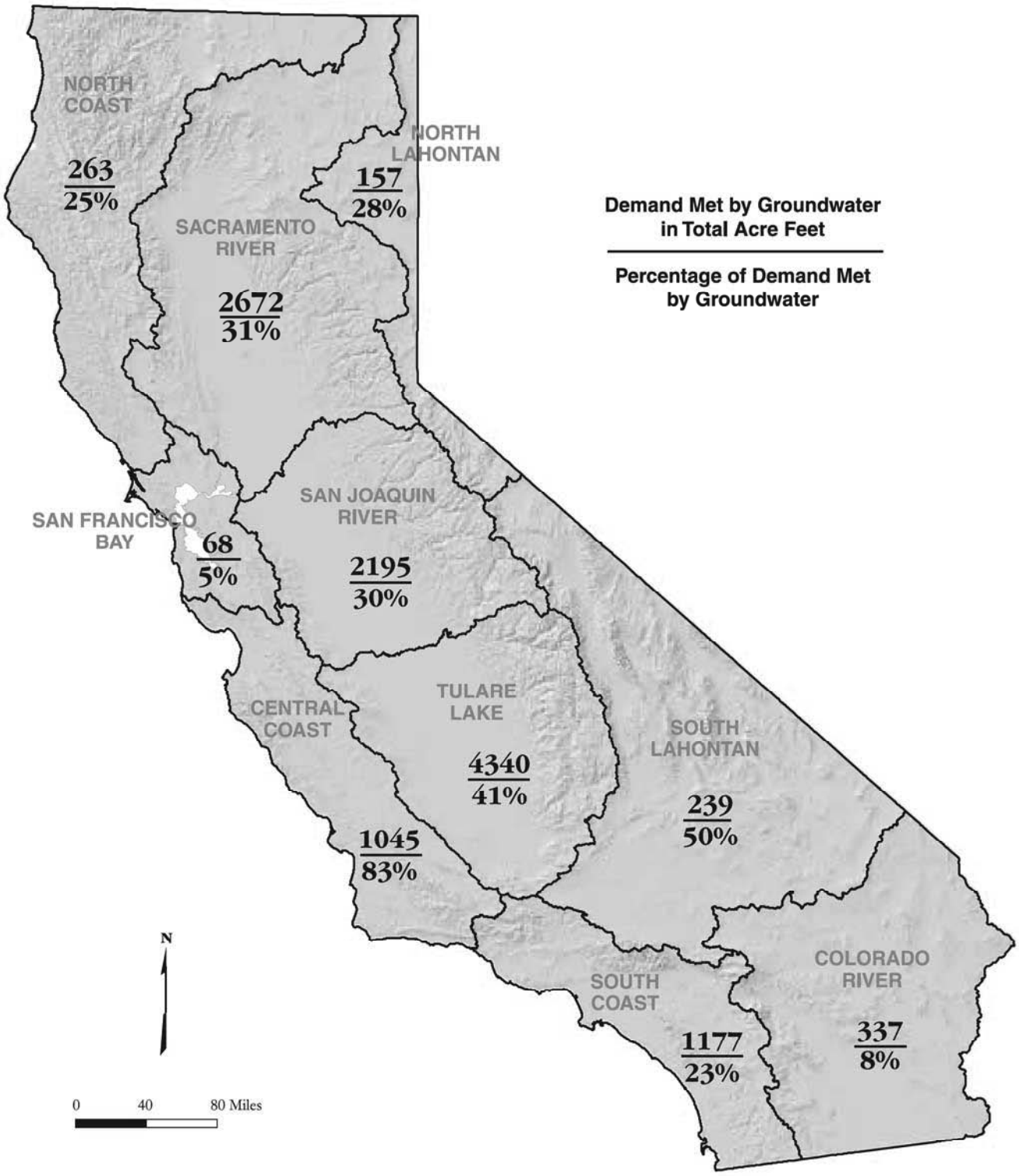

Figure 23 Agricultural and urban demand supplied by groundwater in each hydrologic region

The remainder of this chapter provides a summary of each of the 10 HRs. A basin location map for each HR is followed by a brief discussion of groundwater occurrence and groundwater conditions. A summary tabulation of groundwater information for each groundwater basin within the HR is provided. Greater detail for the data presented in these tables, including a bibliography, is provided in the individual basin/subbasin descriptions in the supplemental report (see Appendix A). Because the groundwater basin numbers are based on the boundaries of the State's nine Regional Water Quality Control Boards (RWQCB), Figure 24 shows the relationship between the Regional Board boundaries and DWR's HR boundaries.

The groundwater basin tabulations give an overview of available data. Where a basin is divided into subbasins, only the information for the subbasins is provided. The data for each subbasin generally come from different sources, so it is inappropriate to sum the data into a larger basin summary. An explanation of each of the data items presented in the summary table is provided in Box R.

Figure 24 Regional Water Quality Control Board regions and Department of Water Resources hydrologic regions

North Coast Hydrologic Region

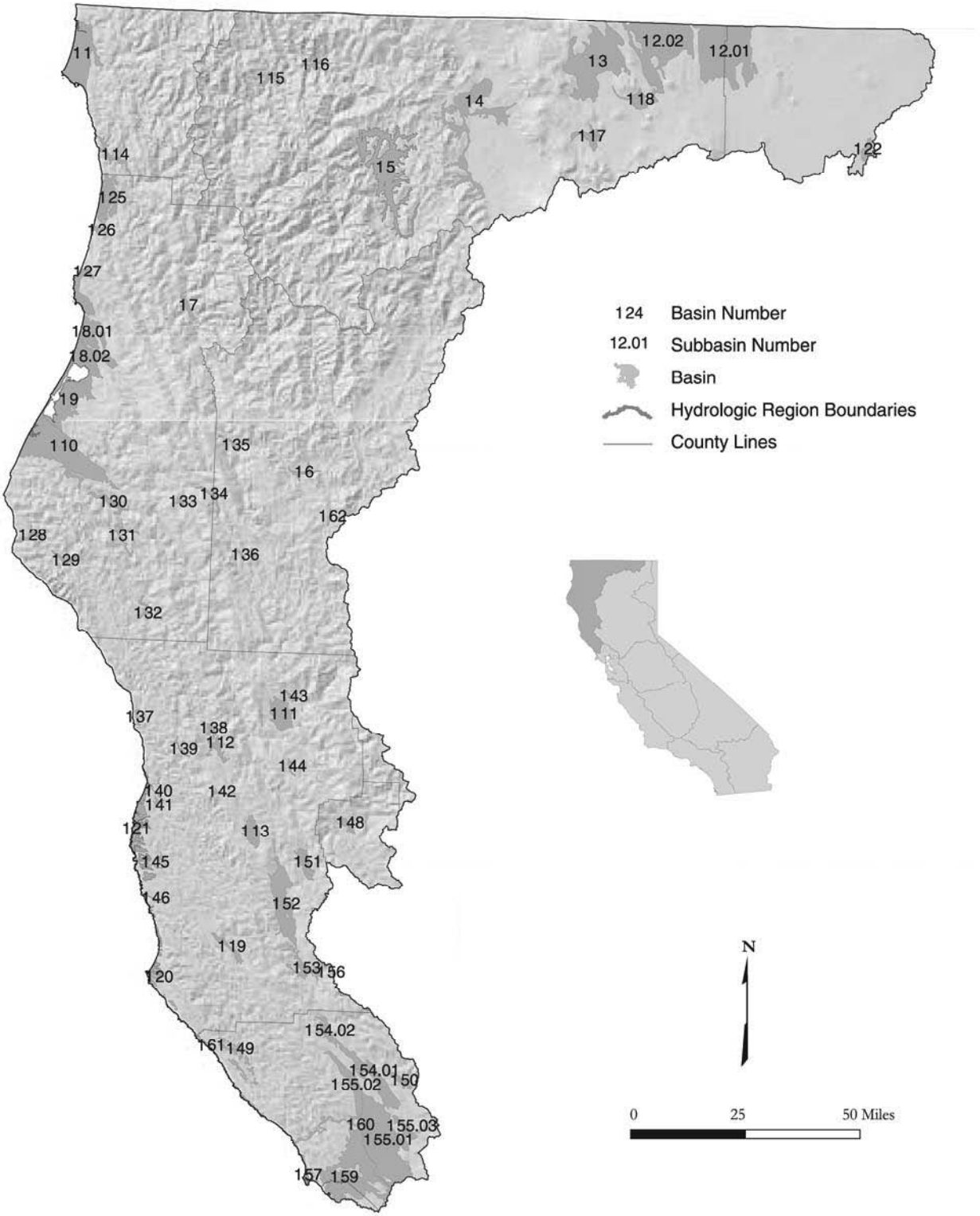

Figure 25 North Coast Hydrologic Region

Basins and Subbasins of the North Coast Hydrologic Region

Basin/subbasin	Basin name
1-1	Smith River Plain
1-2	Klamath River Valley
1-2.01	Tule Lake
1-2.02	Lower Klamath
1-3	Butte Valley
1-4	Shasta Valley
1-5	Scott River Valley
1-6	Hayfork Valley
1-7	Hoopa Valley
1-8	Mad River Valley
1-8.01	Mad River Lowland
1-8.02	Dows Prairie School Area
1-9	Eureka Plain
1-10	Eel River Valley
1-11	Covelo Round Valley
1-12	Laytonville Valley
1-13	Little Lake Valley
1-14	Lower Klamath River Valley
1-15	Happy Camp Town Area
1-16	Seiad Valley
1-17	Bray Town Area
1-18	Red Rock Valley
1-19	Anderson Valley
1-20	Garcia River Valley
1-21	Fort Bragg Terrace Area
1-22	Fairchild Swamp Valley
1-25	Prairie Creek Area
1-26	Redwood Creek Area
1-27	Big Lagoon Area
1-28	Mattole River Valley
1-29	Honeydew Town Area
1-30	Pepperwood Town Area
1-31	Weott Town Area
1-32	Garberville Town Area
1-33	Larabee Valley
1-34	Dinsmores Town Area
1-35	Hyampom Valley
1-36	Hettenshaw Valley
1-37	Cottoneva Creek Valley
1-38	Lower Laytonville Valley
1-39	Branscomb Town Area
1-40	Ten Mile River Valley
1-41	Little Valley
1-42	Sherwood Valley
1-43	Williams Valley
1-44	Eden Valley
1-45	Big River Valley
1-46	Navarro River Valley
1-48	Gravelley Valley
1-49	Annapolis Ohlson Ranch Formation Highlands
1-50	Knights Valley
1-51	Potter Valley
1-52	Ukiah Valley
1-53	Sanel Valley
1-54	Alexander Valley
1-54.01	Alexander Area
1-54.02	Cloverdale Area
1-55	Santa Rosa Valley
1-55.01	Santa Rosa Plain
1-55.02	Healdsburg Area
1-55.03	Rincon Valley
1-56	McDowell Valley
1-57	Bodega Bay Area
1-59	Wilson Grove Formation Highlands
1-60	Lower Russian River Valley
1-61	Fort Ross Terrace Deposits
1-62	Wilson Point Area

Description of the Region

The North Coast HR covers approximately 12.46 million acres (19,470 square miles) and includes all or portions of Modoc, Siskiyou, Del Norte, Trinity, Humboldt, Mendocino, Lake, and Sonoma counties (Figure 25). Small areas of Shasta, Tehama, Glenn, Colusa, and Marin counties are also within the region. Extending from the Oregon border south to Tomales Bay, the region includes portions of four geomorphic provinces. The northern Coast Range forms the portion of the region extending from the southern boundary north to the Mad River drainage and the fault contact with the metamorphic rocks of the Klamath Mountains, which continue north into Oregon. East of the Klamath terrane along the State border are the volcanic terranes of the Cascades and the Modoc Plateau. In the coastal mountains, most of the basins are along the narrow coastal strip between the Pacific Ocean and the rugged Coast Range and Klamath Mountains and along inland river valleys; alluviated basin areas are very sparse in the steep Klamath Mountains. In the volcanic terrane to the east, most of the basins are in block faulted valleys that once held Pleistocene-age lakes. The North Coast HR corresponds to the boundary of RWQCB 1. Significant geographic features include basin areas such as the Klamath River Basin, the Eureka/Arcata area, Hoopa Valley, Anderson Valley, and the Santa Rosa Plain. Other significant features include Mount Shasta, forming the southern border of Shasta Valley, and the rugged north coastal shoreline. The 1995 population of the entire region was about 606,000, with most being centered along the Pacific Coast and in the inland valleys north of the San Francisco Bay Area.

The northern mountainous portion of the region is rural and sparsely populated, primarily because of the rugged terrain. Most of the area is heavily forested. Some irrigated agriculture occurs in the narrow river valleys, but most occurs in the broader valleys on the Modoc Plateau where pasture, grain and alfalfa predominate. In the southern portion of the region, closer to urban centers, crops like wine grapes, nursery stock, orchards, and truck crops are common.

A majority of the surface water in the North Coast HR goes to environmental uses because of the "wild and scenic" designation of most of the region's rivers. Average annual precipitation ranges from 100 inches in the Smith River drainage to 29 inches in the Santa Rosa area and about 10 inches in the Klamath drainage; as a result, drought is likely to affect the Klamath Basin more than other portions of the region. Communities that are not served by the area's surface water projects also tend to experience shortages. Surface water development in the region includes the U.S. Bureau of Reclamation (USBR) Klamath Project, Humboldt Bay Municipal Water District's Ruth Lake, and U.S. Army Corps of Engineer's Russian River Project. An important factor concerning water demand in the Klamath Project area is water allocation for endangered fish species in the upper and lower basin. Surface water deliveries for agriculture in 2001, a severe drought year, were only about 20 percent of normal.

Groundwater Development

Groundwater development in the North Coast HR occurs along the coast, near the mouths of some of the region's major rivers, on the adjacent narrow marine terraces, or in the inland river valleys and basins. Reliability of these supplies varies significantly from area to area. There are 63 groundwater basins/subbasins delineated in the region, two of which are shared with Oregon. These basins underlie approximately 1.022 million acres (1,600 square miles).

Along the coast, most groundwater is developed from shallow wells installed in the sand and gravel beds of several of the region's rivers. Under California law, the water produced in these areas is considered surface water underflow. Water from Ranney collectors installed in the Klamath River, Rowdy Creek, the Smith

River, and the Mad River supply the towns of Klamath, Smith River and Crescent City in Del Norte County and most of the Humboldt Bay area in Humboldt County. Except on the Mad River, which has continuous supply via releases from Ruth Reservoir, these supplies are dependent on adequate precipitation and flows throughout the season. In drought years when streamflows are low, seawater intrusion can occur causing brackish or saline water to enter these systems. This has been a problem in the town of Klamath, which in 1995 had to obtain community water from a private well source. Toward the southern portion of the region, along the Mendocino coast, the Town of Mendocino typifies the problems related to groundwater development in the shallow marine terrace aquifers. Groundwater supply is limited by the aquifer storage capacity, and surveys done in the Town of Mendocino in the mid-1980s indicate that about 10 percent of wells go dry every year and up to 40 percent go dry during drought years.

Groundwater development in the inland coastal valleys north of the divide between the Russian and Eel Rivers is generally of limited extent. Most problems stemming from reliance on groundwater in these areas is a lack of alluvial aquifer storage capacity. Many groundwater wells rely on hydrologic connection to the rivers and streams of the valleys. The City of Rio Dell has experienced water supply problems in community wells and, as a result, recently developed plans to install a Ranney collector near the Eel River. South of the divide, in the Russian River drainage, a significant amount of groundwater development has occurred on the Santa Rosa Plain and surrounding areas. The groundwater supplies augment surface supplies from the Russian River Project.

In the north-central part of the North Coast HR, the major groundwater basins include the Klamath River Valley, Shasta Valley, Scott River Valley, and Butte Valley. The Klamath River Valley is shared with Oregon. Of these groundwater basins, Butte Valley has the most stable water supply conditions. The historical annual agricultural surface water supply has been about 20,000 acre-feet. As farming in the valley expanded from the early 1950s to the early 1990s, bringing nearly all the arable land in the valley into production, groundwater was developed to farm the additional acres. It has been estimated that current, fully developed demands are only about 80 percent of the available groundwater supply. By contrast, water supply issues in the other three basins are contingent upon pending management decisions regarding restoration of fish populations in the Klamath River and the Upper Klamath Basin system. The Endangered Species Act (ESA) fishery issues include lake level requirements for two sucker fish species and in-stream flow requirements for coho salmon and steelhead trout. Since about 1905, the Klamath Project has provided surface water to the agricultural community, which in turn has provided water to the wildlife refuges. Since the early 1990s, it has been recognized that surface water in the Klamath Project is over-allocated, but very little groundwater development had occurred. In 2001, which was a severe drought year, USBR delivered a total of about 75,000 acre-feet of water to agriculture in California, about 20 percent of normal. In the Klamath River Groundwater Basin this translated to a drought disaster, both for agriculture and the wildlife refuges. In addition, there were significant impacts for both coho salmon and sucker fisheries in the Klamath River watershed. As a result of the reduced surface water deliveries, significant groundwater development occurred, and groundwater extraction increased from an estimated 6,000 acre-feet in 1997 to roughly 60,000 acre-feet in 2001. Because of the complexity of the basin's water issues, a long-term Klamath Project Operation plan has not yet been finalized. Since 1995, USBR has issued an annual operation plan based on estimates of available supply. The Scott River Valley and Shasta Valley rely to a significant extent on surface water diversions. In most years, surface water supplies the majority of demand, and groundwater extraction supplements supply as needed depending on wet or dry conditions. Discussions are under way to develop strategies to conjunctively use surface water and groundwater to meet environmental, agricultural, and other demands.

Groundwater Quality

Groundwater quality characteristics and specific local impairments vary with regional setting within the North Coast HR. In general, seawater intrusion and nitrates in shallow aquifers are problems in the coastal groundwater basins; high total dissolved solids (TDS) content and general alkalinity are problems in the lake sediments of the Modoc Plateau basins; and iron, boron, and manganese can be problems in the inland basins of Mendocino and Sonoma counties.

Water Quality in Public Supply Wells

From 1994 through 2000, 584 public supply water wells were sampled in 32 of the 63 basins and subbasins in the North Coast HR. Analyzed samples indicate that 553 wells, or 95%, met the state primary Maximum Contaminant Levels (MCL) for drinking water. Thirty-one wells, or 5%, sampled have constituents that exceed one or more MCL. Figure 26 shows the percentage of each contaminant group that exceeded MCLs in the 31 wells.

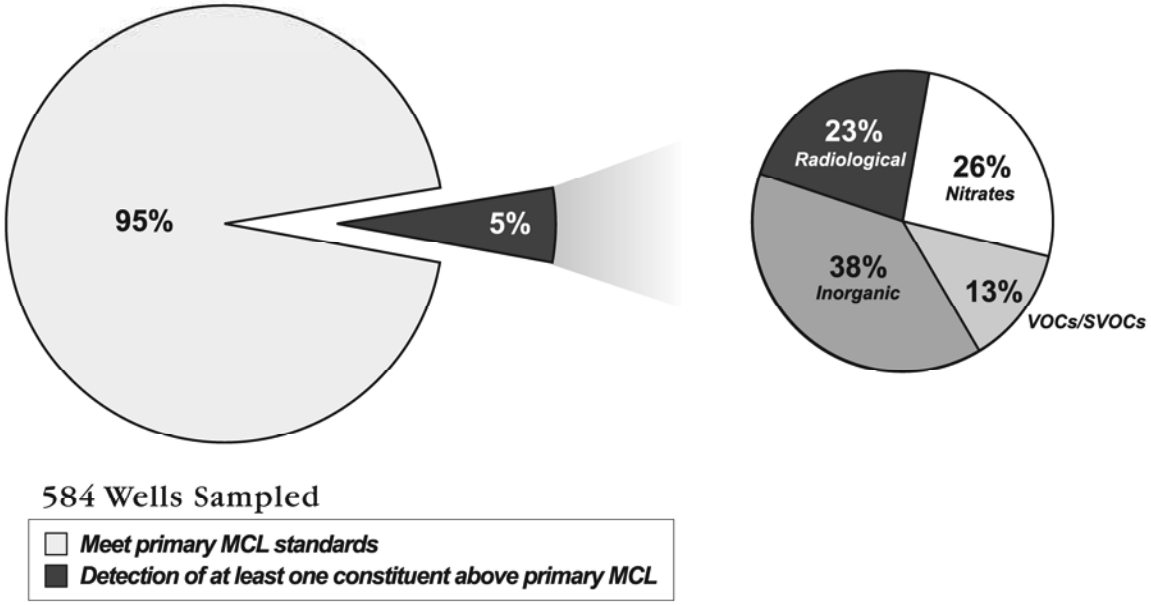

Figure 26 MCL exceedances in public supply wells in the North Coast Hydrologic Region

Table 13 lists the three most frequently occurring individual contaminants in each of the five contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 13 Most frequently occurring contaminants by contaminant group in the North Coast Hydrologic Region

Contaminant group wellsInorganics – Primary exceedance	Contaminant - # of wells Aluminum – 4	Contaminant - # of wells Arsenic – 4	Contaminant - # of 4 tied at 1
Inorganics – Secondary	Manganese – 150	Iron – 108	Copper – 2
Radiological	Radium 228 – 3	Combined RA226 + RA228 – 3	Radium 226 – 1
Nitrates	Nitrate(as NO_3) – 7	Nitrite(as N) – 1	
VOCs/SVOCs	TCE – 2	3 tied at 1 exceedance	

TCE = Trichloroethylene
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

Since Bulletin 118-80 was published, RWQCB 2 boundary has been modified. This resulted in several basins being reassigned to RWQCB 1. These are listed in Table 14, along with other modifications to North Coast HR.

Table 14 Modifications since Bulletin 118-80 of groundwater basins in North Coast Hydrologic Region

Basin name	New number	Old number
McDowell Valley	1-56	2-12
Knights Valley	1-50	2-13
Potter Valley	1-51	2-14
Ukiah Valley	1-52	2-15
Sanel Valley	1-53	2-16
Alexander Valley	1-54	2-17
Santa Rosa Valley	1-55	2-18
Lower Russian River Valley	1-60	2-20
Bodega Bay Area	1-57	2-21
Modoc Plateau Recent Volcanic Area	deleted	1-23
Modoc Plateau Pleistocene Volcanic Area	deleted	1-24
Gualala River Valley	deleted	1-47
Wilson Grove Formation Highlands	1-59	2-25
Fort Ross Terrace Deposits	1-61	
Wilson Point Area	1-62	

Fort Ross Terrace Deposits (1-61) and Wilson Point Area (1-62) have been defined since B118-80 and are included in this update. Mad River Valley Groundwater Basin (1-8) has been subdivided into two subbasins. Sebastopol Merced Formation (2-25) merged into Basin 1-59 and was renamed Wilson Grove Formation Highlands.

There are a couple of deletions of groundwater basins from Bulletin 118-80. The Modoc Plateau Recent Volcanic Area (1-23) and the Modoc Plateau Pleistocene Volcanic Area (1-24) are volcanic aquifers and were not assigned basin numbers in this bulletin. These are considered to be groundwater source areas as discussed in Chapter 6. Gualala River Valley (1-47) was deleted because the State Water Resources Control Board determined the water being extracted in this area as surface water within a subterranean stream.

Table 15 North Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
1-1	SMITH RIVER PLAIN	40,450	B	500	50	7	10	33	164	32 - 496
1-2	KLAMATH RIVER VALLEY									
1-2.01	UPPER KLAMATH LAKE BASIN - Tule Lake	85,930	B	3,380	1,208	40	8	5	721	140 - 2,200
1-2.02	UPPER KLAMATH LAKE BASIN - Lower Klamath	73,330	B	2,600	1,550	4	-	-	-	-
1-3	BUTTE VALLEY	79,700	B	5,000	2,358	28	13	9	310	55 - 1,110
1-4	SHASTA VALLEY	52,640	B	1,200	273	9	15	24	-	-
1-5	SCOTT RIVER VALLEY	63,900	B	3,000	794	6	10	5	258	47 - 1,510
1-6	HAYFORK VALLEY	3,300	B	200	-	-	5	-	-	-
1-7	HOOPA VALLEY	3,900	B	300	-	-	4	-	125	95 - 159
1-8	MAD RIVER VALLEY									
1-8.01	MAD RIVER VALLEY LOWLAND	25,600	B	120	72	4	9	2	184	55 - 280
1-8.02	DOWS PRAIRIE SCHOOL AREA	14,000	B	-	-	-	3	-	-	-
1-9	EUREKA PLAIN	37,400	B	1,200	-	4	4	6	177	97 - 460
1-10	EEL RIVER VALLEY	73,700	B	1,200	-	8	11	29	237	110 - 340
1-11	COVELO ROUND VALLEY	16,400	C	850	193	9	5	29	239	116 - 381
1-12	LAYTONVILLE VALLEY	5,020	A	700	7	4	3	-	149	53 - 251
1-13	LITTLE LAKE VALLEY	10,000	A	1,000	45	7	7	-	340	97 - 1,710
1-14	LOWER KLAMATH RIVER VALLEY	7,030	B	-	-	-	-	-	-	43 - 150
1-15	HAPPY CAMP TOWN AREA	2,770	B	-	-	-	-	17	-	-
1-16	SEIAD VALLEY	2,250	B	-	-	-	2	2	-	-
1-17	BRAY TOWN AREA	8,030	B	-	-	-	-	-	-	-
1-18	RED ROCK VALLEY	9,000	B	-	-	-	-	-	-	-
1-19	ANDERSON VALLEY	4,970	C	300	30	7	5	7	-	80 - 400
1-20	GARCIA RIVER VALLEY	2,240	C	-	-	-	-	-	-	-
1-21	FORT BRAGG TERRACE AREA	24,100	C	75	14	-	-	51	185	26 - 650
1-22	FAIRCHILD SWAMP VALLEY	3,300	B	-	-	-	-	-	-	-
1-25	PRAIRIE CREEK AREA	20,000	B	-	-	-	-	1	106	-
1-26	REDWOOD CREEK AREA	2,000	B	-	-	1	0	4	-	102 - 332
1-27	BIG LAGOON AREA	13,400	B	-	-	1	0	31	174	-
1-28	MATTOLE RIVER VALLEY	3,150	B	-	-	-	-	2	-	-
1-29	HONEYDEW TOWN AREA	2,370	B	-	-	-	-	1	-	-
1-30	PEPPERWOOD TOWN AREA	6,290	B	-	-	-	-	1	-	-
1-31	WEOTT TOWN AREA	3,650	B	-	-	-	-	2	-	-
1-32	GARBERVILLE TOWN AREA	2,100	B	-	-	-	-	5	-	-
1-33	LARABEE VALLEY	970	B	-	-	-	-	-	-	-
1-34	DINSMORES TOWN AREA	2,300	B	-	-	-	-	3	-	-
1-35	HYAMPOM VALLEY	1,350	B	-	-	-	-	1	-	-
1-36	HETTENSHAW VALLEY	850	B	-	-	-	-	-	-	-
1-37	COTTONEVA CREEK VALLEY	760	C	-	-	-	-	-	118	118
1-38	LOWER LAYTONVILLE VALLEY	2,150	C	-	-	-	-	-	-	-
1-39	BRANSCOMB TOWN AREA	1,320	C	-	-	-	-	-	130	80 - 179
1-40	TEN MILE RIVER VALLEY	1,490	C	-	-	-	-	-	-	-
1-41	LITTLE VALLEY	810	C	-	-	-	-	-	-	-

Table 15 North Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
1-42	SHERWOOD VALLEY	1,150	C	-	-	-	-	-	-	-
1-43	WILLIAMS VALLEY	1,640	C	-	-	-	-	-	-	-
1-44	EDEN VALLEY	1,380	C	-	-	-	-	-	140	140
1-45	BIG RIVER VALLEY	1,690	C	-	-	-	-	2	-	-
1-46	NAVARRO RIVER VALLEY	770	C	-	-	-	-	-	-	-
1-48	GRAVELLEY VALLEY	3,000	C	-	-	-	-	3	-	-
1-49	ANAPOLIS OHLSON RANCH FOR. HIGHLANDS	8,650	C	36	-	-	0	1	260	260
1-50	KNIGHTS VALLEY	4,090	C	-	-	-	-	-	-	-
1-51	POTTER VALLEY	8,240	C	100	-	2	0	1	-	140 - 395
1-52	UKIAH VALLEY									
1-53	SANEL VALLEY	5,570	C	1,250	-	5	8	6	-	174 - 306
1-54	ALEXANDER VALLEY									
1-54.01	ALEXANDER AREA									
1-54.02	CLOVERDALE AREA	6,500	C	-	500	3	-	13	-	130 - 304
1-55	SANTA ROSA VALLEY									
1-55.01	SANTA ROSA PLAIN	80,000	A	1,500	-	43	-	155	-	-
1-55.02	HEALDSBURG AREA	15,400	C	500	-	8	-	28	-	90 - 500
1-55.03	RINCON VALLEY	5,600	C	-	-	2	-	12	-	-
1-56	McDOWELL VALLEY	1,500	C	1,200	-	-	-	-	145	143 - 146
1-57	BODEGA BAY AREA	2,680	A	150	-	-	-	6	-	-
1-59	WILSON GROVE FORMATION HIGHLANDS	81,500	C	-	-	14	-	68	-	-
1-60	LOWER RUSSIAN RIVER VALLEY	6,600	C	500 +	-	1	-	32	-	120 - 210
1-61	FORT ROSS TERRACE DEPOSITS	8,490	C	75	27	-	-	13	320	230 - 380
1-62	WILSON POINT AREA	700	B	-	-	-	-	-	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS = total dissolved solids

San Francisco Bay Hydrologic Region

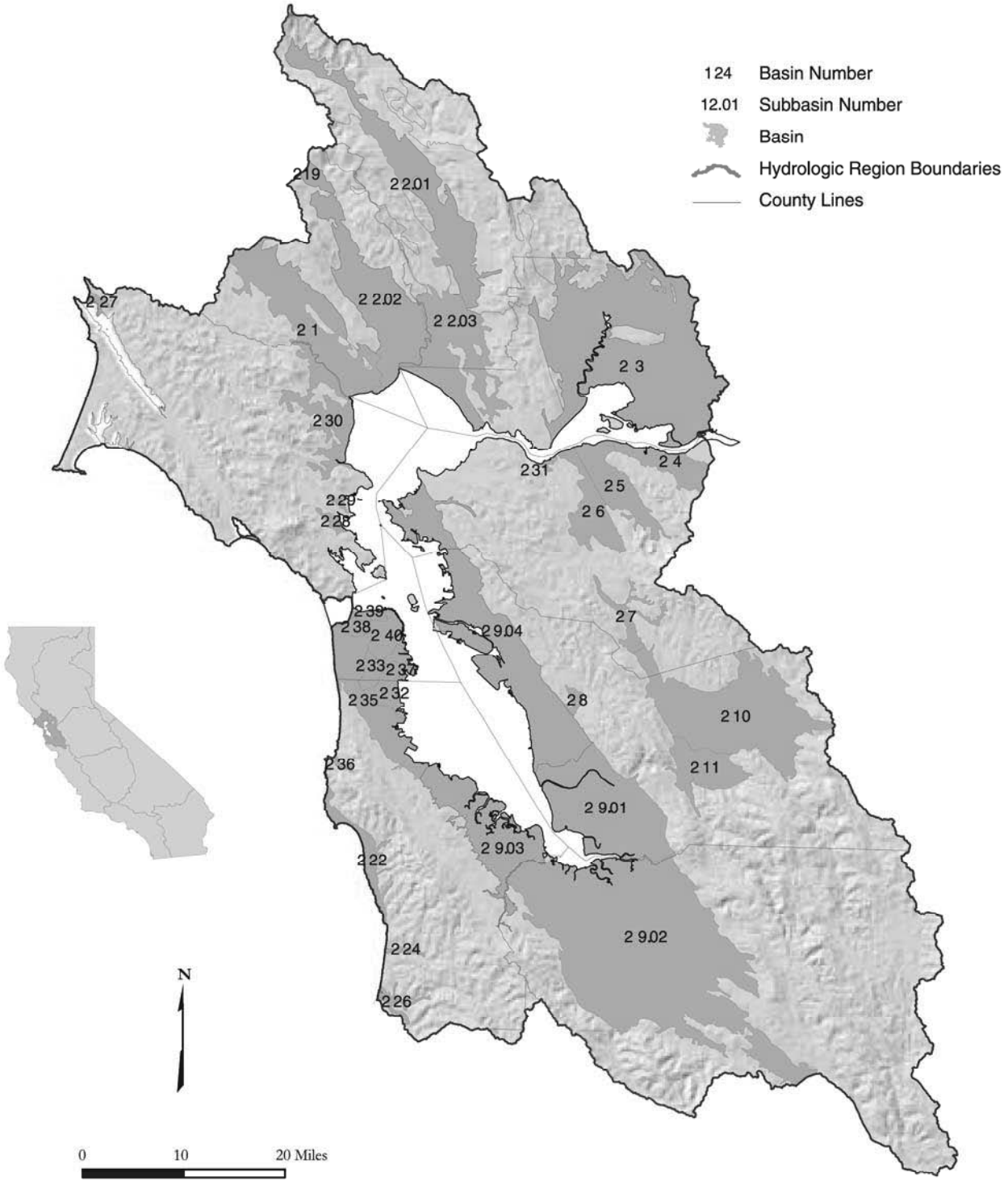

Figure 27 San Francisco Bay Hydrologic Region

Basins and Subbasins of the San Francisco Bay Hydrologic Region

Basin/subbasin	Basin name
2-1	Petaluma Valley
2-2	Napa-Sonoma Valley
2-2.01	Napa Valley
2-2.02	Sonoma Valley
2-2.03	Napa-Sonoma Lowlands
2-3	Suisun-Fairfield Valley
2-4	Pittsburg Plain
2-5	Clayton Valley
2-6	Ygnacio Valley
2-7	San Ramon Valley
2-8	Castro Valley
2-9	Santa Clara Valley
2-9.01	Niles Cone
2-9.02	Santa Clara
2-9.03	San Mateo Plain
2-9.04	East Bay Plain
2-10	Livermore Valley
2-11	Sunol Valley
2-19	Kenwood Valley
2-22	Half Moon Bay Terrace
2-24	San Gregorio Valley
2-26	Pescadero Valley
2-27	Sand Point Area
2-28	Ross Valley
2-29	San Rafael Valley
2-30	Novato Valley
2-31	Arroyo Del Hambre Valley
2-32	Visitacion Valley
2-33	Islais Valley
2-35	Merced Valley
2-36	San Pedro Valley
2-37	South San Francisco
2-38	Lobos
2-39	Marina
2-40	Downtown San Francisco

Description of the Region

The San Francisco Bay HR covers approximately 2.88 million acres (4,500 square miles) and includes all of San Francisco and portions of Marin, Sonoma, Napa, Solano, San Mateo, Santa Clara, Contra Costa, and Alameda counties (Figure 27). The region corresponds to the boundary of RWQCB 2. Significant geographic features include the Santa Clara, Napa, Sonoma, Petaluma, Suisun-Fairfield, and Livermore valleys; the Marin and San Francisco peninsulas; San Francisco, Suisun, and San Pablo bays; and the Santa Cruz Mountains, Diablo Range, Bolinas Ridge, and Vaca Mountains of the Coast Range. While being the smallest in size of the 10 HRs, the region has the second largest population in the State at about 5.8 million in 1995 (DWR 1998). Major population centers include the cities of San Francisco, San Jose and Oakland.

Groundwater Development

The region has 28 identified groundwater basins. Two of those, the Napa-Sonoma Valley and Santa Clara Valley groundwater basins, are further divided into three and four subbasins, respectively. The groundwater basins underlie approximately 896,000 acres (1,400 square miles) or about 30 percent of the entire HR.

Despite the tremendous urban development in the region, groundwater use accounts for only about 5 percent (68,000 acre-feet) of the region's estimated average water supply for agricultural and urban uses, and accounts for less than one percent of statewide groundwater uses.

In general, the freshwater-bearing aquifers are relatively thin in the smaller basins and moderately thick in the more heavily utilized basins. The more heavily utilized basins in this region include the Santa Clara Valley, Napa-Sonoma Valley, and Petaluma Valley groundwater basins. In these basins, the municipal and irrigation wells have average depths ranging from about 200 to 500 feet. Well yields in these basins range from less than 50 gallons per minute (gpm) to approximately 3,000 gpm. In the smaller basins, most municipal and irrigation wells have average well depths in the 100- to 200-foot range. Well yields in the smaller and less utilized basins are typically less than 500 gpm.

Land subsidence has been a significant problem in the Santa Clara Valley Groundwater Basin in the past. An extensive annual monitoring program has been set up within the basin to evaluate changes in an effort to maintain land subsidence at less than 0.01 feet per year (SCVWD 2001). Additionally, groundwater recharge projects have been implemented in the Santa Clara Valley to ensure that groundwater will continue to be a viable water supply in the future.

Groundwater Quality

In general, groundwater quality throughout most of the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high TDS, nitrate, boron, and organic compounds.

The areas of high TDS (and chloride) concentrations are typically found in the region's groundwater basins that are situated close to the San Francisco Bay, such as the northern Santa Clara, southern Sonoma, Petaluma, and Napa valleys. Elevated levels of nitrate have been detected in a large percentage of private wells tested within the Coyote Subbasin and Llagas Subbasin of the Gilroy-Hollister Valley Groundwater Basin (in the Central Coast HR) located to the south of the Santa Clara Valley (SCVWD 2001). The shallow aquifer zone within the Petaluma Valley also shows persistent nitrate contamination. Groundwater with high TDS, iron, and boron levels is present in the Calistoga area of Napa Valley, and elevated boron levels in other parts of Napa Valley make the water unfit for agricultural uses. Releases of fuel hydrocarbons from leaking underground storage tanks and spills/leaks of organic solvents at industrial sites have caused minor to significant groundwater impacts in many basins throughout the region. Methyl tertiary-butyl ether (MTBE) and chlorinated solvent releases to soil and groundwater continue to be problematic. Environmental oversight for many of these sites is performed either by local city and county enforcement agencies, the RWQCB, the Department of Toxic Substances Control, and/or the U.S. Environmental Protection Agency.

Water Quality in Public Supply Wells

From 1994 through 2000, 485 public supply water wells were sampled in 18 of the 33 basins and subbasins in the San Francisco Bay HR. Analyzed samples indicate that 410 wells, or 85 percent, met the state primary MCLs for drinking water standards. Seventy-five wells, or 15 percent, have constituents that exceed one or more MCL. Figure 28 shows the percentages of each contaminant group that exceeded MCLs in the 75 wells.

Table 16 lists the three most frequently occurring contaminants in each contaminant group and the number of wells in the HR that exceeded the MCL for those contaminants.

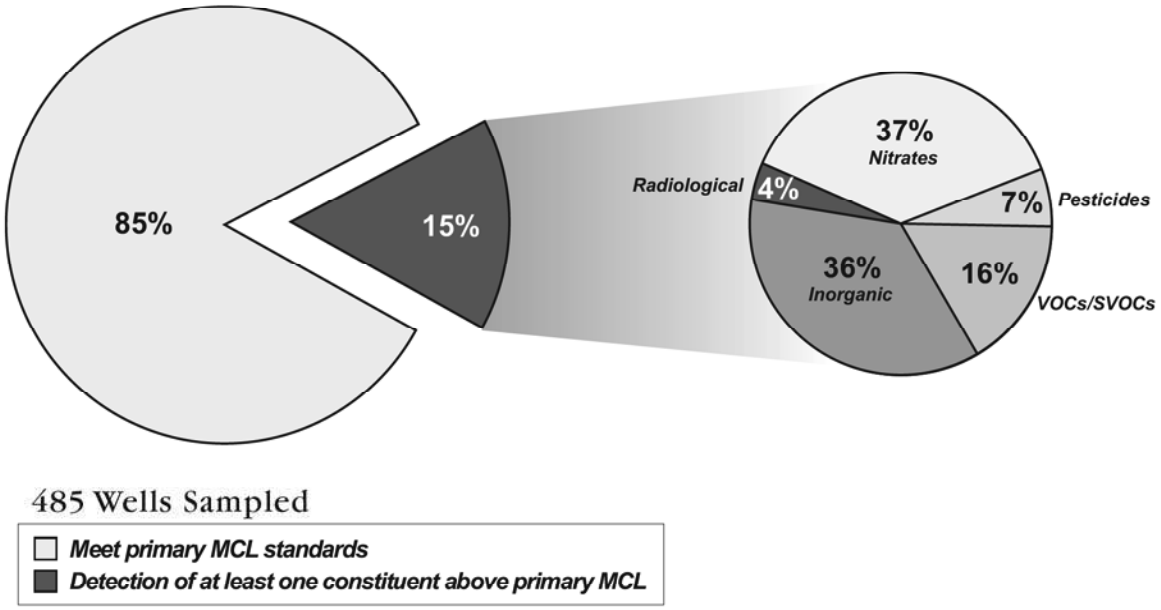

Figure 28 MCL exceedances in public supply wells in the San Francisco Bay Hydrologic Region

Table 16 Most frequently occurring contaminants by contaminant group in the San Francisco Bay Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics	Iron – 57	Manganese – 57	Fluoride – 7
Radiological	Gross Alpha – 2	Radium 226 – 1	
Nitrates	Nitrate (as NO_3) – 27	Nitrate + Nitrite – 3	Nitrite (as N) – 1
Pesticides	Di(2-Ethylhexyl)phthalate – 4	Heptachlor – 1	
VOCs/SVOCs	PCE – 4	Dichloromethane – 3	TCE– 2 Vinyl Chloride – 2

TCE = Trichloroethylene
PCE = Tetrachloroethylene
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Coumpound

Changes from Bulletin 118-80

Since Bulletin 118-80 was published, RWQCB 2 boundary has been modified. This resulted in several basins being reassigned to RWQCB 1. These are listed in Table 17.

Table 17 Modifications since Bulletin 118-80 of groundwater basins in San Francisco Bay Hydrologic Region

Basin name	New number	Old number
McDowell Valley	1-56	2-12
Knights Valley	1-50	2-13
Potter Valley	1-51	2-14
Ukiah Valley	1-52	2-15
Sanel Valley	1-53	2-16
Alexander Valley	1-54	2-17
Santa Rosa Valley	1-55	2-18
Lower Russian River Valley	1-60	2-20
Bodega Bay Area	1-57	2-21

No additional basins were assigned to the San Francisco Bay HR in this revision. However, the Santa Clara Valley Groundwater Basin (2-9) has been subdivided into four subbasins instead of two, and the Napa-Sonoma Valley Groundwater Basin is now three subbasins instead of two.

There are several deletions of groundwater basins from Bulletin 118-80. The San Francisco Sand Dune Area (2-34) was deleted when the San Francisco groundwater basins were redefined in a USGS report in the early 1990s. The Napa-Sonoma Volcanic Highlands (2-23) is a volcanic aquifer and was not assigned a basin number in this bulletin. This is considered to be a groundwater source area as discussed in Chapter 6. Bulletin 118-80 identified seven groundwater basins that were stated to differ from 118-75: Sonoma County Basin, Napa County Basin, Santa Clara County Basin, San Mateo Basin, Alameda Bay Plain Basin, Niles Cone Basin, and Livermore Basin. They were created primarily by combining several smaller basins and subbasins within individual counties. This report does not consider these seven as basins. There is no change in numbering because the basins were never assigned a basin number.

Table 18 San Francisco Bay Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
2-1	PETALUMA VALLEY	46,100	C	100	-	16	7	24	347	58-650
2-2	NAPA-SONOMA VALLEY									
2-2.01	NAPA VALLEY	45,900	A	3,000	223	19	10	23	272	150-370
2-2.02	SONOMA VALLEY	44,700	C	1,140	516	18	9	35	321	100-550
2-2.03	NAPA-SONOMA LOWLANDS	40,500	C	300	98	0	6	9	185	50-300
2-3	SUISUN-FAIRFIELD VALLEY	133,600	C	500	200	21	17	35	410	160-740
2-4	PITTSBURG PLAIN	11,600	C	-	-	-	-	9	-	-
2-5	CLAYTON VALLEY	17,800	C	-	-	-	-	48	-	-
2-6	YGNACIO VALLEY	15,500	C	-	-	-	-	-	-	-
2-7	SAN RAMON VALLEY	7,060	C	-	-	-	-	-	-	-
2-8	CASTRO VALLEY	1,820	C	-	-	-	-	-	-	-
2-9	SANTA CLARA VALLEY									
2-9.01	NILES CONE	57,900	A	3,000	2,000	350	120	20	-	-
2-9.02	SANTA CLARA	190,000	C	-	-	-	10	234	408	200-931
2-9.03	SAN MATEO PLAIN	48,100	C	-	-	-	2	14	407	300-480
2-9.04	EAST BAY PLAIN	77,400	A	1,000	UNK	29	16	7	638	364-1,420
2-10	LIVERMORE VALLEY	69,500	A	-	-	-	-	36	-	-
2-11	SUNOL VALLEY	16,600	C	-	-	-	-	2	-	-
2-19	KENWOOD VALLEY	3,170	C	-	-	-	-	13	-	-
2-22	HALF MOON BAY TERRACE	9,150	C	-	-	5	-	9	-	-
2-24	SAN GREGORIO VALLEY	1,070	C	-	-	-	-	-	-	-
2-26	PESCADERO VALLEY	2,900	C	-	-	3	-	4	-	-
2-27	SAND POINT AREA	1,400	C	-	-	-	-	6	-	-
2-28	ROSS VALLEY	1,770	C	-	-	-	-	-	-	-
2-29	SAN RAFAEL VALLEY	880	C	-	-	-	-	-	-	-
2-30	NOVATO VALLEY	20,500	C	-	-	-	-	1	-	-
2-31	ARROYO DEL HAMBRE VALLEY	790	C	-	-	-	-	-	-	-
2-32	VISITACION VALLEY	880	C	-	-	-	-	-	-	-
2-33	ISLAIS VALLEY	1,550	C	-	-	-	-	-	-	-
2-35	MERCED VALLEY	10,400	C	-	-	-	-	10	-	-
2-36	SAN PEDRO VALLEY	880	C	-	-	-	-	-	-	-
2-37	SOUTH SAN FRANCISCO	2,170	C	-	-	-	-	-	-	-
2-38	LOBOS	2,400	A	-	-	-	-	-	-	-
2-39	MARINA	220	A	-	-	-	-	-	-	-
2-40	DOWNTOWN SAN FRANCISCO	7,600	C	-	-	-	-	-	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS - total dissolved solids

Central Coast Hydrologic Region

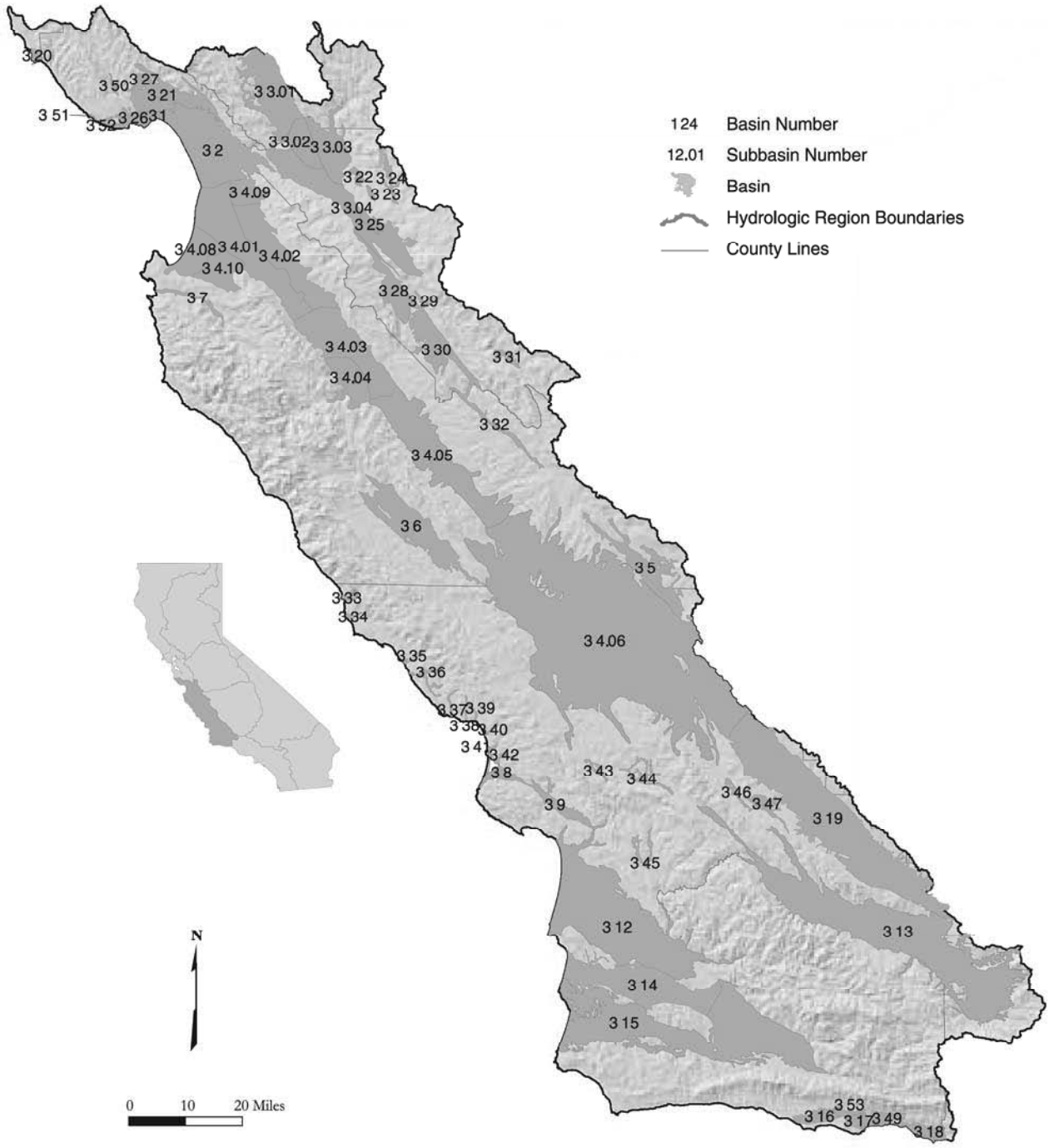

Figure 29 Central Coast Hydrologic Region

Basins and Subbasins of Central Coast Hydrologic Region

RegionBasin/ subbasin	Basin name
3-1	Soquel Valley
3-2	Pajaro Valley
3-3	Gilroy-Hollister Valley
3-3.01	Llagas Area
3-3.02	Bolsa Area
3-3.03	Hollister Area
3-3.04	San Juan Bautista Area
3-4	Salinas Valley
3-4.01	180/400 Foot Aquifer
3-4.02	East Side Aquifer
3-4.04	Forebay Aquifer
3-4.05	Upper Valley Aquifer
3-4.06	Paso Robles Area
3-4.08	Seaside Area
3-4.09	Langley Area
3-4.10	Corral de Tierra Area
3-5	Cholame Valley
3-6	Lockwood Valley
3-7	Carmel Valley
3-8	Los Osos Valley
3-9	San Luis Obispo Valley
3-12	Santa Maria River Valley
3-13	Cuyama Valley
3-14	San Antonio Creek Valley
3-15	Santa Ynez River Valley
3-16	Goleta
3-17	Santa Barbara
3-18	Carpinteria
3-19	Carrizo Plain
3-20	Ano Nuevo Area
3-21	Santa Cruz Purisima Formation
3-22	Santa Ana Valley
3-23	Upper Santa Ana Valley
3-24	Quien Sabe Valley
3-25	Tres Pinos Valley
3-26	West Santa Cruz Terrace
3-27	Scotts Valley
3-28	San Benito River Valley
3-29	Dry Lake Valley
3-30	Bitter Water Valley
3-31	Hernandez Valley
3-32	Peach Tree Valley
3-33	San Carpoforo Valley
3-34	Arroyo de la Cruz Valley

RegionBasin/ subbasin	Basin name
3-35	San Simeon Valley
3-36	Santa Rosa Valley
3-37	Villa Valley
3-38	Cayucos Valley
3-39	Old Valley
3-40	Toro Valley
3-41	Morro Valley
3-42	Chorro Valley
3-43	Rinconada Valley
3-44	Pozo Valley
3-45	Huasna Valley
3-46	Rafael Valley
3-47	Big Spring Area
3-49	Montecito
3-50	Felton Area
3-51	Majors Creek
3-52	Needle Rock Point
3-53	Foothill

Description of the Region

The Central Coast HR covers approximately 7.22 million acres (11,300 square miles) in central California (Figure 29). This HR includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara counties, most of San Benito County, and parts of San Mateo, Santa Clara, and Ventura counties. Significant geographic features include the Pajaro, Salinas, Carmel, Santa Maria, Santa Ynez, and Cuyama valleys; the coastal plain of Santa Barbara; and the Coast Range. Major drainages in the region include the Salinas, Cuyama, Santa Ynez, Santa Maria, San Antonio, San Lorenzo, San Benito, Pajaro, Nacimiento, Carmel, and Big Sur Rivers.

Population data from the 2000 Census suggest that about 1.4 million people or about 4 percent of the population of the State live in this HR. Major population centers include Santa Barbara, Santa Maria, San Luis Obispo, Gilroy, Hollister, Morgan Hill, Salinas, and Monterey.

The Central Coast HR has 50 delineated groundwater basins. Within this region, the Gilroy-Hollister Valley and Salinas Valley groundwater basins are divided into four and eight subbasins, respectively. Groundwater basins in this HR underlie about 2.390 million acres (3,740 square miles) or about one-third of the HR.

Groundwater Development

Locally, groundwater is an extremely important source of water supply. Within the region, groundwater accounted for 83 percent of the annual supply used for agricultural and urban purposes in 1995. For an average year, groundwater in the region accounts for about 8.4 percent of the statewide groundwater supply and about 1.3 percent of the total state water supply for agricultural and urban needs. In drought years, groundwater in this region is expected to account for about 7.2 percent of the statewide groundwater supply and about 1.9 percent of the total State water supply for agricultural and urban needs (DWR 1998).

Aquifers are varied and range from large extensive alluvial valleys with thick multilayered aquifers and aquitards to small inland valleys and coastal terraces. Several of the larger basins provide a dependable and drought-resistant water supply to coastal cities and farms.

Conjunctive use of surface water and groundwater is a long-standing practice in the region. Several reservoirs including Hernandez, Twitchell, Lake San Antonio, and Lake Nacimiento are operated primarily for the purpose of groundwater recharge. The concept is to maintain streamflow over a longer period than would occur without surface water storage and thus provide for increased recharge of groundwater. Seawater intrusion is a major problem throughout much of the region. In the Salinas Valley Groundwater Basin, seawater intrusion was first documented in the 1930s and has been observed more than 5 miles inland.

Groundwater Quality

Much of the groundwater in the region is characterized by calcium sulfate to calcium sodium bicarbonate sulfate water types because of marine sedimentary rock in the watersheds. Aquifers intruded by seawater are typically characterized by sodium chloride to calcium chloride, and have chloride concentrations greater than 500 mg/L. In several areas, groundwater exceeds the MCL for nitrate.

Water Quality in Public Supply Wells

From 1994 through 2000, 711 public supply water wells were sampled in 38 of the 60 basins and subbasins in the Central Coast HR. Analyzed samples indicate that 587 wells, or 83 percent, met the state primary MCLs for drinking water. One-hundred-twenty-four wells, or 17 percent, have constituents that exceed one or more MCL. Figure 30 shows the percentages of each contaminant group that exceeded MCLs in the 124 wells.

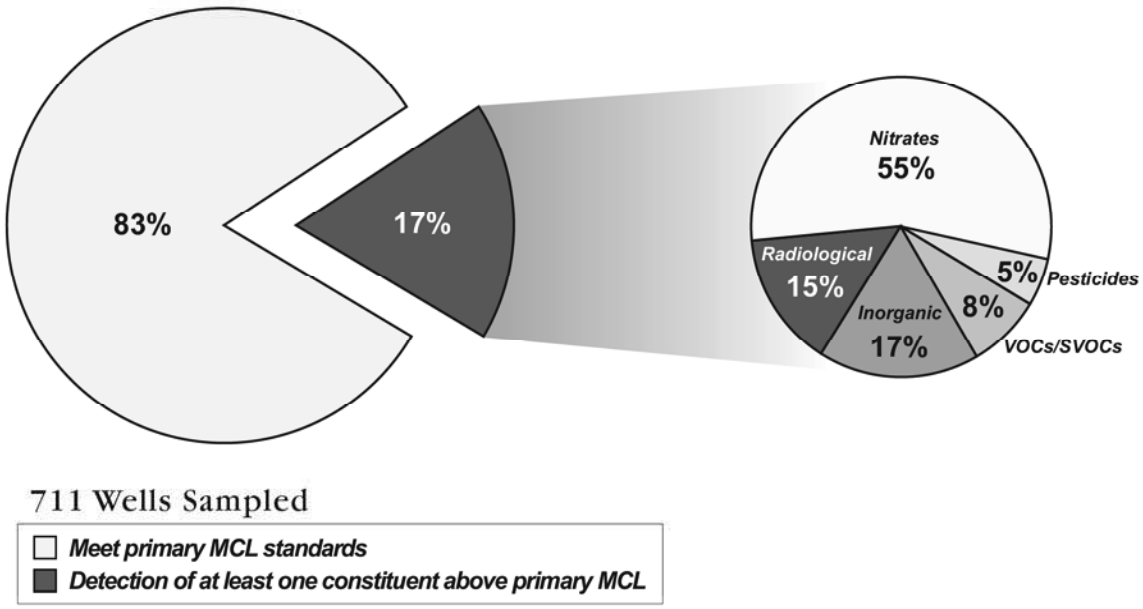

Figure 30 MCL exceedances in public supply wells in the Central Coast Hydrologic Region

Table 19 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 19 Most frequently occurring contaminants by contaminant group in the Central Coast Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Antimony – 6	Aluminum – 4	Chromium (Total) – 4
Inorganics – Secondary	Iron – 145	Manganese – 135	TDS – 11
Radiological	Gross Alpha – 15	Radium 226 – 3	Uranium – 3
Nitrates	Nitrate (as NO_3) – 69	Nitrate + Nitrite – 24	
Pesticides	Heptachlor – 4	Di (2-Ethylhexyl) phthalate – 2	
VOCs/SVOCs	TCE – 3	3 are tied at 2 exceedances	

TCE = Trichloroethylene
VOC = Volatile Organic Compound
SVOC= Semivolatile Organic Compound

Changes from Bulletin 118-80

Four new basins have been defined since Bulletin 118-80. They are Felton Area, Majors Creek, Needle Rock Point, and Foothill groundwater basins. Additionally, new subbasins have been broken out in both the Gilroy-Hollister Valley Groundwater Basin (3-3) and the Salinas Valley Groundwater Basin (3-4) (Table 20).

Table 20 Modifications since Bulletin 118-80 of groundwater basins and subbasins in Central Coast Hydrologic Region

Subbasin name	New number	Old number
Llagas Area	3-3.01	3-3
Bolsa Area	3-3.02	3-3
Hollister Area	3-3.03	3-3
San Juan Bautista Area	3-3.04	3-3
180/400 Foot Aquifer	3-4.01	3-4
East Side Aquifer	3-4.02	3-4
Upper Forebay Aquifer	3-4.04	3-4
Upper Valley Aquifer	3-4.05	3-4
Pismo Creek Valley Basin	3-12	3-10
Arroyo Grande Creek Basin	3-12	3-11
Careaga Sand Highlands Basin	3-12 and 3-14	3-48
Felton Area	3-50	
Majors Creek	3-51	
Needle Rock Point	3-52	
Foothill	3-53	

Pismo Creek Valley Basin (3-10) and Arroyo Grande Creek Basin (3-11) have been merged into the Santa Maria River Valley Basin (3-12). Careaga Sand Highlands Basin (3-48) has been merged into the Santa Maria River Valley Basin (3-12) and San Antonio Creek Valley Basin (3-14).

Table 21 Central Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
3-1	SOQUEL VALLEY	2,500	C	1,421	665	6	6	16	482	270-990
3-2	PAJARO VALLEY	76,800	A	2,000	500	185	185	149	580-910	300-30,000
3-3	GILROY-HOLLISTER VALLEY									
3-3.01	LLAGAS AREA	55,600	C	-	-	-	-	95	-	-
3-3.02	BOLSA AREA	21,000	A	-	400	11	<11	3	-	400-1800
3-3.03	HOLLISTER AREA	32,700	A	-	400	42	<42	35	-	400-1600
3-3.04	SAN JUAN BAUTISTA AREA	74,300	A	-	400	37	<37	40	-	460-1700
3-4	SALINAS VALLEY									
3-4.01	180/400 FOOT AQUIFER	84,400	A	-	-	166	218	82	478	223-1,013
3-4.02	EAST SIDE AQUIFER	57,500	A	-	-	74	67	53	450	168-977
3-4.04	FOREBAY AQUIFER	94,100	A	-	-	89	91	35	624	300-1,100
3-4.05	UPPER VALLEY AQUIFER	98,200	A	4,000	-	36	37	17	443	140-3,700
3-4.06	PASO ROBLES AREA	597,000	A	3,300	-	183	-	58	614	165-3,868
3-4.08	SEASIDE AREA	25,900	B	3,500	1,000		7	24	400	200-900
3-4.09	LANGLEY AREA	15,400	B	1,570	450	-	-	52	-	52-348
3-4.10	CORRAL DE TIERRA AREA	22,300	C	948	450	-	3	26	-	355-679
3-5	CHOLAME VALLEY	39,800	C	3,000	1,000	1	-	1	-	-
3-6	LOCKWOOD VALLEY	59,900	C	1,500	100	-	-	9	-	-
3-7	CARMEL VALLEY	5,160	C	1,000	600	50	23	12	260-670	220-1,200
3-8	LOS OSOS VALLEY	6,990	A	700	230	-	-	10	354	78-33,700
3-9	SAN LUIS OBISPO VALLEY	12,700	A	600	300	-	-	11	583	278-1,949
3-12	SANTA MARIA RIVER VALLEY	184,000	A	2,500	1,000	286	10	108	598	139-1,200
3-13	CUYAMA VALLEY	147,000	A	4,400	1,100	17	2	8	-	206-3,905
3-14	SAN ANTONIO CREEK VALLEY	81,800	A	-	400	30	-	9	415	129-8,040
3-15	SANTA YNEZ RIVER VALLEY	204,000	A	1,300	750	163	21	76	507	400-700
3-16	GOLETA	9,210	A	800	500	49	11	17	755	617-929
3-17	SANTA BARBARA	6,160	A	625	560	75	36	5	-	217-385
3-18	CARPINTERIA	8,120	A	500	300	41	41	4	557	317-1,780
3-19	CARRIZO PLAIN	173,000	C	1,000	500	-	-	1	-	-
3-20	ANO NUEVO AREA	2,032	C	-	-	-	-	2	-	-
3-21	SANTA CRUZ PURISIMA FORMATION	40,200	C	200	20	-	-	39	440	380-560
3-22	SANTA ANA VALLEY	2,720	C	130	-	-	-	-	-	-
3-23	UPPER SANTA ANA VALLEY	1,430	C	-	-	-	-	-	-	-
3-24	QUIEN SABE VALLEY	4,710	C	122	122	-	-	-	-	-
3-25	TRES PINOS VALLEY	3,390	C	1,225	-	-	-	3	-	-
3-26	WEST SANTA CRUZ TERRACE	7,870	C	550	200	-	-	7	480	378-684
3-27	SCOTTS VALLEY	774	C	410	100-900	26	7	7	360	100-980
3-28	SAN BENITO RIVER VALLEY	24,200	C	2,000	-	-	-	3	-	-
3-29	DRY LAKE VALLEY	1,420	C	-	-	-	-	-	-	-
3-30	BITTER WATER VALLEY	32,200	C	-	-	-	-	-	-	-
3-31	HERNANDEZ VALLEY	2,860	C	160	58	-	-	-	-	-

Table 21 Central Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
3-32	PEACH TREE VALLEY	9,790	C	117	84	-	-	-	-	-
3-33	SAN CARPOFORO VALLEY	200	C	-	-	-	-	-	-	217-385
3-34	ARROYO DE LA CRUZ VALLEY	750	C	-	-	-	-	-	-	211-381
3-35	SAN SIMEON VALLEY	620	A	170	100	-	-	4	413	46-2,210
3-36	SANTA ROSA VALLEY	4,480	A	708	400	-	-	2	-	298-2,637
3-37	VILLA VALLEY	980	C	-	-	-	-	-	-	260-1,635
3-38	CAYUCOS VALLEY	530	C	166	100	-	-	-	-	815-916
3-39	OLD VALLEY	750	C	335	200	-	-	-	-	346-2,462
3-40	TORO VALLEY	721	C	500	0	-	-	-	-	458-732
3-41	MORRO VALLEY	1,200	C	442	300	-	-	6	1150	469-5,100
3-42	CHORRO VALLEY	3,200	C	700	200	-	-	6	656	60-3,606
3-43	RINCONADA VALLEY	2,580	C	0	0	-	-	-	-	-
3-44	POZO VALLEY	6,840	C	230	100	-	-	5	-	287-676
3-45	HUASNA VALLEY	4,700	C	0	0	-	-	-	-	-
3-46	RAFAEL VALLEY	2,990	C	0	0	-	-	-	-	-
3-47	BIG SPRING AREA	7,320	C	0	0	-	-	-	-	-
3-49	MONTECITO	6,270	A	1,000	750	88	2	4	700	600-1,100
3-50	FELTON AREA	1,160	C	825	244	6	-	2	-	69-400
3-51	MAJORS CREEK	364	C	50	38	-	-	-	-	-
3-52	NEEDLE ROCK POINT	480	C	450	320	-	-	-	-	-
3-53	FOOTHILL	3,120	A	-	-	-	8	7	828	554-1,118

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

South Coast Hydrologic Region

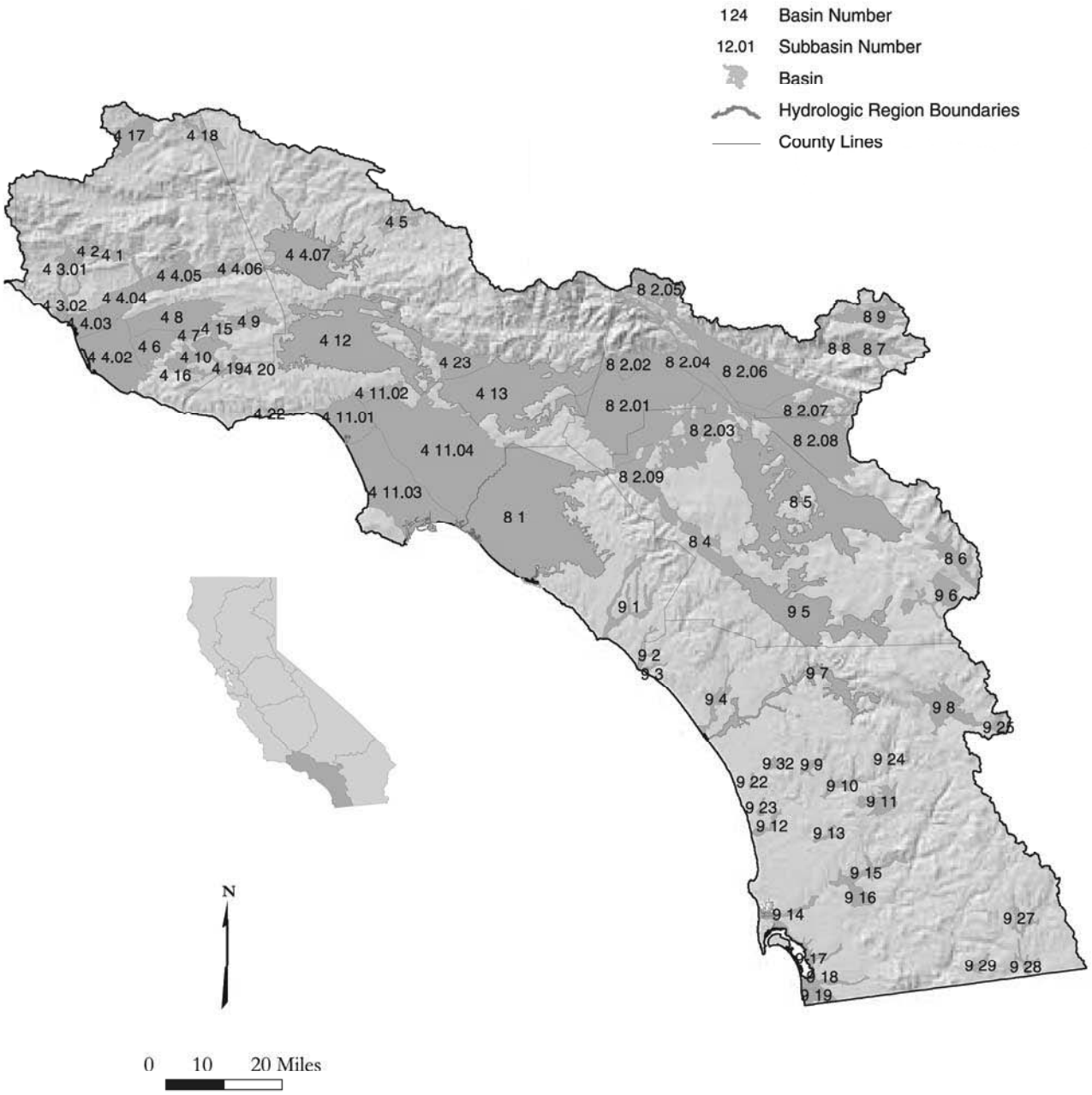

Figure 31 South Coast Hydrologic Region

Basins and Subbasins of the South Coast Hydrologic Region

Basin/subbasin	Basin name
4-1	Upper Ojai Valley
4-2	Ojai Valley
4-3	Ventura River Valley
4-3.01	Upper Ventura River
4-3.02	Lower Ventura River
4-4	Santa Clara River Valley
4-4.02	Oxnard
4-4.03	Mound
4-4.04	Santa Paula
4-4.05	Fillmore
4-4.06	Piru
4-4.07	Santa Clara River Valley East
4-5	Acton Valley
4-6	Pleasant Valley
4-7	Arroyo Santa Rosa Valley
4-8	Las Posas Valley
4-9	Simi Valley
4-10	Conejo Valley
4-11	Coastal Plain of Los Angeles
4-11.01	Santa Monica
4-11.02	Hollywood
4-11.03	West Coast
4-11.04	Central
4-12	San Fernando Valley
4-13	San Gabriel Valley
4-15	Tierre Rejada
4-16	Hidden Valley
4-17	Lockwood Valley
4-18	Hungry Valley
4-19	Thousand Oaks Area
4-20	Russell Valley
4-22	Malibu Valley
4-23	Raymond
8-1	Coastal Plain of Orange County
8-2	Upper Santa Ana Valley
8-2.01	Chino
8-2.02	Cucamonga
8-2.03	Riverside-Arlington
8-2.04	Rialto-Colton
8-2.05	Cajon
8-2.06	Bunker Hill
8-2.07	Yucaipa
8-2.08	San Timoteo
8-2.09	Temescal

Basin/subbasin	Basin name
8-4	Elsinore
8-5	San Jacinto
8-6	Hemet Lake Valley
8-7	Big Meadows Valley
8-8	Seven Oaks Valley
8-9	Bear Valley
9-1	San Juan Valley
9-2	San Mateo Valley
9-3	San Onofre Valley
9-4	Santa Margarita Valley
9-5	Temecula Valley
9-6	Coahuila Valley
9-7	San Luis Rey Valley
9-8	Warner Valley
9-9	Escondido Valley
9-10	San Pasqual Valley
9-11	Santa Maria Valley
9-12	San Dieguito Creek
9-13	Poway Valley
9-14	Mission Valley
9-15	San Diego River Valley
9-16	El Cajon Valley
9-17	Sweetwater Valley
9-18	Otay Valley
9-19	Tijuana Basin
9-22	Batiquitos Lagoon Valley
9-23	San Elijo Valley
9-24	Pamo Valley
9-25	Ranchita Town Area
9-27	Cottonwood Valley
9-28	Campo Valley
9-29	Potrero Valley
9-32	San Marcos Area

Description of the Region

The South Coast HR covers approximately 6.78 million acres (10,600 square miles) of the southern California watershed that drains to the Pacific Ocean (Figure 31). The HR is bounded on the west by the Pacific Ocean and the watershed divide near the Ventura-Santa Barbara County line. The northern boundary corresponds to the crest of the Transverse Ranges through the San Gabriel and San Bernardino mountains. The eastern boundary lies along the crest of the San Jacinto Mountains and low-lying hills of the Peninsular Range that form a drainage boundary with the Colorado River HR. The southern boundary is the international boundary with the Republic of Mexico. Significant geographic features include the coastal plain, the central Transverse Ranges, the Peninsular Ranges, and the San Fernando, San Gabriel, Santa Ana River, and Santa Clara River valleys.

The South Coast HR includes all of Orange County, most of San Diego and Los Angeles Counties, parts of Riverside, San Bernardino, and Ventura counties, and a small amount of Kern and Santa Barbara Counties. This HR is divided into Los Angeles, Santa Ana and San Diego subregions, RWQCBs 4, 8, and 9 respectively. Groundwater basins are numbered according to these subregions. Basin numbers in the Los Angeles subregion are preceded by a 4, in Santa Ana by an 8, and in San Diego by a 9. The Los Angeles subregion contains the Ventura, Santa Clara, Los Angeles, and San Gabriel River drainages, Santa Ana encompasses the Santa Ana River drainage, and San Diego includes the Santa Maria River, San Luis Rey River and the San Diego River and other drainage systems.

According to 2000 census data, about 17 million people live within the boundaries of the South Coast HR, approximately 50 percent of the population of California. Because this HR amounts to only about 7 percent of the surface area of the State, this has the highest population density of any HR in California (DWR 1998). Major population centers include the metropolitan areas surrounding Ventura, Los Angeles, San Diego, San Bernardino, and Riverside.

The South Coast HR has 56 delineated groundwater basins. Twenty-one basins are in subregion 4 (Los Angeles), eight basins in subregion 8 (Santa Ana), and 27 basins in subregion 9 (San Diego).

The Los Angeles subregion overlies 21 groundwater basins and encompasses most of Ventura and Los Angeles counties. Within this subregion, the Ventura River Valley, Santa Clara River Valley, and Coastal Plain of Los Angeles basins are divided into subbasins. The basins in the Los Angeles subregion underlie 1.01 million acres (1,580 square miles) or about 40 percent of the total surface area of the subregion.

The Santa Ana subregion overlies eight groundwater basins and encompasses most of Orange County and parts of Los Angeles, San Bernardino, and Riverside counties. The Upper Santa Ana Valley Groundwater Basin is divided into nine subbasins. Groundwater basins underlie 979,000 acres (1,520 square miles) or about 54 percent of the Santa Ana subregion.

The San Diego subregion overlies 27 groundwater basins, encompasses most of San Diego County, and includes parts of Orange and Riverside counties. Groundwater basins underlie about 277,000 acres (433 square miles) or about 11 percent of the surface of the San Diego subregion.

Overall, groundwater basins underlie about 2.27 million acres (3,530 square miles) or about 33 percent of the South Coast HR.

Groundwater Development

Groundwater has been used in the South Coast HR for well over 100 years. High demand and use of groundwater in Southern California has given rise to many disputes over management and pumping rights, with the resolution of these cases playing a large role in the establishment and clarification of water rights law in California. Raymond Groundwater Basin, located in this HR, was the first adjudicated basin in the State. Of the 16 adjudicated basins in California, 11 are in the South Coast HR. Groundwater provides about 23 percent of water demand in normal years and about 29 percent in drought years (DWR 1998).

Groundwater is found in unconfined alluvial aquifers in most of the basins of the San Diego subregion and the inland basins of the Santa Ana and Los Angeles subregions. In some larger basins, typified by those underlying the coastal plain, groundwater occurs in multiple aquifers separated by aquitards that create confined groundwater conditions. Basins range in depth from tens or hundreds of feet in smaller basins, to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this HR depending on aquifer characteristics and well location, size, and use. Some aquifers are capable of yielding thousands of gallons per minute to municipal wells.

Conjunctive Use

Conjunctive use of surface water and groundwater is a long-standing practice in the region. At present, much of the potable water used in Southern California is imported from the Colorado River and from sources in the eastern Sierra and Northern California. Several reservoirs are operated primarily for the purpose of storing surface water for domestic and irrigation use, but groundwater basins are also recharged from the outflow of some reservoirs. The concept is to maintain streamflow over a longer period of time than would occur without regulated flow and thus provide for increased recharge of groundwater basins. Most of the larger basins in this HR are highly managed, with many conjunctive use projects being developed to optimize water supply.

Coastal basins in this HR are prone to intrusion of seawater. Seawater intrusion barriers are maintained along the Los Angeles and Orange County sections of the coastal plain. In Orange County, recycled water is injected into the ground to form a mound of groundwater between the coast and the main groundwater basin. In Los Angeles County, imported and recycled water is injected to maintain a seawater intrusion barrier.

Groundwater Quality

Groundwater in basins of the Los Angeles subregion is mainly calcium sulfate and calcium bicarbonate in character. Nitrate content is elevated in some parts of the subregion. Volatile organic compounds (VOCs) have created groundwater impairments in some of the industrialized portions of the region. The San Gabriel Valley and San Fernando Valley groundwater basins both have multiple sites of contamination from VOCs. The main constituents in the contamination plumes are trichloroethylene (TCE) and tetrachloroethylene (PCE). Some of the locations have been declared federal Superfund sites. Contamination plumes containing high concentrations of TCE and PCE also occur in the Bunker Hill Subbasin of the Upper Santa Ana Valley Groundwater Basin. Some of these plumes are also designated as Superfund sites. Perchlorate is emerging as an important contaminant in several areas in the South Coast HR.

Groundwater in basins of the Santa Ana subregion is primarily calcium and sodium bicarbonate in character. Local impairments from excess nitrate or VOCs have been recognized. Groundwater and surface water in the Chino Subbasin of the Santa Ana River Valley Groundwater Basin have elevated nitrate concentrations, partly derived from a large dairy industry in that area. In Orange County, water from the Santa Ana River provides a large part of the groundwater replenishment. Wetlands maintained along the Santa Ana River near the boundary of the Upper Santa Ana River and Orange County Groundwater Basins provide effective removal of nitrate from surface water, while maintaining critical habitat for endangered species.

Groundwater in basins of the San Diego subregion has mainly calcium and sodium cations and bicarbonate and sulfate anions. Local impairments by nitrate, sulfate, and TDS are found. Camp Pendleton Marine Base, in the northwestern part of this subregion, is on the EPA National Priorities List for soil and groundwater contamination by many constituents.

Water Quality in Public Supply Wells

From 1994 through 2000, 2,342 public supply water wells were sampled in 47 of the 73 basins and subbasins in the South Coast HR. Analyzed samples indicate that 1,360 wells, or 58 percent, met the state primary MCLs for drinking water. Nine-hundred-eighty-two wells, or 42 percent, have constituents that exceed one or more MCL. Figure 32 shows the percentages of each contaminant group that exceeded MCLs in the 982 wells.

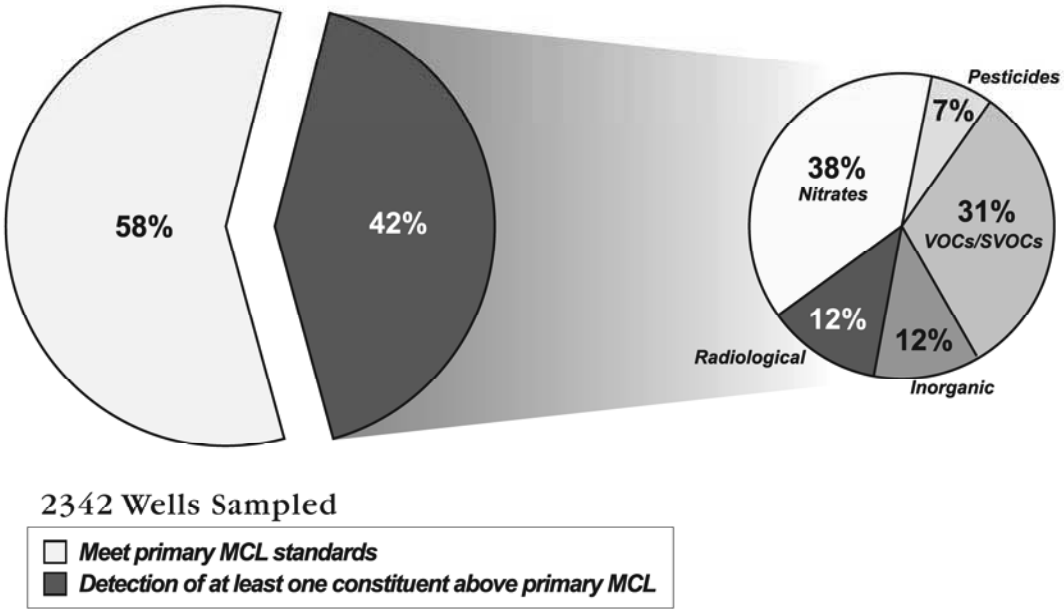

Figure 32 MCL exceedances in public supply wells in the South Coast Hydrologic Region

Table 22 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 23). The Cajalco Valley (8-3), Jamul Valley (9-20), Las Pulgas Valley (9-21), Pine Valley (9-26), and Tecate Valley (9-30) Groundwater Basins have been deleted in this report because they have thin deposits of alluvium and well completion reports indicate that groundwater production is from underlying fractured bedrock. The Conejo Tierra Rejada Volcanic (4-21) is a volcanic aquifer and was not assigned a basin number in this bulletin. This is considered to be groundwater source area as discussed in Chapter 6.

Table 22 Most frequently occurring contaminants by contaminant group in the South Coast Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 56	Thallium – 13	Aluminum – 12
Inorganics – Secondary	Iron – 337	Manganese – 335	TDS – 36
Radiological	Gross Alpha – 104	Uranium – 40	Radium 226 – 9 Radium 228 – 9
Nitrates	Nitrate (as NO_3) – 364	Nitrate + Nitrite – 179	Nitrate Nitrogen (NO_3-N) – 14
Pesticides	DBCP – 61	Di(2-Ethylhexyl)phthalate –5	Heptachlor – 2 EDB – 2
VOCs/SVOCs	TCE – 196	PCE – 152	1,2 Dichloroethane – 89

DBCP = Dibromochloropropane
EDB = Ethylene Dibromide
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds

The Ventura River Valley (4-3), Santa Clara River Valley (4-4), Coastal Plain of Los Angeles (4-11), and Upper Santa Ana Valley (8-2) Groundwater Basins have been divided into subbasins in this report. The extent of the San Jacinto Groundwater Basin (8-5) has been decreased because completion of Diamond Valley Reservoir has inundated the valley. Paloma Valley has been removed because well logs indicate groundwater production is solely from fractured bedrock. The Raymond Groundwater Basin (4-23) is presented as an individual basin instead of being incorporated into the San Gabriel Valley Groundwater Basin (4-13) because it is bounded by physical barriers and has been managed as a separate and individual groundwater basin for many decades. In Bulletin 118-75, groundwater basins in two different subregions were designated the Upper Santa Ana Valley Groundwater Basin (4-14 and 8-2). To alleviate this confusion, basin 4-14 has been divided, with parts of the basin incorporated into the neighboring San Gabriel Valley Groundwater Basin (4-13) and the Chino subbasin of the Upper Santa Ana Valley Groundwater Basin (8-2.01). The San Marcos Area Groundwater Basin (9-32) in central San Diego County is presented as a new basin in this report.

Table 23 Modifications since Bulletin 118-80 of groundwater basins and subbasins in South Coast Hydrologic Region

Basin/subbasin name	Number	Old number
Upper Ventura River	4-3.01	4-3
Lower Ventura River	4-3.02	4-3
Oxnard	4-4.02	4-4
Mound	4-4.03	4-4
Santa Paula	4-4.04	4-4
Fillmore	4-4.05	4-4
Piru	4-4.06	4-4
Santa Clara River Valley East	4-4.07	4-4
Santa Monica	4-11.01	4-11
Hollywood	4-11.02	4-11
West Coast	4-11.03	4-11
Central	4-11.04	4-11
Upper Santa Ana Valley	Incorporated into 8-2.01 and 4-13	4-14
Conejo-Tierra Rejada Volcanic	deleted	4-21
Raymond	4-23	4-13
Chino	8-2.01	8-2
Cucamonga	8-2.02	8-2
Riverside-Arlington	8-2.03	8-2
Rialto-Colton	8-2.04	8-2
Cajon	8-2.05	8-2
Bunker Hill	8-2.06	8-2
Yucaipa	8-2.07	8-2
San Timoteo	8-2.08	8-2
Temescal	8-2.09	8-2
Cajalco Valley	deleted	8-3
Tijuana Basin	9-19	
Jamul Valley	deleted	9-20
Las Pulgas Valley	deleted	9-21
Batiquitos Lagoon Valley	9-22	
San Elijo Valley	9-23	
Pamo Valley	9-24	
Ranchita Town Area	9-25	
Pine Valley	deleted	9-26
Cottonwood Valley	9-27	
Campo Valley	9-28	
Potrero Valley	9-29	
Tecate Valley	deleted	9-30
San Marcos Area	9-32	Not previously identified

Table 24 South Coast Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
4-1	UPPER OJAI VALLEY	3,800	A	200	50	4	-	1	707	438-1,249
4-2	OJAI VALLEY	6,830	A	600	383	24	-	22	640	450-1,140
4-3	VENTURA RIVER VALLEY									
4-3.01	UPPER VENTURA RIVER	7,410	C	-	600	17	-	18	706	500-1,240
4-3.02	LOWER VENTURA RIVER	5,300	A	-	20	-	-	2	-	760-3,000
4-4	SANTA CLARA RIVER VALLEY									
4-4.02	OXNARD	58,000	A	1,600	-	127	127	69	1,102	160-1,800
4-4.03	MOUND	14,800	A	-	700	11	11	4	1,644	1,498-1,908
4-4.04	SANTA PAULA	22,800	A	-	700	60	50	10	1,198	470-3,010
4-4.05	FILLMORE	20,800	A	2,100	700	23	-	10	1,100	800-2,400
4-4.06	PIRU	8,900	A	-	800	19	-	3	1,300	608-2,400
4-4.07	SANTA CLARA RIVER VALLEY EAST	66,200	C	-	-	-	-	62	-	-
4-5	ACTON VALLEY	8,270	A	1,000	140	-	-	7	-	-
4-6	PLEASANT VALLEY	21,600	A	-	1,000	9	-	12	1,110	597-3,490
4-7	ARROYO SANTA ROSA VALLEY	3,740	A	1,200	950	6	-	7	1,006	670-1,200
4-8	LAS POSAS VALLEY	42,200	A	750	-	-	-	24	742	338-1,700
4-9	SIMI VALLEY	12,100	A	-	394	13	-	1	-	1,580
4-10	CONEJO VALLEY	28,900	A	1,000	100	-	-	3	631	335-2,064
4-11	COASTAL PLAIN OF LOS ANGELES									
4-11.01	SANTA MONICA	32,100	C	4,700	-	-	-	12	916	729-1,156
4-11.02	HOLLYWOOD	10,500	A	-	-	5	5	1	-	526
4-11.03	WEST COAST	91,300	A	1,300	-	67	58	33	456	-
4-11.04	CENTRAL	177,000	A	11,000	1,730	302	64	294	453	200-2,500
4-12	SAN FERNANDO VALLEY	145,000	A	3,240	1,220	1398	2385	126	499	176-1,16
4-13	SAN GABRIEL VALLEY	154,000	A	4,850	1,000	67	296	259	367	90-4,288
4-15	TIERRA REJADA	4,390	A	1,200	172	4	1	-	-	619-930
4-16	HIDDEN VALLEY	2,210	C	-	-	-	-	1	453	289-743
4-17	LOCKWOOD VALLEY	21,800	A	350	25	-	-	1	-	-
4-18	HUNGRY VALLEY	5,310	C	-	28	-	-	-	<350	-
4-19	THOUSAND OAKS AREA	3,110	C	-	39	2	-	-	1,410	1,200-2,300
4-20	RUSSELL VALLEY	3,100	A	-	25	-	-	-	-	-
4-22	MALIBU VALLEY	613	C	1,060	1,030	-	-	-	-	-
4-23	RAYMOND	26,200	A	3,620	1,880	88	-	70	346	138-780
8-1	COASTAL PLAIN OF ORANGE COUNTY	224,000	A	4,500	2,500	521	411	240	475	232-661
8-2	UPPER SANTA ANA VALLEY									
8-2.01	CHINO	154,000	A	1,500	1,000	12	8	187	484	200-600
8-2.02	CUCAMONGA	9,530	C	4,400	2,115	1	1	21	-	-
8-2.03	RIVERSIDE-ARLINGTON	58,600	A	-	-	11	3	43	-	370-756
8-2.04	RIALTO-COLTON	30,100	A	5,000	545	50	5	41	337	
8-2.05	CAJON	23,200	C	200	60	-	-	5	-	-
8-2.06	BUNKER HILL	89,600	A	5,000	1,245	398	169	204	-	150-550
8-2.07	YUCAIPA	25,300	A	2,800	206	19	3	45	334	-

Table 24 South Coast Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Active Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
8-2.08	SAN TIMOTEO	73,100	A	-	-	67	12	36	-	-
8-2.09	TEMESCAL	23,500	C	-	-	2	2	20	753	373-950
8-4	ELSINORE	25,700	C	5,400	-	1	1	18	-	
8-5	SAN JACINTO	188,000	C	-	-	150	115	56	463	160-12,000
8-6	HEMET LAKE VALLEY	16,700	C	820	196	-	-	9	-	-
8-7	BIG MEADOWS VALLEY	14,200	C	120	34	-	-	8	-	-
8-8	SEVEN OAKS VALLEY	4,080	C	-	-	-	-	1	-	-
8-9	BEAR VALLEY	19,600	A	1,000	500	57	57	52	-	-
9-1	SAN JUAN VALLEY	16,700	C	1,000	-	-	-	8	760	430-12,880
9-2	SAN MATEO VALLEY	2,990	A	-	-	-	-	5	586	490-770
9-3	SAN ONOFRE VALLEY	1,250	A	-	-	-	-	2	-	600-1,500
9-4	SANTA MARGARITA VALLEY	626	A	1,980	-	4	-	-	-	337-9,030
9-5	TEMECULA VALLEY	87,800	C	1,750	-	140	4	67	476	220-1,500
9-6	COAHUILA VALLEY	18,200	C	500	-	2	-	1	-	304-969
9-7	SAN LUIS REY VALLEY	37,000	C	2,000	500	-	-	28	1,258	530-7,060
9-8	WARNER VALLEY	24,000	C	1,800	800	-	-	4	-	263
9-9	ESCONDIDO VALLEY	2,890	C	190	50	-	-	1	-	250-5,000
9-10	SAN PASQUAL VALLEY	4,540	C	1,700	1,000	-	-	2	-	500-1,550
9-11	SANTA MARIA VALLEY	12,300	A	500	36	3	-	2	1,000	324-1,680
9-12	SAN DIEGUITO CREEK	3,560	A	1,800	700	-	-	-	-	2,000
9-13	POWAY VALLEY	2,470	C	200	100	-	-	1	-	610-1,500
9-14	MISSION VALLEY	7,350	C	-	1,000	-	-	-	-	-
9-15	SAN DIEGO RIVER VALLEY	9,890	C	2,000	-	-	-	5	-	260-2,870
9-16	EL CAJON VALLEY	7,160	C	300	50	1	-	2,340		
9-17	SWEETWATER VALLEY	5,920	C	1,500	300	7	7	9	2,114	300-50,000
9-18	OTAY VALLEY	6,830	C	1,000	185	-	-	-	-	500->2,000
9-19	TIJUANA BASIN	7,410	A	2,000	350	-	-	-	-	380-3,620
9-22	BATIQUITOS LAGOON VALLEY	741	C	-	-	-	-	-	1,280	788-2,362
9-23	SAN ELIJO VALLEY	883	C	1,800	-	-	-	-	-	1,170-5,090
9-24	PAMO VALLEY	1,500	C	-	-	-	-	-	369	279-455
9-25	RANCHITA TOWN AREA	3,130	C	125	22	-	-	-	-	283-305
9-27	COTTONWOOD VALLEY	3,850	C	-	-	-	-	1	-	-
9-28	CAMPO VALLEY	3,550	C	-	<40	-	-	4	-	800
9-29	POTRERO VALLEY	2,020	C	-	-	-	-	4	-	-
9-32	SAN MARCOS VALLEY	2,130	C	60	-	-	-	-	-	500-700

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

Sacramento River Hydrologic Region

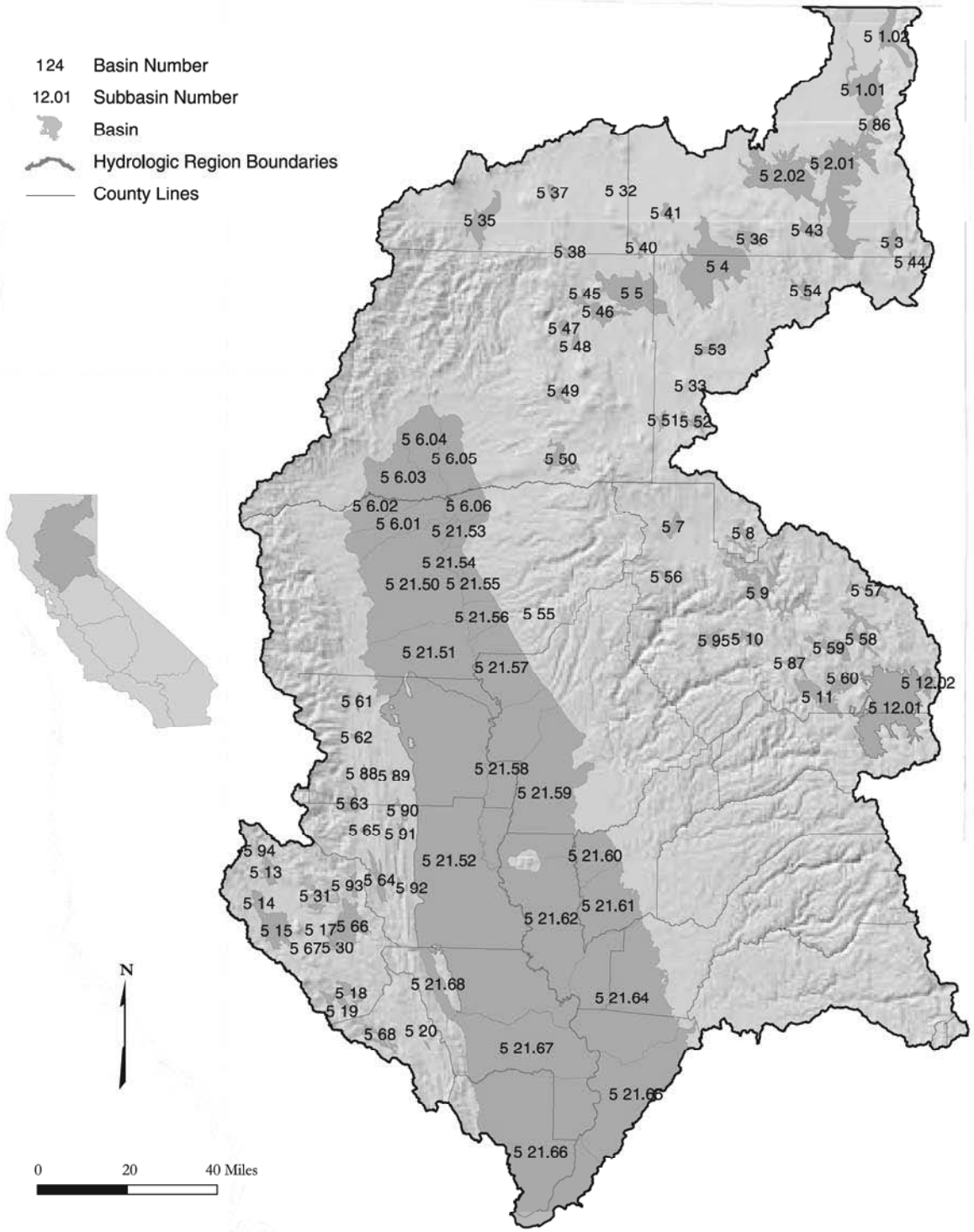

Figure 33 Sacramento River Hydrologic Region

Basins and Subbasins of the Sacramento River Hydrologic Region

Basin/subbasins	Basin name
5-1	Goose Lake Valley
5-1.01	Lower Goose Lake Valley
5-1.02	Fandango Valley
5-2	Alturas Area
5-2.01	South Fork Pitt River
5-2.02	Warm Springs Valley
5-3	Jess Valley
5-4	Big Valley
5-5	Fall River Valley
5-6	Redding Area
5-6.01	Bowman
5-6.02	Rosewood
5-6.03	Anderson
5-6.04	Enterprise
5-6.05	Millville
5-6.06	South Battle Creek
5-7	Lake Almanor Valley
5-8	Mountain Meadows Valley
5-9	Indian Valley
5-10	American Valley
5-11	Mohawk Valley
5-12	Sierra Valley
5-12.01	Sierra Valley
5-12.02	Chilcoot
5-13	Upper Lake Valley
5-14	Scotts Valley
5-15	Big Valley
5-16	High Valley
5-17	Burns Valley
5-18	Coyote Valley
5-19	Collayomi Valley
5-20	Berryessa Valley
5-21	Sacramento Valley
5-21.50	Red Bluff
5-21.51	Corning
5-21.52	Colusa
5-21.53	Bend
5-21.54	Antelope
5-21.55	Dye Creek
5-21.56	Los Molinos
5-21.57	Vina
5-21.58	West Butte
5-21.59	East Butte
5-21.60	North Yuba
5-21.61	South Yuba
5-21.62	Sutter
5-21.64	North American
5-21.65	South American
5-21.66	Solano
5-21.67	Yolo
5-21.68	Capay Valley

Basin/subbasins	Basin name
5-30	Lower Lake Valley
5-31	Long Valley
5-35	Mccloud Area
5-36	Round Valley
5-37	Toad Well Area
5-38	Pondosa Town Area
5-40	Hot Springs Valley
5-41	Egg Lake Valley
5-43	Rock Prairie Valley
5-44	Long Valley
5-45	Cayton Valley
5-46	Lake Britton Area
5-47	Goose Valley
5-48	Burney Creek Valley
5-49	Dry Burney Creek Valley
5-50	North Fork Battle Creek
5-51	Butte Creek Valley
5-52	Gray Valley
5-53	Dixie Valley
5-54	Ash Valley
5-56	Yellow Creek Valley
5-57	Last Chance Creek Valley
5-58	Clover Valley
5-59	Grizzly Valley
5-60	Humbug Valley
5-61	Chrome Town Area
5-62	Elk Creek Area
5-63	Stonyford Town Area
5-64	Bear Valley
5-65	Little Indian Valley
5-66	Clear Lake Cache Formation
5-68	Pope Valley
5-86	Joseph Creek
5-87	Middle Fork Feather River
5-88	Stony Gorge Reservoir
5-89	Squaw Flat
5-90	Funks Creek
5-91	Antelope Creek
5-92	Blanchard Valley
5-93	North Fork Cache Creek
5-94	Middle Creek
5-95	Meadow Valley

Description of the Region

The Sacramento River HR covers approximately 17.4 million acres (27,200 square miles). The region includes all or large portions of Modoc, Siskiyou, Lassen, Shasta, Tehama, Glenn, Plumas, Butte, Colusa, Sutter, Yuba, Sierra, Nevada, Placer, Sacramento, El Dorado, Yolo, Solano, Lake, and Napa counties (Figure 33). Small areas of Alpine and Amador counties are also within the region. Geographically, the region extends south from the Modoc Plateau and Cascade Range at the Oregon border, to the Sacramento-San Joaquin Delta. The Sacramento Valley, which forms the core of the region, is bounded to the east by the crest of the Sierra Nevada and southern Cascades and to the west by the crest of the Coast Range and Klamath Mountains. Other significant features include Mount Shasta and Lassen Peak in the southern Cascades, Sutter Buttes in the south central portion of the valley, and the Sacramento River, which is the longest river system in the State of California with major tributaries the Pit, Feather, Yuba, Bear and American rivers. The region corresponds approximately to the northern half of RWQCB 5. The Sacramento metropolitan area and surrounding communities form the major population center of the region. With the exception of Redding, cities and towns to the north, while steadily increasing in size, are more rural than urban in nature, being based in major agricultural areas. The 1995 population of the entire region was 2.372 million.

The climate in the northern, high desert plateau area of the region is characterized by cold snowy winters with only moderate precipitation and hot dry summers. This area depends on adequate snowpack to provide runoff for summer supply. Annual precipitation ranges from 10 to 20 inches. Other mountainous areas in the northern and eastern portions of the region have cold wet winters with large amounts of snow, which typically provide abundant runoff for summer supplies. Annual precipitation ranges from 40 to more than 80 inches. Summers are generally mild in these areas. The Coast Range and southern Klamath Mountains receive copious amounts of precipitation, but most of the runoff flows to the coast in the North Coastal drainage. Sacramento Valley comprises the remainder of the region. At a much lower elevation than the rest of the region, the valley has mild winters with moderate precipitation. Annual precipitation varies from about 35 inches in Redding to about 18 inches in Sacramento. Summers in the valley are hot and dry.

Most of the mountainous portions of the region are heavily forested and sparsely populated. Three major national forests (Mendocino, Trinity, and Shasta) make up the majority of lands in the Coast Range, southern Klamath Mountains, and the southern Cascades; these forests and the region's rivers and lakes provide abundant recreational opportunities. In the few mountain valleys with arable land, alfalfa, grain and pasture are the predominant crops. In the foothill areas of the region, particularly adjacent to urban centers, suburban to rural housing development is occurring along major highway corridors. This development is leading to urban sprawl and is replacing the former agricultural production on those lands. In the Sacramento Valley, agriculture is the largest industry. Truck, field, orchard, and rice crops are grown on approximately 2.1 million acres. Rice represents about 23 percent of the total irrigated acreage.

The Sacramento River HR is the main water supply for much of California's urban and agricultural areas. Annual runoff in the HR averages about 22.4 maf, which is nearly one-third of the State's total natural runoff. Major water supplies in the region are provided through surface storage reservoirs. The two largest surface water projects in the region are USBR's Shasta Lake (Central Valley Project) on the upper Sacramento River and Lake Oroville (DWR's State Water Project) on the Feather River. In all, there are more than 40 major surface water reservoirs in the region. Municipal, industrial, and agricultural supplies to the region are about 8 maf, with groundwater providing about 2.5 maf of that total. Much of the remainder of the runoff goes to dedicated natural flows, which support various environmental requirements, including in-stream fishery flows and flushing flows in the Delta.

Groundwater Development

Groundwater provides about 31 percent of the water supply for urban and agricultural uses in the region, and has been developed in both the alluvial basins and the hard rock uplands and mountains. There are 88 basins/subbasins delineated in the region. These basins underlie 5.053 million acres (7,900 square miles), about 29 percent of the entire region. The reliability of the groundwater supply varies greatly. The Sacramento Valley is recognized as one of the foremost groundwater basins in the State, and wells developed in the sediments of the valley provide excellent supply to irrigation, municipal, and domestic uses. Many of the mountain valleys of the region also provide significant groundwater supplies to multiple uses.

Geologically, the Sacramento Valley is a large trough filled with sediments having variable permeabilities; as a result, wells developed in areas with coarser aquifer materials will produce larger amounts of water than wells developed in fine aquifer materials. In general, well yields are good and range from one-hundred to several thousand gallons per minute. Because surface water supplies have been so abundant in the valley, groundwater development for agriculture primarily supplement the surface supply. With the changing environmental laws and requirements, this balance is shifting to a greater reliance on groundwater, and conjunctive use of both supplies is occurring to a greater extent throughout the valley, particularly in drought years. Groundwater provides all or a portion of municipal supply in many valley towns and cities. Redding, Anderson, Chico, Marysville, Sacramento, Olivehurst, Wheatland, Willows, and Williams rely to differing degrees on groundwater. Red Bluff, Corning, Woodland, Davis, and Dixon are completely dependent on groundwater. Domestic use of groundwater varies, but in general, rural unincorporated areas rely completely on groundwater.

In the mountain valleys and basins with arable land, groundwater has been developed to supplement surface water supplies. Most of the rivers and streams of the area have adjudicated water rights that go back to the early 1900s, and diversion of surface water has historically supported agriculture. Droughts and increased competition for supply have led to significant development of groundwater for irrigation. In some basins, the fractured volcanic rock underlying the alluvial fill is the major aquifer for the area. In the rural mountain areas of the region, domestic supplies come almost entirely from groundwater. Although a few mountain communities are supplied in part by surface water, most rely on groundwater. These groundwater supplies are generally quite reliable in areas that have sufficient aquifer storage or where surface water replenishes supply throughout the year. In areas that depend on sustained runoff, water levels can be significantly depleted in drought years and many old, shallow wells can be dewatered. During 2001, an extreme drought year on the Modoc Plateau, many well owners experienced problems with water supply.

Groundwater development in the fractured rocks of the foothills of the southern Cascades and Sierra Nevada is fraught with uncertainty. Groundwater supplies from fractured rock sources are highly variable in terms of water quantity and water quality and are an uncertain source for large-scale residential development. Originally, foothill development relied on water supply from springs and river diversions with flumes and ditches for conveyance that date back to gold mining era operations. Current development is primarily based on individual private wells, and as pressures for larger scale development increase, questions about the reliability of supply need to be addressed. Many existing foothill communities have considerable experience with dry or drought year shortages. In Butte County residents in Cohasset, Forest Ranch, and Magalia have had to rely on water brought up the ridges in tanker trucks. The suggested answer has been the development of regional water supply projects. Unfortunately, the area's development pattern of small, geographically dispersed population centers does not lend itself to the kind of financial base necessary to support such projects.

Groundwater Quality

Groundwater quality in the Sacramento River HR is generally excellent. However, there are areas with local groundwater problems. Natural water quality impairments occur at the north end of the Sacramento Valley in the Redding subbasin, and along the margins of the valley and around the Sutter Buttes, where Cretaceous-age marine sedimentary rocks containing brackish to saline water are near the surface. Water from the older underlying sediments mixes with the fresh water in the younger alluvial aquifer and degrades the quality. Wells constructed in these areas typically have high TDS. Other local natural impairments are moderate levels of hydrogen sulfide in groundwater in the volcanic and geothermal areas in the western portion of the region. In the Sierra foothills, there is potential for encountering uranium and radon-bearing rock or sulfide mineral deposits containing heavy metals. Human-induced impairments are generally associated with individual septic system development in shallow unconfined portions of aquifers or in fractured hard rock areas where insufficient soil depths are available to properly leach effluent before it reaches the local groundwater supply.

Water Quality in Public Supply Wells

From 1994 through 2000, 1,356 public supply water wells were sampled in 51 of the 88 basins and subbasins in the Sacramento River HR. Samples analyzed indicate that 1,282 wells, or 95 percent, met the state primary MCLs for drinking water. Seventy-four wells, or 5 percent, have constituents that exceed one or more MCL. Figure 34 shows the percentages of each contaminant group that exceeded MCLs in the 74 wells.

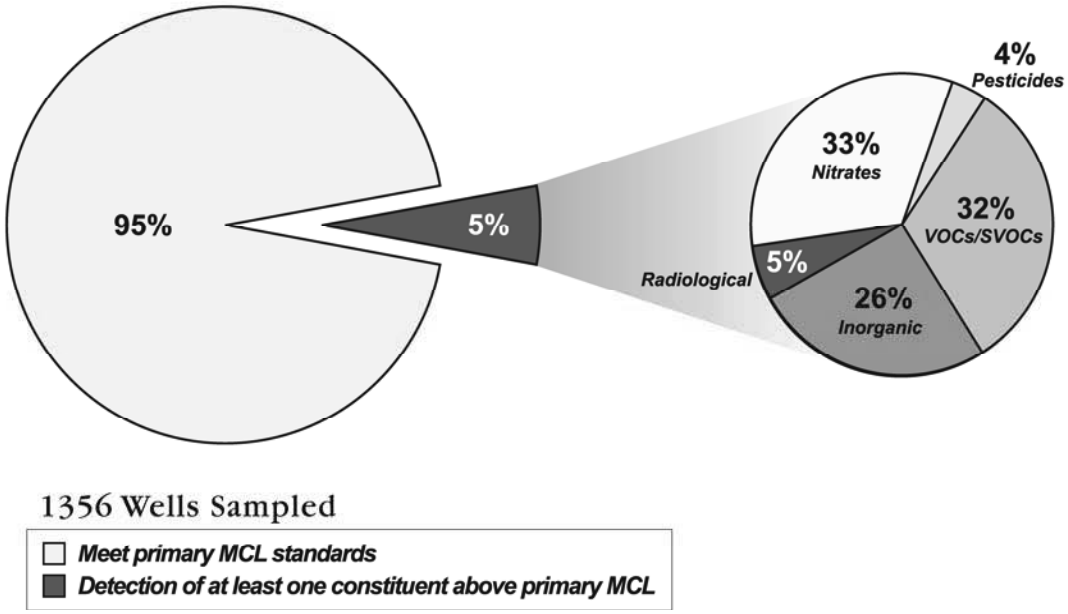

Figure 34 MCL exceedances in public supply wells in the Sacramento River Hydrologic Region

Table 25 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 25 Most frequently occurring contaminants by contaminant group in the Sacramento River Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Cadmium – 4	Chromium (Total) – 3	3 tied at 2
Inorganics – Secondary	Manganese – 221	Iron – 166	Specific Conductance – 3
Radiological	Gross Alpha – 4		
Nitrates	Nitrate (as NO_3) – 22	Nitrate + Nitrite – 5	Nitrate Nitrogen (NO_3-N) – 2
Pesticides	Di(2-Ethylhexyl)phthalate – 4		
VOCs/SVOCs	PCE – 11	TCE – 7	Benzene – 4

PCE = Tetrachloroethylene
TCE = Trichloroethylene
VOC = Volatile Organic Compounds
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

Some modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report. These are listed in Table 26.

Table 26 Modifications since Bulletin 118-80 of groundwater basins and subbasins in Sacramento River Hydrologic Region

Basin name	New number	Old number
Fandango Valley	5-1.02	5-39
Bucher Swamp Valley	deleted	5-42
Modoc Plateau Recent Volcanic Areas	deleted	5-32
Modoc Plateau Pleistocene Volcanic Areas	deleted	5-33
Mount Shasta Area	deleted	5-34
Sacramento Valley Eastside Tuscan Formation Highlands	deleted	5-55
Clear Lake Pleistocene Volcanics	deleted	5-67

No additional basins were assigned to the Sacramento River HR in this revision. However, four basins have been divided into subbasins. Goose Lake Valley Groundwater Basin (5-1) has been subdivided into two subbasins, Fandango Valley (5-39) was modified to be a subbasin of Goose Lake Valley. Redding Area Groundwater Basin has been subdivided into six subbasins, Sierra Valley Groundwater Basin has been subdivided into two subbasins, and the Sacramento Valley Groundwater Basin has been subdivided into 18 subbasins.

There are several deletions of groundwater basins from Bulletin 118-80. Bucher Swamp Valley Basin (5-42) was deleted due to a thin veneer of alluvium over rock. Modoc Plateau Recent Volcanic Areas (5-32), Modoc Plateau Pleistocene Volcanic Areas (5-33), Mount Shasta Area (5-34), Sacramento Valley Eastside Tuscan Formation Highlands (5-55), and Clear Lake Pleistocene Volcanics (5-67) are volcanic aquifers and were not assigned basin numbers in this bulletin. These are considered to be groundwater source areas as discussed in Chapter 6.

Table 27 Sacramento River Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-1	GOOSE LAKE VALLEY									
5-1.01	LOWER GOOSE LAKE	36,000	B	-	400	9	9	-	183	68 - 528
5-1.02	FANDANGO VALLEY	18,500	B	2,000	-	3	-	-	-	-
5-2	ALTURAS AREA								357	180 - 800
5-2.01	SOUTH FORK PITT RIVER	114,000	B	5,000	1,075	9	-	8	-	-
5-2.02	WARM SPRINGS VALLEY	68,000	B	400	314	3	-	11	-	-
5-3	JESS VALLEY	6,700	B		3,000	-	-	-	-	-
5-4	BIG VALLEY	92,000	B	4,000	880	19	9	10	260	141 - 633
5-5	FALL RIVER VALLEY	54,800	B	1,500	266	16	7	3	174	115 - 232
5-6	REDDING AREA									
5-6.01	BOWMAN	85,330	B	2,000	589	8	2	13	-	70 - 247
5-6.02	ROSEWOOD	45,320	B	-	-	4	-	-	-	118 - 218
5-6.03	ANDERSON	98,500	B	1,800	46	11	10	69	194	109-320
5-6.04	ENTERPRISE	60,900	B	700	266	11	3	43	-	160 - 210
5-6.05	MILLVILLE	67,900	B	500	254	6	5	4	140	-
5-6.06	SOUTH BATTLE CREEK	32,300	B	-	-	0	0	0	360	-
5-7	LAKE ALMANOR VALLEY	7,150	B	-	-	10	4	4	105	53 - 260
5-8	MOUNTAIN MEADOWS VALLEY	8,150	B	-	-	-	-	-	-	-
5-9	INDIAN VALLEY	29,400	B	-	-	-	4	9	-	-
5-10	AMERICAN VALLEY	6,800	B	40	40		4	11	-	-
5-11	MOHAWK VALLEY	19,000	B	-	500	1	2	15	248	210 - 285
5-12	SIERRA VALLEY									
5-12.01	SIERRA VALLEY	117,700	B	1,500	640	34	15	9	312	110 - 1,620
5-12.02	CHILCOOT	7,550	B	-	-	15	-	8	-	-
5-13	UPPER LAKE VALLEY	7,260	B	900	302	12	3	6	-	-
5-14	SCOTTS VALLEY	7,320	B	1,200	171	9	1	9	158	140 - 175
5-15	BIG VALLEY	24,210	B	1,470	475	49	11	7	535	270 - 790
5-16	HIGH VALLEY	2,360	B	100	37	5	2	-	598	480 - 745
5-17	BURNS VALLEY	2,900	B	-	30	1	5	-	335	280 - 455
5-18	COYOTE VALLEY	6,530	B	800	446	6	3	3	288	175 - 390
5-19	COLLAYOMI VALLEY	6,500	B	1,000	121	10	4	3	202	150 - 255
5-20	BERRYESSA VALLEY	1,400	C	-	-	0	-	0	-	-
5-21	SACRAMENTO VALLEY									
5-21.50	RED BLUFF	266,750	B	1,200	363	30	10	56	207	120 - 500
5-21.51	CORNING	205,640	B	3,500	977	29	7	30	286	130 - 490
5-21.52	COLUSA	918,380	B	5,600	984	98	30	134	391	120 - 1,220
5-21.53	BEND	20,770	B	-	275	0	3	9		334-360
5-21.54	ANTELOPE	18,710	B	800	575	4	5	22	296	-
5-21.55	DYE CREEK	27,730	B	3,300	890	8	1	3	240	159 - 396
5-21.56	LOS MOLINOS	33,170	B	1,000	500	3	3	9	217	
5-21.57	VINA	125,640	B	3,850	1,212	23	5	69	285	48 - 543
5-21.58	WEST BUTTE	181,600	B	4,000	1,833	32	8	36	293	130 - 676

Table 27 Sacramento River Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-21.59	EAST BUTTE	265,390	B	4,500	1,019	43	4	44	235	122 - 570
5-21.60	NORTH YUBA	100,400	C	4,000	-	21	-	32	-	-
5-21.61	SOUTH YUBA	107,000	C	4,000	1,650	56	-	6	-	-
5-21.62	SUTTER	234,000	C	-	-	34	-	115	-	-
5-21.64	NORTH AMERICAN	351,000	A	-	800	121	-	339	300	150 - 1,000
5-21.65	SOUTH AMERICAN	248,000	C	-	-	105	-	247	221	24-581
5-21.66	SOLANO	425,000	C	-	-	123	23	136	427	150 - 880
5-21.67	YOLO	226,000	B	4,000+	1,000	127	20	185	880	480 - 2,060
5-21.68	CAPAY VALLEY	25,000	C	-	-	11	-	3	-	-
5-30	LOWER LAKE VALLEY	2,400	B	100	37		3	5	568	290 - 1,230
5-31	LONG VALLEY	2,600	B	100	63	-	-	-	-	-
5-35	MCCLOUD AREA	21,320	B	-	380	-	-	1	-	-
5-36	ROUND VALLEY	7,270	B	2,000	800	2				148 - 633
5-37	TOAD WELL AREA	3,360	B	-	-	-	-	-	-	-
5-38	PONDOSA TOWN AREA	2,080	B	-	-	-	-	-	-	-
5-40	HOT SPRINGS VALLEY	2,400	B	-	-	-	-	-	-	-
5-41	EGG LAKE VALLEY	4,100	B	-	20	-	-	-	-	-
5-43	ROCK PRAIRIE VALLEY	5,740	B	-	-	-	-	-	-	-
5-44	LONG VALLEY	1,090	B	-	-	-	-	-	-	-
5-45	CAYTON VALLEY	1,300	B	-	400	-	-	-	-	-
5-46	LAKE BRITTON AREA	14,060	B	-	-	-	-	2	-	-
5-47	GOOSE VALLEY	4,210	B	-	-	-	-	-	-	-
5-48	BURNEY CREEK VALLEY	2,350	B	-	-	-	-	2	-	-
5-49	DRY BURNEY CREEK VALLEY	3,070	B	-	-	-	-	-	-	-
5-50	NORTH FORK BATTLE CREEK VALLEY	12,760	B	-	-	-	-	3	-	-
5-51	BUTTE CREEK VALLEY	3,230	B	-	-	-	-	-	-	-
5-52	GRAYS VALLEY	5,440	B	-	-	-	-	-	-	-
5-53	DIXIE VALLEY	4,870	B	-	-	-	-	-	-	-
5-54	ASH VALLEY	6,010	B	3,000	2,200	-	-	-	-	-
5-56	YELLOW CREEK VALLEY	2,310	B	-	-	-	-	-	-	-
5-57	LAST CHANCE CREEK VALLEY	4,660	B	-	-	-	-	-	-	-
5-58	CLOVER VALLEY	16,780	B	-	-	-	-	-	-	-
5-59	GRIZZLY VALLEY	13,400	B	-	-	-	-	1	-	-
5-60	HUMBUG VALLEY	9,980	B	-	-	-	-	8	-	-
5-61	CHROME TOWN AREA	1,410	B	-	-	-	-	-	-	-
5-62	ELK CREEK AREA	1,440	B	-	-	-	-	-	-	-
5-63	STONYFORD TOWN AREA	6,440	B	-	-	-	-	-	-	-
5-64	BEAR VALLEY	9,100	B	-	-	-	-	-	-	-
5-65	LITTLE INDIAN VALLEY	1,270	B	-	-	-	-	-	-	-
5-66	CLEAR LAKE CACHE FORMATION	30,000	B	245	52		-	4	-	-
5-68	POPE VALLEY	7,180	C	-	-	-	-	1	-	-
5-86	JOSEPH CREEK	4,450	B	-	-	-	-		-	-

Table 27 Sacramento River Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-87	MIDDLE FORK FEATHER RIVER	4,340	B	-	-	-	-	2	-	-
5-88	STONY GORGE RESERVOIR	1,070	B	-	-	-	-	-	-	-
5-89	SQUAW FLAT	1,300	C	-	-	-	-	-	-	-
5-90	FUNKS CREEK	3,000	C	-	-	-	-	-	-	-
5-91	ANTELOPE CREEK	2,040	B	-	-	-	-	-	-	-
5-92	BLANCHARD VALLEY	2,200	B	-	-	-	-	-	-	-
5-93	NORTH FORK CACHE CREEK	3,470	C	-	-	-	-	-	-	-
5-94	MIDDLE CREEK	700	B	-	75	-	-	1	-	-
5-95	MEADOW VALLEY	5,730	B	-	-	-	-	1	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

San Joaquin River Hydrologic Region

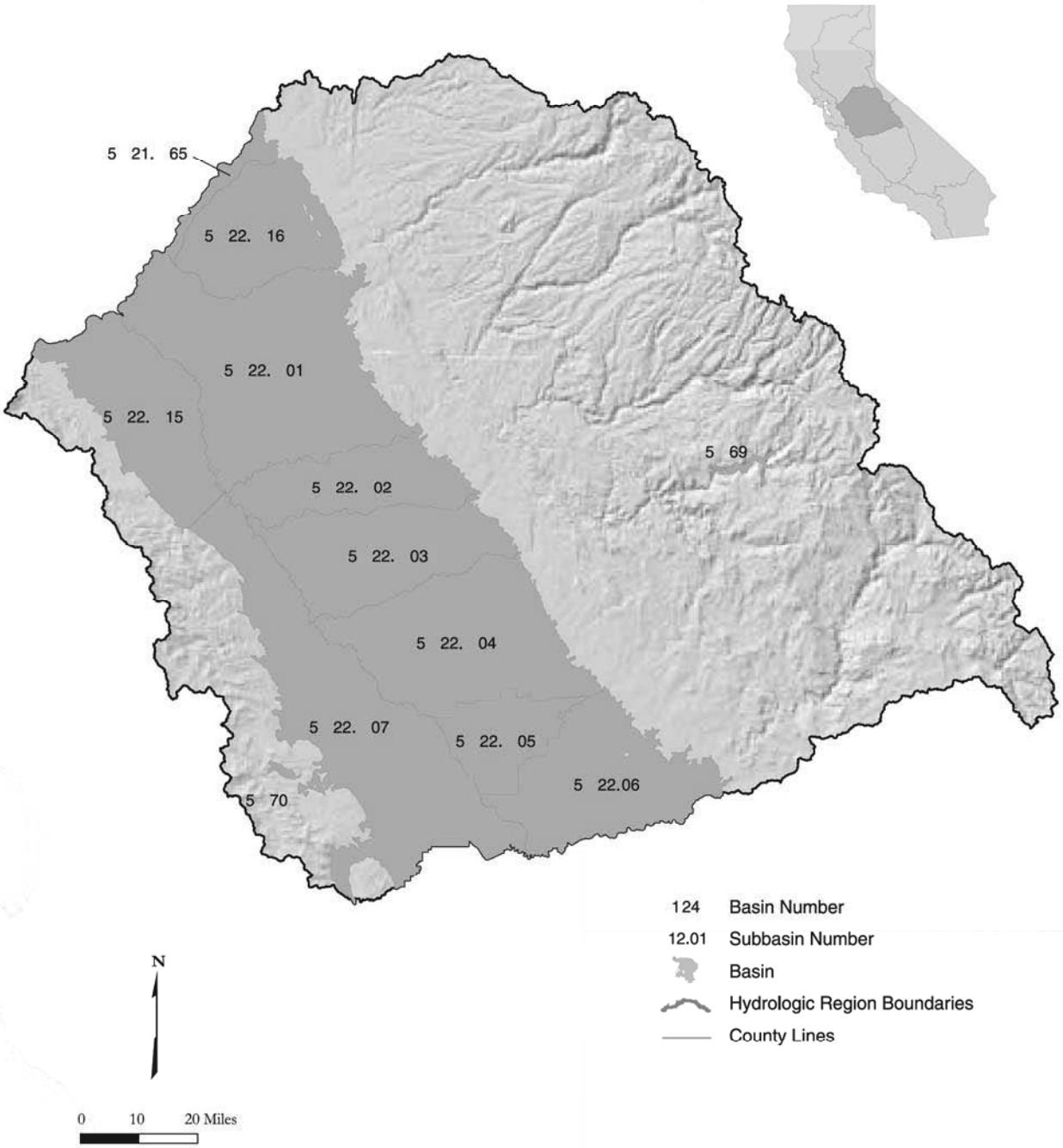

Figure 35 San Joaquin River Hydrologic Region

Basins and Subbasins of the San Joaquin River Hydrologic Region

Basin/subbasin	Basin name
5-22	San Joaquin Valley
5-22.01	Eastern San Joaquin
5-22.02	Modesto
5-22.03	Turlock
5-22.04	Merced
5-22.05	Chowchilla
5-22.06	Madera
5-22.07	Delta-Mendota
5-22.15	Tracy
5-22.16	Cosumnes
5-69	Yosemite Valley
5-70	Los Banos Creek Valley

Description of the Region

The San Joaquin River HR covers approximately 9.7 million acres (15,200 square miles) and includes all of Calaveras, Tuolumne, Mariposa, Madera, San Joaquin, and Stanislaus counties, most of Merced and Amador counties, and parts of Alpine, Fresno, Alameda, Contra Costa, Sacramento, El Dorado, and San Benito counties (Figure 35). The region corresponds to a portion near the middle of RWQCB 5. Significant geographic features include the northern half of the San Joaquin Valley, the southern part of the Sacramento-San Joaquin Delta, the Sierra Nevada and Diablo Range. The region is home to about 1.6 million people (DWR 1998). Major population centers include Merced, Modesto, and Stockton. The Merced area is entirely dependent on groundwater for its supply, as will be the new University of California at Merced campus.

Groundwater Development

The region contains two entire groundwater basins and part of the San Joaquin Valley Groundwater Basin, which continues south into the Tulare Lake HR. The San Joaquin Valley Groundwater Basin is divided into nine subbasins in this region. The basins underlie 3.73 million acres (5,830 square miles) or about 38 percent of the entire HR area.

The region is heavily groundwater reliant. Within the region groundwater accounts for about 30 percent of the annual supply used for agricultural and urban purposes. Groundwater use in the region accounts for about 18 percent of statewide groundwater use for agricultural and urban needs. Groundwater use in the region accounts for 5 percent of the State's overall supply from all sources for agricultural and urban uses (DWR 1998).

The aquifers are generally quite thick in the San Joaquin Valley subbasins, with groundwater wells commonly extending to depths of up to 800 feet. Aquifers include unconsolidated alluvium and consolidated rocks with unconfined and confined groundwater conditions. Typical well yields in the San Joaquin Valley range from 300 to 2,000 gpm with yields of 5,000 gpm possible. The region's only significant basin located outside of San Joaquin Valley is Yosemite Valley. Yosemite Valley Basin supplies water to Yosemite National Park and has substantial well yields.

Conjunctive Use

Since near the beginning of the region's agricultural development, groundwater has been used conjunctively with surface water to meet water needs. Groundwater was and is used when and where surface water is unable to fully meet demands either in time or area. For several decades, this situation was more of an incidental conjunctive use than a formal one. Historical groundwater use has resulted in some land subsidence in the southwest portion of the region.

Groundwater Quality

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are TDS, nitrate, boron, chloride, and organic compounds. The Yosemite Valley Groundwater Basin has exceptionally high quality groundwater.

Areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. The high TDS content of west-side groundwater is due to recharge of streamflow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley is the result of concentration of salts due to evaporation and poor drainage. Nitrates may occur naturally or as a result of disposal of human and animal waste products and fertilizer. Boron and chloride are likely a result of concentration from evaporation near the valley trough. Organic contaminants can be broken into two categories, agricultural and industrial. Agricultural pesticides and herbicides have been detected in groundwater throughout the region, but primarily along the east side of the San Joaquin Valley where soil permeability is higher and depth to groundwater is shallower. The most notable agricultural contaminant is dibromochloropropane (DBCP), a now-banned soil fumigant and known carcinogen once used extensively on grapes and cotton. Industrial organic contaminants include TCE, dichloroethylene (DCE), and other solvents. They are found in groundwater near airports, industrial areas, and landfills.

Water Quality in Public Supply Wells

From 1994 through 2000, 689 public supply water wells were sampled in 10 of the 11 basins and subbasins in the San Joaquin River HR. Samples analyzed indicate that 523 wells, or 76 percent, met the state primary MCLs for drinking water. One-hundred-sixty-six wells, or 24 percent, have constituents that exceed one or more MCL. Figure 36 shows the percentages of each contaminant group that exceeded MCLs in the 166 wells.

Table 28 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Changes from Bulletin 118-80

The subbasins of the San Joaquin Valley, which were delineated as part of the 118-80 update, are given their first numeric designation in this report. Additionally, the Cosumnes Subbasin has been added to the subbasins within the San Joaquin River HR. It is worth noting that the southern portion of the South American Subbasin of the Sacramento Valley Groundwater Basin is also included as part of this HR. The subbasin names and numbers within the region are listed in Table 29.

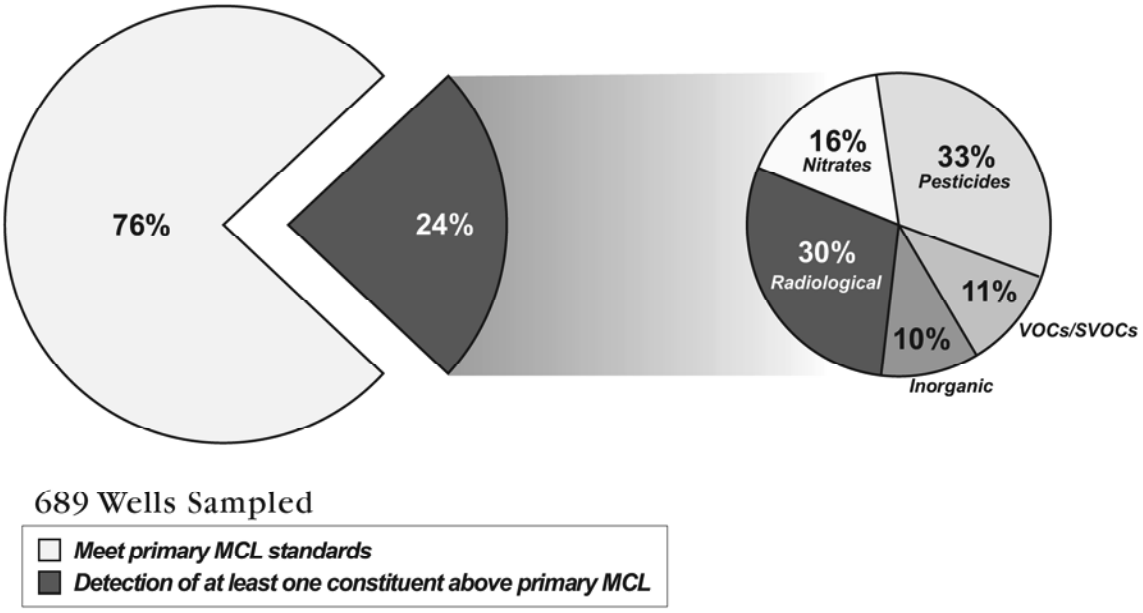

Figure 36 MCL exceedances in public supply wells in the San Joaquin River Hydrologic Region

Table 28 Most frequently occurring contaminants by contaminant group in the San Joaquin River Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Aluminum – 4	Arsenic – 4	4 tied at 2 exceedances
Inorganics – Secondary	Manganese – 123	Iron – 102	TDS – 9
Radiological	Uranium – 33	Gross Alpha – 26	Radium 228 – 6
Nitrates	Nitrate (as NO_3) – 23	Nitrate + Nitrite – 6	Nitrate Nitrogen (NO_3-N) – 3
Pesticides	DBCP – 44	Di(2-Ethylhexyl)phthalate – 11	EDB – 6
VOCs	PCE – 8	Dichloromethane – 3	TCE – 3

DBCP = Dibromochloropropane
EDB = Ethylenedibromide
PCE = Tetrachloroethylene
TCE = Trichloroethylene
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Table 29 Modifications since Bulletin 118-80 of groundwater basins and subbasins in San Joaquin Hydrologic Region

Subbasin name	New number	Old number
Eastern San Joaquin	5-22.01	5-22
Modesto	5-22.02	5-22
Turlock	5-22.03	5-22
Merced	5-22.04	5-22
Chowchilla	5-22.05	5-22
Madera	5-22.06	5-22
Delta-Mendota	5-22.07	5-22
Tracy	5-22.15	5-22
Cosumnes	5-22.16	5-22

Table 30 San Joaquin River Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-22	SAN JOAQUIN VALLEY									
5-22.01	EASTERN SAN JOAQUIN	707,000	A	1,500	-	345	69	540	310	30 - 1,632
5-22.02	MODESTO	247,000	B	4,500	1000-2000	230	15	209	60-500	200-8300
5-22.03	TURLOCK	347,000	B	4,500	1000-2000	307	0	163	200-500	100-8300
5-22.04	MERCED	491,000	B	4,450	1500-1900	378	0	142	200-400	100-3600
5-22.05	CHOWCHILLA	159,000	B	4,750	750-2000	203	0	28	200-500	120-6400
5-22.06	MADERA	394,000	B	4,750	750-2000	378	0	127	200-400	100-6400
5-22.07	DELTA-MENDOTA	747,000	B	5,000	800-2000	816	0	120	770	210-86,000
5-22.15	TRACY	345,000	C	3,000	500-3,000	18	14	183	1,190	210-7,800
5-22.16	COSUMNES	281,000	A	1,500	-	75	13	72	218	140-438
5-69	YOSEMITE VALLEY	7,500	C	1,200	900	0	0	3	54	43-73
5-70	LOS BANOS CREEK VALLEY	4,840	C	-	-	0	0	0	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

Tulare Lake Hydrologic Region

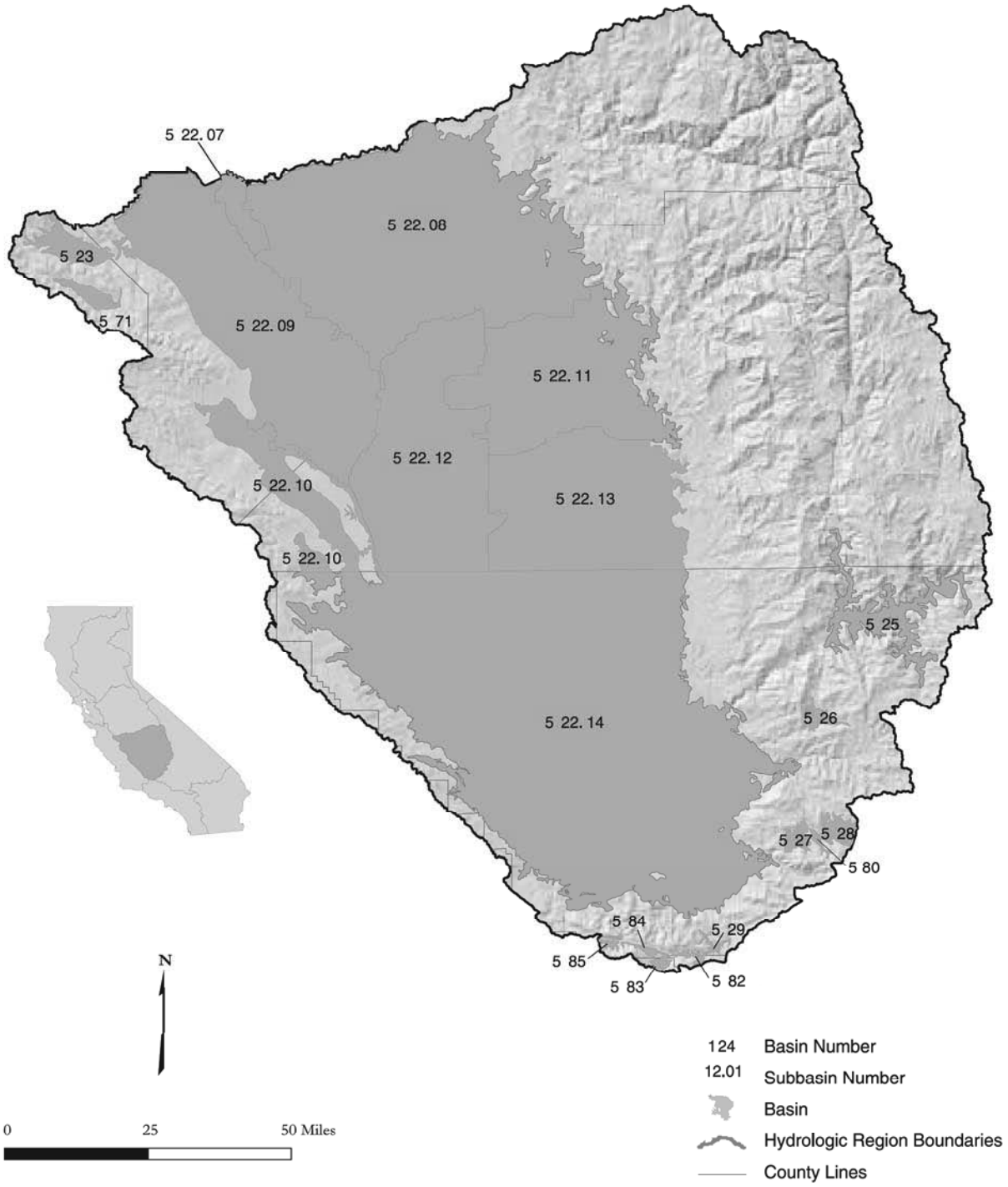

Figure 37 Tulare Lake Hydrologic Region

Basins and Subbasins of Tulare Lake Hydrologic Region

Basin/subbasin	Basin name
5-22	San Joaquin Valley
5-22.08	Kings
5-22.09	Westside
5-22.10	Pleasant Valley
5-22.11	Kaweah
5-22.12	Tulare Lake
5-22.13	Tule
5-22.14	Kern County
5-23	Panoche Valley
5-25	Kern River Valley
5-26	Walker Basin Creek Valley
5-27	Cummings Valley
5-28	Tehachapi Valley West
5-29	Castaic Lake Valley
5-71	Vallecitos Creek Valley
5-80	Brite Valley
5-82	Cuddy Canyon Valley
5-83	Cuddy Ranch Area
5-84	Cuddy Valley
5-85	Mil Potrero Area

Description of the Region

The Tulare Lake HR covers approximately 10.9 million acres (17,000 square miles) and includes all of Kings and Tulare counties and most of Fresno and Kern counties (Figure 37). The region corresponds to approximately the southern one-third of RWQCB 5. Significant geographic features include the southern half of the San Joaquin Valley, the Temblor Range to the west, the Tehachapi Mountains to the south, and the southern Sierra Nevada to the east. The region is home to more than 1.7 million people as of 1995 (DWR, 1998). Major population centers include Fresno, Bakersfield, and Visalia. The cities of Fresno and Visalia are entirely dependent on groundwater for their supply, with Fresno being the second largest city in the United States reliant solely on groundwater.

Groundwater Development

The region has 12 distinct groundwater basins and 7 subbasins of the San Joaquin Valley Groundwater Basin, which crosses north into the San Joaquin River HR. These basins underlie approximately 5.33 million acres (8,330 square miles) or 49 percent of the entire HR area.

Groundwater has historically been important to both urban and agricultural uses, accounting for 41 percent of the region's total annual supply and 35 percent of all groundwater use in the State. Groundwater use in the region represents about 10 percent of the State's overall supply for agricultural and urban uses (DWR 1998).

The aquifers are generally quite thick in the San Joaquin Valley subbasins with groundwater wells commonly exceeding 1,000 feet in depth. The maximum thickness of freshwater-bearing deposits (4,400 feet) occurs at the southern end of the San Joaquin Valley. Typical well yields in the San Joaquin Valley range from 300 gpm to 2,000 gpm with yields of 4,000 gpm possible. The smaller basins in the mountains surrounding the San Joaquin Valley have thinner aquifers and generally lower well yields averaging less than 500 gpm.

The cities of Fresno, Bakersfield, and Visalia have groundwater recharge programs to ensure that groundwater will continue to be a viable water supply in the future. Extensive groundwater recharge programs are also in place in the south valley where water districts have recharged several million acre-feet for future use and transfer through water banking programs.

The extensive use of groundwater in the San Joaquin Valley has historically caused subsidence of the land surface primarily along the west side and south end of the valley.

Groundwater Quality

In general, groundwater quality throughout the region is suitable for most urban and agricultural uses with only local impairments. The primary constituents of concern are high TDS, nitrate, arsenic, and organic compounds.

The areas of high TDS content are primarily along the west side of the San Joaquin Valley and in the trough of the valley. High TDS content of west-side water is due to recharge of stream flow originating from marine sediments in the Coast Range. High TDS content in the trough of the valley is the result of concentration of salts because of evaporation and poor drainage. In the central and west-side portions of the valley, where the Corcoran Clay confining layer exists, water quality is generally better beneath the clay than above it. Nitrates may occur naturally or as a result of disposal of human and animal waste products and fertilizer. Areas of high nitrate concentrations are known to exist near the town of Shafter and other isolated areas in the San Joaquin Valley. High levels of arsenic occur locally and appear to be associated with lakebed areas. Elevated arsenic levels have been reported in the Tulare Lake, Kern Lake and Buena Vista Lake bed areas. Organic contaminants can be broken into two categories, agricultural and industrial. Agricultural pesticides and herbicides have been detected throughout the valley, but primarily along the east side where soil permeability is higher and depth to groundwater is shallower. The most notable agricultural contaminant is DBCP, a now-banned soil fumigant and known carcinogen once used extensively on grapes. Industrial organic contaminants include TCE, DCE, and other solvents. They are found in groundwater near airports, industrial areas, and landfills.

Water Quality in Public Supply Wells

From 1994 through 2000, 1,476 public supply water wells were sampled in 14 of the 19 groundwater basins and subbasins in the Tulare Lake HR. Evaluation of analyzed samples shows that 1,049 of the wells, or 71 percent, met the state primary MCLs for drinking water. Four-hundred-twenty-seven wells, or 29 percent, exceeded one or more MCL. Figure 38 shows the percentages of each contaminant group that exceeded MCLs in the 427 wells.

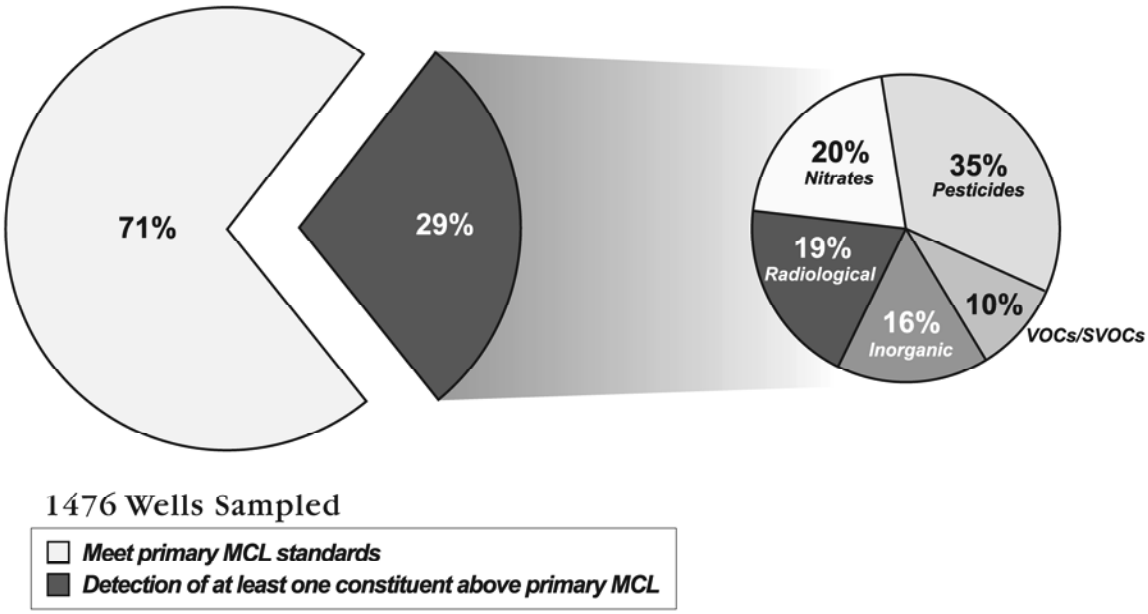

Figure 38 MCL exceedances by contaminant group in public supply wells in the Tulare Lake Hydrologic Region

Table 31 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 31 Most frequently occurring contaminants by contaminant group in the Tulare Lake Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics - Primary	Fluoride – 32	Arsenic – 16	Aluminum – 13
Inorganics - Secondary	Iron – 155	Manganese – 82	TDS – 9
Radiological	Gross Alpha – 74	Uranium – 24	Radium 228 – 8
Nitrates	Nitrate(as NO_3) – 83	Nitrate + Nitrite – 14	Nitrite(as N) – 3
Pesticides	DBCP – 130	EDB – 24	Di(2-Ethylhexyl)phthalate – 7
VOCs/SVOCs	TCE – 17	PCE – 16	Benzene – 6 MTBE – 6

DBCP = Dibromochloropropane
EDB = Ethylenedibromide
TCE = Trichloroethylene
PCE = Tetrachloroehylene
VOC = Volatile organic compound
SVOC = Semivolatile organic compound

Changes from Bulletin 118-80

There are no newly defined basins since Bulletin 118-80. However, the subbasins of the San Joaquin Valley, which were delineated as part of the 118-80 update, are given their first numeric designation in this report (Table 32).

Table 32 Modifications since Bulletin 118-80 of groundwater basins and subbasins in Tulare Lake Hydrologic Region

Subbasin name	New number	Old number
Kings	5-22.08	5-22
Westside	5-22.09	5-22
Pleasant Valley	5-22.10	5-22
Kaweah	5-22.11	5-22
Tulare Lake	5-22.12	5-22
Tule	5-22.13	5-22
Kern County	5-22.14	5-22
Squaw Valley	deleted	5-24
Cedar Grove Area	deleted	5-72
Three Rivers Area	deleted	5-73
Springville Area	deleted	5-74
Templeton Mountain Area	deleted	5-75
Manache Meadow Area	deleted	5-76
Sacator Canyon Valley	deleted	5-77
Rockhouse Meadows Valley	deleted	5-78
Inns Valley	deleted	5-79
Bear Valley	deleted	5-81

Several basins have been deleted from the Bulletin 118-80 report. In Squaw Valley (5-24) all 118 wells are completed in hard rock. Cedar Grove Area (5-72) is a narrow river valley in Kings Canyon National Park with no wells. Three Rivers Area (5-73) has a thin alluvial terrace deposit but 128 of 130 wells are completed in hard rock. Springville Area (5-74) is this strip of alluvium adjacent to Tule River and all wells are completed in hard rock. Templeton Mountain Area (5-75), Manache Meadow Area (5-76), and Sacator Canyon Valley (5-77) are all at the crest of mountains with no wells. Rockhouse Meadows Valley (5-78) is in wilderness with no wells. Inns Valley (5-79) and Bear Valley (5-81) both have all wells completed in hard rock.

Table 33 Tulare Lake Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
5-22	SAN JOAQUIN VALLEY									
5-22.08	KINGS	976,000	C	3,000	500-1,500	909	-	722	200-700	40-2000
5-22.09	WESTSIDE	640,000	C	2,000	1,100	960	-	50	520	220-35,000
5-22.10	PLEASANT VALLEY	146,000	B	3,300	-	151	-	2	1,500	1000-3000
5-22.11	KAWEAH	446,000	B	2,500	1,000-2,000	568	-	270	189	35-580
5-22.12	TULARE LAKE	524,000	B	3,000	300-1,000	241	-	86	200-600	200-40,000
5-22.13	TULE	467,000	B	3,000	-	459	-	150	256	200-30,000
5-22.14	KERN COUNTY	1,950,000	A	4,000	1,200-1,500	2,258	249	476	400-450	150-5000
5-23	PANOCHE VALLEY	33,100	C	-	-	48	-	-	1,300	394-3530
5-25	KERN RIVER VALLEY	74,000	C	3,650	350	-	-	92	378	253-480
5-26	WALKER BASIN CREEK VALLEY	7,670	C	650	-	-	-	1	-	-
5-27	CUMMINGS VALLEY	10,000	A	150	56	51	-	15	344	-
5-28	TEHACHAPI VALLEY WEST	14,800	A	1,500	454	64	-	19	315	280-365
5-29	CASTAC LAKE VALLEY	3,600	C	400	375	-	-	3	583	570-605
5-71	VALLECITOS CREEK VALLEY	15,100	C	-	-	-	-	0	-	-
5-80	BRITE VALLEY	3,170	A	500	50	-	-	-	-	-
5-82	CUDDY CANYON VALLEY	3,300	C	500	400	-	-	3	693	695
5-83	CUDDY RANCH AREA	4,200	C	300	180	-	-	4	550	480-645
5-84	CUDDY VALLEY	3,500	A	160	135	3	-	3	407	325-645
5-85	MIL POTRERO AREA	2,300	C	3,200	240	7	-	7	460	372-657

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

North Lahontan Hydrologic Region

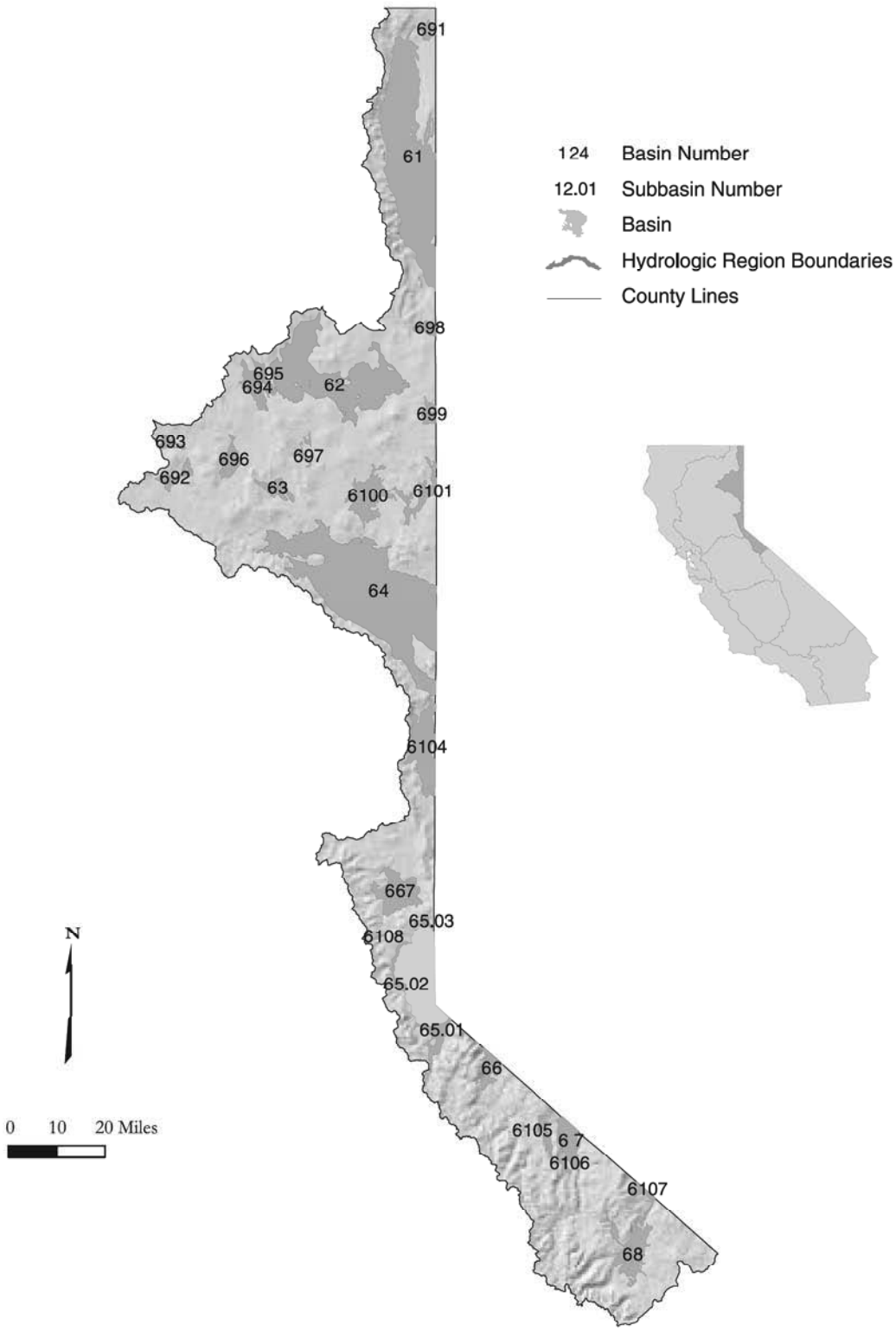

Figure 39 North Lahontan Hydrologic Region

Basins and Subbasins of the North Lahontan Hydrologic Region

Basin/subbasin	Basin name
6-1	Surprise Valley
6-2	Madeline Plains
6-3	Willow Creek Valley
6-4	Honey Lake Valley
6-5	Tahoe Valley
6-5.01	Tahoe Valley South
6-5.02	Tahoe Valley West
6-5.03	Tahoe Valley North
6-6	Carson Valley
6-7	Antelope Valley
6-8	Bridgeport Valley
6-67	Martis (Truckee) Valley
6-91	Cow Head Lake Valley
6-92	Pine Creek Valley
6-93	Harvey Valley
6-94	Grasshopper Valley
6-95	Dry Valley
6-96	Eagle Lake Area
6-97	Horse Lake Valley
6-98	Tuledad Canyon
6-99	Painters Flat
6-100	Secret Valley
6-101	Bull Flat
6-104	Long Valley
6-105	Slinkard Valley
6-106	Little Antelope Valley
6-107	Sweetwater Flat
6-108	Olympic Valley

Description of the Region

The North Lahonton HR covers approximately 3.91 million acres (6,110 square miles) and includes portions of Modoc, Lassen, Sierra, Nevada, Placer, El Dorado, Alpine, Mono, and Tuolumne counties (Figure 39). Reaching south from the Oregon border almost to Mono Lake on the east side of the Sierra, this region encompasses portions of two geomorphic provinces. From Long Valley north, most of the groundwater basins of the region were formed by basin and range block faulting near the western extent of the province. South from Long Valley, most of the basins are in the alpine valleys of the Sierra Nevada or are at the foot of the Sierra along the California-Nevada border where streams and rivers draining the eastern Sierran slopes terminate in desert sinks or lakes. The region corresponds to approximately the northern half of RWQCB 6. Significant geographic features include the Sierra Nevada, the volcanic terrane of the Modoc Plateau, Honey Lake Valley, and Lake Tahoe. The latter two areas are the major population centers in the region. The 1995 population of the entire region was about 84,000 people (DWR, 1998).

The northern portion of the region is rural and sparsely populated. Cattle ranching and associated hay cropping are the predominant land uses in addition to some pasture irrigation. Less than 4 percent of the entire region is irrigated. About 75 percent of the irrigated lands are in Modoc and Lassen counties, and most of the remainder is in Alpine and Mono counties. Much of the southern portion of the region is federally owned and managed as national forest lands where tourism and recreation constitute much of the economic base.

Much of the North Lahontan HR is chronically short of water due to the arid, high desert climate, which predominates in the region. Throughout the northern portion of the region where annual precipitation can be as low as 4 inches, runoff is typically scant and streamflows decrease rapidly during the irrigation season as the snowpack in the higher elevations melts. In the southern portion of the region, annual precipitation ranges from more than 70 inches (mostly snow in the higher elevations of the mountains) to as little as 8 inches in the low elevation valleys. In wet years, surface water can meet much of the agricultural demand, but in dry years, most of the region relies heavily on groundwater to meet water supply needs.

Groundwater Development

There are 24 groundwater basins in the region, one of which is divided into three subbasins. Thirteen of these basins are shared with Nevada and one with Oregon. These basins underlie approximately 1.03 million acres (1,610 square miles) or about 26 percent of the entire region. Although the groundwater basins were delineated based on mapped alluvial fill, much of the groundwater produced in many of them actually comes from underlying fractured rock aquifers. This is particularly true in the volcanic areas of Modoc and Lassen counties where, in many basins, volcanic flows are interstratified with lake sediments and alluvium. Wells constructed in the volcanics commonly produce large amounts of groundwater, whereas wells constructed in fine-grained lake deposits produce less. Because the thickness and lateral extent the of the hard rocks outside of the defined basin are generally not known, actual groundwater in storage in these areas is unknown.

Locally, groundwater is an important resource accounting for about 28 percent of the annual supply for agricultural and urban uses. Groundwater use in the region represents less than 1 percent of the State's overall supply for agricultural and urban uses (DWR 1998).

In the northern portion of the region, a sizable quantity of groundwater (nearly 130,000 acre-feet) is extracted annually for agricultural and municipal purposes. Groundwater extracted from the Honey Lake Valley Basin accounts for 41,900 acre-feet of the agricultural supply and 12,000 acre-feet of the municipal supply (based on normalized data from 1990). An additional 3,100 acre-feet is extracted to meet the demands of the Honey Lake Wildlife Area, which provides habitat for several threatened species (Bald Eagle, Sandhill Crane, Bank Swallow, and Peregrine Falcon).

Well yields in the Honey Lake Valley Basin are greatest in alluvial and volcanic deposits. Wells drawing from these deposits may have yields that vary from 10 gpm to more than 2,000 gpm, but drawdown in these cases is generally high. Eight wells in the Honey Lake Wildlife Area have an average yield of between 1,260 and 2,100 gpm. Depths of completed wells in the region range from 20 to 720 feet.

The Honey Lake Valley Basin is very close to exceeding prudent perennial yield, and future development could come at the expense of water for agriculture. A 1987 agreement between DWR, the state of Nevada, and the U.S. Geological Survey resulted in a study of the groundwater flow system in eastern Honey Lake Valley. Upon conclusion of the study in September 1990, a Nevada state engineer ruled that only about 13,000 acre-feet could be safely transferred from the basin.

No major changes in water use are anticipated in the near future in the northern portion of the region. Irrigated agriculture is already constrained by economically available water supplies. A small amount of agricultural expansion is expected but only in areas that can support minor additional groundwater development. Likewise, the modest need for additional municipal and irrigation supplies can be met by minor expansion of present surface systems or by increased use of groundwater.

The principal drainages in the southern portion of the region are the Truckee, Walker and Carson rivers. Water rights in these drainages historically have been heavily contested, and allocations are limited by interstate agreements with Nevada, in-stream environmental requirements, and miscellaneous private rights holders. In the Lake Tahoe Basin, further development is strictly limited because of concerns regarding water quality in the lake. Surface water storage developed in the region's drainages provides urban and agricultural supply to the Reno/Sparks area and to the many smaller communities in the eastern Sierra and at the foot of the mountain slopes. Most communities rely on a combination of surface water and groundwater supply.

In the upper Truckee drainage, the primary groundwater basins underlie the areas around Lake Tahoe and Martis Valley, where the Town of Truckee is located. Both areas use surface water and groundwater for urban and surrounding rural domestic supplies.

Little is known about the small groundwater basins developed along the foot of the eastern Sierra. Most communities overlying these basins are along the streams and rivers flowing down the mountains, and groundwater is extracted from the underlying alluvium. Groundwater augments surface supplies for agricultural purposes and supports municipal and rural domestic supplies.

Groundwater Quality

In basins in the northern portion of the region, groundwater quality ranges widely from excellent to poor. Wells that obtain their water supply from lake deposits can have high concentrations of boron, arsenic, fluoride, nitrate, and TDS. TDS content generally increases toward the central portions of these basins where concentrations have accumulated over time. The groundwater quality along the margins of most of these basins tends to be of much better quality. There is a potential for future groundwater pollution occurring in urban/suburban areas where single-family septic systems have been installed, especially in hard rock areas. Groundwater quality in the alpine basins is good to excellent; but, as in any area where single-family septic systems have been installed, there is potential for degradation of groundwater quality.

Water Quality in Public Supply Wells

From 1994 through 2000, 169 public supply water wells were sampled in 8 of the 26 basins and subbasins in the North Lahontan HR. Evaluation of the analyzed samples indicates that 147 wells, or 87 percent, met the state primary MCLs for drinking water. Twenty-two wells, or 13 percent, have constituents that exceed one or more MCL. Figure 40 shows the percentages of each contaminant group that exceeded MCLs in the 22 wells.

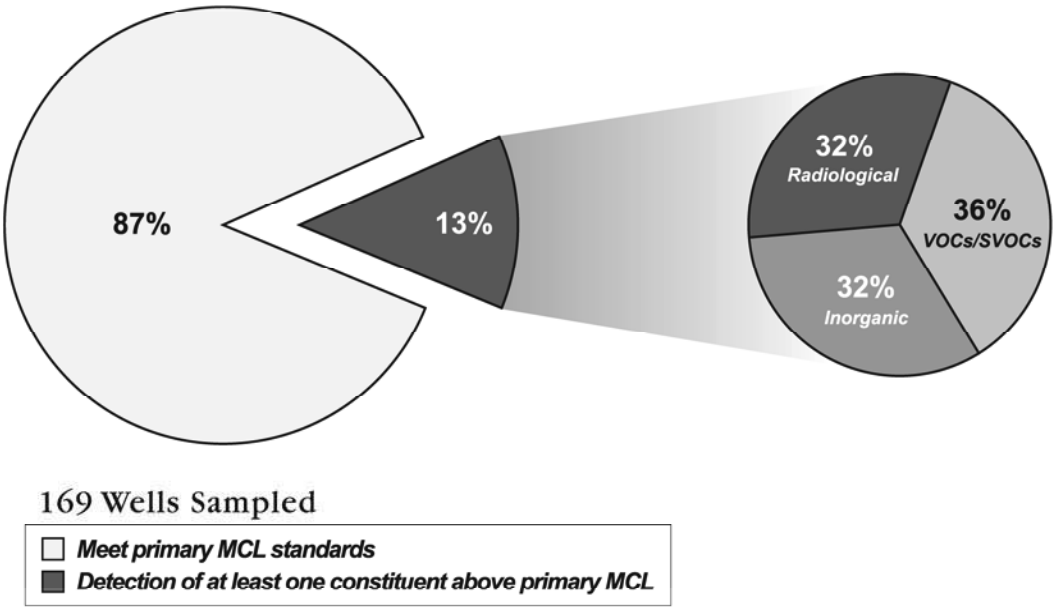

Figure 40 MCL exceedances in public supply wells in the North Lahontan Hydrologic Region

Table 34 lists the three most frequently occurring contaminants in each contaminant group and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 34 Most frequently occurring contaminants by contaminant group in the North Lahontan Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 3	Thallium – 3	3 tied at 1 exceedance
Inorganics – Secondary	Iron – 14	Manganese – 13	TDS – 1
Radiological	Gross Alpha – 7	Uranium – 5	Radium 226 – 1
VOCs/SVOCs	1,2 Dichloroethane – 8	TCE – 2	MTBE – 1

TCE = Trichloroethylene
MTBE = Methyltertiarybutylether
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

There are no newly defined basins since Bulletin 118-80. The only delineated areas removed from the list of region basins are the Recent and Pleistocene volcanic areas of the Modoc Plateau, previously numbered 6-102 and 6-103, respectively.

Table 35 North Lahontan Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
6-1	SURPRISE VALLEY	228,000	B	2,500	1,383	16	11	4	224	87 - 1,800
6-2	MADELINE PLAINS	156,150	B	-	450	2	6	-	402	81 - 1,790
6-3	WILLOW CREEK VALLEY	11,700	B	-	-	7	4	-	401	90 - 1,200
6-4	HONEY LAKE VALLEY	311,150	B	2,500	784	39	24	49	518	89 - 2,500
6-5	TAHOE VALLEY									
6-5.01	TAHOE SOUTH	14,800	C	4,000	-	6	-	54	-	59 - 206
6-5.02	TAHOE WEST	6,000	C	-	-	-	9	3	103	68 - 128
6-5.03	TAHOE VALLEY NORTH	2,000	C	900	-	-	-	-	141	-
6-6	CARSON VALLEY	10,700	C	-	-	-	-	-	-	-
6-7	ANTELOPE VALLEY	20,100	A	-	-	-	-	12	-	-
6-8	BRIDGEPORT VALLEY	32,500	C	-	-	-	-	6	-	-
6-67	MARTIS VALLEY	35,600	C	-	-	-	-	-	-	-
6-91	COW HEAD LAKE VALLEY	5,600	B	-	-	-	-	-	-	-
6-92	PINE CREEK VALLEY	9,530	B	-	-	-	-	1	-	-
6-93	HARVEY VALLEY	4,500	B	-	-	-	-	-	-	-
6-94	GRASSHOPPER VALLEY	17,670	B	-	-	-	-	-	-	-
6-95	DRY VALLEY	6,500	B	-	-	-	-	-	-	-
6-96	EAGLE LAKE AREA	-	B	-	-	-	4	4	-	-
6-97	HORSE LAKE VALLEY	3,800	B	-	-	-	-	-	-	-
6-98	TULEDAD CANYON	5,200	B	-	-	-	-	-	-	-
6-99	PAINTERS FLAT	6,400	B	-	-	-	-	-	-	-
6-100	SECRET VALLEY	33,680	B	-	-	2	2	-	-	125 - 3,200
6-101	BULL FLAT	18,100	B	-	-	-	-	-	-	-
6-104	LONG VALLEY	46,840	B	-	-	31	4		302	127 - 570
6-105	SLINKARD VALLEY	4,500	C	-	-	-	-	-	-	-
6-106	LITTLE ANTELOPE VALLEY	2,500	C	-	-	-	-	-	-	-
6-107	SWEETWATER FLAT	4,700	C	-	-	-	-	-	-	-
6-108	OLYMPIC VALLEY	700	C	600	330	-	-	2	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

South Lahontan Hydrologic Region

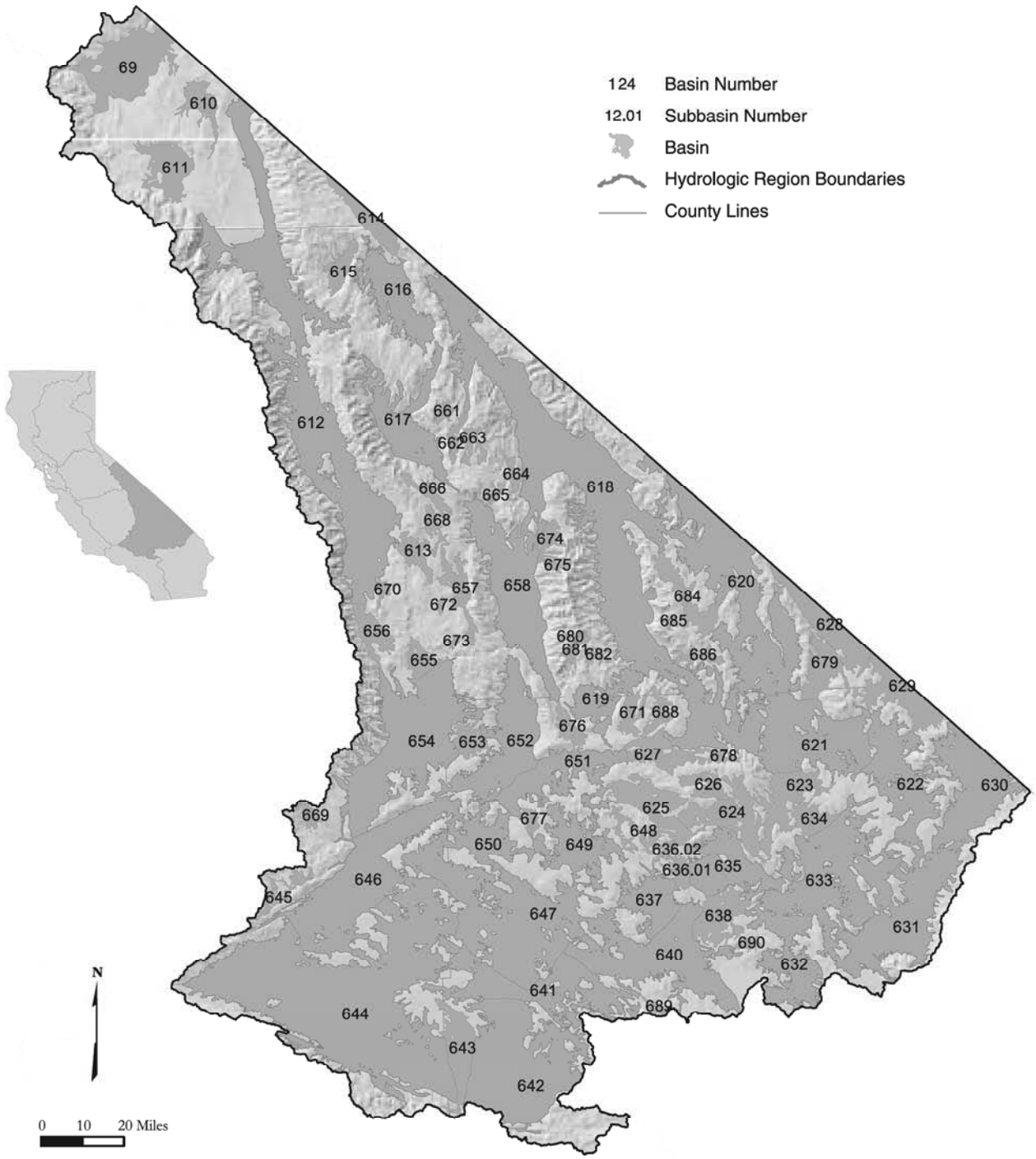

Figure 41 South Lahontan Hydrologic Region

Basins and Subbasins of the South Lahontan Hydrologic Region

Basin/subbasin	Basin name
6-9	Mono Valley
6-10	Adobe Lake Valley
6-11	Long Valley
6-12	Owens Valley
6-13	Black Springs Valley
6-14	Fish Lake Valley
6-15	Deep Springs Valley
6-16	Eureka Valley
6-17	Saline Valley
6-18	Death Valley
6-19	Wingate Valley
6-20	Middle Amargosa Valley
6-21	Lower Kingston Valley
6-22	Upper Kingston Valley
6-23	Riggs Valley
6-24	Red Pass Valley
6-25	Bicycle Valley
6-26	Avawatz Valley
6-27	Leach Valley
6-28	Pahrump Valley
6-29	Mesquite Valley
6-30	Ivanpah Valley
6-31	Kelso Valley
6-32	Broadwell Valley
6-33	Soda Lake Valley
6-34	Silver Lake Valley
6-35	Cronise Valley
6-36	Langford Valley
6-36.01	Langford Well Lake
6-36.02	Irwin
6-37	Coyote Lake Valley
6-38	Caves Canyon Valley
6-40	Lower Mojave River Valley
6-41	Middle Mojave River Valley
6-42	Upper Mojave River Valley
6-43	El Mirage Valley
6-44	Antelope Valley
6-45	Tehachapi Valley East
6-46	Fremont Valley
6-47	Harper Valley
6-48	Goldstone Valley
6-49	Superior Valley
6-50	Cuddeback Valley

Basin/subbasin	Basin name
6-51	Pilot Knob Valley
6-52	Searles Valley
6-53	Salt Wells Valley
6-54	Indian Wells Valley
6-55	Coso Valley
6-56	Rose Valley
6-57	Darwin Valley
6-58	Panamint Valley
6-61	Cameo Area
6-62	Race Track Valley
6-63	Hidden Valley
6-64	Marble Canyon Area
6-65	Cottonwood Spring Area
6-66	Lee Flat
6-68	Santa Rosa Flat
6-69	Kelso Lander Valley
6-70	Cactus Flat
6-71	Lost Lake Valley
6-72	Coles Flat
6-73	Wild Horse Mesa Area
6-74	Harrisburg Flats
6-75	Wildrose Canyon
6-76	Brown Mountain Valley
6-77	Grass Valley
6-78	Denning Spring Valley
6-79	California Valley
6-80	Middle Park Canyon
6-81	Butte Valley
6-82	Spring Canyon Valley
6-84	Greenwater Valley
6-85	Gold Valley
6-86	Rhodes Hill Area
6-88	Owl Lake Valley
6-89	Kane Wash Area
6-90	Cady Fault Area

Description of the Region

The South Lahontan HR covers approximately 21.2 million acres (33,100 square miles) in eastern California. This region includes about 21 percent of the surface area of California and both the highest (Mount Whitney) and lowest (Death Valley) surface elevations of the contiguous United States. The HR is bounded on the west by the crest of the Sierra Nevada and on the north by the watershed divide between Mono Lake and East Walker River drainages; on the east by Nevada and the south by the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining northward. This HR includes the Owens, Mojave, and Amargosa River systems, the Mono Lake drainage system, and many other internally drained basins. Average annual precipitation is about 7.9 inches, and runoff is about 1.3 maf per year (DWR 1994).

The South Lahontan HR includes Inyo County, much of Mono and San Bernardino counties, and parts of Kern and Los Angeles counties (Figure 41). National forests, national and state parks, military bases and other public lands comprise most of the land in this region. The Los Angeles Department of Water and Power is also a major landowner in the northern part of the HR and controls rights to much of the water draining the eastern Sierra Nevada.

According to 2000 census data, the South Lahontan HR is home to about 530,000 people, or 1.6 percent of the state's population. The major population centers are in the southern part of the HR and include Palmdale, Lancaster, Victorville, Apple Valley, and Hesperia.

Groundwater Development

In this report, 76 groundwater basins are delineated in the South Lahontan HR, and the Langford Valley Groundwater Basin (6-36) is divided into two subbasins. The groundwater basins underlie about 11.60 million acres (18,100 square miles) or about 55 percent of the HR.

Most of the groundwater production is concentrated, along with the population, in basins in the southern part of this region. Groundwater provides 41 percent of water supply for agriculture and urban uses (DWR 1998). Much of this HR is public land with very low population density, within these areas there has been little groundwater development and little is known about the basins.

In most smaller basins, groundwater is found in unconfined alluvial aquifers; however, in some of the larger basins, or near dry lakes, aquifers may be separated by aquitards that cause confined groundwater conditions. Depths of the basins range from tens or hundreds of feet in smaller basins to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this region depending on aquifer characteristics and well location, size, and use.

Conjunctive use of surface water and groundwater is practiced in the more heavily pumped basins. Some water used in the southern part of the HR is imported from Northern California by the State Water Project. Some of this imported water is used to recharge groundwater in the Mojave River Valley basins (6-40, 6-41, and 6-42). Surface water and groundwater are exported from the South Lahontan HR to the South Coast HR by the Los Angeles Department of Water and Power.

Groundwater Quality

The chemical character of the groundwater varies throughout the region, but most often is calcium or sodium bicarbonate. Near and beneath dry lakes, sodium chloride and sodium sulfate-chloride water is common. In general, groundwater near the edges of valleys contains lower TDS content than water beneath the central part of the valleys or near dry lakes.

Drinking water standards are most often exceeded for TDS, fluoride, and boron content. The EPA lists 13 sites of contamination in this HR. Of these, three military installations in the Antelope Valley and Mojave River Valley groundwater basins are federal Superfund sites because of VOCs and other hazardous contaminants.

Water Quality in Public Supply Wells

From 1994 through 2000, 605 public supply water wells were sampled in 19 of the 77 basins and subbasins in the South Lahontan HR. Analyzed samples indicate that 506 wells, or 84 percent, met the state primary MCLs for drinking water. Ninety-nine wells, or 16 percent, have constituents that exceed one or more MCL. Figure 42 shows the percentages of each contaminant group that exceeded MCLs in the 99 wells.

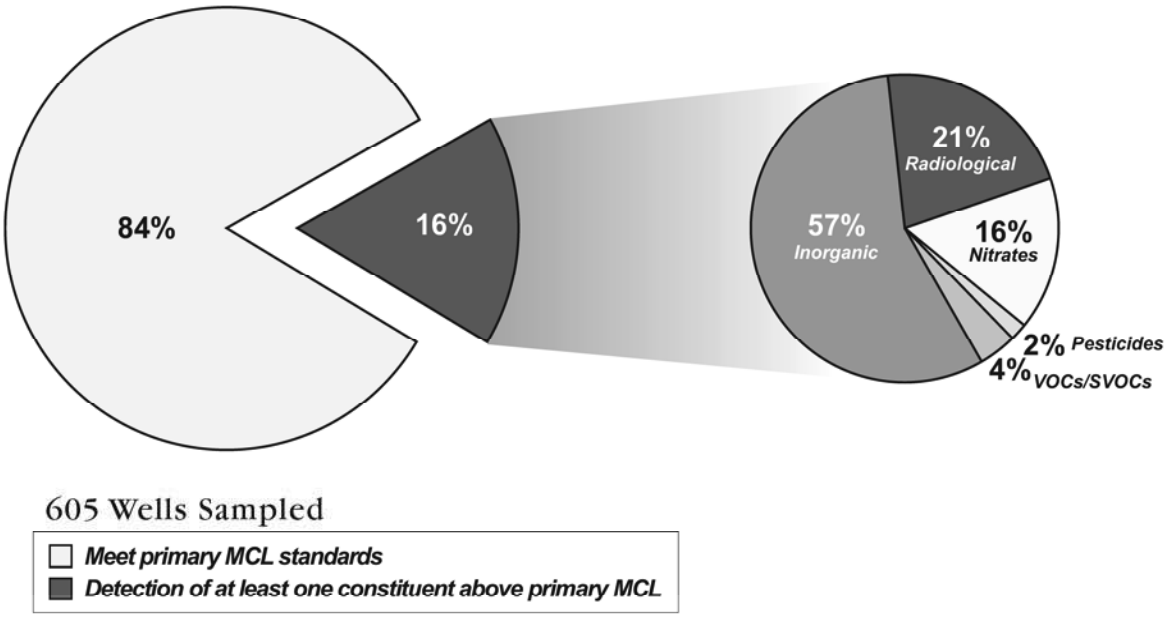

Figure 42 MCL exceedances in public supply wells in the South Lahontan Hydrologic Region

Table 36 lists the three most frequently occurring contaminants in each of the six contaminant groups and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 36 Most frequently occurring contaminants by contaminant group in the South Lahontan Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 30	Arsenic – 19	Antimony – 5
Inorganics – Secondary	Iron – 82	Manganese – 36	Specific Conductance – 5 TDS – 5
Radiological	Gross Alpha – 18	Uranium – 7	Radium 228 – 2
Dissolved Nitrogen	Nitrate (as NO_3) – 12	Nitrate + Nitrite–6	Nitrite (as N) – 4
Pesticides	Di(2-Ethylhexyl)phthalate) – 2		
VOCs/SVOCs	MTBE – 2	TCE – 2	Carbon Tetrachloride – 2

TCE = Trichloroethylene
MTBE = Methyltertiarybutylether
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 37). Langford Valley Groundwater Basin (6-36) has been divided into two subbasins. Granite Mountain Area (6-59) and Fish Slough Valley (6-60) groundwater basins have been deleted because no information was found concerning wells or groundwater in these basins or because well completion reports indicate that groundwater production is derived from fractured rocks beneath the basin. Furnace Creek Area Groundwater Basin (6-83) has been incorporated into Death Valley Groundwater Basin (6-18), and Butterbread Canyon Valley Groundwater Basin (6-87) has been incorporated into Lost Lake Valley Groundwater Basin (6-71).

Table 37 Modifications since Bulletin 118-80 of groundwater basins and subbasins in South Lahontan Hydrologic Region

Basin/subbasin name	New number	Old number
Langford Well Lake	6-36.01	6-36
Irwin	6-36.02	6-36
Troy Valley	Incorporated into 6-40 and 7-14.	6-39
Granite Mountain Area	Deleted	6-59
Fish Slough Valley	Deleted	6-60
Furnace Creek Area	Deleted – incorporated into 6-18	6-83
Butterbread Canyon Valley	Deleted – incorporated into 6-71	6-87

Troy Valley Groundwater Basin (6-39) has been split at the Pisgah fault, which is a groundwater barrier, and has been incorporated into Lower Mojave River Valley (6-40) and Lavic Valley (7-14) groundwater basins. This change incorporates part of the South Lahontan HR into a basin in the Colorado River HR[1]. The Middle Mojave River Valley Groundwater Basin (6-41) has changed boundaries along the north (Harper Valley; 6-47) and east sides (Lower Mojave River Valley; 6-40). The new boundaries are along the Camp Rock-Harper Lake fault zone, Waterman fault, and Helendale fault. Groundwater level elevations indicate that these faults are likely strong barriers to groundwater movement.

The boundary between the Upper Mojave River Valley Groundwater Basin (6-42) and the Lucerne Valley Groundwater Basin (7-19) was changed from the regional surface divide to the southern part of the Helendale fault, which is a groundwater barrier. This change incorporates part of the Colorado Desert HR into a basin in the South Lahontan HR[2].

[1] The boundaries of the hydrologic regions are defined by surface drainage patterns. In this case, faults impede groundwater flow causing it to flow beneath the surface drainage divide into the adjacent hydrologic region.
[2] See previous note.

Table 38 South Lahontan Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
6-09	MONO VALLEY	173,000	A	800	480	-	-	-	-	2060
6-10	ADOBE LAKE VALLEY	39,800	C	-	-	-	-	-	-	-
6-11	LONG VALLEY	71,800	A	250	90	20	-	5	-	-
6-12	OWENS VALLEY	661,000	A	8,100	1,870	700	7	89	-	300-450,000
6-13	BLACK SPRINGS VALLEY	30,800	C	-	-	-	-	-	-	-
6-14	FISH LAKE VALLEY	48,100	C	-	-	-	-	-	-	-
6-15	DEEP SPRINGS VALLEY	29,900	C	700	390	-	-	-	-	-
6-16	EUREKA VALLEY	129,000	C	-	-	-	-	1	-	-
6-17	SALINE VALLEY	146,000	C	-	-	-	-	-	-	-
6-18	DEATH VALLEY	921,000	C	-	-	28	-	6	-	-
6-19	WINGATE VALLEY	71,400	C	-	-		-		-	-
6-20	MIDDLE AMARGOSA VALLEY	390,000	C	3,000	2,500	2	-	4	-	-
6-21	LOWER KINGSTON VALLEY	240,000	C	-	-	-	-	-	-	-
6-22	UPPER KINGSTON VALLEY	177,000	C	24	-	-	-	5	-	-
6-23	RIGGS VALLEY	87,700	C	-	-	-	-	-	-	-
6-24	RED PASS VALLEY	96,500	C	-	-	-	-	-	-	-
6-25	BICYCLE VALLEY	89,600	C	710	-	-	12	6	618	508-810
6-26	AVAWATZ VALLEY	27,700	C	-	-	-	-	-	-	-
6-27	LEACH VALLEY	61,300	C	-	-	-	-	-	-	-
6-28	PAHRUMP VALLEY	93,100	C	300	150	-	-	-	-	-
6-29	MESQUITE VALLEY	88,400	C	1,500	1,020	-	-	-	-	-
6-30	IVANPAH VALLEY	199,000	C	600	400	-	-	9	-	-
6-31	KELSO VALLEY	255,000	C	370	290	-	-		-	-
6-32	BROADWELL VALLEY	92,100	C	-	-	-	-	1	-	-
6-33	SODA LAKE VALLEY	381,000	C	2,100	1,100	-	-	3	-	-
6-34	SILVER LAKE VALLEY	35,300	C	-	-	-	-		-	-
6-35	CRONISE VALLEY	127,000	C	600	340	-	-	-	-	-
6-36	LANGFORD VALLEY									
6-36.01	LANGFORD WELL LAKE	19,300	C	1,700	410	11	7	3	498	440-568
6-36.02	IRWIN	10,500	C	550	-	40	-	3	528	496-598
6-37	COYOTE LAKE VALLEY	88,200	A	1,740	660	5	-	-	-	300-1000
6-38	CAVES CANYON VALLEY	73,100	A	300	-	4	1	4	-	300-1000
6-40	LOWER MOJAVE RIVER VALLEY	286,000	A	2,700	770	70	21	52	300	-
6-41	MIDDLE MOJAVE RIVER VALLEY	211,000	A	4,000	1,000	74	3	14	500	-
6-42	UPPER MOJAVE RIVER VALLEY	413,000	A	5,500	1,030	120	22	153	500	1105
6-43	EL MIRAGE VALLEY	75,900	A	1,000	230	50	3	21	-	-
6-44	ANTELOPE VALLEY	1,110,000	A	7,500	286	262	10	248	300	200-800
6-45	TEHACHAPI VALLEY EAST	24,000	C	150	31	31	-	9	361	298-405
6-46	FREMONT VALLEY	2,370,000	C	4,000	500	23	-	13	596	350-100,000
6-47	HARPER VALLEY	410,000	A	3,000	725	11	3	19	-	179-2391
6-48	GOLDSTONE VALLEY	28,100	C	-	-	-	-	-	-	-
6-49	SUPERIOR VALLEY	120,000	C	450	100	-	-	-	-	-

Table 38 South Lahontan Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
6-50	CUDDEBACK VALLEY	94,900	C	500	300	-	-	-	-	-
6-51	PILOT KNOB VALLEY	139,000	C	-	-	-	-	1	-	-
6-52	SEARLES VALLEY	197,000	C	1,000	300	-	-	-	-	-
6-53	SALT WELLS VALLEY	29,500	C	-	-	-	-	-	-	-
6-54	INDIAN WELLS VALLEY	382,000	A	3,800	815	116	20	63	312	110-1620
6-55	COSO VALLEY	25,600	C	-	-	-	-	-	-	-
6-56	ROSE VALLEY	42,500	C	-	-	-	-	1	-	-
6-57	DARWIN VALLEY	44,200	C	130	43	-	-	-	-	-
6-58	PANAMINT VALLEY	259,000	C	35	30	-	-	-	-	-
6-61	CAMEO AREA	9,310	C	-	-	-	-	-	-	-
6-62	RACE TRACK VALLEY	14,100	C	-	-	-	-	-	-	-
6-63	HIDDEN VALLEY	18,000	C	-	-	-	-	-	-	-
6-64	MARBLE CANYON AREA	10,400	C	-	-	-	-	-	-	-
6-65	COTTONWOOD SPRING AREA	3,900	C	-	-	-	-	-	-	-
6-66	LEE FLAT	20,300	C	-	-	-	-	-	-	-
6-68	SANTA ROSA FLAT	312	C	-	-	-	-	-	-	-
6-69	KELSO LANDER VALLEY	11,200	C	-	-	-	-	-	-	-
6-70	CACTUS FLAT	7,030	C	-	-	-	-	-	-	-
6-71	LOST LAKE VALLEY	23,300	C	-	-	-	-	-	-	-
6-72	COLES FLAT	2,950	C	-	-	-	-	-	-	-
6-73	WILD HORSE MESA AREA	3,320	C	-	-	-	-	-	-	-
6-74	HARRISBURG FLATS	24,900	C	-	-	-	-	1	-	-
6-75	WILDROSE CANYON	5,160	C	-	-	-	-	-	-	-
6-76	BROWN MOUNTAIN VALLEY	21,700	C	-	-	-	-	-	-	-
6-77	GRASS VALLEY	9,980	C	-	-	-	-	-	-	-
6-78	DENNING SPRING VALLEY	7,240	C	-	-	-	-	-	-	-
6-79	CALIFORNIA VALLEY	58,300	C	-	-	-	-	-	-	-
6-80	MIDDLE PARK CANYON	1,740	C	-	-	-	-	-	-	-
6-81	BUTTE VALLEY	8,810	C	-	-	-	-	-	-	-
6-82	ANVIL SPRING CANYON VALLEY	4,810	C	-	-	-	-	-	-	-
6-84	GREENWATER VALLEY	59,900	C	-	-	-	-	-	-	-
6-85	GOLD VALLEY	3,220	C	-	-	-	-	-	-	-
6-86	RHODES HILL AREA	15,600	C	-	-	-	-	-	-	-
6-88	OWL LAKE VALLEY	22,300	C	-	-	-	-	-	-	-
6-89	KANE WASH AREA	5,960	C	60	-	-	-	-	-	-
6-90	CADY FAULT AREA	7,960	C	-	-	-	-	-	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

Colorado River Hydrologic Region

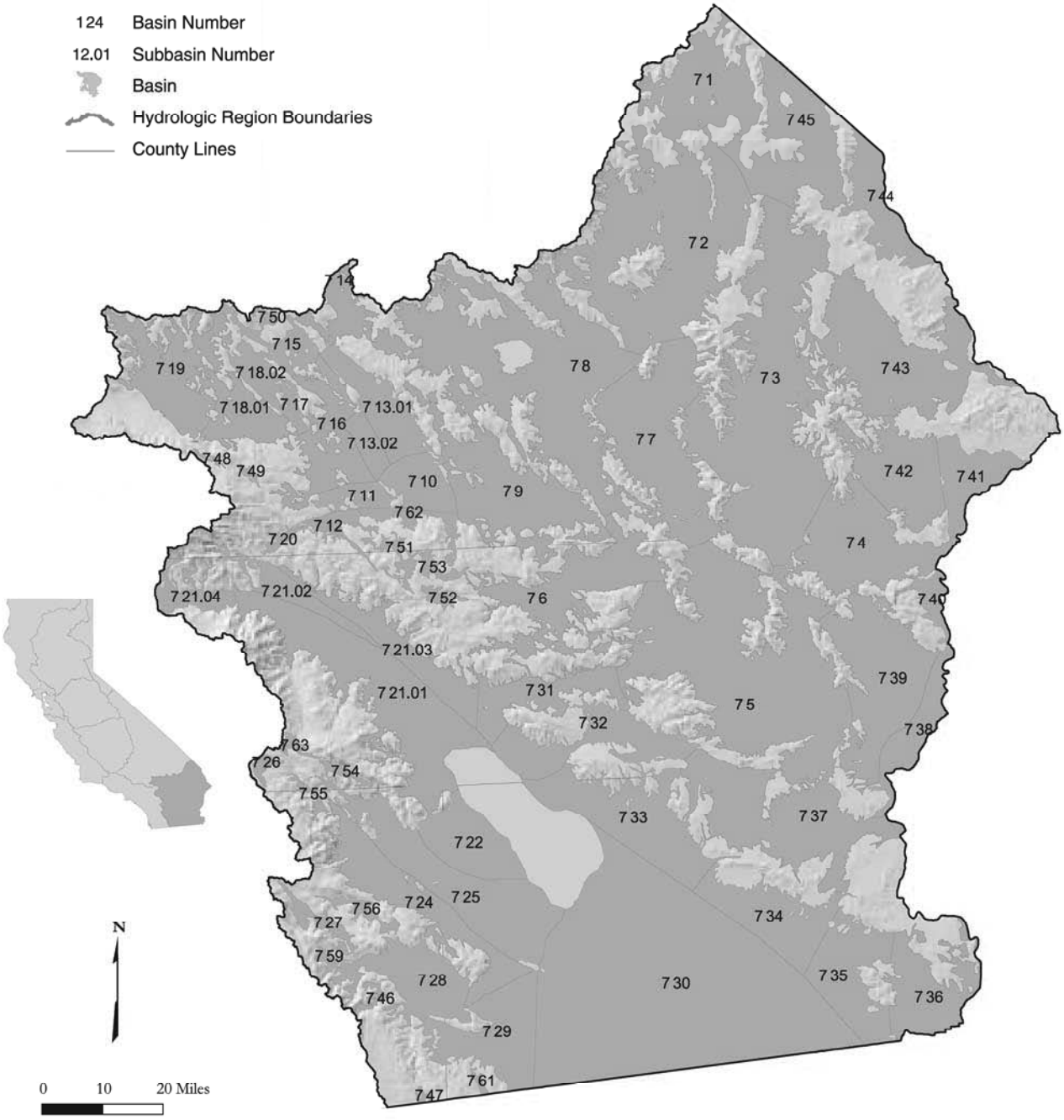

Figure 43 Colorado River Hydrologic Region

Basins and Subbasins of Colorado River Hydrologic Region

Basin/subbasin		Basin name
7-1		Lanfair Valley
7-2		Fenner Valley
7-3		Ward Valley
7-4		Rice Valley
7-5		Chuckwalla Valley
7-6		Pinto Valley
7-7		Cadiz Valley
7-8		Bristol Valley
7-9		Dale Valley
7-10		Twentynine Palms Valley
7-11		Copper Mountain Valley
7-12		Warren Valley
7-13		Deadman Valley
	7-13.01	Deadman Lake
	7-13.02	Surprise Spring
7-14		Lavic Valley
7-15		Bessemer Valley
7-16		Ames Valley
7-17		Means Valley
7-18		Johnson Valley Area
	7-18.01	Soggy Lake
	7-18.02	Upper Johnson Valley
7-19		Lucerne Valley
7-20		Morongo Valley
7-21		Coachella Valley
	7-21.01	Indio
	7-21.02	Mission Creek
	7-21.03	Desert Hot Springs
	7-21.04	San Gorgonio Pass
7-22		West Salton Sea
7-24		Borrego Valley
7-25		Ocotillo-Clark Valley
7-26		Terwilliger Valley
7-27		San Felipe Valley
7-28		Vallecito-Carrizo Valley
7-29		Coyote Wells Valley
7-30		Imperial Valley
7-31		Orocopia Valley
7-32		Chocolate Valley
7-33		East Salton Sea
7-34		Amos Valley
7-35		Ogilby Valley

Basin/subbasin	Basin name
7-36	Yuma Valley
7-37	Arroyo Seco Valley
7-38	Palo Verde Valley
7-39	Palo Verde Mesa
7-40	Quien Sabe Point Valley
7-41	Calzona Valley
7-42	Vidal Valley
7-43	Chemehuevi Valley
7-44	Needles Valley
7-45	Piute Valley
7-46	Canebrake Valley
7-47	Jacumba Valley
7-48	Helendale Fault Valley
7-49	Pipes Canyon Fault Valley
7-50	Iron Ridge Area
7-51	Lost Horse Valley
7-52	Pleasant Valley
7-53	Hexie Mountain Area
7-54	Buck Ridge Fault Valley
7-55	Collins Valley
7-56	Yaqui Well Area
7-59	Mason Valley
7-61	Davies Valley
7-62	Joshua Tree
7-63	Vandeventer Flat

Description of the Region

The Colorado River HR covers approximately 13 million acres (20,000 square miles) in southeastern California. It is bounded on the east by Nevada and Arizona, the south by the Republic of Mexico, the west by the Laguna, San Jacinto, and San Bernardino mountains, and the north by the New York, Providence, Granite, Old Dad, Bristol, Rodman, and Ord Mountain ranges. An average annual precipitation of 5.5 inches and average annual runoff of only 200,000 acre-feet makes this the most arid HR of California (DWR 1994). Surface runoff drains to many closed basins or to the Colorado River.

This HR includes all of Imperial, most of Riverside, much of San Bernardino, and part of San Diego counties (Figure 43). Many of the alluvial valleys in the region are underlain by groundwater aquifers that are the sole source of water for local communities.

About 533,000 people live within the Colorado River HR (DWR, 1998). The largest population centers are Palm Springs, Palm Desert, Indio, Coachella, and El Centro.

Groundwater Development

The earliest groundwater development in California may have been prehistoric water wells dug by the Cahuilla Indians in Coachella Valley of the Colorado River HR. In this report, 64 groundwater basins/subbasins are delineated in this HR. The Deadman Valley, Johnson Valley Area, and Coachella Valley groundwater basins have been divided into subbasins. Groundwater basins underlie about 8.68 million acres or about 26 percent of this HR.

In the Colorado River HR, groundwater provides about 8 percent of the water supply in normal years for agricultural and urban uses (DWR 1998). In most smaller basins, groundwater is found in unconfined alluvial aquifers. In some of the larger basins, particularly near dry lakes, aquifers may be separated by aquitards that create confined groundwater conditions. Depths of basins range from tens or hundreds of feet in smaller basins and along arms of ephemeral rivers to thousands of feet in larger basins. The thickness of aquifers varies from tens to hundreds of feet. Well yields vary in this region depending on aquifer characteristics and well location, size, and use. Some aquifers are capable of yielding thousands of gallons per minute to municipal wells.

Conjunctive use of surface water and groundwater is a long-standing practice in the region. Water is imported from the Colorado River for irrigation in Imperial, Coachella, and Palo Verde Valleys and from groundwater recharge in Coachella Valley. Water imported from Northern California is used to replenish Warren and Joshua Tree groundwater basins. Many agencies have erected systems of barriers to allow more efficient percolation of ephemeral runoff from surrounding mountains. The concept of utilizing groundwater basins in this sparsely populated HR for storing water that would be pumped during drought years is getting much attention.

Groundwater Quality

The chemical character of groundwater in the Colorado River HR is variable. Cation concentration is dominated by sodium with calcium common and magnesium appearing less often. Bicarbonate is usually the dominant anion, although sulfate and chloride waters are also common. In basins with closed drainages, water character often changes from calcium-sodium bicarbonate near the margins to sodium chloride or chloride-sulfate beneath a dry lake. It is not uncommon for concentrations of dissolved constituents to rise dramatically toward a dry lake where saturation of mineral salts is reached. An example of this is found at Bristol Valley Groundwater Basin, where the mineral halite (sodium chloride) is formed and then mined by

evaporation of groundwater in trenches in Bristol (dry) Lake. The TDS content of groundwater is high in many of the basins in this region. High fluoride content is common; sulfate content occasionally exceeds drinking water standards; and high nitrate content is common, especially in agricultural areas.

Two of the primary challenges in the Colorado River HR are overdraft in the Coachella Valley and leaking underground storage tanks. The EPA has not yet placed any contamination sites in this HR on the Superfund National Priorities List; however, one site is under consideration because of high pesticide levels.

Water Quality in Public Supply Wells

From 1994 through 2000, 314 public supply water wells were sampled in 23 of the 64 basins and subbasins in the Colorado River HR. Analyzed samples indicate that 270 wells, or 86 percent, met the state primary MCLs for drinking water standards. Forty-four wells, or 14 percent, have constituents that exceed one or more MCL. Figure 44 shows the percentages of each contaminant group that exceeded MCLs in the 44 wells.

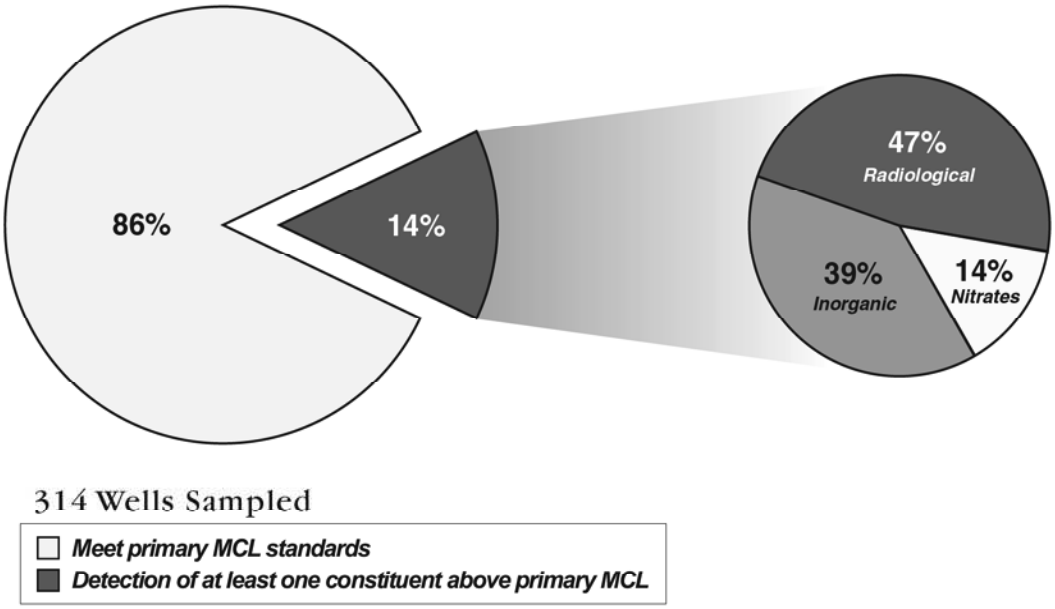

Figure 44 MCL exceedances in public supply wells in the Colorado River Hydrologic Region

Table 39 lists the three most frequently occurring contaminants in each contaminant group and shows the number of wells in the HR that exceeded the MCL for those contaminants.

Table 39 Most frequently occurring contaminants by contaminant group in the Colorado River Hydrologic Region

Contaminant group	Contaminant - # of wells	Contaminant - # of wells	Contaminant - # of wells
Inorganics – Primary	Fluoride – 17		
Inorganics – Secondary	Iron – 38	Manganese – 26	TDS – 5
Radiological	Radium 228 – 3	Combined RA226 + RA228 – 3	Radium 226 – 1
Nitrates	Nitrate (as NO_3) – 6	Nitrate + Nitrite – 1	

Changes from Bulletin 118-80

Several modifications from the groundwater basins presented in Bulletin 118-80 are incorporated in this report (Table 40). Jacumba Valley East Groundwater Basin (7-60) has been deleted because of lack of information about groundwater in this basin. The Pinyon Wash Area (7-57) and Whale Peak Area (7-58) groundwater basin names have been deleted because they are now incorporated into other larger basins. Similarly, Clark Valley (7-23) and Ocotillo Valley (7-25) groundwater basins are now the combined Ocotillo-Clark Valley Groundwater Basin (7-25). The Deadman Valley (7-13), Johnson Valley Area (7-18), and Coachella Valley (7-21) groundwater basins have been subdivided into subbasins in this report. The western boundary of Lucerne Valley Groundwater Basin (7-19) has been moved eastward from the HR boundary to the Helendale fault. Groundwater level elevations indicate that this fault is a groundwater barrier and that groundwater flows westward back under the surface divide into the Upper Mojave River Groundwater Basin (6-42). The boundary between Lucerne Valley (7-19) and Johnson Valley Area (7-18) groundwater basins is delineated in this report.

The boundaries of Twentynine Palms Valley (7-10), Copper Mountain Valley (7-11), Warren Valley (7-12), Deadman Lake (7-13), and Ames Valley (7-16) groundwater basins have been redrawn in light of newer groundwater level data. These data indicate that the Pinto Mountain fault is a groundwater barrier. Joshua Tree Groundwater Basin (7-62) is a new basin that has been delineated from parts of Copper Mountain Valley and Twentynine Palms Valley Groundwater Basins because the Pinto Mountain fault is such a strong barrier. Buck Ridge Fault Valley Groundwater Basin (7-54) was presented in Bulletin 118-80 as two unconnected deposits of water-bearing alluvium separated by outcrop of nonwater-bearing rocks. These water-bearing deposits have been designated as separate groundwater basins in this report, with the Buck Ridge Fault Valley Groundwater Basin (7-54) as the northern basin and Vandeventer Flat Groundwater Basin (7-63) presented as the southern basin.

Table 40 Modifications since Bulletin 118-80 of groundwater basins in Colorado River Hydrologic Region

Basin name	New number	Old number
Clark Valley	Delete – combined with 7-25	7-23
Ocotillo-Clark Valley	7-25 (now combined)	7-25
Pinyon Wash Area	Incorporated into 7-56	7-57
Whale Peak Area	Incorporated into 7-28	7-58
Jacumba Valley East	Deleted	7-60
Joshua Tree	7-62 (new)	
Vandeventer Flat	7-63 (new)	

Table 41 Colorado River Hydrologic Region groundwater data

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
7-1	LANFAIR VALLEY	157,000	C	70	16	-	-	9	515	173-2,260
7-2	FENNER VALLEY	454,000	A	200	100	-	-	4	515	173-2,260
7-3	WARD VALLEY	961,000	A	260	180	-	-	1	-	327-589
7-4	RICE VALLEY	189,000	C	65	-	-	-	-	-	-
7-5	CHUCKWALLA VALLEY	604,000	C	3,900	1,800	12	-	10	-	424
7-6	PINTO VALLEY	183,000	A	1,480	900	-	-	1	-	-
7-7	CADIZ VALLEY	270,000	C	167	66	-	-	-	400	300-3000
7-8	BRISTOL VALLEY	498,000	A	3,000	-	-	-	-		300-298,000
7-9	DALE VALLEY	213,000	C	380	275	-	-	2	-	-
7-10	TWENTYNINE PALMS VALLEY	62,400	C	3,000	540	27	-	2	640	-
7-11	COPPER MOUNTAIN VALLEY	30,300	A	2,450	250	2	-	2	-	180-214
7-12	WARREN VALLEY	17,200	A	4,000	350	27	18	17	196	129-269
7-13	DEADMAN VALLEY									
7-13.01	DEADMAN LAKE	89,200	C	2,000	-	28	3	1	-	311-985
7-13.02	SURPRISE SPRING	29,300	C	1,370	680	26	6	9	177	141-1,050
7-14	LAVIC VALLEY	102,000	C	140	80	-	-	-	-	-
7-15	BESSEMER VALLEY	39,100	C	0	-	-	-	-	-	-
7-16	AMES VALLEY	110,000	C	2,000	-	19	3	11	459	-
7-17	MEANS VALLEY	15,000	C	0	-	1	-	-	-	-
7-18	JOHNSON VALLEY AREA									
7-18.01	SOGGY LAKE	76,800	C	-	-	6	-	1	-	300-2,000
7-18.02	UPPER JOHNSON VALLEY	34,800	C	-	-	-	-	-	-	3,000
7-19	LUCERNE VALLEY	148,000	A	1,000	-	22	9	21	301	200-5,000
7-20	MORONGO VALLEY	7,240	C	600	90	-	-	5	-	-
7-21	COACHELLA VALLEY									
7-21.01	INDIO	336,000	A	1,880	650	30	-	204	300	-
7-21.02	MISSION CREEK	49,000	A	3,500	715	5	-	15	<500	-
7-21.03	DESERT HOT SPRINGS	101,000	C	2,500	985	10	-	2	-	800-1,000
7-21.04	SAN GORGONIO PASS	38,700	A	1,000	0	17	8	5	-	106-205
7-22	WEST SALTON SEA	106,000	C	540	400	v	-	-	-	-
7-24	BORREGO VALLEY	153,000	A	2,000	0	10	10	25	-	300-2,440
7-25	OCOTILLO-CLARK VALLEY	223,000	C	3,500	1,760	1	-	2	-	-
7-26	TERWILLIGER VALLEY	8,030	C	100	-	-	-	1	-	500
7-27	SAN FELIPE VALLEY	2,340	C	500	30	-	-	1	-	-
7-28	VALLECITO-CARRIZO VALLEY	122,000	C	2,500	260	-	-	1	-	-
7-29	COYOTE WELLS VALLEY	146,000	A	-	-	25	6	9	-	-
7-30	IMPERIAL VALLEY	961,000	A	1,000	-	19	-	45	1088	498-7,280
7-31	OROCOPIA VALLEY	96,500	A	210	165	0	-	1	-	-
7-32	CHOCOLATE VALLEY	130,000	C	0	0	0	-	-	-	-
7-33	EAST SALTON SEA	196,000	C	0	0	1	-	4	-	-
7-34	AMOS VALLEY	130,000	C	100	50	3	-	1	-	-
7-35	OGILBY VALLEY	134,000	C	4,000	50	27	1	3	-	-

Table 41 Colorado River Hydrologic Region groundwater data (continued)

Basin/Subbasin	Basin Name	Area (acres)	Groundwater Budget Type	Well Yields (gpm)		Types of Monitoring			TDS (mg/L)	
				Maximum	Average	Levels	Quality	Title 22	Average	Range
7-36	YUMA VALLEY	3,780	C	100	40	59	0	15	-	-
7-37	ARROYO SECO VALLEY	258,000	C	-	-	2	0	0	-	-
7-38	PALO VERDE VALLEY	73,400	A	-	-	11	-	19	840	658-1,030
7-39	PALO VERDE MESA	226,000	C	2,750	1,650	20	-	13	-	-
7-40	QUIEN SABE POINT VALLEY	25,300	C	25	-	-	-	3	-	-
7-41	CALZONA VALLEY	81,000	C	2,340	500	0	0	0	-	
7-42	VIDAL VALLEY	138,000	C	1,800	675	-	-	1	-	-
7-43	CHEMEHUEVI VALLEY	273,000	A	0	0	1	0	1	-	-
7-44	NEEDLES VALLEY	88,400	A	1,500	980	34	-	11	-	-
7-45	PIUTE VALLEY	176,000	C	1,500	200	-	-	-	-	-
7-46	CANEBRAKE VALLEY	5,420	C	125	-	-	-	-	-	-
7-47	JACUMBA VALLEY	2,450	A	1,000	-	-	-	3		296-6,100
7-48	HELENDALE FAULT VALLEY	2,620	C	-	-	-	-	-	-	-
7-49	PIPES CANYON FAULT VALLEY	3,390	C	-	-	-	-	-	-	-
7-50	IRON RIDGE AREA	5,250	C	-	-	-	-	-	-	-
7-51	LOST HORSE VALLEY	17,300	C	-	-	-	-	-	-	-
7-52	PLEASANT VALLEY	9,670	C	-	-	-	-	-	-	-
7-53	HEXIE MOUNTAIN AREA	11,200	C	-	-	-	-	-	-	-
7-54	BUCK RIDGE FAULT VALLEY	6,930	C	-	-	-	-	-	-	-
7-55	COLLINS VALLEY	7,080	C	1,500	-	-	-	-	-	-
7-56	YAQUI WELL AREA	15,000	C	0	-	-	-	1	-	-
7-59	MASON VALLEY	5,530	C	0	0	0	0	1	-	-
7-61	DAVIES VALLEY	3,570	C	0	0	0	0	-	-	-
7-62	JOSHUA TREE	33,800	A	2,200	1,110	25	5	14	180	117-185
7-63	VANDEVENTER FLAT	6,750	C	50	17	-	-	-	-	-

gpm - gallons per minute
mg/L - milligram per liter
TDS -total dissolved solids

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Glossary

Glossary

A

acre-foot (af) The volume of water necessary to cover one acre to a depth of one foot; equal to 43,560 cubic feet or 325,851 gallons.

adjudication A case that has been heard and decided by a judge. In the context of an adjudicated groundwater basin, landowners or other parties have turned to the courts to settle disputes over how much groundwater can be extracted by each party to the decision.

alluvial Of or pertaining to or composed of alluvium.

alluvium A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material, deposited during comparatively recent geologic time by a stream or other body of running water, as a sorted or semi sorted sediment in the bed of the stream or on it's floodplain or delta, as a cone or fan at the base of a mountain slope.

anthropogenic Of human origin or resulting from human activity.

appropriative right The right to use water that is diverted or extracted by a nonriparian or nonoverlying party for nonriparian or nonoverlying uses. In California, surface water appropriative rights are subject to a statutory permitting process while groundwater appropriation is not.

aquitard A confining bed and/or formation composed of rock or sediment that retards but does not prevent the flow of water to or from an adjacent aquifer. It does not readily yield water to wells or springs, but stores ground water.

aquifer A body of rock or sediment that is sufficiently porous and permeable to store, transmit, and yield significant or economic quantities of groundwater to wells and springs.

aridity A term describing a climate or region in which precipitation is so deficient in quantity or occurs so infrequently that intensive agricultural production is not possible without irrigation.

artesian aquifer A body of rock or sediment containing groundwater that is under greater than hydrostatic pressure; that is, a confined aquifer. When an artesian aquifer is penetrated by a well, the water level will rise above the top of the aquifer.

artesian pressure Hydrostatic pressure of artesian water, often expressed in terms of pounds per square inch; or the height, in feet above the land surface, of a column of water that would be supported by the pressure.

artificial recharge The addition of water to a groundwater reservoir by human activity, such as putting surface water into dug or constructed spreading basins or injecting water through wells.

available groundwater storage capacity The volume of a groundwater basin that is unsaturated and capable of storing groundwater.

average annual runoff The average value of total annual runoff volume calculated for a selected period of record, at a specified location, such as a dam or stream gage.

average year water demand Demand for water under average hydrologic conditions for a defined level of development.

B

basin management objectives (BMOs) See management objectives

beneficial use One of many ways that water can be used either directly by people or for their overall benefit. The State Water Resources Control Board recognizes 23 types of beneficial use with water quality criteria for those uses established by the Regional Water Quality Control Boards.

borehole geophysics The general field of geophysics developed around the lowering of a variety of probes into a boring or well. Borehole logging provides additional information concerning physical, electrical, acoustic, nuclear and chemical aspects of the soils and rock encountered during drilling.

C

community water system A public water system that serves at least 15 service connections used by yearlong residents or regularly serves at least 25 year-long residents (DHS 2000).

confined aquifer An aquifer that is bounded above and below by formations of distinctly lower permeability than that of the aquifer itself. An aquifer containing confined ground water. See artesian aquifer.

conjunctive use The coordinated and planned management of both surface and groundwater resources in order to maximize the efficient use of the resource; that is, the planned and managed operation of a groundwater basin and a surface water storage system combined through a coordinated conveyance infrastructure. Water is stored in the groundwater basin for later and planned use by intentionally recharging the basin during years of above-average surface water supply.

contaminant Any substance or property preventing the use or reducing the usability of the water for ordinary purposes such as drinking, preparing food, bathing washing, recreation, and cooling. Any solute or cause of change in physical properties that renders water unfit for a given use. (Generally considered synonymous with pollutant).

critical conditions of overdraft A groundwater basin in which continuation of present practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts. The definition was created after an extensive public input process during the development of the Bulletin 118-80 report.

D

deep percolation Percolation of water through the ground and beyond the lower limit of the root zone of plants into groundwater.

desalination A process that converts seawater or brackish water to fresh water or an otherwise more usable condition through removal of dissolved solids.

domestic well A water well used to supply water for the domestic needs of an individual residence or systems of four or fewer service connections.

drinking water system See public water system

drought condition Hydrologic conditions during a defined period when rainfall and runoff are much less than average.

drought year supply The average annual supply of a water development system during a defined drought period.

E

electrical conductivity (EC) The measure of the ability of water to conduct an electrical current, the magnitude of which depends on the dissolved mineral content of the water.

effective porosity The volume of voids or open spaces in alluvium and rocks that is interconnected and can transmit fluids.

environmental water Water serving environmental purposes, including instream fishery flow needs, wild and scenic river flows, water needs of fresh-water wetlands, and Bay-Delta requirements.

evapotranspiration (ET) The quantity of water transpired (given off), retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces.

G

groundwater basin An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom.

groundwater budget A numerical accounting, the *groundwater equation*, of the recharge, discharge and changes in storage of an aquifer, part of an aquifer, or a system of aquifers.

groundwater in storage The quantity of water in the zone of saturation.

groundwater management The planned and coordinated management of a groundwater basin or portion of a groundwater basin with a goal of long-term sustainability of the resource.

groundwater management plan A comprehensive written document developed for the purpose of groundwater management and adopted by an agency having appropriate legal or statutory authority.

groundwater mining The process, deliberate or inadvertent, of extracting groundwater from a source at a rate in excess of the replenishment rate such that the groundwater level declines persistently, threatening exhaustion of the supply or at least a decline of pumping levels to uneconomic depths.

groundwater monitoring network A series of monitoring wells at appropriate locations and depths to effectively cover the area of interest. Scale and density of monitoring wells is dependent on the size and complexity of the area of interest, and the objective of monitoring.

groundwater overdraft The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that recharges the basin over a period of years during which water supply conditions approximate average conditions.

groundwater quality See water quality

groundwater recharge facility A structure that serves to conduct surface water into the ground for the purpose of replenishing groundwater. The facility may consist of dug or constructed spreading basins, pits, ditches, furrows, streambed modifications, or injection wells.

groundwater recharge The natural or intentional infiltration of surface water into the zone of saturation.

groundwater source area An area where groundwater may be found in economically retrievable quantities outside of normally defined groundwater basins, generally referring to areas of fractured bedrock in foothill and mountainous terrain where groundwater development is based on successful well penetration through interconnecting fracture systems. Well yields are generally lower in fractured bedrock than wells within groundwater basins.

groundwater storage capacity volume of void space that can be occupied by water in a given volume of a formation, aquifer, or groundwater basin.

groundwater subbasin A subdivision of a groundwater basin created by dividing the basin using geologic and hydrologic conditions or institutional boundaries.

groundwater table The upper surface of the zone of saturation in an unconfined aquifer.

groundwater Water that occurs beneath the land surface and fills the pore spaces of the alluvium, soil, or rock formation in which it is situated. It excludes soil moisture, which refers to water held by capillary action in the upper unsaturated zones of soil or rock.

H

hazardous waste Waste that poses a present or potential danger to human beings or other organisms because it is toxic, flammable, radioactive, explosive or has some other property that produces substantial risk to life.

hydraulic barrier A barrier created by injecting fresh water to control seawater intrusion in an aquifer, or created by water injection to control migration of contaminants in an aquifer.

hydraulic conductivity A measure of the capacity for a rock or soil to transmit water; generally has the units of feet/day or cm/sec.

hydrograph A graph that shows some property of groundwater or surface water as a function of time.

hydrologic cycle The circulation of water from the ocean through the atmosphere to the land and ultimately back to the ocean.

hydrologic region A study area consisting of multiple planning subareas. California is divided into 10 hydrologic regions.

hydrostratigraphy A geologic framework consisting of a body of rock having considerable lateral extent and composing a reasonably distinct hydrologic system.

hyporheic zone The region of saturated sediments beneath and beside the active channel and that contain some proportion of surface water that was part of the flow in the surface channel and went back underground and can mix with groundwater.

I

infiltration The flow of water downward from the land surface into and through the upper soil layers.

infiltration capacity The maximum rate at which infiltration can occur under specific conditions of soil moisture.

in-lieu recharge The practice of providing surplus surface water to historic groundwater users, thereby leaving groundwater in storage for later use.

ISI Integrated Storage Investigations Program, an element of the CALFED Bay Delta initiative.

J

joint powers agreement (JPA) An agreement entered into by two or more public agencies that allows them to jointly exercise any power common to the contracting parties. The JPA is defined in Chapter 5 (commencing with Section 6500) of Division 7 of Title 1 of the California Government Code.

L

land subsidence The lowering of the natural land surface due to groundwater (or oil and gas) extraction.

leaky confining layer A low-permeability layer that can transmit water at sufficient rates to furnish some recharge from an adjacent aquifer to a well.

lithologic log A record of the lithology of the soils, sediments and/or rock encountered in a borehole from the surface to the bottom.

lithology The description of rocks, especially in hand specimen and in outcrop, on the basis of such characteristics as color, mineralogic composition, and grain size.

losing stream A stream or reach of a stream that is losing water by seepage into the ground.

M

management objectives Objectives that set forth the priorities and measurable criteria of local groundwater basin management. For example, one management objective could be to minimize degradation of groundwater quality with a criteria set that groundwater will not be degraded by more than 100 mg/l in terms of TDS.

maximum contaminant level (MCL) The highest drinking water contaminant concentration allowed under federal and State Safe Drinking Water Act regulations.

N

natural recharge Natural replenishment of an aquifer generally from snowmelt and runoff; through seepage from the surface.

nonpoint source Pollution discharged over a wide land area, not from one specific location. These are forms of diffuse pollution caused by sediment, nutrients, etc., carried to lakes and streams by surface runoff.

O

operational yield An optimal amount of groundwater that should be withdrawn from an aquifer system or a groundwater basin each year. It is a dynamic quantity that must be determined from a set of alternative groundwater management decisions subject to goals, objectives, and constraints of the management plan.

ordinance A law set forth by a governmental authority.

overdraft See groundwater overdraft

overlying right Property owners above a common aquifer possess a mutual right to the reasonable and beneficial use of a groundwater resource on land overlying the aquifer from which the water is taken. Overlying rights are correlative (related to each other) and overlying users of a common water source must share the resource on a pro rata basis in times of shortage. A proper overlying use takes precedence over all non-overlying uses.

P

perched groundwater Groundwater supported by a zone of material of low permeability located above an underlying main body of groundwater.

perennial yield The maximum quantity of water that can be annually withdrawn from a groundwater basin over a long period of time (during which water supply conditions approximate average conditions) without developing an overdraft condition.

perforated interval The depth interval where slotted casing or screen is placed in a well to allow entry of water from the aquifer formation.

permeability The capability of soil or other geologic formations to transmit water. See hydraulic conductivity.

pesticide Any of a class of chemicals used for killing insects, weeds or other undesirable entities. Most commonly associated with agricultural activities, but has significant domestic use in California.

point source A specific site from which wastewater or polluted water is discharged into a water body.

pollution (of water) The alteration of the physical, chemical, or biological properties of water by the introduction of any substance into water that adversely affects any beneficial use of water.

porosity The ratio of the voids or open spaces in alluvium and rocks to the total volume of the alluvium or rock mass.

possible contaminating activity (PCA) Human activities that are actual or potential origins of contamination for a drinking water source. PCAs include sources of both microbiological and chemical contaminants that could have an adverse effect upon human health (DHS 2000).

potentiometric surface The surface to which the water in a confined aquifer will rise in a tightly cased well.

prescriptive right rights obtained through the open and notorious adverse use of another's water rights. By definition, adverse use is not use of a surplus, but the use of non-surplus water to the direct detriment of the original rights holder.

primary porosity Voids or open spaces that were present when alluvium and rocks were originally deposited or formed.

public supply well A well used as a part of a public water system.

public water system A system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. (DHS 2000).

pueblo right A water right possessed by a municipality which, as a successor of a Spanish or Mexican pueblo, entitled to the beneficial use of all needed, naturally-occurring surface and groundwater of the original pueblo watershed Pueblo rights are paramount to all other claims.

R

recharge Water added to an aquifer or the process of adding water to an aquifer. Ground water recharge occurs either naturally as the net gain from precipitation, or artificially as the result of human influence. See artificial recharge.

recharge basin A surface facility constructed to infiltrate surface water into a groundwater basin.

riparian right A right to use surface water, such right derived from the fact that the land in question abuts upon the banks of streams.

runoff The volume of surface flow from an area.

S

safe yield The maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect.

salinity Generally, the concentration of mineral salts dissolved in water. Salinity may be expressed in terms of a concentration or as electrical conductivity. When describing salinity influenced by seawater, salinity often refers to the concentration of chlorides in the water. See also total dissolved solids.

saline intrusion The movement of salt water into a body of fresh water. It can occur in either surface water or groundwater bodies.

saturated zone The zone in which all interconnected openings are filled with water, usually underlying the unsaturated zone.

seawater intrusion barrier A system designed to retard, cease or repel the advancement of seawater intrusion into potable groundwater supplies along coastal portions of California. The system may be a series of specifically placed injection wells where water is injected to form a hydraulic barrier.

secondary porosity Voids in a rock formed after the rock has been deposited; not formed with the genesis of the rock, but later due to other processes. Fractures in granite and caverns in limestone are examples of secondary openings.

seepage The gradual movement of water into, through or from a porous medium. Also the loss of water by infiltration into the soil from a canal, ditches, laterals, watercourse, reservoir, storage facilities, or other body of water, or from a field.

semi-confined aquifer A semi-confined aquifer or leaky confined aquifer is an aquifer that has aquitards either above or below that allow water to leak into or out of the aquifer depending on the direction of the hydraulic gradient.

service area The geographic area served by a water agency.

specific conductance See electrical conductivity

specific retention The ratio of the volume of water a rock or sediment will retain against the pull of gravity to the total volume of the rock or sediment.

specific yield the ratio of the volume of water a rock or soil will yield by gravity drainage to the total volume of the rock or soil.

spring a location where groundwater flows naturally to the land surface or a surface water body.

stakeholders Any individual or organization that has an interest in water management activities. In the broadest sense, everyone is a stakeholder, because water sustains life. Water resources stakeholders are typically those involved in protecting, supplying, or using water for any purpose, including environmental uses, who have a vested interest in a water-related decision.

stratigraphy The science of rocks. It is concerned with the original succession and age relations of rock strata and their form, distribution, lithologic composition, fossil content, geophysical and geochemical properties—all characters and attributes of rocks as strata—and their interpretation in terms of environment and mode of origin and geologic history.

subsidence See land subsidence

subterranean stream Subterranean streams "flowing through known and definite channels" are regulated by California's surface water rights system.

surface supply Water supply obtained from streams, lakes, and reservoirs.

sustainability Of, relating to, or being a method of using a resource so that the resource is not depleted or permanently damaged.

T

total dissolved solids (TDS) a quantitative measure of the residual minerals dissolved in water that remain after evaporation of a solution. Usually expressed in milligrams per liter. See also salinity

toxic Poisonous, relating to or caused by a poison. Toxicity is determined for individual contaminants or for mixtures of contaminants as found in waste discharges.

transmissivity The product of hydraulic conductivity and aquifer thickness; a measure of a volume of water to move through an aquifer. Transmissivity generally has the units of ft^2/day or gallons per day/foot. Transmissivity is a measure of the subsurface's ability to transmit groundwater horizontally through its entire saturated thickness and affects the potential yield of wells.

transpiration An essential physiological process in which plant tissues give off water vapor to the atmosphere.

U

unconfined aquifer An aquifer which is not bounded on top by an aquitard. The upper surface of an unconfined aquifer is the water table.

underground stream Body of water flowing as a definite current in a distinct channel below the surface of the ground, usually in an area characterized by joints or fissures. Application of the term to ordinary aquifers is incorrect.

unsaturated zone The zone below the land surface in which pore space contains both water and air.

urban water management plan (UWMP) An UWMP is required for all urban water suppliers having more than 3,000 connections or supplying more than 3,000 acre-feet of water. The plans include discussions on water supply, supply reliability, water use, water conservation, and water shortage contingency and serve to assist urban water suppliers with their long-term water resources planning to ensure adequate water supplies for existing and future demands.

usable storage capacity The quantity of groundwater of acceptable quality that can be economically withdrawn from storage.

V

vadose zone See unsaturated zone

volatile organic compound (VOC) A manmade organic compound that readily vaporizes in the atmosphere. These compounds are often highly mobile in the groundwater system and are generally associated with industrial activities.

W

water quality Description of the chemical, physical, and biological characteristics of water, usually in regard to its suitability for a particular purpose or use.

water table See groundwater table

water year A continuous 12-month period for which hydrologic records are compiled and summarized. Different agencies may use different calendar periods for their water years.

watershed The land area from which water drains into a stream, river, or reservoir.

well completion report A required, confidential report detailing the construction, alteration, abandonment, or destruction of any water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well. The reports were called *Water Well Drillers' Report* prior to 1991 and are often referred to as "driller's logs." The report requirements are described in the California Water Code commencing with Section 13750.

WQCP Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary.

Metric Conversions

Quantity	To Convert from Metric Unit	To Customary Unit	Multiply Metric Unit By	To Convert to Metric Unit Multiply Customary Unit By
Length	millimeters (mm)	inches (in)	0.03937	25.4
	centimeters (cm) for snow depth	inches (in)	0.3937	2.54
	meters (m)	feet (ft)	3.2808	0.3048
	kilometers (km)	miles (mi)	0.62139	1.6093
Area	square millimeters (mm2)	square inches (in2)	0.00155	645.16
	square meters (m2)	square feet (ft2)	10.764	0.092903
	hectares (ha)	acres (ac)	2.4710	0.40469
	square kilometers (km2)	square miles (mi2)	0.3861	2.590
Volume	liters (L)	gallons (gal)	0.26417	3.7854
	megaliters	million gallons (10*)	0.26417	3.7854
	cubic meters (m3)	cubic feet (ft3)	36.315	0.028317
	cubic meters (m3)	cubic yards (yd3)	1.308	0.76455
	cubic dekameters (dam3)	acre-feet (ac-ft)	0.8107	1.2335
Flow	cubic meters per second (m3/s)	cubic feet per second (ft3/s)	35.315	0.028317
	liters per minute (L/mn)	gallons per minute (gal/mn)	0.26417	3.7854
	liters per day (L/day)	gallons per day (gal/day)	0.26417	3.7854
	megaliters per day (ML/day)	million gallons per day (mgd)	0.26417	3.7854
	cubic dekameters per day (dam3/day)	acre-feet per day (ac-ft/day)	0.8107	1.2335
Mass	kilograms (kg)	pounds (lbs)	2.2046	0.45359
	megagrams (Mg)	tons (short, 2,000 lb.)	1.1023	0.90718
Velocity	meters per second (m/s)	feet per second (ft/s)	3.2808	0.3048
Power	kilowatts (k/W)	horsepower (hp)	1.3405	0.746
Pressure	kilopascals (kPa)	pounds per square inch (psi)	0.14505	6.8948
	kilopascals (kPa)	eet head of water	0.32456	2.989
Specific Capacity	liters per minute per meter drawdown	gallons per minute per foot drawdown	0.08052	12.419
Concentration	milligrams per liter (mg/L)	parts per million (ppm)	1.0	1.0
Electrical Conductivity	microsiemens per centimeter (µS/cm)	micromnos per centermeter	1.0	1.0
Temperature	degrees Celsius (°C)	degrees Fahrenheit (°F)	(1.8X°C)+32	(°F-321/18

Appendices

Appendix A
Obtaining Copies of Supplemental Material

Bulletin 118 Update 2003 includes this report and supplemental material consisting of individual basin descriptions and a GIS-compatible map of each of the delineated groundwater basins in California. The supplemental material will be updated as new information becomes available and can be viewed or downloaded at http://www.waterplan.water.ca.gov/groundwater/118index.htm

Appendix B
The Right to Use Groundwater in California

California does not have a statewide management program or statutory permitting system for groundwater. Some local agencies have adopted groundwater ordinances under their police powers, or have adopted groundwater management programs under a variety of statutory authorities.

Prior to a discussion of groundwater management, it is helpful to understand some of the laws governing the right to use groundwater in California. When the Water Commission Act of 1913 (Stats. 1913, Ch. 586) became effective in 1914, appropriative surface water rights became subject to a statutory permitting process. This appropriation procedure can be found in Water Code Section 1200 *et seq*. Groundwater classified as underflow of a surface stream, a "subterranean stream flowing through a known and definite channel," was made subject to the State permit system. However, most groundwater in California is presumed to be "percolating water," that is, water in underground basins and groundwater which has escaped from streams. This percolating water is not subject to a permitting process. As a result, most of the body of law governing groundwater use in California today has evolved through a series of court decisions beginning in the early 20th century. Key cases are listed in Table B-1, and some of the most significant are discussed below.

Table B-1 Significant court cases related to the right to use groundwater in California

Case	Issues addressed
Katz v. Walkinshaw, 141 Cal. 116 (1903)	Established Correlative Rights Doctrine. Correlative rights of overlying users, and surplus supply available for appropriation among non-overlying users.
Peabody v. City of Vallejo, 2 Cal. 2d 351 (1935)	Limited riparian rights under the reasonable and beneficial use requirement of the 1928 constitutional amendment; requirement of reasonable and beneficial use.
Pasadena v. Alhambra, 33 Cal. 2d 908 (1949)	First basin adjudication in California; established Doctrine of Mutual Prescription.
Niles Sand and Gravel Co. v. Alameda County Water District, 37 Cal. App. 3d 924 (1974)	Established right to store water underground as a servitude.
Techachapi-Cummings County Water District v. Armstrong, 49 Cal. App. 3d 992 (1975)	Modified the Mutual Prescription Doctrine articulated in Pasadena v. Alhambra. Overlying owners' water rights must be quantified on the basis of current, reasonable and beneficial need, not past use. By analogy to riparian rights, factors to be considered include: the amount of water available, the extent of ownership in the basin, and the nature of projected use.
Los Angeles v. San Fernando, 14 Cal. 3d 199 (1975)	Significantly modified Mutual Prescription Doctrine by disallowing it against public entities (Civil Code section 1007); established pueblo right above overlying owner right; established right to store imported water underground and recapture when needed above the right of overlying landowner.
Wright v. Goleta Water District, 174 Cal. App. 3d 74 (1985)	The unexercised water rights of overlying owners are protected from appropriators; notice and opportunity must be given to overlying owners to resist any interference with their rights.
Hi-Desert County Water District v. Blue Skies Country Club,	Retention of overlying right; no acquisition of prescriptive right by 23 Cal. App. 4th 1723 (1994) overlying owner.
Baldwin v. Tehama County, 31 Cal. App. 4th 166 (1994)	City and County regulation of groundwater through police power. County limitations on export upheld.
City of Barstow v. Mojave Water Agency,	Held that in considering a stipulated physical solution 23 Cal. 4th 1224 (2000) involving equitable apportionment, court must consider correlativerights of parties that did not join the stipulation.

This table modified from Bachman and others 1997

Katz v. Walkinshaw (141 Cal. 116)

In the 1903 decision, *Katz v. Walkinshaw*, the California Supreme Court rejected the English Common Law doctrine of groundwater rights and established the Doctrine of Correlative Rights. Prior to the *Katz* decision, California had followed the doctrine articulated in the 1843 English decision of *Acton v. Blundell* (12 M. & W. 324, 152 Eng. Rep. 1223), which established that landowners enjoyed absolute ownership of groundwater underneath their property. The 1903 decision rejected the English Common Law approach as unsuitable for the "natural conditions" in California, and instead established the Correlative Rights Doctrine analogous to a riparian right. Each overlying landowner was entitled to make reasonable beneficial use of groundwater with a priority equal to all other overlying users. Water in excess of the needs of the overlying owners could be pumped and used on nonoverlying lands on a first-in-time, first-in-right basis under what is known as an appropriative right. An appropriative groundwater right, unlike its surface water counterpart, is not subject to a permitting process. Where overlying owners made full use of available supplies, appropriative rights were extinguished. Where there was insufficient water to meet even the needs of the overlying owners, the court applied the Correlative Rights Doctrine to apportion the available groundwater among the overlying landowners. Figure B-1 depicts the rights to use groundwater established in *Katz v. Walkinshaw*.

City of Pasadena v. City of Alhambra (33 Cal. 2d 908)

The 1949 decision, *Pasadena v. Alhambra*, added significant complexity to the right to use groundwater in California. This decision, involving the adjudication of the Raymond Basin, established the doctrine of mutual prescription. Groundwater levels in the basin had been declining for many years by the time court action was initiated. Most substantial pumpers, both overlying and appropriators, were joined in the action. Previously, appropriators only had a right to water surplus to the needs of overlying users. However, based upon a stipulation by most of the parties, the court in *Pasadena* adopted a program of proportionate reductions. These appropriators had each effectively gained a prescriptive right, similar to that of surface water rights, in which they had taken the water in an open, notorious, and hostile manner for at least five years. Mutual prescription provided groundwater rights to both overlying users and appropriators in depleted groundwater basins by prorating their rights based on the highest continuous amount of pumping during the five years following commencement of the overdraft. All of the users in the Raymond Basin were thus entitled to extract their portion of the court-approved safe yield of the basin.

City of Los Angeles v. City of San Fernando (14 Cal. 3d 199)

In 1975, in *Los Angeles v. San Fernando*, the California Supreme Court significantly limited the Mutual Prescription Doctrine introduced in Pasadena v. Alhambra. This opinion had far-reaching impacts on both the right to use groundwater and the practice of conjunctive use of groundwater and surface water to manage a basin. The case began in 1955, when the City of Los Angeles sued the cities of San Fernando, Glendale, Burbank and other pumpers, asserting a prior right to the San Fernando Valley groundwater basins in the northern part of the City of Los Angeles. The court, relying on Civil Code Section 1007, held that public agencies and public utilities cannot lose their groundwater rights by prescription. This holding effectively ruled out any future "mutual prescription" settlements or judgments involving rights held by public entities.

With respect to the native water supply of the San Fernando Basin, the court found that the City of Los Angeles had prior rights to all of this supply pursuant to its "pueblo right." Pueblo rights are traceable to rights recognized by the Spanish crown and the Mexican government. Under the Spanish/Mexican system, water rights were held in trust by pueblos for the benefit of all of its inhabitants. Under the Treaty of Guadalupe Hidalgo executed by Mexico and the United States in 1848, the municipal successors to Spanish/Mexican pueblos retained their pueblo rights upon the cession of California. In the San Fernando decision, the court confirmed Los Angeles' pueblo right, finding it superior to the rights of all overlying landowners. While a pueblo right is rare, it is an example of the complexity of the rights to use groundwater in California.

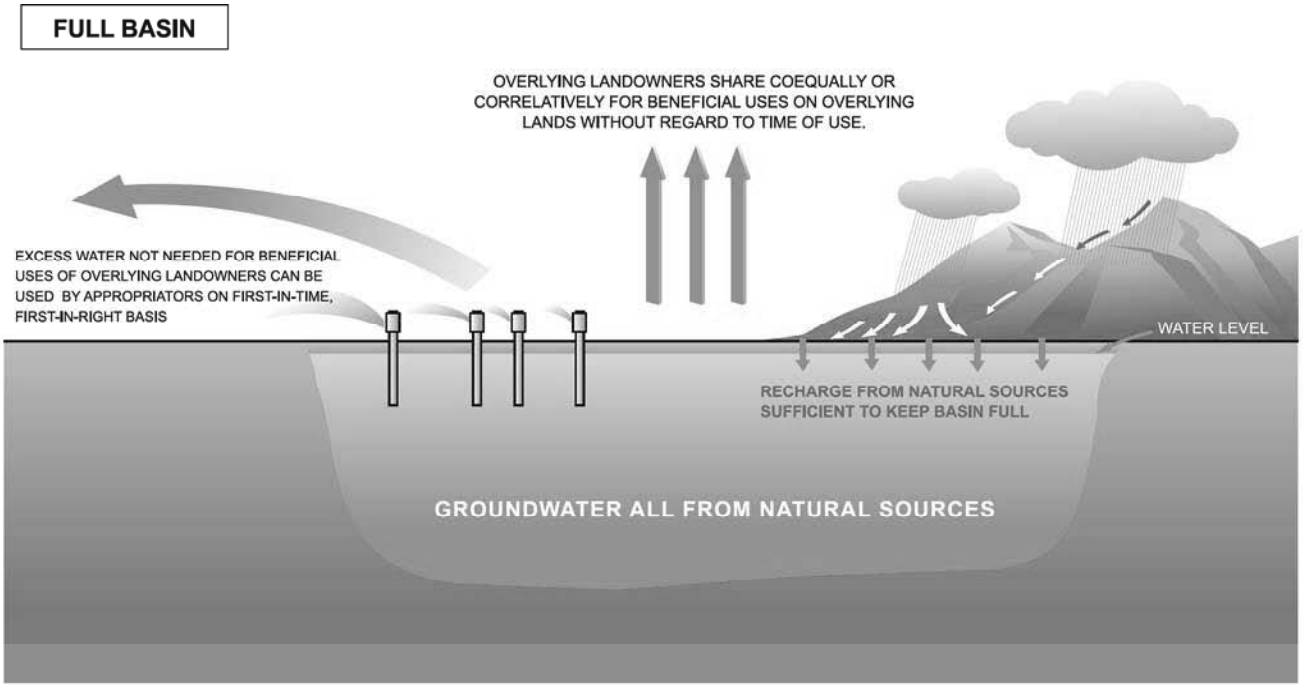

Figure B-1 Rights to groundwater use in full basin established in Katz v. Walkinshaw

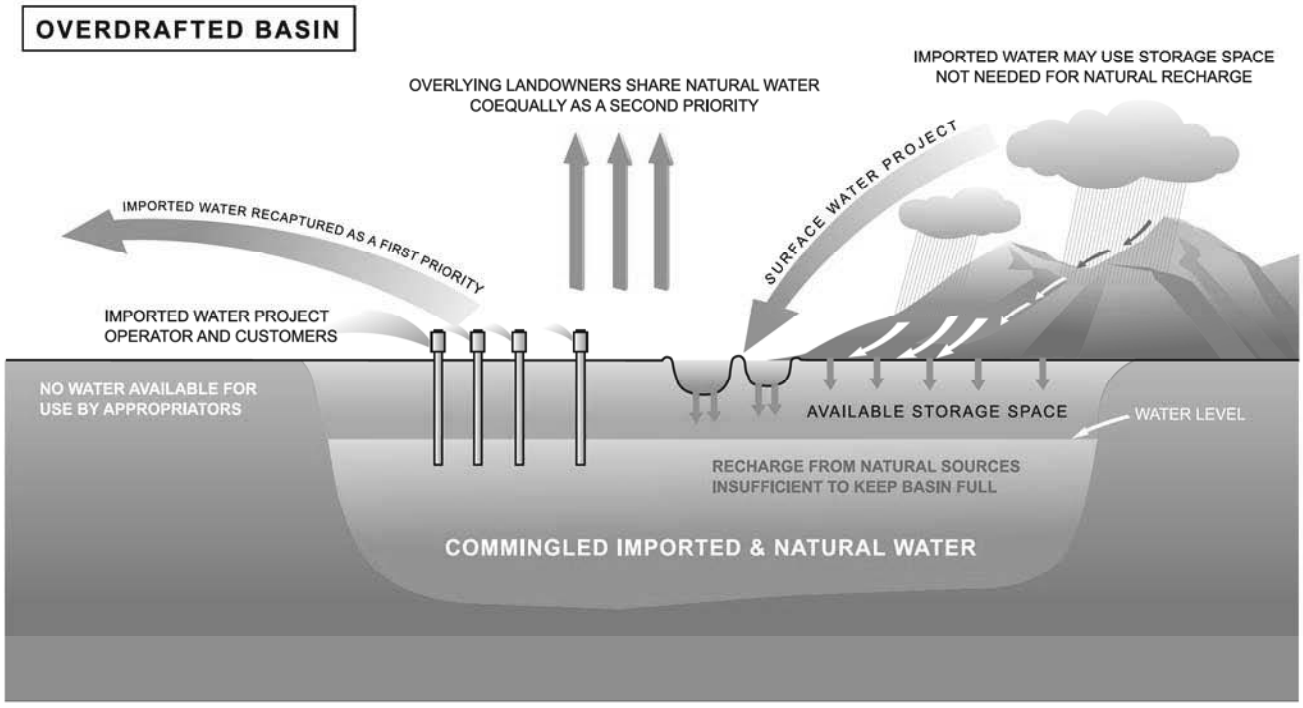

Figure B-2 Rights to groundwater use in overdrafted basin established in Los Angeles v. San Fernando

For the future of conjunctive use of groundwater basins, the court's holding with respect to the rights to available storage space in the Basin is significant. The court upheld the right of public agencies – namely the cities of San Fernando, Los Angeles, Burbank, and Glendale–to recapture the imported water they added to the Basin. The court held that the rights of the respective public agencies to recover such imported water are of equal priority to the City of Los Angeles' pueblo right, and that all such public agency rights are "prior to the rights dependent on ownership of overlying land or based solely upon appropriation of groundwater from the basin." The court remanded the case, directing the trial court to apportion the safe yield of the Basin accordingly.

The court noted that there did not appear to be any shortage of underground storage space in relation to the demand and, hence, the court did not find it necessary to determine priorities as to the future use of such space. The Judgment issued by the trial court on remand, however, provided: "To the extent of any future spreading or in lieu storage of import water or reclaimed water by Los Angeles, Glendale, Burbank or San Fernando, the party causing said water to be so stored shall have a right to extract an equivalent amount of ground water from the San Fernando Basin." Pursuant to the Judgment, a court-appointed Watermaster now manages the groundwater extraction and storage rights within the ULARA. Figure B-2 depicts the rights to use groundwater established in Los Angeles v. San Fernando in an overdrafted basin where water has been stored.

City of Barstow v. Mojave Water Agency (23 Cal. 4th 1224)

In 2000, the California Supreme Court partially overturned the 1995 adjudication of the Mojave River Basin. The trial court had approved a negotiated settlement (or stipulated agreement) that failed to include a well-by-well determination of water rights. The trial court held the negotiated settlement to be binding on all users in the basin, including some pumpers who had not agreed to the settlement. The lower court decision was based on the doctrine of "equitable apportionment," in which the available water is shared based on concepts of equity and fairness. The Court of Appeal had partially reversed the lower court, and held that the trial court did not have the authority to ignore California's traditional water rights doctrine giving overlying users a priority right to beneficial and reasonable use of the groundwater. The Court of Appeal affirmed the trial court's negotiated settlement except as it applied to two of the parties. First, the Court of Appeal reversed the holding against a non-negotiating party since the trial court had ignored that party's existing overlying water rights. Secondly, the Court of Appeal reversed the trial court's judgment as it applied to a company, where the negotiated agreement did not give the company a water-allowance equal to its actual water use. The Supreme Court affirmed the Court of Appeal decision, but reversed the judgment applying to the company's water-allowance. The Supreme Court also affirmed that the trial court could not apply the doctrine of equitable apportionment when overlying water users had already established a prior water right. The Court stated that, while the trial court could impose a physical solution (such as the negotiated settlement), the court could not simply ignore affected owners' legal water rights. Equitable apportionment, thus, remains a tool for adjudicating basin groundwater rights, but only if all parties stipulate to its use.

Appendix C
Required and Recommended Components of Local Groundwater Management Plans

Section 10750 et seq. of the Water Code, commonly referred to as Assembly Bill 3030, stipulates certain procedures that must be followed in adopting a groundwater management plan under this section.

Amendments to Section 10750 et seq. added the requirement that new groundwater management plans prepared under Section 10750 et seq. must include component 1 below (SB1938 (Stats 2002, Ch 603)).

In addition, the amendments mandate that if the agency preparing the groundwater management plan intends to apply for funding administered by the California Department of Water Resources (DWR) for groundwater or groundwater quality projects, the agency must prepare and implement a groundwater management plan that includes components 2, 3, 6, 7 and 9 below. DWR recommends that all the components below be included in any groundwater management plan to be adopted and implemented by a local managing entity.

Consideration and development of these components for the specific conditions of the basin to be managed under the plan will help to ensure effective groundwater management. In developing these criteria, DWR recognizes that the goal of a groundwater management plan and the goal of an ordinance to manage groundwater should be the same—assurance of a long-term, sustainable, reliable, good quality groundwater supply. Such efforts can benefit greatly from cooperative management within the basin or region.

None of the suggested data reporting in the components below should be construed as recommending disclosure of information that is confidential under State law.

1. Include documentation that a written statement was provided to the public "describing the manner in which interested parties may participate in developing the groundwater management plan," which may include appointing a technical advisory committee (Water Code § 10753.4 (b)).
2. Include a plan by the managing entity to "involve other agencies that enables the local agency to work cooperatively with other public entities whose service area or boundary overlies the groundwater basin." (Water Code § 10753.7 (a)(2)). A local agency includes "any local public agency that provides water service to all or a portion of its service area"
(Water Code § 10752 (g)).
3. Provide a map showing the area of the groundwater basin, as defined by DWR Bulletin 118, with the area of the local agency subject to the plan as well as the boundaries of other local agencies that overlie the basin in which the agency is developing a groundwater management plan (Water Code § 10753.7 (a)(3)).
4. Establish an advisory committee of stakeholders (interested parties) within the plan area that will help guide the development and implementation of the plan and provide a forum for resolution of controversial issues.
5. Describe the area to be managed under the plan, including:
    a. The physical structure and characteristics of the aquifer system underlying the plan area in the context of the overall basin.

b. A summary of the availability of historical data including, but not limited to, the components in Section 7 below.

c. Issues of concern including, but not limited to, issues related to the components in Section 7 below.

d. A general discussion of historical and projected water demands and supplies.

6. Establish management objectives (MOs) for the groundwater basin that is subject to the plan. (Water Code § 10753.7 (a)(1)).

7. Include components relating to the monitoring and management of groundwater levels, groundwater quality, inelastic land surface subsidence, and changes in surface flow and surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping. (Water Code § 10753.7 (a)(1)). Consider additional components listed in Water Code § 10753.8 (a) through (l).

8. For each MO, describe how meeting the MO will contribute to a more reliable supply for long-term beneficial uses of groundwater in the plan area, and describe existing or planned management actions to achieve MOs.

9. Adopt monitoring protocols for the components in Section 7 (Water Code § 10753.7 (a)(4)). Monitoring protocols are not defined in the Water Code, but the section is interpreted to mean developing a monitoring program capable of tracking changes in conditions for the purpose of meeting MOs.

10. Describe the monitoring program, including:

    a. A map indicating the general locations of any applicable monitoring sites for groundwater levels, groundwater quality, subsidence stations, or stream gages.

    b. A summary of monitoring sites indicating the type (groundwater level, groundwater quality, subsidence, stream gage) and frequency of monitoring. For groundwater level and groundwater quality wells, indicate the depth interval(s) or aquifer zone monitored and the type of well (public, irrigation, domestic, industrial, monitoring).

11. Describe any current or planned actions by the local managing entity to coordinate with other land use, zoning, or water management planning agencies or activities (Water Code § 10753.8 (k), (l)).

12. Provide for periodic report(s) summarizing groundwater basin conditions and groundwater management activities. The report(s), prepared annually or at other frequencies as determined by the local management agency, should include:

    a. Summary of monitoring results, including a discussion of historical trends.

    b. Summary of management actions during the period covered by the report.

    c. A discussion, supported by monitoring results, of whether management actions are achieving progress in meeting MOs.

    d. Summary of proposed management actions for the future.

    e. Summary of any plan component changes, including addition or modification of MOs, during the period covered by the report.

    f. Summary of actions taken to coordinate with other water management and land use agencies, and other government agencies.

13. Provide for the periodic re-evaluation of the entire plan by the managing entity.

14. For local agencies not overlying groundwater basins, plans should be prepared including the above listed components and using geologic and hydrologic principles appropriate to those areas (Water Code § 10753.7 (a)(5)).

Appendix D
Groundwater Management Model Ordinance

In developing this model ordinance, the California Department of Water Resources recognizes that the goal of a groundwater management plan and the goal of an ordinance to manage groundwater should be the same—assurance of a long-term, sustainable, reliable, good quality groundwater supply. Such efforts require cooperative management within the region or sub-region.

Chapter X

Groundwater Management Ordinance

Sections:

X.01 Declaration of Findings
X.02 Purpose
X.03 Declaration of Intent
X.04 Definitions
X.05 Groundwater Management Program
X.06 Management Objectives
X.07 Monitoring Program Network
X.08 Monitoring Frequency
X.09 Changes in Monitoring
X.10 Review of Technical Data
X.11 Data Dissemination
X.12 Actions when MO Noncompliance is Reported
X.13 Regional Coordination
X.14 Integrated Resource Management
X.15 Data Relating to Export and Substitution of Groundwater

X.01 Declaration of Findings - The Board finds that:

A. The protection of the groundwater resource for its use within the County is of major concern to the residents of the County for the protection of their health, welfare, and safety.
B. The reliability and sustainability of the groundwater supply for all beneficial uses are of critical importance to the economic, social, and environmental well-being of the County.
C. A lack of effective groundwater management may have significant negative impacts, including, but not limited to:
    1. Lower groundwater levels leading to additional expenses from:
        a) Increased energy consumption.
        b) The need to deepen existing wells.
        c) The need to build new wells.
        d) The need to destroy non-functioning wells.
    2. Costly damage to public roads, bridges, canals, and other structures caused by land subsidence.
    3. Reduction of surface and subsurface flows leading to the potential loss of critical riparian and wetland habitat.
    4. Degradation of groundwater quality.

D. It is essential for management purposes to adopt a monitoring program addressing groundwater levels, groundwater quality, land subsidence, and surface water flow and quality where it directly impacts or is impacted by groundwater.

X.02 Purpose - In support of the findings above, the County has determined that this groundwater management ordinance is necessary to ensure that:

A. Groundwater continues to be a reliable and sustainable resource.
B. The extraction of groundwater does not result in significant adverse economic, environmental, or social impacts.
C. Groundwater quality is protected.
D. Excessive land surface subsidence from groundwater extraction is prevented.

X.03 Declaration of Intent

A. The County intends to foster prudent groundwater management practices by establishing a policy that encourages appropriate management of the resource based on recommendations by a committee of stakeholders.
B. The County intends that its groundwater management activities occur as an open and public process that considers input from all stakeholders in the County.
C. The County intends to work cooperatively with interested local agencies to further develop and implement joint groundwater management activities.
D. The County does not intend to regulate, in any manner, the use of groundwater, except as a last resort to protect the groundwater resource.
E. The County intends to act as an enforcing agency should the local resource become threatened.
F. The County does not intend to infringe upon the rights of surface water users in the managed area.
G. The County does not intend to limit other authorized means of managing groundwater within the County.

X.04 Definitions

A. "Aquifer" means a geologic formation that stores groundwater and transmits and yields significant quantities of water to wells and springs. Significant quantity is an amount that that satisfies local needs and may range from thousands of gallons per minute to less than 5 gpm, depending on rock type and intended use.
B. "Board" means the Board of Supervisors of the County.
C. "District" means a district or municipality, located wholly or partially within the boundaries of the County, that is a purveyor of water for agricultural, domestic, or municipal use.
D. "Enforcement Agency" means the Board as the enforcement agency under this chapter.
E. "Groundwater" means all water beneath the surface of the earth below the zone of saturation, but does not include subterranean streams flowing in known and definite channels.
F. "Groundwater Basin" means an aquifer or series of aquifers with a reasonably defined lateral and vertical extent, as defined in Bulletin 118 by Department of Water Resources. "Non-basin areas" are outside defined groundwater basins and contain smaller amounts of groundwater in consolidated sediments or fractured hard rock.
G. "Groundwater Export" means the conveyance of groundwater outside of the boundaries of the County and outside of the boundaries of any district that is partially within the County.
H. "Groundwater Substitution" means the voluntary use of an available groundwater supply instead of surface water for the purposes of using the surface water outside the County and outside the boundaries of any district that is partially within the County.

I. "Land Subsidence" means the lowering of the ground surface caused by the inelastic consolidation of clay beds in the aquifer system.
J. "Management Objective"(MO) means a condition identified for each subunit to ensure that the groundwater supply is reliable and sustainable. The MOs set acceptable conditions with respect to groundwater levels, groundwater quality, inelastic land surface subsidence, and surface water flows and quality. Compliance with the MO is tracked by a monitoring program and threshold values that are adopted for each Management Objective.
K. "Recharge" means flow to groundwater storage from precipitation, and infiltration from streams, irrigation, spreading basins, injection wells, and other sources of water.
L. "Reliability" means having an available, predictable, and usable groundwater supply at any given point in time.
M. "Stakeholder" means an individual or an entity, such as a water supplier or a county resident, with a permanent interest in the availability of the groundwater resource.
N. "Subunit" means any subdivision of a groundwater basin or non-basin area in the County created for the purposes of representation of stakeholders and the establishment of local area management objectives.
O. "Sustainable" means the groundwater resource is maintained for use by residents in the basin over a prolonged period of time.
P. "Technical Advisory Committee" means a committee of persons knowledgeable in groundwater management, hydrology, and hydrogeology established for the purpose of providing technical guidance to the Water Advisory Committee.
Q. "Threshold values" mean the limits established by the WAC for groundwater levels, groundwater quality, land surface subsidence, and surface water flow and quality that are not to be exceeded if the MOs are to be met.
R. "Water Advisory Committee" (WAC) means a multimember advisory body established for the purpose of aiding the Board in providing effective management of the groundwater resources in the County, and representing all of the subunits that are identified.
S. "Water Management Entities" means any local agency, or group of agencies, authorized to manage groundwater.

X.05 Groundwater Management Program

A. The County recognizes that effective groundwater management is key to maintaining a reliable and sustainable resource. For the purposes of establishing an effective groundwater management program, the Board shall appoint a WAC to establish MOs and make recommendations to the Board to ensure that MOs are met.
B. For purposes of establishing a WAC, the groundwater basins and non-basin areas of the County will be divided into subunits based on hydrogeologic principles and institutional boundaries. These subunits shall be established by the Board based on public input to address the groundwater management needs of the County. The WAC shall consist of members that represent each subunit. Upon establishment of the subunits, the Board shall appoint a member to represent each subunit on the WAC.
C. The WAC shall have the following responsibilities to the Board:
    1. Recommend MOs for each groundwater management subunit.
    2. Recommend a groundwater monitoring network for purposes of tracking MOs.
    3. Recommend the frequency of monitoring.
    4. Propose changes in monitoring.
    5. Ensure monitoring data receive technical review.
    6. Ensure that monitoring data are made available to the public.

7. Recommend actions to resolve noncompliance with MOs.

D. For the purposes of providing technical advice to the WAC in carrying out its responsibilities, a technical advisory committee (TAC) shall be established. The TAC shall consist of local experts or a combination of local expertise and technical consultants from private and public organizations that are nominated by the WAC and approved by the Board. Individuals appointed to the TAC should be highly knowledgeable in groundwater management, hydrology, and hydrogeology. The TAC shall review technical data collected by monitoring programs within the County and advise the WAC.

X.06 Management Objectives

A. To ensure that the County maintains a reliable and sustainable groundwater supply, MOs for groundwater levels, groundwater quality, land subsidence, and surface water flow and quality shall be adopted for each subunit. Threshold values that are not to be exceeded shall be defined for each MO.

B. Compliance with the MOs will be determined by evaluation of data collected from groundwater level, groundwater quality, land subsidence, and surface water flow and quality monitoring networks. Evaluation of these data with respect to threshold values shall be the basis for determining compliance with the MOs.

C. Each WAC member shall recommend MOs for their subunit. The WAC shall develop a comprehensive set of recommendations for all subunits, and the Board shall adopt these MOs for the County. MOs may differ from subunit to subunit, but the established MOs shall be consistent with the overall goal of supply reliability for the County.

D. Groundwater management practices based on the established MOs for one subunit of the County shall not adversely impact adjacent subunits.

X.07 Monitoring Program Network

The WAC shall develop County-wide monitoring programs to collect representative data on groundwater levels, groundwater and surface water quality, land surface subsidence, and stream flow and quality. Each subunit shall propose its own monitoring program, and the WAC shall adopt a comprehensive monitoring program for the County. The data collected, showing current conditions and changes over time as a result of groundwater extraction, shall be evaluated by the WAC in consultation with the TAC. The WAC will recommend policies and actions to ensure that MOs for each subunit are met. The collection and evaluation of the data shall be based on scientifically sound principles, and shall incorporate appropriate quality assurance and quality control protocols.

A. Groundwater levels: The groundwater level monitoring network shall be proposed by the WAC and approved by the Board. The intent of the groundwater level monitoring network is to measure water levels in selected wells that can adequately determine representative conditions in the aquifer system for determination of compliance with the MOs. The network will include selected municipal, domestic, and irrigation wells owned by water districts, private parties, and municipal and industrial water suppliers. Where needed, dedicated monitoring wells may be installed. Participation by well owners will be voluntary.

B. Water Quality: The groundwater quality monitoring network shall be proposed by the WAC and approved by the Board. The intent of the groundwater quality monitoring network is to monitor selected wells that can adequately determine representative groundwater quality conditions in the aquifer system for identification of compliance with the MOs. The network will include selected municipal, domestic, and irrigation wells owned by water districts, private parties, and municipal

and industrial water suppliers. Where needed, dedicated monitoring wells may be installed. Participation by well owners will be voluntary.

C. Land Subsidence: The land subsidence program and network shall be proposed by the WAC and approved by the Board. The intent of the land subsidence monitoring is to detect land subsidence for determination of compliance with the MOs. The network may include benchmarks that are surveyed for changes in elevation throughout the County, based on the judgment of the WAC of the need for such a program.

D. Surface Water Flow and Quality: The surface water flow and quality network shall be proposed by the WAC and approved by the Board. The intent of this network is to detect changes in surface water flow or surface water quality that directly affect groundwater levels or quality or are caused by groundwater pumping for evaluation of compliance with MOs.

X.08 Monitoring Frequency

The recommended frequency of collection of data for each of the parameters listed above shall be determined by the WAC. Initially, each parameter should be measured at the frequencies outlined below, unless the WAC notes upon evaluation of existing data that more frequent monitoring or additional analyses are called for.

A. Groundwater levels should be measured at least three times during the year: one measurement prior to the period of highest groundwater use, one measurement during peak groundwater use, and one measurement following the period of highest groundwater use (approximately the months of _____, _____, and _____).

B. Groundwater quality measurements of electrical conductivity, temperature, and pH should be obtained at least twice annually during the periods of highest and lowest groundwater use (approximately the months of _____ and _____). Upon evaluation of the data, the WAC may propose analyses for other constituents.

C. Selected benchmarks in the County land subsidence monitoring network should be surveyed every five years at a minimum. These surveys should be conducted following aquifer recovery and prior to the period of highest groundwater extraction (approximately the month of_____).

D. Measurement of surface water flow and quality in areas determined to directly affect groundwater levels or quality or that are affected by groundwater pumping shall be obtained at least ___ times per month as long as there are flows in the channel.

X.09 Changes in Monitoring

If evaluation of the groundwater level, groundwater quality, land subsidence, surface water flow, or surface water quality data indicates a need for more or less frequent measurements or analyses, the WAC may propose a change in the monitoring frequency. Similarly, if evaluation of the data indicates that additional monitoring sites are necessary, the WAC may propose an additional or a reduced number of sites for data collection. The Board shall adopt these changes when supported by credible evidence.

X.10 Review of Technical Data

A. The TAC shall propose and the WAC shall adopt standard methods using scientifically sound principles for review and analysis of the collected data. The TAC will meet, as needed and requested by the WAC, to evaluate the technical data and shall report their findings at appropriate meetings of the WAC. The WAC shall meet at least __ times per month during the period of maximum groundwater use (months of _____ through _____) and quarterly during the off season (months of _____ through _____), or as necessary.

B. During the period of highest groundwater use, the WAC meetings will focus on data review and analysis with respect to compliance with the current MOs. During the period of low

groundwater use, the WAC meetings will focus on a review of compliance with MOs for the previous period of high groundwater use and consideration of the need for changes to the MOs.

X.11 Data Dissemination

The WAC, in addition to establishing methods for data collection and evaluation, shall establish methods for data storage and dissemination. The WAC shall disseminate the monitoring data and evaluation reports through public presentations and through a County-maintained groundwater Internet site. At a minimum, the WAC shall publicly present findings from the monitoring program to the Board twice annually.

X.12 Actions when MO Noncompliance is Reported

A. Action by Technical Advisory Committee. In the event that the TAC identifies an area that is not in compliance with the MOs, or if noncompliance is reported by any other means, the TAC shall report to the WAC on the regional extent and magnitude of the noncompliance. This information shall also be released to the public no later than ___ days from the time that noncompliance with MOs was identified. The TAC shall then collect all available pertinent hydrologic data, investigate possible causes for noncompliance with MOs, and recommend actions to the WAC to bring the area into compliance. These recommendations shall be made no later than ___ days after the report of noncompliance is released to the public. The TAC shall first make recommendations that focus on correcting the noncompliance through negotiations with all parties in the affected area.

B. Action by Water Advisory Committee. The WAC shall act as lead negotiator in re-establishing compliance with the MO. If negotiations with parties in the affected area do not result in timely and positive action to re-establish compliance with MOs for the basin, the WAC may recommend a plan to the Board to modify, reduce or terminate groundwater extraction in the affected area or take other necessary actions. Such a plan will be recommended to the Board only after the WAC has thoroughly reviewed the recommendations of the TAC at a public meeting. The modification, reduction, or termination of groundwater extraction in the affected area shall first be applied to wells involved in any export or substitution programs, and then to other wells if necessary. Domestic wells shall not be considered for any modification, reductions, or termination of groundwater extraction.

C. Action by Board of Supervisors. The Board of Supervisors, using its police powers, shall act as the enforcement agency for this ordinance. Any recommendation of the WAC may be appealed to the Board within __ working days.

X.13 Regional Coordination

Management decisions recommended by the WAC and adopted by the Board shall not deleteriously affect groundwater resources in any portions of groundwater basins or non-basin areas that share a common groundwater resource in adjacent counties. To accomplish this goal, the WAC shall meet and coordinate with water management entities outside the County that overlie a common groundwater basin at least twice per year once <u>prior</u> to the period of highest groundwater use and once <u>following</u> the period of highest groundwater use.

X.14 Integrated Resource Management

A. To ensure integration of planning activities within the County, the WAC shall inform County departments involved with groundwater related activities, including but not limited to Land Use or Zoning, Planning, Public Works, Utilities, and Environmental Health, of all WAC meetings and actions regarding MOs. In turn, these County departments shall take into consideration the

adopted MOs when approving development or zoning changes or construction projects that may rely on or affect groundwater quantity or quality.

B. To the greatest extent practicable, the WAC should also integrate resource management planning with other agencies within the basin. Resource activities that could benefit from integrated planning with groundwater management include, but are not limited to:
   - Groundwater management planning by other agencies—agricultural, municipal, industrial, local government
   - Watershed management plans
   - Urban water management plans
   - Management and disposal of municipal solid waste and municipal sewage
   - Drinking water source assessment and protection programs
   - Public water system emergency and disaster response plans
   - Surface water and groundwater conjunctive management programs
   - Expansion of surface and groundwater facilities
   - Water efficiency programs
   - Water recycling programs
   - Environmental habitat construction or restoration programs
   - Water quality protection programs
   - Recharge programs
   - Transportation infrastructure planning

X.15 Data Relating to Export and Substitution of Groundwater

A. Districts, persons, or contractors intending to operate a groundwater export or groundwater substitution program shall submit the following data to the WAC __ working days prior to commencing the program:
   1. A description of the project with the total amount of groundwater to be exchanged or substituted
   2. The dates over which the project will take place.
   3. A statement of the anticipated impacts of the project relative to adopted MOs.
   4. A discussion of possible contingencies in the event of MO noncompliance.
   5. A map showing the location of the wells to be used by the program.
   6. A summary of any monitoring program proposed.
   7. All required environmental documentation.

B. While the program is in operation, the following information shall be provided to the WAC at least ___ times per month:
   1. All static and pumping groundwater level measurements made in the pumping well during the period of extraction for the export or substitution program.
   2. The amount of groundwater extracted from each well per week.
   3. Static groundwater level measurements in at least __ of the most proximal wells to the project pumping wells that can be practicably monitored.

   C. All costs for providing such information to the WAC shall be borne by the project participants.

Note: Although the terms "County" and "Board" are used throughout the model ordinance for clarity, the model could be used by any local government or agency with appropriate authority or powers.

Appendix E
SWRCB Beneficial Use Designations[1]

Agricultural Supply (AGR) – Uses of water for farming, horticulture, or ranching including, but not limited to irrigation, stock watering, or support of vegetation for ranch grazing.

Aquaculture (AQUA) – Uses of water for aquaculture or mariculture operations including, but not limited to, propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or bait purposes.

Cold Freshwater Habitat (COLD) – Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Estuarine Habitat (EST) – Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

Freshwater Replenishment (FRSH) – Uses of water for natural or artificial maintenance of surface water quantity or quality (e.g., salinity).

Groundwater Recharge (GWR) – Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.

Hydropower Generation (POW) – Uses of water for hydropower generation.

Industrial Process Supply (PRO) – Uses of water for industrial activities that depend primarily on water quality.

Industrial Service Supply (IND) – Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.

Inland Saline Water Habitat (SAL) – Uses of water that support inland saline water ecosystems including, but not limited to, preservation or enhancement of aquatic saline habitats, vegetation, fish, or wildlife, including invertebrates.

Marine Habitat (MAR) – Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).

Migration of Aquatic Organisms (MIGR) – Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.

Municipal and Domestic Supply (MUN) – Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.

Navigation (NAV) – Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.

Noncontact Water Recreation (REC-2) – Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

Ocean Commercial and Sport Fishing (COMM) – Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.

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[1] From SWRCB 2000

Preservation of Biological Habitats of Special Significance (BIOL) – Uses of water that support designated areas or habitats, such as established refuges, parks, sanctuaries, ecological reserves, or Areas of Special Biological Significance (ASBS), where the preservation or enhancement of natural resources requires special protection.

Rare, Threatened, or Endangered Species (RARE) – Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance or plant or animal species established under State or federal law as rare, threatened or endangered.

Shellfish Harvesting (SHELL) – Uses of water that support habitats suitable for the collection of filter-feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.

Spawning, Reproduction, and/or Early Development (SPWM) – Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.

Warm Freshwater Habitat (WARM) – Uses of water that support warmwater ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

Water Contact Recreation (REC-1) – Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Wildlife Habitat (WILD) – Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

Appendix F
Federal and State MCLs and Regulation Dates for Drinking Water Contaminants

	U.S. Environmental Protection Agency		California Department of Health Services	
Contaminant	**MCL (mg/L)**	**Date[a]**	**MCL (mg/L)**	**Effective date**
Inorganics				
Aluminum	0.05 to 2[b]	1/91	1 0.2[b]	2/25/89 9/8/94
Antimony	0.006	7/92	0.006	9/8/94
Arsenic	0.05 0.01	eff: 6/24/77 2001	0.05	77
Asbestos	7 MFL[c]	1/91	7 MFL[c]	9/8/94
Barium	1 2	eff: 6/24/77 1/91	1	77
Beryllium	0.004	7/92	0.004	9/8/94
Cadmium	0.010 0.005	eff: 6/24/77 1/91	0.010 0.005	77 9/8/94
Chromium	0.05 0.1	eff: 6/24/77 1/91	0.05	77
Copper	1.3[d]	6/91	1[b] 1.3[d]	77 12/11/95
Cyanide	0.2	7/92	0.2 0.15	9/8/94 6/12/03
Fluoride	4 2[b]	4/86 4/86	2	4/98
Lead	0.05[e] 0.015[d]	eff: 6/24/77 6/91	0.05[e] 0.015[d]	771 2/11/95
Mercury	0.002	eff: 6/24/77	0.002	77
Nickel	Remanded	0.1	9/8/94	
Nitrate	(as N)10	eff: 6/24/77	(as N03) 45	77
Nitrite (as N)	1	1/91	1	9/8/94
Total Nitrate/Nitrite (as N)	10	1/91	10	9/8/94
Selenium	0.01 0.05	eff: 6/24/77 1/91	0.01 0.05	77 9/8/94
Thallium	0.002	7/92	0.002	9/8/94
Radionuclides				
Uranium	30 g/L	12/7/00	20 pCi/L	1/1/89
Combined radium-226 & 228	5 pCi/L	eff: 6/24/77	5 pCi/L	77
Gross Alpha particle activity	15 pCi/L	eff: 6/24/77	15 pCi/L	77
Gross Beta particle activity	dose of 4 millirem/yr	eff: 6/24/77	50 pCi/L[f]	77

Contaminant	U.S. Environmental Protection Agency MCL (mg/L)	Date[a]	California Department of Health Services MCL (mg/L)	Effective date
Strontium-90	8 pCi/L	eff: 6/24/77 now covered by Gross Beta	8 pCi/L[f]	77
Tritium	20,000 pCi/L	eff: 6/24/77 now covered by Gross Beta	20,000 pCi/L[f]	77
VOCs				
Benzene	0.005	6/87	0.001	2/25/89
Carbon Tetrachloride	0.005	6/87	0.0005	4/4/89
1,2-Dichlorobenzene	0.6	1/91	0.6	9/8/94
1,4-Dichlorobenzene	0.075	6/87	0.005	4/4/89
1,1-Dichloroethane	- -	- -	0.005	6/24/90
1,2-Dichloroethane	0.005	6/87	0.0005	4/4/89
1,1-Dichloroethylene	0.007	6/87	0.006	2/25/89
cis-1,2-Dichloroethylene	0.07	1/91	0.006	9/8/94
trans-1,2-Dichloroethylene	0.1	1/91	0.01	9/8/94
Dichloromethane	0.005	7/92	0.005	9/8/94
1,3-Dichloropropene	- -	- -	0.0005	2/25/89
1,2-Dichloropropane	0.005	1/91	0.005	6/24/90
Ethylbenzene	0.7	1/91	0.68 0.7 0.3	2/25/89 9/8/94 6/12/03
Methyl-tert-butyl ether (MTBE)	- -	- -	0.005[b] 0.013	1/7/99 5/17/00
Monochlorobenzene	0.1	1/91	0.03 0.07	2/25/89 9/8/94
Styrene	0.1	1/91	0.1	9/8/94
1,1,2,2-Tetrachloroethane	- -	- -	0.001	2/25/89
Tetrachloroethylene	0.005	1/91	0.005	5/89
Toluene	1	1/91	0.15	9/8/94
1,2,4 Trichorobenzene	0.07	7/92	0.07	9/8/94
1,1,1-Trichloroethane	0.200	6/87	0.200	2/25/89
1,1,2-Trichloroethane	0.005	7/92	0.032 0.005	4/4/89 9/8/94
Trichloroethylene	0.005	6/87	0.005	2/25/89
Trichlorofluoromethane	- -	- -	0.15	6/24/90
1,1,2-Trichloro-1,2,2- Trifluoroethane	- -	- -	1.2	6/24/90
Vinyl chloride	0.002	6/87	0.0005	4/4/89
Xylenes	10	1/91	1.750	2/25/89

Contaminant	U.S. Environmental Protection Agency MCL (mg/L)	Date[a]	California Department of Health Services MCL (mg/L)	Effective date
SVOC's				
Alachlor	0.002	1/91	0.002	9/8/94
Atrazine	0.003	1/91	0.003 0.001	4/5/89 6/12/03
Bentazon	- -	- -	0.018	4/4/89
Benzo(a) Pyrene	0.0002	7/92	0.0002	9/8/94
Carbofuran	0.04	1/91	0.018	6/24/90
Chlordane	0.002	1/91	0.0001	6/24/90
Dalapon	0.2	7/92	0.2	9/8/94
Dibromochloropropane	0.0002	1/91	0.0001 0.0002	7/26/89 5/3/91
Di(2-ethylhexyl)adipate	0.4	7/92	0.4	9/8/94
Di(2-ethylhexyl)phthalate	0.006	7/92	0.004	6/24/90
2,4-D	0.10.07	eff: 6/24/77 1/91	0.1 0.07	77 9/8/94
Dinoseb	0.007	7/92	0.007	9/8/94
Diquat	0.02	7/92	0.02	9/8/94
Endothall	0.1	7/92	0.1	9/8/94
Endrin	0.0002 0.002	eff: 6/24/77 7/92	0.0002 0.002	77 9/8/94
Ethylene Dibromide	0.00005	1/91	0.00002 0.00005	2/25/89 9/8/94
Glyphosate	0.7	7/92	0.7	6/24/90
Heptachlor	0.0004	1/91	0.00001	6/24/90
Heptachlor Epoxide	0.0002	1/91	0.00001	6/24/90
Hexachlorobenzene	0.001	7/92	0.001	9/8/94
Hexachlorocyclopentadiene	0.05	7/92	0.05	9/8/94
Lindane	0.004 0.0002	eff: 6/24/77 1/91	0.004 0.0002	77 9/8/94
Methoxychlor	0.1 0.04	eff: 6/24/77 1/91	0.1 0.04 0.03	77 9/8/94 6/12/03
Molinate	- -	- -	0.02	4/4/89
Oxamyl	0.2	7/92	0.2 0.05	9/8/94 6/12/03
Pentachlorophenol	0.001	1/91	0.001	9/8/94
Picloram	0.5	7/92	0.5	9/8/94
Polychlorinated Biphenyls	0.0005	1/91	0.0005	9/8/94
Simazine	0.004	7/92	0.010 0.004	4/4/89 9/8/94

Contaminant	U.S. Environmental Protection Agency MCL (mg/L)	Date[a]	California Department of Health Services MCL (mg/L)	Effective date
Thiobencarb	- -	- -	0.07 0.001[b]	4/4/89 4/4/89
Toxaphene	0.005 0.003	eff: 6/24/77 1/91	0.005 0.003	77 9/8/94
2,3,7,8-TCDD (Dioxin)	$3x10^{-8}$	7/92	$3x10^{-8}$	9/8/94
2,4,5-TP (Silvex)	0.01 0.05	eff: 6/24/77 1/91	0.01 0.05	77 9/8/94
Disinfection Byproducts				
Total trihalomethanes	0.10 0.080	11/29/79 eff: 11/29/83 eff: 1/1/02[g]	0.10	3/14/83
Total haloacetic acids	0.060	eff: 1/1/02[g]		
Bromate	0.010	eff: 1/1/02[g]		
Chlorite	1.0	eff: 1/1/02[g]		
Treatment Technique				
Acrylamide	TT[h]	1/91	TT[h]	9/8/94
Epichlorohydrin	TT[h]	1/91	TT[h]	9/8/94

Source: http://www.dhs.ca.gov/ps/ddwem/chemicals/MCL/EPAandDHS.pdf

a. "eff." indicates the date the MCL took effect; any other date provided indicates when EPA established (that is, published) the MCL.

b. Secondary MCL.

c. MFL = million fibers per liter, with fiber length > 10 microns.

d. Regulatory Action Level; if system exceeds, it must take certain actions such as additional monitoring, corrosion control studies and treatment, and for lead, a public education program; replaces MCL.

e. The MCL for lead was rescinded with the adoption of the regulatory action level described in footnote d.

f. MCLs are intended to ensure that exposure above 4 millirem/yr does not occur.

g. Effective for surface water systems serving more than 10,000 people; effective for all others 1/1/04.

h. TT = treatment technique, because an MCL is not feasible.

Federal and State MCLs – updated 05/23/03

Appendix G
Development of Current Groundwater Basin/Subbasin Map

This Bulletin 118 update represents the first time that groundwater basin boundaries have been released as a digital coverage. The basin boundaries for the revised groundwater basin map were primarily defined using geologic contacts and hydrogeologic barriers. Specifically the identification of the groundwater basins was initially based on the presence and areal extent of unconsolidated alluvial sediments identified on 1:250,000 scale, geologic maps published by the California Department of Conservation, Division of Mines and Geology. The identified groundwater basin areas were then further evaluated through review of relevant geologic and hydrogeologic reports and well completion reports, and using the basin definition criteria listed in Table 8. Basin boundaries that are specified in each of the court decisions has been used for the boundaries of adjudicated basins.

Well completion reports for wells present in basin areas that were identified from the geologic map were reviewed to identify the depth to the top of the water table and the top of impermeable bedrock. If there was less than 25 feet of permeable material present or if there was no groundwater present within the permeable material, the area was eliminated from the map. The well completion reports were also reviewed to determine if water supply wells located within the delineated basin area were extracting groundwater from the permeable materials underlying the area or from the bedrock beneath the permeable material. If the wells only extracted groundwater from the bedrock, the area was eliminated from the map. This resulted in the elimination of some areas identified as basins in previous Bulletin 118 publications. If there were no wells present in basin areas identified from the geologic map and no other information on the geology underlying these areas, the areas were retained in the current version of the map. Additional hydrogeologic information might or might not verify that these areas should be retained as groundwater basins.

Groundwater basins were delineated and separated from each other by the following restrictions on groundwater flow. For more detail on the types of basins and the flow boundaries of those basins, see Table 8.

Impermeable Bedrock. Impermeable bedrock with lower water yielding capacity. These include consolidated rocks of continental and marine origin and crystalline/or metamorphic rock.

Constrictions in Permeable Materials. A lower permeability material, even with openings that are filled with more permeable stream channel materials, generally forms a basin boundary for practical purposes. While groundwater may flow through the sediment-filled gaps, the flow is restricted to those gaps.

Fault. A fault that crosses permeable materials may form a barrier to groundwater movement if movement along the fault plane has created fine material that impedes groundwater movement or juxtaposed low permeability material adjacent to an aquifer. This is usually indicated by noticeable difference in water levels in wells and/or flow patterns on either side of the fault. Not all faults act as barriers to groundwater flow.

Low Permeability Zone. Areas of clay or other fine-grained material that have significant areal or vertical extent generally form a barrier to groundwater movement within the basin but do not form basin boundaries.

Groundwater Divide. A groundwater divide is generally considered a barrier to groundwater movement from one basin to another for practical purposes. Groundwater divides have noticeably divergent groundwater flow directions on either side of the divide with the water table sloping away from the divide. The location of the divide may change as water levels in either one of the basins change, making such a "divide" less useful. Such a boundary is often used for subbasins.

Adjudicated Basin Boundaries. The basin boundaries established by court order were used for all adjudicated basins. These court-decided boundaries affect the location of natural boundaries of adjoining basins. Some adjudicated basins are represented as subbasins in this bulletin.

Available reports on the geologic and hydrogeologic conditions in the delineated basin areas were also reviewed to determine if there was information that would further define the boundaries of the basin areas. This review resulted in changes to some of the basin boundaries identified in previous versions of Bulletin 118.

Several of the larger groundwater basins were further subdivided into groundwater subbasins in Bulletin 118-80 and additional large groundwater basins were subdivided during this 2003 revision. The subbasin boundaries were also primarily defined using geologic contacts and hydrogeologic divides where possible. If this was not possible, political or institutional boundaries were used.

The hydrogeologic information contained in the basin descriptions that supplement this update of Bulletin 118 includes only the information that was available in California Department of Water Resources (DWR) files through reference searches and through limited contact with local agencies. Local agencies may have conducted more recent studies that have generated additional information about water budgets and aquifer characteristics. Unless the agency notified DWR or provided a copy of the recent reports to DWR staff that recent information has not been included in the basin descriptions. Therefore, although Senate Bill 610 refers to groundwater basins identified as overdrafted in Bulletin 118, it would be prudent for local water suppliers to evaluate the potential for overdraft of any basin included as a part of a water supply assessment.

Persons interested in collecting groundwater information in accordance with the Water Code as amended by SB 221 and SB 610 may start with the information in Bulletin 118, but should follow up by consulting the references listed for each basin and contacting local water agencies to obtain any new information that is available. Otherwise, evaluation of available groundwater resources as mandated by SB 221 and SB 610 may not be using the most complete and recent information about water budgets and aquifer characteristics.

Groundwater basin and subbasin boundaries shown on the map included with this bulletin are based on evaluation of the best available information. In basins where many studies have been completed and the basin has been operated for a number of years, the basin response is fairly well understood and the boundaries are fairly well defined. Even in these basins, however, there are many unknowns and changes in boundaries may result as more information about the basin is collected and evaluated.

In many other basins where much less is known and understood about the basin, boundaries will probably change as a better understanding of the basin is developed. A procedure for collecting information from all the stakeholders should be developed for use statewide so that agreement on basin boundaries can be achieved.

2005
URBAN WATER MANAGEMENT PLAN

Prepared for:

Castaic Lake Water Agency (CLWA)
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company
(Los Angeles County Waterworks District No. 36/Cooperating Agency)

Prepared by:

Black & Veatch :: Nancy Clemm :: Kennedy/Jenks Consultants :: Jeff Lambert :: Luhdorff & Scalmanini Consulting Engineers :: Reiter/Lowry Consultants :: Richard Slade and Associates, L.L.C.

November 2005

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SUMMARY

SUMMARY

The California Urban Water Planning Act (Act) requires most water utilities to update and submit an Urban Water Management Plan (UWMP) every five years. An UWMP is required in order for a water supplier to be eligible for the California Department of Water Resources (DWR) administered State grants and loans and drought assistance. This document presents the 2005 UWMP (Plan) for the Castaic Lake Water Agency (Agency, CLWA) service area, which includes four local retail water purveyors. This regional Plan builds upon previous documents, specifically CLWA's 2000 UWMP and an amendment to the 2000 Plan. Following a general discussion of Plan preparation and general project rationale, information is provided on water use, water resources, recycled water, water quality, reliability planning, demand management measures (DMMs), best management practices (BMPs), and water shortage contingency planning. This summary chapter presents an overview of each chapter in the Plan.

1.0 INTRODUCTION

CLWA's service area includes the service areas of four local retail water agencies. This regional Plan has been prepared for CLWA and three of the purveyors: CLWA Santa Clarita Water Division (SCWD), Newhall County Water District (NCWD), and Valencia Water Company (VWC). The fourth purveyor, Los Angeles County Waterworks District No. 36 (LACWWD #36), does not prepare a plan because it does not provide water to more than 3,000 customers or supply more than 3,000 acre-feet (af) of water annually – the minimum requirements for plan preparation. However, LACWWD #36 participated in the development of the Plan on an "ad-hoc" basis. Chapter 1 describes the purpose of the Plan, discusses Plan implementation, and provides general information about CLWA, the retail water purveyors, and service area characteristics. In response to new documents by DWR, this Plan also acknowledges the potential effects of global warming as a component of water management planning.

2.0 WATER USE

Chapter 2 describes historic and current water usage and the methodology used to project future demands within CLWA's service area. Water usage is divided into sectors such as residential, industrial, institutional, landscape, agricultural, and other purposes. To undertake this evaluation, existing land use data and new housing construction information were compiled from each of the retail water purveyors and projections prepared by "One Valley One Vision" (OVOV), a joint planning effort by the City of Santa Clarita and Los Angeles County Department of Regional Planning (LACDRP). This information was then compared to historical trends for new water service connections and customer water usage. In addition, weather and water conservation effects on historical water usage were factored into the evaluation.

3.0 WATER RESOURCES

Chapter 3 describes the water resources available to CLWA and the retail water purveyors from 2005 to 2030 – the 25-year period covered by the Plan. Resources include: (1) wholesale (imported) water supplies from the State Water Project (SWP), (2) local groundwater supplies from the Alluvium and Saugus Formation aquifers, and (3) transfers, exchanges, and

groundwater banking programs. Also described are planned water supply projects and programs and the development of desalination. Current and future imported water supplies are discussed, including "Table A" water supplies, CLWA's Flexible Storage Accounts, and reliability issues associated with SWP supplies. CLWA's Groundwater Management Plan (GWMP) is described, and available groundwater supplies are assessed. The adequacy of groundwater supplies and the emergence of perchlorate contamination issues are introduced and discussed in more detail in subsequent chapters. The role of water transfers and groundwater banking is described, and recent and proposed cooperative agreements to maximize local supplies through these progressive water management strategies are also discussed.

4.0 RECYCLED WATER

State water policy identifies water recycling as a beneficial use of water, and recycled water is an important component of water management planning. Chapter 4 describes the existing and future recycled water opportunities available to the CLWA service area. Currently, CLWA serves recycled water to VWC for the Westridge Golf Course and miscellaneous landscape irrigation. This Plan presents estimates of potential supply and demand for 2005 to 2030 in five year increments, as well as CLWA's proposed incentives and optimization plan.

5.0 WATER QUALITY

Chapter 5 describes the water quality of both groundwater and imported water supplies and discusses potential water quality impacts on supply reliability. As mentioned above, perchlorate contamination control is a major issue in CLWA's service area. The contamination is associated with the former Whittaker-Bermite site. Extensive investigations, management plans, and control actions to address this issue have been undertaken and are described in detail in this Plan. It has been determined that the programs underway should restore the impaired wells during 2006.

6.0 RELIABILITY PLANNING

The Act requires urban water suppliers to assess water supply reliability that compares total projected water used with the expected water supply over the next twenty years in five year increments. The Act also requires an assessment for a single dry year and multiple dry years. Chapter 6 presents the reliability assessment for CLWA's service area.

It is the stated goal of CLWA and the retail water purveyors to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions over the next 25 years in combination with conservation of non-essential demand during certain dry years, the Plan successfully achieves this goal.

The organization of the reliability tables presented in this Plan varies from those presented in the 2000 Plan Amendment to follow more closely with the recommended tables provided in the DWR "Guidebook to Assist Water Suppliers in the Preparation of a 2005 Urban Water Management Plan," dated January 18, 2005.

7.0 WATER DEMAND MANAGEMENT MEASURES AND BEST MANAGEMENT PRACTICES

Establishing goals and choosing water conservation measures is a continuing planning process. Goals are developed, adopted, and then evaluated periodically. Specific conservation measures are phased in and then evaluated for their effectiveness, achievement of desired results, and customer satisfaction. Chapter 7 of this plan summarizes DMMs and BMPs in both the implementation and development stages. CLWA and the retail water purveyors have been aggressively implementing DMM and BMP programs even though implementation is voluntary. Activities include water audits/repairs, public outreach, conservation pricing, residential plumbing retrofit, residential ultra low flush toilet replacement, large landscape conservation, and conservation programs for commercial, industrial, and institutional accounts. CLWA and the retail purveyors continue development and implementation of a comprehensive program.

8.0 WATER SHORTAGE CONTINGENCY PLANNING

Water supplies may be interrupted or reduced significantly in a number of ways, such as a drought which limits supplies, an earthquake which damages water delivery or storage facilities, or a toxic spill that affects water quality. Chapter 8.0 of this Plan describes how CLWA and the retail water purveyors plan to respond to such emergencies so that customer needs are met promptly and equitably.

Chapter 1
INTRODUCTION

Chapter 1.0
INTRODUCTION

1.1 OVERVIEW

This volume presents the Urban Water Management Plan 2005 (Plan) for the Castaic Lake Water Agency (Agency, CLWA) service area, which includes four retail water purveyors. This chapter describes the general purpose of the Plan, discusses Plan implementation, and provides general information about CLWA, retail purveyors, and service area characteristics. A list of acronyms and abbreviations is also provided.

1.2 PURPOSE

An Urban Water Management Plan (UWMP) is a planning tool that generally guides the actions of water management agencies. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "describes the opportunities for exchanges or water transfers on a short-term or long-term basis." (California Urban Water Planning Act, Article 2, Section 10630(d).) The identification of such opportunities, and the inclusion of those opportunities in a general water service reliability analysis, neither commits a water management agency to pursue a particular water exchange/transfer opportunity, nor precludes a water management agency from exploring exchange/transfer opportunities not identified in the plan. When specific projects are chosen to be implemented, detailed project plans are developed, environmental analysis, if required, is prepared, and financial and operational plans are detailed.

In short, this Plan is a management tool, providing a framework for action, but not functioning as a detailed project development or action. It is important that this Plan be viewed as a long-term, general planning document, rather than as an exact blueprint for supply and demand management. Water management in California is not a matter of certainty, and planning projections may change in response to a number of factors. From this perspective, it is appropriate to look at the Plan as a general planning framework, not a specific action plan. It is an effort to generally answer a series of planning questions including:

- What are the potential sources of supply and what is the reasonable probable yield from them?
- What is the probable demand, given a reasonable set of assumptions about growth and implementation of good water management practices?
- How well do supply and demand figures match up, assuming that the various probable supplies will be pursued by the implementing agency?

Using these "framework" questions and resulting answers, the implementing agency will pursue feasible and cost-effective options and opportunities to meet demands. CLWA and the retail water purveyors will explore enhancing basic supplies from traditional sources such as the State Water Project (SWP) as well as other options. These include groundwater extraction, water

exchanges, recycling, desalination, and water banking/conjunctive use. Specific planning efforts will be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, how each option would impact the environment, and how each option would affect customers. The objective of these more detailed evaluations would be to find the optimum mix of conservation and supply programs that ensure that the needs of the customers are met.

The California Urban Water Management Planning Act (Act) requires preparation of a plan that:

- Accomplishes water supply planning over a 20-year period in five year increments. (CLWA and the purveyors are going beyond the requirements of the Act by developing a plan which spans 25 years.)
- Identifies and quantifies adequate water supplies, including recycled water, for existing and future demands, in normal, single-dry, and multiple-dry years.
- Implements conservation and efficient use of urban water supplies.

A checklist to ensure compliance of this Plan with the Act requirements is provided in Appendix A.

In short, the Plan answers the question: *Will there be enough water for the Santa Clarita Valley community in future years, and what mix of programs should be explored for making this water available?*

It is the stated goal of CLWA and the retail water purveyors to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions over the next 25 years in combination with conservation of non-essential demand during certain dry years, the Plan successfully achieves this goal.

1.3 IMPLEMENTATION OF THE PLAN

The CLWA service area includes the service areas of four local retail water agencies. This Plan has been prepared for the CLWA and three of the purveyors: CLWA Santa Clarita Water Division (SCWD), Newhall County Water District (NCWD), and Valencia Water Company (VWC). The fourth purveyor, Los Angeles County Waterworks District No. 36 (LACWWD #36), is not required to prepare a Plan because the District does not provide water to more than 3,000 customers or supply more than 3,000 acre-feet (af) of water annually; however, LACWWD #36 participated in the development of the Plan on an “ad-hoc” basis. This subsection provides the cooperative framework within which the Plan will be implemented including agency coordination, public outreach, and resources maximization.

1.3.1 Joint Preparation of the Plan

Water agencies are permitted by the State to work together to develop a cooperative regional plan. This approach has been adopted by the water agencies in the Santa Clarita Valley (Valley), which are jointly sponsoring the current Plan. Water resource specialists with expertise in water resource management were retained to assist the local water agencies in preparing the details of the Plan. Agency coordination for this Plan is summarized in Table 1-1.

Table 1-1
Agency Coordination Summary

	Participated in UWMP Development	Received Copy of Draft	Commented on Draft	Attended Public Meetings	Contacted for Assistance	Sent Notice of Intent to Adopt	Not Involved
Antelope Valley-East Kern Water Agency					✓		
California Department of Water Resources	✓				✓		
Castaic Lake Water Agency	✓	✓	✓	✓	✓		
Castaic Town Council		✓	✓	✓	✓		
City of Santa Clarita Department of Planning and Building Services		✓		✓	✓	✓	
CLWA Santa Clarita Water Division	✓	✓	✓	✓	✓		
LA County Department of Regional Planning		✓			✓	✓	
Los Angeles County Supervisor Mike Antonovich (representatives)				✓	✓		
LA County Waterworks District No. 36	✓	✓	✓	✓	✓		
Metropolitan Water District of Southern California		✓			✓		
Newhall County Water District	✓	✓	✓	✓	✓		
Valencia Water Company	✓	✓	✓	✓	✓		
Ventura County Resource Management Agency		✓			✓	✓	
Westranch Town Council					✓		

1.3.2 Public Outreach

The water agencies have encouraged community participation in water planning. For the current Plan, public sessions were held for review and to solicit input on the Draft Plan before its adoption. Interested groups were informed about the development of the Plan along with the schedule of public activities. Notices of public meetings were published in the local press. Copies of the Draft Plan were made available at the water agencies' offices, local public libraries and sent to the City of Santa Clarita, the County of Los Angeles, and the County of Ventura, as well as interested parties. Water agencies also convened meetings with various interests to gather data concerning planned development and the probable implementation of approved development. Such informed data gathering on important issues is a means of checking the short-term "reality" of official projections and understanding the concerns of various groups.

CLWA contracted with a local public relations firm to coordinate preparation of the Plan with the local community. CLWA notified the cities and counties within its service area of the opportunity to provide input regarding the Plan. Table 1-2 presents a timeline for public participation during the development of the Plan. A copy of the public outreach materials,

including paid advertisements, newsletter covers, website postings, and invitation letters are attached in Appendix B.

Table 1-2
Public Participation Timeline

April 7, 2005	Kick-off Community Workshop	Describe UWMP requirements and process
June 27, 2005	Preliminary Draft UWMP	Preliminary Draft released to solicit input
June 29, 2005	Community Workshop	Review UWMP and solicit input
August 31, 2005	Follow-up Community Workshop	Release Draft UWMP and review contents
September 28, 2005	First CLWA Public Hearing	Review contents of Draft UWMP and take comments
October 26, 2005	Second CLWA Public Hearing	UWMP considered for approval by the CLWA Board and NCWD Board (at a joint meeting)

The components of public participation include:

Local Media

- Paid advertisements in local newspapers
- Meeting(s) with local editorial boards (Daily News and Signal)

Community-based Outreach

- Building Industry Association
- Castaic Town Council
- Chamber of Commerce
- Friends of the Santa Clara River
- Santa Clarita Valley Well Owners Association
- Santa Clarita Organization for Planning the Environment (SCOPE)
- Sierra Club
- Valencia Industrial Association
- Westranch Town Council

Water Agencies Public Participation

- Presentation(s) to NCWD Board – March, May, September, and October
- Presentation(s) to CLWA Board – March, May, July, September, and October

City/County Outreach

- Meeting with City Planning Division – March, May, and July

- Meeting with Los Angeles County Department of Regional Planning – March, May, and July
- Meeting with Supervisor Antonovich representative(s) Millie Jones, Paul Novak – May and July

Public Availability of Documents

- Water Agencies' websites
- City Hall
- Local libraries

1.3.3 Resources Maximization

Several documents were developed to enable CLWA to maximize the use of available resources and minimize use of imported water, including the Groundwater Management Plan (GWMP), Santa Clara River Valley Memorandum of Understanding, Water Supply Reliability Plan Draft Report, and the 2004 Santa Clarita Valley Water Report. Chapter 3 of this Plan describes in detail the water resources available to CLWA and the retail purveyors for the 25-year period covered by the Plan. Additional discussion regarding documents developed to maximize resources is included in Section 3.3.2 and Chapter 6.

1.4 THE WATER AGENCIES OF THE SANTA CLARITA VALLEY

1.4.1 Castaic Lake Water Agency

CLWA was formed in 1962 for the purpose of contracting with the California Department of Water Resources (DWR) to provide a supplemental supply of imported water to the water purveyors in the Valley. CLWA serves an area of 195 square miles in Los Angeles and Ventura Counties.

CLWA is a SWP contractor with an annual contractual Table A Amount of 95,200 af. Table A Amount (formerly referred to as "entitlement") is named for the "Table A" in each SWP contractor's Water Supply Contract. It contains an annual buildup in Table A Amounts of SWP water, from the first year of the Water Supply Contract through a specific year, based on growth projections made before the Water Supply Contract was executed. For most contractors, the maximum annual Table A Amount was reached in 1990. The total of all SWP contractors' maximum Table A Amounts is currently about 4.17 million af.

CLWA's original SWP Water Supply Contract with DWR was amended in 1966 for a maximum annual Table A Amount of 41,500 af. In 1991, CLWA purchased 12,700 af of annual Table A Amount from a Kern County water district and in 1999 purchased 41,000 af of annual Table A Amount from another Kern County water district, for a current total annual Table A Amount of 95,200 af.[1] CLWA wholesales this imported water to each of the local retail water purveyors through an extensive transmission pipeline system.

Though the reliability of SWP water is variable due to weather-related issues and environmental factors, SWP water remains an important supplemental water supply source for the Valley in the long-term. An important element to enhancing the long-term water supply reliability of SWP supplies is the effective use of water banking/conjunctive-use programs, such as those described in this Plan.

1.4.2 Retail Water Purveyors

Four retail purveyors provide water service to most residents of the Valley.

SCWD's service area includes portions of the city of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Canyon Country, Newhall, and Saugus. SCWD supplies water from local groundwater and CLWA imported water.

LACWWD #36's service area includes the Hasley Canyon area in the unincorporated community of Val Verde. During most years, the District obtains its water supply from CLWA.

NCWD's service area includes portions of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Newhall, Canyon Country, Saugus, and Castaic. The District supplies water from local groundwater and CLWA imported water.

VWC's service area includes a portion of the City of Santa Clarita and unincorporated portions of Los Angeles County in the communities of Castaic, Stevenson Ranch, and Valencia. VWC supplies water from local groundwater, CLWA imported water, and recycled water.

The service area for CLWA and the retail water purveyors is shown on Figure 1-1.

[1] CLWA's contract rights to SWP water total 95,200 acre feet per year ('afy"), including a water transfer of 41,000 afy approved in 1999 from Wheeler Ridge-Maricopa Water Storage District, a member unit of the Kern County Water Agency. CLWA's Environmental Impact Report ("EIR") prepared in connection with the 41,000 afy water transfer was challenged in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (Los Angeles County Superior Court, Case Number BS056954) ("*Friends*"). That action was dismissed with prejudice (permanently) in February 2005. New challenges to CLWA's environmental review of the transfer were filed in January 2005 (*i.e., Planning and Conservation League v. Castaic Lake Water Agency*, Los Angeles County Superior Court Case Number BS098724). A more detailed discussion of these new challenges and the reasons the challenges will have no impact on the amount of water available to CLWA can be found at Section 3.2.2.

Castaic Lake Water Agency Service Area

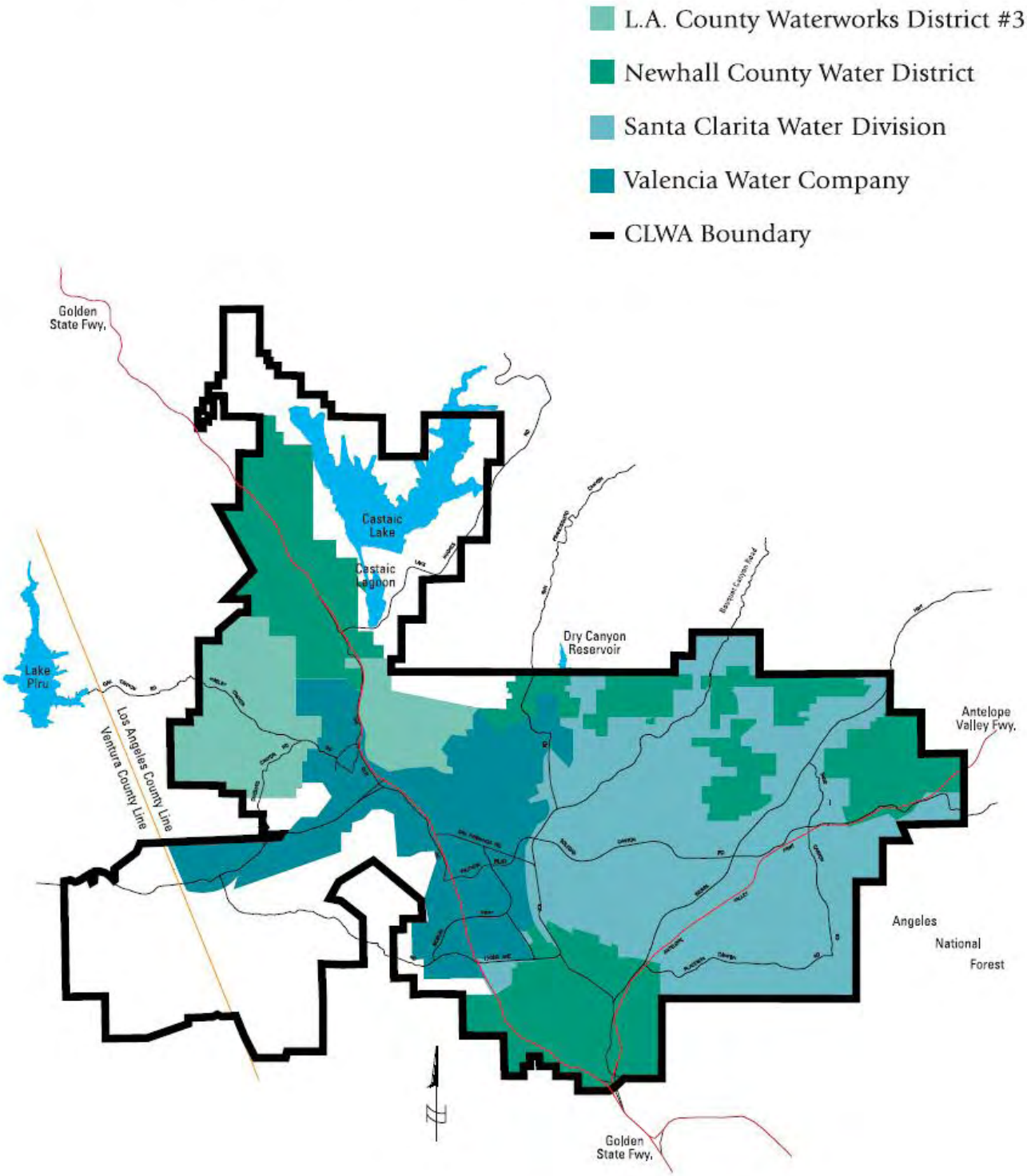


Figure 1-1
Castaic Lake Water Agency Service Area

As of mid-2005, the retail water purveyors served about 65,800 connections, as presented in Table 1-3.

Table 1-3
Retail Water Service Connections

Retail Water Purveyor	Connections
CLWA Santa Clarita Water Division (SCWD)	26,784
Los Angeles County Waterworks District No. 36 (LACWWD # 36)	1,311
Newhall County Water District (NCWD)	9,112
Valencia Water Company (VWC)	28,602
Total Connections	**65,809**

1.5 CLIMATE

The climate in CLWA's service area is generally semi-arid and warm. Summers are dry with temperatures as high as 110°F. Winters are somewhat cool with temperatures as low as 20°F. Average rainfall is about 17.64 inches per year in the flat areas and about 27 inches in the mountains. The region is subject to wide variations in annual precipitation and also experiences periodic wildfires. Table 1-4 presents the region's annual average climate data. Standard Monthly Average data was generated from 1996-2005 data. Average Monthly Rainfall data is provided for 1980-2004, and Average Maximum Temperature data is provided for 1971-2000.

Table 1-4
Climate Data for the Santa Clarita Valley

	Jan	Feb	Mar	Apr	May	Jun
Standard Monthly Average ETo(1)	2.20	2.45	3.64	4.74	5.31	6.06
Average Rainfall (inches) (2)	3.52	4.88	3.13	0.88	0.28	0.06
Average Max. Temperature (Fahrenheit) (3)	64.2	66.0	68.7	73.1	79.9	88.0

	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Standard Monthly Average ETo(1)	6.75	6.66	5.01	3.95	2.73	2.31	51.81
Average Rainfall (inches)(2)	0.03	0.05	0.15	0.88	1.29	2.49	17.64
Average Max. Temperature (Fahrenheit) (3)	94.9	94.9	89.4	81.3	69.1	65.2	78.1

Notes:
(1) ETo (evapotranspiration) data provided for Glendale region, http://wwwcimis.water.ca.gov/cimis/welcome.jsp
(2) Average Monthly Rainfall data gathered from long-term average precipitation records from Newhall-Soledad 32c gage during period 1980-2004.
(3) Temperature data provided for Dry Canyon Reservoir region, http://www.wrcc.dri.edu/CLIMATEDATA.html

1.6 Potential Effects of Global Warming

A topic of growing concern for water planners and managers is global warming and the potential impacts it could have on California's future water supplies. DWR's Draft California Water Plan Update 2005 contains the first-ever assessment of such potential impacts in a California Water Plan.

Volume 1, Chapter 4 of the California Water Plan, "Preparing for an Uncertain Future," lists some potential impacts of global warming, based on more than a decade of scientific studies on the subject:

- Could produce hydrologic conditions, variability, and extremes that are different from what current water systems were designed to manage
- May occur too rapidly to allow sufficient time and information to permit managers to respond appropriately
- May require special efforts or plans to protect against surprises or uncertainties

Should global warming increase over time, it may cause a number of changes impacting future water supplies, including changes in Sierra snowpack patterns (the source of the SWP's water supply in Lake Oroville), hydrologic patterns, sea level, rainfall intensity, and statewide water demand. Computer models (such as CALVIN) have been developed to show water planners how California water management might adapt to climate change. DWR has committed to continue to update and refine these models based on ongoing scientific data collection and to incorporate this information into future California Water Plans. As DWR develops more specific assessments of the potential effects of climate change on SWP delivery reliability and water demands, CLWA and the purveyors can update their plans accordingly.

1.7 OTHER DEMOGRAPHIC FACTORS

Water service is provided to residential, commercial, industrial, institutional, recreational, and agricultural customers and for environmental and other uses, such as fire protection and pipeline cleaning.

Recently, the Valley area (along with most of California) has experienced significant increases in both single family and multi-family residential construction, as well as in commercial and industrial construction. As the local population has increased, the demand for water has also increased.

1.8 LIST OF ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are used in this report.

AB	Assembly Bill
ACOE	U.S. Army Corps of Engineers
Act	California Urban Water Management Planning Act
af	acre-feet
afy	acre-feet per year
Agency	Castaic Lake Water Agency
AWWARF	American Water Works Association Research Foundation
Basin	Santa Clara River Valley Groundwater Basin, East Subbasin
BMPs	Best Management Practices

CCF	One Hundred Cubic Feet
CCR	Consumer Confidence Report
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLWA	Castaic Lake Water Agency
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
DBP	Disinfection by-products
Delta	Sacramento-San Joaquin Delta
DHS	California Department of Health Services
DMM	Demand Management Measures
DOF	Department of Finance
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
EC	Electrical conductivity
Edison	Southern California Edison
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
gpcd	gallons per capita per day
gpd	gallons per day
gpm	gallons per minute
GWMP	Groundwater Management Plan
KCWA	Kern County Water Agency
LACDRP	Los Angeles County Department of Regional Planning
LACSD	Sanitation Districts of Los Angeles County
LACWWD #36	Los Angeles County Waterworks District # 36
M&I	Municipal and Industrial
Metropolitan	Metropolitan Water District of Southern California
mgd	million gallons per day
mg/L	milligrams per liter
MOU	Memorandum of Understanding
NCWD	Newhall County Water District
NPDES	National Pollutant Discharge Elimination System
OVOV	One Valley One Vision
Plan	Urban Water Management Plan 2005
PUC	California Public Utilities Commission
RAP	Remedial Action Plan
RO	Reverse Osmosis
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SCAG	Southern California Association of Governments

SCLLC	Santa Clarita LLC
SCOPE	Santa Clarita Organization for Planning the Environment
SCWC	Santa Clarita Water Company
SCWD	Santa Clarita Water Division
Semitropic	Semitropic Water Storage District
SWP	State Water Project
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
umhos/cm	Micromhos per centimeter
UWCD	United Water Conservation District
UWMP	Urban Water Management Plan
Valley	Santa Clarita Valley
VWC	Valencia Water Company
WRP	Waste Water Reclamation Plant

Chapter 2
WATER USE

Chapter 2.0
WATER USE

2.1 OVERVIEW

This chapter describes historic and current water usage and the methodology used to project future demands within CLWA's service area. Water usage is divided into sectors such as residential, industrial, institutional, landscape, agricultural, and other purposes. To undertake this evaluation, existing land use data and new housing construction information were compiled from each of the retail water purveyors and projections prepared by "One Valley One Vision" (OVOV), a joint planning effort by the City of Santa Clarita and Los Angeles County Department of Regional Planning (LACDRP). This information was then compared to historical trends for new water service connections and customer water usage information. In addition, weather and water conservation effects on historical water usage were factored into the evaluation.

The methodology used to project future demands within CLWA's service area included three steps: (1) obtain projected demands to 2030 from each water purveyor, (2) compare projections based on historical records to the totals developed by the purveyors, and (3) compare these results with the OVOV Plan for consistency with the General Plan.

This approach allowed the comparison of three different sources of data and projections to be evaluated. Several factors can affect demand projections, including:

- Land use revisions
- New regulations
- Consumer choice
- Economic conditions
- Transportation needs
- Highway construction
- Environmental factors
- Conservation programs
- Plumbing codes

The foregoing factors affect the amount of water needed, as well as the timing of when it is needed. Past experience in the Valley has indicated that the economy is the biggest factor in determining water demand projections. During an economic recession, there is a major downturn in development and a subsequent slowing of the projected demand for water. The projections in this Plan do not attempt to forecast recessions or droughts. Likewise, no speculation is made about future plumbing codes or other regulatory changes. However, the projections do include water conservation, which is projected to reduce overall water demand by 10 percent. There have been, and continue to be, major efforts statewide to conserve water, which have been successful.

2.2 HISTORIC WATER USE

Predicting future water supply requires accurate historic water use patterns and water usage records. Both the economy and entitlement process (compliance with the California Environmental Quality Act [CEQA]) are key factors impacting growth in population and demand. Figure 2-1 illustrates the steady increase in Valley water demand since 1980.

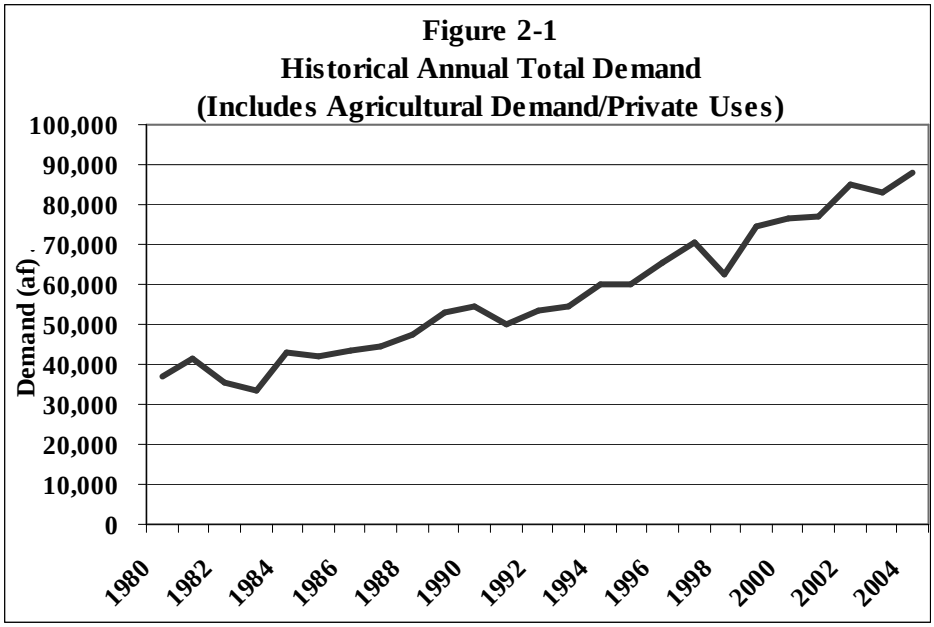


Table 2-1 presents the historical accounts and deliveries by retail purveyor since 1990. The type of customer accounts included in the table are single family homes, multi-family homes, commercial, industrial, institutional/government, and landscape.

Table 2-1
Historical Accounts and Deliveries by Retail Purveyor

Purveyor		1990	1992	1994	1996	1998	2000	2002	2004
CLWA SCWD	No. Accounts	18,550	19,000	19,400	19,650	20,300	21,970	24,175	26,161
	Deliveries (af)	18,503	17,551	19,911	22,006	20,319	25,280	28,434	29,191
LACWWD #36	No. Accounts	706	736	752	768	774	972	1,200	1,300
	Deliveries (af)	513	456	500	533	578	758	1,071	1,302
NCWD	No. Accounts	6,039	6,230	6,373	6,475	6,726	7,434	7,941	8,970
	Deliveries (af)	7,813	7,973	7,754	8,916	8,782	9,623	9,869	10,555
VWC	No. Accounts	13,965	14,520	15,359	17,009	19,389	21,661	24,453	27,238
	Deliveries (af)	16,572	15,338	17,390	19,721	19,874	25,190	28,360	30,682
Total	No. Accounts	39,260	40,486	41,884	43,902	47,189	52,037	57,769	63,669
	Deliveries (af)	43,401	41,318	45,555	51,176	49,553	60,851	67,734	71,730
	af/Account	1.11	1.02	1.09	1.17	1.05	1.17	1.17	1.13

2.3 PROJECTED WATER USE

2.3.1 Purveyor Projections

Each of the four retail water purveyors provided projected water demands based on the projects that are under evaluation, are in the planning process, or the result of its own water planning efforts for its service area. The purveyors maintain historical data, as well as work closely with property owners and developers in their service areas, to ensure they have an adequate water supply and the necessary infrastructure to provide water service.

Since there are only four purveyors in the service area, there is close coordination and exchange of data. SCWD's engineering department continually updates expected demands and infrastructure needs. NCWD prepared a "Water Supply Assessment" in 2004 that is the basis for NCWD's projected demand. VWC is a California Public Utilities Commission (PUC)-regulated water supplier and is required to regularly provide its service plan for rate increases and service area changes. Table 2-2 summarizes the purveyors' projected water demands through 2030.

Table 2-2
Projected Water Demands

Purveyor	Demand (af)						Annual Increase
	2005	2010	2015	2020	2025	2030	
CLWA SCWD	30,400	35,000	39,100	43,100	47,100	51,100	2.1%
LACWWD #36	1,300	1,600	1,800	2,000	2,400	2,800	3.1%
NCWD	11,800	14,400	16,000	17,700	19,300	21,000	2.4%
VWC	30,200	35,100	40,200	43,700	50,600	54,400	2.4%
Total Purveyor	**73,700**	**86,100**	**97,100**	**106,500**	**119,400**	**129,300**	2.2%
Agricultural/Private Uses	15,600	13,950	12,300	10,650	9,000	9,000	--
Total (w/o conservation)	**89,300**	**100,050**	**109,400**	**117,150**	**128,400**	**138,300**	**--**
Conservation (1)	(7,370)	(8,610)	(9,710)	(10,650)	(11,940)	(12,930)	--
Total (w/conservation)	81,930	91,440	99,690	106,500	116,460	125,370	1.3%

Notes:
(1) Assumes 10 percent reduction on urban portion of demand resulting from conservation best management practices (see Chapter 7).

Tables 2-3 through 2-6 present the past, current, and projected water deliveries by customer type for the CLWA SCWD, LACWWD #36, NCWD, and VWC, respectively.

Table 2-3
Past, Current, and Projected Water Deliveries (by customer type)
CLWA Santa Clarita Water Division

Year		Water Use Sectors	Single Family	Multi-Family	Comm-ercial	Industrial	Institutional/ Government	Landscape	Total
2000	metered	No. of accounts	16,906	3,784	537	48	83	612	21,970
		Deliveries (af)	15,966	2,669	930	1,096	893	3,726	25,280
2005	metered	No. of accounts	20,550	4,800	650	50	125	700	26,875
		Deliveries (af)	19,139	3,386	1,126	1,142	1,345	4,262	30,400
2010	metered	No. of accounts	23,575	5,800	750	60	175	800	31,160
		Deliveries (af)	21,486	4,091	1,299	1,370	1,883	4,871	35,000
2015	metered	No. of accounts	25,715	6,800	850	70	225	900	34,560
		Deliveries (af)	23,333	4,796	1,472	1,598	2,421	5,480	39,100
2020	metered	No. of accounts	27,855	7,800	950	80	275	1,000	37,960
		Deliveries (af)	25,080	5,501	1,645	1,826	2,959	6,089	43,100
2025	metered	No. of accounts	29,995	8,800	1,050	90	325	1,100	41,360
		Deliveries (af)	26,827	6,206	1,818	2,054	3,497	6,698	47,100
2030	metered	No. of accounts	32,135	9,800	1,150	100	375	1,200	44,760
		Deliveries (af)	28,574	6,911	1,991	2,282	4,035	7,307	51,100

Table 2-4
Past, Current, and Projected Water Deliveries (by customer type)
Los Angeles County Waterworks District No. 36

Year		Water Use Sectors	Single Family	Multi-Family	Comm-ercial	Const/ Industrial	Institutional/ Government	Landscape	Total
2000	metered	No. of accounts	948	5	0	10	5	4	972
		Deliveries (af)	643	29	0	54	20	12	758
2005	metered	No. of accounts	1,275	5	0	10	5	5	1,300
		Deliveries (af)	1,185	29	0	54	20	12	1,300
2010	metered	No. of accounts	1,575	5	0	10	5	4	1,600
		Deliveries (af)	1,480	30	0	56	21	12	1,600
2015	metered	No. of accounts	1,774	5	0	11	5	4	1,800
		Deliveries (af)	1,676	31	0	58	22	13	1,800
2020	metered	No. of accounts	1,973	6	0	11	6	4	2,000
		Deliveries (af)	1,872	32	0	60	22	13	2,000
2025	metered	No. of accounts	2,372	6	0	11	6	5	2,400
		Deliveries (af)	2,268	33	0	62	23	14	2,400
2030	metered	No. of accounts	2,772	6	0	12	6	5	2,800
		Deliveries (af)	2,665	34	0	63	23	14	2,800

Table 2-5
Past, Current, and Projected Water Deliveries (by customer type)
Newhall County Water District

Year		Water Use Sectors	Single Family	Multi-Family	Commercial	Construction/ Industrial	Institutional/ Government	Landscape	Total
2000	metered	No. of accounts	6,608	293	377	11	18	127	7,434
		Deliveries (af)	5,556	1,537	872	411	119	1,128	9,623
2005	metered	No. of accounts	8,047	293	399	35	59	232	9,065
		Deliveries (af)	7,243	1,969	891	207	133	1,357	11,800
2010	metered	No. of accounts	9,735	425	425	60	75	300	11,020
		Deliveries (af)	8,750	2,485	999	250	176	1,740	14,400
2015	metered	No. of accounts	10,730	450	450	85	90	425	12,230
		Deliveries (af)	9,475	2,595	1,038	315	212	2,365	16,000
2020	metered	No. of accounts	11,865	475	475	110	105	550	13,580
		Deliveries (af)	10,385	2,750	1,066	375	234	2,890	17,700
2025	metered	No. of accounts	12,620	500	500	135	120	675	14,550
		Deliveries (af)	11,000	2,900	1,114	425	261	3,600	19,300
2030	metered	No. of accounts	14,050	525	525	160	135	800	16,195
		Deliveries (af)	12,275	3,000	1,140	500	285	3,800	21,000

Table 2-6
Past, Current, and Projected Water Deliveries (by customer type)
Valencia Water Company

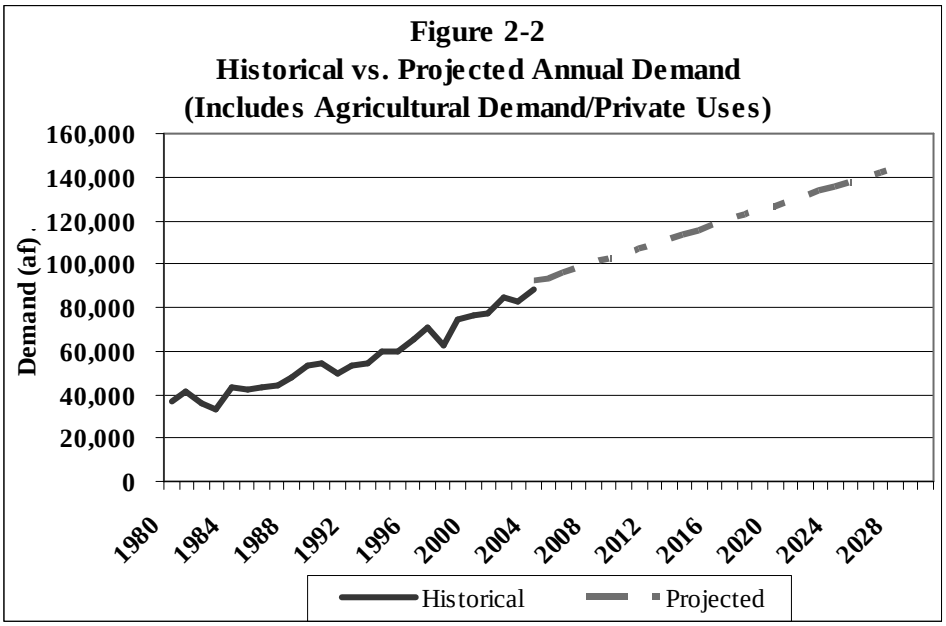
Year		Water Use Sectors	Single Family	Multi-Family	Comm-ercial	Industrial	Institutional/ Government	Landscape	Total
2000	metered	No. of accounts	19,805	191	876	382	406	1	21,661
		Deliveries (af)	12,112	1,373	5,798	1,759	3,711	437	25,190
2005	metered	No. of accounts	25,067	364	1,307	452	505	3	27,698
		Deliveries (af)	14,526	1,646	6,949	2,108	4,448	523	30,200
2010	metered	No. of accounts	29,405	2,035	1,615	558	624	3	34,240
		Deliveries (af)	17,147	2,186	8,611	2,399	4,465	292	35,100
2015	metered	No. of accounts	30,724	8,176	1,998	690	772	3	42,363
		Deliveries (af)	17,998	4,151	9,882	2,753	5,124	292	40,200
2020	metered	No. of accounts	31,234	13,203	2,282	788	882	3	48,392
		Deliveries (af)	18,326	5,760	10,752	2,995	5,575	292	43,700
2025	metered	No. of accounts	36,384	14,341	2,605	900	1,007	3	55,240
		Deliveries (af)	21,803	6,124	12,454	3,469	6,458	292	50,600
2030	metered	No. of accounts	39,484	14,391	2,767	956	1,069	3	58,670
		Deliveries (af)	23,909	6,140	13,388	3,729	6,942	292	54,400

2.3.2 Projections Based On Historical Use

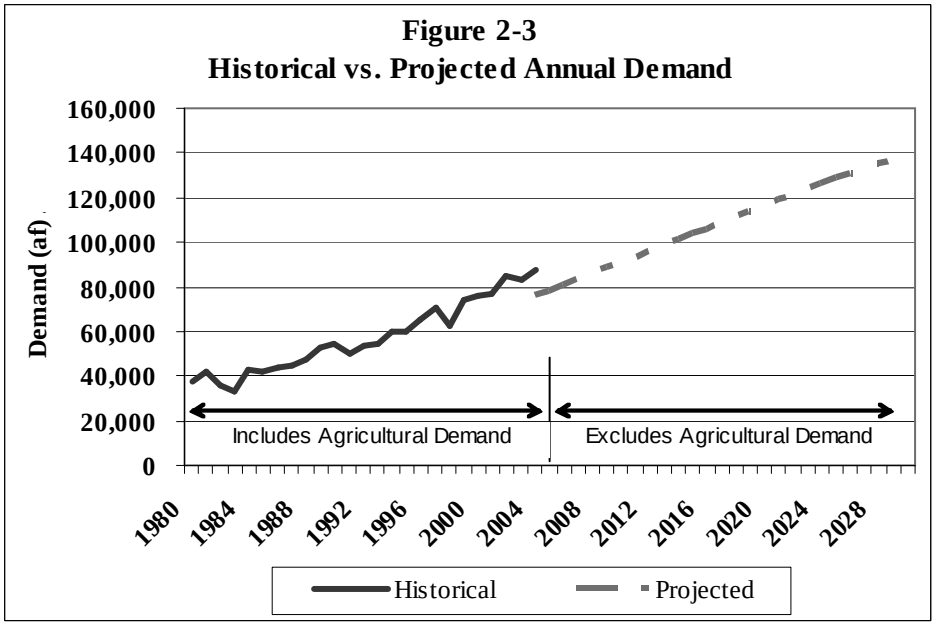
Another methodology to forecast demand involves projecting historical water use into the future. Mathematical methods are used to perform this projection. A correlation factor to the historical data of 1.0 would be considered the most exact. The ideal method results in a correlation of 0.9 or greater. For this Plan, a Linear Regression method was used to project demands, which resulted in a coefficient of correlation of 0.95.

2.3.2.1 Linear Regression Method

The Linear Regression method examines the historical growth in water demand and projects forward using linear regression. Figure 2-2 displays the growth in water demand since 1980 for the CLWA service area with a linear progression through the year 2030. Growth in demand has been relatively constant with some downturns that reflect either weather patterns or economic trends. The demand includes agricultural as well and municipal and industrial (M&I) uses.



On Figure 2-3, agricultural demand is removed to show M&I use only. As shown on Figure 2-3, results from the linear regression (after extracting the projected agricultural demands provided in Table 2-2) indicate a total 2030 demand of 137,100 af. This demand figure is comparable to the 129,300 af submitted by the purveyors (a six percent difference), as shown in Table 2-2.



2.3.2.2 Comparison to City and County Planning

The next step involved comparison of the purveyor-projected growth in water demand with the growth projections provided by local land use planning agencies. Table 2-7 is the result of the joint OVOV planning effort by the City of Santa Clarita and LACDRP.

Table 2-7
Adjusted Santa Clarita Valleywide General Plan (1)(2)
(SCAG 2004 RTP, Projections: Years 2000 to 2030)

Jurisdiction	2000 (3)	2005	2010	2015	2020	2025	2030	Change	Average Annual Growth
City of Santa Clarita									
Population	151,088	171,290	196,680	210,280	222,290	232,830	242,620	91,532	1.6%
Households	50,787	55,614	62,837	67,832	72,883	77,868	82,806	32,019	1.6%
Employment	51,380	59,640	68,820	73,240	77,490	81,460	85,190	33,810	1.7%
Jobs/Household ratio	*1.01*	*1.07*	*1.10*	*1.08*	*1.06*	*1.05*	*1.03*	0.02	
Persons per Household	*2.97*	*3.08*	*3.13*	*3.10*	*3.05*	*2.99*	*2.93*	(0.04)	
SCV Unincorporated Area									
Population	61,523	78,053	105,094	125,850	146,401	166,557	185,589	124,066	3.7%
Households	17,973	20,645	28,108	34,609	41,154	47,941	54,630	36,657	3.8%
Employment (estimated)	10,790	13,900	18,830	23,190	27,980	33,080	38,240	27,450	4.3%
Jobs/Household ratio	*0.60*	*0.67*	*0.67*	*0.67*	*0.68*	*0.69*	*0.70*	0.10	
Persons per Household	*3.42*	*3.78*	*3.74*	*3.64*	*3.56*	*3.47*	*3.40*	(0.03)	
SCV Planning Area(4)									
Population	212,611	249,343	301,774	336,130	368,691	399,387	428,209	215,598	2.4%
Households	68,760	76,259	90,945	102,441	114,037	125,809	137,436	68,676	2.3%
Employment	62,170	73,540	87,650	96,430	105,470	114,540	123,430	61,260	2.3%
Jobs/Household ratio	*0.90*	*0.96*	*0.96*	*0.94*	*0.92*	*0.91*	*0.90*	(0.01)	
Persons per Household	*3.09*	*3.27*	*3.32*	*3.28*	*3.23*	*3.17*	*3.12*	0.02	

Notes:
(1) Source: Stanley R. Hoffman Associates, Inc.; Southern California Association of Governments, 2004 Regional Transportation Plan (RTP).
(2) The SCAG population and household projections are used as control totals for the entire "One Valley One Vision" (OVOV) planning area while the allocation between the City and unincorporated areas is based on 2000-2003 Department of Finance (DOF) population and household trend data. The 1998-2003 Employment Development Department data is used to calibrate the 2005 base year for employment. However, the employment totals for the unincorporated area are allowed to exceed the SCAG RTP 2004 forecast based on local information from the County of Los Angeles Planning staff.
(3) 2000 Population and Household data is based on DOF estimates benchmarked to the 2000 U.S. Census Figures.
(4) The Santa Clarita Valley Planning Area estimates are the sum of the City and unincorporated area.
(5) On May 11, 2005, the OVOV Team agreed to use these adjusted RTP data for the OVOV General Plan Update.

The OVOV task force used the data provided by Southern California Association of Governments' (SCAG's) Regional Transportation Plan (RTP), the State Department of Finance (DOF), and the Employment Development Department. This joint effort was undertaken to ensure compatibility of planning efforts since the Valley is considered a realistic planning area with both City and County jurisdictions.

The annual rate of growth was examined to determine if the projected water demand was in accordance with the purveyors' projected growth shown in Table 2-2.

In Table 2-7, the OVOV projections indicate a 1.6 percent annual growth rate of population and households for the City of Santa Clarita, and 3.7 to 3.8 percent annual growth rates for the Valley Unincorporated Area. This results in a combined growth rate of 2.3 to 2.4 percent, which is

comparable to the purveyors' projected annual growth rate in water demand of 2.2 percent shown in Table 2-2.

Table 2-8 summarizes the projected Valley water use per household in af and in gallons per capita per day (gpcd). The data developed in this table is derived from the total annual demand projections provided in Table 2-2 divided by the projected annual populations and by the projected annual households provided in Table 2-7. Since the forecasted growth is based on households and population, it is not possible to obtain a direct match to number of service connections and water use per connection. However, based on 2005 population and water demand, the current estimated water use is 264 gpcd. The projected water use in 2030 of 270 gpcd remains very close to the 2005 water use of 264 gpcd, thus demonstrating that water demand and projected growth track closely. The term "household" is a term used by OVOV and does not equate to a single family residence.

Table 2-8
Projected Household Water Use

Projected Water Use	2005	2010	2015	2020	2025	2030
Water Use (af/household) (1)	0.97	0.95	0.95	0.93	0.95	0.94
Water Use (gpcd) (2)	264	255	258	258	267	270

Notes:
(1) Based on dividing the total annual demand projections provided in Table 2-2 by the projected annual households provided in Table 2-7.
(2) Based on dividing the total annual demand projections (converted from af to gpd) provided in Table 2-2 by the projected annual populations provided in Table 2-7.

An additional analysis was conducted by using actual 2004 water use (in gpcd) and multiplying that by the projected population from the OVOV population forecast (Table 2-7). 2004 actual water use was determined by taking the "2004 Santa Clarita Valley Water Report" M&I water use for 2004 and dividing that by the 2004 population. This resulted in an actual water use of 269 gpcd, which compares closely to the values presented in Table 2-8. Table 2-9 presents a summary of the comparison between the purveyors and OVOV demand projections. The projected demand by the purveyors varies from -0.20 percent to 5.62 percent of the water demand determined based on the OVOV population projections. This demonstrates that the purveyors' projections track closely with the anticipated growth projected by OVOV.

Table 2-9
Comparison of Purveyor and OVOV Demand Projections

Projection	Demand (af)					
	2005	2010	2015	2020	2025	2030
Purveyor (1)	73,700	86,100	97,100	106,500	119,400	129,300
OVOV (2)	75,136	90,936	101,288	111,100	120,350	129,035
Difference	1,436	4,836	4,188	4,600	950	(264)
Percent Difference	1.95%	5.62%	4.31%	4.32%	0.80%	-0.20%

Notes:
(1) Demand projections based on total puveyor projections provided in Table 2-2.
(2) Demand projections based on 269 gpcd multiplied by OVOV population projections provided in Table 2-7.

The data provided in Tables 2-3 through 2-6 indicates total estimated 2005 Valley water use to be (in af/connection) 1.13 for all connection types and 0.77 for a single family connection. These findings were compared with a study conducted by the American Water Works Association Research Foundation (AWWARF), Residential End Uses of Water (1999). This study compared residential water demand for several cities in the western United States. For comparison, the average annual water use (in af/connection) for a single family connection in Las Virgenes Municipal Water District and the City of San Diego are 0.87 and 0.47, respectively, which compare with the Valley water use of 0.77.

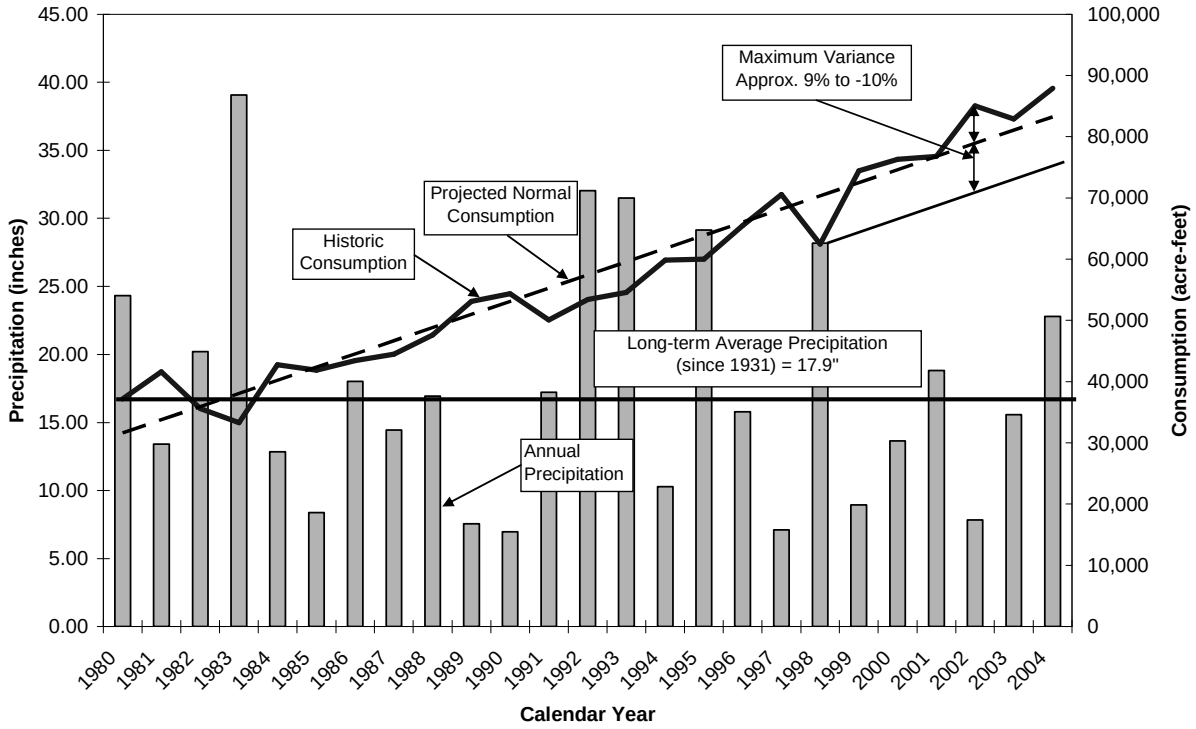
2.4 OTHER FACTORS AFFECTING WATER USAGE

Two major factors that affect water usage are weather and water conservation. Historically, when the weather is hot and dry, water usage increases. The amount of increase varies according to the number of consecutive years of hot, dry weather and the conservation activities imposed. During cool-wet years, historical water usage has decreased to reflect less water usage for external landscaping. Water conservation measures employed within the CLWA's and purveyors' service areas have a direct long-term effect on water usage. Both of these factors are discussed below in detail.

2.4.1 Weather Effects on Water Usage

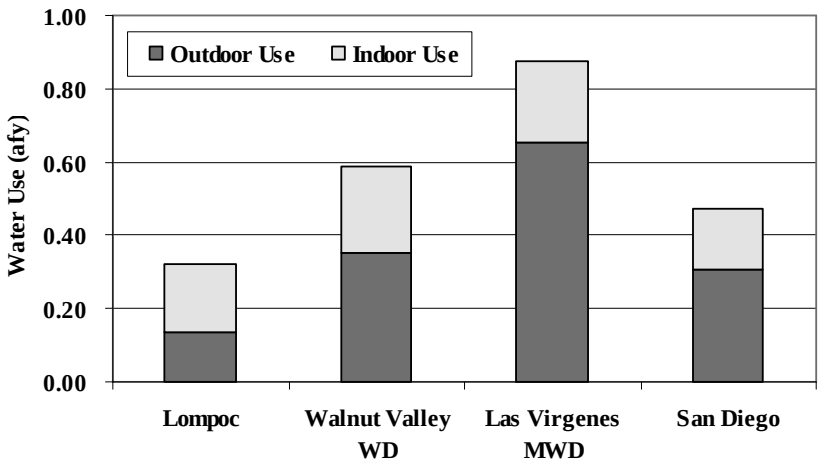
Historically, about 605 to 1,110 gallons of water are consumed daily for urban uses for every household in the CLWA's and purveyors' service areas. Most of this range in water use is due to seasonal weather variations. As presented on Figure 2-4, the historical water use from 1980 to 2004 fluctuated principally due to weather, with the maximum variance around the projected normal of approximately 9 percent higher use in hot, dry years to approximately 10 percent lower use in cool, wet years.

Figure 2-4
Weather Effects on Water Usage



The same AWWARF study described in Section 2.3.2.2 compared residential indoor and outdoor water use for several cities in the western United States. A comparison of the water use for four California locations is presented on Figure 2-5. As shown on the figure, indoor water use tracks closely among each of the four locations. However, outdoor use (landscaping), varies significantly among the locations. CLWA and the retail purveyors' water use correlates most closely with the data provided for Las Virgenes MWD.

Figure 2-5
Comparison of Regional Indoor/Outdoor Water Use



2.4.2 Conservation Effects on Water Usage

In recent years, water conservation has become an increasingly important factor in water supply planning in California. The California plumbing code has instituted requirements for new construction that mandate the installation of ultra low-flow toilets and low-flow showerheads. CLWA and the purveyors have developed water conservation measures that include public information and education programs. CLWA funds a toilet replacement program and, through its connection fee program, has provided financial incentives to developers for good water management practices.

During the 1987-1992 drought period, overall water requirements due to the effects of hot, dry weather were projected to increase by approximately 10 percent. As a result of extraordinary conservation measures enacted during the period, the overall water requirements actually decreased by more than 10 percent.

Residential, commercial, and industrial usage can be expected to decrease as a result of the implementation of more aggressive water conservation practices. As previously discussed, the greatest opportunity for conservation is in developing greater efficiency and reduction in landscape irrigation. The irrigation demand can represent as much as 50 percent of the water demand for residential customers depending upon lot size and amount of irrigated turf and plants. It is assumed that conservation will result in a long-term 10 percent reduction of demand.

Chapter 3
WATER RESOURCES

Chapter 3.0
WATER RESOURCES

3.1 OVERVIEW

This section describes the water resources available to CLWA and the purveyors for the 25-year period covered by the Plan. These are summarized in Table 3-1 and discussed in more detail below. Both currently available and planned supplies are discussed.

Table 3-1
Summary of Current and Planned Water Supplies and Banking Programs(1)

Water Supply Sources	Supply (af)					
	2005	2010	2015	2020	2025	2030
Existing Supplies						
Wholesale (Imported)	*70,380*	*73,660*	*75,560*	*76,080*	*77,980*	*77,980*
SWP Table A Supply (2)	65,700	67,600	69,500	71,400	73,300	73,300
Flexible Storage Account (CLWA) (3)	4,680	4,680	4,680	4,680	4,680	4,680
Flexible Storage Account (Ventura County) (3) (4)	0	1,380	1,380	0	0	0
Local Supplies						
Groundwater	*40,000*	*46,000*	*46,000*	*46,000*	*46,000*	*46,000*
Alluvial Aquifer	35,000	35,000	35,000	35,000	35,000	35,000
Saugus Formation	5,000	11,000	11,000	11,000	11,000	11,000
Recycled Water	1,700	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	112,080	121,360	123,260	123,780	125,680	125,680
Existing Banking Programs (3)						
Semitropic Water Bank (5)	50,870	50,870	0	0	0	0
Total Existing Banking Programs	50,870	50,870	0	0	0	0
Planned Supplies						
Local Supplies						
Groundwater	*0*	*10,000*	*10,000*	*20,000*	*20,000*	*20,000*
Restored wells (Saugus Formation)	0	10,000	10,000	10,000	10,000	10,000
New Wells (Saugus Formation)	0	0	0	10,000	10,000	10,000
Recycled Water (6)	0	0	1,600	6,300	11,000	15,700
Transfers						
Buena Vista-Rosedale (7)	0	11,000	11,000	11,000	11,000	11,000
Total Planned Supplies	0	21,000	22,600	37,300	42,000	46,700
Planned Banking Programs (3)						
Rosedale-Rio Bravo	0	20,000	20,000	20,000	20,000	20,000
Additional Planned Banking	0	0	20,000	20,000	20,000	20,000
Total Planned Banking Programs	0	20,000	40,000	40,000	40,000	40,000

Notes:

(1) The values shown under "Existing Supplies" and "Planned Supplies" are supplies projected to be available in average/normal years. The values shown under "Existing Banking Programs" and "Planned Banking Programs" are either total amounts currently in storage, or the maximum capacity of program withdrawals.

(2) SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of average deliveries projected to be available, taken from Table 6-5 of DWR's "Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report" (May 2005).

(3) Supplies shown are total amounts that can be withdrawn, and would typically be used only during dry years.

(4) Initial term of the Ventura County entities' flexible storage account is ten years (from 2006 to 2015).

(5) Supplies shown are the total amount currently in storage, and would typically be used only during dry years. Once the current storage amount is withdrawn, this supply would no longer be available and in any event, is not available after 2013.

(6) Recycled water supplies based on projections provided in Chapter 4, Recycled Water.

(7) CLWA is in the process of acquiring this supply, primarily to meet the potential demands of future annexations to the CLWA service area. This acquisition is consistent with CLWA's annexation policy under which it will not approve potential annexations unless additional water supplies are acquired. Currently proposed annexations have a demand for about 4,000 afy of this supply which, if approved, would leave the remaining 7,000 afy available for potential future annexations. Unless and until any such annexations are actually approved, this supply will be available to meet demands within the existing CLWA service area.

The term "dry" is used throughout this chapter and in subsequent chapters concerning water resources and reliability as a measure of supply availability. As used in this Plan, dry years are those years when supplies are the lowest, which occurs primarily when precipitation is lower than the long-term average precipitation. The impact of low precipitation in a given year on a particular supply may differ based on how low the precipitation is, or whether the year follows a high-precipitation year or another low-precipitation year. For the SWP, a low-precipitation year may or may not affect supplies, depending on how much water is in SWP storage at the beginning of the year. Also, dry conditions can differ geographically. For example, a dry year can be local to the Valley area (thereby affecting local groundwater replenishment and production), local to northern California (thereby affecting SWP water deliveries), or statewide (thereby affecting both local groundwater and the SWP). When the term "dry" is used in this Plan, statewide drought conditions are assumed, affecting both local groundwater and SWP supplies at the same time.

3.2 WHOLESALE (IMPORTED) WATER SUPPLIES

3.2.1 Imported Water Supplies

Imported water supplies consist primarily of SWP supplies, which were first delivered to CLWA in 1980. In addition, CLWA has access to water from Flexible Storage Accounts in Castaic Lake, which are planned for dry-year use, but are not strictly limited as such. CLWA wholesales these imported supplies to each of the local retail water purveyors.

The SWP is the largest state-built, multi-purpose water project in the country. It was authorized by the California State Legislature in 1959, with the construction of most initial facilities completed by 1973. Today, the SWP includes 28 dams and reservoirs, 26 pumping and generating plants, and approximately 660 miles of aqueducts. The primary water source for the SWP is the Feather River, a tributary of the Sacramento River. Storage released from Oroville Dam on the Feather River flows down natural river channels to the Sacramento-San Joaquin River Delta (Delta). While some SWP supplies are pumped from the northern Delta into the North Bay Aqueduct, the vast majority of SWP supplies are pumped from the southern Delta into the 444-mile-long California Aqueduct. The California Aqueduct conveys water along the west side of the San Joaquin Valley to Edmonston Pumping Plant, where water is pumped over the Tehachapi Mountains and the aqueduct then divides into the East and West Branches. CLWA takes delivery of its SWP water at Castaic Lake, a terminal reservoir of the West Branch. From Castaic Lake, CLWA delivers its SWP supplies to the local retail water purveyors through an extensive transmission pipeline system.

In the early 1960s, DWR began entering into individual SWP Water Supply Contracts with urban and agricultural public water supply agencies located throughout northern, central, and southern California for SWP water supplies. CLWA is one of 29 water agencies (commonly referred to as “contractors”) that have an SWP Water Supply Contract with DWR. Each SWP contractor’s SWP Water Supply Contract contains a “Table A,” which lists the maximum amount of water an agency may request each year throughout the life of the contract. Table A is used in determining each contractor’s proportionate share, or “allocation,” of the total SWP water supply DWR determines to be available each year. The total planned annual delivery capability of the SWP and the sum of all contractors’ maximum Table A amounts was originally

4.23 million af. The initial SWP storage facilities were designed to meet contractors' water demands in the early years of the SWP, with the construction of additional storage facilities planned as demands increased. However, essentially no additional SWP storage facilities have been constructed since the early 1970s. SWP conveyance facilities were generally designed and have been constructed to deliver maximum Table A amounts to all contractors. After the permanent retirement of some Table A amount by two agricultural contractors in 1996, the maximum Table A amounts of all SWP contractors now totals about 4.17 million af. Currently, CLWA's annual Table A Amount is 95,200 af.[1,2]

While Table A identifies the maximum annual amount of water an SWP contractor may request, the amount of SWP water actually available and allocated to SWP contractors each year is dependent on a number of factors and can vary significantly from year to year. The primary factors affecting SWP supply availability include hydrology, the amount of water in SWP storage at the beginning of the year, regulatory and operational constraints, and the total amount of water requested by SWP contractors. Urban SWP contractors' requests for SWP water, which were low in the early years of the SWP, have been steadily increasing over time, which increases the competition for limited SWP dry-year supplies.

Consistent with other urban SWP contractors, SWP deliveries to CLWA have increased as its requests for SWP water have increased. Tables 3-2 and 3-3 present historical total SWP deliveries to CLWA municipal purveyors and CLWA SWP demand projections provided to DWR (CLWA's wholesale supplier), respectively.

Table 3-2
Historical Total SWP Deliveries to Purveyors(1)

Year	Deliveries (af)	Year	Deliveries (af)
1980	1,125	1993	13,393
1981	5,816	1994	14,389
1982	9,659	1995	16,996
1983	9,185	1996	18,093
1984	10,996	1997	22,148
1985	11,823	1998	20,254
1986	13,759	1999	27,282
1987	16,285	2000	32,579
1988	19,033	2001	35,369
1989	21,618	2002	41,768
1990	21,613	2003	44,419
1991	7,968	2004	47,205
1992	13,911		

Notes:
(1) Includes CLWA SCWD, LACWWD 36, NCWD, and VWC.

[1] CLWA's original SWP Water Supply Contract with DWR was amended in 1966 for a maximum annual Table A Amount of 41,500 af. In 1991, CLWA purchased 12,700 af of annual Table A Amount from a Kern County water district, and in 1999 purchased an additional 41,000 af of annual Table A Amount from another Kern County water district, for a current total annual Table A Amount of 95,200 af.
[2] See Section 3.2.2.

Table 3-3
CLWA Demand Projections Provided to Wholesale Supplier (DWR) (af)

Wholesaler (Supply Source)	2010	2015	2020	2025	2030
DWR (SWP)	95,200	95,200	95,200	95,200	95,200

In an effort to assess the impacts of these varying conditions on SWP supply reliability, DWR issued its "State Water Project Delivery Reliability Report" in May 2003. The report assists SWP contractors in assessing the reliability of the SWP component of their overall supplies. DWR is in the process of updating this report and, on May 25, 2005, provided updated delivery reliability estimates to the SWP contractors in its "Excerpts from the Working Draft of 2005 State Water Project Delivery Reliability." In this update, DWR provided a recommended set of analyses for SWP contractors to use in preparing their 2005 UWMPs.[3] These updated analyses indicate that the SWP, using existing facilities operated under current regulatory and operational constraints, and with all contractors requesting delivery of their full Table A Amounts in most years, could deliver 77 percent of total Table A Amounts on a long-term average basis. These most recent analyses also project that SWP deliveries during multiple-year dry periods could average about 25 to 40 percent of total Table A Amounts and could possibly be as low as 5 percent during an unusually dry single year. During wetter years, or more than 25 percent of the time, 100 percent of full Table A Amounts is projected to be available.

The SWP supplies projected to be available for delivery to CLWA were determined based on the total SWP delivery percentages identified by DWR in its updated analyses. Table 3-4 shows SWP supplies projected to be available to CLWA in average/normal years (based on the average delivery over the study's historic hydrologic period from 1922-1994), i.e., long-term average basis. Table 3-5 summarizes estimated SWP supply availability in a single dry year (based on a repeat of the worst-case historic hydrologic conditions of 1977) and over a multiple dry year period (based on a repeat of the worst-case historic four-year drought of 1931-1934). Reliability and dry-year planning of water supplies are further described in Chapter 6, Reliability Planning.

[3]As part of the Monterey Settlement Agreement, DWR is to prepare an assessment every two years of SWP delivery reliability, which SWP contractors are to use in their water planning efforts. DWR has completed an update of its analysis of SWP delivery reliability and is currently updating this report. While DWR continues its drafting of the remainder of the report, it issued this updated reliability data to the SWP contractors early, so that they could use the most up-to-date SWP reliability data in preparation of their UWMPs. For this reason, DWR issued, in a Notice to Contractors, excerpts from its working draft of this report (available at www.swpao.water.ca.gov/pdfs/05-08.pdf). It is unlikely that the reliability data in DWR's final version of this updated report will differ from the draft.

Table 3-4
Wholesaler Identified and Quantified Existing and Planned Sources of Water Available to CLWA for Average/Normal Years (1)

Wholesaler (Supply Source)	2010	2015	2020	2025	2030
DWR (SWP)					
Table A Supply (af)	67,600	69,500	71,400	73,300	73,300
% of Table A Amount	71%	73%	75%	77%	77%

Notes:
(1) The percentages of Table A Amount projected to be available are taken from Table 6-5 of DWR's "Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report" (May 2005). Supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by these percentages.

Table 3-5
Wholesale Supply Reliability (1)

Wholesaler	Single Dry Year (2)	Multiple Dry Years (3)
DWR (SWP Supply)		
2005		
Table A Supply (af)	3,800	30,500
% of Table A Amount	4%	32%
2025/2030		
Table A Supply (af)	4,800	31,400
% of Table A Amount	5%	33%

Notes:
(1) The percentages of Table A Amount projected to be available are taken from Table 6-5 of DWR's "Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report" (May 2005). Supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by these percentages.
(2) Based on the worst case historic single dry year of 1977.
(3) Supplies shown are annual averages over four consecutive dry years, based on the worst case historic four-year dry period of 1931-1934.

As part of its Water Supply Contract with DWR, CLWA has access to a portion of the storage capacity of Castaic Lake. This Flexible Storage Account allows CLWA to borrow up to 4,684 af of the storage in Castaic Lake. Any of this amount that CLWA borrows must be replaced by CLWA within five years of its withdrawal. CLWA manages this storage by keeping the account full in normal and wet years and then delivering that stored amount (or a portion of it) during dry periods. The account is refilled during the next year that adequate SWP supplies are available to CLWA to do so. CLWA has recently negotiated with Ventura County water agencies to obtain the use of their Flexible Storage Account. This will allow CLWA access to another 1,376 af of storage in Castaic Lake. CLWA access to this additional storage will be available on a year-to-year basis for ten years, beginning in 2006.

While the primary supply of water available from the SWP is allocated Table A supply, SWP supplies in addition to Table A water may periodically be available, including “Article 21” water, Turnback Pool water, and DWR dry-year purchases. Article 21 water (which refers to the SWP contract provision defining this supply) is water that may be made available by DWR when

excess flows are available in the Delta (i.e., when Delta outflow requirements have been met, SWP storage south of the Delta is full, and conveyance capacity is available beyond that being used for SWP operations and delivery of allocated and scheduled Table A supplies). Article 21 water is made available on an unscheduled and interruptible basis and is typically available only in average to wet years, generally only for a limited time in the late winter. The Turnback Pool is a program where contractors with allocated Table A supplies in excess of their needs in a given year may turn back that excess supply for purchase by other contractors who need additional supplies that year. The Turnback Pool can make water available in all types of hydrologic years, although generally less excess water is turned back in dry years. As urban contractor demands increase in the future, the amount of water turned back and available for purchase will likely diminish. In critical dry years, DWR has formed Dry Year Water Purchase Programs for contractors needing additional supplies. Through these programs, water is purchased by DWR from willing sellers in areas that have available supplies and is then sold by DWR to contractors willing to purchase those supplies. Because the availability of these supplies is somewhat uncertain, they are not included as supplies in this UWMP. However, CLWA's access to these supplies when they are available may enable it to improve the reliability of its SWP supplies beyond the values used throughout this report.

3.2.2 Litigation Effects on Availability of Imported Water

Of CLWA's 95,2000 af annual Table A Amount, 41,000 afy was permanently transferred to CLWA in 1999 by Wheeler Ridge-Maricopa Water Storage District, a member unit of the Kern County Water Agency. CLWA's Environmental Impact Report ("EIR") prepared in connection with the 41,000 afy water transfer was challenged in Friends of the Santa Clara River v. Castaic Lake Water Agency (Los Angeles County Superior Court, Case Number BS056954) ("Friends"). On appeal, the Court of Appeal, Second Appellate District held that since the 41,000 afy EIR tiered off the Monterey Agreement EIR that was later decertified, CLWA would also have to decertify its EIR as well and prepare a revised EIR. As amplified in detail in the following sentences, Friends was dismissed with prejudice (permanently) in February 2005. CLWA has not been enjoined from using any water that is part of the 41,000 afy transfer.

Under the jurisdiction of the Los Angeles County Superior Court in Friends, CLWA prepared and circulated a revised Draft EIR for the transfer, received and responded to public comments regarding the revised Draft EIR, and held two separate public hearings concerning the revised Draft EIR. CLWA approved the revised EIR for the transfer on December 22, 2004 and lodged the revised EIR with the Los Angeles Superior Court as part of its Return to the Preemptory Writ of Mandate in Friends. Thereafter, Friends was dismissed with prejudice (permanently). In January 2005, two new challenges to CLWA's environmental review for the transfer were filed in the Ventura County Superior Court by the Planning and Conservation League and by the California Water Impact Network; these cases have been consolidated and transferred to Los Angeles County Superior Court.

These pending challenges to the EIR for the transfer do not affect the reliability of the transfer amount, and it is still appropriate to include the transfer amount as part of CLWA's 95,200 AFY Table A amount, for the following reasons. First, the transfer was completed in 1999, and DWR has allocated and annually delivered the water in accordance with the completed transfer. Second, the Court of Appeal held that the only defect in the 1999 EIR was that it tiered off the

Monterey Agreement EIR, which was later decertified. This defect has now been remedied by the preparation of a revised EIR that did not tier off the Monterey Agreement EIR. Third, the Monterey Amendments settlement agreement expressly authorizes the operation of the SWP in accordance with the Monterey Amendments, which authorized the transfer. Fourth, the Court of Appeal refused to enjoin the transfer, and instead required preparation of a revised EIR. Fifth, the transfer contracts remain in full force and effect, and no court has ever questioned their validity or enjoined the use of this portion of CLWA's Table A amount. It is, therefore, reasonable to conclude that if a court finds the revised EIR legally deficient, that court, like all others before it, will again refuse to enjoin the transfer, and will instead require further revisions to the EIR. Therefore, the pending challenges litigation should have no impact upon the amount of water available to CLWA as a result of the transfer.

3.3 GROUNDWATER

This section presents information about CLWA's and the purveyor's groundwater supplies, including a summary of the adopted GWMP.

3.3.1 Santa Clara River Groundwater Basin – East Subbasin

The sole source of local groundwater for urban water supply in the Valley is the groundwater Basin identified in the DWR Bulletin 118, 2003 Update as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) (Basin No. 4-4.07). The Basin is comprised of two aquifer systems, the Alluvium and the Saugus Formation. The Alluvium generally underlies the Santa Clara River and its several tributaries, and the Saugus Formation underlies practically the entire Upper Santa Clara River area. There are also some scattered outcrops of Terrace deposits in the Basin that likely contain limited amounts of groundwater. Since these deposits are located in limited areas situated at elevations above the regional water table and are also of limited thickness, they are of no practical significance as aquifers and consequently have not been developed for any significant water supply. Figure 3-1 illustrates the mapped extent of the Santa Clara River Valley East Subbasin in DWR Bulletin 118 (2003), which approximately coincides with the outer extent of the Alluvium and Saugus Formation. The service area for CLWA and the purveyors is also shown on Figure 3-1.

3.3.2 Adopted Groundwater Management Plan

As part of legislation authorizing CLWA to provide retail water service to individual municipal customers, Assembly Bill (AB) 134 (2001) included a requirement that CLWA prepare a groundwater management plan in accordance with the provisions of Water Code Section 10753, which was originally enacted by AB 3030. The general contents of CLWA's groundwater management plan were outlined in 2002, and a detailed plan was drafted and adopted in 2003 to satisfy the requirements of AB 134. The plan both complements and formalizes a number of existing water supply and water resource planning and management activities in CLWA's service area, which effectively encompasses the East Subbasin of the Santa Clara River Valley Groundwater Basin.

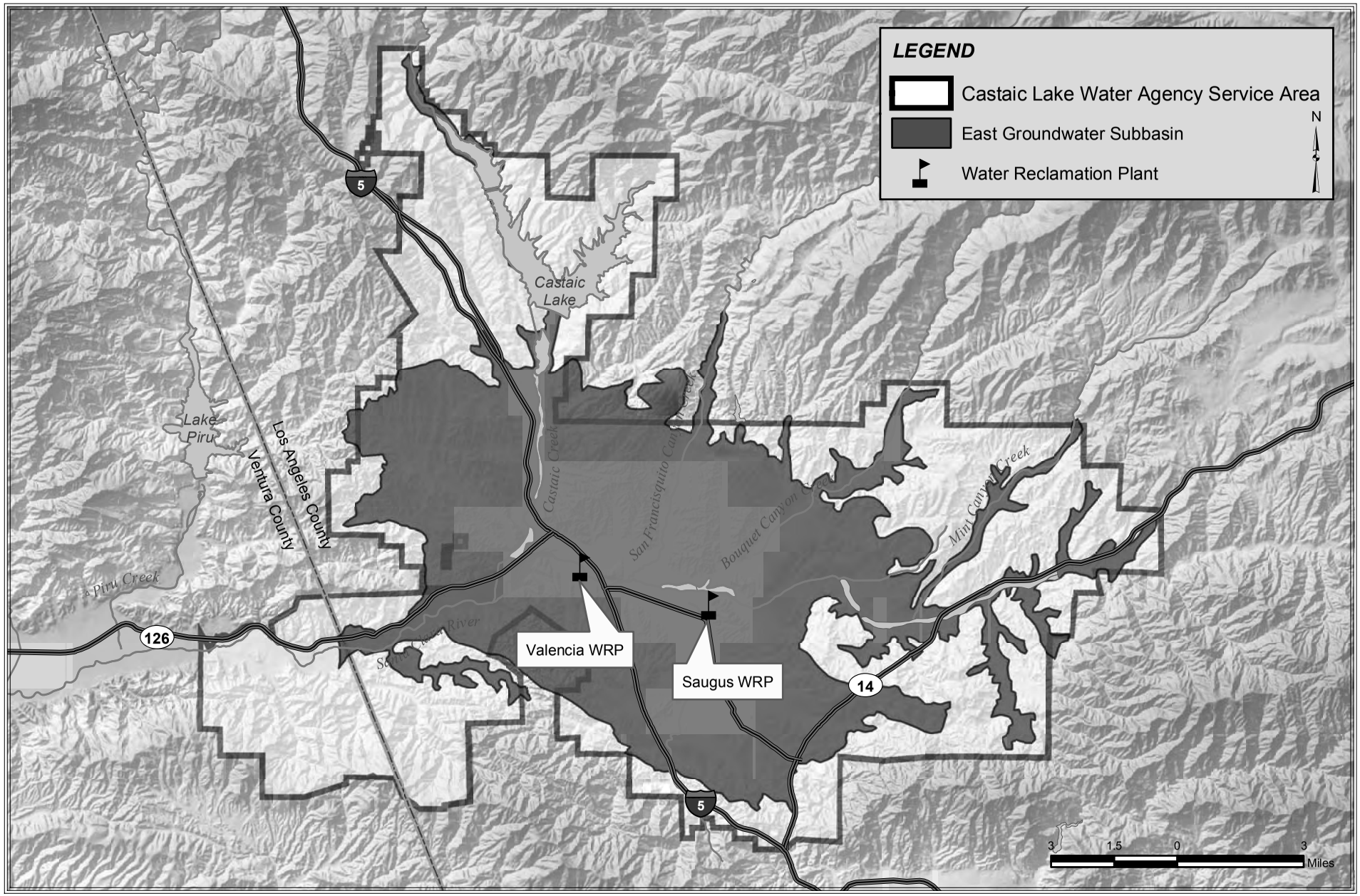


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Figure 3-1
Santa Clara River Valley
East Groundwater Subbasin

CLWA adopted the GWMP on December 10, 2003. The GWMP contains four management objectives, or goals, for the Basin including (1) development of an integrated surface water, groundwater, and recycled water supply to meet existing and projected demands for municipal, agricultural, and other water uses; (2) assessment of groundwater basin conditions to determine a range of operational yield values that use local groundwater conjunctively with supplemental SWP supplies and recycled water to avoid groundwater overdraft; (3) preservation of groundwater quality, including active characterization and resolution of any groundwater contamination problems; and (4) preservation of interrelated surface water resources, which includes managing groundwater to not adversely impact surface and groundwater discharges or quality to downstream basin(s).

Prior to preparation and adoption of the GWMP, a local Memorandum of Understanding (MOU) process among CLWA, the purveyors, and United Water Conservation District (UWCD) in neighboring Ventura County had produced the beginning of local groundwater management, now embodied in the GWMP. In 2001, out of a willingness to seek opportunities to work together and develop programs that mutually benefit the region as well as their individual communities, those agencies prepared and executed the MOU. The agreement is a collaborative and integrated approach to several of the aspects of water resource management included in the GWMP. UWCD manages surface water and groundwater resources in seven groundwater basins, all located in Ventura County, downstream of the East Subbasin of the Santa Clara River Valley (Basin). UWCD is a partner in cooperative management efforts to accomplish the objectives (goals) for the Basin, particularly as they relate to preservation of surface water resources that flow through the respective basins. As a result of the MOU, the cooperating agencies have undertaken the following measures: integrated their database management efforts, developed and utilized a numerical groundwater flow model for analysis of groundwater basin yield and containment of groundwater contamination, and continued to monitor and report on the status of Basin conditions, as well as on geologic and hydrologic aspects of the overall stream-aquifer system.

The adopted GWMP includes 14 elements intended to accomplish the Basin management objectives listed above. In summary, the plan elements include:

- Monitoring of groundwater levels, quality, production and subsidence
- Monitoring and management of surface water flows and quality
- Determination of Basin yield and avoidance of overdraft
- Development of regular and dry-year emergency water supply
- Continuation of conjunctive use operations
- Long-term salinity management
- Integration of recycled water
- Identification and mitigation of soil and groundwater contamination, including involvement with other local agencies in investigation, cleanup, and closure
- Development and continuation of local, state and federal agency relationships
- Groundwater management reports

- Continuation of public education and water conservation programs
- Identification and management of recharge areas and wellhead protection areas
- Identification of well construction, abandonment, and destruction policies
- Provisions to update the groundwater management plan

Work on a number of the GWMP elements had been ongoing for some time prior to the formal adoption of the GWMP and continues on an ongoing basis. The results of some of that work are reflected in this Plan.

3.3.2.1 Available Groundwater Supplies

The groundwater component of overall water supply in the Valley derives from a groundwater operating plan developed over the last 20 years to meet water requirements (municipal, agricultural, small domestic) while maintaining the Basin in a sustainable condition (i.e., no long-term depletion of groundwater or interrelated surface water). This operating plan also addresses groundwater contamination issues in the Basin, all consistent with both the MOU and the GWMP described above. The groundwater operating plan is based on the concept that pumping can vary from year to year to allow increased groundwater use in dry periods and increased recharge during wet periods and to collectively assure that the groundwater Basin is adequately replenished through various wet/dry cycles. As described in the MOU and subsequently formalized in the GWMP, the operating yield concept has been quantified as ranges of annual pumping volumes.

The ongoing work of the MOU has produced two formal reports. The first report, dated April 2004, documents the construction and calibration of the groundwater flow model for the Valley. The second report, dated August 2005, presents the modeling analysis of the purveyors' groundwater operating plan, described below. The primary conclusion of the modeling analysis is that the groundwater operating plan will not cause detrimental short or long term effects to the groundwater and surface water resources in the Valley and is therefore, sustainable[4]. The analysis of sustainability for groundwater and interrelated surface water is described in Appendix C.

The groundwater operating plan, summarized in Table 3-6, is as follows:

> **Alluvium** – Pumping from the Alluvial Aquifer in a given year is governed by local hydrologic conditions in the eastern Santa Clara River watershed. Pumping ranges between 30,000 and 40,000 afy during normal and above-normal rainfall years. However, due to hydrogeologic constraints in the eastern part of the Basin, pumping is reduced to between 30,000 and 35,000 afy during locally dry years.
>
> **Saugus Formation** – Pumping from the Saugus Formation in a given year is tied directly to the availability of other water supplies, particularly from the SWP. During average-year conditions within the SWP system, Saugus pumping ranges between 7,500 and 15,000 afy. Planned dry-year pumping from the Saugus Formation ranges between

[4] From "Analysis of Groundwater Basin Yield, Upper Santa Clara River Basin, Eastern Subbasin, Los Angeles County, California," prepared by CH2M Hill and Luhdorff and Scalmanini Consulting Engineers, August 2005.

15,000 and 25,000 afy during a drought year and can increase to between 21,000 and 25,000 afy if SWP deliveries are reduced for two consecutive years and between 21,000 and 35,000 afy if SWP deliveries are reduced for three consecutive years. Such high pumping would be followed by periods of reduced (average-year) pumping, at rates between 7,500 and 15,000 afy, to further enhance the effectiveness of natural recharge processes that would recover water levels and groundwater storage volumes after the higher pumping during dry years.

Table 3-6
Groundwater Operating Plan for the Santa Clarita Valley

Aquifer	Groundwater Production (af)			
	Normal Years	Dry Year 1	Dry Year 2	Dry Year 3
Alluvium	30,000 to 40,000	30,000 to 35,000	30,000 to 35,000	30,000 to 35,000
Saugus	7,500 to 15,000	15,000 to 25,000	21,000 to 25,000	21,000 to 35,000
Total	**37,500 to 55,000**	**45,000 to 60,000**	**51,000 to 60,000**	**51,000 to 70,000**

Within the groundwater operating plan, three factors affect the availability of groundwater supplies: sufficient source capacity (wells and pumps); sustainability of the groundwater resource to meet pumping demand on a renewable basis; and protection of groundwater sources (wells) from known contamination, or provisions for treatment in the event of contamination. The first two factors are briefly discussed as follows, and more completely addressed in Appendix C. Protection of groundwater sources and provisions for treatment in the event of contamination are developed further in Chapter 5.

For reference to the Groundwater Operating Plan, recent historical and projected groundwater pumping by the retail water purveyors is summarized in Tables 3-7 and 3-8, respectively.

Table 3-7
Historical Groundwater Production by the Retail Water Purveyors(1)

Basin Name	Groundwater Pumped (af) (2)				
	2000	2001	2002	2003	2004
Santa Clara River Valley East Subbasin					
CLWA Santa Clarita Water Division	*11,529*	*9,896*	*9,513*	*6,424*	*7,146*
Alluvium	11,529	9,896	9,513	6,424	7,146
Saugus Formation	0	0	0	0	0
LA County Waterworks District 36	*0*	*0*	*0*	*0*	*380*
Alluvium	0	0	0	0	380
Saugus Formation	0	0	0	0	0
Newhall County Water District	*3,694*	*4,073*	*4,376*	*3,779*	*5,321*
Alluvium	1,508	1,641	981	1,266	1,582
Saugus Formation	2,186	2,432	3,395	2,513	3,739
Valencia Water Company	*13,186*	*11,353*	*12,568*	*12,775*	*11,824*
Alluvium	12,179	10,518	11,603	11,707	9,862
Saugus Formation	1,007	835	965	1,068	1,962
Total	*28,409*	*25,322*	*26,457*	*22,978*	*24,671*
Alluvium	25,216	22,055	22,097	19,397	18,970
Saugus Formation	3,193	3,267	4,360	3,581	5,701
% of Total Municipal Water Supply	**47%**	**42%**	**39%**	**34%**	**34%**

Notes:
(1) From 2004 Santa Clarita Valley Water Report (May 2005).
(2) Pumping for municipal and industrial uses only. Does not include pumping for agricultural and miscellaneous uses.

Table 3-8
Projected Groundwater Production (Normal Year)

Basin Name	Range of Groundwater Pumping (af) (1)(2)(3)				
	2010	2015	2020	2025	2030
Santa Clara River Valley East Subbasin					
CLWA Santa Clarita Water Division					
Alluvium	6,000-14,000	6,000-14,000	6,000-14,000	6,000-14,000	6,000-14,000
Saugus Formation	3,000	3,000	3,000	3,000	3,000
LA County Waterworks District 36					
Alluvium	0	0	0	0	0
Saugus Formation	500-1,000	500-1,000	500-1,000	500-1,000	500-1,000
Newhall County Water District					
Alluvium	1,500-3,000	1,500-3,000	1,500-3,000	1,500-3,000	1,500-3,000
Saugus Formation	3,000-6,000	3,000-6,000	3,000-6,000	3,000-6,000	3,000-6,000
Valencia Water Company					
Alluvium	12,000-20,000	12,000-20,000	12,000-20,000	12,000-20,000	12,000-20,000
Saugus Formation	2,500-5,000	2,500-5,000	2,500-5,000	2,500-5,000	2,500-5,000

Notes:

(1) The range of groundwater production capability for each purveyor varies based on a number of factors which include each purveyor's capacity to produce groundwater, the location of its wells within the Alluvium and Saugus Formation, local hydrology, availability of imported water supplies and water demands.

(2) To ensure sustainability, the purveyors have committed that the annual use of groundwater pumped collectively in any given year will not exceed the purveyors' operating plan as described in the Basin Yield Study and reported annually in the SCV Water Report. As noted in the discussion of the purveyors' operating plan for groundwater in Table 3-6 of this Plan, the "normal" year quantities of groundwater pumped from the Alluvium and Saugus Formation are 30,000 to 40,000 afy and 7,500 to 15,000 afy, respectively.

(3) Groundwater pumping shown for purveyor municipal and industrial uses only.

The groundwater operating plan recognizes ongoing Alluvial pumping for both municipal and agricultural water supply, as well as other small private domestic and related pumping. During preparation of this Plan, the Santa Clarita Valley Well Owners' Association submitted some limited information about the nature and magnitude of private well pumping. This included a detailed estimate of private well pumping in the San Francisquito Canyon portion of the Basin: a total of 85 afy by 73 individual private pumpers, or nearly 1.2 afy per private well pumper. As a result of that input, it is now better recognized that total private pumping is likely well within the 500 afy estimates of small private well pumping in recent annual Water Reports, or about 1 percent of typical Alluvial Aquifer pumping by the purveyors and other known private well owners, e.g. agricultural pumpers, combined. Thus, while the small private wells are not explicitly modeled in the Basin yield analysis described herein because their locations and operations are not known, their operation creates a pumping stress that is essentially negligible at the scale of the regional model. Ultimately, the intent to maintain overall pumping within the operating plan, including private pumping, will result in sustainable groundwater conditions to support the combination of municipal (purveyor), agricultural, and small private groundwater use on an ongoing basis.

3.3.2.1.1 Alluvium

Based on a combination of historical operating experience and recent groundwater modeling analysis, the Alluvial Aquifer can supply groundwater on a long-term sustainable basis in the overall range of 30,000 to 40,000 afy, with a probable reduction in dry years to a range of 30,000 to 35,000 afy. Both of those ranges include about 15,000 afy of Alluvial pumping for current agricultural water uses and an estimated pumping of up to about 500 afy by small private pumpers. The dry year reduction is a result of practical constraints in the eastern part of the Basin, where lowered groundwater levels in dry periods have the effect of reducing pumping capacities in that shallower portion of the aquifer.

Adequacy of Supply

For municipal water supply, with existing wells and pumps, the three retail water purveyors with Alluvial wells (NCWD, SCWD, and VWC) have a combined pumping capacity from active wells (not contaminated by perchlorate) of 36,120 gpm, which translates into a current full-time Alluvial source capacity of approximately 58,000 afy. Alluvial pumping capacity from all the active municipal supply wells is summarized in Table 3-9. The locations of the various municipal Alluvial wells throughout the Basin are illustrated on Figure 3-2. These capacities do not include one Alluvial Aquifer well that has been temporarily inactivated due to perchlorate contamination: the SCWD Stadium well, which represents another 800 gpm of pumping capacity, or full-time source capacity of about 1,290 afy.

In terms of adequacy and availability, the combined active Alluvial groundwater source capacity of municipal wells is approximatley 58,000 afy. This is more than sufficient to meet the municipal, or urban, component of groundwater supply from the Alluvium, which is currently 20,000 to 25,000 afy of the total planned Alluvial pumping of 30,000 to 40,000 afy. (The balance of Alluvial pumping in the operating plan is for agricultural and other, including small private, pumping.)

Sustainability

Until recently, the long-term renewability of Alluvial groundwater was empirically determined from approximately 60 years of recorded experience. Generally, it consists of long-term stability in groundwater levels and storage, with some dry period fluctuations in the eastern part of the Basin, over a historical range of total Alluvial pumpage from as low as about 20,000 afy to as high as about 43,000 afy. Those empirical observations have now been complemented by the development and application of a numerical groundwater flow model, which has been used to predict aquifer response to the planned operating ranges of pumping. The numerical groundwater flow model has also been used to analyze the control of perchlorate contaminant migration under selected pumping conditions that would restore, with treatment, pumping capacity inactivated due to perchlorate contamination detected in some wells in the Basin. The latter use of the model is described in Chapter 5, which addresses the Saugus Formation and the overall approach to the perchlorate contamination issue.

Table 3-9
Active Municipal Groundwater Source Capacity—Alluvial Aquifer Wells

Wells	Pump Capacity (gpm)	Max Annual Capacity (af)	Normal Year Production (1) (af)	Dry-Year Production (af)
Newhall CWD				
Castaic 1	600	960	385	345
Castaic 2	425	680	166	125
Castaic 4	270	430	100	45
Pinetree 1	300	480	164	N/A
Pinetree 3	550	880	545	525
Pinetree 4	500	800	300	N/A
NCWD Subtotal	2,645	4,230	1,660	1,040
Santa Clarita WD				
Clark	600	960	782	700
Guida	1,000	1,610	1,320	1,230
Honby	950	1,530	696	870
Lost Canyon 2	850	1,370	741	640
Lost Canyon 2A	825	1,330	1,034	590
Mitchell 5B	700	1,120	557	N/A
N. Oaks Central	1,000	1,610	822	1,640
N. Oaks East	950	1,530	1,234	485
N. Oaks West	1,400	2,250	898	N/A
Sand Canyon	750	1,200	930	195
Sierra	1,500	2,410	846	N/A
SCWD Subtotal	10,525	16,920	9,860	6,350
Valencia WC				
Well D	1,050	1,690	690	690
Well E-15	1,400	2,260	N/A	N/A
Well N	1,250	2,010	620	620
Well N7	2,500	4,030	1,160	1,160
Well N8	2,500	4,030	1,160	1,160
Well Q2	1,200	1,930	985	985
Well S6	2,000	3,220	865	865
Well S7	2,000	3,220	865	865
Well S8	2,000	3,220	865	865
Well T2	800	1,290	460	460
Well T4	700	1,120	460	460
Well U4	1,000	1,610	935	935
Well U6	1,250	2,010	825	825
Well W9	800	1,290	600	600
Well W10	1,500	2,410	865	865
Well W11	1,000	1,610	350	350
VWC Subtotal	22,950	36,950	11,705	11,705
Total Purveyors	**36,120**	**58,100** (2)	**23,225** (2)	**19,095** (2)

Notes:
(1) Based on recent annual pumping.
(2) Currently active wells only; capacity will slightly increase by restoration of contaminated wells.

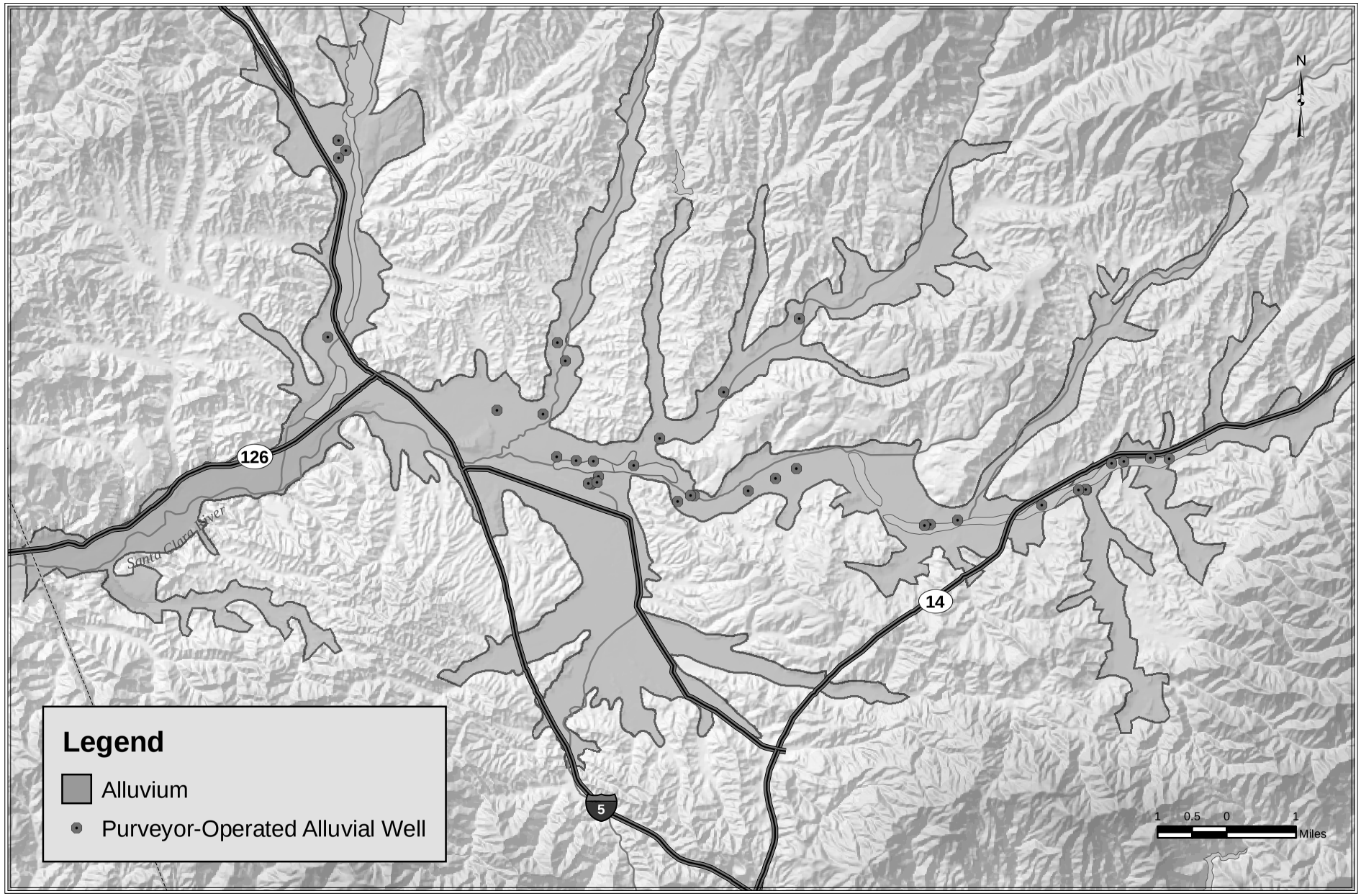

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Figure 3-2
Municipal Alluvial Well Locations
Santa Clara River Valley, East Groundwater Subbasin

To examine the yield of the Alluvium or, the sustainability of the Alluvium on a renewable basis, the groundwater flow model was used to examine the long-term projected response of the aquifer to pumping for municipal and agricultural uses in the 30,000 to 40,000 afy range under average/normal and wet conditions, and in the 30,000 to 35,000 afy range under locally dry conditions. To examine the response of the entire aquifer system, the model also incorporated pumping from the Saugus Formation in accordance with the normal (7,500-15,000 afy) and dry year (15,000-35,000 afy) operating plan for that aquifer. The model was run over a 78-year hydrologic period, which was selected from actual historical precipitation to examine a number of hydrologic conditions expected to affect both groundwater pumping and groundwater recharge. The selected 78-year simulation period was assembled from an assumed recurrence of 1980 to 2003 conditions, followed by an assumed recurrence of 1950 to 2003 conditions. The 78-year period was analyzed to define both local hydrologic conditions (normal and dry), which affect the rate of pumping from the Alluvium, and hydrologic conditions that affect SWP operations, which in turn affect the rate of pumping from the Saugus. The resultant simulated pumping cycles included the distribution of pumping for each of the existing Alluvial Aquifer wells, for normal and dry years respectively, as shown in Table 3-9.

Simulated Alluvial Aquifer response to the range of hydrologic conditions and pumping stresses is essentially a long-term repeat of the historical conditions that have resulted from similar pumping over the last several decades. The resultant response consists of: (1) generally constant groundwater levels in the middle to western portion of the Alluvium and fluctuating groundwater levels in the eastern portion as a function of wet and dry hydrologic conditions, (2) variations in recharge that directly correlate with wet and dry hydrologic conditions, and (3) no long-term decline in groundwater levels or storage. The Alluvial Aquifer is considered a sustainable water supply source to meet the Alluvial portion of the operating plan for the groundwater Basin. This is based on the combination of actual experience with Alluvial Aquifer pumping at capacities similar to those planned for the future and the resultant sustainability (recharge) of groundwater levels and storage, and further based on modeled projections of aquifer response to planned pumping rates that also show no depletion of groundwater.

3.3.2.1.2 Saugus Formation

Based on historical operating experience and extensive recent testing and groundwater modeling analysis, the Saugus Formation can supply water on a long-term sustainable basis in a normal range of 7,500 to 15,000 afy, with intermittent increases to 25,000 to 35,000 af in dry years. The dry-year increases, based on limited historical observation and modeled projections, demonstrate that a small amount of the large groundwater storage in the Saugus Formation can be pumped over a relatively short (dry) period. This would be followed by recharge (replenishment) of that storage during a subsequent normal-to-wet period when pumping would be reduced.

Adequacy of Supply

For municipal water supply with existing wells, the three retail water purveyors with Saugus wells (NCWD, SCWD, and VWC) have a combined pumping capacity from active wells (not contaminated by perchlorate) of 14,900 gpm, which translates into a full-time Saugus source capacity of 24,000 afy. Saugus pumping capacity from all the active municipal supply wells is summarized in Table 3-10; the locations of the various active municipal Saugus wells are illustrated on Figure 3-3. These capacities do not include the four Saugus wells contaminated by

perchlorate, although they indirectly reflect the capacity of one of the contaminated wells, VWC's Well 157, which has been sealed and abandoned, and replaced by VWC's Well 206 in a non-impacted part of the Basin. The four contaminated wells, one owned by NCWD and two owned by SCWD, in addition to the VWC well, represent a total of 7,900 gpm of pumping capacity (or full-time source capacity of about 12,700 afy) inactivated due to perchlorate contamination.

Table 3-10
Active Municipal Groundwater Source Capacity—Saugus Formation Wells

Wells	Pump Capacity (gpm)	Max Annual Capacity (af)	Normal Year Production (1) (af)	Dry-Year Production (af)
Newhall CWD				
12	2,300	3,700	1,315	2,044
13	2,500	4,030	1,315	2,044
NCWD Subtotal	4,800	7,730	2,630	4,088
Valencia WC				
159	500	800	50	50
160	2,000	3,220	1,000	1,330
201	2,400	3,870	100	3,577
205	2,700	4,350	1,000	3,827
206	2,500	4,030	1,175	3,500
VWC Subtotal	10,100	16,270	3,325	12,284
Total Purveyors	**14,900**	**24,000** (2)	**5,955** (2)	**16,372** (2)

Notes:
(1) Based on recent annual pumping.
(2) Currently active wells only; additional capacity to meet dry-year operating plan would be met by restoration of contaminated wells and new well construction.

In terms of adequacy and availability, the combined active Saugus groundwater source capacity of municipal wells of 24,000 afy, is more than sufficient to meet the planned use of Saugus groundwater in normal years of 7,500 to 15,000 afy. During the currently scheduled two-year time frame for restoration of impacted Saugus capacity (as discussed further in Chapter 5), this currently active capacity is more than sufficient to meet water demands, in combination with other sources, if both of the next two years are dry. At that time, the combination of currently active capacity and restored impacted capacity, through a combination of treatment at two of the impacted wells and replacement well construction, will provide sufficient total Saugus capacity to meet the planned use of Saugus groundwater during multiple dry-years of 35,000 af, if that third year is also a dry year.

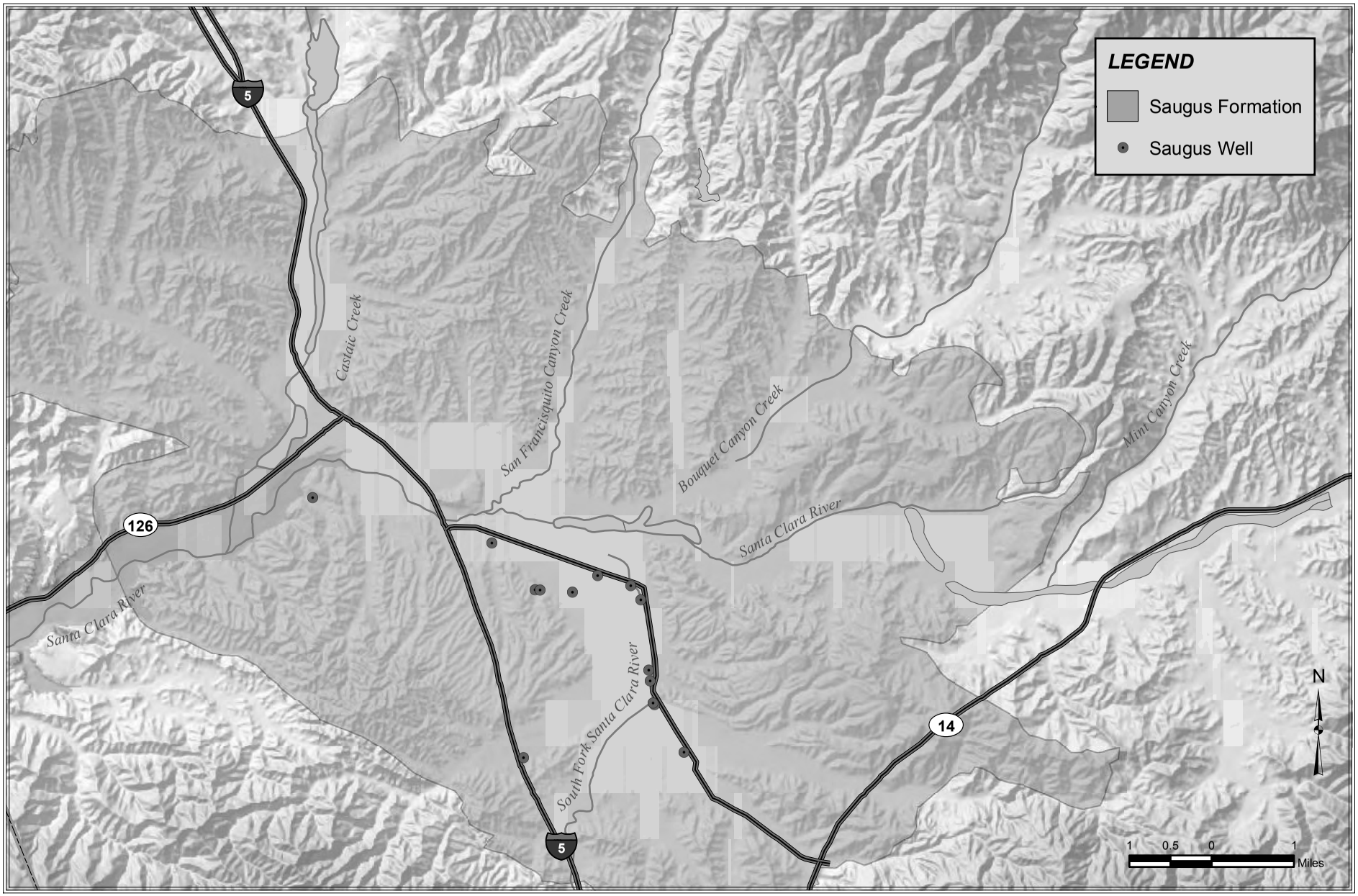

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Figure 3-3
Saugus Well Locations
Santa Clara River Valley, East Groundwater Subbasin

Sustainability

Until recently, the long-term sustainability of Saugus groundwater was empirically determined from limited historical experience. The historical record shows fairly low annual pumping in most years, with one four-year period of increased pumping up to about 15,000 afy that produced no long-term depletion of the substantial groundwater storage in the Saugus. Those empirical observations have now been complemented by the development and application of the numerical groundwater flow model, which has been used to examine aquifer response to the operating plan for pumping from both the Alluvium and the Saugus and also to examine the effectiveness of pumping for both contaminant extraction and control of contaminant migration within the Saugus Formation. The latter aspects of Saugus pumping are discussed in Chapter 5.

To examine the yield of the Saugus Formation or, its sustainability on a renewable basis, the groundwater flow model was used to examine long-term projected response to pumping from both the Alluvium and the Saugus over the 78-year period of hydrologic conditions using alternating wet and dry periods as have historically occurred. The pumping simulated in the model was in accordance with the operating plan for the Basin. For the Saugus, simulated pumpage included the planned restoration of recent historic pumping from the perchlorate-impacted wells. In addition to assessing the overall recharge of the Saugus, that pumping was analyzed to assess the effectiveness of controlling the migration of perchlorate by extracting and treating contaminated water close to the source of contamination.

Simulated Saugus Formation response to the ranges of pumping under assumed recurrent historical hydrologic conditions is consistent with actual experience under smaller pumping rates. The response consists of (1) short-term declines in groundwater levels and storage near pumped wells during dry-period pumping, (2) rapid recovery of groundwater levels and storage after cessation of dry-period pumping, and (3) no long-term decreases or depletion of groundwater levels or storage. The combination of actual experience with Saugus pumping and recharge up to about 15,000 afy, now complemented by modeled projections of aquifer response that show long-term utility of the Saugus at 7,500 to 15,000 afy in normal years and rapid recovery from higher pumping rates during intermittent dry periods, shows that the Saugus Formation can be considered a sustainable water supply source to meet the Saugus portion of the operating plan for the groundwater Basin.

3.3.3 Potential Supply Inconsistency

A small group of wells that have been impacted by perchlorate represent a temporary loss of well capacity within CLWA's service area. Of the six wells that were initially removed from active water supply service upon the detection of perchlorate, four wells with a combined capacity of 10,000 af remain out of service, as discussed further in Chapter 5. However, CLWA and the purveyors have developed an implementation plan that would restore this well capacity. The implementation plan includes a combination of treatment facilities and replacement wells. Treatment facilities for several of the impacted wells will be operational in 2006 and the production restoration (replacement) wells will be operational by 2010. Additional information on the treatment technology and schedule for restoration of the impacted wells is provided in Chapter 5. Additional information concerning water quality issues and replacement capacity is also provided in Chapter 5.

3.4 TRANSFERS, EXCHANGES, AND GROUNDWATER BANKING PROGRAMS

Additional water supplies can be purchased from other water agencies and sources, and CLWA is currently exploring opportunities. An important element to enhancing the long-term reliability of the total mix of supplies currently available to meet the needs of the Valley is the use of transfers, exchanges, and groundwater banking programs, such as those described below.

3.4.1 Transfers and Exchanges

An opportunity available to CLWA to increase water supplies is to participate in voluntary water transfer programs. Since the drought of 1987-1992, the concept of water transfer has evolved into a viable supplemental source to improve supply reliability. The initial concept for water transfers was codified into law in 1986 when the California Legislature adopted the "Katz" Law (California Water Code, Sections 1810-1814) and the Costa-Isenberg Water Transfer Law of 1986 (California Water Code, Sections 470, 475, 480-483). These laws help define parameters for water transfers and set up a variety of approaches through which water or water rights can be transferred among individuals or agencies.

Up to 27 million af of water are delivered for agricultural use every year. Over half of this water use is in the Central Valley, and much of it is delivered by, or adjacent to, SWP and Central Valley Project (CVP) conveyance facilities. This proximity to existing water conveyance facilities could allow for the voluntary transfer of water to many urban areas, including CLWA, via the SWP. Such water transfers can involve water sales, conjunctive use and groundwater substitution, and water sharing and usually occur as a form of spot, option, or core transfers agreement. The costs of a water transfer would vary depending on the type, term, and location of the transfer. The most likely voluntary water transfer programs would probably involve the Sacramento or southern San Joaquin Valley areas.

One of the most important aspects of any resource planning process is flexibility. A flexible strategy minimizes unnecessary or redundant investments (or stranded costs). The voluntary purchase of water between willing sellers and buyers can be an effective means of achieving flexibility. However, not all water transfers have the same effectiveness in meeting resource needs. Through the resource planning process and ultimate implementation, several different types of water transfers could be undertaken.

3.4.1.1 Core Transfers

Core transfers are agreements to purchase a defined quantity of water every year. These transfers have the benefit of more certainty in costs and supply, but in some years can be surplus to imported water (available in most years) that is already paid for.

3.4.1.2 Spot Market Transfers

Spot market transfers involve water purchased only during the time of need (usually a drought). Payments for these transfers occur only when water is actually requested and delivered, but there is usually greater uncertainty in terms of costs and availability of supply. Examples of such transfers were the Governor's Drought Water Banks of 1991 and 1992. An additional risk of spot

market transfers is that the purchases may be subject to institutional limits or restricted access (e.g., requiring the purchasing agency to institute rationing before it is eligible to participate in the program).

3.4.1.3 Option Contracts

Option contracts are agreements that specify the amount of water needed and the frequency or probability that the supply will be called upon (an option). Typically, a relatively low up-front option payment is required and, if the option is actually called upon, a subsequent payment would be made for the amount called. These transfers have the best characteristics of both core and spot transfers. With option contracts, the potential for redundant supply is minimized, as are the risks associated with cost and supply availability.

3.4.1.4 Future Market Transfers

The most viable types of water transfers are core and option transfers and, as such, represent CLWA's long-term strategy. The costs for these types of transfers have been estimated to be about $60 to $110 per af (equivalent to $1,100 to $2,000 per af for Table A Amount) for core transfers and $250 per af for option transfers. Although the option transfer costs might seem high, the equivalent average annual cost is much less - about $65 to $112 per af. Average annual option transfer costs are much lower due to the variable likelihood that the transfers will be needed. Currently, CLWA is proceeding with environmental compliance to acquire a core transfer of an additional 11,000 afy of surface water from the Buena Vista Water Storage District and Rosedale-Rio Bravo Water Storage District, both located in Kern County.

3.4.2 Groundwater Banking Programs

With recent developments in conjunctive use and groundwater banking, significant opportunities exist to improve water supply reliability for CLWA. Conjunctive use is the coordinated operation of multiple water supplies to achieve improved supply reliability. Most conjunctive use concepts are based on storing groundwater supplies in times of surplus for use during dry periods and drought when surface water supplies would likely be reduced.

Groundwater banking programs involve storing available SWP surface water supplies during wet years in groundwater basins in, for example, the San Joaquin Valley. Water would be stored either directly by surface spreading or injection, or indirectly by supplying surface water to farmers for their use in lieu of their intended groundwater pumping. During water shortages, the stored water could be pumped out and conveyed through the California Aqueduct to CLWA as the banking partner, or used by the farmers in exchange for their surface water allocations, which would be delivered to CLWA as the banking partner through the California Aqueduct. Several conjunctive use and groundwater banking opportunities are available to CLWA.

In 2003, CLWA produced a Draft Water Supply Reliability Plan. The plan outlines primary elements that CLWA should include in its water supply mix to obtain maximum overall supply reliability enhancement. These elements include both conjunctive use and groundwater banking programs, as well as water acquisitions. The Plan also contains a recommended implementation plan and schedule.

The reliability plan recommends that CLWA obtain total banking storage capacity of 50,000 af, with pumpback capacity of 20,000 af per year, by 2005. For the long-term, CLWA should obtain a total of 183,000 af of storage capacity, with total pumpback capacity of 70,000 af per year by 2050. Table 3-11, taken from the 2003 Draft Water Supply Reliability Report, presents an implementation schedule recommended for both storage and pumpback capacity beginning in 2005 and incrementally increasing through 2050.

Table 3-11
Recommended Schedule for Water Banking Capacity(1)

Year	Total Pumpback (afy)	Total Storage (afy)
2005	20,000	50,000
2010	20,000	50,000
2020	40,000	100,000
2030	60,000	150,000
2040	70,000	183,000
2050	70,000	183,000

Notes:
(1) Reference "Draft Report – CLWA Water Supply Reliability Plan", Kennedy/Jenks Consultants, 2003.

3.4.2.1 Semitropic Water Banking

Semitropic Water Storage District (Semitropic) provides SWP water to farmers for irrigation. Semitropic is located in the San Joaquin Valley in the northern part of Kern County immediately east of the California Aqueduct. Using its available groundwater storage capacity (approximately one million af), Semitropic has developed a groundwater banking program, which it operates by taking available SWP supplies in wet years and returning the water in dry years. As part of this dry-year return, Semitropic can leave its SWP water in the Aqueduct for delivery to a banking partner and increase its groundwater production for its farmers. Semitropic constructed facilities so that groundwater can be pumped into a Semitropic canal and, through reverse pumping plants, be delivered to the California Aqueduct. Semitropic currently has six banking partners: the Metropolitan Water District of Southern California (Metropolitan), Santa Clara Valley Water District, Alameda County Water District, Alameda County Flood Control and Water Conservation District Zone 7, Vidler Water Company, and The Newhall Land and Farming Company. The total amount of storage under contract is approximately 1 million af.

In 2002, CLWA stored an available portion of its Table A Amount (24,000 af) in an account in Semitropic's program.[5] In 2004, 32,522 af of available 2003 Table A Amount water was stored in a second Semitropic account.[6] In accordance with the terms of CLWA's storage agreements with Semitropic, 90 percent of the banked amount, or a total of 50,870 af, is recoverable through 2013 to meet CLWA water demands when needed. Each account has a term of ten years for the

[5] CLWA's approval of this project and of its negative declaration was challenged under the California Environmental Quality Act ("CEQA") in the Ventura County Superior Court (i.e., California Water Network v. Castaic Lake Water Agency [Ventura County Superior Court Case No. CIV 215327]). Finding that CLWA's approval of this project and of its negative declaration did not violate CEQA, the trial entered judgment in favor of CLWA. Petitioners have, however, filed an appeal with the California Court of Appeal, Second Appellate District, Division 6 Court of Appeal Case No. B177978.
[6] No legal challenge was made to CLWA's approval of this project or to the negative declaration for this project.

water to be withdrawn and delivered to CLWA.[7] Current operational planning includes use of the water stored in Semitropic for dry-year supply. Accordingly, it is reflected in the available supplies delineated in this section, and it is also reflected in contributing to short-term (prior to 2013) reliability in Chapter 6.

3.4.2.2 Rosedale-Rio Bravo Water Storage District Water Banking

Also located in Kern County, immediately adjacent to the Kern Water Bank, Rosedale-Rio Bravo Water Storage District has completed environmental documentation for a Water Banking and Exchange Program. The initial offering from the program is storage and pumpback capacity of 20,000 afy, with up to 100,000 af of storage capacity. This banking program would meet the total pumpback and exceed the total storage capacity in 2010 recommended in the implementation schedule provided in the 2003 Draft Water Supply Reliability Report. This program is available for subscription and, in 2004, CLWA signed an MOU with Rosedale-Rio Bravo to begin preliminary non-binding negotiations on the possible terms for participation in the program. Such terms would define a project that would then be subject to subsequent environmental analysis. In April 2005, CLWA and Rosedale-Rio Bravo executed a deposit agreement for the exclusive right to negotiate, and CLWA approved an EIR in October 2005. This project is a water management program to improve the reliability of CLWA's existing dry-year supplies; it is not, and should not be considered, an annual supply that could support growth. CLWA anticipates that, upon completion of CEQA documentation, this program will be operational by 2006.

3.4.2.3 Other Opportunities

The Draft Water Supply Reliability Plan recommends water banking storage and pumpback capacity both north and south of CLWA's service area, the latter of which would provide an emergency supply in case of catastrophic outage along the California Aqueduct. With short-term storage now existing in the Semitropic program and negotiations underway with Rosedale-Rio Bravo, CLWA is assessing southern water banking opportunities. These include potential programs with the Chino Basin Watermaster (with whom CLWA signed an MOU in 2003), Calleguas Municipal Water District, and San Gorgonio Pass Water Agency.

Groundwater banking and conjunctive-use programs enhance the reliability of both the existing and future supplies. Table 3-12 summarizes CLWA's future reliability enhancement programs.

Table 3-12
Future Reliability Enhancement Programs

Project Name	Year Available	Proposed Quantities (af)		
		Average/ Normal Year	Single Dry Year	Multiple Dry Years (1)
Rosedale-Rio Bravo Water Banking Program	2006	0	20,000	20,000
Additional Planned Banking Programs	2014	0	20,000	20,000

Notes:
(1) Supplies shown are maximum withdrawal capacity for each of four consecutive dry years.

[7] Thereafter, the remaining amount of project water is forfeited from the account.

3.5 PLANNED WATER SUPPLY PROJECTS AND PROGRAMS

The 2003 Draft Water Supply Reliability Plan also discusses the potential for acquiring additional water supplies to meet future demands (the plan refers to these as "water transfer opportunities"). Table 3-13 summarizes CLWA's transfer and exchange opportunities.

Table 3-13
Transfer and Exchange Opportunities

Source Transfer Agency	Transfer/ Exchange	Year Available	Short/Long Term	Proposed Quantity (afy)
Buena Vista-Rosedale (1)	Transfer	2006	Long Term	11,000

Notes:
(1) CLWA is in the process of acquiring this supply, primarily to meet the potential demands of future annexations to the CLWA service area. This acquisition is consistent with CLWA's annexation policy under which it will not approve potential annexations unless additional water supplies are acquired. Currently proposed annexations have a demand for about 4,000 afy of this supply which, if approved, would leave the remaining 7,000 afy available for potential future annexations. Unless and until any such annexations are actually approved, this supply will be available to meet demands within the existing CLWA service area.

Buena Vista Water Storage District/Rosedale-Rio Bravo Water Storage District Water Storage and Recovery Program

These two districts, both located in Kern County, have joined together to develop a program that provides both a firm water supply and a water banking component. Both districts are member agencies of the Kern County Water Agency (KCWA), an SWP contractor, and both districts have contracts with KCWA for SWP Table A Amounts. Environmental documentation has been completed for this program, which envisions a single partner purchasing a firm annual water supply, which can then be banked in years when it is not needed for withdrawal and delivery in later years. The supply is based on existing long-standing Kern River water rights, which would be delivered by exchange of SWP Table A Amount. In 2004, CLWA signed an MOU with both districts to begin preliminary non-binding negotiations on the possible terms for participation in the program. Such terms would define a project subject to subsequent environmental analysis. The initial offering from the program is up to 11,000 afy of firm supply. In December 2004, CLWA, Buena Vista, and Rosedale-Rio Bravo executed a deposit agreement for the exclusive right to negotiate, and CLWA started preparing an EIR. CLWA anticipates that, upon completion of CEQA documentation, this program will be operational during 2006.

3.6 DEVELOPMENT OF DESALINATION

The California UWMP Act requires a discussion of potential opportunities for use of desalinated water (Water Code Section 10631[i]). CLWA has explored such opportunities, and they are described in the following section, including opportunities for desalination of brackish water, groundwater, and seawater. However, at this time, none of these opportunities is practical or economically feasible for CLWA, and CLWA has no current plans to pursue them. Therefore, desalinated supplies are not included in the supply summaries in this Plan (e.g., Tables 3-1, 6-2, 6-3, and 6-4).

3.6.1 Opportunities for Brackish Water and/or Groundwater Desalination

As discussed in Chapter 5, the two sources of groundwater in the Valley are water drawn from the Alluvial Aquifer and from the Saugus Formation. Neither of these supplies can be considered brackish in nature, and desalination is not required.

However, CLWA and the retail water purveyors could team up with other SWP contractors and provide financial assistance in construction of other regional groundwater desalination facilities in exchange for SWP supplies. The desalinated water would be supplied to users in communities near the desalination plant, and a similar amount of SWP supplies would be exchanged and allocated to CLWA from the SWP contractor. A list summarizing the groundwater desalination plans of other SWP contractors is not available; however, CLWA would begin this planning effort should the need arise.

In addition, should an opportunity emerge with a local agency other than an SWP contractor, an exchange of SWP deliveries would most likely involve a third party, such as Metropolitan. Most local groundwater desalination facilities would be projects implemented by retailers of SWP contractors and, if an exchange program was implemented, would involve coordination and wheeling of water through the contractor's facilities to CLWA.

3.6.2 Opportunities for Seawater Desalination

Because the Valley is not in a coastal area, it is neither practical nor economically feasible for CLWA and its purveyors to implement a seawater desalination program. However, similar to the brackish water and groundwater desalination opportunities described above, CLWA and the purveyors could provide financial assistance to other SWP contractors in the construction of their seawater desalination facilities in exchange for SWP supplies.

CLWA and the purveyors have been following the existing and proposed seawater desalination projects along California's coast. In March 2004, the California Coastal Commission released the "Seawater Desalination and the California Coastal Act." This Act provides a summary and status of the existing and proposed seawater desalination plants along California's coast. Tables 3-14 and 3-15 provide a summary of several of California's existing and proposed municipal/domestic seawater desalination facilities, respectively.

As shown in the tables, most of the existing and proposed seawater desalination facilities are/would be operated by agencies that are not SWP contractors. However, in these cases as described above, an exchange for SWP deliveries would most likely involve a third party (SWP contractor), the local water agency (retailer), and CLWA.

Table 3-14
Existing Seawater Desalination Facilities Along the California Coast[(1)]

Operator/Location	Maximum Capacity (gpd/afy[2])	Status
City of Morro Bay	830,000/930	Intermittent Use
City of Santa Barbara	N/A	Inactive
Marina Coast Water District	300,000/335	Active

Notes:
(1) Reference "Seawater Desalination and the California Coastal Act," California Coastal Commission, March 2004.
(2) gpd = gallons per day; afy = acre-feet per year

Although not listed in Table 3-15, the Bay Area Regional Desalination Partnership, made up of four agencies collaborating on a Regional Desalination Project in the San Francisco Bay Area, is working to develop desalination as a water supply for the region. This partnership, comprised of San Francisco Public Utilities Commission, Santa Clara Valley Water District, East Bay Municipal Utilities District, and Contra Costa Water District, is in the process of planning regional seawater/brackish water desalination facilities. This regional desalination project is an example of the type of project that CLWA could participate in on an exchange basis.

Table 3-15
Proposed Seawater Desalination Facilities Along the California Coast[(1)]

Operator/Location	Maximum Capacity (gpd/afy[2])	Status
Cambria Community Services District	500,000/560	Planning
City of Santa Cruz	2,500,000/2,800	Planning
Marina Coast Water District/Fort Ord	2,680,000/3,000	Planning
Long Beach	10,000,000/11,000	Planning
Los Angeles Dept. of Water & Power	10,000,000/11,000	Planning
Monterey Peninsula Water Mgmt. District/Sand City	7,500,000/8,400	Planning
Cal-Am/Moss Landing Power Plant	9,000,000/10,000	Planning
Municipal Water District of Orange County/Dana Point	27,000,000/30,000	Planning
Poseidon Resources/Huntington Beach	50,000,000/55,000	Draft EIR Complete
San Diego County Water Authority/San Onofre	TBD	Planning
San Diego County Water Authority/South County	50,000,000/55,000	Planning
San Diego County Water authority/Poseidon/Carlsbad	50,000,000/55,000	Planning
West Basin Municipal Water District	20,000,000/22,000	Planning

Notes:
(1) Reference "Seawater Desalination and the California Coastal Act," California Coastal Commission, March 2004.
(2) gpd = gallons per day; afy = acre-feet per year

Chapter 4
WATER RECYCLING

Chapter 4.0
RECYCLED WATER

4.1 OVERVIEW

This section of the Plan describes the existing and future recycled water opportunities available to the CLWA service area. The description includes estimates of potential supply and demand for 2005 to 2030 in five year increments, as well as CLWA's proposed incentives and optimization plan.

4.2 RECYCLED WATER MASTER PLAN

The four retail water purveyors provide water to M&I customers. In normal years, approximately 60 percent of the M&I demand within CLWA's service area is met with imported water. However, the reliability of the imported SWP supply is variable (due to its dependence on current year hydrology in northern California and prior year storage in SWP reservoirs). When sufficient imported water is not available, the balance is met with local groundwater provided by the purveyors.

It is anticipated that water demands will continue to increase. Accordingly, additional reliable sources of water are necessary to meet projected water demands. CLWA recognizes that recycled water is an important and reliable source of additional water. Recycled water would enhance reliability in that it would provide an additional source of supply and allow for more effective utilization of CLWA's water supplies. A Draft Reclaimed Water System Master Plan for the CLWA service area was completed in 1993, and a Draft Recycled Water Master Plan update was completed in 2002. Table 4-1 provides a list of the agencies that participated in the Recycled Water Master Plan update.

Table 4-1
Participating Agencies

Participating Agencies	Role in Plan Development
Castaic Lake Water Agency	Wholesale water provider
Newhall County Water District	Retail water purveyor
Santa Clarita Water Division	Retail water purveyor
Valencia Water Company	Retail water purveyor
Los Angeles County Waterworks District 36	Retail water purveyor
Los Angeles County Sanitation District 26	Recycled water supplier
Los Angeles County Sanitation District 32	Recycled water supplier
Berry Petroleum	Potential recycled water supplier

The Sanitation Districts of Los Angeles County (LACSD) own and operate two water reclamation plants (WRPs): Saugus WRP and Valencia WRP, within the CLWA service area. The water is treated to tertiary levels and discharged to the Santa Clara River. The Newhall Ranch development is also planning to construct a water recycling facility, and non-potable

water from this source may be incorporated into the CLWA's recycled water system. Additionally, Berry Petroleum has expressed interest in treating oilfield produced water from the Placerita Oilfield for sale to CLWA for non-potable uses. Oilfield produced water is a by-product of petroleum extraction, however, and would only be available on a short-term basis. By utilizing the effluent from the WRPs and oilfield produced water for irrigation and other non-potable purposes, CLWA can more efficiently allocate its potable water and increase the overall reliability of water supplies in the Valley.

4.3 POTENTIAL SOURCES OF RECYCLED WASTEWATER

LACSD provides wastewater collection, treatment, and disposal services to residents of two sanitation districts in the Valley: District Nos. 26 and 32, which serve the eastern and western portions of the Valley, respectively. The majority of the two districts' service areas lies within the City of Santa Clarita.

4.3.1 Existing and Planned Wastewater Treatment Facilities

4.3.1.1 Existing Facilities

LACSD's Saugus and Valencia WRPs operated independently until 1980, at which time the two plants were linked by a bypass interceptor. The interceptor was installed to transfer a portion of flows received at the Saugus WRP to the Valencia WRP. In order to improve operating efficiencies and because a shortage of space at the Saugus WRP limits future expansion of wastewater facilities in District No. 26, a joint powers agreement was enacted in 1984, creating the Santa Clarita Valley Joint Sewerage System. Through use of wastewater and sludge connecting lines, future expansions of treatment works, including sludge handling and disposal operations, will be provided at the larger Valencia WRP.

The primary sources of wastewater to the Saugus and Valencia WRPs are domestic. Both plants are tertiary treatment facilities and produce high quality effluent. Historically, the effluent from the two WRPs has been discharged to the Santa Clara River. The Saugus WRP effluent outfall is located approximately 400 feet downstream (west) of Bouquet Canyon Road. Effluent from the Valencia WRP is discharged to the Santa Clara River at a point approximately 2,000 feet downstream (west) of The Old Road Bridge.

Together, the Valencia and Saugus WRPs have a design capacity of 28.1 million gallons per day (mgd). In fiscal year 2002-2003 (FY 02/03), they produced an average of 18.33 mgd, none of which was used for recycled water purposes.

Located within District No. 26, the Saugus WRP, completed in 1962, is southeast of the intersection of Bouquet Canyon Road and Soledad Canyon Road. Two subsequent expansions and flow equalization facilities brought its current design capacity to 6.5 mgd. The treatment process was brought up to a tertiary level with the addition of dual-media pressure filters in 1987. However, no future expansions are possible due to space limitations at the site. In FY 02/03, the Saugus WRP produced an average effluent flow of 5.28 mgd (5,914 afy). Use of recycled water from this facility is permitted under Regional Water Quality Control Board (RWQCB) Order No. 87-49; however, LACSD staff has expressed concern about diverting these discharges due to potential impacts to downstream habitat. Until more detailed habitat

investigations are conducted, it is assumed that only recycled water from the Valencia WRP will be used.

The Valencia WRP is located within District No. 32 and is on The Old Road near Magic Mountain Amusement Park. The Valencia WRP was completed in 1967. The existing capacity is 21.6 mgd following three subsequent expansions: construction of a 4.4 million gallon flow equalization tank in February 1995, the Stage 4 expansion completed in June 1996, and the Joint Sewerage System Phase I expansion of 9 mgd in 2002. In FY 02/03, the Valencia WRP produced an average effluent flow of 13.05 mgd (14,628 afy). Use of recycled water from the Valencia WRP is permitted under RWQCB Order No. 87-48. On July 24, 1996, CLWA executed an agreement with LACSD to purchase up to 1,700 afy of recycled water from the Valencia WRP. In 2002, CLWA constructed the facilities to utilize this supply and initiated deliveries in 2003 to the Westridge Golf Course.

Recycled water from Valencia WRP has been used in the past by the City of Santa Clarita for landscape irrigation and by Pacific Pipeline and Oberg Construction for construction applications, delivered via tanker truck. In April 2000, a contract was signed with TransCoast Financial for use of up to 20,000 gallons per day (gpd) for dust control at a nearby composting facility. When recycled water is requested, it is transported via tanker truck.

4.3.2 Planned Improvements and Expansions

To accommodate anticipated growth in the Valley and to ensure compliance with discharge requirements from the RWQCB, LACSD has begun an expansion of the Valencia WRP as part of the 2015 Joint Sewerage System Facilities Plan. The ultimate capacity of the WRP is planned to be 27.6 mgd. The Phase I expansion (9 mgd increase) was completed in 2002. Phase 2 is expected to be completed in 2010 and involves an additional 6 mgd increase. No expansion is planned at the Saugus WRP. Thus, the ultimate total capacity for both WRPs is 34.1 mgd (38,200 afy). Table 4-2 provides the projected wastewater flow for the combined Valencia and Saugus WRP planning area.

Table 4-2
Wastewater Collection and Capacity

Type of Wastewater	Capacity (af)						
	2002	2005	2010	2015	2020	2025	2030
Wastewater Collected and Treated in Service Area	20,542	31,500	38,200	38,200	38,200	38,200	38,200
Quantity that Meets Recycled Water Standard	20,542	31,500	38,200	38,200	38,200	38,200	38,200

Note:
(1) Information collected from LACSD and Draft 2002 Recycled Water Master Plan.

4.3.3 Water Rights

The ability of CLWA to use recycled water is constrained by its rights to use the water available. While there are few regulatory limitations on the use of oilfield produced water, the use of wastewater effluent is limited by various state water laws, codes, and court decisions. These

regulatory limitations are described in greater detail in the 2002 Draft Recycled Water Master Plan.

CLWA has been approved to use 1,700 afy, but the ultimate recycled water use is governed by the availability of native versus foreign water as shown in Table 4-3. According to the Water Code Section 1211, downstream water rights holders are protected if the source of return flow is "native water." Native water is water that under natural conditions would contribute to a given stream or other body of water (i.e., surface water or percolating groundwater). Thus, if the source of water is "foreign" (e.g., imported or SWP water), downstream water rights holders are not protected under the code. Groundwater extracted from and used in the Valley and then discharged to the Santa Clara River as wastewater effluent may be considered a "native water" to the river; whereas, SWP water imported into and used in the Valley and then discharged to the Santa Clara River as wastewater effluent may be considered a "foreign water." Furthermore, while existing discharges may have a permanent public use (i.e., habitat), only the "foreign water" percentage within the effluent flows can be diverted for recycling purposes.

In 2005, the Valley's potable water supply is projected to consist of approximately 36 percent groundwater (native water) and 64 percent imported water (foreign water). Projected potable water demand for the year 2030 is approximately 112,500 af, 65 percent derived from foreign water and 35 percent derived from native sources. The projected recycled water component would consist of approximately 65 percent (72,800 af foreign / 112,500 total) of projected wastewater generation. Therefore, CLWA's future recycled water system is limited to the foreign water portion of wastewater. This volume is determined by multiplying the percentage of foreign water by the wastewater flow. As shown in Table 4-3, the future foreign water portion of wastewater is 24,830 afy (65 percent times 38,200 afy). It is important to note that these percentages are of potable water demand (i.e., they do not include the use of recycled water in the calculation) and as such are not percentages of total water demand. Although the foreign water percentage of potable water demand only increases by one percent from 2005 to 2030, actual use of foreign water increases by approximately 58 percent.

Table 4-3
Use of Native Water vs. Foreign Water

	Native Water Demand (afy)	Foreign Water Demand (afy)(1)	Recycled Water Demand (afy)	Potable Water Demand Total (afy)	Wastewater Flow(2) (afy)	Foreign Water Percentage of Potable Water Demand	Foreign Water Portion of Wastewater (afy)
Projected (2005)	25,500	46,100	800	71,600	31,500	64%	20,100
Future (2030)	39,700	72,800	17,391	112,500	38,200	65%	24,830

Note:
(1) Foreign water includes SWP water, water transfers, and desalination.
(2) From Table 4-2.

In order to maintain native water rights, and assuming the ultimate capacities and recycled water demand (as discussed in Section 4.3), the existing and planned methods of wastewater effluent discharge and use are as summarized in Table 4-4.

Table 4-4
Disposal of Wastewater (non-recycled)

Method of Disposal	Treatment Level	Wastewater Discharge and Use (af)					
		2005	2010	2015	2020	2025	2030
Discharge to Santa Clara River	Disinfected, tertiary	30,700	36,600	34,900	30,200	25,500	20,800
Recycled Water Users	Disinfected Tertiary	800	1,600	3,300	8,000	12,700	17,400
Total		**31,500**	**38,200**	**38,200**	**38,200**	**38,200**	**38,200**

4.3.4 Other Potential Sources of Recycled Water

4.3.4.1 Newhall Ranch Water Reclamation Plant

A third Valley reclamation plant is proposed as part of the Newhall Ranch project. This proposed facility would be located near the western edge of the development project along the south side of State Route 126. The plant will be constructed in stages, with an ultimate capacity of 7.7 mgd. Effluent from the proposed water reclamation plant would be used to meet non-potable water demand within the development area. According to the Newhall Ranch Draft Additional Analyses, this plant is projected to produce 5,344 afy on average. During the dry months, all of the recycled water would be used for non-potable uses within Newhall Ranch, supplemented by additional recycled water from CLWA. During the wet winter months when demands are low, the Newhall Ranch WRP would on average have approximately 286 afy excess recycled water. In order for the WRP to be non-discharging (i.e., have production equal demand), this recycled water would be transferred into CLWA's recycled water system for use and/or storage. Any excess demand would need a National Pollutant Discharge Elimination System (NPDES) permit prior to discharge. NPDES permits could place stricter regulatory limitation on the effluent, which may increase treatment costs. Furthermore, the discharge could be subject to additional environmental review prior to approval.

4.3.4.2 Oilfield Produced Water

Oilfield produced water is a by-product of oil production generated when oil is extracted from the oil reservoir. It is generally of poor quality and unsuitable for potable, industrial, or irrigation use without treatment. Because of the poor water quality, reinjection has often been the most cost-effective disposal option.

Treatment processes can produce potable quality water; yet, because of the poor initial water quality and the organic constituents, it is often more appropriate for treated oilfield produced water to be used for irrigation or industrial purposes to offset potable water demand. Pilot studies performed at the Placerita Oilfield have indicated that, even with reverse osmosis (RO) treatment, some organic compounds such as naphthalene, 2-butanone, and ethylbenzene, can be detected in the RO effluent.

The economics of oil production are market-driven and are different from those of drinking water supplies. As oil prices rise or drop, oilfields go into and out of production depending on the costs of production. Also, oilfields are eventually depleted of supply and abandoned. Therefore, while oilfield produced water should be considered as long-term, it is not a completely firm supply and is not permanent.

Studies of the potential reuse of treated oilfield produced water from the Placerita Oilfield have indicated that approximately 44,000 barrels per day (1.8 mgd) of treated oilfield produced water may be available. For irrigation reuse, the produced water would need to be cooled and treated to remove hardness, silica, total dissolved solids (TDS), boron, ammonia, and total organic carbon (TOC).

4.3.5 Summary of Available Source Water Flows

As discussed previously, the non-potable water system has four potential sources of water. The flows projected to be available are shown in Table 4-5. For planning purposes, only recycled water from LACSD is considered available to meet the projected recycled water demands due to the level of evaluation still needed on the alternative sources.

Table 4-5
Summary of Available Source Water Flows

Source	Current Capacity (mgd)	Projected Capacity (mgd)	Projected to be Available for Non-Potable Use (afy)
LACSD Total	28.1	34.1	19,995
Valencia WRP	*21.6*	*27.6*	*19,995*
Saugus WRP	*6.5*	*6.5*	*0*
Oilfield Produced Water	0	1.8	1,980
Newhall Ranch WRP	0	7.7	5,344
Total			**27,319**

4.4 RECYCLED WATER DEMAND

In this section, current recycled water use is discussed, and potential recycled water users within CLWA's service area are identified as determined from the 2002 Draft Recycled Water Master Plan. For each potential user, estimates are provided for annual demand, peak monthly demand, peak daily demand, and the hourly distribution of water demand during peak months. The requirements for potential users to convert their existing water potable systems to recycled water are also discussed.

4.4.1 Current Use

Currently, Recycled water is served to landscape irrigation customers, including the Westridge Golf Course. Table 4-6 provides a summary of existing recycled water use.

Table 4-6
Actual Recycled Water Uses

Type of Use	Treatment Level	Actual 2004 Use (af)
Landscape	Disinfected tertiary	448
Total		**448**

4.4.2 Potential Users

Potential recycled water users were identified through a number of sources including:

- 1993 Recycled Water Master Plan
- Water consumption records for LACWD No. 36, NCWD, SCWD, and VWC
- Land use maps
- General Plans and Specific Plans for the City of Santa Clarita and County of Los Angeles
- Discussions with City, County, water purveyor, and land developer staff
- "Windshield" survey of CLWA service area
- Draft 2002 Recycled Water Master Plan

In order to be considered as a potential recycled water user, the user had to be located within CLWA's service area and have a potential non-potable water demand of at least 4 afy. A total potential demand for existing and future recycled water users is 34,500 afy as identified in the Draft 2002 Recycled Water Master Plan for 2015. As this volume is already greater than the anticipated source of recycled water supply, additional future recycled users were not identified at this time. However, CLWA may reevaluate the list of recycled users after 2015 to consider future users not included in the Draft Master Plan. Table 4-7 provides a summary of the demands by user type.

Table 4-7
Potential Recycled Water Uses

Type of Use	Treatment Level	Potential Use (af)				
		2010	2015	2020	2025	2030
Landscape	Disinfected tertiary	34,500	34,500	34,500	34,500	34,500
Total		**34,500**	**34,500**	**34,500**	**34,500**	**34,500**

The initial list of potential recycled water users was reduced by evaluating the potential users that would be most expensive to serve until potential uses were approximately 17,000 afy. The unit cost to serve each user was calculated using the capital costs for pipelines, reservoirs, and pump stations as well as operational costs for pumping. The areas retained for recycled water service have costs per af ranging from $120 to $5,000. Areas eliminated from service had costs as high as $13,000/af. However, only two of the proposed phases in the Draft Master Plan had costs above $1,000 per af. The resulting proposed recycled water service area encompasses a large portion of CLWA's western service area.

4.4.3 Potential Recycled Water Demand

Potential annual recycled water demands were estimated from historical water use records for existing users and the proposed irrigated area and expected water use per acre for future users. Demands for recycled water are seasonal, with the highest demands occurring during the hot, dry summer months when irrigation requirements are greatest.

The total potential annual recycled water demand that is cost effective to serve is approximately 17,400 afy. Implementation of the recycled water system is expected to occur over the next 25 years. Table 4-8 summarizes the projected future use by user type.

Table 4-8
Projected Potential Future Use of Recycled Water in Service Area

Type of Use	Projected Use (af)				
	2010	2015	2020	2025	2030
Landscape	1,600	3,300	8,000	12,700	17,400
Total	1,600	3,300	8,000	12,700	17,400

4.4.4 Recycled Water Comparison

CLWA's 2000 UWMP projected a total recycled water demand of 19,612 afy by the year 2010. Although it did not specifically state a projected 2005 demand, CLWA had approval for 1,700 afy of recycled water use and was in the process of constructing the necessary facilities to deliver this amount at the time the 2000 UWMP was written. Approximately 448 afy was served in 2004 to landscape irrigation customers, including the Westridge Golf Course. Current demand is lower than originally predicted due to delays in the necessary environmental documentation and funding availability to expand the recycled water distribution system. Table 4-9 provides a comparison of the 2000 projected demand versus the actual 2004 demand.

Table 4-9
Recycled Water Uses - 2000 Projection Compared with 2004 Actual

User Type	2000 Projection for 2005 (af)	2004 Actual Use (af)
Landscape	1,700	448
Total	**1,700**	**448**

4.5 METHODS TO ENCOURAGE RECYCLED WATER USE

In order to provide an incentive to recycled water users, it was recommended in the Draft 2002 Recycled Water Master Plan that the CLWA issue a monthly rebate directly to each recycled water user. However, CLWA is currently considering utilizing a two-fold approach to encourage recycled water use. CLWA plans on making recycled water available at a reduced rate and to work with the City of Santa Clarita and Los Angeles County to adopt a Recycled Water Ordinance, mandating recycled use for certain applications. A Draft Ordinance is currently

being developed and is anticipated to be ready for review in late 2005. The recycled water incentives are summarized in Table 4-10.

Table 4-10
Methods To Encourage Recycled Water Use

Actions	Use Projected to Result From This Action (1) (af)				
	2010	2015	2020	2025	2030
Reduced Rate/Recycled Water Ordinance	800	1,600	3,980	6,340	8,700
Total	800	1,600	3,980	6,340	8,700

Note:
(1) Estimated as the projected use due to future customers and assuming future customer use is half of projected recycled water demand for the given years.

CLWA may consider providing financial assistance to retail water providers to offset the costs of extending the recycled water conveyance system or to existing customers to cover a portion of or all of the costs to convert their potable water system to receive recycled water.

4.6 OPTIMIZATION PLAN

Production from the WRPs is not anticipated to be adequate to meet the total demands of the system. However, as potable water demands increase and, consequently, recycled water production increases, the water available to meet system demands would also increase. Therefore, it is recommended that construction of the recycled water system be phased to utilize the increases in plant production.

Oilfield produced water would also not be available immediately, nor would it be available as a permanent source of supply. Instead, this alternative water source would be used as an interim supply when the field is in operation and inadequate recycled water is available from Valencia WRP. Oilfield produced water is anticipated to be available as a long-term supply, available for approximately the next 20 years. The phasing considers when this water source would be available. A detailed discussion of the recommended phasing plan is provided in the Draft Master Plan.

Phasing implementation of the recycled water system is recommended for the following reasons:

- A number of the potential recycled water users are future users that do not yet need recycled water.
- The current flow of the Valencia WRP is not adequate to meet the total demands of the recycled water users.
- Capital requirements would be spread over CLWA's current planning period through 2030.
- Oilfield produced water is not immediately (nor permanently) available.
- Demand is increasing due to development of Newhall Ranch

The recycled water system is divided into implementation phases based primarily on service zone boundaries.

In general, the following factors were considered in developing a phasing plan:

- Ease or willingness of customers to connect to recycled water
- Retrofit costs
- Regulatory requirements
- Community impacts and development requirements
- Water utility involvement/cooperation
- Funding availability
- Reliability and operational costs considerations
- System flexibility

The implementation phases are prioritized based on the status of the users (existing or future), the anticipated construction schedule of future users, and the proximity of the users to the non-potable water source (e.g., Valencia WRP, Placerita Oilfield).

Chapter 5
WATER QUALITY

Chapter 5.0
WATER QUALITY

5.1 OVERVIEW

The quality of any natural water is dynamic in nature. This is true for the SWP and the local groundwater of the Basin. During periods of intense rainfall or snowmelt, routes of surface water movement are changed; new constituents are mobilized and enter the water while other constituents are diluted or eliminated. The quality of water changes over the course of a year. These same basic principles apply to groundwater. Depending on water depth, groundwater will pass through different layers of rock and sediment and leach different materials from those strata. Water depth is a function of local rainfall and snowmelt. During periods of drought, the mineral content of groundwater increases. Water quality is not a static feature of water, and these dynamic variables must be recognized.

Water quality regulations also change. This is the result of the discovery of new contaminants, changing understanding of the health effects of previously known as well as new contaminants, development of new analytical technology, and the introduction of new treatment technology. All water purveyors are subject to drinking water standards set by the Federal Environmental Protection Agency (EPA) and the California Department of Health Services (DHS). Additionally, investor-owned water utilities, such as VWC, are also subject to water quality regulation by the PUC. CLWA provides surface water from the SWP while local retail water purveyors combine local groundwater with treated SWP water from CLWA for delivery to their customers. (LACWWD #36 is an exception and during most years receives water from SWP.) An annual Consumer Confidence Report (CCR) is provided to all Valley residents who receive water from CLWA and one of the four retail water purveyors. That report includes detailed information about the results of quality testing of the water supplied during the preceding year (CCR, 2005).

The quality of water received by individual customers will vary depending on whether they receive SWP water, groundwater, or a blend. Some will receive only SWP water at all times, while others will receive only groundwater. Others may receive water from one well at one time, water from another well at a different time, different blends of well and SWP water at other times, and only SWP water at yet other times. These times may vary over the course of a day, a week, or a year.

This section provides a general description of the water quality of both imported water and groundwater supplies. A discussion of potential water quality impacts on the reliability of these supplies is also provided.

5.2 IMPORTED WATER QUALITY

CLWA provides SWP water to the Valley. The source of SWP water is rain and snow of the Sierra Nevada, Cascade, and Coastal mountain ranges. This water travels to the Delta through a series of rivers and various SWP structures. There it is pumped into a series of canals and reservoirs, which provides water to urban and agricultural users throughout the San Francisco

Bay Area and central and southern California. The most southern reservoir on the West Branch of the SWP California Aqueduct is Castaic Lake. CLWA receives water from Castaic Lake and distributes it to the purveyors following treatment.

Perhaps the most important difference in quality between surface water and groundwater is the presence of microbes in surface water. Surface water is exposed to a variety of microbial contaminants while groundwater in general is not. As a result, there are considerably more water quality regulations for surface water providers. CLWA has two surface water treatment plants, the Rio Vista Water Treatment Plant and the Earl Schmidt Water Filtration Plant, whose function is to ensure the safety of the water by eliminating microbial contaminants. Both of these plants have a multi-barrier strategy. The first barrier is the application of ozone, a powerful disinfectant, which has the ability to kill a broad range of microbes. The second barrier is the addition of chemicals to remove particles from the water, which can hide and protect microbes. Removing particles improves the anti-microbial action of the disinfectants. The water is then passed through two sets of filters, and chloramines are then added to the water. Chloramines are similar to chlorine and prevent the growth of bacteria in the distribution system, which delivers water from the treatment plants to the retail water purveyors.

An important property of SWP water is the chemical make up caused by its passage through the Delta. The Delta is basically a very large marsh (or estuary) with large masses of plants and peat soils. These contribute organic materials (TOC) to the water. Salt water can also move into the Delta from San Francisco Bay and the Pacific Ocean. This brings in salts, notably bromide and chloride. None of these chemicals are harmful in and of themselves; however, when bromide and TOC react with disinfectants such as ozone, chlorine, or chloramines, a reaction occurs forming substances known as disinfection by-products (DBPs). A variety of health-based concerns are associated with DBPs (CCR, 2005).

Another important property of SWP water is the mineral content. SWP water is generally low in dissolved minerals, such as calcium, magnesium, sodium, potassium, iron, manganese, nitrate, and sulfate. Most of these minerals do not have health based concerns, but “hard” water (water high in calcium, magnesium, and iron) can cause a number of problems for consumers, such as the formation of white crusts in plumbing fixtures, water spots, damage to water heaters, and excess use of soaps. Nitrate is the main exception, as it has significant health effects for infants; however, the nitrate content of SWP water is very low. Also of significance is the chloride content. Although not a human health risk, chloride can have a negative impact on agricultural activities and regulatory compliance for local sanitation agencies. The chloride content of SWP water varies widely from well over 100 milligrams per liter (mg/L) to below 40 mg/L, depending on Delta conditions.

All surface waters can have taste and odor problems caused by the growth of algae in reservoirs, such as Castaic Lake. Under certain conditions, algae can grow in large mats, which then die, releasing foul smelling chemicals. Although harmless, the taste and odor causing chemicals can generally be very unpleasant for consumers.

5.3 GROUNDWATER QUALITY

The Basin has two sources of groundwater. Most local wells draw water from the Alluvial Aquifer. A smaller portion of the Valley's water supply is drawn from the Saugus Formation, a much deeper aquifer than the Alluvial Aquifer. The quality components of these aquifers differ with changing rainfall conditions. The two aquifers' water quality changes at different rates and much more slowly than surface water.

Local groundwater generally does not have microbial water quality problems. Parasites, bacteria, and viruses are filtered out as the water percolates through the soil, sand, and rock on its way to the aquifer. Even so, disinfectants are added to local groundwater when it is pumped by wells to protect public health. Local groundwater has very little TOC and generally has very low concentrations of bromide, minimizing potential for DPB formation. Taste and odor problems from algae are not an issue with groundwater.

The mineral content of local groundwater is very different from SWP water. The groundwater is very "hard," that is, it has high concentrations of calcium and magnesium (approximately 250-600 mg/L, as developed in the CLWA et al 2005 Annual Water Quality Report). Groundwater may also contain higher concentrations of nitrates and chlorides when compared to SWP water. However, all groundwater meets or exceeds drinking water standards.

The following sections describe the groundwater quality of the Alluvium and Saugus Formation.

5.3.1 Groundwater Quality – Alluvium

Groundwater quality is a key factor in assessing the Alluvial Aquifer as a municipal and agricultural water supply. In terms of the aquifer system, there is no convenient long-term record of water quality, i.e., water quality data in one or more single wells that spans several decades and continues to the present. Thus, in order to examine a long-term record of water quality in the Alluvium, individual records have been integrated from several wells completed in the same aquifer materials and in close proximity to each other to examine historical trends in general mineral groundwater quality throughout the Basin. Based on these records of groundwater quality, wells within the Alluvium have experienced historical fluctuations in general mineral content, as indicated by specific conductance (or electrical conductivity [EC]), which correlates with fluctuations of individual constituents that contribute to EC. The historic water quality data indicates that, on a long-term basis, there has not been a notable trend and, specifically, there has not been a decline in water quality within the Alluvium.

Specific conductance within the Alluvium exhibits a westward gradient, corresponding with the direction of groundwater flow in the Alluvium. EC is lowest in the easternmost portion of the Basin and highest in the west. Water quality in the Alluvium generally exhibits an inverse correlation with precipitation and streamflow, with a stronger correlation in the easternmost portion of the Basin, where groundwater levels fluctuate the most. Wet periods have produced substantial recharge of higher quality (low EC) water, and dry periods have resulted in declines in groundwater levels, with a corresponding increase in EC (and individual contributing constituents) in the deeper parts of the Alluvium.

Specific conductance throughout the Alluvium is currently below the Secondary (aesthetic) Upper Maximum Contaminant Level of 1,600 micromhos per centimeter (umhos/cm). The presence of long-term consistent water quality patterns, although intermittently affected by wet and dry cycles, supports the conclusion that the Alluvial aquifer is a viable ongoing water supply source in terms of groundwater quality.

The most notable groundwater quality issue in the Alluvium is perchlorate contamination. In 2002, one Alluvial well located near the former Whittaker-Bermite facility was inactivated for municipal water supply due to detection of perchlorate slightly below the Notification Level. In early 2005, perchlorate was detected in a second Alluvial well, VWC's Well Q2. In response, VWC removed the well from active service and commissioned an analysis and report assessing the impact of, and response to, the perchlorate contamination of that well. Sections 5.4 and 5.5 present additional information on the results of the Q2 analysis and report and VWC's response plan for Well Q2 to pursue permitting and installation of wellhead treatment, which resulted in returning the well to water supply service in October 2005.

5.3.2 Groundwater Quality – Saugus Formation

Similar to the Alluvium, groundwater quality in the Saugus Formation is a key factor in assessing that aquifer as a municipal and agricultural water supply. As with groundwater level data, long-term Saugus groundwater quality data is not sufficiently extensive (few wells) to permit any basin-wide analysis or assessment of pumping-related impacts on quality. As with the Alluvium, EC has been chosen as an indicator of overall water quality, and records have been combined to produce a long-term depiction of water quality. Water quality in the Saugus Formation has not historically exhibited the precipitation-related fluctuations seen in the Alluvium. Based on the historical record over the last 50 years, groundwater quality in the Saugus has exhibited a slight overall increase in EC. More recently, several wells within the Saugus Formation have exhibited an additional increase in EC similar to that seen in the Alluvium. In 2004, monthly data collected by VWC for two Saugus wells shows that the overall level of EC remained fairly stable during the year. Levels of EC in the Saugus Formation remain below the Secondary (aesthetic) Upper Maximum Contaminant Level for EC. Groundwater quality within the Saugus will continue to be monitored to ensure that degradation that presents concern relative to the long-term viability of the Saugus as an agricultural or municipal water supply does not occur.

As with the Alluvium, the most notable groundwater quality issue in the Saugus Formation is prechlorate contamination. Perchlorate was originally detected in four Saugus wells operated by the retail water purveyors in the eastern part of the Saugus Formation in 1997, near the former Whittaker-Bermite facility. Since then, the four Saugus municipal supply wells have been out of water supply service due to the presence of perchlorate. While the inactivation of those wells does not limit the ability of the purveyors to meet water requirements, there is an ongoing effort to restore impacted pumping capacity and contain potential perchlorate migration in the Saugus Formation by 2006 as discussed in Sections 5.4 and 5.5.

The local retail water purveyors continue to test for perchlorate in active water supply wells near the Whittaker-Bermite site, and there has been no additional detection of perchlorate in any other municipal Saugus well. Details are provided below on the various aspects of ongoing

perchlorate-related work, including investigation of the extent of contamination, development of an interrelated program for control and extraction of perchlorate by restoring impacted capacity (wells), treatment technology and its planned application for restoration of impacted wells, regulatory aspects of utilizing impacted wells with treatment for domestic water supply, and the current state of planning and implementation of perchlorate control and clean-up, including restoration of contaminated municipal water supply as part of that control and clean-up.

5.4 AQUIFER PROTECTION

As introduced in Chapter 3, three factors affect the availability of groundwater: sufficient source capacity (wells and pumps); sustainability of the groundwater resource to meet pumping demand on a renewable basis; and protection of groundwater sources (wells) from known contamination, or provisions for treatment in the event of contamination. The first two of those factors are addressed in Chapter 3. The third factor, the impact and resolution of contamination, is being addressed in the Valley's two aquifers as follows.

5.4.1 Alluvium

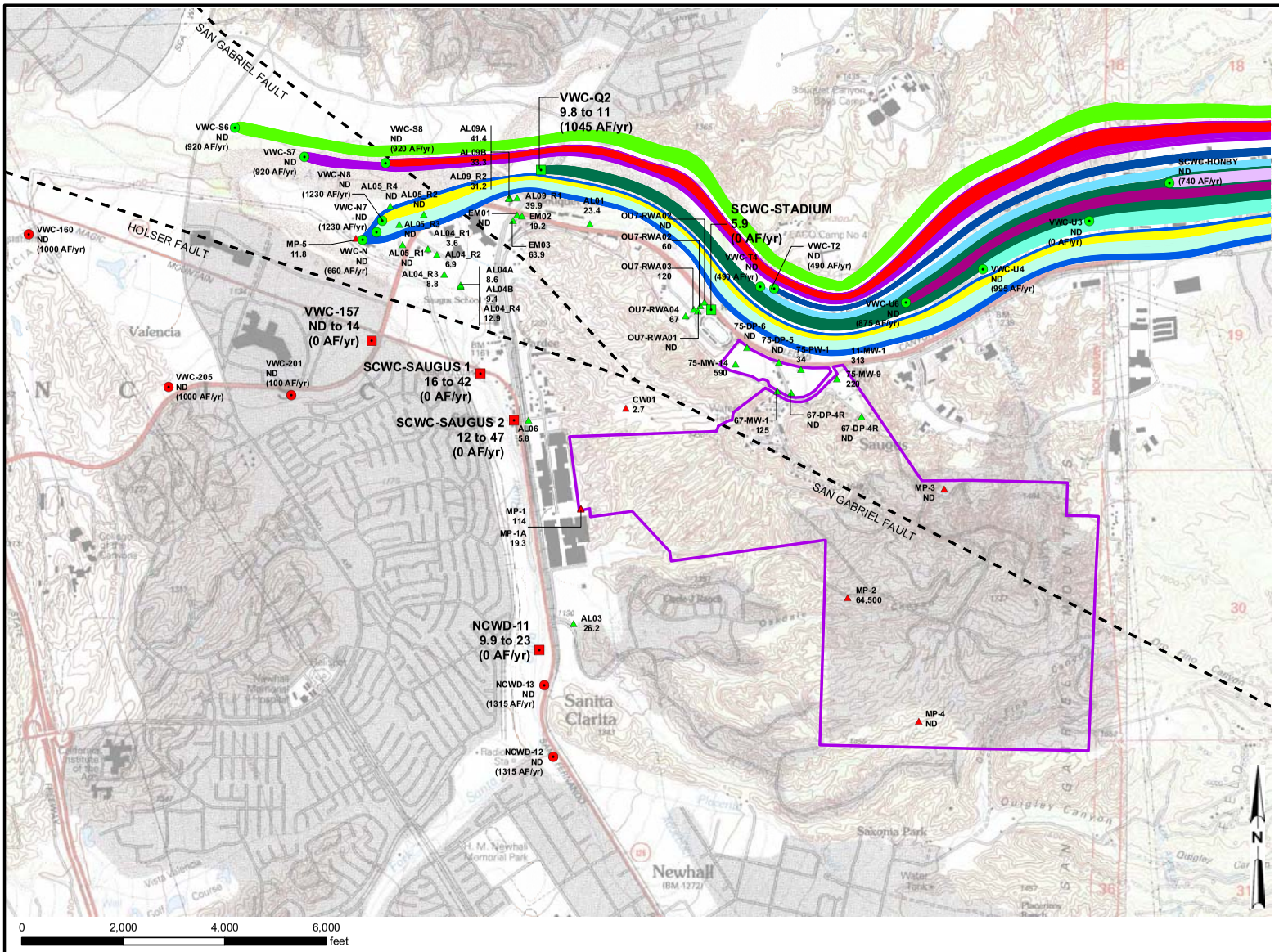
Details of the overall perchlorate contamination issue, which has had a larger impact on the Saugus Formation (four impacted wells with a total pumping capacity of 7,900 gpm) than on the Alluvium (one impacted well with a total pumping capacity of 800 gpm), are discussed in Appendix D of this Plan. As detailed in that Appendix, there has been extensive investigation of the extent of perchlorate contamination which, in combination with the groundwater modeling previously described, has led to the current plan for integrated control of contamination migration and restoration of impacted pumping (well) capacity in 2006. While most of the perchlorate contamination control and restoration plan is focused on the Saugus Formation, part of that plan includes potential capture of contaminated groundwater in the Alluvium by pumping of selected Saugus wells. Specific long-term resolution of perchlorate contamination in the Alluvium, which impacted two water supply wells, is focused on a combination of wellhead treatment at one well, the VWC's Well Q2, and several source control methods such as on-site pumping and treatment in the northern Alluvium (at the northerly portion of the former Whittaker-Bermite site) and subsequent restoration of the impacted Stadium well. In the interim, i.e., through 2006, a key challenge is protection of active Alluvial wells that could be impacted, including what effect that might have on adequacy of Alluvial groundwater pumping capacity and what response will be taken.

In April 2005, perchlorate was detected in VWC's Well Q2. VWC's response was to remove the well from active water supply service and to rapidly seek approval for installation of wellhead treatment and return of the well to service. As part of outlining its plan for treatment and return of the well to service, VWC analyzed the impact of the temporary inactivation of the well on its water supply capability; the analysis determined that VWC's other sources are sufficient to meet demand and that the inactivation of Well Q2 thus had no impact on VWC's water supply capability (LSCE, 2005). VWC proceeded through mid-2005 to gain approval for installation of wellhead treatment (ion-exchange as described below), including environmental review, and completed the installation of the wellhead treatment facilities in September 2005. Well Q2 was returned to active water supply service in October 2005.

Ongoing monitoring of all active municipal wells near the Whittaker-Bermite site has shown no detections of perchlorate in any active Alluvial wells. However, based on a combination of proximity to the Whittaker-Bermite site and prevailing groundwater flow directions, complemented by findings in the ongoing on-site and off-site investigations by Whittaker-Bermite and the Army Corps of Engineers (ACOE) (See Appendix D), there is logical concern that perchlorate could impact nearby, downgradient Alluvial wells. As a result, provisions are in place to respond to perchlorate contamination if it should occur. The groundwater model was used to examine capture zones around Alluvial wells under planned operating conditions (pumping capacities and volumes) for the time period through currently scheduled restoration of impacted wells in 2006 (Technical Memorandum "Analysis of Near-Term Groundwater Capture Areas for Production Wells Located Near the Whittaker-Bermite Property (Santa Clarita, California)", CH2M Hill, November 2004). The capture zone analysis of Alluvial wells generally near the Whittaker-Bermite site, shown on Figure 5-1, suggests that inflow to those wells will either be upgradient of the contamination site, or will be from the Alluvium beyond where perchlorate is most likely to be transported, with the possible exception of the VWC's Pardee wellfield, which includes Wells N, N7, and N8. Although the capture zone analysis does not show the Pardee wells to be impacted, they are considered to be at some potential risk due to the proximity of their capture zone to the Whittaker-Bermite site.

The combined pumping capacity of VWC's Pardee wells is 6,200 gpm, which equates to about 10,000 af of maximum annual capacity. However, in the operating plan for both normal and dry-year Alluvial pumping, the planned use of those wells represents 2,940 afy of the total 30,000 to 40,000 afy Alluvial groundwater supply. Thus, if the wells were to become contaminated with perchlorate, they would represent an amount of the total Alluvial supply that could be readily replaced, on a short-term interim basis, by utilizing an equivalent amount of imported water from CLWA or by utilizing existing capacity from other Alluvial wells (see Table 3-9 in Chapter 3.0). However, if the Pardee wells were to become contaminated by perchlorate contamination, VWC has made site provisions at its Pardee wellfield for installation of wellhead treatment. Such treatment would be the same methodology as installed at its Well Q2.

In addition to the preceding, on-site investigation by Whittaker-Bermite since late 2003 has resulted in the completion, in June 2005, of a Workplan for a Pilot Remediation Pumping Program in the Northern Alluvium and certain on-site sub-areas east/southeast, or generally upgradient, of the impacted Stadium well. That program basically involves the establishment of containment, generally along the northern boundary of the Whittaker-Bermite site, upgradient of the Stadium well, by continuous pumping of a former Whittaker-Bermite facility well, at a continuous low capacity, complemented by pumping at several groundwater "hot spots" also generally upgradient of the Stadium well. Due to the low conductivity nature of the aquifer materials at the various "hot spots," pumping for containment at those locations would be from several wells at low pumping capacities. Extracted water would be treated at Whittaker-Bermite's existing on-site treatment system. Generally consistent with the Saugus restoration concept, the Northern Alluvium pumping program would have the concurrent objectives of preventing site-related contaminants from leaving the site and removing some contamination from groundwater such that it can be removed in the on-site treatment process prior to discharge of the water back to the groundwater Basin.



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LEGEND

CONTAMINATED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

UNCONTAMINATED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

MONITORING WELL

- ALLUVIUM
- SAUGUS

TWO-YEAR GROUNDWATER CAPTURE ZONE

- SCWC-HONBY
- VWC-N
- VWC-N7
- VWC-N8
- VWC-Q2
- VWC-S6
- VWC-S7
- VWC-S8
- VWC-T2
- VWC-T4
- VWC-U4
- VWC-U6
- WHITTAKER-BERMITE PROPERTY BOUNDARY

NOTES:

1. VALUES PRESENTED UNDER WELL SYMBOLS REPRESENT PERCHLORATE CONCENTRATION IN GROUNDWATER (µg/L).
2. PUMPING VALUES IN PARENTHESES ARE ANNUAL PUMPING VOLUMES
3. ND = PERCHLORATE NOT DETECTED IN GROUNDWATER SAMPLE.
4. µg/L = MICROGRAMS PER LITER; AF/yr = acre feet per year
5. FLOWPATHS ARE DELINEATED USING AN EFFECTIVE POROSITY OF 0.10 IN THE ALLUVIAL AQUIFER AND 0.05 IN THE SAUGUS FORMATION.

FIGURE 5-1
FORECASTED TWO-YEAR GROUNDWATER CAPTURE ZONES FOR ACTIVE ALLUVIAL PRODUCTION WELLS LOCATED CLOSEST TO THE WHITTAKER-BERMITE PROPERTY
SANTA CLARITA, CALIFORNIA

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5.4.2 Saugus Formation

Details of the overall nature and extent of perchlorate contamination are discussed in Appendix D. The program and schedule involves the ultimate installation of treatment facilities to both extract contaminated water and control migration in the aquifer, such that the impacted capacity is restored and perchlorate migration is controlled in 2006.

In the interim, the question of whether existing active Saugus wells are likely to be contaminated by perchlorate migration prior to the installation of treatment and pumping for perchlorate contamination control has been evaluated by using the groundwater flow model to analyze capture zones of existing active wells through 2006, the scheduled period for permitting, installation of treatment, and restoration of impacted capacity. For that analysis, recognizing current hydrologic conditions and available supplemental SWP supplies, the rate of Saugus pumping was conservatively projected to be in the normal range (7,500 to 15,000 afy) for the near-term. The results of the capture zone analysis, illustrated on Figure 5-2, were that the two nearest downgradient Saugus wells, VWC's Wells 201 and 205, would draw water from very localized areas around the wells and would not draw water from locations where perchlorate has been detected in the Saugus. As shown on the figure, the capture zone analysis projected Well 201 would potentially draw Saugus groundwater from areas located up to 450 feet east of the well, but was unlikely to draw water from areas farther to the east through that time period. During the same time, Well 205 would potentially draw Saugus groundwater from areas as much as 650 feet to the east and northeast of this well.

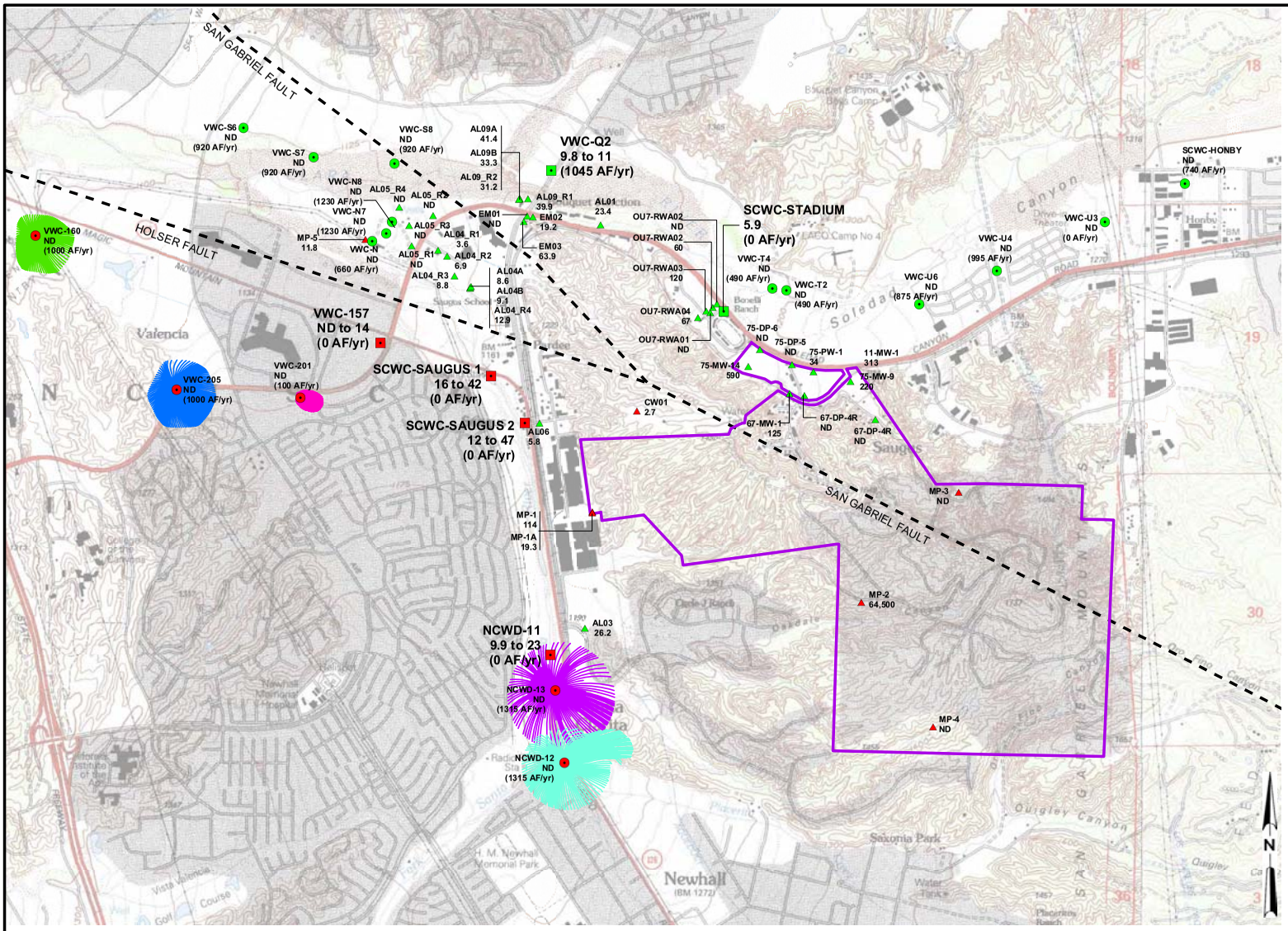
As a result, the currently active downgradient Saugus wells are expected to remain active as sources of water supply in accordance with the overall operating plan for the Saugus Formation, given the generally low planned pumping from the nearest downgradient Saugus wells in the operating plan through 2006, after which restored capacity and resultant aquifer hydraulic control are scheduled to be in place.

5.5 WATER QUALITY IMPACTS ON RELIABILITY

5.5.1 Groundwater Contamination (Perchlorate)

The detection of perchlorate in Valley groundwater supplies has raised concerns over the reliability of those supplies, in particular the Saugus Formation, where four wells have been removed from active service as a result of perchlorate. As discussed below and in Appendix D, planning for remediation of the perchlorate and restoration of the impacted well capacity is substantially underway. While that work is being completed, non-impacted production facilities can be relied upon for the quantities of water projected to be available from the Alluvial Aquifer and Saugus Formation during the time necessary to restore perchlorate-impacted wells. CLWA, the local retail water purveyors, the California Department of Toxic Substances Control (DTSC), and the ACOE continue to work closely on the perchlorate contamination issue.

The following is a summary of the status of perchlorate remediation and restoration of perchlorate-impacted groundwater supply. A more detailed discussion of pertinent events related



LEGEND

CONTAMINATED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

UNCONTAMINATED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

MONITORING WELL

- ALLUVIUM
- SAUGUS

TWO-YEAR GROUNDWATER CAPTURE ZONE

- NC-12
- NC-13
- VWC-160
- VWC-201
- VWC-205
- WHITTAKER-BERMITE PROPERTY BOUNDARY

NOTES:

1. VALUES PRESENTED UNDER WELL SYMBOLS REPRESENT PERCHLORATE CONCENTRATION IN GROUNDWATER (µg/L).
2. PUMPING VALUES IN PARENTHESES ARE ANNUAL PUMPING VOLUMES.
3. ND = PERCHLORATE NOT DETECTED IN GROUNDWATER SAMPLE.
4. µg/L = MICROGRAMS PER LITER; AF/yr = acre feet per year
5. FLOWPATHS ARE DELINEATED USING AN EFFECTIVE POROSITY OF 0.10 IN THE ALLUVIAL AQUIFER AND 0.05 IN THE SAUGUS FORMATION.

FIGURE 5-2
FORECASTED TWO-YEAR GROUNDWATER CAPTURE ZONES FOR ACTIVE SAUGUS PRODUCTION WELLS LOCATED CLOSEST TO THE WHITTAKER-BERMITE PROPERTY
SANTA CLARITA, CALIFORNIA

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to perchlorate contamination, containment, remediation, and water supply restoration is included in Appendix D. These discussions are provided to illustrate that work toward the ultimate remediation of the perchlorate contamination, including the reactivation of impacted groundwater supply wells, has progressed on several integrated fronts over the last five years.

5.5.2 Perchlorate Impacted Water Purveyor Wells

As introduced above, perchlorate was detected in four Saugus Formation production wells near the former Whittaker-Bermite site in 1997. As a result, these wells (SCWD's Wells Saugus 1 and Saugus 2, NCWD's Well NC-11, and VWC's Well V-157) were removed from service. In 2002, perchlorate was detected in the SCWD Stadium well located directly adjacent to the Whittaker-Bermite site. This Alluvial well also has been removed from service.

Since the detection of perchlorate and resultant inactivation of impacted wells, the purveyors have been conducting regular monitoring of active wells near the Whittaker-Bermite site. In April 2005, that monitoring detected the presence of perchlorate in VWC's Well Q2, an Alluvial well located immediately northwest of the confluent of Bouquet Creek and the Santa Clara River. The location of this well is also shown on Figures 5-1 and 5-2. As a result of the detection and confirmation of perchlorate in its Well Q2, VWC removed the well from active service and pursued rapid permitting and installation of wellhead treatment in order to return the well to water supply service as described in Section 5.4.1.

In January 2005, VWC permanently closed well V-157 and in September 2005 completed the construction of new Saugus well V-206 located in an area of the Saugus Formation not impacted by perchlorate. VWC's V-206 is operational and replaces the pumping capacity temporarily impacted by the detection of perchlorate at V-157. In October 2005, VWC restored the pumping capacity of well Q2 with the start-up of wellhead treatment designed to effectively remove perchlorate. In summary, four wells (Saugus 1 and 2, NC-11, and Stadium well) remain temporarily offline due to perchlorate contamination.

Locations of the impacted wells, and other nearby non-impacted wells, relative to the Whittaker-Bermite site are shown on Figures 5-1 and 5-2.

5.5.3 Restoration of Perchlorate Impacted Water Supply

Since the detection of perchlorate in the four Saugus wells in 1997, CLWA and the retail water purveyors have recognized that one element of an overall remediation program would most likely include pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. Thus, CLWA and the retail water purveyors expect that the overall perchlorate remediation program could include dedicated pumping from some or all of the impacted wells, with appropriate treatment, such that two objectives could be achieved. The first objective is control of subsurface flow and protection of downgradient wells, and the second is restoration of some or all of the contaminated water supply. Not all impacted capacity is required for control of groundwater flow. The remaining capacity would be replaced by construction of replacement wells at non-impacted locations.

In cooperation with state regulatory agencies and investigators working for Whittaker-Bermite, CLWA and the local retail water purveyors developed an off-site plan that focuses on the concepts of groundwater flow control and restored pumping capacity and is compatible with on-site and possibly other off-site remediation activities. Specifically relating to water supply, the plan includes the following:

- Constructing and operating a water treatment process that removes perchlorate from two impacted wells such that the produced water can be used for municipal supply.
- Hydraulically containing the perchlorate contamination that is moving from the Whittaker-Bermite site toward the impacted wells by pumping the wells at rates that will capture water from all directions around them.
- Protecting the downgradient non-impacted wells through the same hydraulic containment that results from pumping two of the impacted wells.
- Restoring the annual volumes of water pumped from the impacted wells before they were inactivated and also restoring the wells' total capacity to produce water in a manner consistent with the retail water purveyors' operating plan for groundwater supply described above.

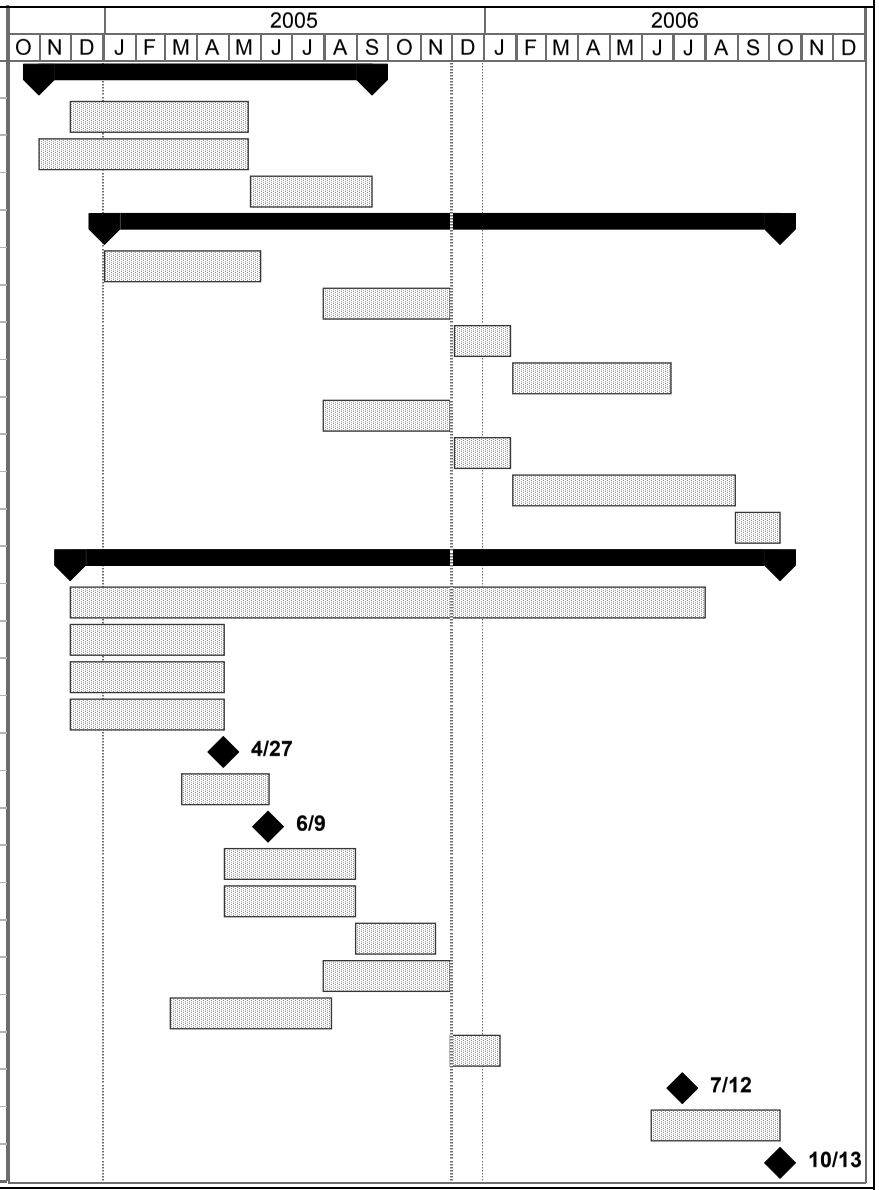
The current schedule for implementation of the plan to restore contaminated water supply (wells) is illustrated on Figure 5-3. Included in the schedule is a planned extended test of the wells that will be returned to service as part of restoring contaminated water supply and that will also be operated to extract contaminated water and control the migration of contamination in the aquifer. Concurrent with the testing of the wells, several specific ion exchange resins will also be tested to evaluate their performance and longevity. The two key activities that comprise the majority of effort required for implementation of the plan are general facilities-related work (design and construction of well facilities, treatment equipment, pipelines, etc.) and permitting work. Both activities are planned and scheduled concurrently, resulting in planned completion (i.e., restoration of all impacted capacity) in 2006. Notable recent accomplishments toward implementation include completion of the Final Draft Interim Remedial Action Plan (RAP) in August 2005 and completion of environmental review with the adoption of a Mitigated Negative Declaration in September 2005.

In light of the preceding, with regard to the adequacy of groundwater as the local component of water supply in this Plan, the impacted capacity will remain unavailable through early to mid-2006, during which time the non-impacted groundwater supply will be sufficient to meet near-term water requirements as described in Chapter 3, Water Resources. Afterwards, the total groundwater capacity will be sufficient to meet the full range of normal and dry-year conditions as provided in the operating plan for groundwater supply.

Returning the contaminated Saugus wells to municipal water supply service by installing treatment requires issuance of permits from DHS before the water can be considered potable and safe for delivery to customers. The permit requirements are contained in DHS Policy Memo 97-005 for direct domestic use of impaired water sources.

Figure 5-3
Preliminary 97-005 Implementation Schedule
Castaic Lake Water Agency

ID	Task Name	Duration	Start	Finish
1	**DTSC Approval Activities**	**230 days**	**Mon 11/1/04**	**Fri 9/16/05**
2	Feasibility Study	6.15 mons	Wed 12/1/04	Fri 5/20/05
3	Draft RAP	29 wks	Mon 11/1/04	Fri 5/20/05
4	Final RAP	4.25 mons	Mon 5/23/05	Fri 9/16/05
5	**Implementation Activities**	**465 days**	**Mon 1/3/05**	**Fri 10/13/06**
6	Easements and ROW	5.4 mons	Mon 1/3/05	Wed 6/1/05
7	Treatment Design	4.4 mons	Mon 8/1/05	Wed 11/30/05
8	Treatment Bidding & Contracting	2 mons	Mon 12/5/05	Fri 1/27/06
9	Treatment Construction	5.5 mons	Mon 1/30/06	Fri 6/30/06
10	Pipeline Design	4.4 mons	Mon 8/1/05	Wed 11/30/05
11	Pipeline Bidding & Contracting	2 mons	Mon 12/5/05	Fri 1/27/06
12	Pipeline Construction	7.7 mons	Mon 1/30/06	Thu 8/31/06
13	System Startup	1.55 mons	Fri 9/1/06	Fri 10/13/06
14	**DHS Approval Activities (97-005)**	**488 days**	**Wed 12/1/04**	**Fri 10/13/06**
15	DHS Coordination	21.8 mons	Wed 12/1/04	Wed 8/2/06
16	TM1: Source Water Assessment	5.3 mons	Wed 12/1/04	Wed 4/27/05
17	TM2: Raw Water Quality Characterization	5.3 mons	Wed 12/1/04	Wed 4/27/05
18	TM3: Source Water Protection	5.3 mons	Wed 12/1/04	Wed 4/27/05
19	DHS Workshop No. 1	0 days	Wed 4/27/05	Wed 4/27/05
20	TM4: Effective Monitoring & Treatment	3 mons	Fri 3/18/05	Thu 6/9/05
21	DHS Workshop No. 2	0 days	Thu 6/9/05	Thu 6/9/05
22	TM5: Human Health Risk Assessment	4.5 mons	Thu 4/28/05	Wed 8/31/05
23	TM6: Alternative Source Assessment	4.5 mons	Thu 4/28/05	Wed 8/31/05
24	DHS Review of TMs 5 & 6	2.75 mons	Thu 9/1/05	Wed 11/16/05
25	Prepare 97-005 Engineer's Report	4.4 mons	Mon 8/1/05	Wed 11/30/05
26	CEQA Initial Study and Draft MND	5.55 mons	Mon 3/7/05	Mon 8/8/05
27	Permit Application	1.7 mons	Thu 12/1/05	Tue 1/17/06
28	Public Hearing	0 days	Wed 7/12/06	Wed 7/12/06
29	DHS Evaluation	4.5 mons	Mon 6/12/06	Fri 10/13/06
30	Obtain DHS Permit	0 days	Fri 10/13/06	Fri 10/13/06



Project: CLWA 97-005_r2
Date: Thu 12/1/05

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

Before issuing a permit to a water utility for use of an impaired source as part of the utility's overall water supply permit, DHS requires that studies and engineering work be performed to demonstrate that pumping the wells and treating the water will be protective of public health for users of the water. The 97-005 Policy Memo requires that DHS review the local retail water purveyor's plan, establish appropriate permit conditions for the wells and treatment system, and provide overall approval of returning the impacted wells to service for potable use. Ultimately, CLWA's and the local retail water purveyor's plan and the DHS requirements are intended to ensure that the water introduced to the potable water distribution system has no detectable concentration of perchlorate.

The DHS 97-005 Policy Memo requires, among other things, the completion of a source water assessment for the impacted wells intended to be returned to service. The purpose of the assessment is to determine the extent to which the aquifer is vulnerable to continued migration of perchlorate and other contaminants of interest from the Whittaker-Bermite site. The assessment includes the following:

- Delineation of the groundwater capture zone caused by operating the impacted wells
- Identification of contaminants found in the groundwater at or near the impacted wells
- Identification of chemicals or contaminants used or generated at the Whittaker-Bermite facility
- Determination of the vulnerability of pumping the impacted wells to these contaminant sources

CLWA is currently working directly with the retail water purveyors and its consultants on development of the DHS 97-005 Policy Memo permit application. Two coordination workshops have already been held with DHS. Drafts of all six elements of the 97-005 Policy Memo have been submitted to DHS and the retail purveyors for review, including: the Source Water Assessment, Raw Water Quality Characterization, Source Protection Plan, Effective Monitoring and Treatment Evaluation, Human Health Risk Assessment, and the Alternatives Sources Evaluation. The Engineer's Report, which summarizes these six elements for the 97-005 process, is anticipated to be complete by the end of November 2005.

The CEQA process for the "CLWA Groundwater Containment, Treatment, and Restoration Project," for which the 97-005 process is being conducted, was completed in August 2005. The Project Description from the project's CEQA Initial Study is included in Appendix E.

As listed above, DHS 97-005 Policy Memo requires an analysis to demonstrate contaminant capture and protection of other nearby water supply wells. The development and calibration of a numerical groundwater flow model of the entire basin had been initiated as a result of a 2001 MOU among the Upper Basin Water Purveyors (CLWA, CLWA SCWD, LACWWD #36, NCWD, and VWC) and the United Water Conservation District in Ventura County.

The groundwater model was initially intended for use in analyzing the operating yield and sustainability of groundwater in the Basin. Use of the model for that analysis is described in Chapter 3. However, the model was adaptable to analyze both the sustainability of groundwater under an operational scenario that includes full restoration of perchlorate-contaminated supply

and the containment of perchlorate near the Whittaker-Bermite property (i.e., by pumping some of the contaminated wells). In 2004, DTSC reviewed and approved the construction and calibration of the regional model as described in the final model report, "Regional Groundwater Flow Model for the Santa Clarita Valley, Model Development and Calibration" (CH2M Hill, April 2004).

After DTSC approval, the model was used to simulate the capture and control of perchlorate by restoring impacted wells, with treatment. The results of that work are summarized in a second report, "Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California" (CH2M Hill, December 2004). The modeling analysis indicates that the pumping of impacted wells SCWD-Saugus 1 and SCWD-Saugus 2 on a nearly continual basis will effectively contain perchlorate migrating westward in the Saugus Formation from the Whittaker-Bermite property. The analysis also indicates that (1) no new production wells are needed in the Saugus Formation to meet the perchlorate containment objective, (2) impacted well NCWD-11 is not a required component of the containment program, and (3) pumping at SCWD-Saugus 1 and SCWD-Saugus 2 is necessary to prevent migration of perchlorate to other portions of the Saugus Formation.

The perchlorate containment report also includes the general design of a sentinel groundwater monitoring network and program required by DHS as part of its 97-005 Policy Memo permitting. The perchlorate containment report was approved by DTSC in November 2004. With that approval, the model is now being used to support the source water assessment and the balance of the permitting process required by DHS under its 97-005 Policy Memo.

Chapter 6
RELIABILITY PLANNING

Chapter 6.0
RELIABILITY PLANNING

6.1 OVERVIEW

The Act requires urban water suppliers to assess water supply reliability that compares total projected water used with the expected water supply over the next twenty years in five year increments. The Act also requires an assessment for a single dry year and multiple dry years. This chapter presents the reliability assessment for CLWA's service area.

It is the stated goal of CLWA and the retail water purveyors to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions over the next 25 years in combination with conservation of non-essential demand during certain dry years, the Plan successfully achieves this goal.

6.2 RELIABILITY OF WATER SUPPLIES

Each water supply source has its own reliability characteristics. In any given year, the variability in weather patterns around the state may affect the availability of supplies to the Valley differently. For example, from 2000 through 2002, southern California experienced dry conditions in all three years. During the same period, northern California experienced one dry year and two normal years. The Valley is typical in terms of water management in southern California; local groundwater supplies are used to a greater extent when imported supplies are less available due to dry conditions in the north, and larger amounts of imported water supplies are used during periods when northern California has wetter conditions. This pattern of "conjunctive use" has been in effect since SWP supplies first came to the Valley in 1980. SWP supplies have supplemented the overall supply of the Valley, which previously depended solely on local groundwater supplies.

To supplement these local groundwater supplies, CLWA contracted with DWR for delivery of SWP water, providing an imported water supply to the Valley. However, the variability in SWP supplies affects the ability of the agencies to meet the overall water supply needs for the service area. While each of the Valley's available supply sources has some variability, the variability in SWP supplies has the largest effect on overall supply reliability.

As discussed in Section 3.2 of Chapter 3, each SWP contractor's Water Supply Contract contains a Table A Amount that identifies the maximum amount of water that contractor may request. However, the amount of SWP water actually allocated to contractors each year is dependent on a number of factors than can vary significantly from year to year. The primary factors affecting SWP supply availability include hydrologic conditions in northern California, the amount of water in SWP storage reservoirs at the beginning of the year, regulatory and operational constraints, and the total amount of water requested by the contractors. The availability of SWP supplies to CLWA and the other SWP contractors is generally less than their full Table A amounts in many years and can be significantly less in very dry years.

DWR's SWP Delivery Reliability Report, issued in May 2003, assists SWP contractors in assessing the reliability of the SWP component of their overall supplies. DWR is currently in the process of updating this report and, on May 25, 2005, provided excerpts from this update that includes updated reliability analyses and a recommendation for which set of analyses to use in preparation of 2005 UWMPs. DWR provided these updated delivery reliability estimates to the SWP contractors in its "Excerpts from the Working Draft of 2005 State Water Project Delivery Reliability."

The amount of SWP water projected to be available to CLWA in this Plan is based on DWR's draft reliability report update. In its report, DWR presents the results of its analysis of the reliability of SWP supplies, based on model studies of SWP operations. In general, DWR model studies show the anticipated amount of SWP supply that would be available for a given SWP water demand, given an assumed set of physical facilities and operating constraints, based on 73 years of historic hydrology. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of hydrologic conditions, for that assumed set of physical facilities and operating constraints.

DWR's draft report presents the results of model studies for years 2005 and 2025. In these model studies, DWR assumed existing SWP facilities and operating constraints for both the 2005 and 2025 studies. The primary differences between the two studies are an increase in projected SWP contractor demands and an increase in projected upstream demands (which affects SWP supplies by reducing the amount of inflows available for the SWP). In the report, DWR presents the SWP delivery capability resulting from these studies as a percent of full contractor Table A Amounts. To estimate supply capability in intermediate years between 2005 and 2025, DWR interpolates between the results of those studies.

6.3 NORMAL, SINGLE-DRY, AND MULTIPLE-DRY YEAR PLANNING

CLWA has various water supplies available to meet demands during normal, single-dry, and multiple-dry years. The following sections elaborate on the different supplies available to CLWA including groundwater, recycled water, and SWP supplies.

6.3.1 Groundwater

Supplies from the Alluvial Aquifer are projected to be 30,000 to 40,000 afy in average years and 30,000 to 35,000 afy in dry years; supplies from the Saugus Formation are projected to be 7,500 to 15,000 afy in average years and 15,000 to 35,000 afy in dry years. Groundwater modeling of the aquifers has shown that short-term, dry-year supply from the Saugus Formation could increase to up to 35,000 afy. This amount of Saugus Formation pumping can be achieved through pumping from a combination of existing wells at about 15,000 afy, restored capacity from perchlorate-impacted wells of about 10,000 afy, and new wells at 10,000 afy.

The projected groundwater supplies used in this Plan are generally the midpoints of the ranges mentioned above, with the exception of dry-period pumping from the Saugus Formation. Given the large amount of groundwater storage within the Saugus Formation, it was assumed that single-dry year pumping on an intermittent basis would be limited primarily by well capacity, to 35,000 afy. For the multiple-dry year period, it was assumed that pumping from the Saugus

Formation would be governed by the groundwater operating plan summarized in Table 3-6, with average pumping over the 4-year dry period of about 21,500 afy.

6.3.2 Recycled Water

Recycled water is available from two existing water reclamation plants operated by LACSD. CLWA has completed environmental review on the construction of Phase I of its Reclaimed Water System Master Plan, a multi-phased program to deliver recycled water in the Valley. As described in Chapter 4, the ability of CLWA to use recycled water is constrained by its rights to use the water available. CLWA currently has rights to use 1,700 afy of recycled water, and Phase I provides for the delivery of this amount. While actual use of recycled water currently totals approximately 500 afy, the amount of this supply currently available is 1,700 afy. In this Plan, the existing supply of recycled water assumed to be available is 1,700 afy in an average year, a single-dry year, and in each year of a multiple-dry year period. CLWA projects an increase of 15,700 afy in the supply of recycled water by 2030, for a total of 17,400 afy. Similar to the existing recycled water supply, the 15,700 afy of planned recycled water supply is assumed to be available in an average year, a single-dry year, and in each year of a multiple-dry year period.

6.3.3 State Water Project Table A Supply

For this Plan, the availability of SWP supplies to CLWA was estimated by multiplying CLWA's 95,200 afy of Table A Amount by the delivery percentages from DWR's draft report.[1] For the three hydrologic conditions evaluated, the delivery percentages used were taken from DWR's report based on the 73-year average, 1977, and the 1931-1934 average, for the average year, single-dry year, and multiple-dry year conditions, respectively.

In DWR's 73-year model studies, the lowest single-year SWP delivery results from 1977 hydrologic conditions, and the lowest delivery over any four-year period results from the hydrologic conditions from 1931 to 1934. Thus, the estimates of SWP dry-year supply availability used in this assessment were based on the worst case hydrologic conditions in DWR's report.

6.3.3.1 Flexible Storage Account

Under the Water Supply Contracts with DWR for SWP water, the contractors that share in the repayment of Castaic Lake may access a portion of the storage in that reservoir. This accessible storage is referred to as "flexible storage." The contractors may withdraw water from flexible storage, in addition to their allocated Table A supplies, on an as-needed basis. A contractor must replace any water it withdraws from this storage within five years. As one of the three contractors sharing in the repayment of Castaic Lake, CLWA has access to this flexible storage. Its share of the total flexible storage is currently 4,684 af. After recent negotiations with Ventura

[1] Of CLWA's 95,2000 af annual Table A Amount, 41,000 afy was permanently transferred to CLWA in 1999 by Wheeler Ridge-Maricopa Water Storage District, a member unit of the Kern County Water Agency. CLWA's Environmental Impact Report ("EIR") prepared in connection with the 41,000 afy water transfer was challenged in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (Los Angeles County Superior Court, Case Number BS056954) ("*Friends*"). A more detailed discussion of these new challenges and the reasons the challenges will have no impact on the amount of water available to CLWA can be found at Section 3.2.2.

County water agencies, CLWA has gained access to an additional 1,376 af of flexible storage for ten years beginning in 2006.

CLWA plans to use this supply only in dry years. For the single-dry year condition, it was assumed the entire amount would be used. For the multiple-dry year condition, it was assumed that the entire amount would be used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total. Any water withdrawn was assumed to be replaced in intervening average and wet years and would be available again for use in the next dry year.

6.3.3.2 Semitropic Water Bank

In 2002, CLWA stored 24,000 af of its allocated SWP Table A supply through a groundwater banking agreement with Semitropic. In 2004, CLWA stored 32,522 af of its 2003 allocated SWP Table A supply in a second Semitropic storage account. Under the terms of these agreements, and after consideration for losses within the groundwater basin, CLWA may withdraw up to 50,870 af when needed within ten years of when the water was stored. In addition to this short-term storage for CLWA, Semitropic has a long-term groundwater banking program with several other partners. The facilities that Semitropic may use in the return of CLWA's banked water supply are the same facilities that Semitropic may use to return banked water to its long-term banking program partners. As a result, there may be competition for use of those facilities in a particularly dry year, which could limit CLWA's ability to access the water in that year.

CLWA plans to use this supply only in dry years. For the single dry year, it was assumed that competition among Semitropic's banking partners for use of return facilities would limit CLWA's supply to about one third of the storage available, or about 17,000 af. For the multiple-dry year period, it was assumed that the entire amount would be accessible and used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total available, or about 12,700 af. Since the stored water must be withdrawn within ten years of when it was stored, it was assumed that this supply is available only through 2013.

6.3.4 Buena Vista-Rosedale

The Buena Vista Water Storage District and the Rosedale-Rio Bravo Water Storage District, both member districts of KCWA, have jointly developed a program that provides both a firm water supply and a water banking component. This planned supply program would provide a firm annual water supply based on existing and long-standing Kern River water rights, which would be delivered by exchange of their SWP Table A supplies. In years when this supply is not needed, it can be banked for withdrawal and delivery in later years. The supply from this program is up to 11,000 afy of firm supply, which will be available in every year.

6.3.5 Rosedale-Rio Bravo Bank

Rosedale-Rio Bravo Water Storage District has also developed a water banking and exchange program. The initial offering from the program is for storage and withdrawal capacity of 20,000 afy, with up to 100,000 af of storage capacity. Withdrawals from the program can be made by exchange of Rosedale's Table A supply, or by pumpback into the California Aqueduct. CLWA issued a draft EIR on its participation in this program in August 2005, and plans to use this

supply only in dry years. For the single-dry year, supplies were assumed at the program's maximum withdrawal capacity of 20,000 af. For the multiple-dry year period, it was assumed in the first five-year increment the program is available that supplies would be limited to an average of 5,000 afy and that 20,000 af of water would be stored in one wet year prior to the dry period. In later years, it was assumed that supplies would average at least 15,000 afy over the dry period and that additional supplies would be banked during wetter years to allow withdrawal of at least this amount.

6.3.6 Additional Planned Banking

CLWA's Draft Water Supply Reliability Plan identifies a need for additional banking programs to firm up the dry-year reliability of service area supplies. While a specific banking program has not yet been identified, the amount of the additional dry-year supply needed was estimated as equivalent to the storage and withdrawal capacity of the Rosedale-Rio Bravo Bank. The supply amounts needed from this additional banking program were assumed to be the same as for the Rosedale-Rio Bravo Bank, with the exception that the program was not assumed to be available until 2015.

6.4 SUPPLY AND DEMAND COMPARISONS

The available supplies and water demands for CLWA's service area were analyzed to access the region's ability to satisfy demands during three scenarios: a normal water year, single-dry year, and multiple-dry years. The tables in this section present the supplies and demands for the various drought scenarios for the projected planning period of 2010-2030 in five year increments. Table 6-1 presents the base years for the development of water year data. Tables 6-2, 6-3, and 64 at the end of this section summarize, respectively, Normal Water Year, Single-Dry Water Year, and Multiple-Dry Year supplies.

Table 6-1
Basis of Water Year Data

Water Year Type	Base Years	Historical Sequence
Normal Water Year	Average	1922-1994
Single-Dry Water Year	1977	--
Multiple-Dry Water Years	1931-1934	--

6.4.1 Normal Water Year

Table 6-2 summarizes CLWA's water supplies available to meet demands over the 20-year planning period during an average/normal year. As presented in the table, CLWA's water supply is broken down into existing and planned water supply sources, including wholesale (imported) water, local supplies, transfers, and banking programs. Demands are shown with and without the effects of an assumed 10 percent urban demand reduction resulting from conservation best management practices.

6.4.2 Single-Dry Year

The water supplies and demands for CLWA's service area over the 20-year planning period were analyzed in the event that a single-dry year occurs, similar to the drought that occurred in California in 1977. Table 6-3 summarizes the existing and planned supplies available to meet demands during a single-dry year. Demand during dry years was assumed to increase by 10 percent.

6.4.3 Multiple-Dry Year

The water supplies and demands for CLWA's service area over the 20-year planning period were analyzed in the event that a four-year multiple-dry year event occurs, similar to the drought that occurred during the years 1931 to 1934. Table 6-4 summarizes the existing and planned supplies available to meet demands during multiple-dry years. Demand during dry years was assumed to increase by 10 percent.

6.4.4 Summary of Comparisons

As shown in the analyses above, CLWA and the retail purveyors have adequate supplies to meet demands during normal, single-dry, and multiple-dry years throughout the 20-year planning period.

Table 6-2
Projected Average/Normal Year Supplies and Demands

Water Supply Sources	Supply (af)				
	2010	2015	2020	2025	2030
Existing Supplies					
Wholesale (Imported)	*67,600*	*69,500*	*71,400*	*73,300*	*73,300*
SWP Table A Supply (1)	67,600	69,500	71,400	73,300	73,300
Flexible Storage Account (CLWA) (2)	0	0	0	0	0
Flexible Storage Account (Ventura County) (2)	0	0	0	0	0
Local Supplies					
Groundwater	*46,000*	*46,000*	*46,000*	*46,000*	*46,000*
Alluvial Aquifer	35,000	35,000	35,000	35,000	35,000
Saugus Formation	11,000	11,000	11,000	11,000	11,000
Recycled Water	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	115,300	117,200	119,100	121,000	121,000
Existing Banking Programs					
Semitropic Water Bank (2)	0	0	0	0	0
Total Existing Banking Programs	0	0	0	0	0
Planned Supplies					
Local Supplies					
Groundwater	*0*	*0*	*0*	*0*	*0*
Restored wells (Saugus Formation) (2)	0	0	0	0	0
New Wells (Saugus Formation) (2)	0	0	0	0	0
Recycled Water (3)	0	1,600	6,300	11,000	15,700
Transfers					
Buena Vista-Rosedale (4)	11,000	11,000	11,000	11,000	11,000
Total Planned Supplies	11,000	12,600	17,300	22,000	26,700
Planned Banking Programs					
Rosedale-Rio Bravo (2)	0	0	0	0	0
Additional Planned Banking (2)	0	0	0	0	0
Total Planned Banking Programs	0	0	0	0	0
Total Existing and Planned Supplies and Banking	126,300	129,800	136,400	143,000	147,700
Total Estimated Demand (w/o conservation) (5)	100,050	109,400	117,150	128,400	138,300
Conservation (6)	(8,600)	(9,700)	(10,700)	(11,900)	(12,900)
Total Adjusted Demand	91,450	99,700	106,450	116,500	125,400

Notes:

(1) SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of average deliveries projected to be available (71% in 2010 and 77% in 2025/2030), taken from Table 6-5 of DWR's "Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report" (May 2005).

(2) Not needed during average/normal years.

(3) Recycled water supplies based on projections provided in Chapter 4, Recycled Water.

(4) CLWA is in the process of acquiring this supply, primarily to meet the potential demands of future annexations to the CLWA service area. This acquisition is consistent with CLWA's annexation policy under which it will not approve potential annexations unless additional water supplies are acquired. Currently proposed annexations have a demand for about 4,000 afy of this supply which, if approved, would leave the remaining 7,000 afy available for potential future annexations. Unless and until any such annexations are actually approved, this supply will be available to meet demands within the existing CLWA service area.

(5) Demands are for uses within the existing CLWA service area. Demands for any annexations to the CLWA service area will be added if and when such annexations are approved. Currently proposed annexations have a demand for about 4,000 afy and, given supplies CLWA is in the process of acquiring, potential future annexations with demands up to an additional 7,000 afy could eventually be approved (see Footnote 4).

(6) Assumes 10 percent reduction on urban portion of total demand resulting from conservation best management practices, as discussed in Chapter 7.

Table 6-3
Projected Single-Dry Year Supplies and Demands

Water Supply Sources	Supply (af)				
	2010	2015	2020	2025	2030
Existing Supplies					
Wholesale (Imported)	*9,860*	*9,860*	*8,480*	*9,480*	*9,480*
SWP Table A Supply (1)	3,800	3,800	3,800	4,800	4,800
Flexible Storage Account (CLWA)	4,680	4,680	4,680	4,680	4,680
Flexible Storage Account (Ventura County) (2)	1,380	1,380	0	0	0
Local Supplies					
Groundwater	*47,500*	*47,500*	*47,500*	*47,500*	*47,500*
Alluvial Aquifer	32,500	32,500	32,500	32,500	32,500
Saugus Formation	15,000	15,000	15,000	15,000	15,000
Recycled Water	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	59,060	59,060	57,680	58,680	58,680
Existing Banking Programs					
Semitropic Water Bank (3)	17,000	0	0	0	0
Total Existing Banking Programs	17,000	0	0	0	0
Planned Supplies					
Local Supplies					
Groundwater	*10,000*	*10,000*	*20,000*	*20,000*	*20,000*
Restored wells (Saugus Formation)	10,000	10,000	10,000	10,000	10,000
New Wells (Saugus Formation)	0	0	10,000	10,000	10,000
Recycled Water (4)	0	1,600	6,300	11,000	15,700
Transfers					
Buena Vista-Rosedale (5)	11,000	11,000	11,000	11,000	11,000
Total Planned Supplies	21,000	22,600	37,300	42,000	46,700
Planned Banking Programs					
Rosedale-Rio Bravo (6)	20,000	20,000	20,000	20,000	20,000
Additional Planned Banking (7)	0	20,000	20,000	20,000	20,000
Total Planned Banking Programs	20,000	40,000	40,000	40,000	40,000
Total Existing and Planned Supplies and Banking	117,060	121,660	134,980	140,680	145,380
Total Estimated Demand (w/o conservation) (8) (9)	110,100	120,300	128,900	141,200	152,100
Conservation (10)	(9,500)	(10,700)	(11,700)	(13,100)	(14,200)
Total Adjusted Demand	100,600	109,600	117,200	128,100	137,900

Notes:

(1) SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of single dry deliveries projected to be available for the worst case single dry year of 1977 (4% in 2010 and 5% in 2025/2030), taken from Table 6-5 of DWR's "Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report" (May 2005).

(2) Initial term of the Ventura County entities' flexible storage account is ten years (from 2006 to 2015).

(3) The total amount of water currently in storage is 50,870 af, available through 2013. Withdrawals of up to this amount are potentially available in a dry year, but given possible competition for withdrawal capacity with other Semitropic banking partners in extremely dry years, it is assumed here that about one third of the total amount stored could be withdrawn.

(4) Recycled water supplies based on projections provided in Chapter 4, Recycled Water.

(5) CLWA is in the process of acquiring this supply, primarily to meet the potential demands of future annexations to the CLWA service area. This acquisition is consistent with CLWA's annexation policy under which it will not approve potential annexations unless additional water supplies are acquired. Currently proposed annexations have a demand for about 4,000 afy of this supply which, if approved, would leave the remaining 7,000 afy available for potential future annexations. Unless and until any such annexations are actually approved, this supply will be available to meet demands within the existing CLWA service area.

(6) Rosedale-Rio Bravo Water Banking and Recovery Program online in 2006, based on completing CEQA and subsequent adoption by CLWA Board of Directors.

(7) Assumes additional planned banking supplies available by 2014.

(8) Assumes increase in total demand of 10 percent during dry years.

(9) Demands are for uses within the existing CLWA service area. Demands for any annexations to the CLWA service area will be added if and when such annexations are approved. Currently proposed annexations have a demand for about 4,000 afy and, given supplies CLWA is in the process of acquiring, potential future annexations with demands up to an additional 7,000 afy could eventually be approved (see Footnote 5).

(10) Assumes 10 percent reduction on urban portion of total normal year demand resulting from conservation best management practices ([urban portion of total normal year demand x 1.10] * 0.10), as discussed in Chapter 7.

Table 6-4
Projected Multiple-Dry Year Supplies and Demands (1)

Water Supply Sources	2010	2015	2020	2025	2030
Existing Supplies					
Wholesale (Imported)	*32,010*	*32,910*	*32,570*	*32,570*	*32,570*
SWP Table A Supply (2)	30,500	31,400	31,400	31,400	31,400
Flexible Storage Account (CLWA) (3)	1,170	1,170	1,170	1,170	1,170
Flexible Storage Account (Ventura County) (3)	340	340	0	0	0
Local Supplies					
Groundwater	*47,500*	*47,500*	*47,500*	*47,500*	*47,500*
Alluvial Aquifer	32,500	32,500	32,500	32,500	32,500
Saugus Formation (4)	15,000	15,000	15,000	15,000	15,000
Recycled Water	1,700	1,700	1,700	1,700	1,700
Total Existing Supplies	81,210	82,110	81,770	81,770	81,770
Existing Banking Programs					
Semitropic Water Bank (3)	12,700	0	0	0	0
Total Existing Banking Programs	12,700	0	0	0	0
Planned Supplies					
Local Supplies					
Groundwater	*6,500*	*6,500*	*6,500*	*6,500*	*6,500*
Restored wells (Saugus Formation) (4)	6,500	6,500	5,000	5,000	5,000
New Wells (Saugus Formation) (4)	0	0	1,500	1,500	1,500
Recycled Water (5)	0	1,600	6,300	11,000	15,700
Transfers					
Buena Vista-Rosedale (6)	11,000	11,000	11,000	11,000	11,000
Total Planned Supplies	17,500	19,100	23,800	28,500	33,200
Planned Banking Programs					
Rosedale-Rio Bravo (7) (8)	5,000	15,000	15,000	15,000	15,000
Additional Planned Banking (8) (9)	0	5,000	15,000	15,000	15,000
Total Planned Banking Programs	5,000	20,000	30,000	30,000	30,000
Total Existing and Planned Supplies and Banking	116,410	121,210	135,570	140,270	144,970
Total Estimated Demand (w/o conservation) (10) (11)	110,100	120,300	128,900	141,200	152,100
Conservation (12)	(9,500)	(10,700)	(11,700)	(13,100)	(14,200)
Total Adjusted Demand	100,600	109,600	117,200	128,100	137,900

Notes:

(1) Supplies shown are annual averages over four consecutive dry years (unless otherwise noted).

(2) SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of deliveries projected to be available for the worst case four-year drought of 1931-1934 (32% in 2010 and 33% in 2025/2030), taken from Table 6-5 of DWR's "Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report" (May 2005).

(3) Based on total amount of storage available divided by 4 (4-year dry period). Initial term of the Ventura County entities' flexible storage account is ten years (from 2006 to 2015).

(4) Total Saugus pumping is the average annual amount that would be pumped under the groundwater operating plan, as summarized in Table 3-6 ([11,000+15,000+25,000+35,000]/4).

(5) Recycled water supplies based on projections provided in Chapter 4, Recycled Water.

(6) CLWA is in the process of acquiring this supply, primarily to meet the potential demands of future annexations to the CLWA service area. This acquisition is consistent with CLWA's annexation policy under which it will not approve potential annexations unless additional water supplies are acquired. Currently proposed annexations have a demand for about 4,000 afy of this supply which, if approved, would leave the remaining 7,000 afy available for potential future annexations. Unless and until any such annexations are actually approved, this supply will be available to meet demands within the existing CLWA service area.

(7) Rosedale-Rio Bravo Water Banking and Recovery Program online in 2006, assuming CEQA complete and adoption by CLWA Board of Directors.

(8) Average dry year period supplies could be up to 20,000 af for each program depending on storage amounts at the beginning of the dry period.

(9) Assumes additional planned banking supplies available by 2014.

(10) Assumes increase in total demand of 10 percent during dry years.

(11) Demands are for uses within the existing CLWA service area. Demands for any annexations to the CLWA service area will be added if and when such annexations are approved. Currently proposed annexations have a demand for about 4,000 afy and, given supplies CLWA is in the process of acquiring, potential future annexations with demands up to an additional 7,000 afy could eventually be approved (see Footnote 6).

(12) Assumes 10 percent reduction on urban portion of total normal year demand resulting from conservation best management practices ([urban portion of total normal year demand x 1.10] * 0.10), as discussed in Chapter 7.

Chapter 7
DEMAND MANAGEMENT MEASURES

Chapter 7.0
WATER DEMAND MANAGEMENT MEASURES

7.1 OVERVIEW

This section describes the water Demand Management Measures (DMMs) and the Best Management Practices (BMPs) implemented by CLWA as a part of water conservation programs to result in quantifiable water savings for the Valley.

7.2 WATER DEMAND MANAGEMENT MEASURES AND BEST MANAGEMENT PRACTICES

Establishing goals and choosing water conservation measures is a continuing planning process. Goals are developed, adopted, and then evaluated periodically. Specific conservation measures are phased in and then evaluated for their effectiveness, achievement of desired results, and customer satisfaction. Water conservation can achieve a number of goals such as:

- Meeting legal mandates
- Reducing average annual potable water demands
- Reducing wastewater flows
- Reducing urban runoff
- Reducing demands during peak seasons
- Meeting drought restrictions

The Act specifies 14 DMMs. The Act was revised in 2000 to relate the DMMs to the 14 BMPs of the California Urban Water Conservation Council (CUWCC).

The CUWCC was formed in 1991 through the "Memorandum of Understanding Regarding Urban Water Conservation in California." The urban water conservation BMPs included in the MOU are intended to reduce California's long-term urban water demands. The BMPs are currently implemented by the signatories to the MOU on a voluntary basis. However, the CALFED Bay-Delta Program (now the California Bay-Delta Authority) included mandatory implementation of the BMPs and certification of water use efficiency programs in its final Environmental Impact Statement/Report and Record of Decision. Work toward this certification requirement has taken place during the five year planning period since 2000, but to date a final decision on such a requirement has not been made by the Bay-Delta Authority. Therefore, implementation of the BMPs/DMMs continues to be voluntary.

After adoption of the 2000 UWMP, CLWA signed the urban MOU in February 2001 on its own behalf as a water wholesaler and on behalf of the local retail water purveyors, thus meeting one of the recommendations of the 2000 UWMP. NCWD signed the MOU separately on its own behalf in September 2002. Los Angeles County signed the MOU prior to the 2000 UWMP on

behalf of all its Waterworks Districts. The retail purveyors have voluntarily complied with those BMPs considered locally cost-effective, as discussed in Section 7.3.

7.3 IMPLEMENTATION LEVELS OF DMMs/BMPs

The CUWCC is composed of over 150 urban water suppliers and 30 environmental organizations, as well as other interested companies and organizations. It has spent much of its existence determining the methodology by which savings from various water conservation measures (BMPs) can be quantified. The CUWCC has published "Guidelines to Preparing Cost-effectiveness Analysis" and a "BMP Cost and Savings Study," which assigns the water savings that can be ascribed to specific devices and activities when making cost-effectiveness evaluations for specific BMPs.

The BMP Cost and Savings Study recognizes two categories of BMPs: device-based and activity-based. Device-based BMPs, such as showerhead and toilet replacement programs, are intended to alter water use patterns through the actual installation of water-saving appliances. Activity-based BMPs, such as school education and public information programs, are intended to modify social behaviors to encourage people to save water. The savings from device-based BMPs can be directly quantified and attributed, whereas savings from activity-based BMPs are usually not possible to quantify. Device-based BMPs will result in quantifiable water savings for the Valley.

CLWA has been implementing the following BMPs, which pertain to wholesalers and retailers (with the exception of BMP 10), for the past several years (both prior to and after signing the urban MOU):

BMP 3	System Water Audits, Leak Detection and Repair
BMP 7	Public Information
BMP 8	School Education
BMP 10	Wholesale Agency Assistance
BMP 11	Conservation Pricing
BMP 12	Conservation Coordinator

CLWA implements BMP 8 on behalf of all the retailers.

In addition, since signing the urban MOU, CLWA has been assisting the purveyors by implementing BMPs 2 (Residential Plumbing Retrofit) and 14 (Residential Ultra Low Flush Toilet Replacement Programs). CLWA and VWC also undertook a pilot program to assess the cost-effectiveness of BMP 5 (Large Landscape Conservation Programs and Incentives) and BMP 9 (Conservation Programs for Commercial, Industrial, and Institutional Accounts). These two BMPs will see increased focus during the next five year planning period of this Plan. NCWD has been implementing all cost-effective BMPs since it signed the MOU.

Three BMPs are undergoing revision by the CUWCC and their implementation will be re-assessed during this planning period.

Signatories to the urban MOU are allowed by Water Code Section 10631(j) to include their biennial CUWCC BMP reports in an UWMP to meet the requirements of the DMMs sections of the UWMP Act. As a wholesaler MOU signatory, CLWA assists with BMP implementation and reporting for two retail purveyors: SCWD and VWC. NCWD, as a separate MOU signatory, is responsible for BMP implementation and reporting for its own retail service area. LACWWD #36 BMP implementation and reporting is done by the County of Los Angeles on behalf of all its Waterworks Districts. For the purposes of this Plan, the most recent BMP reports (2003 and 2004) as required by the urban MOU are attached as Appendix F. This appendix includes the reports for CLWA (wholesale), SCWD, and VWC. NCWD's separate report is also included in Appendix F.

7.4 SUMMARY OF CONSERVATION

CLWA will continue to implement the BMPs applicable to a wholesale water agency (BMPs 3, 7, 8, 10, 11, and 12), as well as other BMPs found to be locally cost-effective. NCWD will continue to implement all locally cost-effective BMPs for its service area. VWC, while not a signatory, will also continue to implement all cost-effective BMPs in its service territory.

CLWA, in cooperation with the retail purveyors, continues development and implementation of a comprehensive water conservation program. The program will expand existing water conservation activities and BMP implementation. These efforts will be tied to water conservation programs in adjoining urban areas making appropriate improvements to meet the unique conditions of the Valley.

Chapter 8
WATER SHORTAGE CONTINGENCY PLANNING

Chapter 8.0
WATER SHORTAGE CONTINGENCY PLANNING

8.1 OVERVIEW

Water supplies may be interrupted or reduced significantly in a number of ways, such as a drought which limits supplies, an earthquake which damages water delivery or storage facilities, a regional power outage, or a toxic spill that affects water quality. This chapter of the Plan describes how CLWA and the retail water purveyors plan to respond to such emergencies so that emergency needs are met promptly and equitably.

To date, both a Water Shortage Contingency Plan and a Drought Emergency Water Sharing Agreement have been prepared by CLWA and the retail purveyors. Prohibitions, penalties and financial impacts of shortages have recently been developed by CLWA SCWD, NCWD, and VWC and are summarized in this chapter.

8.2 COORDINATED PLANNING

CLWA and the purveyors have coordinated efforts in the past to meet water shortages. During 1991 (the fifth year of a six-year drought), the purveyors and CLWA prepared a Water Shortage Contingency Plan. Since this plan was first prepared, the Valley has experienced two water shortages: in 1991-1992 due to the continuation of the 1987-1992 drought and in 1994 due to the January 17, 1994, Northridge earthquake. The plan worked extremely well in both instances, and minor updates were made to incorporate what was actually experienced during these two periods. It is envisioned that the Water Shortage Contingency Plan will be implemented whenever needed on a contingency basis.

8.2.1 CLWA and the Water Purveyors

During times of normal supply, the water agencies meet periodically to review total water supply and demand in the Valley and any new regulations affecting the water industry.

During 1991, the local agencies met about once per month. Monthly water production and demand reports were produced and shared with the City of Santa Clarita Drought Committee. Also, after the 1987-1992 drought, CLWA and the retail purveyors cooperated in sharing available water from all sources without regard to contractual or other water rights for the duration of the emergency, and to facilitate among themselves water transfers, exchanges, and arrangements to use each others distribution facilities. Should water shortage conditions similar to the 1987-1992 drought occur again, it is expected that similar coordinated planning between the local agencies would be conducted.

8.2.2 City of Santa Clarita Drought Committee

The City of Santa Clarita Drought Committee was created by the City's Ordinance No. 91-16, adopted on March 13, 1991. The committee was made up of five appointees representing the

public, a representative of the City Staff, purveyor representatives, and a representative from CLWA. The function was to:

- Review all available data on water consumption, water supply and groundwater conditions
- Evaluate the level of compliance with the terms of the ordinance
- Evaluate the level of achievement of the stated water consumption reductions
- Make recommendations to the City Council concerning the timing of and need for implementation of future additional water restrictions as may be developed
- Make recommendations to the water purveyors serving the City of Santa Clarita concerning additional measures to encourage water conservation

From its inception and through the crucial summer months of 1991, the group met twice monthly. In the event of another drought or water shortage crisis, such a committee could be reinstituted. The 1991 ordinances, resolutions and agreements in Appendix G will be used as the model for the water shortage contingency resolution/ordinance package.

8.3 STAGES OF ACTION TO RESPOND TO WATER SHORTAGES

The Saugus Formation has underground storage of approximately 1.65 million acre-feet. In times of continued drought, the Saugus Formation can be pumped for temporary periods above its normal-year production. During an extended drought, the purveyors would consider upgrading the pumping capacity of their wells in the Saugus Formation and possibly drill additional wells to enable temporary pumping above the normal-year production of 7,500 to 15,000 afy. As developed in the Valley's groundwater operating plan and presented in Table 3-6, production in the Saugus Formation can be as high as 25,000-35,000 afy during multiple-dry year periods.

The Alluvium would be most affected by a continued local drought. As developed in the Valley's groundwater operating plan and further presented in Table 3-6, sustainable production during normal years can range from 30,000 to 40,000 afy. However, due to operational constraints in the eastern part of the Basin, production would be reduced to approximately 30,000 to 35,000 afy during locally dry years.

Table 8-1 presents the four-stage rationing and demand reduction goals for the Valley.

Table 8-1
Rationing and Reduction Goals

Deficiency	Stage	Demand Reduction Goal	Type of Program
Up to 15%	1	15% reduction	Voluntary
15-25%	2	25% reduction	Mandatory
25-35%	3	35% reduction	Mandatory
35-50%	4	50+% reduction	Mandatory

Priorities for use of available water, based on Chapter 3 of the California Water Code, are:

- Health and Safety—Interior residential, sanitation and fire protection
- Commercial, Industrial, and Governmental—Maintain jobs and economic base
- Existing Landscaping—Especially trees and shrubs
- New Demand—Projects with permits when shortage declared

Water quantity calculations used to determine the interior household gpcd requirements for health and safety are provided in Table 8-2. As developed in Table 8-2, the California Water Code Stage 2, 3, and 4 health and safety allotments are 68 gpcd, or 33 ccf (100 cubic feet) per person per year. When considering this allotment and the 2005 Valley Planning Area population of 249,343, as presented in Table 2-7, the total annual water supply required to meet the first priority use during a water shortage is approximately 19,000 afy.

Table 8-2
Per Capita Health and Safety Water Quantity Calculations

	Non-Conserving Fixtures		Habit Changes		Conserving Fixtures	
Toilets	5 flushes x 5.5 gpf =	27.5	3 flushes x 5.5 gpf =	16.5	5 flushes x 1.6 gpf =	8.0
Showers	5 min x 4.0 gpm =	20.0	4 min x 3.0 gpm =	12.0	5 min x 2.0 gpm =	10.0
Washers	12.5 gpcd (1/3 load) =	12.5	11.5 gpcd (1/3 load) =	11.5	11.5 gpcd (1/3 load) =	11.5
Kitchens	4 gpcd =	4.0	4 gpcd =	4.0	4 gpcd =	4.0
Other	4 gpcd =	4.0	4 gpcd =	4.0	4 gpcd =	4.0
Total gpcd		68.0		48.0		37.5
CCF per capita per year		33.0		23.0		18.0

8.4 MINIMUM WATER SUPPLY AVAILABLE DURING NEXT THREE YEARS

The minimum water supply available during the next three years would occur during a three-year multiple-dry year event between the years 2006 and 2008. As shown in Table 8-3, the total supplies and banking range from approximately 103,500 afy to 120,500 afy during the next three years. When comparing these supplies to the demand projections provided in Chapters 2 and 6 of this Plan, CLWA and the purveyors have adequate supplies available to meet projected demands should a multiple-dry year period occur during the next three years.

Table 8-3
Estimate of Minimum Supply for the Next Three Years

Source	Supply (af)		
	2006	2007	2008
Wholesale Imported	*29,620*	*29,620*	*29,620*
SWP Table A Supply (1)	27,600	27,600	27,600
Flexible Storage Account (CLWA) (2)	1,560	1,560	1,560
Flexible Storage Account (Ventura County) (2)	460	460	460
Local Supply			
Groundwater	*37,500*	*54,500*	*54,500*
Alluvial Aquifer	32,500	32,500	32,500
Saugus Formation	5,000	22,000	22,000
Recycled Water	1,700	1,700	1,700
Transfers			
Buena Vista-Rosedale (3)	11,000	11,000	11,000
Banking Programs	*23,600*	*23,600*	*23,600*
Semitropic Water Bank (4)	16,900	16,900	16,900
Rosedale-Rio Bravo (5) (6)	6,700	6,700	6,700
Total Supplies	**103,420**	**120,420**	**120,420**

Notes:

(1) SWP supplies are calculated by multiplying CLWA's Table A Amount of 95,200 af by percentages of total deliveries projected to be available for the worst case three-year drought of 1990-1992, calculated from data in Table B-8 of DWR's "Excerpts from Working Draft of 2005 State Water Project Delivery Reliability Report" (May 2005). The average of total SWP deliveries over this three year period was 29 percent of total Table A Amounts.

(2) Based on total amount of storage available divided by 3 (3-year dry period).

(3) CLWA is in the process of acquiring this supply, primarily to meet the potential demands of future annexations to the CLWA service area. This acquisition is consistent with CLWA's annexation policy under which it will not approve potential annexations unless additional water supplies are acquired. Currently proposed annexations have a demand for about 4,000 afy of this supply which, if approved, would leave the remaining 7,000 afy available for potential future annexations. Unless and until any such annexations are actually approved, this supply will be available to meet demands within the existing CLWA service area.

(4) Based on total amount of storage available (50,870 af) divided by 3 (3-year dry period) and rounded down to the nearest 100.

(5) Assumes Rosedale-Rio Bravo Water Banking and Recovery Program on line in 2006, based on completion of CEQA and subsequent adoption by CLWA Board of Directors.

(6) Based on total amount of storage available (20,000 af) divided by 3 (3-year dry period).

8.5 ACTIONS TO PREPARE FOR CATASTROPHIC INTERRUPTION

8.5.1 General

The Valley is located approximately 20 miles southwest of the San Andreas Fault. A major earthquake along the southern portion of the San Andreas Fault would affect the Valley. The California Division of Mines and Geology has stated two of the aqueduct systems that import

water to southern California could be ruptured by displacement on the San Andreas Fault, and supply may not be restored for a three to six week period. The situation would be further complicated by physical damage to pumping equipment and local loss of electrical power.

DWR has a contingency aqueduct outage plan for restoring the California Aqueduct to service should a major break occur, which it estimates would take approximately four months to repair.

Experts agree it may be at least three days after the earthquake before outside help could get to the Valley. Extended supply shortages of both groundwater and imported water, due to power outages and/or equipment damage, would be severe until the water supply could be restored.

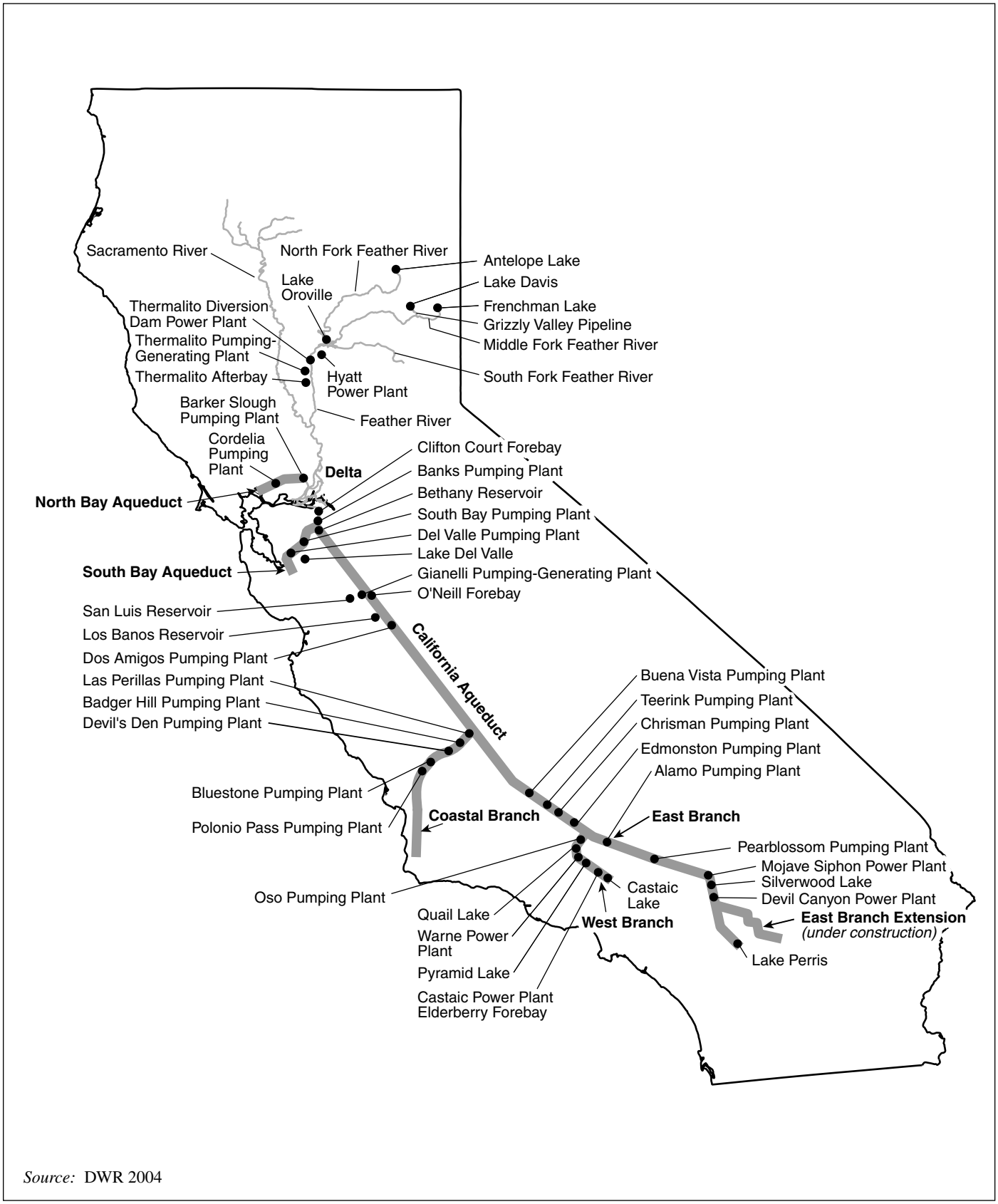
Combined water storage of the local agencies totals approximately 190 million gallons of water in storage tanks, which can be gravity fed to Valley residences, even if there is a power outage. In addition, since the 1994 Northridge earthquake, storage tanks have been fitted with flexible couplings, which should reduce damage to local storage facilities. The public would be asked to reduce consumption to minimum health and safety levels, extending the supply to seven days. This would provide sufficient time to restore a significant amount of groundwater production. After the groundwater supply is restored, the pumping capacity of the four retail purveyors, along with CLWA's proportionate share of storage from Pyramid and Castaic Lakes, could meet the reduced demand until such time that the imported water supply was reestablished. Updates on the water situation would be made as often as necessary.

The Valley's water sources are generally of good quality, and no insurmountable problems resulting from industrial or agricultural contamination are foreseen. If contamination did result from a toxic spill or similar accident, the contamination would be isolated and should not significantly impact the total water supply. In addition, such an event would be covered by the purveyors' emergency response plan. The recent detection of perchlorate in the Saugus Formation and Alluvial Aquifer is an example of prior contamination due to industrial chemical processes. The few affected wells have been shut down; design of the treatment process to remove the perchlorate is near completion; and the wells are expected to return to service in 2006.

8.5.2 SWP Emergency Outage Scenarios

In addition to earthquakes, the SWP could experience other emergency outage scenarios. Past examples include slippage of aqueduct side panels into the California Aqueduct near Patterson in the mid-1990s, the Arroyo Pasajero flood event in 1995 (which also destroyed part of Interstate 5 near Los Banos), and various subsidence repairs needed along the East Branch of the Aqueduct since the 1980s. All these outages were short-term in nature (on the order of weeks), and DWR's Operations and Maintenance Division worked diligently to devise methods to keep the Aqueduct in operation while repairs were made. Thus, the SWP contractors experienced no interruption in deliveries.

One of the SWP's important design engineering features is the ability to isolate parts of the system. The Aqueduct is divided into "pools." Thus, if one reservoir or portion of the California Aqueduct is damaged in some way, other portions of the system can still remain in operation. The Primary SWP facilities are shown on Figure 8-1.



Source: DWR 2004

Figure 8-1. Primary SWP Facilities

Other events could result in significant outages and potential interruption of service. Examples of possible nature-caused events include a levee breach in the Delta near the Harvey O. Banks Pumping Plant, a flood or earthquake event that severely damaged the Aqueduct along its San Joaquin Valley traverse, or an earthquake event along either the West or East Branches. Such events could impact some or all SWP contractors south of the Delta.

The response of DWR, CLWA, and other SWP contractors to such events would be highly dependent on the type and location of any such event. In typical SWP operations, water flowing through the Delta is diverted at the SWP's main pumping facility, located in the southern Delta, and is pumped into the California Aqueduct. During the relatively heavier runoff period in the winter and early spring, Delta diversions generally exceed SWP contractor demands, and the excess is stored in San Luis Reservoir. Storage in SWP aqueduct terminal reservoirs, such as Pyramid and Castaic Lakes, is also refilled during this period. During the summer and fall, when diversions from the Delta are generally more limited and less than contractor demands, releases from San Luis Reservoir are used to make up the difference in deliveries to contractors. The SWP share of maximum storage capacity at San Luis Reservoir is 1,062,000 af.

CLWA receives its SWP deliveries through the West Branch of the California Aqueduct at Castaic Lake. The only other contractors receiving deliveries from the West Branch are Metropolitan and Ventura County Watershed Protection District (formerly known as the Ventura County Flood Control District). The West Branch has two terminal reservoirs, Pyramid Lake and Castaic Lake, which were designed to provide emergency storage and regulatory storage (i.e., storage to help meet peak summer deliveries) for CLWA and the other two West Branch contractors. Maximum operating capacity at Pyramid and Castaic lakes is 169,900 af and 323,700 af, respectively.

In addition to SWP storage south of the Delta in San Luis and the terminal reservoirs, a number of contractors have stored water in groundwater banking programs in the San Joaquin Valley, and many also have surface and groundwater storage within their own service areas.

Three scenarios that could impact the delivery to CLWA of its SWP supply, previously banked supplies, or other supplies delivered to it through the California Aqueduct are described below. For each of these scenarios, it was assumed that an outage of six months could occur. CLWA's ability to meet demands during the worst of these scenarios is presented following the scenario descriptions.

Scenario 1: Levee Breach Near Banks Pumping Plant

As demonstrated by the June 2004 Jones Tract levee breach and previous levee breaks, the Delta's levee system is fragile. The SWP's main pumping facility, Banks Pumping Plant, is located in the southern Delta. Should a major levee in the Delta near these facilities fail catastrophically, salt water from the eastern portions of San Francisco Bay would flow into the Delta, displacing the fresh water runoff that supplies the SWP. All pumping from the Delta would be disrupted until water quality conditions stabilized and returned to pre-breach conditions. The re-freshening of Delta water quality would require large amounts of additional Delta inflows, which might not be immediately available, depending on the timing of the levee

breach. The Jones Tract repairs took several weeks to accomplish and months to complete; a more severe breach could take much longer, during which time pumping from the Delta might not be available on a regular basis.

Assuming that the Banks Pumping Plant would be out of service for six months, DWR could continue making at least some SWP deliveries to all southern California contractors from water stored in San Luis Reservoir. The water available for such deliveries would be dependent on the storage in San Luis Reservoir at the time the outage occurred and could be minimal if it occurred in the late summer or early fall when San Luis Reservoir storage is typically low. In addition to supplies from San Luis Reservoir, water from the West Branch terminal reservoirs would also be available to the three West Branch contractors, including CLWA. CLWA water stored in groundwater banking programs in the San Joaquin Valley may also be available for withdrawal and delivery to CLWA.

Scenario 2: Complete Disruption of the California Aqueduct in the San Joaquin Valley

The 1995 flood event at Arroyo Pasajero demonstrated vulnerabilities of the California Aqueduct (the portion that traverses the San Joaquin Valley from San Luis Reservoir to Edmonston Pumping Plant). Should a similar flood event or an earthquake damage this portion of the aqueduct, deliveries from San Luis Reservoir could be interrupted for a period of time. DWR has informed the SWP contractors that a four-month outage could be expected in such an event. CLWA's assumption is a six-month outage.

Arroyo Pasajero is located downstream of San Luis Reservoir and upstream of the primary groundwater banking programs in the San Joaquin Valley. Assuming an outage at a location near Arroyo Pasajero that resulted in the California Aqueduct being out of service for six months, supplies from San Luis Reservoir would not be available to those SWP contractors located downstream of that point. However, CLWA water stored in groundwater banking programs in the San Joaquin Valley could be withdrawn and delivered to CLWA, and water from the West Branch terminal reservoirs would also be available to the three West Branch contractors, including CLWA. Assuming an outage at a location on the California Aqueduct south of the groundwater banking programs in the San Joaquin Valley, these supplies would not be available to CLWA, but water from the West Branch terminal reservoirs would be available to the three West Branch contractors, including CLWA.

Scenario 3: Complete Disruption of the West Branch of the California Aqueduct

The West Branch of the California Aqueduct begins at a bifurcation of the Aqueduct south of Edmonston Pumping Plant, which pumps SWP water through and across the Tehachapi Mountains. From the point of bifurcation, the West Branch is an open canal through Quail Lake, a small flow regulation reservoir, to the Peace Valley Pipeline, which carries water into Pyramid Lake. From Pyramid Lake, water is released into the Angeles Tunnel, through Castaic Powerplant into Elderberry Forebay, and then into Castaic Lake.

If a major earthquake (an event similar to or greater than the 1994 Northridge earthquake) were to damage a portion of the West Branch, deliveries could be interrupted. The exact location of

such damage along the West Branch would be key to determining emergency operations by DWR and the three West Branch SWP contractors. For this scenario, it was assumed that the West Branch would suffer a single-location break and deliveries of SWP water from north of the Tehachapi Mountains or of CLWA water stored in groundwater banking programs in the San Joaquin Valley would not be available. It was also assumed that Pyramid and Castaic dams would not be damaged by the event and that water in Pyramid and Castaic Lakes would be available to the three West Branch SWP contractors, including CLWA.

In any of these three SWP emergency outage scenarios, DWR and the SWP contractors would coordinate operations to minimize supply disruptions. Depending on the particular outage scenario or outage location, some or all of the SWP contractors south of the Delta might be affected. But even among those contractors, potential impacts would differ given each contractor's specific mix of other supplies and available storage. During past SWP outages, the SWP contractors have worked cooperatively to minimize supply impacts among all contractors. Past examples of such cooperation have included certain SWP contractors agreeing to rely more heavily on alternate supplies, allowing more of the outage-limited SWP supply to be delivered to other contractors; and exchanges among SWP contractors, allowing delivery of one contractor's SWP or other water to another contractor, with that water being returned after the outage was over.

Of these three SWP outage scenarios, the West Branch outage scenario presents the worst-case scenario for CLWA. In this scenario, CLWA would rely on local supplies and water available from Pyramid and Castaic Lakes. An assessment of the supplies available to meet demands in CLWA's service area during a six-month West Branch outage and the additional levels of conservation projected to be needed are presented in Table 8-4 for 2005 through 2030.

During an outage, the local supplies available would consist of groundwater from the Alluvial Aquifer and the Saugus Formation, as well as recycled water. It was assumed that local well production would be unimpaired by the outage and that the outage would occur during a year when average/normal supplies would be available from the Alluvial Aquifer. Pumping from the Saugus was assumed to be one-half of the annual supplies available in a single dry year. Note that adequate well and aquifer capacity exists to pump at levels higher than those assumed in this assessment, particularly during a temporary period such as an outage. However, to be conservative, groundwater production was assumed to be one-half of annual supplies. Based on the assumption that additional voluntary conservation could reduce the amount of waste discharge, and therefore the amount of recycled water available, the amount of recycled water assumed to be available would be reduced by 25 percent.

The water available to CLWA from Pyramid and Castaic Lakes includes flexible storage available to CLWA at Castaic Lake and emergency and potentially regulatory storage available in both Pyramid and Castaic Lakes. Regulatory storage, which is used to help meet high peak summer deliveries, may or may not be available depending on what time of year an outage occurs. For this assessment, regulatory storage was assumed to be unavailable. The amount of emergency storage assumed to be available to CLWA was based on CLWA's proportionate share of usable storage in each reservoir, where usable storage is maximum operating storage, less regulatory and dead pool storage. At Castaic Lake, this usable storage determination also

excludes the three West Branch contractors' total flexible storage. CLWA's proportionate share of usable storage was assumed to be slightly less than three percent, based on its share of capital cost repayment at each reservoir. On this cost repayment basis, the proportionate shares of the Metropolitan and Ventura County Flood Control District are about 96 percent and one percent, respectively.

Table 8-4 shows that, for a six-month emergency outage, additional conservation beyond the conservation BMPs described in Chapter 7 would be required, with the additional demand reductions ranging from three to 16 percent of the urban portion of total demand. It is likely that potential cooperation among SWP contractors and/or temporarily increased purveyor groundwater production during such an outage could increase supplies so that lower amounts, or even no amount, of additional conservation would be needed. However, even without such supply increases, these levels of additional conservation would be readily achievable. In an emergency such as this, these levels of additional conservation would likely be achieved through voluntary conservation, but mandatory measures would be enacted if needed.

Table 8-4
Projected Supplies and Demands During
Six-Month Disruption of Imported Supply System (1)

	Supply / Demand (af)					
	2005	2010	2015	2020	2025	2030
Local Supplies						
Existing Supplies						
Groundwater						
Alluvial Aquifer (2)	17,500	17,500	17,500	17,500	17,500	17,500
Saugus Formation (3)	5,000	7,500	7,500	7,500	7,500	7,500
Recycled Water (4) (5)	190	600	640	640	640	640
Planned Supplies						
Groundwater (3)						
Restored wells (Saugus Formation)	0	5,000	5,000	5,000	5,000	5,000
New Wells (Saugus Formation)	0	0	0	5,000	5,000	5,000
Recycled Water (5)	0	0	600	2,360	4,130	5,890
Total Existing and Planned Local Supplies	22,690	30,600	31,240	38,000	39,770	41,530
SWP West Branch Storage Available						
Flexible Storage (at Castaic Lake)						
Existing (CLWA)	4,680	4,680	4,680	4,680	4,680	4,680
Existing (Ventura County) (6)	0	1,380	1,380	0	0	0
Emergency Storage						
Pyramid Lake (7)	4,370	4,370	4,370	4,370	4,370	4,370
Castaic Lake (8)	3,370	3,370	3,370	3,370	3,370	3,370
Total West Branch Storage	12,420	13,800	13,800	12,420	12,420	12,420
Total Local Supplies and West Branch Storage	35,110	44,400	45,040	50,420	52,190	53,950
Demands (9)						
Total Estimated Demand (w/o Conservation) (10)	44,700	50,000	54,700	58,600	64,200	69,100
Conservation (11)	(3,700)	(4,300)	(4,900)	(5,300)	(6,000)	(6,500)
Total Demand (w/ Conservation)	41,000	45,700	49,800	53,300	58,200	62,600
Additional Conservation Required	5,900	1,300	4,800	2,900	6,000	8,700
Additional Conservation as Percent of Demand (12)	16%	3%	10%	5%	10%	13%

Notes:

(1) Assumes complete disruption in SWP supplies and in deliveries through the California Aqueduct for six months.

(2) Pumping from the Alluvial Aquifer is assumed to be one-half of average/normal year supplies (see Table 6-2).

(3) Pumping from the Saugus Formation is assumed to be one-half of single dry year supplies (see Table 6-3).

(4) Existing recycled water supply is based on one-half of current actual use of about 500 af for 2005, projected demand of 1,600 af for 2010, and existing supply of 1,700 af from 2015 on, as adjusted for the reduction described in Footnote 5.

(5) Assumes 25 percent reduction in waste discharge, and therefore in recycled water availability, due to additional voluntary conservation.

(6) Initial term of the Ventura County entities' flexible storage account is ten years (from 2006 to 2015).

(7) CLWA's share of usable storage at Pyramid Lake, based on its 2.817 percent proportionate share of capital cost repayment of the reservoir. Usable storage is assumed to be 165,100 af (maximum operating storage of 169,900 af, less regulatory storage of 10,000 af for making peak summer deliveries and dead pool storage of 4,800 af).

(8) CLWA's share of usable storage at Castaic Lake, based on its 2.927 percent proportionate share of capital cost repayment of the reservoir. Usable storage is assumed to be 115,100 af (maximum operating storage of 323,700 af, less regulatory storage of 30,000 af for making peak summer deliveries, total SWP contractor flexible storage of 160,000 af, and dead pool storage of 18,600 af).

(9) Demands are assumed to be one-half of average/normal year demands (see Table 2-2).

(10) Demands are for uses within the existing CLWA service area. Demands for any annexations to the CLWA service area will be added if and when such annexations are approved. During a six-month outage, currently proposed annexations would have a demand for about 2,000 afy and, given supplies CLWA is in the process of acquiring, potential future annexations with demands up to an additional 3,500 afy could eventually be approved.

(11) Assumes 10 percent reduction on urban portion of total demand resulting from conservation best management practices, as discussed in Chapter 7.

(12) Additional Conservation is expressed as percent of urban portion of total demand, since an outage would result in shortfall only to purveyors' customers (i.e., urban users).

8.5.3 Regional Power Outage Scenarios

For a major emergency such as an earthquake, Southern California Edison (Edison) has declared that in the event of an outage, power would be restored within a 24 hour period. Following the Northridge earthquake, Edison was able to restore power within 19 hours. Edison experienced extensive damage to several key power stations, yet was still able to recover within a 24 hour timeframe.

CLWA

To specifically address the concern of water outages due to loss of power, CLWA has equipped its two treatment plants with generators to produce power for treating water to comply with the State of California Safe Drinking Water Act and the Health and Safety Code. The Rio Vista Water Treatment Plant and Intake Pump Station emergency generator system provides electrical power to treat 30 mgd for 72 hours without fuel replacement. The Earl Schmidt Filtration Plant emergency generator system provides electrical power to treat 33 mgd for 72 hours without fuel replacement.

CLWA SCWD

SCWD is committed to providing regular service and meeting the needs of the community during any emergency situation. SCWD is obligated to respond to emergencies by using all available resources in the most effective way possible. SCWD has prepared an Emergency Response Plan that provides emergency operations procedures for the effective use of resources during various emergency situations. Emergency situations include but are not limited to: earthquakes, major fire emergencies, water outages due to loss of power, localized flooding, water contamination, and acts of sabotage.

To specifically address the concerns of water outages due to loss of power, SCWD has purchased and maintains one mobile generator and has the ability to obtain emergency access to others. The current generator is trailer mounted and has the capability of supplying 180 Kilovolt-Amperes (KVA). This capacity provides the capability to run any facility within the service area of SCWD. Most primary pumping facilities are equipped with emergency transfer switches, and SCWD employees are trained regularly to install and operate the generators in the most efficient and safe manner. The generator's run time is only limited by the amount of available diesel fuel. SCWD has an above ground diesel fuel storage tank with a capacity of 1,000 gallons located at its Warehouse at 21110 West Golden Triangle Road in the City of Santa Clarita. SCWD maintains one carrier truck, which is equipped with the capability of dispensing 100 gallons of diesel as necessary in refilling the generators. In addition, SCWD maintains a trailer-mounted 100 gallon diesel tank that will be deployed as required to preserve services. SCWD will respond to power outages on a prioritized basis and will continue its response to the power emergency as long as necessary. In addition to the generators, SCWD has a gas driven pump capable of delivering a maximum 2,000 gallons per minute (gpm). This pump can be installed at select facilities and run as required.

NCWD

NCWD fully understands its role in providing a vital service to the community. NCWD is obligated to respond to emergencies by using all available resources in the most effective way possible. NCWD has prepared an Emergency Response Plan that provides emergency operations procedures for the effective use of NCWD resources during various emergency situations. Emergency situations meant to be addressed by this plan are: earthquakes, major fire emergencies, water outages due to loss of power, localized flooding, water contamination, and acts of sabotage. To specifically address the concerns of water outages due to loss of power, NCWD has purchased and maintains three mobile generators. The generators are trailer mounted and have the following capacities: 600 KVA; 300 KVA; and 180 KVA.

These capacities provide the capability to run any facility within NCWD's service area. All primary pumping facilities are equipped with emergency transfer switches, and NCWD employees are trained regularly to maximize the speed to install and operate the generators. The generator run time is only limited by the amount of available diesel fuel. NCWD has an above ground diesel fuel storage tank with a capacity of 1,000 gallons located at its main office at 23780 N. Pine Street in the City of Santa Clarita. Multiple crew trucks are equipped with 100 gallon diesel tanks and the necessary fueling equipment to refill the generators. NCWD would respond to power outages on a prioritized basis and would continue its response to the power emergency as long as necessary. In addition to the generators, NCWD has a gas driven pump capable of delivering 600 gpm. This pump can be installed at select facilities as needed.

The NCWD Emergency Response Plan should be referenced for a more detailed description of specific actions NCWD plans to take in the event of a major power failure.

VWC

In the event that a power outage occurs, VWC has one mobile generator capable of powering either one of VWC's Saugus wells or two Alluvial wells that are in close proximity to one another. VWC would use the generator as a back-up to ensure water service remained until Edison was able to restore power. For regional power outages, VWC would rely on Edison's reliability criteria for restoring service with the longest outage assumed not to exceed 24 hours. This length of outage would not have a significant impact on water service.

The VWC Emergency Response Plan should be referenced for a more detailed description of specific actions VWC plans to take in the event of a major power failure.

8.6 MANDATORY PROHIBITIONS DURING SHORTAGES

All Valley residents live within the boundaries of the City of Santa Clarita or Los Angeles County. Several ordinances were passed in 1991, during the last long-term drought, by the various governmental entities in the Santa Clarita Valley outlawing wasteful water practices. It is expected that, if the Valley experienced another dry-year period, the same ordinances would be reactivated.

On February 11, 1991, the CLWA Board of Directors adopted Resolution No. 804 mandating a program of water conservation in the Santa Clarita Valley.

On February 14, 1991, the NCWD Board of Directors adopted Resolution No. 101 outlawing wasteful water practices. The ordinance was amended on October 15, 1991, with the adoption of Ordinance No. 102 and further amended on July 14, 2005, with the adoption of Ordinance No. 112.

On March 13, 1991, the City of Santa Clarita adopted Ordinance No. 91-16 outlawing wasteful water practices and calling for voluntary water conservation. The ordinance was amended on October 8, 1991 by the adoption of Ordinance No. 91-48.

On March 21, 1991, the Los Angeles County Board of Supervisors adopted Ordinance No. 91-0046U, which prohibits wasteful water practices.

Most of the ordinances mentioned above had sunset provisions that were effective January 1, 1992; however, these ordinances could be reinstituted as needed.

8.7 CONSUMPTIVE REDUCTION METHODS DURING RESTRICTIONS

8.7.1 Supply Shortage Triggering Levels

The agencies will manage water supplies to minimize the social and economic impact of water shortages. The Plan is designed to provide a minimum 50 percent of normal supply during a severe or extended water shortage.

Demand reduction stages may be triggered by a shortage in any one of the water sources in the Valley or by shortages in a combination of supplies. The guidelines for triggering the stages are listed in Table 8-5. However, circumstances may arise where the purveyors may deviate from these guidelines, such as in a case where the Governor declares a water shortage emergency and/or institutes a statewide rationing program.

Table 8-5
Water Deficiency Triggering Levels

Stage	Percent Shortage
1	Up to 15 percent water deficiency
2	15 to 25 percent water deficiency
3	25 to 35 percent water deficiency
4	35 to 50+ percent water deficiency

8.7.2 Consumption Limits

The Valley-wide consumption allocation method for each customer type is as follows:

Single Family	Hybrid of Per-capita and Percentage Reduction
Multi Family	Hybrid of Per-capita and Percentage Reduction

Commercial	Percentage Reduction
Industrial	Percentage Reduction
Governmental	Percentage Reduction
Recreational	Percentage Reduction
Irrigation	Percentage Reduction

The percentage reductions at each stage and for each customer type correspond to the figures listed in Table 8-4. In a drought situation (multiple-dry year period), individual customer allotments will be based on a normal year consumption table. The water agencies will classify each customer and calculate each customer's allotment according to Table 8-4. Each customer will be notified of its classification and allotment by mail before the implementation of a mandatory program. New customers and connections will be notified at the time service commences if a mandatory program is in effect. Any customer may appeal its classification on the basis of use or the allotment on the basis of incorrect calculation.

In a disaster, prior notice of allotment may not be possible. Notice will be provided by the most efficient means available, if necessary, through the terms of the CLWA's Emergency Response Plan.

8.7.3 New Demand

During any declared water shortage emergency requiring mandatory rationing, the retail purveyors recommend that the City and County building departments continue to process applications for grading and building permits, but not issue the actual permits until mandatory rationing is rescinded. In Stages 3 and 4, it may be necessary to discontinue all use of grading water, even if permits have been issued, and consider banning all use of water for non-essential uses, such as new landscaping and pools.

8.8 PENALTIES FOR EXCESSIVE USE

The following section provides a summary of the penalties, if any, that are implemented for excessive water use for CLWA SCWD, NCWD, and VWC.

8.8.1 CLWA Santa Clarita Water Division

The SCWD has one commodity rate for all customer classes, so no excessive use penalties are in place.

8.8.2 Newhall County Water District

In July 2005, NCWD's Board of Directors adopted Ordinance No. 112, which addresses water conservation, shortage, drought, and emergency response procedures. NCWD's Water Conservation Action Plan states that no water user shall waste water or make, cause, or permit the use of water for any purpose contrary to any provision of Ordinance No. 112, or in quantities in excess of the use permitted by the conservation stage in effect. If excessive use (water leaks and/or waste) is detected from any water user, the following enforcement plan will be followed:

Efficient Water Use and Stage 1 Enforcement:

- Any sign of water leaks and/or waste will be documented.
- NCWD will then determine the appropriate level of action to inform the water user of the guidelines in Ordinance No. 112 and will encourage more efficient water use.

Stages 2, 3, and 4 Enforcement:

- First Violation: NCWD shall issue a verbal warning to the water user and recommend corrective action.
- Second Violation: NCWD shall issue a written warning to the water user, and a fine of $40 shall be added to the water user's bill if the corrective action is not taken within 30 days after receiving the written warning.
- Third Violation: A fine of $100 shall be added to the water user's bill if the corrective action is not taken within 30 days after receiving the written warning. In addition, the NCWD Board or General Manager may require installation of a flow-restricting device on the water user's service connection.
- Fourth Violation: For the fourth and any additional violations, a fine of $250 shall be added to the water user's bill at the property where the violation occurred. NCWD may also discontinue the water user's water service at the property where the violation occurred. Reconnection shall be permitted only when there is reasonable protection against future violations, such as a flow-restricting device on the customer's service connection, as determined at NCWD's discretion.

NCWD Enforcement Costs: NCWD shall be reimbursed for its costs and expenses in enforcing the provisions of Ordinance No. 112, including costs incurred for staff to investigate and monitor the water user's compliance with the terms of the Ordinance. Charges for installation of flow-restricting devices or for discontinuing or restoring water service, as NCWD incurs those charges, shall be added to the water user's bill at the property where the enforcement costs were incurred.

8.8.3 Valencia Water Company

VWC is regulated by the PUC. During times of threatened or actual water shortage, the PUC will require that VWC apportion its available water supply among its customers. In the absence of direction from the PUC, VWC will apportion the supply in the manner that appears most equitable under circumstances then prevailing and with the cooperation of the Valley water purveyors with due regard to public health and safety.

The PUC's methodology for water utilities to implement Water Conservation Plans is documented in Standard Practice U-40-W, "Instructions for Water Conservation, Rationing, and Service Connection Moratoria." Water shortage contingency plans must be approved by the PUC prior to implementation by VWC. As stated in the Standard Practice U-40-W, the PUC shall

authorize mandatory conservation and rationing by approving Schedule No. 14.1, Mandatory Water Conservation and Rationing. Schedule No. 14.1 sets forth water use violation fines, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect.

8.9 FINANCIAL IMPACTS OF ACTIONS DURING SHORTAGES

The following section addresses the financial impacts of actions during water shortages for CLWA SCWD, NCWD, and VWC.

8.9.1 CLWA Santa Clarita Water Division

Approximately 45 percent of SCWD's expenses are variable and will be reduced proportionately with any reduction in sales due to voluntary or mandatory conservation. The remaining 55 percent of expenses are fixed and will not decrease as a result of reduced sales. Also, only 50 percent of the fixed expenses are included in the meter charge, and 70 percent of SCWD's revenues are generated by the commodity and energy charge.

As a result of the 1987-1992 drought, the Valley's retail water purveyors asked their retail customers to voluntarily reduce water use in 1992. The customers temporarily achieved a 25 percent reduction in usage. Approximately 70 percent of SCWD's revenues are derived from the commodity charge. A reduction of 25 percent could dramatically affect the financial stability of SCWD and impact its ability to meet its payment obligations and fund its capital program. Rather than being faced with the necessity of raising rates during a drought period, the Board directed staff to establish and maintain a Water Conservation Rate Stabilization Fund to be used in years when actual consumption drops 10 percent or more below average consumption. The Rate Stabilization Fund, established to address the financial impacts of water shortages, was approved by the Board in 2004.

8.9.2 Newhall County Water District

NCWD's rates are designed with the intent that NCWD will generate adequate revenues to meet the costs of operating the water system. For the 2005-06 budget year, it is expected that 26 percent of NCWD's total water revenues will come from the service charge and about 74 percent of the total revenues will come from the commodity charge. The service charge is based on meter size and the commodity charge is based on the quantity of water consumed.

The nature of NCWD's operation (as with any water utility) is that the majority of the operating costs are "fixed" in nature and do not increase or decrease in direct proportion with increases or decreases in water use by customers. For example, if water availability issues or shortages cause NCWD to request a voluntary reduction in the customer's water use, two-thirds of the operating costs will remain the same even though less water is sold. This would result in a major revenue shortfall.

In an effort to address this shortfall, NCWD established a reserve policy (Resolution 2005-26), that includes a "rate stabilization" fund to be used in situations where actual consumption of

water is reduced as a direct result of a water shortage situation as defined in Table 8-1 of this Plan.

In the event of a declaration of a water shortage situation, NCWD's Board of Directors will consider options and actions intended to replenish the rate stabilization reserve to its ideal level. These actions may include but are not limited to rate increases or surcharges, per customer assessments, and utilization of other reserve funds.

8.9.3 Valencia Water Company

The PUC allows the investor owned water utilities it regulates to track and seek recovery of lost revenues and expense increases due to mandatory or voluntary water rationing during a drought. PUC regulated utilities' rates are set based on an assumed level of customer water usage during normal weather conditions. Therefore, when a drought occurs and customers conserve water, a utility's revenue declines, and it is difficult for the utility to fund its operating expenses. In order to provide an incentive for utilities to promote water conservation during periods of drought, the PUC developed a mechanism whereby utilities can track lost revenues as well as increases in expenses due to drought. Utilities can then recover a portion of their lost revenues and expense increases via a surcharge to customers. This reduces the financial strain conservation programs place on investor owned utilities while furthering the statewide goal of water conservation during periods of drought.

8.10 WATER SHORTAGE CONTINGENCY RESOLUTION

If a water shortage crisis reoccurs, such as the 1987-1992 drought, the water agencies will call a public hearing to declare a water shortage pursuant to Sections 351 and 352 of the California Water Code.

The Los Angeles County Board of Supervisors (on behalf of LACWWD #36) and NCWD's and CLWA's respective Boards of Directors would adopt ordinances, similar to those adopted in 1991, implementing the Water Shortage Contingency Plan. As stated in Section 8.6, in February 1991, the CLWA Board of Directors adopted Resolution No. 804, which recognized reductions in requested delivery of SWP supply and mandated water conservation in the Valley.

VWC would file an advice letter with the CPUC implementing the Water shortage Contingency Plan.

8.11 MECHANISM TO DETERMINE REDUCTIONS IN WATER USE

Demand

NCWD, SCWD, and VWC bill their customers on a monthly basis. The prior year's consumption is included on most customer bills. This allows comparison of the total consumption from each billing period to the same billing period from the prior year.

Production

Under normal conditions, CLWA, NCWD, SCWD, and VWC prepare monthly production reports, which are reviewed and compared to production reports and pumping statistics from the same period of the prior year. Under water shortage conditions, these production reports could be prepared as often as daily.

Stage 1 and 2 Water Shortages

During Stage 1 and 2 Water Shortages, retail purveyors will review selected production reports on a daily basis, and CLWA will provide each retail purveyor with a copy of its daily production report. The water agencies will meet on a more frequent basis to review water supply and demand in the Valley. Billing reports will be reviewed to identify users who are not abiding by the plan.

Stage 3 and 4 Water Shortages

During Stage 3 and 4 Water Shortages, the retail purveyors will review all production reports and pumping statistics on a daily basis. The water agencies will continue to monitor the supply and demand in the Valley. Water transfers and agreements to use each other's distribution facilities will be implemented as needed. Billing reports will be reviewed to identify users who are not abiding by the plan.

Disaster Shortage

During a disaster shortage, management will continually monitor production figures. The water agencies will work to transfer water and use each other's distribution facilities where feasible.

Appendix A
UWMP Checklist

Appendix A
2005 Urban Water Management Plan Checklist

Yes	No			
Coordination with Appropriate Agencies				(Water Code §10620 (d)(1)(2))
✓		Participated in area, regional, watershed or basin wide plan		1-2 Page or Chapter
✓		Describe the coordination of the plan preparation and anticipated benefits.		1-2 thru 1-4 Page or Chapter
Describe resource maximization / import minimization plan				(Water Code §10620 (f))
✓		Describe how water management tools / options maximize resources & minimize need to import water		1-5 Page or Chapter
Plan Updated in Years Ending in Five and Zero				(Water Code § 10621(a))
✓		Date updated and adopted plan received	*Adopted Nov. 9th, 2005*	1-2 thru 1-4 Page or Chapter
City and County Notification and Participation				(Water Code § 10621(b))
✓		Notify any city or county within service area of UWMP of plan review & revision		1-3 thru 1-5 Page or Chapter
✓		Consult and obtain comments from cities and counties within service area		1-3 thru 1-5 Page or Chapter
Service Area Information				(Water Code § 10631 (a))
✓		Include current and projected population		2-7 Page or Chapter
✓		Population projections were based on data from state, regional or local agency		2-7 Page or Chapter
✓		Describe climate characteristics that affect water management		1-8; 1-9; 2-9; 2-10 Page or Chapter
✓		Describe other demographic factors affecting water management		1-9 Page or Chapter
Water Sources				(Water Code § 10631 (b))
✓		Identify existing and planned water supply sources		3-1; chapter 3 Page or Chapter
✓		Provide current water supply quantities		3-1; chapter 3 Page or Chapter
✓		Provide planned water supply quantities		3-1; chapter 3 Page or Chapter
If Groundwater identified as existing or planned source				(Water Code §10631 (b)(1-4))
✓		Has management plan		3-6 thru 3-9 Page or Chapter
✓		Attached management plan (b)(1)		[attached to adopted plan] Page or Chapter
✓		Description of basin(s) (b)(2)		3-6 Page or Chapter
		Basin is adjudicated		-- Page or Chapter
		If adjudicated, attached order or decree (b)(2)		-- Page or Chapter
		Quantified amount of legal pumping right (b)(2)		-- Page or Chapter
✓		Analysis of location, amount & sufficiency, last five years (b)(3)		3-9 thru 3-18 Page or Chapter
✓		Analysis of location & amount projected, 20 years (b)(4)		3-9 thru 3-18 Page or Chapter
Reliability of Supply				(Water Code §10631 (c) (1-3)
✓		Describes the reliability of the water supply and vulnerability to seasonal or climatic shortage		Chapter 6 Page or Chapter
Water Sources Not Available on a Consistent Basis				(Water Code §10631 (c))
✓		Describe the reliability of the water supply due to seasonal or climatic shortages		3-3, 3-8, Chapter 6 Page or Chapter
✓		Describe the vulnerability of the water supply to seasonal or climatic shortages		1-8; 1-9; Chapter 6 Page or Chapter
✓		Describe plans to supplement/replace inconsistent sources with alternative sources/DMMs		3-17; 5-5; 5-10 Page or Chapter
Transfer or Exchange Opportunities				(Water Code §10631 (d))
✓		Describe short term and long term exchange or transfer opportunities		3-19; 3-23 Page or Chapter
Water Use Provisions				(Water Code §10631 (e) (1-2))
✓		Quantify past water use by sector		2-4; 2-5 Page or Chapter
✓		Quantify current water use by sector		2-4; 2-5 Page or Chapter
✓		Project future water use by sector		2-4; 2-5 Page or Chapter
✓		Identify and quantify sales to other agencies		3-2, 3-3 Page or Chapter
✓		Identify and quantify additional water uses		Chapter 3 & 4 Page or Chapter
Demand Management Measures				(Water Code §10631 (f)(g))
✓		Agency is a CUWCC member		Chapter 7 Page or Chapter
✓		Annual BMP reports provided and considered completed by CUWCC website		Appendix F Page or Chapter
Planned Water Supply Projects and Programs				(Water Code §10631 (h))
✓		Detailed description of expected future supply projects & programs		3-22; 3-23 Page or Chapter
✓		Timeline for each proposed project		3-20 thru 3-23 Page or Chapter
✓		Quantification of each projects normal yield (AFY)		3-22; 3-23 Page or Chapter
✓		Quantification of each projects single dry-year yield (AFY)		3-22; 3-23 Page or Chapter
✓		Quantification of each projects multiple dry-year yield (AFY)		3-22; 3-23 Page or Chapter

Appendix A
2005 Urban Water Management Plan Checklist

Yes	No			
Opportunities for development of desalinated water				**(Water Code §10631 (i))**
✓		Describes opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply	**3-23 thru 3-25**	Page or Chapter
If Supplier receives or projects receiving water from a wholesale supplier				**(Water Code §10631 (k))**
✓		Agency receives, or projects receiving, wholesale water	**3-2 thru 3-6**	Page or Chapter
✓		Agency provided written demand projections to wholesaler, 20 years	**3-3**	Page or Chapter
✓		Wholesaler provided written water availability projections, by source, to agency, 20 years (if agency served by more than one wholesaler, duplicate this table and provide the source availability for each wholesaler)	**3-4**	Page or Chapter
✓		Reliability of wholesale supply provided in writing by wholesale agency (if agency served by more than one wholesaler, duplicate this table and provide the source availability for each wholesaler)	**3-5; chapter 6**	Page or Chapter
Water Shortage Contingency Plan Section				**(Water Code § 10632)**
Stages of Action				**(Water Code § 10632 (a))**
✓		Provide stages of action	**8-2**	Page or Chapter
✓		Provide the water supply conditions for each stage	**8-2**	Page or Chapter
✓		Includes plan for 50 percent supply shortage	**8-2**	Page or Chapter
Three-Year Minimum Water Supply				**(Water Code §10632 (b))**
✓		Identifies driest 3-year period	**8-3; 8-4**	Page or Chapter
✓		Minimum water supply available by source for the next three years	**8-3**	Page or Chapter
Preparation for catastrophic water supply interruption				**(Water Code §10632 (c))**
✓		Provided catastrophic supply interruption plan	**8-4 thru 8-13**	Page or Chapter
Prohibitions				**(Water Code § 10632 (d))**
✓		List the mandatory prohibitions against specific water use practices during water shortages	**8-13; 8-14**	Page or Chapter
Consumption Reduction Methods				**(Water Code § 10632 (e))**
✓		List the consumption reduction methods the water supplier will use to reduce water use in the most restrictive stages with up to a 50% reduction.	**8-14; 8-15**	Page or Chapter
Penalties				**(Water Code § 10632 (f))**
✓		List excessive use penalties or charges for excessive use	**8-15 thru 8-17**	Page or Chapter
Revenue and Expenditure Impacts				**(Water Code § 10632 (g))**
✓		Describe how actions and conditions impact revenues	**8-17; 8-18**	Page or Chapter
✓		Describe how actions and conditions impact expenditures	**8-17; 8-18**	Page or Chapter
✓		Describe measures to overcome the revenue and expenditure impacts	**8-17; 8-18**	Page or Chapter
Water Shortage Contingency Ordinance/Resolution				**(Water Code § 10632 (h))**
✓		Attach a copy of the draft water shortage contingency resolution or ordinance.	**Appendix G**	Page or Chapter
Reduction Measuring Mechanism				**(Water Code § 10632 (i))**
✓		Provided mechanisms for determining actual reductions	**8-18**	Page or Chapter
Recycling Plan Agency Coordination				**(Water Code § 10633)**
✓		Describe the coordination of the recycling plan preparation information to the extent available.	**4-1**	Page or Chapter
Wastewater System Description				**(Water Code § 10633 (a))**
✓		Describe the wastewater collection and treatment systems in the supplier's service area	**4-2; 4-3**	Page or Chapter
✓		Quantify the volume of wastewater collected and treated	**4-3**	Page or Chapter
Wastewater Disposal and Recycled Water Uses				**(Water Code § 10633 (a - d))**
✓		Describes methods of wastewater disposal	**4-5**	Page or Chapter
✓		Describe the current type, place and use of recycled water	**4-6; 4-7**	Page or Chapter
✓		Describe and quantify potential uses of recycled water	**4-7; 4-8**	Page or Chapter
✓		Determination of technical and economic feasibility of serving the potential uses	**4-7; 4-8**	Page or Chapter
Projected Uses of Recycled Water				**(Water Code § 10633 (e))**
✓		Projected use of recycled water, 20 years	**4-8**	Page or Chapter
✓		Compare UWMP 2000 projections with UWMP 2005 actual (§ 10633 (e))	**4-8**	Page or Chapter

Appendix A
2005 Urban Water Management Plan Checklist

Yes	No			
Plan to Optimize Use of Recycled Water			**(Water Code § 10633 (f))**	
✓		Describe actions that might be taken to encourage recycled water uses	**4-8, 4-9**	Page or Chapter
✓		Describe projected results of these actions in terms of acre-feet of recycled water used per year	**4-9**	Page or Chapter
✓		Provide a recycled water use optimization plan which includes actions to facilitate the use of recycled water (dual distribution systems, promote recirculating uses)	**4-9, 4-10**	Page or Chapter
Water quality impacts on availability of supply			**(Water Code §10634)**	
✓		Discusses water quality impacts (by source) upon water management strategies and supply reliability	**Chapter 5**	Page or Chapter
Supply and Demand Comparison to 20 Years			**(Water Code § 10635 (a))**	
✓		Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments.	**6-7**	Page or Chapter
Supply and Demand Comparison: Single-dry Year Scenario			**(Water Code § 10635 (a))**	
✓		Compare the projected single-dry year water supply to projected single-dry year water use over the next 20 years, in 5-year increments.	**6-8**	Page or Chapter
Supply and Demand Comparison: Multiple-dry Year Scenario			**(Water Code § 10635 (a))**	
✓		Project a multiple-dry year period (as identified in Table 9) occurring between 2006-2010 and compare projected supply and demand during those years	**6-9**	Page or Chapter
✓		Project a multiple-dry year period (as identified in Table 9) occurring between 2011-2015 and compare projected supply and demand during those years	**6-9**	Page or Chapter
✓		Project a multiple-dry year period (as identified in Table 9) occurring between 2016-2020 and compare projected supply and demand during those years	**6-9**	Page or Chapter
✓		Project a multiple-dry year period (as identified in Table 9) occurring between 2021-2025 and compare projected supply and demand during those years	**6-9**	Page or Chapter
Provision of Water Service Reliability section to cities/counties within service area			**(Water Code § 10635(b))**	
✓		Provided Water Service Reliability section of UWMP to cities and counties within which it provides water supplies within 60 days of UWMP submission to DWR	**[to be complied w/ adopted Plan]**	Page or Chapter
Does the Plan Include Public Participation and Plan Adoption			**(Water Code § 10642)**	
✓		Attach a copy of adoption resolution	**[attached to adopted Plan]**	Page or Chapter
✓		Encourage involvement of social, cultural & economic community groups	**1-3 thru 1-5; Appendix B**	Page or Chapter
✓		Plan available for public inspection	**1-3 thru 1-5; Appendix B**	Page or Chapter
✓		Provide proof of public hearing	**1-3 thru 1-5; Appendix B**	Page or Chapter
✓		Provided meeting notice to local governments	**1-3 thru 1-5; Appendix B**	Page or Chapter
Review of implementation of 2000 UWMP			**(Water Code § 10643)**	
✓		Reviewed implementation plan and schedule of 2000 UWMP	**Chapter 1**	Page or Chapter
✓		Implemented in accordance with the schedule set forth in plan	**Chapter 1**	Page or Chapter
Provision of 2005 UWMP to local governments			**(Water Code § 10644 (a))**	
✓		Provide 2005 UWMP to DWR, and cities and counties within 30 days of adoption	**[to be complied w/ upon adoption of Plan]**	Page or Chapter
Does the plan or correspondence accompanying it show where it is available for public review			**(Water Code § 10645)**	
✓		Does UWMP or correspondence accompanying it show where it is available for public review	**1-3**	Page or Chapter

Appendix B
Public Outreach Materials

UWMP 2005 Workshop and Public Hearing Schedule	
Date	**Meeting**
April 7, 2005	Community Workshop #1
June 29, 2005	Community Workshop #2
August 31, 2005	Community Workshop #3
September 28, 2005	First Joint Public Hearing
October 26, 2005	Second Joint Public Hearing

UWMP 2005 Outreach Meeting Schedule	
Date	**Meeting**
May 17, 2005	City of Santa Clarita Planning and Government Relations Staff
July 13, 2005	Building Industry Association Executive Director
August 3, 2005	Building Industry Association Government Affairs Committee
August 9, 2005	Santa Clarita Valley Government Affairs Committee
September 20, 2005	Santa Clarita Valley Chamber of Commerce Board
September 21, 2005	Castaic Town Council
September 22, 2005	Santa Clarita Valley Chamber of Commerce Environmental Committee

The Signal
3/29/05

SANTA CLARITA VALLEY

URBAN WATER MANAGEMENT PLAN

2005

CASTAIC LAKE WATER AGENCY AND THE SANTA CLARITA VALLEY WATER COMMUNITY ANNOUNCE THE PREPARATION OF THE 2005 URBAN WATER MANAGEMENT PLAN

The Urban Water Management Plan, mandated by the State of California, presents a picture of the Valley's water situation through the year 2030. It describes the long-range water needs of the community, and the means that will be used to supply the necessary water. We encourage your interest and involvement.

Kick-Off Community Workshop

Date: Thursday, April 7, 2005

Time: 6:00 pm

Location: Castaic Lake Water Agency,
Administration Building,
27234 Bouquet Canyon Road

Purpose: At this Kick-Off Community Workshop we will present an overview of the state requirements and an outline of the contents of the 2005 Urban Water Management Plan. Our team of experts will provide an overview and answer any questions. We will also provide an overview of the many opportunities for public comment during the preparation of the 2005 Urban Water Management Plan.

CASTAIC LAKE WATER AGENCY

Please call (661) 297-1600
for information.

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

Daily News
3/31/05

SANTA CLARITA VALLEY

URBAN WATER MANAGEMENT PLAN

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CASTAIC LAKE WATER AGENCY

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Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

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The Signal
Daily News
6/22/05

SANTA CLARITA VALLEY

URBAN WATER MANAGEMENT PLAN

2005

CASTAIC LAKE WATER AGENCY AND
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YOU ARE CORDIALLY INVITED TO ATTEND OUR NEXT WORKSHOP

JUNE 29, 2005
5:30 P.M.

June 2005	Preliminary Draft UWMP release for public comment
June 2005	Community Workshop to review UWMP and seek input
August 2005	Follow up Community Workshop – release Draft UWMP, review contents with the public
September 2005	First CLWA Public Hearing
October 2005	Second CLWA Public Hearing
October 2005	Final UWMP considered for approval by the CLWA Board and NCWD Board (at a joint meeting)

CASTAIC LAKE WATER AGENCY

All meetings will be held at
Castaic Lake Water Agency, Administration Building
27234 Bouquet Canyon Road, at times TBA.
Please call (661) 297-1600 for information.

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

Breakfast, Lunch and Dinner only $175.00.
All Golfers get a chance at the Hole In One contest for a car sponsored by Frontier Toyota as well as many other raffles and prizes.
Musical sendoff provided by Canyon High Marching Band and Happy Hour Jazz, by the Canyon High Jazz Band.
Register online at **www.goldstarbrigade.org** or call (661) 252-7076.
This is a Non-Profit event. For sponsorship information log onto our website or call the number above.

SANTA CLARITA VALLEY
URBAN WATER MANAGEMENT PLAN
2005

CASTAIC LAKE WATER AGENCY AND
THE SANTA CLARITA VALLEY WATER COMMUNITY
ANNOUNCE THE PREPARATION OF THE
2005 URBAN WATER MANAGEMENT PLAN

The Urban Water Management Plan, mandated by the State of California, presents a picture of the Valley's water situation through 2030. It describes the long-range water needs of the community, and the means that will be used to supply the necessary water. We encourage your interest and involvement.

YOU ARE CORDIALLY INVITED TO ATTEND OUR NEXT WORKSHOP
AUGUST 31, 2005
6:30 P.M.

June 2005	Preliminary Draft UWMP release for public comment
June 2005	Community Workshop to review UWMP and seek input
August 2005	Follow up Community Workshop – release Draft UWMP, review contents with the public
September 2005	First CLWA Public Hearing
October 2005	Second CLWA Public Hearing - UWMP considered for approval by the CLWA Board and NCWD Board (at a joint meeting)

CASTAIC LAKE WATER AGENCY

All meetings will be held at
Castaic Lake Water Agency, Administration Building
27234 Bouquet Canyon Road, at times TBA.
Please call (661) 297-1600 for information.

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

SANTA CLARITA VALLEY
URBAN WATER MANAGEMENT PLAN
2005

CASTAIC LAKE WATER AGENCY AND
THE SANTA CLARITA VALLEY WATER COMMUNITY
ANNOUNCE THE PREPARATION OF THE
2005 URBAN WATER MANAGEMENT PLAN

The Urban Water Management Plan, mandated by the State of California, presents a picture of the Valley's water situation through 2030. It describes the long-range water needs of the community, and the means that will be used to supply the necessary water. We encourage your interest and involvement.

YOU ARE CORDIALLY INVITED TO ATTEND OUR NEXT WORKSHOP

AUGUST 31, 2005
6:30 P.M.

June 2005	Preliminary Draft UWMP release for public comment
June 2005	Community Workshop to review UWMP and seek input
August 2005	Follow up Community Workshop – release Draft UWMP, review contents with the public
September 2005	First CLWA Public Hearing
October 2005	Second CLWA Public Hearing - UWMP considered for approval by the CLWA Board and NCWD Board (at a joint meeting)

CASTAIC LAKE WATER AGENCY

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Castaic Lake Water Agency, Administration Building
27234 Bouquet Canyon Road, at times TBA.
Please call (661) 297-1600 for information.

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company

The Signal
Monday
10-17-05
3 of 3

SANTA CLARITA VALLEY
URBAN WATER MANAGEMENT PLAN
2005

CASTAIC LAKE WATER AGENCY AND
THE SANTA CLARITA VALLEY WATER COMMUNITY
ANNOUNCE THE PREPARATION OF THE
2005 URBAN WATER MANAGEMENT PLAN

The Urban Water Management Plan, mandated by the State of California, presents a picture of the Valley's water situation through 2030. It describes the long-range water needs of the community, and the means that will be used to supply the necessary water. We encourage your interest and involvement.

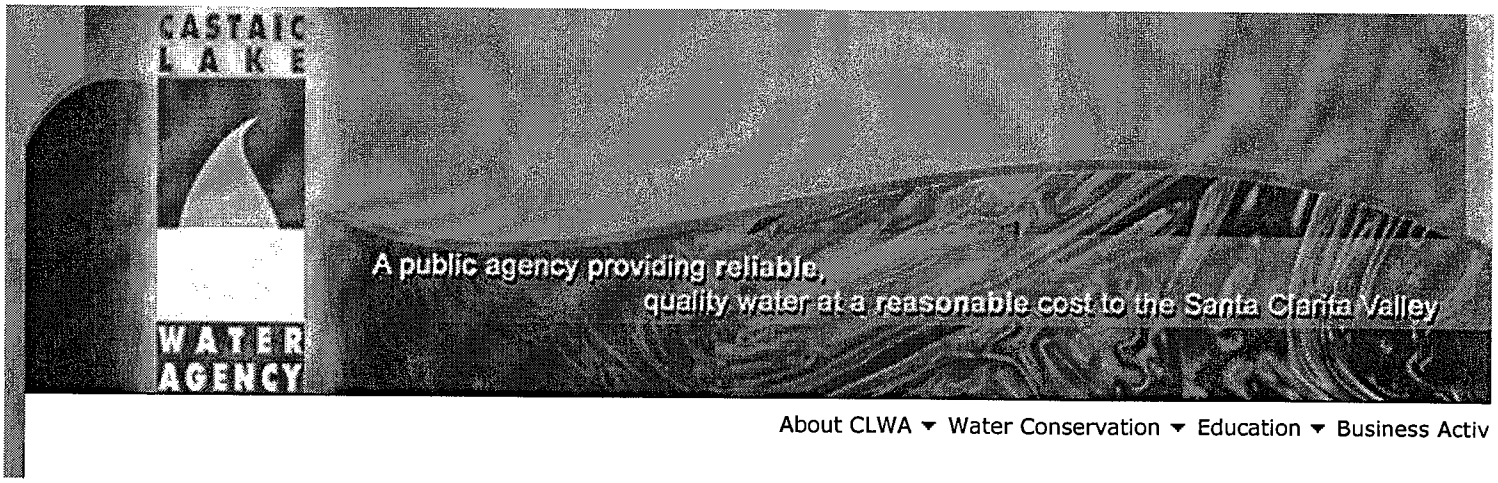
YOU ARE CORDIALLY INVITED TO ATTEND OUR NEXT PUBLIC HEARING
OCTOBER 26, 2005
7:00 P.M.

June 2005	Preliminary Draft UWMP release for public comment
June 2005	Community Workshop to review UWMP and seek input
August 2005	Follow up Community Workshop – release Draft UWMP, review contents with the public
September 23, 2005	First CLWA Public Hearing
October 26, 2005	Second CLWA Public Hearing - UWMP considered for approval by the CLWA Board and NCWD Board (at a joint meeting)

CASTAIC LAKE WATER AGENCY

Hearing will be held at
Castaic Lake Water Agency, Administration Building
27234 Bouquet Canyon Road
Please call (661) 297-1600 for information.

Castaic Lake Water Agency
CLWA Santa Clarita Water Division
Newhall County Water District
Valencia Water Company



Publications (Newsletters, etc.)

Important Notices

This is where new items, important notices and information on upcoming events are posted.

IMPORTANT: The Draft 2005 Urban Water Management Plan for the Santa Clarita Valley is available for review. PLEASE SCROLL TO THE BOTTOM OF THIS PAGE FOR MORE INFORMATION.

Draft 2005 Urban Water Management Plan for the Santa Clarita Valley

The Draft 2005 Urban Water Management Plan is prepared in accordance with the requirements of the Urban Water Management Planning Act (Water Code sections 10630 et seq.). Every five years, in years ending in "5" and "0," water suppliers having more th 3,000 service connections or selling at least 3,000 acre-feet of water per year must prepare a plan.

Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Newhall County Water District and Valencia Water Company ha prepared a joint regional plan for the Santa Clarita Valley, as encouraged by the Act. Los Angeles County Waterworks District No. 36 is participating on an ad hoc basis.

Two public hearings will be held to review the plan. Both hearings will he held during joint meetings of the CLWA and NCWD Boar of Directors, and will take place in the CLWA Board Room at the address shown below.

Wednesday, September 28, 2005 7:00 p.m.

Wednesday, October 26, 2005 7:00 p.m.

Written comments should be submitted to CLWA by 5:00 p.m., Wednesday, October 21, 2005. Comments should be directed to:

Mary Lou Cotton
Water Resources Manager
CLWA
27234 Bouquet Canyon Road
Santa Clarita, CA 91350
Fax: 661/297-1611

- Draft 2005 UWMP Introduction and Table of Contents
- Draft 2005 UWMP Chapters 1 through 4
- Draft 2005 UWMP Chapters 5 through 8
- Draft 2005 UWMP Appendix A
- Draft 2005 UWMP Appendix B
- Draft 2005 UWMP Appendix C
- Draft 2005 UWMP Appendix D
- Draft 2005 UWMP Appendix E

CASTAIC LAKE WATER AGENCY

Vital News About Water Issues in the Santa Clarita Valley Summer 2005

Water Currents

DIRECTORS
E. G. "Jerry" Gladbach
Dean D. Efstathiou
William C. Cooper
Robert J. Di Pizzo
William [illegible]
Peter Kavanaugh
Barbara D. [illegible]
Thomas P. Campbell
Edward A. Colley
Jacquelyn H. McMillan
R.J. Kelly

GENERAL MANAGER
Don Maszaro

Urban Water Management Plan to Address SCV Water Demand and Supply

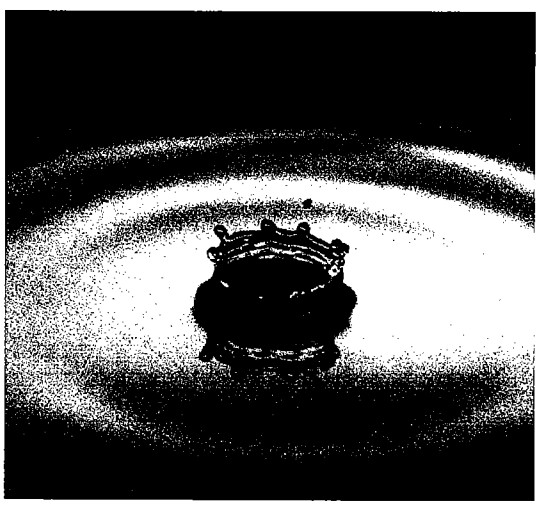
CLWA and the local water retailers are preparing a draft of the Santa Clarita Valley 2005 Urban Water Management Plan (UWMP) for review this summer and fall. All California urban water suppliers having more than 3,000 service connections or selling more than 3,000 acre-feet of water annually are required by the California Water Code to prepare a UWMP every five years. About 450 water suppliers statewide are affected. CLWA, CLWA Santa Clarita Water Division, Newhall County Water District (NCWD), and Valencia Water Company are working jointly to prepare a draft of a 2005 plan for the Santa Clarita Valley. Los Angeles County Waterworks District No. 36 is participating on an *ad hoc* basis, as the Los Angeles County Department of Public Works must prepare its own UWMP.

A UWMP must consider projected demands and supplies for a 20-year period, in five-year increments. It must also assess water supply and demand scenarios for average/normal water years (i.e., periods of normal precipitation), a single dry year, and multiple dry years.

The draft 2005 UWMP for the Santa Clarita Valley will identify current local and imported water supply sources, as well as potential future sources. Current sources include the State Water Project, local groundwater and recycled water. Future potential sources include all of these plus water transfers, additional recycled water, groundwater banking, water conservation and desalination.

The plan will identify future demand based on growth projections. By assessing projected demand along with projected supply, the 2005 UWMP will show how the Santa Clarita Valley will meet its water needs through 2030.

CLWA and the retailers published an amended 2000 UWMP this past January, which addresses in detail the issue of perchlorate contamination first detected in 1997 in certain groundwater wells adjacent to the former Whittaker-Bermite site. It describes plans for returning the contaminated wells to service.



Years of negotiations between CLWA, the local water retailers and the current and former owners of the site, in an effort to reach agreement on clean-up, were unproductive. In November 2000 CLWA and the retailers filed suit to compel the

Continued, page 4

CASTAIC LAKE WATER AGENCY

Vital News About Water Issues in the Santa Clarita Valley Fall 2005

Water Currents

DIRECTORS
E. G. "Jerry" Gladbach
Dean D. Efstathiou
William C. Cooper
Robert J. DiPrimio
William [illegible]
Peter Kuyers
Barbara D[illegible]
Thomas P. Campbell
Edward A. Colley
Jacquelyn H. McMillan
R.J. Kelly

GENERAL MANAGER
Dan Masnada

CLWA and Retailers Seek Public Comment on 2005 Urban Water Management Plan

The California Urban Water Planning Act requires water utilities to update and submit an Urban Water Management Plan (UWMP) every five years. CLWA is one of California's approximately 450 water suppliers now preparing such a plan. CLWA, CLWA Santa Clarita Water Division, Newhall County Water District (NCWD), and Valencia Water Company have worked together to prepare a draft of a 2005 plan for the Santa Clarita Valley. (Los Angeles County Waterworks District No. 36 is participating on an *ad hoc* basis, as the Los Angeles County Department of Public Works must prepare its own UWMP.)

A UWMP must consider projected demands and supplies for a 20-year period, in five-year increments. It must also assess water supply and demand scenarios for average/normal water years (i.e., periods of normal precipitation), a single dry year, and multiple dry years.

The draft 2005 UWMP for the Santa Clarita Valley is available for public review and comment. The Plan identifies current local and imported water supply sources, as well as potential future sources. Current sources include the State Water Project, local ground- water and recycled water. Future potential sources include all of these sources plus water transfers, additional recycled water, groundwater banking, water conservation and desalination.

The Plan identifies future demand based on growth projections. By assessing projected demand along with projected supply, the 2005 UWMP shows how the Santa Clarita Valley will meet its water needs through 2030.

Two public hearings to discuss the 2005 UWMP have been scheduled, the first of which was held on Wednesday, September 28, 2005, during a joint meeting of the CLWA and NCWD Boards of Directors . A second public hearing is scheduled for 7 p.m. on Wednesday, October 26, 2005. The hearing will be held in the CLWA Boardroom at 27234 Bouquet Canyon Road, Santa Clarita, CA 91350.

JEFFREY LAMBERT, AICP
Planning / Government Relations

March 26, 2005

Sand Canyon Area Well Owners Association
c/o 27363 Sand Canyon Road
Santa Clarita, CA 91387-3632

Subject: 2005 Santa Clarita Valley Urban Water Manager Plan

Dear Sand Canyon Well Owners Association:

We have begun to prepare the 2005 Santa Clarita Valley Urban Water Management Plan. In an effort to ensure all interested parties are fully informed and involved in our process, we have scheduled the first of many community workshops.

Date:	Thursday, April 7, 2005
Time:	6:00 pm
Location:	Castaic Lake Water Agency, Administration Building, 27234 Bouquet Canyon Road

The purpose of this Kick-Off Community Workshop is to present an overview of the state requirements and an outline of the contents of the 2005 Santa Clarita Valley Urban Water Management Plan.

I have enclosed a flyer for this workshop and encourage you to attend.

Sincerely,

Jeffrey Lambert, AICP
Public Outreach Manager, 2005 SCV UWMP

4603 Morse Avenue, Sherman Oaks, CA 91423, (818) 907-0294
Jeffrey@Jeffrey-Lambert.com

Ms. Dana Wisehart
United Water Conservation District
106 N. 8th Street
Santa Paula, California 93060

Stephan C. Volker
436 14th Street, Suite 1300
Oakland, California 94612

Sierra Club Angeles Chapter
3435 Wilshire Boulevard, Suite 320
Los Angeles, California 90010-1904

Friends of the Santa Clara River
660 Randy Drive
Newbury Park, California 91320-4323

Mr. Steve Cole
Acting General Manager
Newhall Country Water District
P.O. Box 220970
Newhall, California 91322-0970

Mr. Dennis Slivinski, Assistant County Counsel
County of Ventura
800 South Victoria Avenue
Ventura, California 93009-1830

Mr. David Todd
Office of Water Use Efficiency
CA Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Mr. Gerald Johns, Deputy Director
CA Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Jeffrey M. Smith, AICP
Southern CA Association of Governments
818 West Seventh Street, 12th Floor
Los Angeles, CA 90017-3435

McCormick, Kidman & Behrens, LLP
Russ Behrens, Esq.
695 Town Center Drive
Suite 400
Costa Mesa, California 92626-7187

Mr. Chris Stephens, Planning Director
Resource Management Agency
County of Ventura
800 South Victoria Avenue
Ventura, California 93009-1600

Mr. James Hartl
Director, Regional Planning
County of Los Angeles
320 West Temple Street
Los Angeles, CA 90012

Mr. Michael Murphy
Inter-Government Relations Officer
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355

Ms. Judy Reinsma, President
Santa Clarita Valley Well Owners Association
P.O. Box 800085
Santa Clarita, CA 91380

Sand Canyon Area Well Owners Association
c/o 27363 Sand Canyon Road
Santa Clarita, CA 91387-3632

Paul Fancett
Castaic Area Town Council
P.O. Box 325
Castaic, CA 91310

Paul Ash, President
Westranch Town Council
Hanger, Levine and Steinberg
21031 Ventura Blvd., Suite 800
Woodland Hills, CA 91364

Santa Clarita Sierra Club
21827 Parvin Dr.
Saugus, CA 91350

Santa Clarita Organization for Planning the Environment **SCOPE**
P.O. Box 1182
Canyon Country, CA
91386-1182

NOTE:
Those shaded addresses were sent Return Receipt (only Judy Reinsma was returned without evidence of receipt)

JEFFREY LAMBERT, AICP
Planning / Government Relations

June 21, 2005

Subject: 2005 Santa Clarita Valley Urban Water Management Plan

Dear:

As you know, we are preparing the 2005 Santa Clarita Valley Urban Water Management Plan. In an effort to ensure all interested parties are fully informed and involved in the process, we have scheduled the second community workshop.

Date:	Wednesday, June 29, 2005
Time:	5:30 pm
Location:	Castaic Lake Water Agency, Administration Building, 27234 Bouquet Canyon Road

The purpose of this Community Workshop is to present the Preliminary Draft 2005 UWMP and to seek your feedback. The Draft 2005 UWMP is scheduled to be released in August with public hearings scheduled for September and October.

I encourage you to attend and learn more about the 2005 Santa Clarita Valley Urban Water Management Plan.

Sincerely,

Jeffrey Lambert, AICP
Public Outreach Manager, 2005 SCV UWMP

4603 Morse Avenue, Sherman Oaks, CA 91423, (818) 907-0294
Jeffrey@Jeffrey-Lambert.com

JEFFREY LAMBERT, AICP
Planning / Government Relations
4603 Morse Avenue, Sherman Oaks, CA 91423, (818) 907-0294
Jeffrey@Jeffrey-Lambert.com

August 22, 2005

Subject: 2005 Santa Clarita Valley Urban Water Management Plan

Dear Interested Party:

As you know, the Santa Clarita Valley water suppliers are preparing the 2005 Santa Clarita Valley Urban Water Management Plan. This letter is intended to provide you with advanced information on upcoming public meetings. We have scheduled the third community workshop and have tentatively scheduled two public hearings at joint meetings of the Castaic Lake Water Agency and Newhall County Water District Boards of Directors. These meetings have been scheduled as follows:

What:	**Third Community Workshop**
Date:	Wednesday, August 31, 2005
Time:	6:30 pm
Location:	Castaic Lake Water Agency, Administration Building, 27234 Bouquet Canyon Road

What:	**Joint Public Hearing**
Date:	Wednesday, September 28, 2005 (tentative)
Time:	7:00 pm
Location:	Castaic Lake Water Agency, Administration Building, 27234 Bouquet Canyon Road

What:	**Joint Public Hearing (Second)**
Date:	Wednesday, October 26, 2005 (tentative)
Time:	7:00 pm
Location:	Castaic Lake Water Agency, Administration Building, 27234 Bouquet Canyon Road

The Draft 2005 UWMP is scheduled for release in mid- to late-August. The Draft 2005 UWMP will be available on the CLWA and NCWD web sites.

I encourage you to attend and be involved in the review and adoption of the 2005 Santa Clarita Valley Urban Water Management Plan.

Sincerely,

Jeffrey Lambert, AICP
Public Outreach Manager, 2005 SCV UWMP

Ms. Dana Wisehart
United Water Conservation District
106 N. 8th Street
Santa Paula, California 93060

Stephan C. Volker
436 14th Street, Suite 1300
Oakland, California 94612

Sierra Club Angeles Chapter
3435 Wilshire Boulevard, Suite 320
Los Angeles, California 90010-1904

Friends of the Santa Clara River
660 Randy Drive
Newbury Park, California 91320-4323

Mr. Steve Cole
Acting General Manager
Newhall Country Water District
P.O. Box 220970
Newhall, California 91322-0970

Mr. Dennis Slivinski, Assistant County Counsel
County of Ventura
800 South Victoria Avenue
Ventura, California 93009-1830

Mr. David Todd
Office of Water Use Efficiency
CA Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Mr. Gerald Johns, Deputy Director
CA Department of Water Resources
P.O. Box 942836
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Jeffrey M. Smith, AICP
Southern CA Association of Governments
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Russ Behrens, Esq.
695 Town Center Drive
Suite 400
Costa Mesa, California 92626-7187

Mr. Chris Stephens, Planning Director
Resource Management Agency
County of Ventura
800 South Victoria Avenue
Ventura, California 93009-1600

Mr. James Hartl
Director, Regional Planning
County of Los Angeles
320 West Temple Street
Los Angeles, CA 90012

Mr. Michael Murphy
Inter-Government Relations Officer
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355

Ms. Judy Reinsma, President
Santa Clarita Valley Well Owners Association
P.O. Box 800085
Santa Clarita, CA 91380

Sand Canyon Area Well Owners Association
c/o 27363 Sand Canyon Road
Santa Clarita, CA 91387-3632

Paul Fancett
Castaic Area Town Council
P.O. Box 325
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Hanger, Levine and Steinberg
21031 Ventura Blvd., Suite 800
Woodland Hills, CA 91364

Santa Clarita Sierra Club
21827 Parvin Dr.
Saugus, CA 91350

Santa Clarita Organization for Planning the Environment SCOPE
P.O. Box 1182
Canyon Country, CA
91386-1182

NOTE:
Those shaded addresses were sent Return Receipt (only Judy Reinsma was returned without evidence of receipt)

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Santa Clarita Organization for Planning the Environment **SCOPE**
P.O. Box 1182
Canyon Country, CA
91386-1182

Dear SCOPE:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

With this in mind, I am requesting an opportunity to meet with you at your convenience. We would like to present the most recent version of the 2005 UWMP and answer any questions you may have.

I look forward to meeting with you. Please contact me via my cell phone at (818) 605-1506 to arrange a meeting.

Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Santa Clarita Sierra Club
21827 Parvin Dr.
Saugus, CA 91350

Dear Santa Clarita Sierra Club:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

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Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Paul Ash, President
Westranch Town Council
Hanger, Levine and Steinberg
21031 Ventura Blvd., Suite 800
Woodland Hills, CA 91364

Dear Mr. Ash:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Paul Fancett
Castaic Area Town Council
P.O. Box 325
Castaic, CA 91310

Dear Mr. Fancett:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Sand Canyon Area Well Owners Association
c/o 27363 Sand Canyon Road
Santa Clarita, CA 91387-3632

Dear Sand Canyon Area Well Owners Association:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Ms. Judy Reinsma, President
Santa Clarita Valley Well Owners Association
P.O. Box 800085
Santa Clarita, CA 91380

Dear Ms. Reinsma:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Mr. Michael Murphy
Inter-Government Relations Officer
City of Santa Clarita
23920 Valencia Blvd.
Santa Clarita, CA 91355

Dear Mr. Murphy:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Mr. James Hartl
Director, Regional Planning
County of Los Angeles
320 West Temple Street
Los Angeles, CA 90012

Dear Mr. Hartl:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Mr. Chris Stephens, Planning Director
Resource Management Agency
County of Ventura
800 South Victoria Avenue
Ventura, California 93009-1600

Dear Mr. Stephens:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Jeffrey M. Smith, AICP
Southern CA Association of Governments
818 West Seventh Street, 12th Floor
Los Angeles, CA 90017-3435

Dear Mr. Smith:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Mr. Gerald Johns, Deputy Director
CA Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

Dear Mr. Johns:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Mr. David Todd
Office of Water Use Efficiency
CA Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Mr. Dennis Slivinski, Assistant County Counsel
County of Ventura
800 South Victoria Avenue
Ventura, California 93009-1830

Dear Mr. Slivinski:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Friends of the Santa Clara River
660 Randy Drive
Newbury Park, California 91320-4323

Dear Friends of the Santa Clara River:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Sierra Club Angeles Chapter
3435 Wilshire Boulevard, Suite 320
Los Angeles, California 90010-1904

Dear Sierra Club:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Stephan C. Volker
436 14th Street, Suite 1300
Oakland, California 94612

Dear Mr. Volker:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Sincerely,

Jeffrey Lambert, AICP

Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Ms. Dana Wisehart
United Water Conservation District
106 N. 8th Street
Santa Paula, California 93060

Dear Ms Wisehart:

As you know, the Santa Clarita Valley water agencies are preparing the 2005 Urban Water Management Plan. I have been asked to manage the public outreach component of this effort. This includes seeking opportunities to talk with interested community groups about the 2005 UWMP. We released the Preliminary Draft 2005 UWMP on June 27, 2005 and are working toward the release of the Draft 2005 UWMP in August.

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Jeffrey Lambert, AICP
Planning / Government Relations

July 20, 2005

Paul Ash, President
Westranch Town Council
Hanger, Levine & Steinberg
21031 Ventura Blvd, Suite 800
Woodland Hills, CA 91364-6512

Dear Mr. Ash:

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Sincerely,

Jeffrey Lambert, AICP

Appendix C
Groundwater Resources and Yield In the Santa Clarita Valley

Appendix C
Groundwater Resources and Yield in the Santa Clarita Valley

Introduction

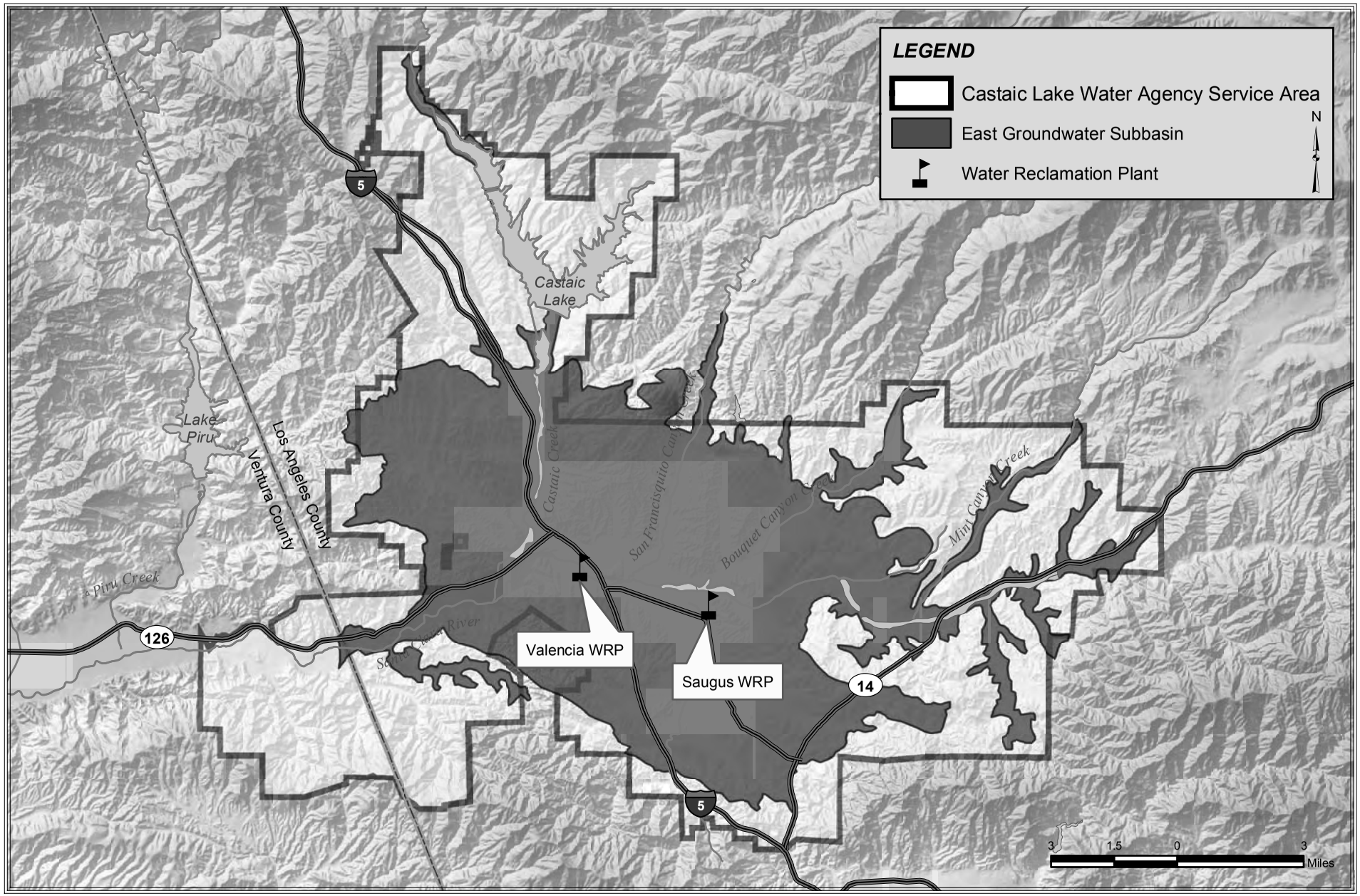
Beginning in the early part of the twentieth century, and continuing through the 1970s, local groundwater extracted from the two aquifers that comprise the local groundwater basin was the Santa Clarita Valley's sole source of water supply. Since 1980, local groundwater supplies have been supplemented with imported surface water from the State Water Project (SWP). In 2003, augmentation of those water supplies began with the initiation of deliveries from Castaic Lake Water Agency's (CLWA) recycled water system, which is anticipated to increase with time.

Santa Clara River Valley Groundwater Basin – East Subbasin

The groundwater basin generally beneath the Santa Clarita Valley, identified in the California Department of Water Resources' (DWR) Bulletin 118, 2003 Update as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin) (Basin No. 4-4.07), is comprised of two aquifer systems. The Alluvium generally underlies the Santa Clara River and its several tributaries and the Saugus Formation underlies practically the entire Upper Santa Clara River area. There are also some scattered outcrops of Terrace deposits in the Basin that likely contain limited amounts of groundwater; however, since these deposits are located in limited areas that are situated at elevations above the regional water table and are also of limited thickness, they are of no practical significance as aquifers and consequently have not been developed for any significant water supply. Figure C-1 illustrates the mapped extent of the Basin in DWR Bulletin 118 (2003), which approximately coincides with the outer extent of the Alluvium and Saugus Formation, and its relationship to the extent of the CLWA service area.

A 2001 Update Report on both the Alluvium and Saugus Formation Aquifers was completed by Richard C. Slade and Associates, Consulting Groundwater Geologists (Slade, 2002). That report updated the analyses and interpretation of hydrogeologic conditions from earlier reports (Slade, 1986 and 1988), including extensive detail on major aspects of the groundwater Basin. Notable parts of the 2001 Update Report includes:

- Description of the extensive additional data available since the original Alluvium and Saugus Formation reports were prepared in 1986 and 1988, respectively
- Organization of historic data into a Geographic Information System (GIS) database
- Description of the overall groundwater basin in conformance with that being mapped by the Department of Water Resources in Bulletin 118 (2003)



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure C-1
Santa Clara River Valley
East Groundwater Subbasin

- Analysis of historical groundwater levels and production, and conclusions that there have been no conditions that would be illustrative of groundwater overdraft
- Suggestion that utilization of operational yield (as opposed to perennial yield) as a basis for managing groundwater production would be more applicable in this basin to reflect
- Fluctuating utilization of groundwater in conjunction with utilization of imported SWP water
- Conclusion that operational yield of the Alluvium is 30,000 to 40,000 acre-feet per year (afy) for wet and average/normal rainfall years, with an expected reduction into the range of 30,000 to 35,000 afy in dry years
- Conclusion that operational yield of the Saugus Formation would be in the range of 7,500 to 15,000 afy on a long-term basis, with short-term increases during dry periods into a range of 15,000 to 25,000 afy, and to 35,000 afy if dry year conditions continue

Groundwater Management Plan

As part of legislation authorizing CLWA to provide retail water service to individual municipal customers in addition to its ongoing wholesale water supply, Assembly Bill 134 (2001) included a requirement that CLWA prepare a groundwater management plan in accordance with the provisions of Water Code Section 10753, which was originally enacted by, and is commonly known as, Assembly Bill 3030. The general contents of CLWA's groundwater management plan were outlined in 2002, and a detailed plan was drafted and adopted in 2003 to satisfy the requirements of AB 134. The plan both complements and formalizes a number of existing water supply and water resource planning and management activities in CLWA's service area, which effectively encompasses the East Subbasin of the Santa Clara River Valley Groundwater Basin.

CLWA adopted the Groundwater Management Plan (GWMP) in December 2003. As part of the GWMP, four management objectives, or goals, were established for the Basin including: (1) development of an integrated surface water, groundwater, and recycled water supply to meet existing and projected demands for municipal, agricultural, and other water uses; (2) assessment of groundwater Basin conditions to determine a range of operational yield values that will make use of local groundwater conjunctively with supplemental SWP supplies and recycled water to avoid groundwater overdraft, (3) preservation of groundwater quality, including active characterization and solution of any groundwater contamination problems, and (4) preservation of interrelated surface water resources, which includes managing groundwater to not adversely impact surface and groundwater discharges or quality to downstream basin(s).

The adopted GWMP includes 14 elements that are intended to accomplish the Basin management objectives listed above. In summary, the plan elements include:

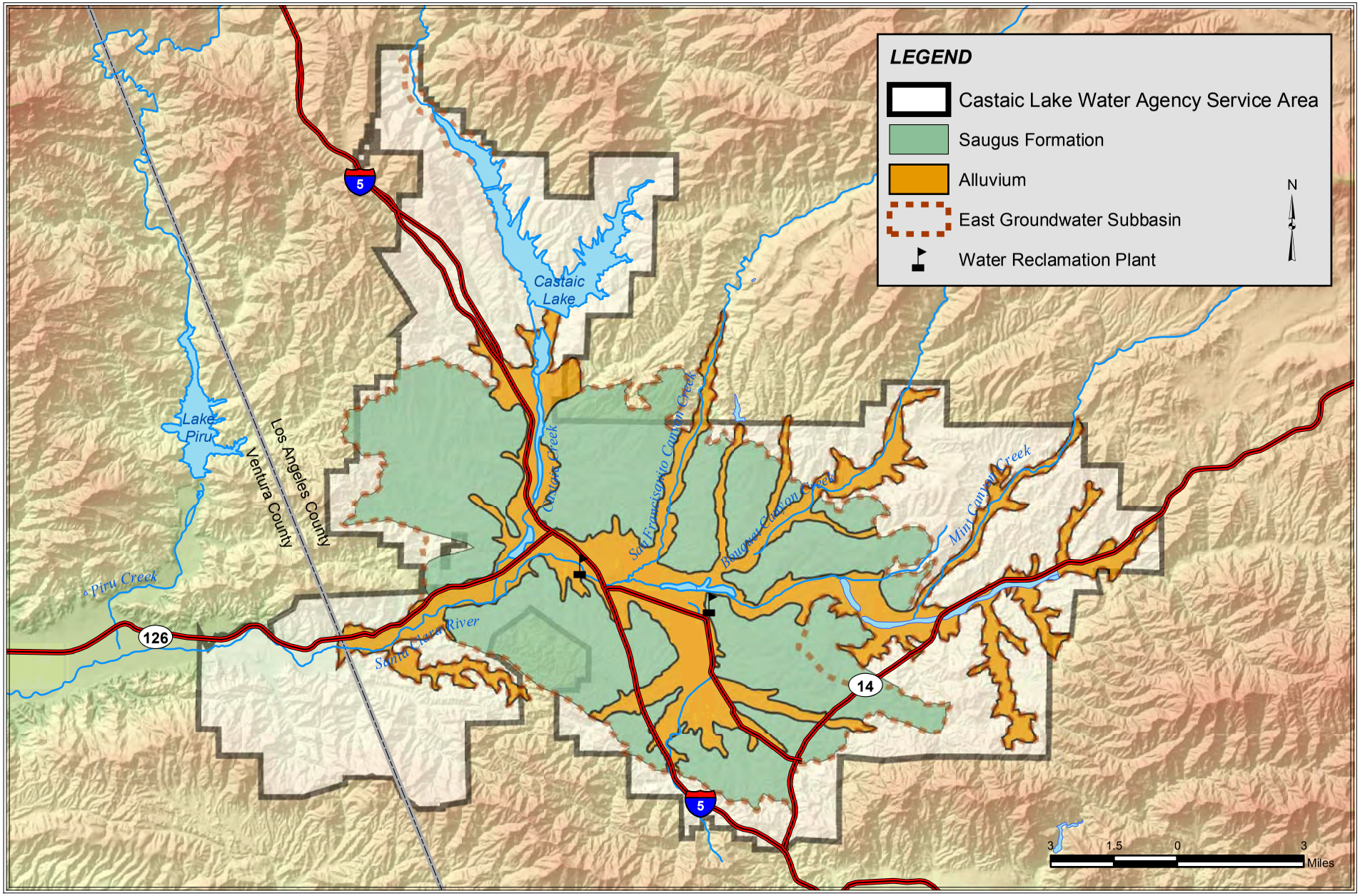
- Monitoring of groundwater levels, quality, production and subsidence
- Monitoring and management of surface water flows and quality
- Determination of Basin yield and avoidance of overdraft

- Development of regular and dry-year emergency water supply
- Continuation of conjunctive use operations
- Long-term salinity management
- Integration of recycled water
- Identification and mitigation of soil and groundwater contamination, including involvement with other local agencies in investigation, cleanup, and closure
- Development and continuation of local, state and federal agency relationships
- Groundwater management reports
- Continuation of public education and water conservation programs
- Identification and management of recharge areas and wellhead protection areas
- Identification of well construction, abandonment, and destruction policies
- Provisions to update the groundwater management plan

Alluvium – General

The Alluvial Aquifer system, of Quaternary to Holocene (recent) geologic age, consists primarily of stream channel and flood plain deposits of the Santa Clara River and its tributaries. The Alluvium is deepest along the center of the present river channel, with a maximum thickness of about 200 feet near the Saugus area. It thins toward the flanks of the adjoining hills and toward the eastern and western boundaries of the Basin and, in the tributaries, becomes a mere veneer in their upper reaches. The spatial extent of the Alluvium throughout the Basin is illustrated in Figure C-2.

Groundwater generally moves westward toward the outlet of the Basin, which is also the outlet of the Upper Santa Clara River Hydrologic Area. Thus, groundwater movement in the Alluvium beneath the tributaries is toward their confluence with the Santa Clara River and then westward in the Alluvium. From about Castaic Junction to Blue Cut, the Alluvium thins and narrows. This configuration forces groundwater to rise, keeping the depth to water at or close to the land surface. As discussed in more detail below, the general groundwater flow direction has remained unchanged whether groundwater levels are high or intermittently depressed. The San Gabriel and Holser faults traverse the Basin but neither fault measurably affects groundwater levels or flows in the Alluvium.



LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

Figure C-2
Alluvial and Saugus Formations
Santa Clara River Valley East Groundwater Subbasin

Alluvial wells are distributed throughout the basin along the Santa Clara River and its southwest draining tributaries. Figure C-3 illustrates the location of the wells operated by retail water purveyors and other known Alluvial wells in the Basin. The Alluvium is the most permeable of the local aquifer units. Based on well yields and aquifer testing, estimated transmissivity values of 50,000 to 500,000 gallons per day per foot have been reported for the Alluvium, with the higher values where the Alluvium is thickest in the center of the Valley and generally west of Bouquet Canyon. The amount of groundwater in storage in the Alluvium can vary because of the effects of recharge, discharge, and pumping from the aquifer. The maximum storage capacity of the Alluvium has been estimated to be 240,000 acre-feet (af).

Consistent with the 2001 Update Report (Slade, 2002), the current management practice of the local retail water purveyors is to continue a groundwater operating plan that generally results in total Alluvial pumping in the range of 30,000 to 40,000 afy, slightly reduced to 30,000 to 35,000 afy in dry periods. This operating plan maximizes use of the Alluvium because of the aquifer's ability to store and produce good quality water on a perennial basis, and because the Alluvium is capable of rapid recovery of water levels and storage in wet periods. As with many groundwater basins, it is possible to intermittently exceed the long-term average yield for one or more years without long-term adverse effects. In the eastern part of the Alluvial Aquifer system, pumping during dry periods results in intermittently lower water levels in that portion of the aquifer. However, management of pumping during dry periods limits the lowering of water levels, and normal-to-wet period recharge results in a rapid return of groundwater levels to historic highs. Historical groundwater data collected from the Alluvium over many hydrologic cycles provides assurance that groundwater elevations return to normal in average or wet years following periods during which the groundwater elevations have declined. In addition, high rainfall totals in only one to two years generally will cause water levels within the Alluvium to rise quickly and by a relatively large amount. Such water level response to rainfall is a significant characteristic of permeable, porous, alluvial aquifer systems that occur within large watersheds.

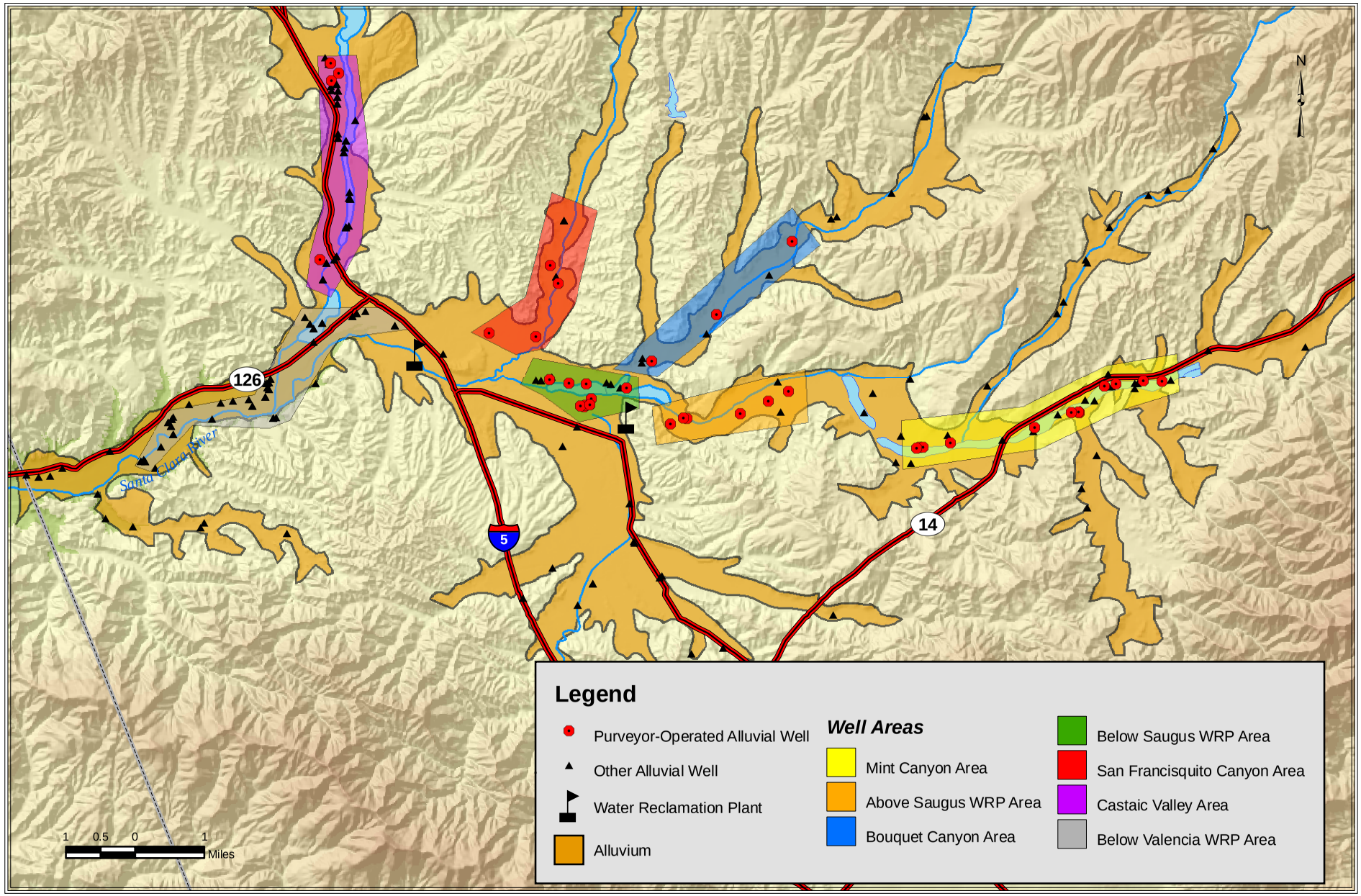


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Figure C-3
Alluvial Well Locations
Santa Clara River Valley, East Groundwater Subbasin

Alluvium – Historical and Current Conditions

Total pumpage from the Alluvium in 2004 was about 33,800 af, of which about 56 percent (19,000 af) was for municipal water supply, and the balance, about 44 percent (14,800 af), was for agriculture and other (minor) miscellaneous uses.

Alluvial pumpage has been recorded intermittently since the mid-1940s, and consistently since 1980. When pumpage records are unavailable (e.g., in the 1970s), data has been approximated to obtain a continuous historic record (Figure C-4). Alluvial pumpage from private wells, estimated to be at most 500 afy, has been included in the total Alluvial pumpage. Since the inception of SWP deliveries to CLWA in 1980, total pumpage from the Alluvium has ranged from a low of about 20,000 afy (in 1983) to slightly more than 43,000 afy (in 1999). Agricultural pumpage remained stable from the mid-1940's through about 1960, generally ranging from 33,000 to 37,000 afy, with annual pumpage as high as 41,000 af. From 1960 through the late 1970's, agricultural pumpage declined in a nearly linear trend, and has fluctuated slightly since then, between approximately 10,000 and 16,000 afy. As agricultural pumpage declined, municipal pumpage from the Alluvium increased from less than 4,000 afy in the 1950s to approximately 17,000 af in 1980. Beginning in 1980 with the importation of SWP water, municipal pumpage from the Alluvium declined to about 12,500 afy and remained stable throughout the 1980's. Municipal pumpage has subsequently increased to the current range of approximately 20,000 to 25,000 afy. Overall, there has been a change in municipal/agricultural pumping distribution since 1980, toward a slightly higher fraction for municipal water supply (from about 50 percent to nearly 60 percent of Alluvial pumpage), which reflects the general land use changes in the Valley.

The most recent analysis of the Alluvium (Slade, 2002) suggested that the operational yield of the Alluvium is 30,000 to 40,000 afy in average/normal and wet years, with a reduction to 30,000 to 35,000 afy in dry years. On a long-term basis since the importation of SWP water, total Alluvial pumpage has been about 30,500 afy (31,300 af in years with less than average precipitation, and 29,400 af in years with greater than average precipitation). These amounts are at the lower end of the range of operational yield of the Alluvium.

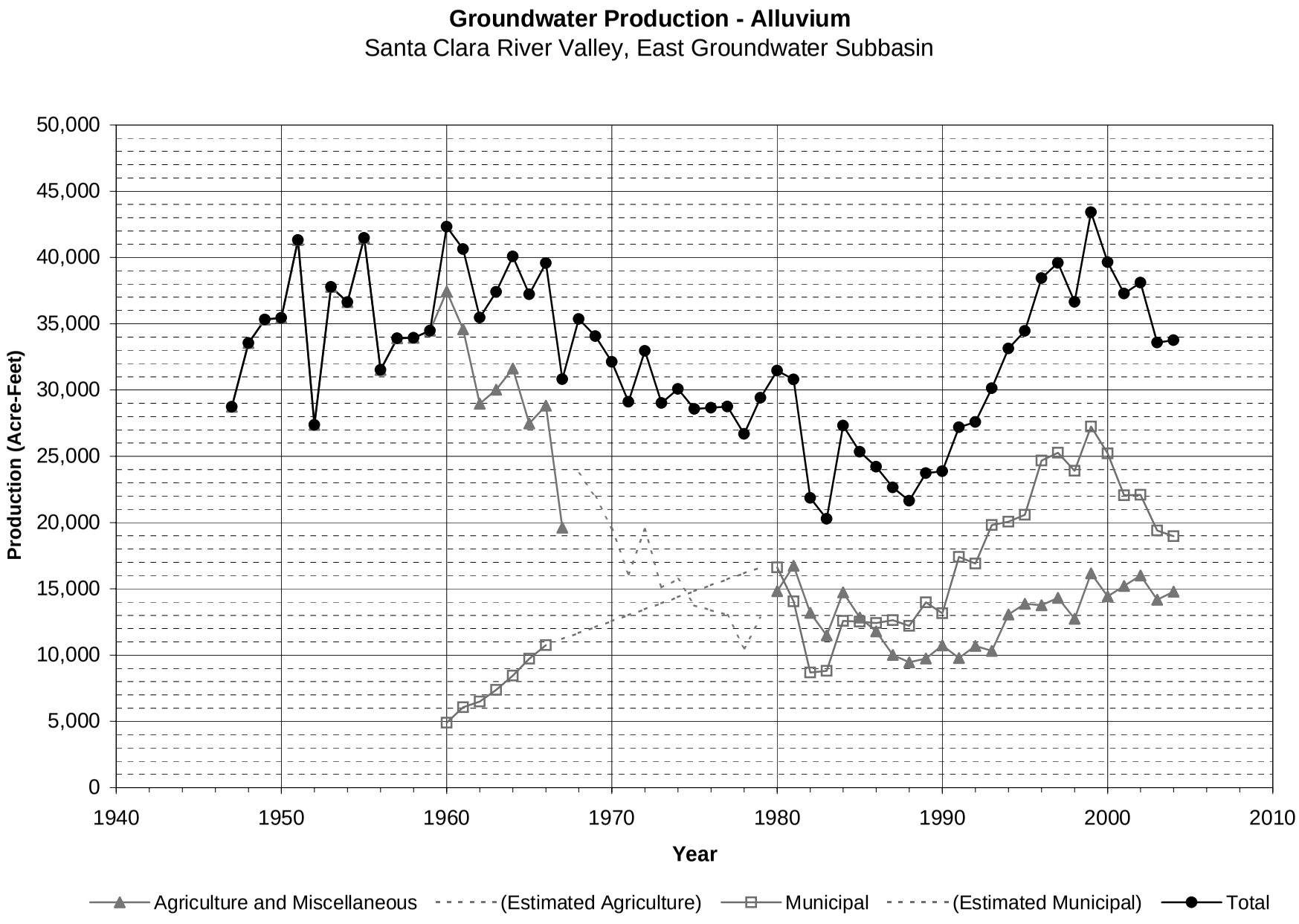

Groundwater Production - Alluvium
Santa Clara River Valley, East Groundwater Subbasin
Production (Acre-Feet)
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1940
1950
1960
1970
1980
1990
2000
2010
Year
Agriculture and Miscellaneous
(Estimated Agriculture)
Municipal
(Estimated Municipal)
Total

Figure C-4

Groundwater levels in various parts of the Basin have historically exhibited different responses to both pumpage and climatic fluctuations. During the last 20 to 30 years, in essentially all the alluvial portions of the Basin, groundwater levels have fluctuated from near the ground surface when the Basin is full, to as much as 100 feet lower when the Basin is pumped during intermittent dry periods of reduced recharge. Figure C-3 groups the Alluvial wells into areas with similar groundwater level fluctuations. Figures C-5 and C-6 present historical groundwater levels organized into hydrograph form (groundwater elevation vs. time) for four of these areas in the Basin. The other areas shown in Figure C-3 exhibit groundwater level responses similar to those in these four areas.

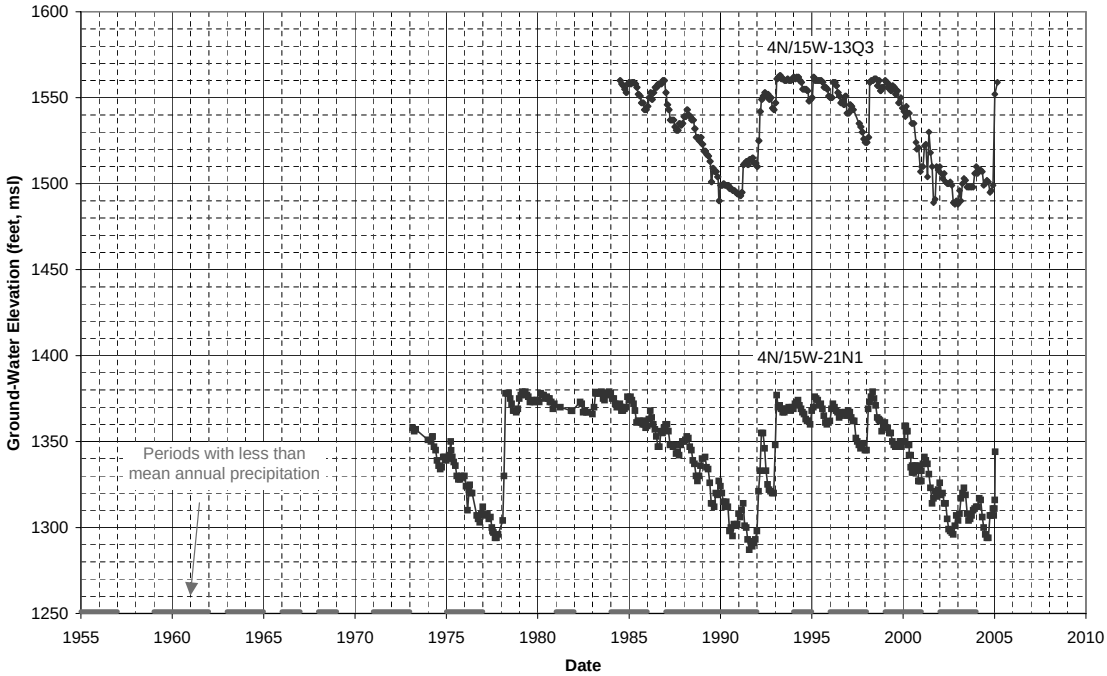
The 'Mint Canyon' area is located at the far eastern end of the Basin along the Santa Clara River. In this area, the Alluvium is shallower than in the western parts of the Basin; consequently, the area has historically exhibited the most dramatic responses to climatic fluctuations. The 'Above Saugus WRP' and 'Bouquet Canyon' areas generally exhibit groundwater level responses that are similar to those in the 'Mint Canyon' area.

The 'Below Saugus WRP' area is located along the Santa Clara River immediately downstream of the Saugus Water Reclamation Plant (WRP). This area has shown a dramatic increase in groundwater levels (30 to 60 feet) since the 1960s. The area now receives recharge from the treated wastewater discharged from the Saugus WRP to the Santa Clara River, and is located in one of the thickest areas of the Alluvium. The 'Below Saugus WRP' area exhibits groundwater level responses to climatic fluctuations, but these responses are much smaller than those further east in the Basin. The 'San Francisquito Canyon' area generally exhibits groundwater level responses that are similar to those in the 'Below Saugus WRP' area.

The 'Castaic Valley' area is located along Castaic Creek below Castaic Lake. Groundwater levels in this area have remained fairly constant, with slight responses to climatic fluctuations, since the 1950s.

The 'Below Valencia' WRP area is located along the Santa Clara River downstream of the Valencia WRP, and receives recharge from the treated wastewater discharged from the Valencia WRP to the Santa Clara River. Groundwater levels in this area exhibit slight, if any, response to climatic fluctuations, and have remained fairly constant since the 1950s.

Groundwater Elevation for 'Mint Canyon' Area Alluvial Wells
(lowest and highest for area shown)



Groundwater Elevation for 'Below Saugus WRP' Area Alluvial Wells
(lowest and highest for area shown)

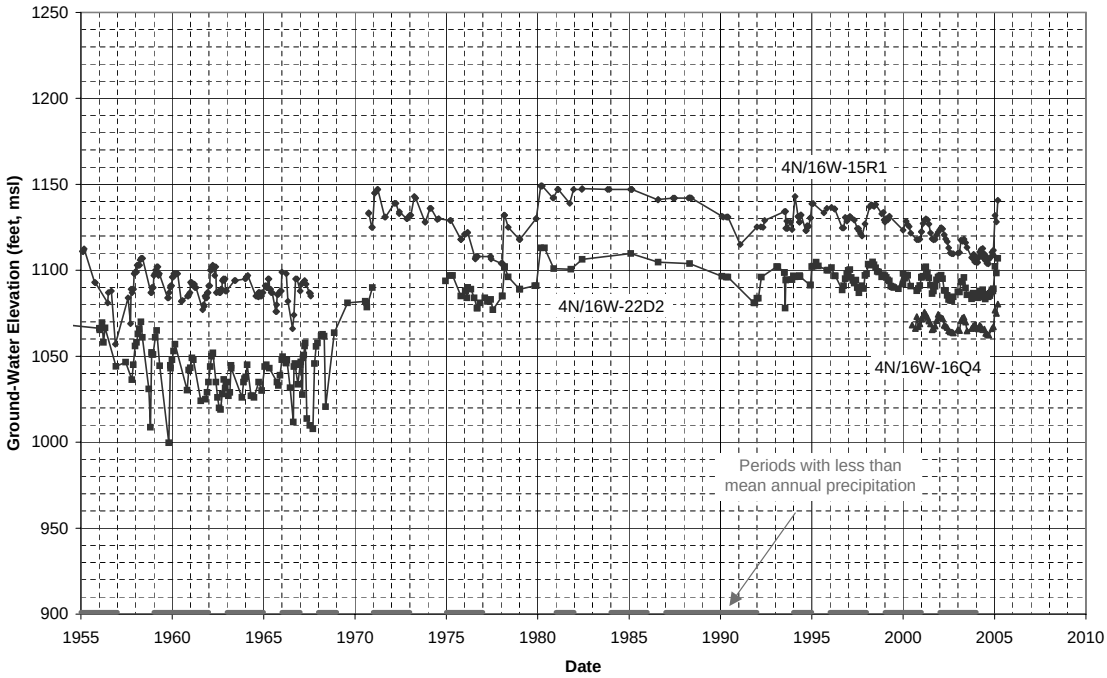
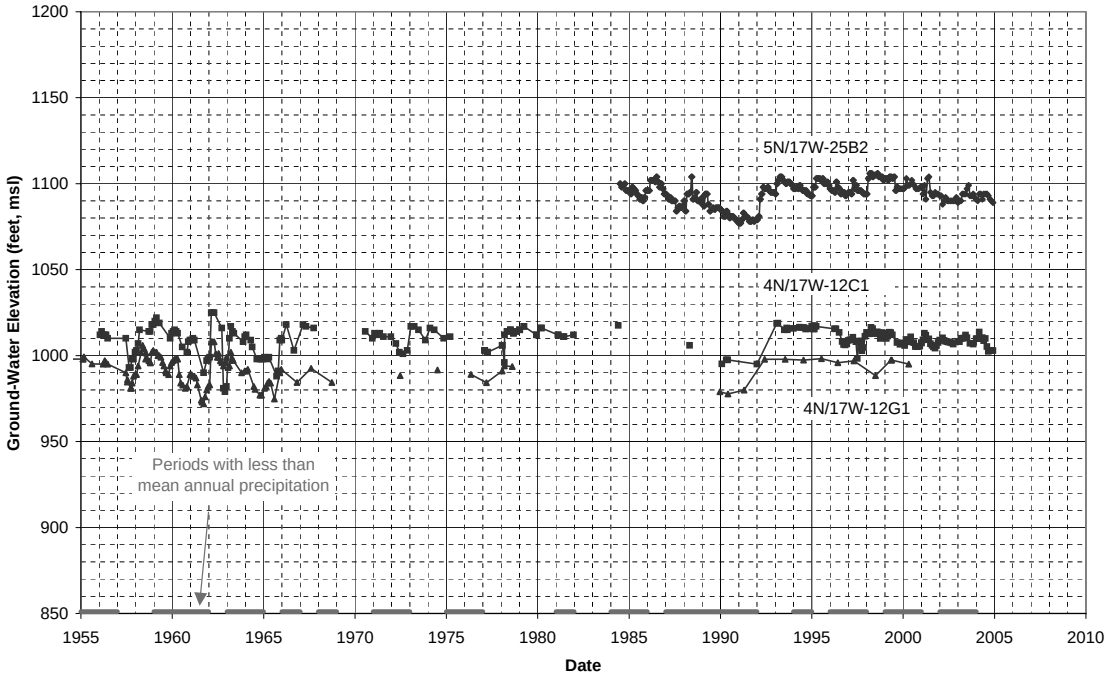


Figure C-5

Groundwater Elevation for 'Castaic Valley' Area Alluvial Wells
(lowest and highest for area shown)



Groundwater Elevation for 'Below Valencia WRP' Area Alluvial Wells
(lowest and highest for area shown)

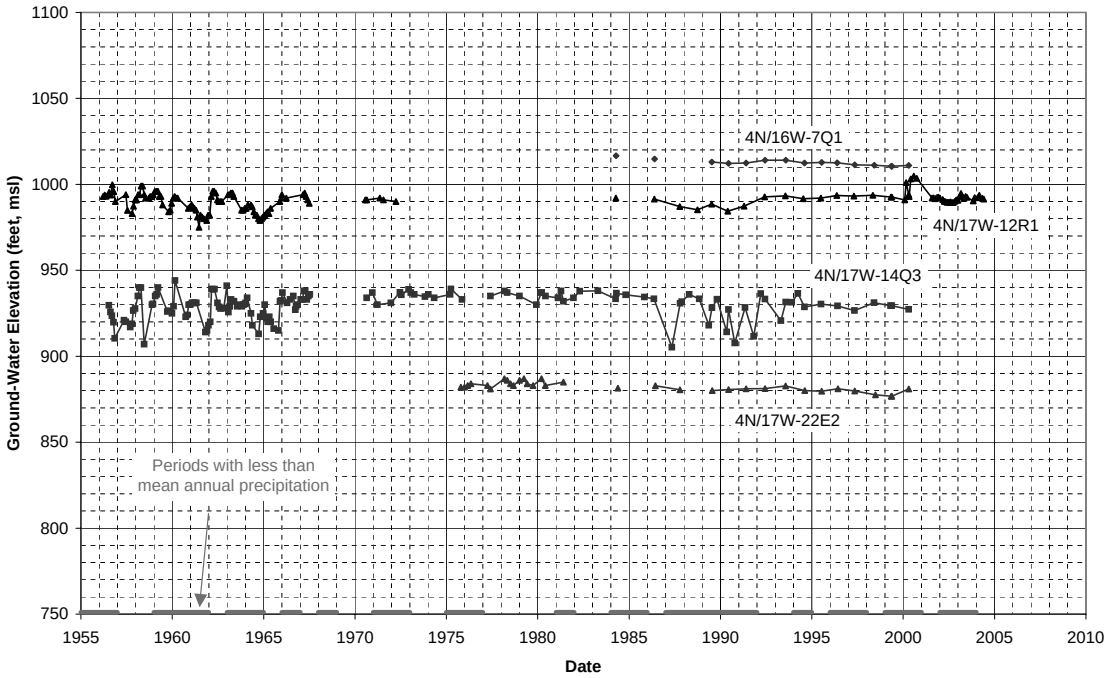


Figure C-6

Groundwater fluctuations in the 'Mint Canyon' area (illustrated in Figure C-5) represent the most substantial intermittent changes in the Basin. As described and discussed above, the Alluvium has historically experienced a number of alternating wet and dry hydrologic conditions during which groundwater level declines are followed by returns to historic highs. Since the Alluvium is thinner to the east, the resulting groundwater fluctuations are most dramatic in this area, up to 75 to 100 feet. When water levels are low, well yields and pumping capacities in this area can be impacted. The affected retail water purveyors respond by decreasing pumping and increasing use of Saugus Formation and imported SWP supplies. The purveyors also shift a fraction of the Alluvial pumpage that would normally be supplied by 'Mint Canyon' area wells to areas further west, where well yields and pumping capacities remain fairly constant because of smaller groundwater level fluctuations. As shown in Figure C-7, the purveyors have decreased the percent of total Alluvial pumpage from the 'Mint Canyon' area steadily beginning in 2000, and have offset these decreases by increasing pumpage in the 'Below Saugus WRP' and 'Below Valencia WRP' areas. This allows the purveyors to maximize the available supply from the Alluvium during dry periods to best meet demand. In spite of the current period of below average precipitation, groundwater levels in the 'Mint Canyon' area have ceased to decline in the last two years. This is illustrative of the purveyors' integrated use of surface water and groundwater to maintain local groundwater resources within their overall yield.

Depending on the period of available data, all the hydrographs of groundwater levels in the Alluvium show the same general picture: recent (last 30 years) groundwater levels have exhibited historic highs; in some locations, there are intermittent dry-period declines (and an associated use of some groundwater from storage) followed by wet-period recoveries (and associated natural refilling of storage space). On a long-term basis, the Alluvium shows no signs of water level-related overdraft (i.e., no trend toward decreasing water levels and storage). Since there is no evidence of any historic or recent trend toward permanent groundwater level or storage decline, pumpage from the Alluvium has been, and continues to be, within the operational yield of that aquifer.

As previously mentioned, it is possible to intermittently pump the aquifer by exceeding its average yield for one or more years without long-term impacts. This utilizes some water from storage in the aquifer, and is evidenced by lowered groundwater levels, which subsequently recover during periods of reduced pumpage or higher than average precipitation. Records of groundwater levels, pumpage and precipitation suggest that declines and subsequent rises in groundwater levels are influenced more by fluctuations in the availability of water for recharge than by pumpage. When less water is available for recharge, during periods of lower than average precipitation and streamflow, groundwater levels decline even when pumpage remains

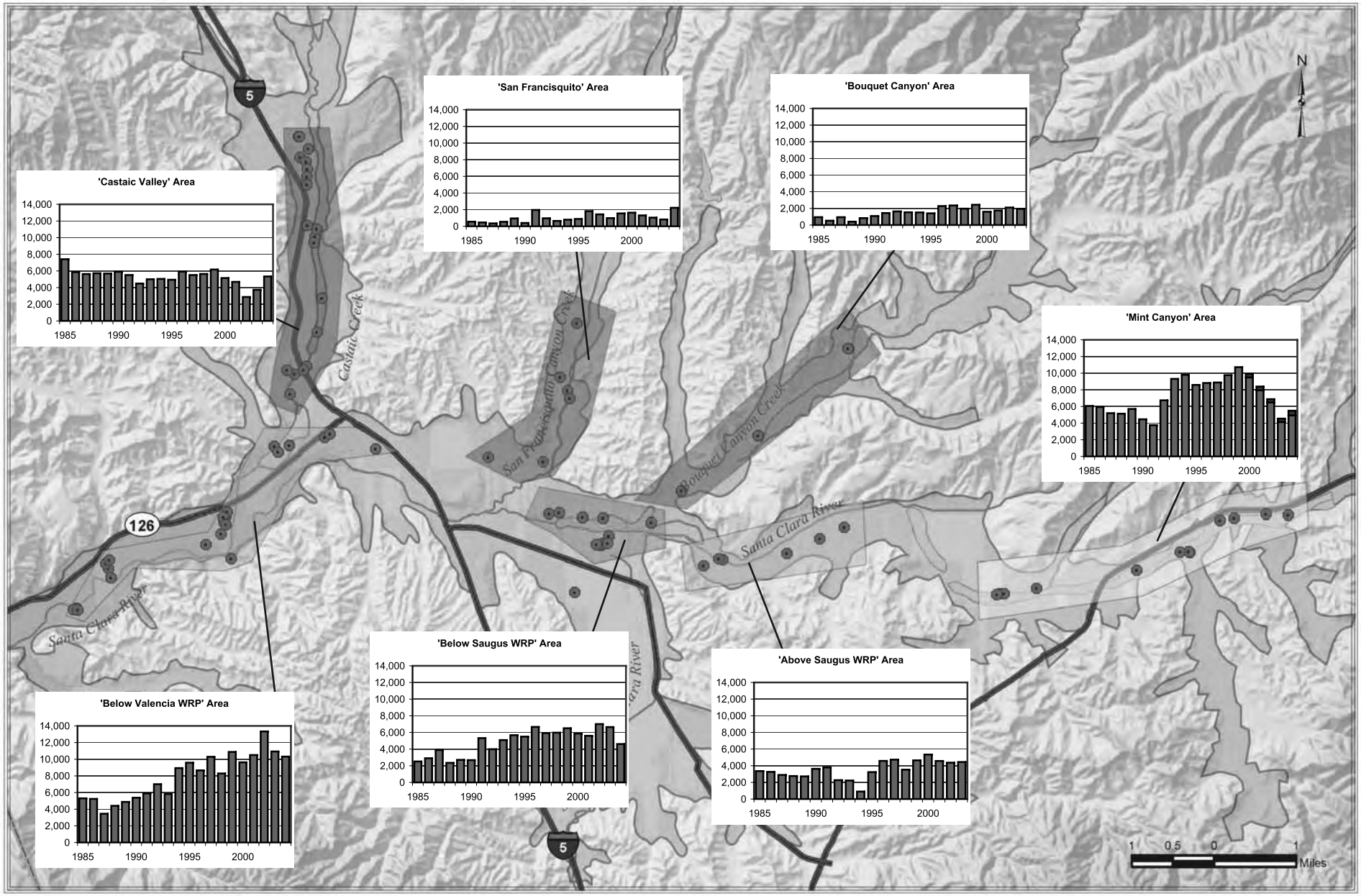


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Figure C-7
Annual Groundwater Production from Alluvium by Area (Acre-feet)
Santa Clara River Valley, East Groundwater Subbasin

constant. Conversely, when an abundance of water is available for recharge because of wet conditions, pumpage can increase significantly without affecting groundwater levels. Overall, long-term experience with Alluvial Aquifer response to pumping in the ranges now considered to be its operational yield shows that such ranges can be considered reliable components of future supply. Recently completed numerical groundwater flow modeling, discussed in detail below, has been used to project Alluvial Aquifer response to the same ranges of pumping over multiple decades of varying hydrologic conditions; groundwater levels are projected to essentially repeat what has historically occurred since the importation of supplemental SWP water.

Saugus Formation – General

The Saugus Formation, of Pliocene to Pleistocene geologic age, has traditionally been divided into two stratigraphic units: the lowermost, geologically older Sunshine Ranch Member, which is of mixed marine to terrestrial (non-marine) origin; and the overlying, or upper, portion of the Formation which is entirely terrestrial in origin. The Sunshine Ranch Member of the Saugus Formation has a maximum thickness of about 3,000 to 3,500 feet in the central part of the Valley; however, due to its marine origin and fine-grained nature, it is not considered to be a viable source of groundwater for municipal or other water supply. Above the Sunshine Ranch Member, the upper portion of the Saugus Formation is coarser grained, consisting mainly of lenticular beds of sandstone and conglomerate that are interbedded with lesser amounts of sandy mudstone, which were deposited in stream channels, flood plains, and alluvial fans by one or more ancestral drainage systems in the Valley. The sand and gravel units that represent aquifer materials in the upper part of the Saugus Formation are generally located between depths of about 300 and 2,500 feet. The spatial extent of the Saugus Formation throughout the Basin is illustrated on Figure C-8.

The Saugus Formation is much thicker and more spatially extensive throughout the Basin when compared to the Alluvium. It is also significant in terms of groundwater storage and individual well capacity. However, the Saugus Formation has typically lower values of transmissivity, in the range of 80,000 to 160,000 gpd/ft, with the higher values in the upper portions of the Formation. The storage capacity of the Saugus has most recently been estimated to be 1.65 million af between depths of 300 feet and approximately 2,500 feet (to the base of the Saugus, or to the base of fresh water if shallower than 2,500 feet). Groundwater in the Saugus Formation generally moves north along the South Fork of the Santa Clara River, towards the Santa Clara River and the outlet of the Basin. Saugus wells operated by the retail water purveyors (shown in Figure C-8) are located in the southern portion of the Basin, south of the Santa Clara River.

For long-term planning purposes, the operating plan includes pumping from the Saugus in the range of 7,500 to 15,000 afy in average/normal years, a conservative estimate in light of historical estimates of potential recharge to the Saugus complemented by observations of high groundwater levels in the overlying Alluvium over the last 30 years. The operating plan also

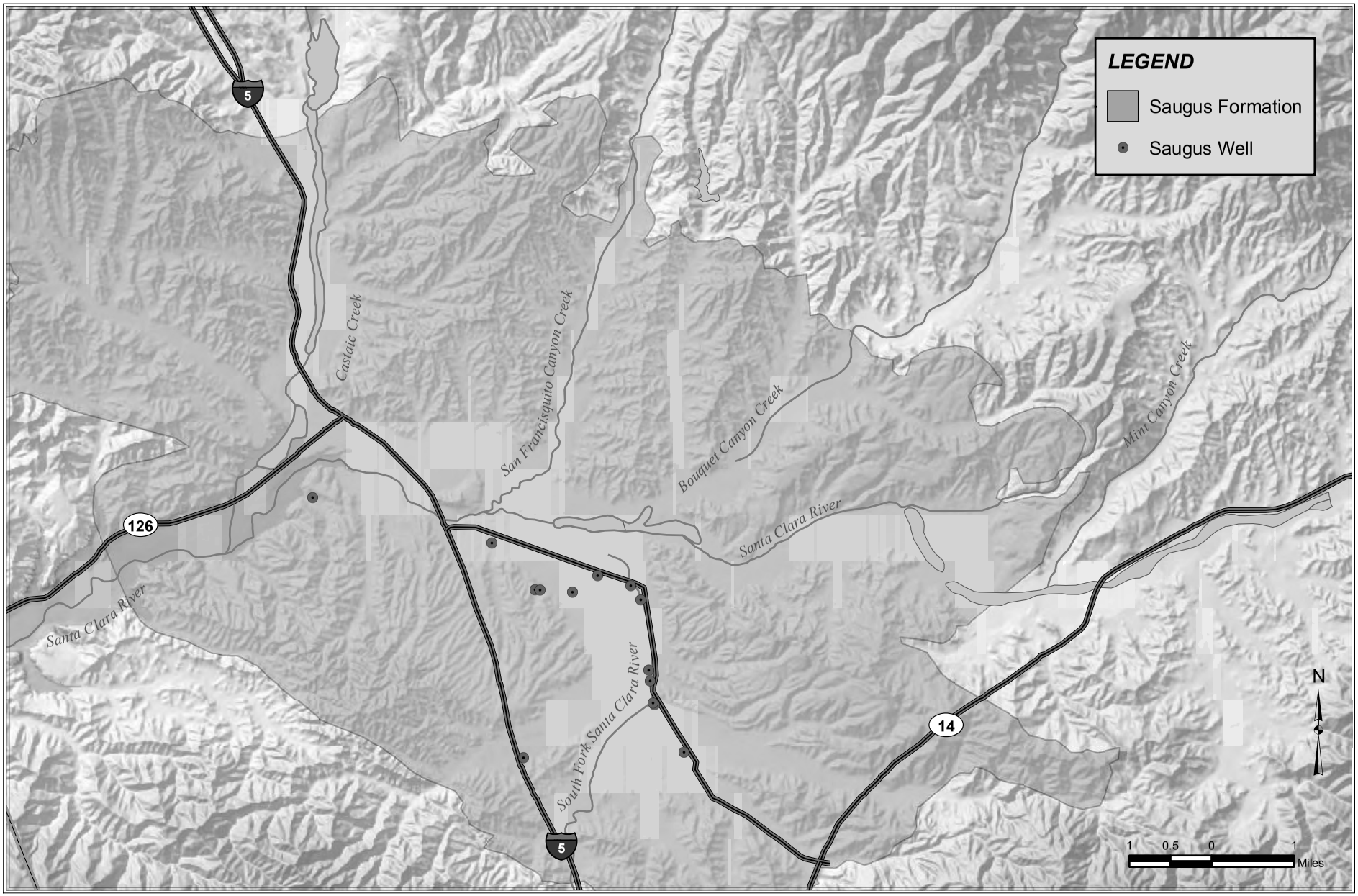

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Figure C-8
Saugus Well Locations
Santa Clara River Valley, East Groundwater Subbasin

includes planned dry-year pumping of 15,000 to 35,000 afy for one to three consecutive dry years, when shortages to other water supplies could occur. Such high pumping would be followed by periods of lower pumpage (7,500 to 15,000 afy in average/normal years as noted above) to allow recharge to recover water levels and storage in the Saugus. Maintaining the substantial volume of water in the Saugus Formation is an important strategy to help provide water supplies in the Valley during dry periods.

Saugus Formation – Historical and Current Conditions

Total pumpage from the Saugus Formation in 2004 was 6,500 af, of which most (5,700 af) was for municipal water supply, and the balance (800 af) was for agricultural and other (minor) uses. Historically, groundwater pumpage from the Saugus peaked in the early 1990s and then declined steadily. Pumpage has remained generally stable, at an average of about 4,600 afy, since 1998.

Historical pumpage records for the Saugus Formation are limited prior to 1980, but suggest that pumpage from the Saugus was minimal at that time. When pumpage records are unavailable, data have been approximated to obtain a continuous historic record (Figure C-9). The records indicate that there was almost no pumping from the Saugus prior to 1960 (about 100 af in most years, beginning in 1948), and that some increased pumping for agricultural water supply (about 900 af) began in about 1962. The largest amount of agricultural pumping from the Saugus was during the mid-1960s, when annual pumpage was about 3,000 af. Agricultural pumping from the Saugus declined to near zero by the late 1970s, but has generally ranged from 500 to 1,000 afy since 1982. Municipal pumping records from the Saugus are incomplete prior to 1980. There was no Saugus pumpage for municipal supply in the early 1960s. Despite the lack of pre-1980 records, post-1980 data suggests that municipal pumping from the Saugus began in the 1970s, and reached nearly 5,000 afy by 1980-81.

The first historical investigation of the Saugus (Slade, 1988) suggested that the recharge potential of the Saugus was in the range of 11,000 to 22,000 afy, depending on precipitation and groundwater levels in the partially overlying Alluvium. Recent updating of that original work (Slade, 2002) suggested that the operational yield of the Saugus Formation is in the range of 7,500 to 15,000 afy in average years, with an increase to as much as 35,000 afy in multiple dry year periods. On a long-term average basis since the importation of SWP water, total pumpage from the Saugus Formation has ranged from a low of about 3,700 afy (in 1999) to a high of nearly 15,000 afy (in 1991); average pumpage from 1980 to present has been about 6,700 afy. These numbers are at the lower end of the estimated range of the operational yield of the Saugus Formation.

Unlike the Alluvium, which has an abundance of wells with extensive water level records, the water level data for the Saugus Formation is limited by the distribution of the wells in this Formation and the periods of record. The wells that do have water level records extending back

Groundwater Production - Saugus Formation
Santa Clara River Valley, East Groundwater Subbasin

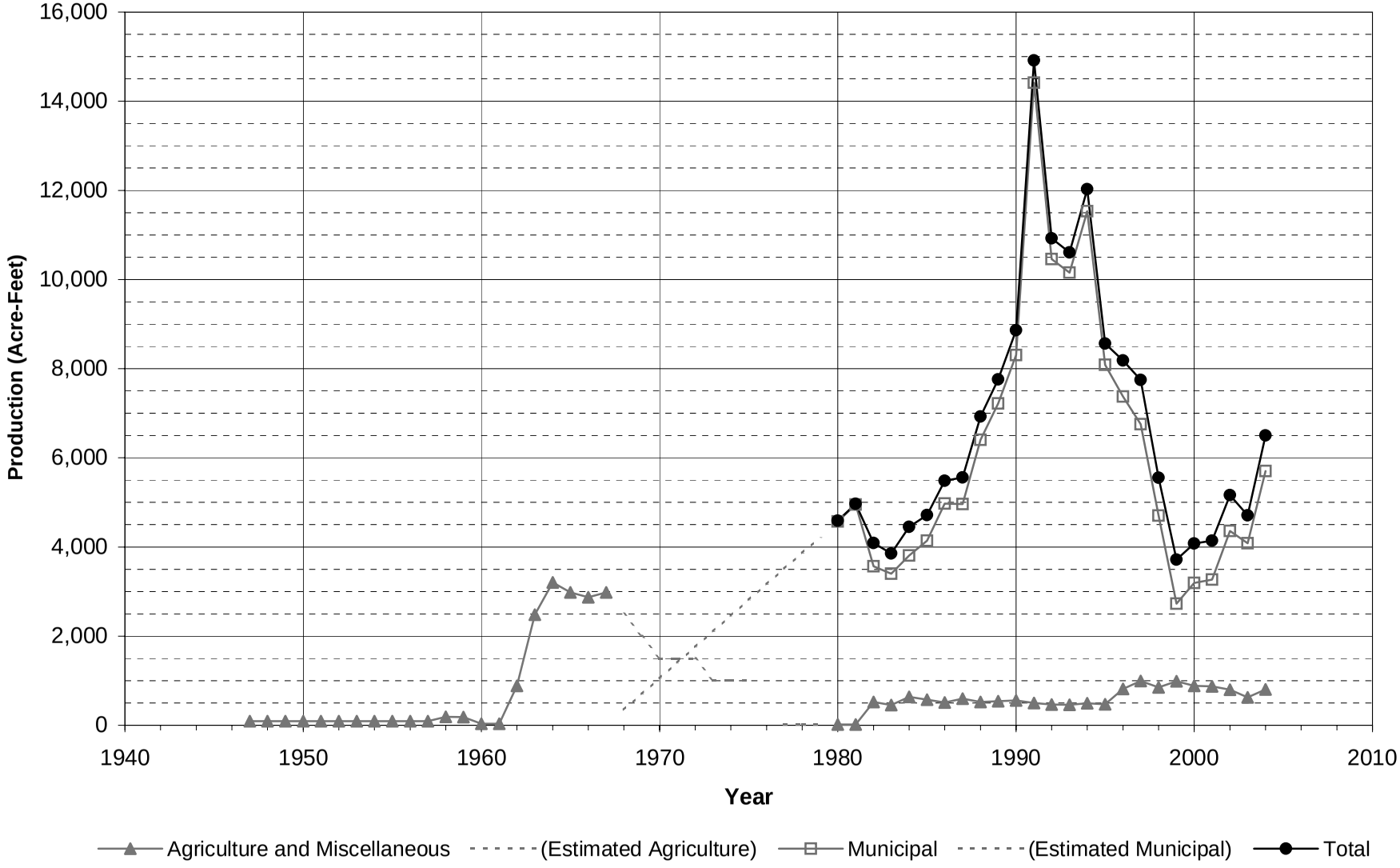


Figure C-9

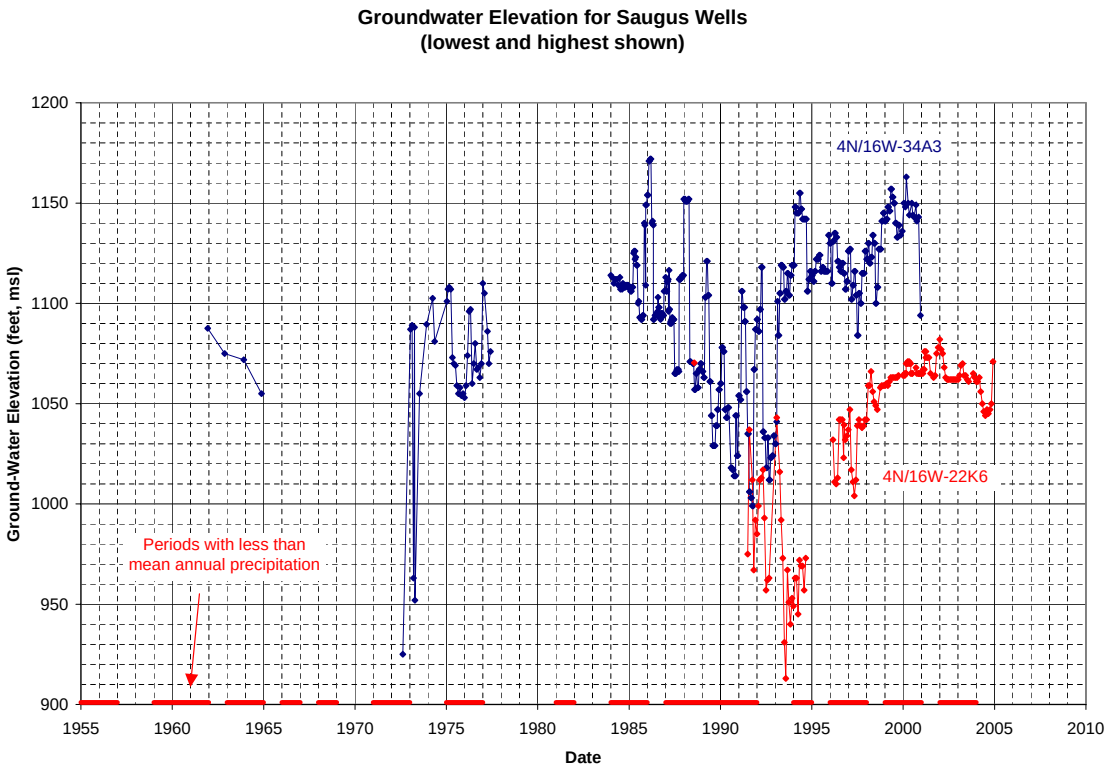
to the mid-1960s indicate that groundwater levels in the Saugus Formation were highest in the mid-1980s and are currently higher than they were in the mid-1960s (Figure C-10). Based on these data, there is no evidence of any historic or recent trend toward permanent water level or storage decline.

Records of groundwater levels, pumpage and precipitation suggest that declines and subsequent rises in groundwater levels in the Saugus Formation are more influenced by pumpage than by climatic fluctuations. Water levels in wells in the Saugus Formation are highly dependent on pumping in the respective wells. As opposed to the Alluvium, where pumpage is fairly evenly distributed among a number of wells in a given area, there are fewer active wells in the Saugus Formation. Consequently, pumping at one well can create a localized pumping depression that is evident in groundwater level hydrographs. Water levels in the Saugus Formation also exhibit stronger seasonal pumping fluctuations over a year than in the Alluvium (generally more than 20 feet in active Saugus wells, as opposed to generally less than ten feet in Alluvial wells). These responses to pumping are characteristic of the lower transmissivity of the Saugus Formation.

During the period from 1985 through 1991, which experienced consecutive years of lower than average precipitation (with one average year in the middle), pumpage from the Saugus increased from 4,700 afy to nearly 15,000 afy, and groundwater levels declined more than 100 feet in some cases. The subsequent rise in water levels at an individual well depended on pumping at that well. For example (as illustrated on Figure C-10), pumping of Saugus wells declined dramatically beginning between 1993 and 1995, and water levels in individual wells subsequently rose when pumping decreased. Since 1999, water levels in the Saugus have been stable and have exhibited very slight, if any, response to current less-than-average precipitation. A slight pumping depression is evident around active wells. Water levels in the Saugus remain at or above historic levels, and there is no trend toward a sustained decline in Saugus water levels or storage that would be indicative of overdraft.

Consistent with the 2001 Update Report (Slade, 2002), the current management practice of the retail water purveyors is to preserve the Saugus Formation so this supply is available during drought periods, when Alluvial groundwater and SWP supplies are anticipated to decrease. The period of increased pumpage during the late 1980s and early 1990s is a good example of this management strategy. Most notably, in 1991, when SWP deliveries were substantially reduced, increased pumpage from the Saugus made up almost half of the decrease in SWP deliveries. This increased Saugus pumpage resulted in a short-term decline in water levels reflecting the use of stored water. However, the water levels subsequently rose when pumping was reduced, reflecting recovery of groundwater storage in the Saugus Formation.

As with the Alluvial aquifer as introduced above, the response of the Saugus Formation to pumping in the operational yield ranges has been projected by use of a recently completed numerical groundwater flow model. Results of those projections, discussed in detail below,


Groundwater Elevation for Saugus Wells
(lowest and highest shown)
Ground-Water Elevation (feet, msl)
Date
4N/16W-34A3
4N/16W-22K6
Periods with less than
mean annual precipitation
1200
1150
1100
1050
1000
950
900
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010

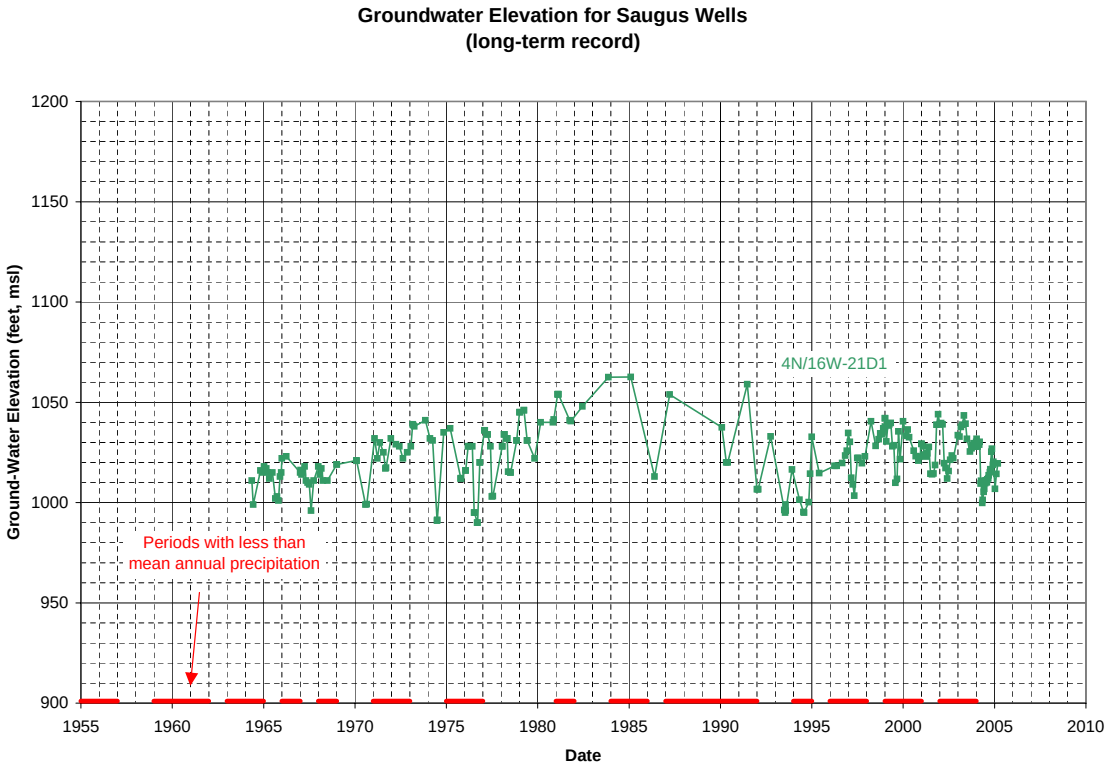

Groundwater Elevation for Saugus Wells
(long-term record)
Ground-Water Elevation (feet, msl)
Date
4N/16W-21D1
Periods with less than
mean annual precipitation
1200
1150
1100
1050
1000
950
900
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010

Figure C-10

show that fluctuations in pumping over multiple decades of varying hydrologic conditions will cause fluctuations in groundwater levels similar to what has historically occurred. Short-term declines during dry periods when Saugus pumping is temporarily increased are followed by recovery of water levels when pumping is reduced during wet/normal periods. The lack of any projected permanent decline in Saugus groundwater levels supports the reliability of the Saugus Formation as a long-term water supply at the capacities included in its operational yield.

Sustainability of Groundwater Supplies

Alluvial Aquifer – Based in part on historical operating experience, complemented by recent groundwater modeling work as described herein, it is planned that the Alluvial Aquifer can supply water on a long-term sustainable basis in the overall range of 30,000 to 40,000 afy, with a probable reduction in dry years to a range of 30,000 to 35,000 afy. Both of those ranges include about 15,000 afy of Alluvial pumping for current agricultural water uses and about 500 afy for small private water supply. The dry year reduction is a result of practical constraints in the eastern part of the Basin where lowered groundwater levels in dry periods have the effect of reducing pumping capacities in that shallower portion of the aquifer.

Until recently, the long-term renewability of Alluvial groundwater was empirically determined from approximately 60 years of recorded experience as previously described: long-term stability in groundwater levels and storage, with some dry period fluctuations in the eastern part of the Basin, over a historical range of Alluvial pumpage from as low as about 20,000 afy to as high as about 43,000 afy. Over the last couple of years, those empirical observations have been complemented by the development and application of a numerical groundwater flow model, has been used to predict aquifer response to the planned operating ranges of pumping. The numerical groundwater flow model has also been used to analyze the control of contaminant migration under selected pumping conditions that would restore, with treatment, pumping capacity that has been inactivated due to perchlorate contamination detected in some wells in the Basin.

To examine the yield of the Alluvium or, in other words, the sustainability of Alluvium on a renewable basis, the groundwater flow model was used to examine long-term projected response of the aquifer to pumping for municipal and agricultural uses in the 30,000 to 40,000 afy range under average/normal and wet conditions, and in the 30,000 to 35,000 afy range under locally dry conditions. To examine the response of the entire aquifer system, the model also incorporated pumping from the Saugus Formation in accordance with the normal (7,500-15,000 afy) and dry year (15,000-35,000 afy) operating plan for that aquifer. The model was run over a 78 year hydrologic period which was selected from actual historical hydrology (i.e., precipitation) to examine a number of hydrologic conditions that would be expected to affect both groundwater pumping and groundwater recharge. The selected 78-year simulation period was assembled from an assumed recurrence of 1980 to 2003 conditions, followed by an assumed

recurrence of 1950 to 2003 conditions. The 78-year period was analyzed to define both local hydrologic conditions (normal vs. dry), which affect the rate of pumping from the Alluvium, and hydrologic conditions that affect SWP operations, which in turn affect the rate of pumping from the Saugus. The resultant simulated pumping cycles included the distribution of pumping around the Basin for each of the existing wells, for normal and dry years respectively, shown in Tables C-1 and C-2.

The resultant pumping cycles are summarized as follows:

- Twenty-four years of dry year Alluvial pumping at 30,000 to 35,000 afy
- One drought of four consecutive dry years of Alluvial pumping at 30,000 to 35,000 afy
- Two droughts of three consecutive dry years each, with Alluvial pumping at 30,000 to 35,000 afy
- Three selected years with assigned dry-year Alluvial pumping despite near-normal or above-normal rainfall because each selected year was preceded by a multi-year drought
- Eighteen years of dry-year pumping from the Saugus, or an average of one dry year approximately every four years
- Two droughts lasting three years, plus (in both cases) a dry year that occurs two years before the beginning of each three-year drought and another dry year that begins one year after each three-year drought has ended; Saugus pumping was increased into the 15,000 to 35,000 afy range in all those years
- Two droughts lasting two years; Saugus pumping was increased into the 15,000 to 25,000 afy range in those years
- Sixty years of normal-year Saugus pumping, 7,500 to 15,000 afy

Simulated Alluvial aquifer response to the preceding range of hydrologic conditions and pumping stresses was essentially a long-term repeat of the historical conditions that have resulted from similar pumping over the last several decades. The resultant response consisted of (1) generally constant groundwater levels in the middle to western portion of the Alluvium, and fluctuating groundwater levels in the eastern portion of the Alluvium as a function of wet and dry hydrologic conditions, (2) variations in recharge that directly correlate with wet and dry hydrologic conditions, and (3) no long-term decline in groundwater levels or storage. Examples of projected groundwater levels and storage in various parts of the basin are illustrated in Figures C-11 through C-15. Based on the combination of actual experience with Alluvial aquifer pumping at capacities similar to those planned for the future and the resultant sustainability (recharge) of groundwater levels and storage, complemented by modeled projections of aquifer response to planned pumping rates that also show no depletion of groundwater, the Alluvial Aquifer is considered a sustainable water supply source to meet the Alluvial portion of the operating plan for the groundwater Basin.

TABLE C-1

Recent and Simulated Future Annual Groundwater Pumping Volumes from the Alluvial Aquifer

Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California

		Historical Pumping			UWMP Pumping	
Well Name	**Location[a]**	**2001**	**2002**	**2003**	**Normal Years**	**Dry Years**
NCWD-Castaic 1	Castaic Valley	345	385	561	385	345
NCWD-Castaic 2	Castaic Valley	166	0	123	166	125
NCWD-Castaic 3	Castaic Valley	0	0	0	0	0
NCWD-Castaic 4	Castaic Valley	100	47	56	100	45
NCWD-Pinetree 1	Mint Canyon	164	0	0	164	0
NCWD-Pinetree 2	Mint Canyon	0	0	0	0	0
NCWD-Pinetree 3	Mint Canyon	566	544	525	545	525
NCWD-Pinetree 4	Mint Canyon	300	5	0	300	0
NCWD Total		**1,641**	**981**	**1,265**	**1,660**	**1,040**
NLF-161	Downstream of Valencia WRP	496	485	2,021	485	485
NLF-B10	Downstream of Valencia WRP	1,240	534	344	344	344
NLF-B11	Downstream of Valencia WRP	205	232	271	232	232
NLF-B5	Downstream of Valencia WRP	1,680	2,280	1,582	1,582	1,582
NLF-B6	Downstream of Valencia WRP	1,312	2,175	1,766	1,766	1,766
NLF-B7	Downstream of Valencia WRP	474	584	402	584	584
NLF-C	Downstream of Valencia WRP	1,319	1,720	1,373	1,373	1,373
NLF-C3	Downstream of Valencia WRP	93	192	186	192	192
NLF-C4	Downstream of Valencia WRP	1,028	809	764	809	809
NLF-C5	Downstream of Valencia WRP	680	850	622	850	850
NLF-C6	Downstream of Valencia WRP	231	241	108	241	241
NLF-C7	Downstream of Valencia WRP	741	866	443	866	866
NLF-C8	Downstream of Valencia WRP	293	594	408	594	594
NLF-E	Castaic Valley	1,691	16	28	16	16
NLF-E2	Castaic Valley	141	55	14	55	55
NLF-E4	Downstream of Valencia WRP	0	0	0	0	0
NLF-E5	Downstream of Valencia WRP	172	679	537	679	679
NLF-E9	Downstream of Valencia WRP	238	814	47	814	814
NLF-G45	Downstream of Valencia WRP	291	283	60	283	283
NLF-W4	San Francisquito Canyon[b]	46	1	0	0	0
NLF-W5	San Francisquito Canyon	276	104	23	107	107
NLF-X3	Downstream of Valencia WRP	12	0	0	0	0
NLF Total		**12,659**	**13,514**	**10,999**	**11,872**	**11,872**
SCWD-Clark	Bouquet Canyon	696	782	712	782	700
SCWD-Guida	Bouquet Canyon	1,047	1,320	1,230	1,320	1,230
SCWD-Honby	Above Saugus WRP	721	696	874	696	870
SCWD-Lost Canyon 2	Mint Canyon	741	730	644	741	640
SCWD-Lost Canyon 2A	Mint Canyon	1,034	905	593	1,034	590
SCWD-Mitchell #5A	Mint Canyon	407	143	19	0	0
SCWD-Mitchell #5B	Mint Canyon	0	150	0	557	0
SCWD-N. Oaks Central	Mint Canyon	822	1,646	1,641	822	1,640
SCWD-N. Oaks East	Mint Canyon	1,234	448	485	1,234	485
SCWD-N. Oaks West	Mint Canyon	898	1,123	31	898	0
SCWD-Sand Canyon	Mint Canyon	930	705	195	930	195
SCWD-Sierra	Mint Canyon	846	87	0	846	0
SCWD-Stadium	Above Saugus WRP	565	778	0	800	800
SCWD Total		**9,941**	**9,513**	**6,424**	**10,660**	**7,150**

TABLE C-1

Recent and Simulated Future Annual Groundwater Pumping Volumes from the Alluvial Aquifer

Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California

		Historical Pumping			UWMP Pumping	
Well Name	**Location[a]**	**2001**	**2002**	**2003**	**Normal Years**	**Dry Years**
VWC-D	Castaic Valley	645	772	687	690	690
VWC-I	San Francisquito Canyon	0	0	0	0	0
VWC-K2	Downstream of Saugus WRP[c]	669	955	364	0	0
VWC-L2	Downstream of Saugus WRP[d]	349	490	71	0	0
VWC-N	Downstream of Saugus WRP	591	700	622	620	620
VWC-N3	Downstream of Saugus WRP[e]	226	857	255	0	0
VWC-N4	Downstream of Saugus WRP[f]	458	909	248	0	0
VWC-N7	Downstream of Saugus WRP				1,160	1,160
VWC-N8	Downstream of Saugus WRP				1,160	1,160
VWC-Q2	Downstream of Saugus WRP	923	1,167	1,451	985	985
VWC-S6	Downstream of Saugus WRP	1,490	1,320	2,134	865	865
VWC-S7	Downstream of Saugus WRP	564	419	1,095	865	865
VWC-S8	Downstream of Saugus WRP	327	190	409	865	865
VWC-T2	Above Saugus WRP	900	696	1,014	460	460
VWC-T4	Above Saugus WRP	690	831	799	460	460
VWC-U3	Above Saugus WRP[g]	956	572	823	0	0
VWC-U4	Above Saugus WRP	942	796	934	935	935
VWC-U6	Above Saugus WRP	0	0	0	825	825
VWC-W10	San Francisquito Canyon	182	0		0	0
VWC-W11	San Francisquito Canyon	806	939	764	600	600
VWC-W6	San Francisquito Canyon[h]	0	0	36	865	865
VWC-W9	San Francisquito Canyon				350	350
VWC Total		**10,718**	**11,613**	**11,706**	**11,705**	**11,705**
Robinson Ranch	Mint Canyon				932	400
WHR (All Wells)	Castaic Valley	1,604	1,602	2,273	1,600	1,600
Total Alluvial Aquifer Pumping		**36,563**	**37,223**	**32,667**	**38,429**	**33,767**

[a]See Figure 2-4 for well locations.

[b]Former well NLF-W4 was located approximately 900 feet west of existing production well VWC-11.

[c]Former well VWC-K2 was located approximately 210 feet south of existing production well VWC-N7.

[d]Former well VWC-L2 was located approximately 150 feet southeast of existing production well VWC-N7.

[e]Former well VWC-N3 was located approximately 440 feet northeast of existing production well VWC-N8.

[f]Former well VWC-N4 was located approximately 430 feet southeast of existing production well VWC-N8.

[g]Former well VWC-U3 was located approximately 2,300 feet northeast of existing production well VWC-U4.

[h]Former well VWC-W6 was located approximately 575 feet northeast of existing production well VWC-11.

Notes:

All pumping volumes are listed in AF/yr. Blank entries for historical pumping indicate that the well did not exist at that time.

Wells that are not listed are assumed to not be pumping in the future.

NLF = Newhall Land & Farming Company

UWMP = Urban Water Management Plan

VWC = Valencia Water Company

WHR = Wayside Honor Rancho, whose wells are owned by the Los Angeles County Waterworks District No. 36

TABLE C-2

Simulated Annual Groundwater Pumping from the Saugus Formation for the 78-year Simulation

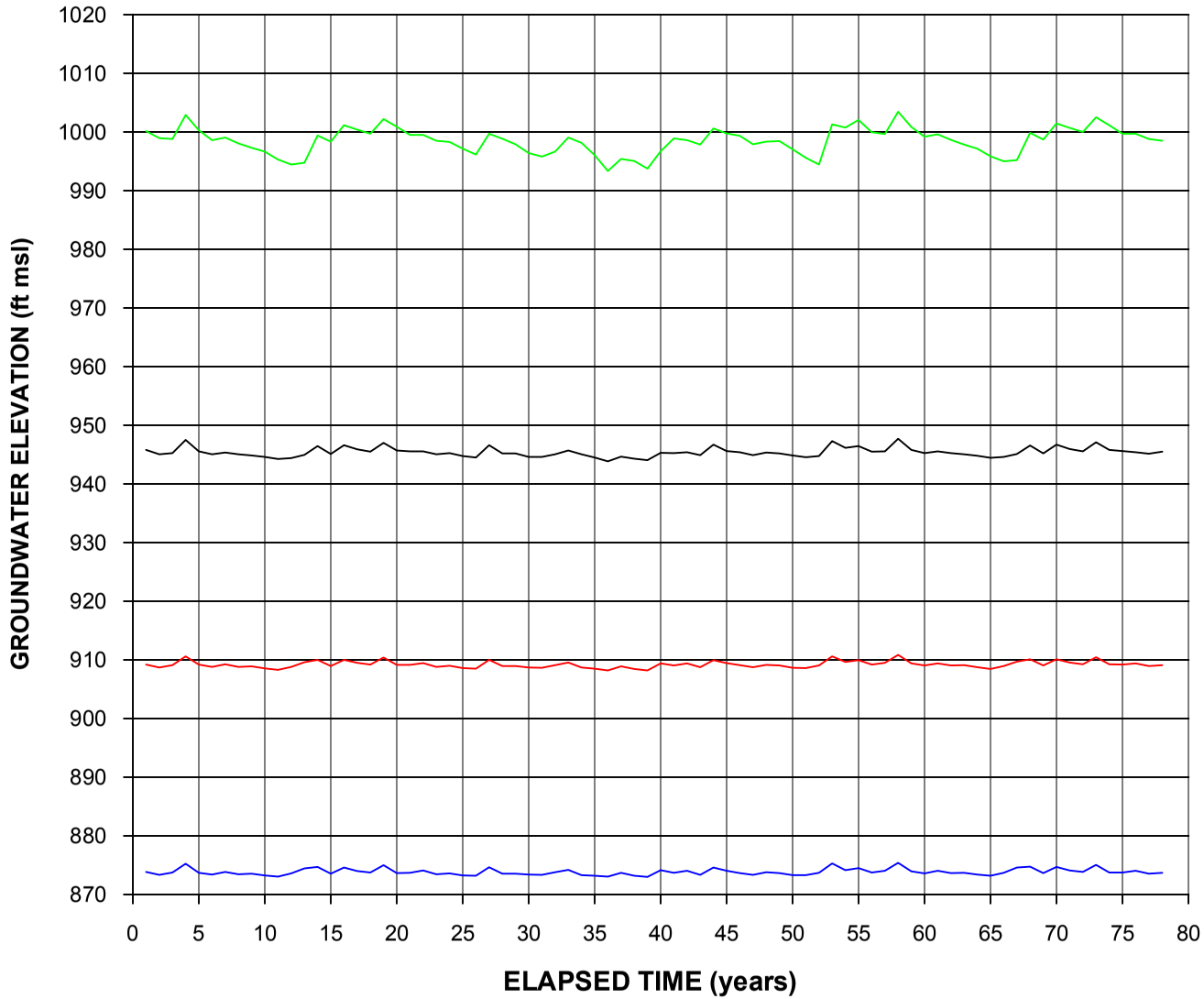
Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California

Owner	Well Name	Normal Years	Dry Year 1	Dry Year 2	Dry Year 3
NCWD	11	811	811	811	811
	12	1,315	2,044	2,044	2,044
	13	1,315	2,044	2,044	2,044
Total Pumping (NCWD)		**3,441**	**4,899**	**4,899**	**4,899**
NLF	156	369	369	369	369
Total Pumping (NLF)		**369**	**369**	**369**	**369**
SCWC	Saugus1	1,772	1,772	1,772	1,772
	Saugus2	1,772	1,772	1,772	1,772
Total Pumping (SCWC)		**3,544**	**3,544**	**3,544**	**3,544**
VWC	159	50	50	50	50
	160 (Municipal)	500	830	830	830
	160 (Valencia Country Club)	500	500	500	500
	201	100	100	3,577	3,577
	205	1,000	2,734	3,827	3,827
	206	1,175	2,734	3,500	3,500
Total Pumping (VWC)		**3,325**	**6,948**	**12,284**	**12,284**
To Be Determined	Future #1	0	0	3,250	3,250
	Future #2	0	0	0	3,250
	Future #3	0	0	0	3,250
	Future #4	0	0	0	3,250
Total Pumping (Future)		**0**	**0**	**3,250**	**13,000**
Total Saugus Formation Pumping		**10,679**	**15,760**	**24,346**	**34,096**

Notes:

All pumping volumes are listed in acre-feet.

Wells VWC-157 and NCWD-7, 8, 9, and 10 are assumed to no longer operate in the future.



LEGEND

- LACFCD-6968
- NLF-TOPCO1
- NLF-C6
- LACFCD-6995D

NOTE:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS. WELL NLF-TOPCO1 IS LOCATED 210 feet SOUTHWEST OF WELL NLF-B11.

FIGURE C-11
SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER WEST OF INTERSTATE 5
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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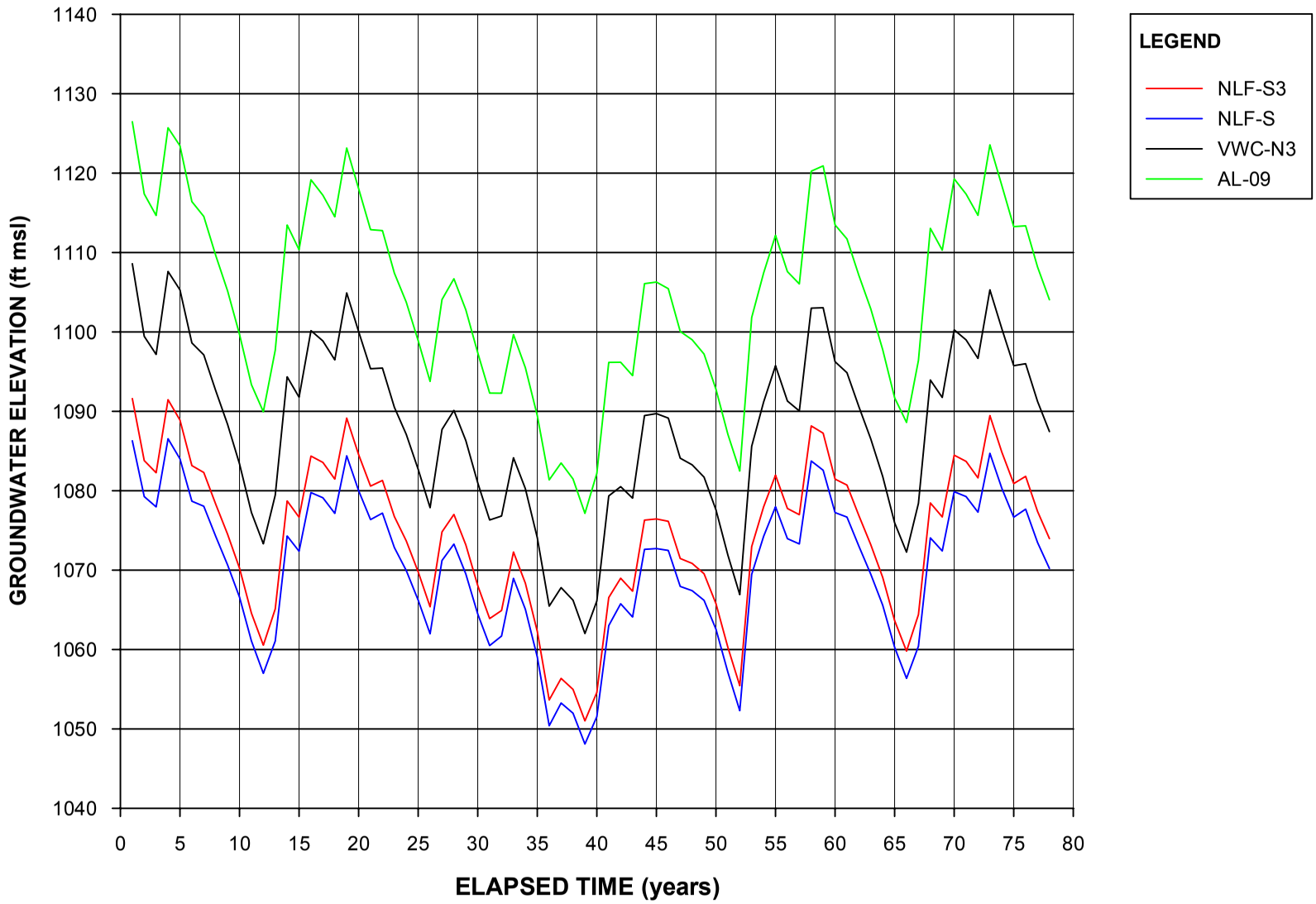

NOTES:

1. AL09 IS A CLUSTER OF OBSERVATION WELLS LOCATED 845 feet SOUTHWEST OF PRODUCTION WELL VWC-Q2.

2. THE REMAINING HYDROGRAPHS REPRESENT FORMER ALLUVIAL AQUIFER WELLS THAT HAVE BEEN ABANDONED AND THEREFORE ARE NOT PUMPED IN THE MODEL SIMULATIONS. RELATIVE TO EXISTING WELLS SHOWN ON FIGURE 2-4, THESE FORMER WELLS WERE LOCATED AS FOLLOWS:

   – WELL NLF-S3 WAS LOCATED 305 feet EAST OF WELL VWC-S6
   – WELL NLF-S WAS LOCATED 940 feet SOUTHWEST OF WELL VWC-S6
   – WELL VWC-N3 WAS LOCATED 435 feet NORTHEAST OF WELL VWC-N8

FIGURE C-12
SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER EAST OF INTERSTATE 5
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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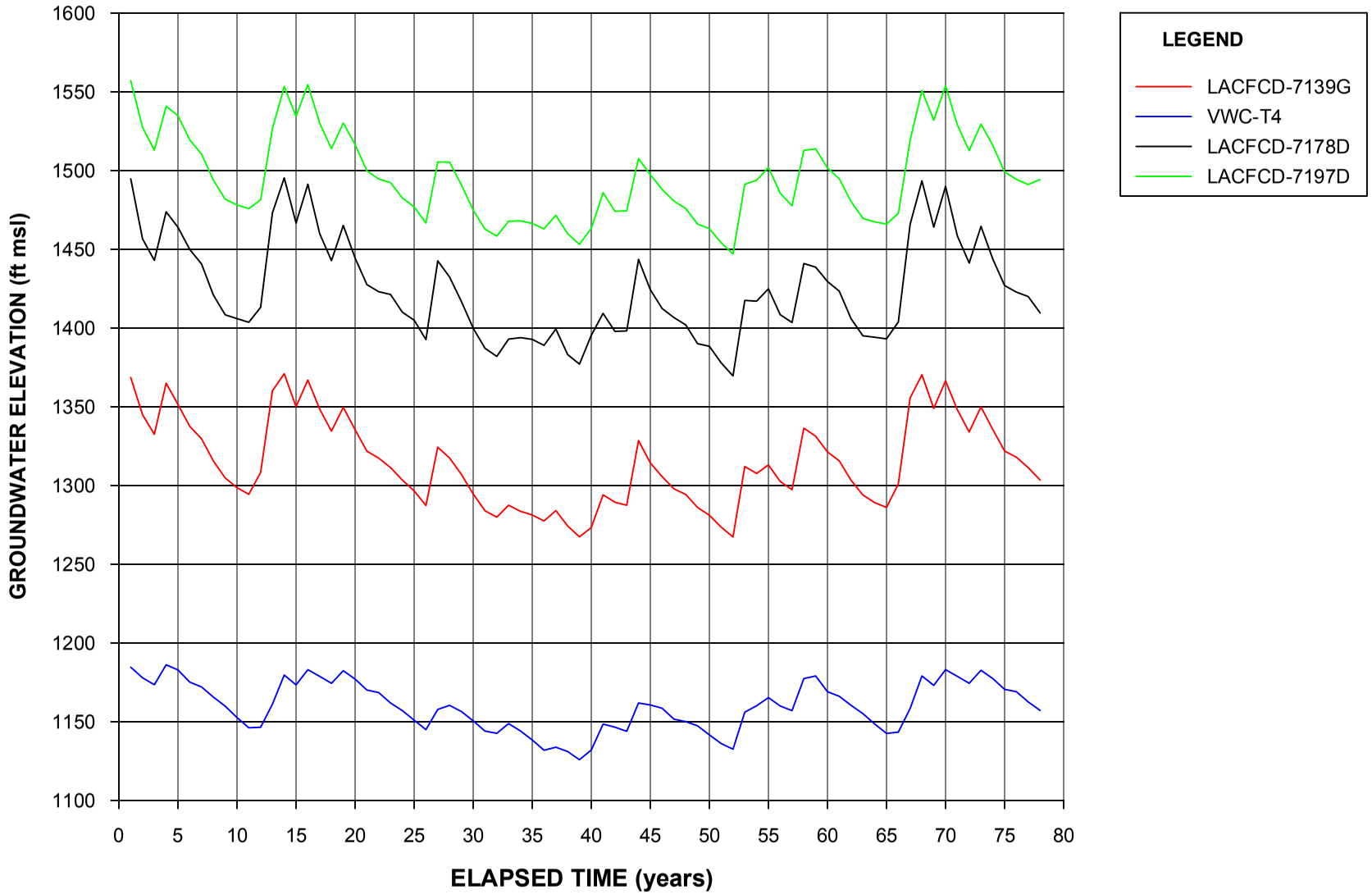

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.
2. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR VWC- T4 = 1101 ft msl; ALLUVIUM BOTTOM ELEVATION ~1050 TO 1065 ft msl.
3. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR LACFCD-7139G = 1289 ft msl; ALLUVIUM BOTTOM ELEVATION ~1256 ft msl OR LOWER.
4. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR LACFCD-7178D = 1463 ft msl; ALLUVIUM BOTTOM ELEVATION ~1398 TO 1425 ft msl.
5. LOWEST HISTORICAL GROUNDWATER ELEVATION FOR LACFCD-7197D = 1474 ft msl; ALLUVIUM BOTTOM ELEVATION ~1423 TO 1447 ft msl.

FIGURE C-13
SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER IN SOLEDAD CANYON
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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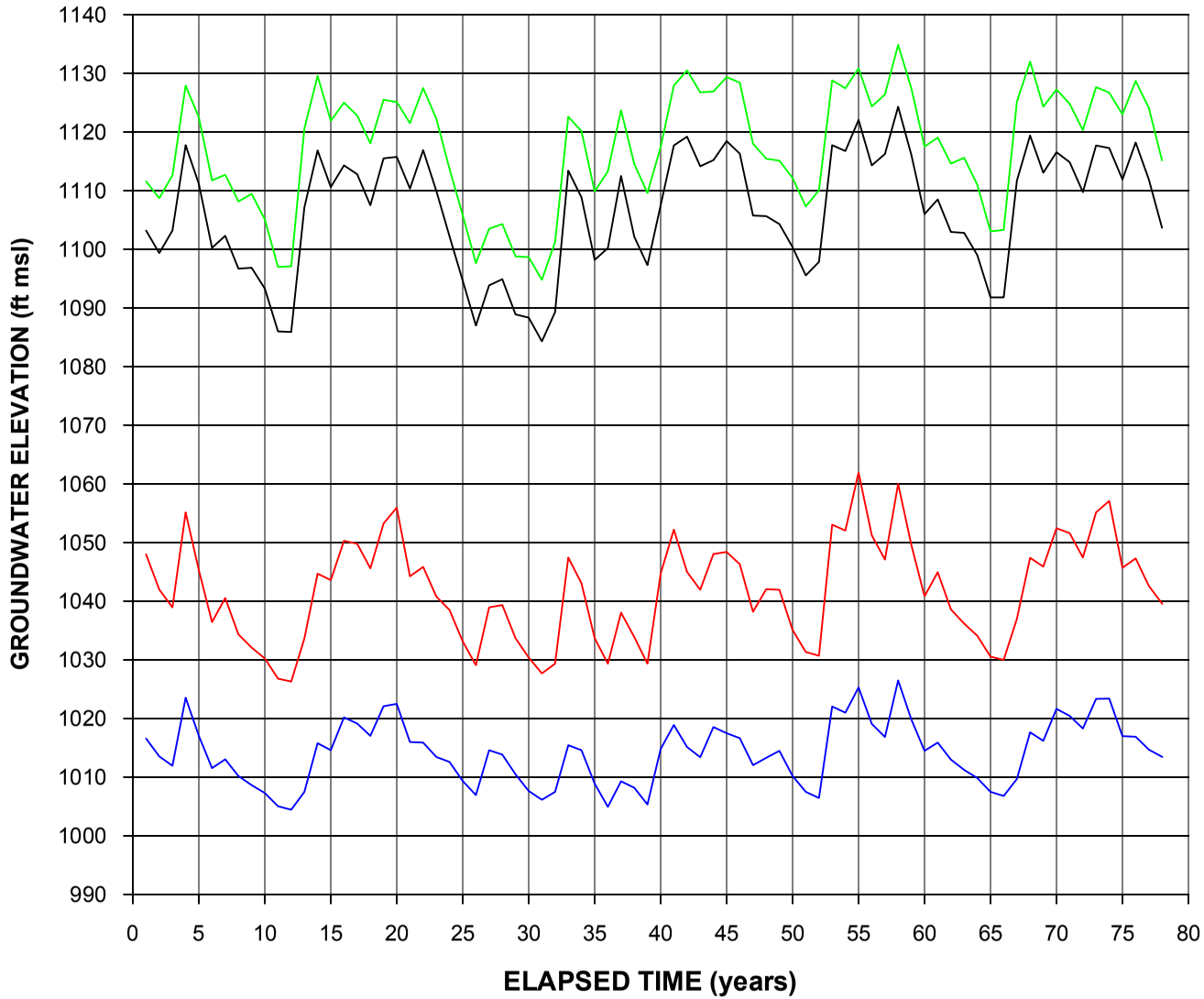

LEGEND

- LACFCD-6993A
- VWC-D
- LACFCD-6981D
- LACFCD-6980E

NOTE:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

FIGURE C-14
SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER ALONG CASTAIC CREEK
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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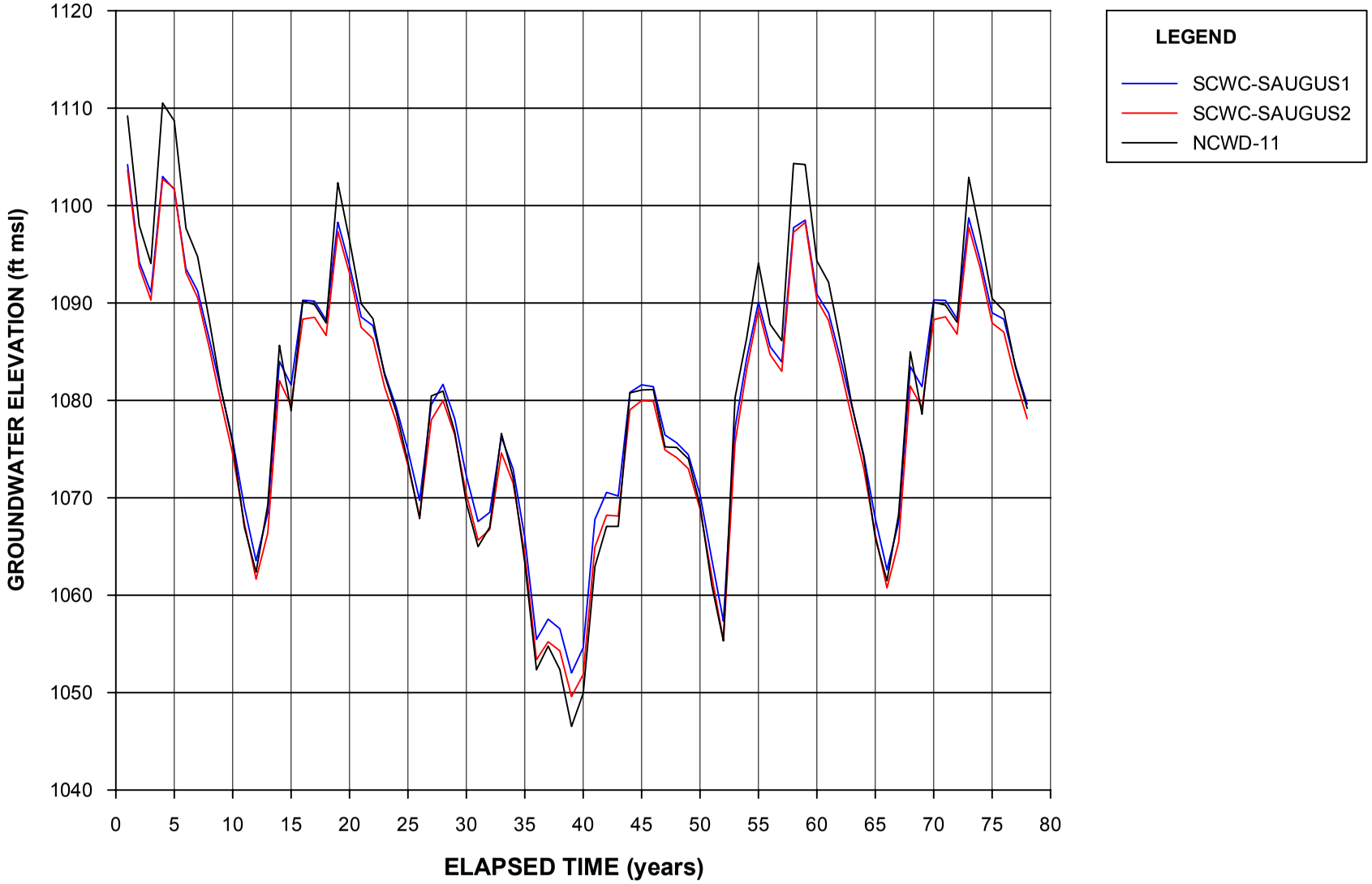

NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

2. THESE WELLS ARE CONSTRUCTED IN THE SAUGUS FORMATION AND ARE NOT OPEN TO THE ALLUVIAL AQUIFER. THE SIMULATED HYDROGRAPHS AT THESE WELL LOCATIONS ARE FOR GROUNDWATER LEVELS IN THE ALLUVIAL AQUIFER, ABOVE THE OPEN INTERVALS OF THESE WELLS.

FIGURE C-15
SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE ALLUVIAL AQUIFER ALONG THE SOUTH FORK SANTA CLARA RIVER
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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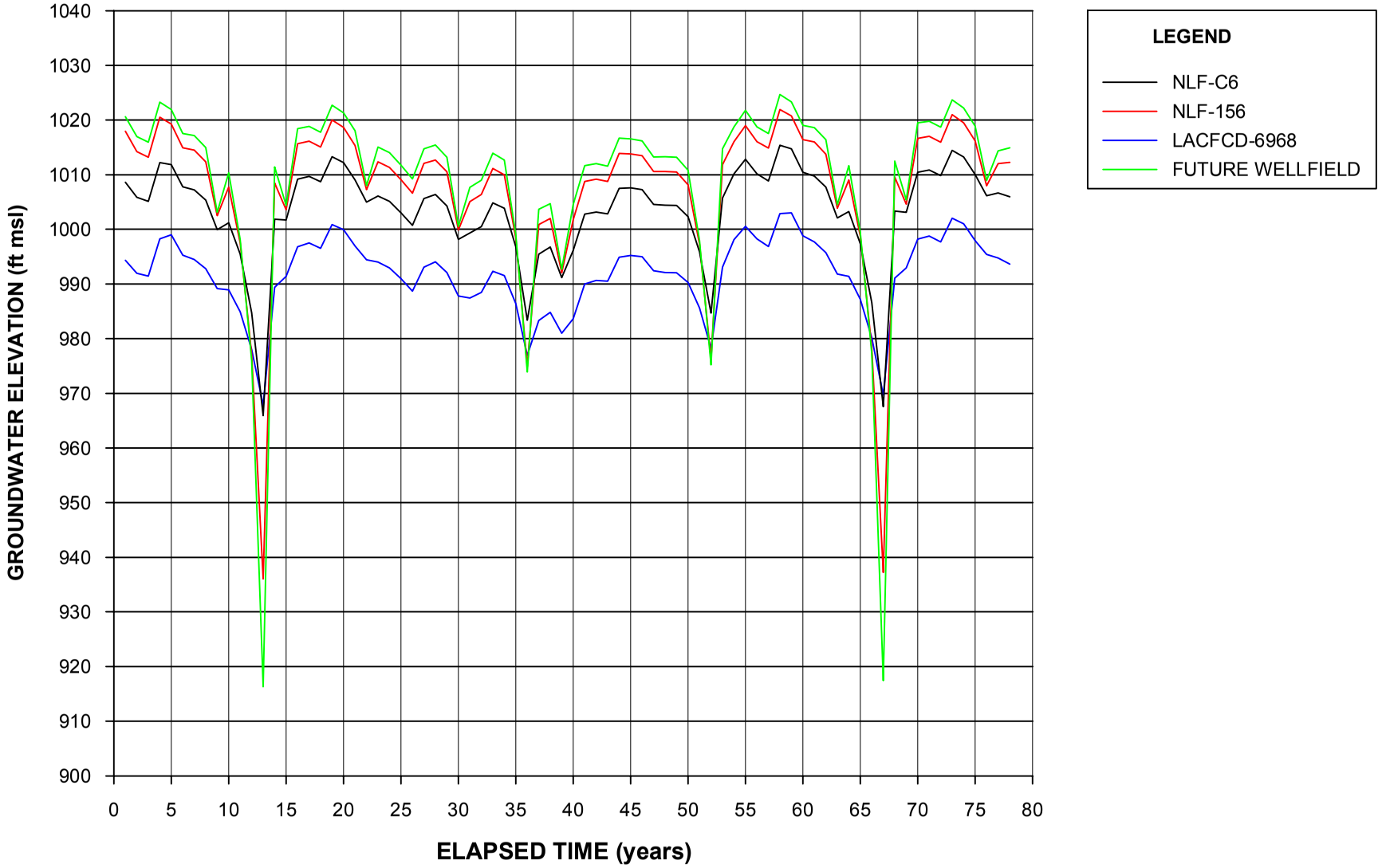
Saugus Formation – Based partially on historical operating experience, complemented by extensive recent testing and groundwater modeling work as described herein, it is planned that the Saugus Formation aquifer can supply water on a long-term sustainable basis in a normal range of 7,500 to 15,000 afy, with intermittent increases to 25,000 to 35,000 af in multiple dry years. The dry-year increases result from limited historical observation, now complemented by modeled projections, that a small amount of the large groundwater storage in the Saugus Formation can be pumped over a relatively short (dry) period, followed by recharge (replenishment) of that storage during a subsequent wet to normal period when pumping would be reduced.

Until recently, the long-term sustainability of Saugus groundwater was empirically determined from limited historical experience. The historical record shows fairly low annual pumping in most years, with one four-year period of increased pumping up to about 15,000 afy, that produced no long-term depletion of the substantial groundwater storage in the Saugus. As with the Alluvium, those empirical observations have now been complemented by the development and application of the numerical groundwater flow model. The model has been used to examine aquifer response to the operating plan for pumping from both the Alluvium and the Saugus, and to examine the effectiveness of pumping for both contaminant extraction and control of contaminant migration within the Saugus Formation.

To examine the yield of the Saugus Formation or, in other words, its sustainability on a renewable basis, the groundwater flow model was used to examine long-term projected response to pumping from both the Alluvium and the Saugus, over the 78-year period of hydrologic conditions to introduce alternating wet and dry periods as have historically occurred. The pumping simulated in the model was in accordance with the operating plan for the Basin. For the Saugus, simulated pumpage included the planned restoration of recent historic pumping from the perchlorate-impacted wells. That pumping was analyzed to assess, in addition to the overall recharge of the Saugus, the effectiveness of controlling the migration of perchlorate by extracting and treating contaminated water close to the source of contamination.

Simulated Saugus Formation response to the ranges of pumping under assumed recurrent historical hydrologic conditions was consistent with actual experience under smaller pumping rates. The response consisted of (1) short-term declines in groundwater levels and storage near pumped wells during dry-period pumping, (2) rapid recovery of groundwater levels and storage after cessation of dry-period pumping, and (3) no long-term decreases or depletion of groundwater levels or storage. Examples of projected groundwater levels and storage around the planned Saugus pumping areas are illustrated in Figures C-16 and C-17. The combination of actual experience with Saugus pumping and recharge up to about 15,000 afy, now complemented by modeled projections of aquifer response that show long-term utility of the Saugus at 7,500 to 15,000 afy in normal years and rapid recovery from higher pumping rates during intermittent dry periods, shows that the Saugus Formation can be considered a sustainable water supply source to meet the Saugus portion of the operating plan for the groundwater Basin.



NOTES:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

2. WELLS NLF-C6 AND LACFCD-6968 ARE CONSTRUCTED IN THE ALLUVIAL AQUIFER AND ARE NOT OPEN TO THE SAUGUS FORMATION. THE SIMULATED HYDROGRAPHS SHOWN AT THESE WELL LOCATIONS ARE FOR GROUNDWATER LEVELS IN THE SAUGUS FORMATION, BELOW THE OPEN INTERVALS OF THESE WELLS.

3. THE SIMULATED HYDROGRAPH FOR THE FUTURE WELLFIELD IS FOR A MODEL NODE WITH NO ASSIGNED PUMPING, LOCATED INSIDE THE WELLFIELD NEAR VWC-206.

FIGURE C-16
SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE SAUGUS FORMATION WEST OF INTERSTATE 5
ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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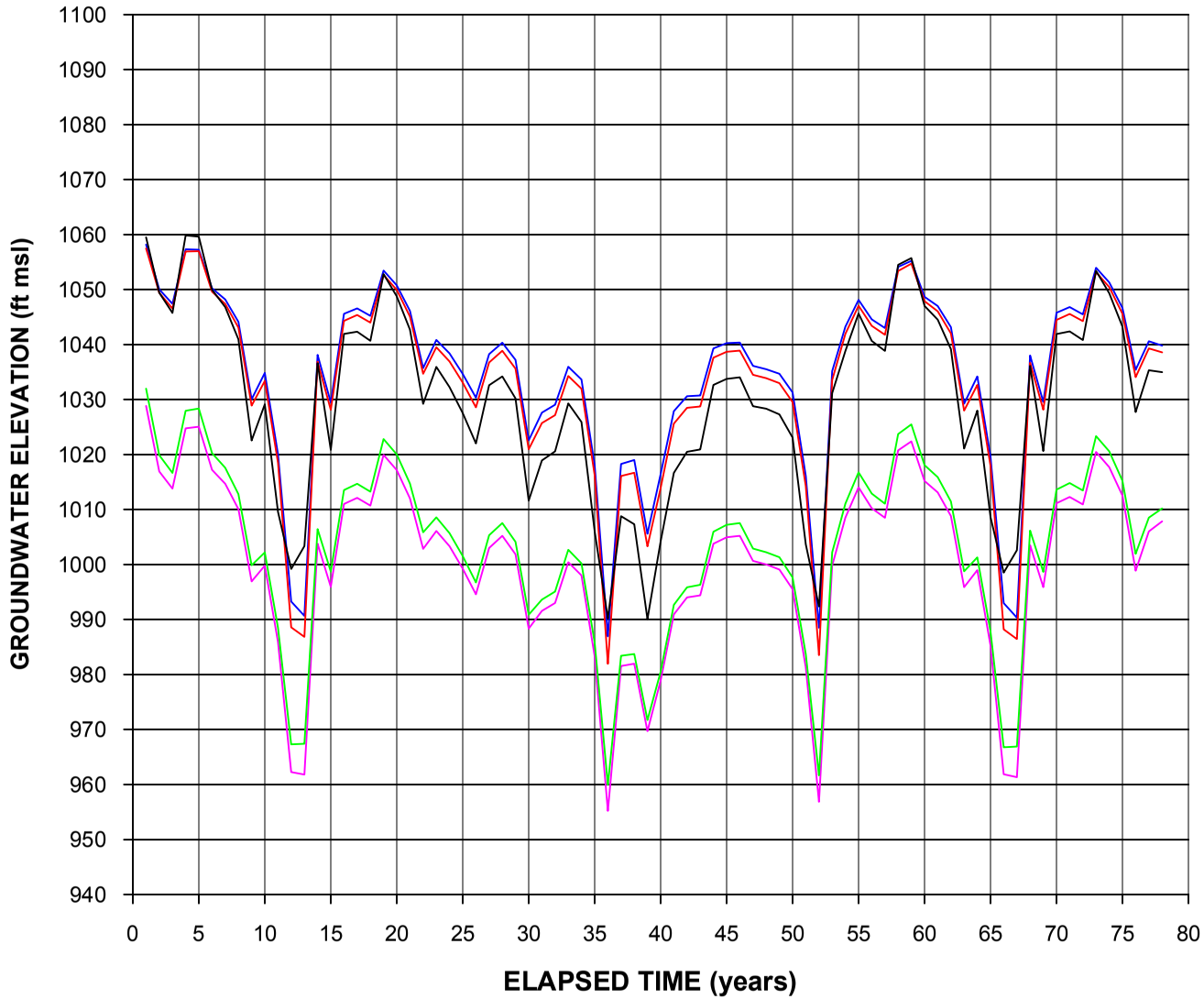

LEGEND

- VCW-157
- MP-5
- NCWD-11
- SCWC-SAUGUS1
- SCWC-SAUGUS2

NOTE:

1. SEE FIGURE 2-4 FOR LOCATIONS OF WELLS.

FIGURE C-17
SIMULATED AVERAGE ANNUAL GROUNDWATER ELEVATIONS IN THE SAUGUS FORMATION EAST OF INTERSTATE 5

ANALYSIS OF GROUNDWATER BASIN YIELD
UPPER SANTA CLARA RIVER GROUNDWATER BASIN
EAST SUBBASIN, LOS ANGELES COUNTY, CALIFORNIA

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Appendix D

Contamination and Impact on Groundwater Supplies in the Santa Clarita Valley

Appendix D

Perchlorate Contamination and Impact on Groundwater Supplies in the Santa Clarita Valley

Introduction

The detection of perchlorate in Santa Clarita Valley groundwater supplies has raised concerns over the reliability of those supplies, in particular the Saugus Formation where four wells have been removed from active service as a result of perchlorate. As discussed below, planning for remediation of the perchlorate and restoration of the impacted well capacity is substantially underway. While that work is being completed, non-impacted production facilities can be relied upon for the quantities of water projected to be available from the Alluvial Aquifer and Saugus Formation during the time necessary to restore perchlorate-impacted wells. CLWA, the local retail water purveyors, the California Department of Toxic Substances Control (DTSC), and the U.S. Army Corps of Engineers (ACOE) continue to work closely on the perchlorate contamination issue, which reasonably ensures a prompt response to any significant changes in conditions.

The following is a discussion of pertinent events related to perchlorate contamination. This discussion is provided to illustrate that work toward the ultimate remediation of the perchlorate contamination, including the reactivation of impacted groundwater supply wells, has progressed on several integrated fronts over the last four years. The following discussion is organized into a section which summarizes the on-site investigations and clean-up activities which are under the regulatory control of DTSC, followed by several sections that focus on various aspects of the off-site impacts of perchlorate on water supply wells, and the ongoing activities to remediate that problem and restore the impacted water supply.

On-Site Investigations and Clean-up

On-site investigation is substantially underway and clean-up is in the planning stages at the former Whittaker-Bermite facility. The on-site investigation and clean-up activities at the source of the contamination are under the regulatory authority and control of DTSC.

Brief History[1]

The Whittaker-Bermite site is located in the center of the Santa Clarita Valley and was operated as an explosives and munitions manufacturing, testing, and storage facility since the late 1930's. It was first owned by the Los Angeles Powder Company and later by Golden State Fireworks, the Halifax Explosives Company, the Bermite Powder Company, and the Whittaker Corporation (Whittaker), which assumed ownership of the site in 1967. Under contracts with the U.S. Department of Defense, Whittaker Corporation used perchlorate in the manufacture of solid propellants for rockets and missiles until operations ceased in 1987. There is a long history of

[1] See, "General Site History," Whittaker Bermite Clean-Up, http://www.whittaker-bermite.com/history.html, pp. 1-3.

perchlorate use and other chemical use at the site, and recent surface and subsurface investigations at the site have revealed the presence of perchlorate and other contaminants in soil and groundwater.

The contaminants found in the soil that require clean-up are perchlorate and volatile organic compounds (VOCs). These chemicals were used in the manufacturing and testing of fireworks, dynamite, oil-field explosives, and munitions. The site consists of about 996 acres, with actual production facilities occupying approximately 50 acres. The property is characterized by chaparral covering the undisturbed portions of the site, fire breaks, dirt roads and remnants of facility foundations and buildings. The surrounding areas include commercial, light industrial, and residential land uses. The facility was closed in 1987 and most of the structures on the property were removed at or about that time.

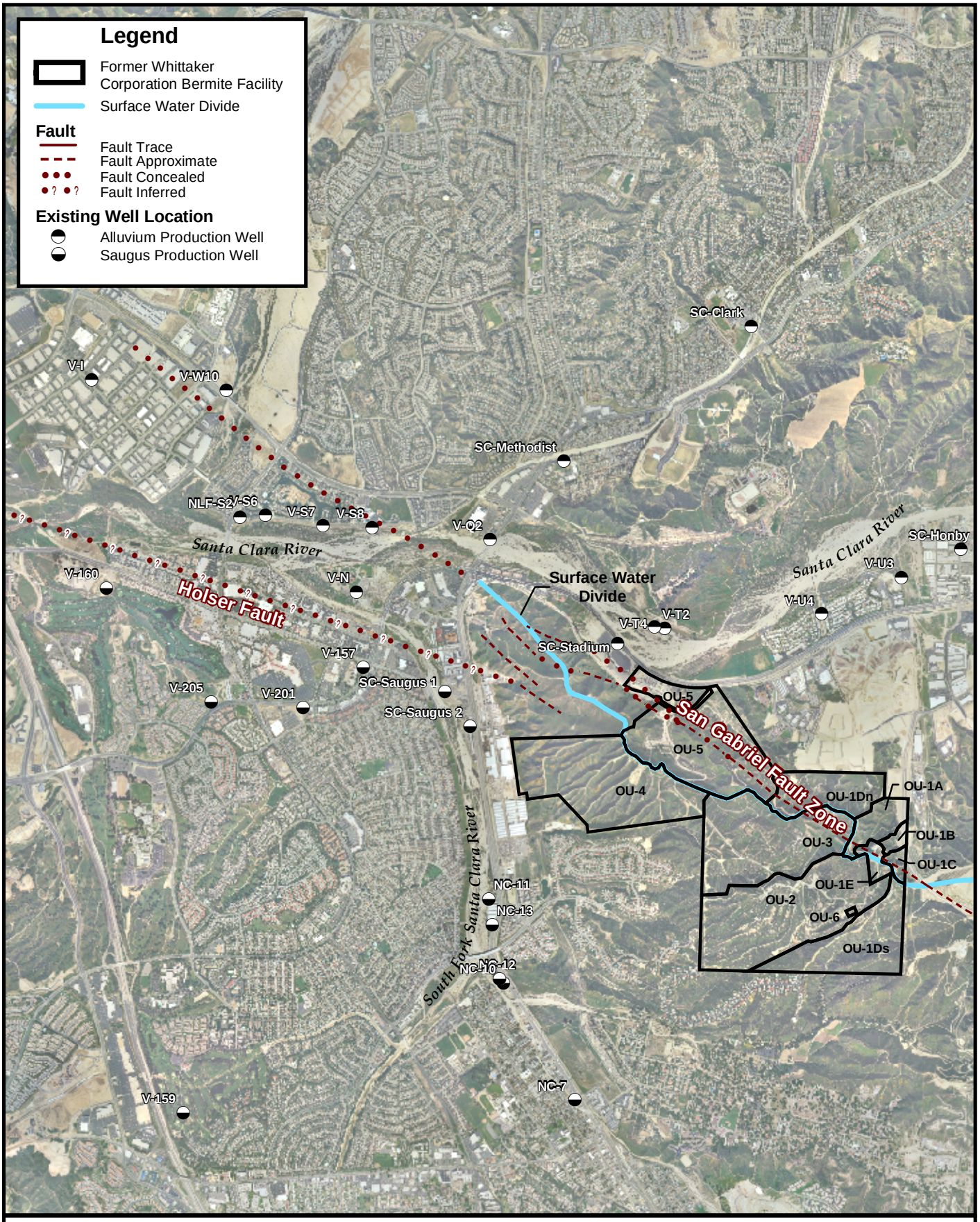
Between 1987 and 1998, Whittaker conducted environmental investigations and clean-up activities under the supervision of DTSC and its predecessor agency. In 1994, Whittaker entered into an enforceable agreement with DTSC to conduct a comprehensive site-wide investigation of areas of concern. In early 1997, with the remedial investigations underway, DTSC informed Whittaker that the soils, groundwater, and surface runoff would have to be reassessed for the presence of perchlorate, a compound that had been unregulated during the entire period of manufacturing at the site.

In 1998, Whittaker sold the property to Santa Clarita LLC, a brownfield development company. In addition to assuming all clean-up responsibilities, Santa Clarita LLC acquired the right to develop the property contingent upon the full cleanup and certification of the property's reuse by DTSC. Between 1999 and 2001, Santa Clarita LLC continued and expanded the site investigation and clean-up programs that had been initiated by Whittaker under the 1994 agreement. In 2002, however, with Santa Clarita LLC unable to fund additional site work due to financial difficulties, DTSC opened negotiations with Whittaker to resume site investigation and clean-up work. In November 2002, DTSC issued an Order that required Whittaker to complete the site investigations and feasibility studies for all contaminants of concern under a tight time schedule.

Recent Site Activities[2]

Because the site is so large, DTSC has divided the property into separate and distinct areas called Operable Units (OUs), which are defined largely by topographic features as shown in Figure D-1. OUs 1 through 6 comprise soils and perched groundwater zones from the ground surface to 200 feet below grade. OU-7 comprises soils below 200 feet from grade and site-wide groundwater and surface water, including any off-site migration of contaminants.

[2] See, "Recent Site Activities," http://www.whittaker-bermite.com/recent.html, pp. 1-5; see also, letter from Hassan Amini, Ph.D., C.HG., Geomatrix Consultants, Inc., to Sayareh Amir, DTSC, dated August 20, 2004, pp. 1-20; and letters from Hassan Amini, Ph.D., C.HG., Geomatrix Consultants, Inc., to Sayareh Amir, DTSC, dated August 25 and 26, 2004.



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0 3,500 7,000 Feet

Figure D-1
Site Location
Former Whittaker-Bermite Facility

SCO \\GALT\GIS2\SNTA_CLRTA\PLOTS\FIGURE_121404\FIGURE_2-16.MXD 12/14/2004

In complying with DTSC's Order, Whittaker consultants and contractors have conducted a significant amount of work since December 2002. The work has been performed pursuant to workplans submitted to and approved by DTSC. The principal activities, summarized by OU, include (1) additional remedial investigations, including soil samples, borings, exploratory trenching, and groundwater monitoring wells, (2) feasibility reports, treatability studies, and pilot tests, and (3) remedial action plans.[3] These efforts have included expediting the final remedial investigation reports, feasibility studies and remedial action plan for OU-1 soils. The final draft remedial action plan for OU-1 was submitted to DTSC in May 2004, and represents the results of efforts to initiate soil remediation work this year in some of the key source areas.[4]

In October 2004, DTSC issued a second public notice requesting comments on DTSC's proposal to clean-up perchlorate and other contaminants in the soil at OU-1.[5] Because of the different chemical and physical properties of the contaminants and the different types of soils in the impacted areas, DTSC has evaluated seven soil remediation alternatives that would protect human health and the environment. DTSC proposes to clean up perchlorate and VOCs in the soil by using a combination of the identified remediation alternatives.[6]

In addition, remedial investigation field work for the soil in OUs 2, 3, 4, 5 and 6 is almost complete, with the investigation results indicating it would be most expedient to conduct the remaining remedial response work for soils by modifying DTSC's Order to allow Whittaker to prepare and submit comprehensive site-wide documents for soil clean-up (e.g., remedial investigation, feasibility study, baseline risk assessment, and remedial action plan), rather than OU-specific documents.[7]

Whittaker also recently submitted a letter to DTSC requesting modifications to DTSC's Order, as it relates to the groundwater remedial response work for the area designated OU-7.[8] Although substantial progress has been made in OU-7, the remedial investigation and feasibility study field work for OU-7 is still ongoing.[9] Whittaker has proposed a tentative schedule for completing site-wide investigation and groundwater remediation work. The work is scheduled to be completed in 2005.[10]

In OU-7, in close coordination with the ACOE, CLWA, and local retail water purveyors, Whittaker has been conducting remedial investigation and clean-up work with respect to production wells impacted by the perchlorate contamination.[11] As part of that effort, ACOE has

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[3] See, "Recent Site Activities," http://www.whittaker-bermite.com/recent.html, pp. 1-4.
[4] See, letter from Hassan Amini, Ph.D., C.HG., Geomatrix Consultants, Inc., to Sayareh Amir, DTSC, dated August 20, 2004, p. 1.
[5] See, DTSC: Site Cleanup, Whittaker-Bermite Facility (former), Fact Sheet - October 2004, http://www.dtsc.ca.gov/SiteCleanup/Whittaker_Bermite/, p. 2.
[6] See, DTSC: Site Cleanup, Whittaker-Bermite Facility (former), Fact Sheet - May 2004, http://www.dtsc.ca.gov/SiteCleanup/Whittaker_Bermite/, p. 2.
[7] See, letter from Hassan Amini, Ph.D., C.HG., Geomatrix Consultants, Inc., to Sayareh Amir, DTSC, dated August 25, 2004, pp. 1-2.
[8] See, letter from Hassan Amini, Ph.D., C.HG., Geomatrix Consultants, Inc., to Sayareh Amir, DTSC, dated August 26, 2004, pp. 1-2.
[9] *Id.*
[10] *Id.*
[11] See, "Recent Site Activities," http://www.whittaker-bermite.com/recent.html, p. 4.

been investigating the nature and extent of the perchlorate contamination impacting the production wells. In OU-7, Whittaker, CLWA, the local retail water purveyors, and ACOE have conducted the following remedial investigation and feasibility study work in 2002-2004:

- Installed and sampled approximately 30 temporary Alluvial Aquifer monitoring wells
- Installed 12 permanent Alluvial Aquifer monitoring wells
- Installed and sampled six temporary Saugus monitoring wells on and off the site
- Installed five deep multi-port Saugus monitoring wells, four within the site boundaries and one off-site
- Installed one deep single-port Saugus monitoring well within the site boundaries
- Installed cluster wells at four locations to monitor discrete Saugus Formation zones, two within and two outside the site boundaries
- Conducted several rounds of groundwater monitoring for new and existing wells
- Constructed and calibrated a computer model capable of simulating aquifer conditions for development and evaluation of plume containment and treatment strategies
- Conducted aquifer pumping and permeability tests
- Conducted sampling of some of the impacted production wells
- Conducted pilot-scale testing of above-ground treatment options for removing perchlorate from drinking water, including ion exchange and bioremediation.[12]

Remedial response actions for groundwater is continuing through 2005. The schedule contemplates additional remedial investigations, feasibility studies, interim remedial measures, and a remedial action plan for groundwater. The remedial action plan will include the design, construction, and commencement of treatment of perchlorate-contaminated groundwater from two of the retail water purveyors' impacted production wells, which would concurrently provide treated potable water and contain and capture the OU-7 perchlorate plume along its downgradient edges. [13]

For contaminated surface waters on site, Whittaker updated the site-wide surface water sampling plan subject to the approval of DTSC and the Regional Water Quality Control Board (RWQCB).[14] Whittaker collected surface water samples from the primary site drainages during winter storm events in 2003 and 2004. In addition, Whittaker updated the site's stormwater pollution plan and devised and implemented erosion control measures in various areas of the site. Whittaker also conducted a sediment sampling program for the principal drainage areas.[15]

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[12] *Id.* at pp. 4-5.
[13] See, letter from Hassan Amini, Ph.D., C.HG., Geomatrix Consultants, Inc., to Sayareh Amir, DTSC, dated August 20, 2004, pp. 16-19.
[14] See, "Recent Site Activities," http://www.whittaker-bermite.com/recent.html, p. 5.
[15] *Id.*

In short, the investigation of on-site sources of the perchlorate contamination and evaluation of clean-up options are substantially underway and closely monitored by DTSC (soils and groundwater), RWQCB (surface water), and ACOE (groundwater).

Perchlorate Impacted Water Purveyor Wells

As previously noted, in 1997, perchlorate was detected in four Saugus Formation production wells operating near the former Whittaker-Bermite site. These wells, CLWA Santa Clarita Water Division's (SCWD) Wells Saugus 1 and Saugus 2, Newhall County Water District's (NCWD) Well NC-11 and Valencia Water Company's (VWC) Well V-157, were removed from service. In 2002, perchlorate was detected in the SCWD Stadium well located directly adjacent to the Whittaker-Bermite site. This Alluvial well was also removed from service. Locations of the impacted wells, and other nearby non-impacted wells, relative to the Whittaker-Bermite site are shown on Figure D-1.

Since the detection of perchlorate and resultant inactivation of impacted wells, the retail water purveyors have been conducting regular monitoring of active wells near the Whittaker-Bermite site. In late March 2005, that monitoring detected the presence of perchlorate in VWC's Well Q2, an Alluvial well located immediately northwest of the confluent of Bouquet Creek and the Santa Clara River. As a result of the detection and confirmation of perchlorate in its Well Q2, VWC removed the well from active service and pursued rapid permitting and installation of wellhead treatment. The well was returned to water supply service in October 2005.

Regulatory Standards for Perchlorate

Perchlorate is a chemical salt and is very soluble in water. It is also very mobile in water and is persistent (i.e., doesn't degrade) under typical environmental conditions. The applicable drinking water standards for perchlorate are summarized below.

On December 6, 2002, the California Office of Environmental Health Hazard Assessment (OEHHA) proposed a public health goal (PHG) for the amount of perchlorate present in drinking water. OEHHA's proposal suggested a range of 2 to 6 micrograms per liter (µg/l). A proposed PHG is a theoretical calculation that initiates a thorough, multi-year standard-setting process by DHS. An adopted PHG reflects a very stringent health standard and is not an enforceable drinking water standard. A final PHG contributes to DHS' development of a Maximum Contaminant Level (MCL), which is an enforceable drinking water standard. DHS is required to establish an MCL at a level as close as is technically and economically feasible to the PHG.

In addition to OEHHA's proposal, DHS was required to adopt an MCL for perchlorate by January 1, 2004. However, this date has been extended into 2005 to allow additional review and study by DHS. Presently, there is no drinking water standard, or MCL, for perchlorate, only a provisional limit called an "action level". The perchlorate advisory action level is currently 6 µg/l, and is not an enforceable standard.

When perchlorate was first discovered in California drinking water supplies in 1997, DHS set the advisory action level at 18 µg/l. It was revised to 4 µg/l in January 2002 and then finally to its current level of 6 µg/l in March 2004. In September 2004, Assembly Bill 2528 was signed into law by Governor Schwarzenegger. This bill eliminates the term "action level" and replaces it with two new terms, "notification level" and "response level". This new terminology became

effective January 2005. However, DHS has advised public water systems that they may use the new terminology in advance of the effective date. Using this new approach, the term "notification level" is the same as the "action level". With respect to perchlorate, the notification level would be 6 µg/l and DHS recommends that the utility provide information to its customers about the presence of the contaminant using its annual consumer confidence report. The response level for perchlorate is 10 times the notification level, or 60 µg/l. At this level, DHS recommends the source be removed from service. At perchlorate levels greater than ten times the action level (or 60 µg/l), DHS recommends (or may require) that a water system remove the source(s) of supply with that concentrations from service. However, with the primary interest of protecting public health from those contaminants regulated by an action level, water utilities normally employ conservative operations by limiting use of the contaminated source, or elect to deliver an alternate source of supply until DHS establishes an enforceable drinking water standard (i.e., MCL). Accordingly, the local retail water purveyors removed all the perchlorate-impacted wells from active water supply service. At present, while prepared to comply with evolving terms, the retail water purveyors have adopted an intended goal in restoring impacted capacity to utilize groundwater for water supply at non-detect concentrations of perchlorate. This goal is consistent with the DHS Policy 97-005 for use of impaired water sources.

Water Purveyor Litigation and Interim Settlement

On November 29, 2000, CLWA and the local retail water purveyors filed suit against the current and prior owners of the Whittaker-Bermite facility. The lawsuit includes causes of action relating to payment of all necessary costs of response, removal of the perchlorate contamination, payment of remediation action costs, and compensation for other damages associated with the perchlorate contamination. CLWA and the local retail water purveyors have incurred substantial response costs and other expenses as a result of production lost on account of the contamination. As a result, CLWA's purveyors have used SWP water to make up for lost groundwater production.

In late summer 2003, CLWA, the local retail water purveyors, Whittaker and Remediation Financial, Inc. (RFI) and Santa Clarita LLC (SCLLC) entered into an interim settlement agreement, in which the parties agreed to work cooperatively for a minimum of one year to further define long-term costs and possibly achieve a long-term settlement. The interim settlement agreement specifies that Whittaker, RFI, and SCLLC and/or their insurers will reimburse certain past costs as well as fund studies and prepare cost estimates for the clean-up plan that will restore water production and capacity of the impacted wells and protect other wells from future contamination. The interim settlement provided for a one-year stay of the lawsuit between the parties and was subsequently amended to extend the stay through January 31, 2005. This has allowed the parties to focus on the final elements of the clean-up plan, which will be submitted to the regulatory agencies in early 2005. The parties continue negotiations to reach a complete settlement.

United States Army Corps of Engineers (ACOE) Groundwater Study

In early 2002, the owner of the Whittaker-Bermite property and CLWA initiated efforts to obtain federal assistance to conduct onsite and off-site groundwater investigations. Through Congressman McKeon, an initial federal authorization of seven million dollars was provided in the form of participation by the ACOE.

Toward that end, on April 11, 2002, ACOE and CLWA entered into a Feasibility Cost-Sharing Agreement to study and locate the source of perchlorate contamination, and other contaminants of interest (COI), in the groundwater in the Santa Clarita Valley. The main objective of the ACOE/CLWA study is to sufficiently characterize the existing groundwater conditions, develop and evaluate both interim and long-term solutions to the contamination and address the contaminated groundwater in the study area, which includes the former Whittaker-Bermite facility and areas adjacent to the property. The project is being implemented pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and in October 2004, the ACOE issued its report entitled, "Draft Final Conceptual Hydrology Memorandum, Eastern Santa Clara Subbasin Study, Santa Clarita, California".[16]

ACOE is actively testing the groundwater in the region in two major phases. ACOE completed five rounds of groundwater sampling in the Saugus Formation and the Alluvial Aquifer between October 2002 and April 2004.[17] ACOE drilled over 8,500 linear feet in the study area, and installed 41 groundwater monitoring wells at 11 different locations. Groundwater sampling was performed at all 41 wells, collecting a total of 149 groundwater samples. The testing began with an initial baseline assessment of each well[18] and was followed by additional groundwater sampling events of each well.[19] As a result of the testing program, ACOE identified the concentrated source areas, began tracing and understanding the contaminant plume, and developed two-dimensional geologic cross-sectional drawings of the study area.[20]

As a result of the sampling program, ACOE determined that perchlorate appears to be one of the primary COIs in the groundwater.[21] Perchlorate was detected in a monitoring well and reconnaissance sampling points in the Alluvial Aquifer approximately one mile west of the former Whittaker-Bermite facility at Bouquet Junction.[22] Additionally, ACOE found perchlorate in a monitoring well in the Alluvial Aquifer at the mouth of Oakdale Canyon in the South Fork of the Santa Clara River, apparently caused by surface water runoff from the former Whittaker-Bermite facility.[23] Testing at this monitoring well has revealed that perchlorate may have migrated vertically into the Saugus Formation at this location, which may have caused the contamination of the NC-11 well, one of the wells that has been inactivated.[24]

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[16] See, ACOE, Los Angeles District, Draft Final Conceptual Hydrogeology Technical Memorandum (Memorandum), October, 2004, p.ES-1.
[17] See, Memorandum, p.ES-2; see also, ACOE, Los Angeles District, Citizens Advisory Group Update on City of Santa Clarita Eastern Santa Clara Subbasin Groundwater Study (Update), June 9, 2004, p.6.
[18] The initial baseline sampling tested for perchlorate, volatile organic compounds (VOCs), explosive compounds, nitrosamines and other contaminants of interest (COIs) (i.e., 1,4-dioxane, semivolatile organic compounds (SVOCs), chlorate, gross alpha and gross beta, cyanide and hexavalent chromium). The wells were also tested for metals (including major cations), major anions, alkalinity, total Kjedahl nitrogen (TKN), nitrate, ammonia, total dissolved solids (TDS), biochemical oxygen demand (BOD), chemical oxygen demand (COD) and total organic compound (TOC). See, Memorandum, p.ES-3.
[19] See, Memorandum, p.ES-3; Section 6.1.
[20] See, Update, p.7.
[21] See, Memorandum, p.ES-5; Section 6.1.
[22] See, Memorandum, p.ES-5; Section 6.1; see also, Update, p.15.
[23] See, Memorandum, p. ES-5; see also, Update, p.16.
[24] See, Memorandum, p.ES-5; Section 6.1.

In the Saugus Formation, ACOE found perchlorate in a monitoring well west of Bouquet Junction, over two miles from the former Whittaker-Bermite facility.[25] However, it appears that the impact on groundwater in this area of the Saugus Formation may be limited to the upper portions of the Saugus Formation, as the contamination was not detected below hydrostratigraphic unit (HSU) SIII. The contamination of the V-157 and SC-Saugus 1 and 2 wells, which also have been deactivated, appears to be caused by the vertical downward migration of perchlorate in HSU SIII, and lateral migration away from the source areas. It also appears that the NC-11 well also may have been impacted by this contaminant plume.[26]

As a result of ACOE's work to date, the extent of perchlorate contamination in the Santa Clara region is better understood. Further work will continue to define the lateral and vertical extent of the contaminated groundwater in the Saugus Formation and Alluvial Aquifer, and evaluate potential changes in groundwater contaminants over time.[27] Therefore, ACOE plans to continue integrating its current study results with other ongoing investigations in the area, including the remedial investigation by the Whittaker Company and the response activities undertaken by CLWA and the local retail water purveyors for impacted production wells.[28] ACOE also intends to complete further focused sampling programs and prepare follow-up technical memoranda of those test results.[29]

Based on the knowledge obtained by its testing and analysis, ACOE plans to implement interim remedial measures at selected locations to reduce the perchlorate concentration before it can disperse and/or interfere with the known transportation pathways. By these efforts, ACOE, in coordination with response actions of the property with oversight from DTSC, anticipates preventing further contamination and establishing source control.[30]

DTSC/CLWA/Purveyor Environmental Oversight Agreement

In February 2003, DTSC and CLWA, NCWD, SCWD, and VWC entered into an Environmental Oversight Agreement (Agreement) whereby DTSC provides review and oversight of the response activities being undertaken by CLWA and the local retail water purveyors relating to the detection of perchlorate in the five impacted wells.

The significance of the Agreement lies in the response actions to be undertaken in its “Scope of Work” (Exhibit B to the Agreement). Under the Scope of Work, CLWA and the retail water purveyors will prepare (1) Well Characterization Reports, (2) a Health-Based Risk Assessment, (3) a Regional Groundwater Flow Model, and (4) a Treatment Technology Evaluation Report. The regional groundwater flow model and the treatment technology evaluation are key inputs to the permitting for restoring the impacted wells by returning them to water supply service as described below. Both have been completed and are being utilized in conjunction to control contamination migration and restore impacted water supply well capacity. Most importantly, under the Scope of Work, CLWA and the retail water purveyors will prepare and implement a

[25] See, Memorandum, P.ES-5; see also, Update, p.9.
[26] See, Memorandum, p. ES-5; Section 6.1.
[27] See, Memorandum, p.ES-6; Section 6.2.
[28] See, Memorandum, p.ES-1.
[29] See, Update, p.17.
[30] See, ACOE, Los Angeles District, "Citizens Advisory Group Update on City of Santa Clarita Eastern Santa Clara Subbasin Groundwater Study," June 9, 2004, p.18.

Remedial Action Plan (RAP) that will be used in connection with water treatment programs and/or well relocation. The RAP is important to the retail water purveyors, who have been working cooperatively with DTSC to implement the groundwater clean-up. CLWA is planning to submit the RAP to DTSC for its review in early 2005.

Treatment Technology

A number of full scale perchlorate treatment systems have been implemented in California and other states. In an effort to evaluate the various available treatment technologies, CLWA commissioned an investigation to identify and evaluate alternative treatment processes effective in removing perchlorate. The scope of that investigation includes resolving permitting issues pertaining to the construction and certification of a treatment facility, conducting bench-scale and pilot-scale tests to determine treatment process performance, and preparing preliminary capital and operations and maintenance cost estimates.

Three treatment technologies, an ion exchange system and two biological systems, were selected for study. The report "Treatment of Perchlorate Contaminated Groundwater from the Saugus Aquifer, TM 3 Bench and Pilot Test Results" (Carollo Engineers, February 2004), concluded that all three systems were effective in removing perchlorate. However, there was considerable uncertainty with respect to the capital and operations and maintenance costs associated with each process. Therefore, a technical group comprised of representatives from CLWA, the retail water purveyors, and consultants retained by Whittaker-Bermite agreed to solicit competitive bids for the design, construction, and operation of both ion exchange and biological treatment systems. After thorough evaluation of several bids, the technical group determined that ion exchange is the preferred technology based upon treatment performance, ease of regulatory compliance, and comparison of costs associated with construction and operations and maintenance.

The preferred single-pass ion exchange treatment technology does not generate a concentrated perchlorate waste stream that would require additional treatment before discharge to a sanitary sewer or a brine line (if one is available). This technology incorporates an active resin (a material that attracts perchlorate molecules) that safely removes the perchlorate from water. The resin is contained in pressure vessels and the water is pumped through the vessel. The resin is eventually replaced with new resin after a period of time. The old resin is removed and transported by truck to an approved waste disposal site where it is safely destroyed. This technology is robust and reliable for use in drinking water systems. DHS has approved operation of the perchlorate treatment plants currently in operation at the following locations:

- La Puente Valley Water District (2,500 gpm)
- San Gabriel Valley Water Company, El Monte (7,800 gpm)
- California Domestic Water Company, Whittier (5,000 gpm)
- City of Riverside (2,000 gpm)
- West San Bernardino Water District, Rialto (2,000 gpm)
- City of Rialto (2,000 gpm)
- City of Colton (3,500 gpm)
- Fontana Union WC (5,000 gpm)
- City of Pomona (10,000 gpm)

Based on (1) the results of CLWA's investigation of perchlorate removal technologies, (2) the technical group's evaluation, and (3) DHS' approval of single-pass ion exchange for treatment in other settings, CLWA and the local retail water purveyors are planning single-pass ion exchange for the treatment technology for restoration of impacted capacity (wells) in accordance with the permitting, testing, and installation process as currently scheduled and described in the next section. The wellhead treatment installed at VWC Well Q2 is the same single-pass ion exchange as is planned for restoration of impacted Saugus well capacity.

Restoration of Perchlorate Impacted Water Supply

Since the detection of perchlorate in the four Saugus wells in 1997, CLWA and the retail water purveyors have recognized that one element of an overall remediation program would most likely include pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. Thus, CLWA and the retail water purveyors expect that the overall perchlorate remediation program could include dedicated pumping from some or all of the impacted wells, with appropriate treatment, such that two desirable objectives could both be achieved. The first objective is control of subsurface flow and protection of downgradient wells and the second is restoration of some or all of the contaminated water supply. Not all impacted capacity is required for control of groundwater flow. The remaining capacity would be replaced by construction of replacement wells at other non-impacted locations.

In cooperation with state regulatory agencies and investigators working for Whittaker-Bermite, CLWA and the local retail water purveyors developed an off-site plan that focuses on the above concepts of groundwater flow control and restored pumping capacity and is compatible with on-site and possibly other off-site remediation activities. Specifically relating to water supply, the plan includes the following:

- Constructing and operating a water treatment process that removes perchlorate from two impacted wells such that the produced water can be used for municipal supply
- Hydraulically containing the perchlorate contamination moving from the Whittaker-Bermite site toward the impacted wells by pumping the wells at rates that will capture water from all directions around them
- Protecting the downgradient non-impacted wells through the same hydraulic containment that results from pumping two of the impacted wells
- Restoring the annual volumes of water that were pumped from the impacted wells before they were inactivated, and also restoring the wells' total capacity to produce water in a manner consistent with the retail water purveyor's operational plan for groundwater supply

The current schedule for implementation of the plan to restore contaminated water supply (wells) is illustrated in Figure D-2. Included in the schedule is a planned extended test of the wells that will be returned to service as part of restoring contaminated water supply and that will also be operated to extract contaminated water and control the migration of contamination in the aquifer. Concurrent with the testing of the wells, several specific ion exchange resins will also be tested to evaluate their performance and longevity. The two key activities that comprise the majority of

effort required for implementation of the plan are general facilities-related work (design and construction of well facilities, treatment equipment, pipelines, etc.) and permitting work. Both activities are planned and scheduled concurrently resulting in planned completion (i.e., restoration of all impacted capacity) in 2006. Notable recent accomplishments toward implementation include completion of the Final Draft Interim Remedial Action Plan (RAP) in August 2005 and completion of environmental review with the adoption of a Mitigated Negative Declaration in September 2005.

In light of the preceding, with regard to the adequacy of groundwater as the local component of water supply in this UWMP, the impacted capacity will remain unavailable into 2006, during which time the non-impacted groundwater supply will be sufficient to meet near-term water requirements. Afterwards, the total groundwater capacity will be sufficient to meet the full range of normal and dry-year conditions as provided in the operating plan for groundwater supply, as described in Chapter 3 of this UWMP.

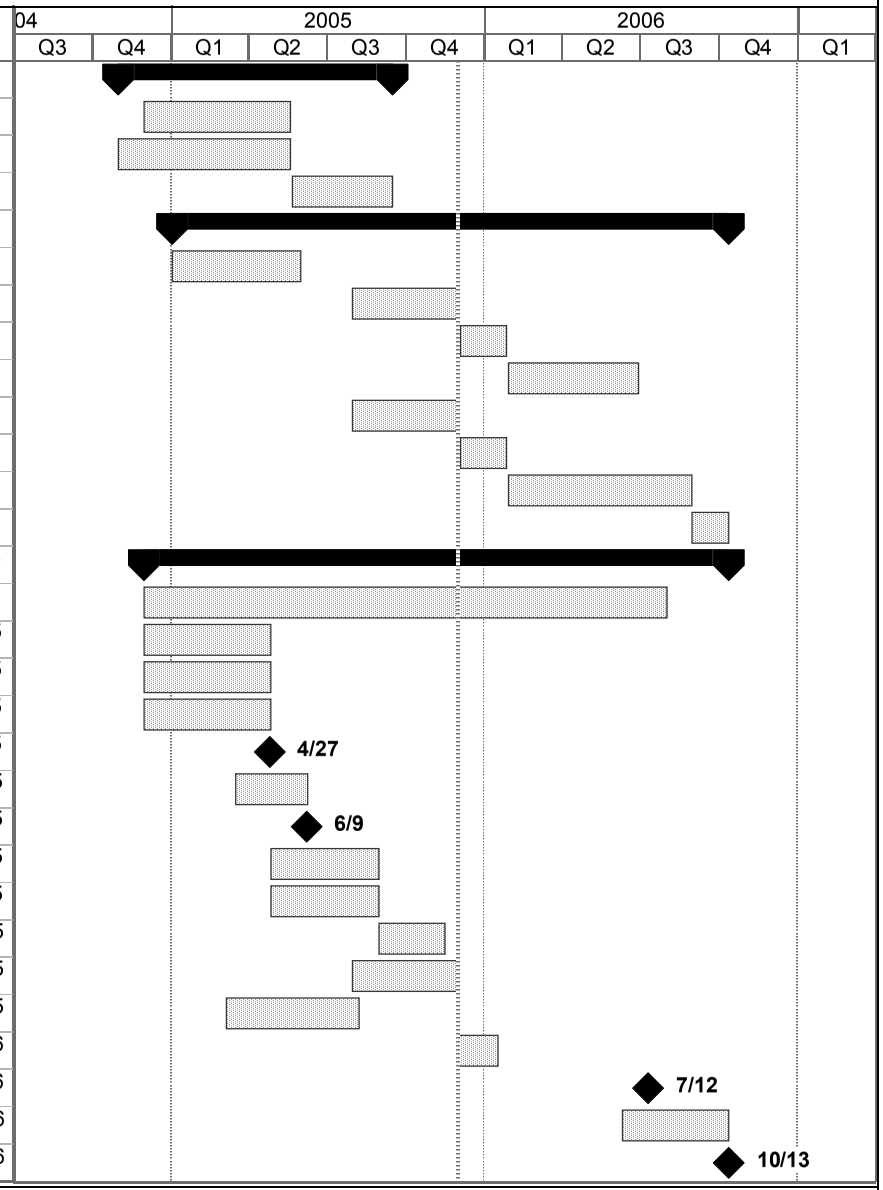
Returning contaminated wells to municipal water supply service by installing treatment requires issuance of permit from DHS before the water can be considered potable and safe for delivery to customers. The permit requirements are contained in DHS Policy Memo 97-005 for direct domestic use of impaired water sources. Before issuing a permit to a water utility for use of an impaired source as part of the utility's overall water supply permit, DHS requires that studies and engineering work be performed to demonstrate that pumping the wells and treating the water will be protective of public health for users of the water. The Policy Memo requires that DHS review the local retail water purveyor's plan, establish appropriate permit conditions for the wells and treatment system, and provide overall approval of returning the impacted wells to service for potable use. Ultimately, CLWA and the local retail water purveyor's plan and the DHS requirements are intended to ensure that the water introduced to the potable water distribution system has no detectable concentration of perchlorate.

The DHS 97-005 Policy Memo requires, among other things, the completion of a source water assessment for the impacted wells intended to be returned to service. The purpose of the assessment is to determine the extent to which the aquifer is vulnerable to continued migration of perchlorate and other contaminants of interest from the Whittaker-Bermite site. The assessment will include the following:

- Delineation of the groundwater capture zone caused by operating the impacted wells
- Identification of contaminants found in the groundwater at or near the impacted wells
- Identification of chemicals or contaminants used or generated at the Whittaker-Bermite facility
- Determination of the vulnerability of pumping the impacted wells to these contaminant sources

Figure D-2
Preliminary 97-005 Implementation Schedule
Castaic Lake Water Agency

ID	Task Name	Duration	Start	Finish
1	**DTSC Approval Activities**	**230 days**	**Mon 11/1/04**	**Fri 9/16/05**
2	Feasibility Study	6.15 mons	Wed 12/1/04	Fri 5/20/05
3	Draft RAP	29 wks	Mon 11/1/04	Fri 5/20/05
4	Final RAP	4.25 mons	Mon 5/23/05	Fri 9/16/05
5	**Implementation Activities**	**465 days**	**Mon 1/3/05**	**Fri 10/13/06**
6	Easements and ROW	5.4 mons	Mon 1/3/05	Wed 6/1/05
7	Treatment Design	4.4 mons	Mon 8/1/05	Wed 11/30/05
8	Treatment Bidding & Contracting	2 mons	Mon 12/5/05	Fri 1/27/06
9	Treatment Construction	5.5 mons	Mon 1/30/06	Fri 6/30/06
10	Pipeline Design	4.4 mons	Mon 8/1/05	Wed 11/30/05
11	Pipeline Bidding & Contracting	2 mons	Mon 12/5/05	Fri 1/27/06
12	Pipeline Construction	7.7 mons	Mon 1/30/06	Thu 8/31/06
13	System Startup	1.55 mons	Fri 9/1/06	Fri 10/13/06
14	**DHS Approval Activities (97-005)**	**488 days**	**Wed 12/1/04**	**Fri 10/13/06**
15	DHS Coordination	21.8 mons	Wed 12/1/04	Wed 8/2/06
16	TM1: Source Water Assessment	5.3 mons	Wed 12/1/04	Wed 4/27/05
17	TM2: Raw Water Quality Characterization	5.3 mons	Wed 12/1/04	Wed 4/27/05
18	TM3: Source Water Protection	5.3 mons	Wed 12/1/04	Wed 4/27/05
19	DHS Workshop No. 1	0 days	Wed 4/27/05	Wed 4/27/05
20	TM4: Effective Monitoring & Treatment	3 mons	Fri 3/18/05	Thu 6/9/05
21	DHS Workshop No. 2	0 days	Thu 6/9/05	Thu 6/9/05
22	TM5: Human Health Risk Assessment	4.5 mons	Thu 4/28/05	Wed 8/31/05
23	TM6: Alternative Source Assessment	4.5 mons	Thu 4/28/05	Wed 8/31/05
24	DHS Review of TMs 5 & 6	2.75 mons	Thu 9/1/05	Wed 11/16/05
25	Prepare 97-005 Engineer's Report	4.4 mons	Mon 8/1/05	Wed 11/30/05
26	CEQA Initial Study and Draft MND	5.55 mons	Mon 3/7/05	Mon 8/8/05
27	Permit Application	1.7 mons	Thu 12/1/05	Tue 1/17/06
28	Public Hearing	0 days	Wed 7/12/06	Wed 7/12/06
29	DHS Evaluation	4.5 mons	Mon 6/12/06	Fri 10/13/06
30	Obtain DHS Permit	0 days	Fri 10/13/06	Fri 10/13/06



Project: CLWA 97-005_r2
Date: Thu 12/1/05

Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

CLWA is currently working directly with the retail water purveyors and its consultants on development of the DHS 97-005 Policy Memo permit application. Two coordination workshops have already been held with DHS. Drafts of all six elements of the 97-005 Policy Memo have been submitted to DHS and the retail purveyors for review, including: the Source Water Assessment, Raw Water Quality Characterization, Source Protection Plan, Effective Monitoring and Treatment Evaluation, Human Health Risk Assessment, and the Alternatives Sources Evaluation. The Engineer's Report, which summarizes these six elements for the 97-005 process, is anticipated to be complete by the end of November 2005.

As noted above, CLWA and the local retail water purveyors have recognized the probable need for some form of pumping in or near the impacted wells to extract contamination and protect downgradient non-impacted wells. As part of the permitting for use of impacted wells with treatment, DHS 97-005 Policy Memo requires an analysis to demonstrate contaminant capture and protection of other nearby water supply wells. The development and calibration of a numerical groundwater flow model of the entire basin was initiated as a result of a 2001 Memorandum of Understanding among the Upper Basin Water Purveyors (CLWA, CLWA SCWD, LACWWD #36, NCWD, and VWC) and the United Water Conservation District in Ventura County.

The groundwater model was initially intended for use in analyzing the yield and sustainability of groundwater in the Basin. Use of the model for that analysis is described in Chapter 3. The model was adaptable to analyze both the sustainability of groundwater under an operational scenario that includes full restoration of perchlorate-contaminated supply and the containment of perchlorate near the Whittaker-Bermite property (i.e., by pumping some of the contaminated wells), including preventing movement of perchlorate contamination to other portions of the aquifer system. DTSC reviewed and approved the construction and calibration of the regional model as described in the final model report "Regional Groundwater Flow Model for the Santa Clarita Valley, Model Development and Calibration" (CH2M Hill, April 2004).

After DTSC's approval of the model, it was used to simulate the capture and control of perchlorate by restoring impacted wells, with treatment, as described above. The results of that work were summarized in a second report "Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California" (CH2M Hill, December 2004). The modeling analysis indicate that the pumping of impacted wells SCWD-Saugus 1 and SCWD-Saugus 2 at rates of 1,200 gpm each on a nearly continual basis will effectively contain perchlorate migrating westward in the Saugus Formation from the Whittaker-Bermite property. The analysis also indicates that (1) no new production wells are needed in the Saugus Formation to meet the perchlorate containment objective, (2) impacted well NCWD-11 is not a required component of the containment program, and (3) pumping at SCWC-Saugus 1 and SCWC-Saugus 2 is necessary to prevent migration of perchlorate to other portions of the Saugus Formation.

This report also includes the general design of a sentinel groundwater monitoring network and program required by DHS as part of its 97-005 Policy Memo permitting. The perchlorate containment report was approved by DTSC in November 2004. With that approval, the model is now being used to support the source water assessment and the remainder of the permitting process required by DHS under its 97-005 Policy Memo.

Somewhat independent of the focus on impacted Saugus wells and restoration of that impacted water supply has been the Alluvial Stadium well. On-site investigations by Whittaker-Bermite since late 2003 have resulted in the completion, in June 2005, of a Workplan for a Pilot Remediation Pumping Program in the Northern Alluvium and certain on-site sub-areas that are east/southeast, or generally upgradient, of the impacted Stadium well. That program basically involves the establishment of containment, generally along the northern boundary of the Whittaker-Bermite site, upgradient of the Stadium well, by continuous pumping of a former Whittaker-Bermite facility well, at a continuous low capacity, complemented by pumping at several groundwater "hot spots" that are also generally upgradient of the Stadium well. Due to the low conductivity nature of the aquifer materials at the various "hot spots", pumping for containment at those locations would be from several wells at low pumping capacities. Extracted water would be treated at Whittaker-Bermite's existing on-site treatment system. Generally consistent with the Saugus restoration concept, the Northern Alluvium pumping program would have the concurrent objectives of preventing site-related contaminants from leaving the site and removing some contamination from groundwater such that it can be removed in the on-site treatment process prior to discharge of the water back to the groundwater Basin.

Appendix E

Project Description Excerpt from August 2005 “CLWA Groundwater Containment, Treatment, and Restoration Project” Mitigated Negative Declaration

Appendix E

Project Description Excerpt from August 2005 "CLWA Groundwater Containment, Treatment, and Restoration Project" Mitigated Negative Declaration

Containment/Treatment Facilities

The Proposed Project for containment/treatment is based on analysis of temporal and spatial variations in groundwater flow patterns using the Regional Groundwater Flow Model for Santa Clarita Valley ("*Draft Interim Feasibility Study*," Kennedy/Jenks 2005). Model development and calibration are described in the "*Regional Groundwater Flow Model for the Santa Clarita Valley: Model Development and Calibration*," CH2M HILL 2004. Based on the model, the movement of contaminated water from the Whittaker-Bermite Property in the Saugus Formation was in a westerly direction. The San Gabriel Fault Zone, which runs east-west through the northern portion of the Whittaker-Bermite Property, was determined to provide a partial barrier to northward migration of the perchlorate-contaminated groundwater, and perchlorate-contaminated water could therefore be intercepted at the existing Saugus 1 and Saugus 2 wells, which are located near the intersection of Magic Mountain Parkway and San Fernando Road. Pumping of groundwater along the leading edge of the plume at these wells would effectively create a cone of depression adjacent to the wells. Perchlorate-contaminated water would then flow into this cone of depression where it would be extracted. The volume of extraction was evaluated to match it to the inflow of perchlorate-contaminated water, thereby maintaining a cone of depression that does not induce migration of better quality groundwater from the Alluvial Aquifer into the cone of depression. An extraction rate of from 1,100 gpm to 1,250 gpm is proposed.

Once extracted, the contaminated water would then be treated to remove the perchlorate and utilized. Over time, this interception of the contaminated plume would (a) reduce downstream migration of the plume and (b) collect the perchlorate and permanently remove it from the groundwater basin. Given that no new contamination would occur up-gradient from the interceptor wells, this strategy should eventually remediate the perchlorate problem.

The primary elements of the Containment Facilities to be constructed and operated (Figure 4 [not included]; Table E-1) are new pumps for existing production wells, new monitoring wells, new pipelines, and a new treatment plant for perchlorate removal. In addition, several existing wells would be removed. These facilities would provide for extraction of contaminated groundwater, conveyance of this water to a treatment facility, and treatment to remove perchlorates. The treatment plant would be tied into existing CLWA distribution pipelines to deliver treated water. Containment facility elements and specifications are shown on Table E-1.

Table E-1
Proposed Project Perchlorate Containment Facilities

FACILITY	SITE	DESCRIPTION (SEE FIGURE 4 [Not Included])
New pumps	Saugus-1 and Saugus-2 wells	**New** variable speed up to 1200 gpm each, installed at existing well site.
Network of monitoring wells	North of Saugus-2 and adjacent to alluvial basin	**New** Small-diameter wells not used for production, located to characterize the contaminant plume and to monitor program effectiveness; included up gradient wells managed in cooperation with other entities.
Conveyance to Treatment Plant	Road rights of way and bike trail	**Segment 1: New** 10" pipeline from Saugus-2, along San Fernando Road to connect with an existing 14-21 inch pipeline on the east side of the South Fork of the Santa Clara River.
		Segment 2: **Connection** of segment 1 to an existing 14-21" pipeline under the Santa Clara River, along Magic Mountain Parkway, and north along Valencia Blvd. to the bridge at the South Fork of the Santa Clara River.
		Segment 3. **New** 16" pipeline under the Valencia Blvd. bridge at the South Fork of the Santa Clara River, along the north/west right-of-way of Valencia Boulevard, along a bike path around the gas station at Bouquet Canyon Bridge, suspended on the west side of Bouquet Canyon Bridge, then west along a bike path to the Rio Vista Intake Pump Station.
Treatment Plant	At Rio Vista Intake Pump Station	**New** one-train, two vessel ion exchange system using Amberlite PWA2 strong-base anion exchange resin followed by chloramination disinfection with a rated capacity of 2400 gpm.
Conveyance from Treatment Plant	West of Treatment Plant	**Connect new Treatment Plant to existing Rio Vista Intake Pump Plant** and CLWA's existing treated water pipeline.

Containment Facility Operation

Containment wells would initially be operated at 1,100 gpm, and then adjusted based on monitoring well data to achieve effective containment of perchlorates. Adjustments would be made in consultation with the Department of Toxic Substance Control (DTSC). Contaminants would be treated in accordance with DHS requirements.

The containment treatment facility utilizes disposable filters to remove perchlorates (US Filter). The dual vessel design of the facility would provide for continuous operation. Primary filtration would occur in Vessel 1, with Vessel 2 providing a final "polishing." When the filter in Vessel 1 requires replacement, primary filtration would switch to Vessel 2 while the filter in Vessel 1 is removed and replaced. Filters would then be collected from the facility and transported off site to an approved commercial disposal facility. The perchlorate treatment plant would be monitored on a continuous 24-hour basis at the adjacent Rio Vista Intake Pump Station using a Supervisory Control and Data Acquisition (SCADA) program.

Facilities for Restoration of Service

The containment element of the Proposed Project would restore up to 43% of production from the Saugus-1 and Saugus-2 wells. The permanent closure of VWC's V-157 well (V-157), NCWD's well number 11 (NC 11), and the Stadium well operated by CLWA's Santa Clara Water Division has created a deficit in local groundwater production of 6,300 gpm capacity, or about 3,838 afy. The containment project would also convert several existing pipelines from treated water use for conveyance of perchlorate-contaminated water to the treatment plant.

To restore local well production to pre-contamination levels and to restore service affected by conversion of existing facilities to carry untreated water, CLWA proposes to relocate production wells to areas outside of the zone of perchlorate contamination and to construct new conveyance facilities to replace the existing treated water pipelines that will be converted to convey water from Saugus 1 and Saugus 2 to the new treatment plant. This involves two elements (Figures 5 and 6 [not included]).

First, to replace lost production east of the confluence of the Santa Clara River and the South Fork of the Santa Clara River from closure of the Stadium Well, CLWA would relocate the Stadium Well from its location adjacent to the Stadium along the south bank of the Santa Clara River to a location about 0.6 miles upstream from the Stadium site to an existing CLWA facility at Furnivall Avenue and Santa Clara Street and would construct a short (50-100 foot) pipeline from the well to an existing 8-inch distribution line.

Second, in addition to VWC's new 2,500 gpm well northwest of Magic Mountain Amusement Park (hereafter MMA Park), CLWA would:

- Construct a new multiple-well 4,000 gpm facility (with chloramination facilities) along a dirt road to the west of the MMA Park), with wells connected via a 12-inch pipeline;
- Construct a new 18-inch treated water pipeline from CLWA's 48-inch pipeline at the McBean Parkway Bridge to a site opposite from NC 11; and
- Construct a new 18-inch groundwater pipeline along new road alignments that would connect these new wells directly to CLWA's existing 42-inch pipeline.

Long-term planning for CLWA's water storage and conveyance facilities includes potential development of a regulating reservoir southwest of the two proposed new wells. The regulating reservoir and the pipelines, which may be developed to connect it to the Proposed Project, are shown on Figure 6 [not included] for informational purposes and because they are addressed in the cumulative impacts discussion in this Initial Study. However, this reservoir facility and the pipelines needed to connect it to the Proposed Project are not a part of the Proposed Project and the Proposed Project does not depend upon them.

The wells, 12-inch connecting pipeline, chloramination facility, and 12-inch to 18-inch pipeline would be constructed within the road alignments of future planned roads. CLWA facilities would be constructed following the initial grading for these roads and the adjacent development. In combination with yield from the Saugus-1 and Saugus-2 wells and associated treatment plant, these actions would restore production lost due to perchlorate contamination and would restore service to areas previously served by the NC-11, V-157, and Stadium wells. Siting and details of the proposed restoration-of-service facilities are summarized on Table E-2. Note that the planned reservoir is not a part of the Proposed Project.

Chloramination Facilities

Chloramination facilities would be constructed at two sites: (a) at the new perchlorate treatment facility and (b) at the new well field west of MMA Park. Chloramines are formed by mixing sodium hypochlorate and ammonia, which are produced or stored in separate areas prior to mixing into the water stream. Several types of facilities would be considered during final design. Regardless of facility type, these facilities would be fully contained, and storage of water treatment chemicals would be within double-walled containers with separate containment back-up systems capable of holding 1.5 times the capacity of each chemical tank.

Table E-2
Proposed Project facilities for Restoration of Service

FACILITY	SITE	DESCRIPTION (SEE FIGURES 5 AND 6 [Not Included])
To replace Stadium Well		
New alluvial well	Furnivall Ave. & Santa Clara St.	**New** 800 gpm well and up to 100 foot long pipeline to connect to existing 8" pipeline.
To replace pumping capacity from contaminated wells to restore local dry year water supplies		
Well field and chloramination facility	West of MMA Park	**New** wells with a combined capacity of 4,000 gpm to be constructed along the unpaved perimeter road on the west boundary of the MMA Park, with a chloramination facility located at the last well along the 12" to 18" pipeline connecting these wells.
Pipeline from new wells to Existing 42" CLWA	West Magic Mountain Parkway to I-5	**Segment 4: New** 18" pipeline from the chloramination facility to Magic Mountain Parkway and then east along Magic Mountain Parkway to the terminus of CLWA's 42" pipeline at I-5.
Pipeline to serve area west of McBean Parkway	McBean Parkway to NC-11	**Segment 5. New** 33" pipeline along bikeway on south levee of the South Fork of the Santa Clara River to Valencia Boulevard; **Segment 6. New** 39" pipeline along Valencia Blvd. and Magic Mountain Parkway with a turnout west of San Fernando Road. **Segment 7. New** 18" pipeline from the Segment 5 turnout to San Fernando Road; and **Segment 8. New** turnout, connection to the CLWA existing 21" pipeline along the west side of the South Fork of the Santa Clara River, and 18" pipeline from the turnout parallel to CLWA's existing 21" pipeline along an access road to a site opposite NC-11, connecting to existing turnouts.

Appendix F
Best Management Practices

Reported as of 5/7/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2003**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	yes
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	44418
b. Determine other system verifiable uses (AF)	0
c. Determine total supply into the system (AF)	44838
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.99
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	no
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	no
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

monthly review of metered sales vs. supply

B. Survey Data

1. Total number of miles of distribution system line.	26
2. Number of miles of distribution system line surveyed.	26

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	5000	6000
2. Actual Expenditures	5000	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 5/7/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2003**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Agency provides a quarterly community newsletter to approx. 2,000 people/organizatioms/elected officials. Utilize paid advertising, public and media events and Agency conservation garden to promote water conservation in service area.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	10
b. Public Service Announcement	yes	0
c. Bill Inserts / Newsletters / Brochures	yes	4
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	15
f. Special Events, Media Events	yes	10
g. Speaker's Bureau	yes	3
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	147102	100000
2. Actual Expenditures	144283	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

A2d. Retailers are billed based on usage and are shown last year's usage of Agency wholesale production. B1 and B2. After 2003, began new accounting system, also re-organized personnel.

Reported as of 5/7/05

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2003**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	147	3033	0
Grades 4th-6th	yes	67	2421	0
Grades 7th-8th	yes	0	0	0
High School	yes	0	0	0

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 09/01/1995

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	114670	115000
2. Actual Expenditures	110979	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Have expanded program to include more workshops, career days and job fairs. PROBLEM: increased school district emphasis on testing has made entry into Grades 7-12 very difficult.

Reported as of 5/7/05

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2003**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	No	0	0	**8**	yes	165852	162161
2	yes	10000	10000	**9**	No		
3	No			**10**	yes	93659	72659
4	No			**11**	No		
5	No			**12**	yes	58000	58000
6	No			**13**	No		
7	yes	147102	144283	**14**	yes	20000	20000

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	yes
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	yes
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	yes
2) Residential retrofits	yes
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	No
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.5	**8**	yes	10
2	yes	.5	**9**	yes	.5
3	yes	1	**10**	yes	2
4	yes	.5	**11**	yes	.5
5	yes	2.5	**12**	yes	2
6	yes	.5	**13**	yes	.5
7	yes	3	**14**	yes	.5

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	yes
2	yes	**9**	yes
3	No	**10**	yes
4	No	**11**	No
5	yes	**12**	yes
6	No	**13**	No
7	yes	**14**	yes

B. Wholesale Agency Assistance Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	494613	500000
2. Actual Expenditures	467103	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2003**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$6049713
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$3264000

2. Commercial

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

3. Industrial

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

4. Institutional / Government

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

5. Irrigation

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

6. Other

a. Water Rate Structure

b. Sewer Rate Structure

c. Total Revenue from Volumetric Rates $

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources $

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2003**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	no
4. Partner agency's name:	
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	50%
b. Coordinator's Name	Mary Lou Cotton
c. Coordinator's Title	Water Resources Manager
d. Coordinator's Experience and Number of Years	11
e. Date Coordinator's position was created (mm/dd/yyyy)	02/15/2001
6. Number of conservation staff, including Conservation Coordinator.	3

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	68497	59000
2. Actual Expenditures	68497	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

One position filled for only part of calendar year.

Reported as of 5/7/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2004**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	yes
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	46669
b. Determine other system verifiable uses (AF)	0
c. Determine total supply into the system (AF)	47088
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.99
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	no
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	no
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

monthly review of metered sales vs. supply

B. Survey Data

1. Total number of miles of distribution system line.	26
2. Number of miles of distribution system line surveyed.	26

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	6000	6000
2. Actual Expenditures	6000	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 5/7/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2004**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Agency provides a quarterly community newsletter to approx. 50,000 people/organizatioms/elected officials. Utilize paid advertising, public and media events and Agency conservation garden to promote water conservation in service area.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	15
b. Public Service Announcement	yes	0
c. Bill Inserts / Newsletters / Brochures	yes	5
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	15
f. Special Events, Media Events	yes	3
g. Speaker's Bureau	yes	8
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	235163	200000
2. Actual Expenditures	241461	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

A2d. Retailers are billed based on usage and are shown last year's usage of Agency wholesale production. B1 and B2. Relects new accounting process and reorganization.

Reported as of 5/7/05

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2004**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	54	1080	0
Grades 4th-6th	yes	21	732	0
Grades 7th-8th	yes	0	0	0
High School	yes	0	0	0

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 09/01/1995

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	207270	200000
2. Actual Expenditures	219362	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Continuing difficulty gaining entry into Grades 7-12. B1 and B2. Reflects additonal staff hired in 2004.

Reported as of 5/7/05

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2004**

A. Implementation

1. Financial Support by BMP

BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded	BMP	Financial Incentives Offered?	Budgeted Amount	Amount Awarded
1	No			**8**	yes	235163	241461
2	yes	20000	21000	**9**	No		
3	No			**10**	yes	88659	86621
4	No			**11**	No		
5	No			**12**	yes	58000	58000
6	No			**13**	No		
7	yes	207270	219362	**14**	yes	25000	25000

2. Technical Support

a. Has your agency conducted or funded workshops addressing CUWCC procedures for calculating program savings, costs and cost-effectiveness?	yes
b. Has your agency conducted or funded workshops addressing retail agencies' BMP implementation reporting requirements?	yes
c. Has your agency conducted or funded workshops addressing:	
1) ULFT replacement	yes
2) Residential retrofits	yes
3) Commercial, industrial, and institutional surveys	No
4) Residential and large turf irrigation	No
5) Conservation-related rates and pricing	No

3. Staff Resources by BMP

BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP	BMP	Qualified Staff Available for BMP?	No. FTE Staff Assigned to BMP
1	yes	.5	**8**	yes	10
2	yes	.5	**9**	yes	.5
3	yes	1	**10**	yes	2
4	yes	.5	**11**	yes	.5
5	yes	2.5	**12**	yes	2
6	yes	.5	**13**	yes	.5
7	yes	3	**14**	yes	.5

4. Regional Programs by BMP

BMP	Implementation/ Management Program?	BMP	Implementation/ Management Program?
1	No	**8**	yes
2	yes	**9**	yes
3	No	**10**	yes
4	No	**11**	No
5	yes	**12**	yes
6	No	**13**	No
7	yes	**14**	yes

B. Wholesale Agency Assistance Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	634092	650000
2. Actual Expenditures	651444	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

all budget numbers reflect new accounting process started in 2004.

Reported as of 5/7/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2004**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$8561300
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

2. Commercial

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

3. Industrial

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

4. Institutional / Government

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

5. Irrigation

a. Water Rate Structure	
b. Sewer Rate Structure	
c. Total Revenue from Volumetric Rates	$
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$

6. Other

a. Water Rate Structure

b. Sewer Rate Structure

c. Total Revenue from Volumetric Rates $

d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources $

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Castaic Lake Water Agency	**100% Complete**	**2004**

A. Implementation

1. Does your Agency have a conservation coordinator? yes
2. Is this a full-time position? no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ? no
4. Partner agency's name:
5. If your agency supplies the conservation coordinator:
   - a. What percent is this conservation coordinator's position? 50%
   - b. Coordinator's Name Mary Lou Cotton
   - c. Coordinator's Title Water Resources Manager
   - d. Coordinator's Experience and Number of Years 11
   - e. Date Coordinator's position was created (mm/dd/yyyy) 02/18/2001
6. Number of conservation staff, including Conservation Coordinator. 3

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	80503	80000
2. Actual Expenditures	80503	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

CUWCC

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Memorandum of Understanding

Base Year Data

Reporting Unit: **Santa Clarita Water Division**	**Submitted to CUWCC** 04/19/2003

INSTRUCTIONS: This form MUST BE completed and submitted to the CUWCC prior to filing any BMP reports. The data provided on this form is used in determining coverage requirements for specific BMPs as indicated. If some of the data requested is not available, make reasonable estimates. You can update and edit values, if more precise information becomes available in the future.

For Customer Classification Definitions (i.e. Single Family, Multi-Family) click HERE.

1. Your **BASE YEAR is 2001**.
NOTE: Many calculations in determining credit history and coverage requirements are contingent on your BASE YEAR, which is calculated based on the following criteria. If a Signatory signed the MOU in 1997 or earlier, then the Base Year is 1997. If a Signatory signed the MOU after 1997, then the Base Year is the year the MOU was signed. The same holds true for USBR Contractors, except the date their Base Year is calculated from is the date that their Plan was noticed in the Federal Register.

BMP 1	
2. Number of single-family customers in 2001	20802
3. Number of multi-family units in 2001	1892
BMPs 2 and 14	
4. Number of single-family housing units constructed prior to 1992	14457
5. Number of multi-family units prior to 1992	3401
BMP 4	
6. Number of unmetered accounts in 2001	0
BMPs 5 and 9	
7. Number of commercial accounts in 2001	582
8. Number of industrial accounts in 2001	19
9. Number of institutional accounts in 2001	89
10. Total water use (AF) by commercial, industrial and institutional accounts in 2001	2850
BMP 14	
11. Average number of toilets per single-family household	2
12. Average number of toilets per multi-family household	2
13. Five-year average resale rate of single-family households	10.6

	14. Five-year average resale rate of multi-family households	19.1
	15. Average persons per single-family household	3.3
	16. Average persons per multi-family household	3.3

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Webmaster

Reported as of 5/7/05

Accounts & Water Use

Reporting Unit Name:	Submitted to	Year:
Santa Clarita Water Division	CUWCC **02/15/2005**	**2003**

A. Service Area Population Information:

1. Total service area population 82200

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	21754	16006	0	0
2. Multi-Family	4216	2594	0	0
3. Commercial	617	888	0	0
4. Industrial	19	135	0	0
5. Institutional	95	764	0	0
6. Dedicated Irrigation	731	4231	0	0
7. Recycled Water	0	0	0	0
8. Other	0	0	0	0
9. Unaccounted	NA	0	NA	0
Total	27432	24618	0	0
	Metered		**Unmetered**	

Reported as of 5/7/05

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Based on your signed MOU date, 02/07/2001, your Agency STRATEGY DUE DATE is:	02/07/2003
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	0	0
2. Number of surveys completed:	0	0
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	no	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	no	no
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	no	no
Outdoor Survey:		
6. Check irrigation system and timers	no	no
7. Review or develop customer irrigation schedule	no	no
8. Measure landscaped area (Recommended but not required for surveys)	no	no
9. Measure total irrigable area (Recommended but not required for surveys)	no	no
10. Which measurement method is typically used (Recommended but not required for surveys)		None
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	no	no
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	no	no
a. If yes, in what form are surveys tracked?		None

b. Describe how your agency tracks this information.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Waiting on BMP revision before beginning implementation.

Reported as of 5/7/05

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts?	no
a. If YES, list local jurisdictions in your service area and code or ordinance in each:	
2. Has your agency satisfied the 75% saturation requirement for single-family housing units?	no
3. Estimated percent of single-family households with low-flow showerheads:	%
4. Has your agency satisfied the 75% saturation requirement for multi-family housing units?	no
5. Estimated percent of multi-family households with low-flow showerheads:	%
6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.	

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices?	yes
a. If YES, when did your agency begin implementing this strategy?	5/12/2002
b. Describe your targeting/ marketing strategy.	

Newspaper ads, flyers and newsletter notifications of distrbution events.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	83	4
3. Number of toilet-displacement devices distributed:	0	0
4. Number of toilet flappers distributed:	0	0
5. Number of faucet aerators distributed:	25	15

6. Does your agency track the distribution and cost of low-flow devices?	yes
a. If YES, in what format are low-flow devices tracked?	Manual Activity
b. If yes, describe your tracking and distribution system :	

Keep records of which account addresses received low-flow devices.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0

2. Actual Expenditures 0

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

All funding provided by CLWA on behalf of retailers.

Reported as of 5/7/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	no
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	
b. Determine other system verifiable uses (AF)	
c. Determine total supply into the system (AF)	
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.00
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	no
4. Did your agency complete a full-scale audit during this report year?	no
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	no
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

Visual inpsections/response to customers.

B. Survey Data

1. Total number of miles of distribution system line.	286
2. Number of miles of distribution system line surveyed.	0

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 5/7/05

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use?	yes
2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use?	no
a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?	
b. Describe the program:	
3. Number of previously unmetered accounts fitted with meters during report year.	0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	no
a. If YES, when was the feasibility study conducted? (mm/dd/yy)	
b. Describe the feasibility study:	
2. Number of CII accounts with mixed-use meters.	700
3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period.	0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

All connections are metered.

Reported as of 5/7/05

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	731
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	
b. Description of marketing / targeting strategy:	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	no
b. Distribution Uniformity Analysis	no
c. Review / Develop Irrigation Schedules	no
d. Measure Landscape Area	no
e. Measure Total Irrigable Area	no
f. Provide Customer Report / Information	no
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	yes
4. Does your agency offer financial incentives to improve	no

landscape water use efficiency?

Type of Financial Incentive:	Budget (Dollars/ Year)	Number Awarded to Customers	Total Amount Awarded
a. Rebates			
b. Loans			
c. Grants			

5. Do you provide landscape water use efficiency information to new customers and customers changing services? yes

a. If YES, describe below:

Information and training provided by Castaic Lake WA

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? yes

b. If yes, does it have dedicated irrigation metering? yes

7. Do you provide customer notices at the start of the irrigation season? no

8. Do you provide customer notices at the end of the irrigation season? no

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

Reported as of 5/7/05

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers?	no
a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.	
2. Does your agency offer rebates for high-efficiency washers?	no
3. What is the level of the rebate?	0
4. Number of rebates awarded.	0

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

D. Comments

Reported as of 5/7/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? no

a. If YES, describe the program and how it's organized.

CLWA as wholesaler runs program for retailers. See CLWA form.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	no	
b. Public Service Announcement	no	
c. Bill Inserts / Newsletters / Brochures	no	
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	no	
f. Special Events, Media Events	no	
g. Speaker's Bureau	no	
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program provided by Castaic Lake WA.

Reported as of 5/7/05

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? no

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd				
Grades 4th-6th				
Grades 7th-8th				
High School				

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program?

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program provided by CLWA on behalf of retailers.

Reported as of 5/7/05

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

---

Option A: CII Water Use Survey and Customer Incentives Program

---

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	no

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered			
b. Number of New Surveys Completed			
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)			
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)			

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	no	no	no
f. Evaluation of all water-using apparatus and processes	no	no	no
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	no	no	no

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	0	0	0
i. Loans	0	0	0
j. Grants	0	0	0
k. Others	0	0	0

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?	no
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	no
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Not implementing BMP.

Reported as of 5/7/05

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — No

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

2. How does your agency advertise this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)

2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency?

3. What is the total number of customer accounts participating in the program during the last year ?

CII Subsector	Number of Toilets Replaced			
4.	Standard Gravity Tank	Air Assisted	Valve Floor Mount	Valve Wall Mount
a. Offices				
b. Retail / Wholesale				
c. Hotels				
d. Health				
e. Industrial				
f. Schools: K to 12				
g. Eating				
h. Government				
i. Churches				
j. Other				

5. Program design.

6. Does your agency use outside services to implement this program?

a. If yes, check all that apply.

7. Participant tracking and follow-up.

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business

b. Inadequate payback

c. Inadequate ULFT performance

d. Lack of funding

e. American's with Disabilities Act

f. Permitting

g. Other. Please describe in B. 9.

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

Not implementing BMP.

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor	0	0
b. Materials	0	0
c. Marketing & Advertising	0	0
d. Administration & Overhead	0	0
e. Outside Services	0	0
f. Total	0	0

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution	
b. State agency contribution	
c. Federal agency contribution	
d. Other contribution	
e. Total	0

Reported as of 5/7/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$6968914
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$2740750

2. Commercial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$337293
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$122163

3. Industrial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$51278
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$9310

4. Institutional / Government

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$290286
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$42691

5. Irrigation

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$1606562
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$215115

6. Other

a. Water Rate Structure	Service Not Provided

b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

2003 revenues reflect new accounting process.

Reported as of 5/7/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

1. Does your Agency have a conservation coordinator? no
2. Is this a full-time position? no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ? yes
4. Partner agency's name: Castaic Lake WA
5. If your agency supplies the conservation coordinator:
   - a. What percent is this conservation coordinator's position? %
   - b. Coordinator's Name
   - c. Coordinator's Title
   - d. Coordinator's Experience and Number of Years
   - e. Date Coordinator's position was created (mm/dd/yyyy)
6. Number of conservation staff, including Conservation Coordinator. 0

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? — no

   a. If YES, describe the ordinance:

2. Is a copy of the most current ordinance(s) on file with CUWCC? — no

   a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

   a. Gutter flooding — no

   b. Single-pass cooling systems for new connections — no

   c. Non-recirculating systems in all new conveyor or car wash systems — yes

   d. Non-recirculating systems in all new commercial laundry systems — no

   e. Non-recirculating systems in all new decorative fountains — yes

   f. Other, please name — no

2. Describe measures that prohibit water uses listed above:

   Recirculating systems required in all car washes and fountains (city/san district ordinance).

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

   a. Allow the sale of more efficient, demand-initiated regenerating DIR models. — no

   b. Develop minimum appliance efficiency standards that:

      i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. — no

      ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. — no

   c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. — no

4. Does your agency include water softener checks in home water audit programs? — no

5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models? no

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Agency supported San District water softener ban ordinance adopted in 2003.

Reported as of 5/7/05

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2003**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	60	9
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**60**	**9**

6. Describe your agency's ULFT program for single-family residences.

publicly advertised rebate program

7. Describe your agency's ULFT program for multi-family residences.

publicly advertised rebate program

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	10000	20000
2. Actual Expenditures	10000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program run by CLWA on behalf of retailers

Reported as of 5/7/05

Accounts & Water Use

Reporting Unit Name:	Submitted to CUWCC	Year:
Santa Clarita Water Division	**02/15/2005**	**2004**

A. Service Area Population Information:

1. Total service area population 85300

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	22404	16922	0	0
2. Multi-Family	4351	2538	0	0
3. Commercial	627	917	0	0
4. Industrial	19	127	0	0
5. Institutional	97	790	0	0
6. Dedicated Irrigation	773	4828	0	0
7. Recycled Water	0	0	0	0
8. Other	0	0	0	0
9. Unaccounted	NA	0	NA	0
Total	28271	26122	0	0
	Metered		**Unmetered**	

Reported as of 5/7/05

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Based on your signed MOU date, 02/07/2001, your Agency STRATEGY DUE DATE is:	02/07/2003
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	0	0
2. Number of surveys completed:	0	0
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	no	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	no	no
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	no	no
Outdoor Survey:		
6. Check irrigation system and timers	no	no
7. Review or develop customer irrigation schedule	no	no
8. Measure landscaped area (Recommended but not required for surveys)	no	no
9. Measure total irrigable area (Recommended but not required for surveys)	no	no
10. Which measurement method is typically used (Recommended but not required for surveys)		None
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	no	no
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	no	no
a. If yes, in what form are surveys tracked?		None

b. Describe how your agency tracks this information.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Waiting on BMP revision before beginning implementation.

Reported as of 5/7/05

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts?	no
a. If YES, list local jurisdictions in your service area and code or ordinance in each:	
2. Has your agency satisfied the 75% saturation requirement for single-family housing units?	no
3. Estimated percent of single-family households with low-flow showerheads:	%
4. Has your agency satisfied the 75% saturation requirement for multi-family housing units?	no
5. Estimated percent of multi-family households with low-flow showerheads:	%
6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.	

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices?	yes
a. If YES, when did your agency begin implementing this strategy?	5/12/2002
b. Describe your targeting/ marketing strategy.	

Newspaper ads, flyers and newsletter notifications of distrbution events.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	41	3
3. Number of toilet-displacement devices distributed:	0	0
4. Number of toilet flappers distributed:	0	0
5. Number of faucet aerators distributed:	25	10

6. Does your agency track the distribution and cost of low-flow devices?	yes
a. If YES, in what format are low-flow devices tracked?	Manual Activity
b. If yes, describe your tracking and distribution system :	

Keep records of which account addresses received low-flow devices.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0

2. Actual Expenditures 0

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

All funding provided by CLWA on behalf of retailers.

Reported as of 5/7/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	no
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	
b. Determine other system verifiable uses (AF)	
c. Determine total supply into the system (AF)	
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.00
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	no
4. Did your agency complete a full-scale audit during this report year?	no
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	no
6. Does your agency operate a system leak detection program?	yes

a. If yes, describe the leak detection program:

Visual inpsections/response to customers.

B. Survey Data

1. Total number of miles of distribution system line.	299
2. Number of miles of distribution system line surveyed.	0

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 5/7/05

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use?	yes
2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use?	no
a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?	
b. Describe the program:	
3. Number of previously unmetered accounts fitted with meters during report year.	0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	no
a. If YES, when was the feasibility study conducted? (mm/dd/yy)	
b. Describe the feasibility study:	
2. Number of CII accounts with mixed-use meters.	715
3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period.	0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

E. Comments

All connections are metered.

Reported as of 5/7/05

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	773
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	
b. Description of marketing / targeting strategy:	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	no
b. Distribution Uniformity Analysis	no
c. Review / Develop Irrigation Schedules	no
d. Measure Landscape Area	no
e. Measure Total Irrigable Area	no
f. Provide Customer Report / Information	no
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	yes
4. Does your agency offer financial incentives to improve	no

landscape water use efficiency?

Type of Financial Incentive:	Budget (Dollars/ Year)	Number Awarded to Customers	Total Amount Awarded
a. Rebates			
b. Loans			
c. Grants			

5. Do you provide landscape water use efficiency information to new customers and customers changing services? yes

a. If YES, describe below:

Information and training provided by Castaic Lake WA

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? yes

b. If yes, does it have dedicated irrigation metering? yes

7. Do you provide customer notices at the start of the irrigation season? no

8. Do you provide customer notices at the end of the irrigation season? no

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

Reported as of 5/7/05

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers?	no
a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.	
2. Does your agency offer rebates for high-efficiency washers?	no
3. What is the level of the rebate?	0
4. Number of rebates awarded.	0

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	no
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

D. Comments

Reported as of 5/7/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? no

a. If YES, describe the program and how it's organized.

CLWA as wholesaler runs program for retailers. See CLWA form.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	no	
b. Public Service Announcement	no	
c. Bill Inserts / Newsletters / Brochures	no	
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	no	
f. Special Events, Media Events	no	
g. Speaker's Bureau	no	
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program provided by Castaic Lake WA.

Reported as of 5/7/05

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? no

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd				
Grades 4th-6th				
Grades 7th-8th				
High School				

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program?

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program provided by CLWA on behalf of retailers.

Reported as of 5/7/05

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

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Option A: CII Water Use Survey and Customer Incentives Program

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4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	no

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered			
b. Number of New Surveys Completed			
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)			
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)			

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	no		no
f. Evaluation of all water-using apparatus and processes	no	no	no
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	no	no	no

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	0	0	0
i. Loans	0	0	0
j. Grants	0	0	0
k. Others	0	0	0

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?	no
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	no
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Not implementing BMP.

Reported as of 5/7/05

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — No

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

2. How does your agency advertise this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)

2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency?

3. What is the total number of customer accounts participating in the program during the last year ?

CII Subsector	Number of Toilets Replaced			
4.	Standard Gravity Tank	Air Assisted	Valve Floor Mount	Valve Wall Mount
a. Offices				
b. Retail / Wholesale				
c. Hotels				
d. Health				
e. Industrial				
f. Schools: K to 12				
g. Eating				
h. Government				
i. Churches				
j. Other				

5. Program design.

6. Does your agency use outside services to implement this program?

a. If yes, check all that apply.

7. Participant tracking and follow-up.

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business

b. Inadequate payback

c. Inadequate ULFT performance

d. Lack of funding

e. American's with Disabilities Act

f. Permitting

g. Other. Please describe in B. 9.

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

Not implementing BMP.

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor		
b. Materials		
c. Marketing & Advertising		
d. Administration & Overhead		
e. Outside Services		
f. Total	0	0

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution	
b. State agency contribution	
c. Federal agency contribution	
d. Other contribution	
e. Total	0

Reported as of 5/7/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$8082631
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$3716432

2. Commercial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$374628
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$166423

3. Industrial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$52330
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$12265

4. Institutional / Government

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$339935
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$57314

5. Irrigation

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$2072553
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$299384

6. Other

a. Water Rate Structure	Service Not Provided

b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$0
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

CII revenues are combined and shown in Commercial

Reported as of 5/7/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

1. Does your Agency have a conservation coordinator? no
2. Is this a full-time position? no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ? yes
4. Partner agency's name: Castaic Lake WA
5. If your agency supplies the conservation coordinator:
   a. What percent is this conservation coordinator's position? %
   b. Coordinator's Name
   c. Coordinator's Title
   d. Coordinator's Experience and Number of Years
   e. Date Coordinator's position was created (mm/dd/yyyy)
6. Number of conservation staff, including Conservation Coordinator. 0

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? — no

   a. If YES, describe the ordinance:

2. Is a copy of the most current ordinance(s) on file with CUWCC? — no

   a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

   a. Gutter flooding — no

   b. Single-pass cooling systems for new connections — no

   c. Non-recirculating systems in all new conveyor or car wash systems — no

   d. Non-recirculating systems in all new commercial laundry systems — no

   e. Non-recirculating systems in all new decorative fountains — no

   f. Other, please name — no

2. Describe measures that prohibit water uses listed above:

   Recirculating systems required in all car washes and fountains (city/san district ordinance).

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

   a. Allow the sale of more efficient, demand-initiated regenerating DIR models. — no

   b. Develop minimum appliance efficiency standards that:

      i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. — no

      ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. — no

   c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. — no

4. Does your agency include water softener checks in home water audit programs? — no

5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models? no

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Agency supported San District water softener ban ordinance adopted in 2003.

Reported as of 5/7/05

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
Santa Clarita Water Division	**100% Complete**	**2004**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	125	10
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**125**	**10**

6. Describe your agency's ULFT program for single-family residences.

publicly advertised rebate program

7. Describe your agency's ULFT program for multi-family residences.

publicly advertised rebate program

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	20000	20000
2. Actual Expenditures	20000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program run by CLWA on behalf of retailers

CUWCC

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Memorandum of Understanding

Base Year Data

Reporting Unit: **Valencia Water Company**	**Submitted to CUWCC** 04/19/2003

INSTRUCTIONS: This form MUST BE completed and submitted to the CUWCC prior to filing any BMP reports. The data provided on this form is used in determining coverage requirements for specific BMPs as indicated. If some of the data requested is not available, make reasonable estimates. You can update and edit values, if more precise information becomes available in the future.

For Customer Classification Definitions (i.e. Single Family, Multi-Family) click HERE.

1. Your **BASE YEAR is 2001**.
NOTE: Many calculations in determining credit history and coverage requirements are contingent on your BASE YEAR, which is calculated based on the following criteria. If a Signatory signed the MOU in 1997 or earlier, then the Base Year is 1997. If a Signatory signed the MOU after 1997, then the Base Year is the year the MOU was signed. The same holds true for USBR Contractors, except the date their Base Year is calculated from is the date that their Plan was noticed in the Federal Register.

BMP 1	
2. Number of single-family customers in 2001	19565
3. Number of multi-family units in 2001	219
BMPs 2 and 14	
4. Number of single-family housing units constructed prior to 1992	12871
5. Number of multi-family units prior to 1992	152
BMP 4	
6. Number of unmetered accounts in 2001	0
BMPs 5 and 9	
7. Number of commercial accounts in 2001	567
8. Number of industrial accounts in 2001	901
9. Number of institutional accounts in 2001	52
10. Total water use (AF) by commercial, industrial and institutional accounts in 2001	6650
BMP 14	
11. Average number of toilets per single-family household	2
12. Average number of toilets per multi-family household	2
13. Five-year average resale rate of single-family households	8.6

	14. Five-year average resale rate of multi-family households	8.9
	15. Average persons per single-family household	3.3
	16. Average persons per multi-family household	3.3

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Webmaster

Reported as of 5/7/05

Accounts & Water Use

Reporting Unit Name:	Submitted to	Year:
Valencia Water Company	CUWCC **02/15/2005**	**2003**

A. Service Area Population Information:

1. Total service area population 89000

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	23365	14191	0	0
2. Multi-Family	277	1186	0	0
3. Commercial	854	5110	0	0
4. Industrial	441	1825	0	0
5. Institutional	59	1101	0	0
6. Dedicated Irrigation	400	2952	0	0
7. Recycled Water	1	96	0	0
8. Other	0	0	0	0
9. Unaccounted	NA	0	NA	0
Total	25397	26461	0	0
	Metered		**Unmetered**	

Reported as of 5/7/05

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Based on your signed MOU date, 02/07/2001, your Agency STRATEGY DUE DATE is:	02/07/2003
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	0	0
2. Number of surveys completed:	0	0
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	no	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	no	no
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	no	no
Outdoor Survey:		
6. Check irrigation system and timers	no	no
7. Review or develop customer irrigation schedule	no	no
8. Measure landscaped area (Recommended but not required for surveys)	no	no
9. Measure total irrigable area (Recommended but not required for surveys)	no	no
10. Which measurement method is typically used (Recommended but not required for surveys)		None
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	no	no
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	no	no
a. If yes, in what form are surveys tracked?		None

b. Describe how your agency tracks this information.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

waiting on BMP revision

Reported as of 5/7/05

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts?	no
a. If YES, list local jurisdictions in your service area and code or ordinance in each:	
2. Has your agency satisfied the 75% saturation requirement for single-family housing units?	no
3. Estimated percent of single-family households with low-flow showerheads:	%
4. Has your agency satisfied the 75% saturation requirement for multi-family housing units?	no
5. Estimated percent of multi-family households with low-flow showerheads:	%
6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.	

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices?	yes
a. If YES, when did your agency begin implementing this strategy?	5/12/2002

b. Describe your targeting/ marketing strategy.

Distribution at public events, paid advertising.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	25	6
3. Number of toilet-displacement devices distributed:	0	0
4. Number of toilet flappers distributed:	0	0
5. Number of faucet aerators distributed:	30	5

6. Does your agency track the distribution and cost of low-flow devices?	yes
a. If YES, in what format are low-flow devices tracked?	Database

b. If yes, describe your tracking and distribution system :

Names and address of recipient.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0

2. Actual Expenditures 0

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

CLWA provides program and funding on behalf of retailers.

Reported as of 5/7/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	no
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	
b. Determine other system verifiable uses (AF)	
c. Determine total supply into the system (AF)	
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.00
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	yes
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
6. Does your agency operate a system leak detection program?	no
a. If yes, describe the leak detection program:	

B. Survey Data

1. Total number of miles of distribution system line.	310
2. Number of miles of distribution system line surveyed.	310

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	yes

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

see 2002 explanation

E. Comments

Reported as of 5/7/05

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use?	yes
2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use?	no
a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?	
b. Describe the program:	
3. Number of previously unmetered accounts fitted with meters during report year.	0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	no
a. If YES, when was the feasibility study conducted? (mm/dd/yy)	
b. Describe the feasibility study:	
2. Number of CII accounts with mixed-use meters.	0
3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period.	0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

E. Comments

All connections are metered.

Reported as of 5/7/05

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	400
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	
b. Description of marketing / targeting strategy:	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	no
b. Distribution Uniformity Analysis	no
c. Review / Develop Irrigation Schedules	no
d. Measure Landscape Area	no
e. Measure Total Irrigable Area	no
f. Provide Customer Report / Information	no
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	yes
4. Does your agency offer financial incentives to improve	no

landscape water use efficiency?

Type of Financial Incentive:	Budget (Dollars/ Year)	Number Awarded to Customers	Total Amount Awarded
a. Rebates	0	0	0
b. Loans	0	0	0
c. Grants	0	0	0

5. Do you provide landscape water use efficiency information to new customers and customers changing services? No

a. If YES, describe below:

CLWA provides training and information on behalf of retailers

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? yes

b. If yes, does it have dedicated irrigation metering? yes

7. Do you provide customer notices at the start of the irrigation season? no

8. Do you provide customer notices at the end of the irrigation season? no

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

Reported as of 5/7/05

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers? no
   a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.
2. Does your agency offer rebates for high-efficiency washers? no
3. What is the level of the rebate?
4. Number of rebates awarded.

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

Newlsetters, bill inserts, website, coordination with wholesaler.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	3
b. Public Service Announcement	no	
c. Bill Inserts / Newsletters / Brochures	yes	4
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	2
f. Special Events, Media Events	yes	3
g. Speaker's Bureau	no	
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Coordinate public outreach with CLWA programs/part of CLWA budget

Reported as of 5/7/05

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? no

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd				
Grades 4th-6th				
Grades 7th-8th				
High School				

3. Did your Agency's materials meet state education framework requirements? no

4. When did your Agency begin implementing this program?

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program is run by CLWA on behalf of retailers

Reported as of 5/7/05

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	yes

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered	16	4	4
b. Number of New Surveys Completed	12	2	4
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)	0	0	0
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)	0	0	0

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	yes	yes	yes
f. Evaluation of all water-using apparatus and processes	yes	yes	yes
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	yes	yes	yes

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	0	0	0
i. Loans	0	0	0
j. Grants	0	0	0
k. Others	0	0	0

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?	no
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	no
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	0
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	0

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	40000	45000
2. Actual Expenditures	40000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Operating a pilot survey program while waiting on BMP revision.

Reported as of 5/7/05

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — No

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

2. How does your agency advertise this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)

2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency?

3. What is the total number of customer accounts participating in the program during the last year ?

CII Subsector	Number of Toilets Replaced			
4.	Standard Gravity Tank	Air Assisted	Valve Floor Mount	Valve Wall Mount
a. Offices				
b. Retail / Wholesale				
c. Hotels				
d. Health				
e. Industrial				
f. Schools: K to 12				
g. Eating				
h. Government				
i. Churches				
j. Other				

5. Program design.

6. Does your agency use outside services to implement this program?

a. If yes, check all that apply.

7. Participant tracking and follow-up.

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business

b. Inadequate payback

c. Inadequate ULFT performance

d. Lack of funding

e. American's with Disabilities Act

f. Permitting

g. Other. Please describe in B. 9.

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

ULFTs are part of a pilot CII survey program. Seemed well-accepted by those entities that accepted surveys

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor		
b. Materials		
c. Marketing & Advertising		
d. Administration & Overhead		
e. Outside Services		
f. Total	0	0

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution

b. State agency contribution

c. Federal agency contribution

d. Other contribution

e. Total	0

D. Comments

Reported as of 5/7/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$5886000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$3181000

2. Commercial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$1984000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$468000

3. Industrial

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$708000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$262000

4. Institutional / Government

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$426000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$426000

5. Irrigation

a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$1152000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$238000

6. Other

a. Water Rate Structure	Uniform

b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$33000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$1000

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

"Other" is recycled water service initiated in 2003.

Reported as of 5/7/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

1. Does your Agency have a conservation coordinator? no
2. Is this a full-time position? no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ? yes
4. Partner agency's name: Castaic Lake WA
5. If your agency supplies the conservation coordinator:
   - a. What percent is this conservation coordinator's position? %
   - b. Coordinator's Name
   - c. Coordinator's Title
   - d. Coordinator's Experience and Number of Years
   - e. Date Coordinator's position was created (mm/dd/yyyy)
6. Number of conservation staff, including Conservation Coordinator. 2

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? — no

   a. If YES, describe the ordinance:

2. Is a copy of the most current ordinance(s) on file with CUWCC? — no

   a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

   a. Gutter flooding — no

   b. Single-pass cooling systems for new connections — no

   c. Non-recirculating systems in all new conveyor or car wash systems — yes

   d. Non-recirculating systems in all new commercial laundry systems — no

   e. Non-recirculating systems in all new decorative fountains — yes

   f. Other, please name — no

2. Describe measures that prohibit water uses listed above:

   Local planning rules.

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

   a. Allow the sale of more efficient, demand-initiated regenerating DIR models. — yes

   b. Develop minimum appliance efficiency standards that:

      i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. — yes

      ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. — yes

   c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. — yes

4. Does your agency include water softener checks in home water audit programs? — no

5. Does your agency include information about DIR and exchange-

type water softeners in educational efforts to encourage replacement of less efficient timer models? no

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 5/7/05

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2003**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	40	7
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**40**	**7**

6. Describe your agency's ULFT program for single-family residences.

publicly-advertised rebate program

7. Describe your agency's ULFT program for multi-family residences.

publicly-advertised rebate program

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	10000	20000
2. Actual Expenditures	10000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program run by CLWA on behalf of retailers

Reported as of 5/7/05

Water Supply & Reuse

Reporting Unit:

Year:
2004

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type

Total AF:

Reported as of 5/7/05

Accounts & Water Use

Reporting Unit Name:
Valencia Water Company

Submitted to
CUWCC
02/15/2005

Year:
2004

A. Service Area Population Information:

1. Total service area population 93000

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	24297	15522	0	0
2. Multi-Family	293	1288	0	0
3. Commercial	928	5827	0	0
4. Industrial	442	1957	0	0
5. Institutional	63	928	0	0
6. Dedicated Irrigation	405	3193	0	0
7. Recycled Water	8	420	0	0
8. Other	0	0	0	0
9. Unaccounted	NA	0	NA	0
Total	26436	29135	0	0
	Metered		**Unmetered**	

Reported as of 5/7/05

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Based on your signed MOU date, 02/07/2001, your Agency STRATEGY DUE DATE is:	02/07/2003
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	0	0
2. Number of surveys completed:	0	0
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	no	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	no	no
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	no	no
Outdoor Survey:		
6. Check irrigation system and timers	no	no
7. Review or develop customer irrigation schedule	no	no
8. Measure landscaped area (Recommended but not required for surveys)	no	no
9. Measure total irrigable area (Recommended but not required for surveys)	no	no
10. Which measurement method is typically used (Recommended but not required for surveys)		None
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	no	no
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	no	no
a. If yes, in what form are surveys tracked?		None

b. Describe how your agency tracks this information.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

waiting on BMP revision

Reported as of 5/7/05

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts?	no
a. If YES, list local jurisdictions in your service area and code or ordinance in each:	
2. Has your agency satisfied the 75% saturation requirement for single-family housing units?	no
3. Estimated percent of single-family households with low-flow showerheads:	%
4. Has your agency satisfied the 75% saturation requirement for multi-family housing units?	no
5. Estimated percent of multi-family households with low-flow showerheads:	%
6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.	

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices?	yes
a. If YES, when did your agency begin implementing this strategy?	5/12/2002
b. Describe your targeting/ marketing strategy.	

Distribution at public events, paid advertising.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	20	5
3. Number of toilet-displacement devices distributed:	0	0
4. Number of toilet flappers distributed:	0	0
5. Number of faucet aerators distributed:	25	5

6. Does your agency track the distribution and cost of low-flow devices?	yes
a. If YES, in what format are low-flow devices tracked?	Database
b. If yes, describe your tracking and distribution system :	

Names and address of recipient.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0

2. Actual Expenditures 0

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

CLWA provides program and funding on behalf of retailers.

Reported as of 5/7/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	no
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	
b. Determine other system verifiable uses (AF)	
c. Determine total supply into the system (AF)	
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.00
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	yes
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
6. Does your agency operate a system leak detection program?	no
a. If yes, describe the leak detection program:	

B. Survey Data

1. Total number of miles of distribution system line.	323
2. Number of miles of distribution system line surveyed.	323

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	yes

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

see 2002 explanation

E. Comments

Reported as of 5/7/05

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use?	yes
2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use?	no
a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed?	
b. Describe the program:	
3. Number of previously unmetered accounts fitted with meters during report year.	0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters?	no
a. If YES, when was the feasibility study conducted? (mm/dd/yy)	
b. Describe the feasibility study:	
2. Number of CII accounts with mixed-use meters.	0
3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period.	0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No
a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."	

E. Comments

Reported as of 5/7/05

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	1119
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	
b. Description of marketing / targeting strategy:	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	no
b. Distribution Uniformity Analysis	no
c. Review / Develop Irrigation Schedules	no
d. Measure Landscape Area	no
e. Measure Total Irrigable Area	no
f. Provide Customer Report / Information	no
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	yes
4. Does your agency offer financial incentives to improve	no

landscape water use efficiency?

Type of Financial Incentive:	Budget (Dollars/ Year)	Number Awarded to Customers	Total Amount Awarded
a. Rebates	0	0	0
b. Loans	0	0	0
c. Grants	0	0	0

5. Do you provide landscape water use efficiency information to new customers and customers changing services? No

a. If YES, describe below:

CLWA provides training on behalf of retailers

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? yes

b. If yes, does it have dedicated irrigation metering? yes

7. Do you provide customer notices at the start of the irrigation season? no

8. Do you provide customer notices at the end of the irrigation season? no

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

Reported as of 5/7/05

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers? no

   a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.

2. Does your agency offer rebates for high-efficiency washers? no
3. What is the level of the rebate?
4. Number of rebates awarded.

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

   a. If YES, describe the program and how it's organized.

   Newlsetters, bill inserts, website, coordination with wholesaler.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	3
b. Public Service Announcement	no	
c. Bill Inserts / Newsletters / Brochures	yes	4
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	2
f. Special Events, Media Events	yes	3
g. Speaker's Bureau	no	
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Coordinate public outreach with CLWA programs/part of CLWA budget

Reported as of 5/7/05

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? no

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd				
Grades 4th-6th				
Grades 7th-8th				
High School				

3. Did your Agency's materials meet state education framework requirements? no

4. When did your Agency begin implementing this program?

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program is run by CLWA on behalf of retailers

Reported as of 5/7/05

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	yes

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered	7	3	0
b. Number of New Surveys Completed	7	3	0
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)	0	0	0
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)	0	0	0

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	yes	yes	yes
f. Evaluation of all water-using apparatus and processes	yes	yes	yes
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	yes	yes	yes

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	0	0	0
i. Loans	0	0	0
j. Grants	0	0	0
k. Others	0	0	0

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water savings for the purpose of complying with BMP 9 under this option?	no
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	no
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	0
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	0

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	40000	40000
2. Actual Expenditures	45000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Operating a pilot survey prorgam while waiting on BMP revision.

Reported as of 5/7/05

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — No

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

2. How does your agency advertise this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)

2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency?

3. What is the total number of customer accounts participating in the program during the last year ?

CII Subsector	Number of Toilets Replaced			
4.	Standard Gravity Tank	Air Assisted	Valve Floor Mount	Valve Wall Mount
a. Offices				
b. Retail / Wholesale				
c. Hotels				
d. Health				
e. Industrial				
f. Schools: K to 12				
g. Eating				
h. Government				
i. Churches				
j. Other				

5. Program design.

6. Does your agency use outside services to implement this program?

a. If yes, check all that apply.

7. Participant tracking and follow-up.

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business

b. Inadequate payback

c. Inadequate ULFT performance

d. Lack of funding

e. American's with Disabilities Act

f. Permitting

g. Other. Please describe in B. 9.

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

ULFTs are part of a pilot CII survey program. Seemed well-accepted by those entities that accepted surveys

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor		
b. Materials		
c. Marketing & Advertising		
d. Administration & Overhead		
e. Outside Services		
f. Total	0	0

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution

b. State agency contribution

c. Federal agency contribution

d. Other contribution

e. Total	0

D. Comments

Reported as of 5/7/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$6504000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$3190000
2. Commercial	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$2420000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$489000
3. Industrial	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$813000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$245000
4. Institutional / Government	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$385000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$58000
5. Irrigation	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$1331000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$231000
6. Other	
a. Water Rate Structure	Service Not Provided

b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$143000
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$7000

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

"Other" is recycled water

Reported as of 5/7/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

1. Does your Agency have a conservation coordinator? no
2. Is this a full-time position? no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ? yes
4. Partner agency's name: Castaic Lake WA
5. If your agency supplies the conservation coordinator:
   - a. What percent is this conservation coordinator's position? %
   - b. Coordinator's Name
   - c. Coordinator's Title
   - d. Coordinator's Experience and Number of Years
   - e. Date Coordinator's position was created (mm/dd/yyyy)
6. Number of conservation staff, including Conservation Coordinator. 2

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no
   - a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Reported as of 5/7/05

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? — no

   a. If YES, describe the ordinance:

2. Is a copy of the most current ordinance(s) on file with CUWCC? — no

   a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

   a. Gutter flooding — no

   b. Single-pass cooling systems for new connections — no

   c. Non-recirculating systems in all new conveyor or car wash systems — yes

   d. Non-recirculating systems in all new commercial laundry systems — no

   e. Non-recirculating systems in all new decorative fountains — yes

   f. Other, please name — no

2. Describe measures that prohibit water uses listed above:

   Local planning rules.

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

   a. Allow the sale of more efficient, demand-initiated regenerating DIR models. — yes

   b. Develop minimum appliance efficiency standards that:

      i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. — yes

      ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. — yes

   c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. — yes

4. Does your agency include water softener checks in home water audit programs? — no

5. Does your agency include information about DIR and exchange-

type water softeners in educational efforts to encourage replacement of less efficient timer models? no

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

E. Comments

Reported as of 5/7/05

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
Valencia Water Company	**100% Complete**	**2004**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	90	4
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**90**	**4**

6. Describe your agency's ULFT program for single-family residences.

publicly-advertised rebate program

7. Describe your agency's ULFT program for multi-family residences.

publicly-advertised rebate program

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	20000	20000
2. Actual Expenditures	20000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

Program run by CLWA on behalf of retailers

CUWCC

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Memorandum of Understanding

Base Year Data

Reporting Unit: **Newhall County Water District**	**Submitted to CUWCC** 08/21/2003

INSTRUCTIONS: This form MUST BE completed and submitted to the CUWCC prior to filing any BMP reports. The data provided on this form is used in determining coverage requirements for specific BMPs as indicated. If some of the data requested is not available, make reasonable estimates. You can update and edit values, if more precise information becomes available in the future.

For Customer Classification Definitions (i.e. Single Family, Multi-Family) click HERE.

	1. Your **BASE YEAR is 2002**. NOTE: Many calculations in determining credit history and coverage requirements are contingent on your BASE YEAR, which is calculated based on the following criteria. If a Signatory signed the MOU in 1997 or earlier, then the Base Year is 1997. If a Signatory signed the MOU after 1997, then the Base Year is the year the MOU was signed. The same holds true for USBR Contractors, except the date their Base Year is calculated from is the date that their Plan was noticed in the Federal Register.	
	BMP 1	
	2. Number of single-family customers in 2002	6662
	3. Number of multi-family units in 2002	4812
	BMPs 2 and 14	
	4. Number of single-family housing units constructed prior to 1992	5522
	5. Number of multi-family units prior to 1992	4756
	BMP 4	
	6. Number of unmetered accounts in 2002	0
	BMPs 5 and 9	
	7. Number of commercial accounts in 2002	323
	8. Number of industrial accounts in 2002	8
	9. Number of institutional accounts in 2002	71
	10. Total water use (AF) by commercial, industrial and institutional accounts in 2002	2289.66
	BMP 14	
	11. Average number of toilets per single-family household	2.5
	12. Average number of toilets per multi-family household	1.2
	13. Five-year average resale rate of single-family households	4.46

	14. Five-year average resale rate of multi-family households	9.02
	15. Average persons per single-family household	3.35
	16. Average persons per multi-family household	2.51

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Webmaster

Accounts & Water Use

Reporting Unit Name:	Submitted to	Year:
Newhall County Water District	CUWCC **11/30/2004**	**2003**

A. Service Area Population Information:

1. Total service area population 32000

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	6807	5687	0	0
2. Multi-Family	384	1803	0	0
3. Commercial	267	562	0	0
4. Industrial	7	76	0	0
5. Institutional	64	632	0	0
6. Dedicated Irrigation	70	945	0	0
7. Recycled Water	0	0	0	0
8. Other	72	130.4	0	0
9. Unaccounted	NA	21.55	NA	12.48
Total	7671	9856.95	0	12.48
	Metered		**Unmetered**	

Accounts & Water Use

Reporting Unit Name:	Submitted to	Year:
Newhall County Water District	CUWCC **11/30/2004**	**2004**

A. Service Area Population Information:

1. Total service area population 35000

B. Number of Accounts and Water Deliveries (AF)

Type	Metered		Unmetered	
	No. of Accounts	Water Deliveries (AF)	No. of Accounts	Water Deliveries (AF)
1. Single-Family	7544	6054	0	0
2. Multi-Family	367	1682	0	0
3. Commercial	283	524	0	0
4. Industrial	7	116	0	0
5. Institutional	63	613	0	0
6. Dedicated Irrigation	77	1457	0	0
7. Recycled Water	0	0	0	0
8. Other	81	54	0	0
9. Unaccounted	NA	6.62	NA	826.23
Total	8422	10506.62	0	826.23
	Metered		**Unmetered**	

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

1. Based on your signed MOU date, 03/05/2002, your Agency STRATEGY DUE DATE is:	03/04/2004
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	N/A
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	N/A

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	0	0
2. Number of surveys completed:	0	0
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	no	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	no	no
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	no	no
Outdoor Survey:		
6. Check irrigation system and timers	no	no
7. Review or develop customer irrigation schedule	no	no
8. Measure landscaped area (Recommended but not required for surveys)	no	no
9. Measure total irrigable area (Recommended but not required for surveys)	no	no
10. Which measurement method is typically used (Recommended but not required for surveys)		None
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	no	no
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	no	no
a. If yes, in what form are surveys tracked?		None

b. Describe how your agency tracks this information.

NCWD did not have a residential survey program from 7/2002 - 6/2003. However, in Fiscal Year 2002/2003 NCWD updated their database system

to Inhance which allowed for customer service to more easily identify and log customers based on their class code. Single-family and multi-family customers were classified in separate classes and homeowner association accounts, neighborhood recreation facilities, and other common irrigated areas were coded as landscape for future BMP 5 programs. The Inhance system also allowed NCWD to electronically sort residential customers by parcel groupings or books. From the listed books/groups, Customer Service was able to calculate the estimated number of single and multi-family dwelling units built before 1992. This data information can then be used for the development and marketing BMP 2 (Residential Plumbing Retrofit) and 14 (ULFT Rebate Program).

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

E. Comments

NCWD signed the MOU in 3/2002 and therefore was not required to implement a Residential Water Use Survey Program until 7/2003 which is the start of the 2004 reporting period. Although a residential water use survey program was not implemented in FY 2002/03, NCWD offered residential customers informative material and guidebooks to help them identify water waste or inefficiency and how they could conserve. All new residential customers were given Conservation Packets with information on water conservation for indoor and outdoor residential water usage. These packets included irrigation and gardening guidebooks (Sunset Magazine), 55 Quick Tips, recommendations to identify and prevent leaks, how to complete a self audit of your home, and other useful pamphlets and material.

Reported as of 5/18/05

BMP 01: Water Survey Programs for Single-Family and Multi-Family Residential Customers

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Based on your signed MOU date, 03/05/2002, your Agency STRATEGY DUE DATE is:	03/04/2004
2. Has your agency developed and implemented a targeting/ marketing strategy for SINGLE-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	N/A
3. Has your agency developed and implemented a targeting/ marketing strategy for MULTI-FAMILY residential water use surveys?	no
a. If YES, when was it implemented?	N/A

B. Water Survey Data

Survey Counts:	Single Family Accounts	Multi-Family Units
1. Number of surveys offered:	0	0
2. Number of surveys completed:	0	0
Indoor Survey:		
3. Check for leaks, including toilets, faucets and meter checks	no	no
4. Check showerhead flow rates, aerator flow rates, and offer to replace or recommend replacement, if necessary	no	no
5. Check toilet flow rates and offer to install or recommend installation of displacement device or direct customer to ULFT replacement program, as neccesary; replace leaking toilet flapper, as necessary	no	no
Outdoor Survey:		
6. Check irrigation system and timers	no	no
7. Review or develop customer irrigation schedule	no	no
8. Measure landscaped area (Recommended but not required for surveys)	no	no
9. Measure total irrigable area (Recommended but not required for surveys)	no	no
10. Which measurement method is typically used (Recommended but not required for surveys)		None
11. Were customers provided with information packets that included evaluation results and water savings recommendations?	no	no
12. Have the number of surveys offered and completed, survey results, and survey costs been tracked?	yes	yes
a. If yes, in what form are surveys tracked?		database

b. Describe how your agency tracks this information.

A tracking system for monitoring participation in BMP 1 and other programs was created in NCWD's Inhance database in 2002/03 which is

connected to the customer service and billing database. In 2003/04, NCWDÌs Customer Service staff began connecting the BMP data to the district's GIS mapping software. With the GIS, NCWD is able to map out pre and post 1992 residential accounts so that the district could have additional information such as lot size, topographic conditions and other issues essential to identify ideal customers for a residential survey program. Furthermore, a new detailed BMP data section was added to the Inhance system to log customer participation in each of the BMP programs including residential surveys. Combining the new BMP data section and the GIS capabilities, NCWD was able to determine trends in customer behavior/participation so that BMP 1 and other programs can be better marketed and implemented. Specific data and information related to BMP 1 is also tracked in an excel database.

C. Water Survey Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

E. Comments

NCWD filed a late exemption in November 2004 for the District's first year (2003/04 reporting period) for implementing BMP 1. NCWD did not have the staff or budgeted funds to implement a residential survey program. NCWD has begun development of a pilot survey program in late FY 2003/04 to evaluate the effectiveness (resulting water savings and cost savings achieved) of a district managed residential survey program. The pilot survey program is expected to begin in 2005. After the completion of 30-50 surveys and post-survey monitoring and assessments, NCWD will determine the most cost-effective method for reducing residential water usage out of the listed options below: 1. In-house (staff operated and maintained) survey program. 2. Outsourced (to outside consulting firm) large scale residential survey program. 3. Valley-wide survey program (with other local retailers and CLWA assistance). 4. Discontinuation of any and all residential survey programs. Although a residential water use survey program was not implemented in FY 2003/04, NCWD continued to offer residential customers informative material and guidebooks to help them identify water waste or inefficiency and how they could conserve. All new residential customers were given Conservation Packets with information on water conservation for indoor and outdoor residential water usage. These packets included irrigation and gardening guidebooks (Sunset Magazine), 55 Quick Tips, recommendations to identify and prevent leaks, how to complete a self audit of your home, and other useful pamphlets and material.

Reported as of 5/18/05

BMP 02: Residential Plumbing Retrofit

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Is there an enforceable ordinance in effect in your service area requiring replacement of high-flow showerheads and other water use fixtures with their low-flow counterparts? — no

   a. If YES, list local jurisdictions in your service area and code or ordinance in each:

   The City of Santa Clarita requires the replacement of high flow plumbing fixtures and devices in high stage drought conditions only. No other local ordinance or code requiring installation or retrofit of low flow plumbing devices (for residential customers) is in place for NCWDís service area in the Santa Clarita Valley. NCWD is creating a Water Use Efficiency Ordinance (effective 12/2004) with listed recommendations to be water efficient including the installation of low flow plumbing devices. NCWD is considering requiring that customers/residents follow these recommendations during a DWR declared drought.

2. Has your agency satisfied the 75% saturation requirement for single-family housing units? — no
3. Estimated percent of single-family households with low-flow showerheads: — 1.3%
4. Has your agency satisfied the 75% saturation requirement for multi-family housing units? — no
5. Estimated percent of multi-family households with low-flow showerheads: — .15%
6. If YES to 2 OR 4 above, please describe how saturation was determined, including the dates and results of any survey research.

   N/A

B. Low-Flow Device Distribution Information

1. Has your agency developed a targeting/ marketing strategy for distributing low-flow devices? — yes

   a. If YES, when did your agency begin implementing this strategy? — 01/01/2003

   b. Describe your targeting/ marketing strategy.

   Showerheads and aerators were provided by the wholesaler (CLWA) to give out to customers at local events (i.e. Open House, River Rally, Emergency Expo). The program was mainly marketed by CLWA; however NCWD advertised the program in the quarterly newsletter and at the front office desk. In 2003/04 NCWD expanded the BMP 2 program to also include all pre-1992 multi-family homes in addition to the (pre-1992) single-family homes. This includes several mobile home parks and small apartment buildings built prior to 1992. Customers were allocated up to 4 devices per household unless they could prove additional low flow devices were necessary.

Low-Flow Devices Distributed/ Installed	SF Accounts	MF Units
2. Number of low-flow showerheads distributed:	21	4
3. Number of toilet-displacement devices distributed:	0	0
4. Number of toilet flappers distributed:	0	0
5. Number of faucet aerators distributed:	29	27

6. Does your agency track the distribution and cost of low-flow devices? yes

a. If YES, in what format are low-flow devices tracked? Database

b. If yes, describe your tracking and distribution system :

In 2003/04 NCWD staff added data box in the customer service and billing database (Inhance) in order to accurately track customer participation. BMP participation was categorized by program and tracked based on the status or level of a customerÌs participation as follows: 1. Call or email of interest 2. Received Application Form (for rebate programs) 3. Participated in designated BMP program (example: received showerhead) 4. Customer on waiting list 5. Post program follow up completed For BMP 2, each low flow device (i.e. showerheads, faucet aerators and garden hose spray nozzles) was tracked as well. Using the database, NCWD was able to map the distribution of participation throughout the four service areas and easily identify patterns and trends. For example, participation in BMP 2 was clumped in neighborhoods most likely due to communication between neighbors regarding the programs.

C. Low-Flow Device Distribution Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	2228.4	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

E. Comments

In June of 2/004, NCWD offered the free devices to both single and multi-family customers to increase distribution and meet the requirements of BMP 2. NCWD also started providing the low flow devices to customers at the district's front office rather than strictly at public events. The estimated expenditures are for approximately 60 hours of staff time invested at $37.14/hour. Staff hours includes the time necessary to created the tracking database and maps, coordinating with CLWA, assisting customers, stocking front office inventory, and logging customer participation.

Reported as of 5/18/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year? yes

2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:

   a. Determine metered sales (AF) 9840.96

   b. Determine other system verifiable uses (AF) 0

   c. Determine total supply into the system (AF) 9869.43

   d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required. 1.00

3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production? yes

4. Did your agency complete a full-scale audit during this report year? no

5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit? no

6. Does your agency operate a system leak detection program? no

   a. If yes, describe the leak detection program:

   Although NCWD does not have a proactive leak detection program, the district monitors key data to quickly identify leaks and other necessary repairs in the distribution system. Monthly records of total water purchased from CLWA and water supply obtained through district wells (groundwater), as well as the total water sales and other verifiable usage for all 4 service areas is logged. The percent water loss is tracked to determine potential leaks or system misreads throughout the 4 service areas. The total (annual) water loss for the entire district averages around 7.5 to 9.0 percent.

B. Survey Data

1. Total number of miles of distribution system line. 134.93

2. Number of miles of distribution system line surveyed. 0

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	500000	382.343
2. Actual Expenditures	567444.49	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

   N/A

E. Comments

The listed budget and expenditures [Section C (1,2)] include all maintenance, leak and general repairs, upgrades and replacement of the distribution system in the four service areas. NCWD investigates

potential leaks and system damages as needed and monitors the collected data to detect major leaks and other irregularities in the system. The investigation of system leaks is classified under system maintenance in the 2002-03 Budget. A detailed breakdown of the budget and expenditures for Leak Detection, Repair and Distribution System Maintenance is attached (submitted separately to CUWCC).

Reported as of 5/18/05

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Has your agency completed a pre-screening system audit for this reporting year?	no
2. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
a. Determine metered sales (AF)	10507.16
b. Determine other system verifiable uses (AF)	-4.04
c. Determine total supply into the system (AF)	11332.85
d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.93
3. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
4. Did your agency complete a full-scale audit during this report year?	yes
5. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	no
6. Does your agency operate a system leak detection program?	no

a. If yes, describe the leak detection program:

Refer to 2002-03 Submission

B. Survey Data

1. Total number of miles of distribution system line.	147.41
2. Number of miles of distribution system line surveyed.	0

C. System Audit / Leak Detection Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	382343	500000
2. Actual Expenditures	358475.08	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

E. Comments

The listed budget and expenditures [Section C (1,2)] include all maintenance, leak and general repairs, upgrades and replacement of the distribution system in the four service areas. NCWD investigates potential leaks and system damages as needed and monitors the collected data to detect major leaks and other irregularities in the system. The investigation of system leaks is classified under system maintenance in the 2002-03 Budget. A detailed breakdown of the budget and expenditures for Leak Detection, Repair and Distribution System Maintenance is attached (submitted separately to CUWCC).

Reported as of 5/18/05

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use? yes

2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use? no

   a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed? Always Metered

   b. Describe the program:

   All existing accounts are metered and have been for several years. All new connections are required to install the appropriate size meter and type (i.e. CII mixed or dedication irrigation meter) as determined necessary by the district's engineering department and approved by management.

3. Number of previously unmetered accounts fitted with meters during report year. 0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? no

   a. If YES, when was the feasibility study conducted? (mm/dd/yy) N/A

   b. Describe the feasibility study:

   N/A - NCWD has an "at least as effective" district policy to assess the benefits of installing a dedicated irrigation meter on a case by case basis [see Section D(b)].

2. Number of CII accounts with mixed-use meters. 341

3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period. 0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? yes

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

   NCWD meets the requirements under BMP 4 Sections A(a), C, and D as described in the BMP. A dedicated irrigation meter retrofit program [Section A(b)] and a feasibility study [Section a(c)] on the merits of an incentive program to switch mixed meters to dedicated landscape (irrigation) meters has not been completed. These two requirements have been meet through NCWD*s new water service connection policies and procedures. Currently, dedicated irrigation meters have been installed in all appropriate CII properties within the district and therefore there are no retrofit opportunities available. Like all CII and other meters, the dedicated irrigation meters are

billed based on monthly usage. The irrigation meters are also separately billed from a property*s main meter with a separate monthly service fee (based on the size of the meter), energy and water availability fees, and other standard monthly charges. Instead of a feasibility study to determine the potential merits of an incentive program, NCWD requires developers to install dedicated irrigation meters when appropriate (as determined by the district). NCWD evaluates the cost/benefits of installing a dedicated irrigation meter during a new projects* (or customer*s) water service application and installation process. The engineering staff work with the developer/customer to determine if a dedicated irrigation meter is necessary and will benefit the customer and the district to help conserve water. If the NCWD*s engineering department determines a dedicated irrigation meter is necessary, the developer/customer is required to install the separate meter and incur any related installation costs. As a result of these policies, NCWD has a significant number of dedicated irrigation meters in the CII sectors that will allow the district to better audit these accounts and establish water budgets (for BMP 5 requirements) to reduce district water usage.

E. Comments

NCWD has met the requirements stated under BMP 4 requiring meters for all existing and new customers. Furthermore, dedicated irrigation meters are installed at the time of initial service connection (when appropriate) to reduce water usage and minimize costs to the district and the customer. NCWD will assist any property owners in retrofitting their property with a dedicated irrigation meter if there is an increase in the landscape area(s) or other circumstance to constitute the need for a separate landscape/irrigation meter. However, NCWD does not offer any incentive for customers to retrofit and the associated installation costs are the responsibility of the customers.

Reported as of 5/18/05

BMP 04: Metering with Commodity Rates for all New Connections and Retrofit of Existing

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Does your agency require meters for all new connections and bill by volume-of-use? yes

2. Does your agency have a program for retrofitting existing unmetered connections and bill by volume-of-use? no

   a. If YES, when was the plan to retrofit and bill by volume-of-use existing unmetered connections completed? N/A

   b. Describe the program:

   All existing accounts are metered and have been for several years. All new connections are required to install the appropriate size meter and type (i.e. CII mixed, residential, dedication irrigation meter, etc.) as determined necessary by the district's engineering department.

3. Number of previously unmetered accounts fitted with meters during report year. 0

B. Feasibility Study

1. Has your agency conducted a feasibility study to assess the merits of a program to provide incentives to switch mixed-use accounts to dedicated landscape meters? no

   a. If YES, when was the feasibility study conducted? (mm/dd/yy) N/ A

   b. Describe the feasibility study:

   N/A

2. Number of CII accounts with mixed-use meters. 358

3. Number of CII accounts with mixed-use meters retrofitted with dedicated irrigation meters during reporting period. 0

C. Meter Retrofit Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? yes

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

   N/A ñ NCWD has an "at least as effective" district policy to assess the benefits of installing a dedicated irrigation meter on a case by case basis [see Section D(a) 2002-03 submission].

E. Comments

NCWD continues to meet the requirements under BMP 4 Sections A(a), C, D as described in the BMP, as well as Section A(b) (retrofit program) and Section A(c) (feasibility study) under the district*s úat least as effectiveî program in place. These two requirements are met through NCWD*s new water service connection policies and procedures. The incentives of installing a dedicated irrigation meter are evaluated during the initial service application process for each individual service application.

Dedicated irrigation meters are installed in all appropriate CII properties during the initial service connection to minimize retrofit costs to the district and the customer (refer to BMP 4 2002-03 Comment submission).

Reported as of 5/18/05

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	118
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	N/A
b. Description of marketing / targeting strategy:	
N/A	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	no
b. Distribution Uniformity Analysis	no
c. Review / Develop Irrigation Schedules	no
d. Measure Landscape Area	no
e. Measure Total Irrigable Area	no
f. Provide Customer Report / Information	no
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	
N/A	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	no
4. Does your agency offer financial incentives to improve landscape water use efficiency?	no

Type of Financial Incentive:	Budget (Dollars/ Year)	Number Awarded to Customers	Total Amount Awarded

a. Rebates	0	0	0
b. Loans	0	0	0
c. Grants	0	0	0

5. Do you provide landscape water use efficiency information to new customers and customers changing services? yes

a. If YES, describe below:

NCWD offers basic landscape design manuals (published by AWWA) to help customers incorporate native and drought tolerant plants with consideration to the unique conditions found in the Santa Clarita Valley. Information on efficient gardening is also provided to children in the Culver and AWWA published coloring and activity books provided to customers at events and the NCWD office. The local water wholesaler (CLWA) also provides NCWD and the other local retailers with several sources and opportunities for all customers to learn more about water efficient landscape irrigation. Residents and businesses in the valley have access to an extensive list of plants and key information on planting and maintaining the recommended species on CLWAls website. CLWA also offers training courses to all Santa Clarita Valley residents (including NCWD customers), gardeners and business owners on creating and maintaining a water efficient landscape. Classes include organic gardening, drip irrigation, native and drought tolerant plants, among other classes available. NCWD further promotes water efficient landscape design and irrigation through newsletter articles, local newspaper articles and through the districtls Ordinance 101 (Water Conservation) that lists recommended watering hours and outdoor (and indoor) water wasting activities.

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? yes

b. If yes, does it have dedicated irrigation metering? yes

7. Do you provide customer notices at the start of the irrigation season? yes

8. Do you provide customer notices at the end of the irrigation season? yes

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

F. Comments

There are no listed expenditures for BMP 5 for 2002/03 since any costs for landscape /irrigation educational material and guidebooks were included in expenditures for BMP 7 (Public Information Programs). Estimated expenditures specifically for educational material on water efficient landscape/irrigation are approximately $400 ordered from AWWA. Staff hours and miscellaneous costs are also calculated under BMP 7. NCWD signed the MOU in 3/2002 and therefore was not

required to implement a Landscape Survey Program until 7/2004 which is the start of the 2005 reporting period.

Reported as of 5/18/05

BMP 05: Large Landscape Conservation Programs and Incentives

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Water Use Budgets

1. Number of Dedicated Irrigation Meter Accounts:	133
2. Number of Dedicated Irrigation Meter Accounts with Water Budgets:	0
3. Budgeted Use for Irrigation Meter Accounts with Water Budgets (AF):	0
4. Actual Use for Irrigation Meter Accounts with Water Budgets (AF):	0
5. Does your agency provide water use notices to accounts with budgets each billing cycle?	no

B. Landscape Surveys

1. Has your agency developed a marketing / targeting strategy for landscape surveys?	no
a. If YES, when did your agency begin implementing this strategy?	N/A
b. Description of marketing / targeting strategy:	
N/A	
2. Number of Surveys Offered.	0
3. Number of Surveys Completed.	0
4. Indicate which of the following Landscape Elements are part of your survey:	
a. Irrigation System Check	no
b. Distribution Uniformity Analysis	no
c. Review / Develop Irrigation Schedules	no
d. Measure Landscape Area	no
e. Measure Total Irrigable Area	no
f. Provide Customer Report / Information	no
5. Do you track survey offers and results?	no
6. Does your agency provide follow-up surveys for previously completed surveys?	no
a. If YES, describe below:	
N/A	

C. Other BMP 5 Actions

1. An agency can provide mixed-use accounts with ETo-based landscape budgets in lieu of a large landscape survey program. Does your agency provide mixed-use accounts with landscape budgets?	no
2. Number of CII mixed-use accounts with landscape budgets.	0
3. Do you offer landscape irrigation training?	yes
4. Does your agency offer financial incentives to improve landscape water use efficiency?	no

Type of Financial Incentive:	Budget (Dollars/ Year)	Number Awarded to Customers	Total Amount Awarded

a. Rebates	0	0	0
b. Loans	0	0	0
c. Grants	0	0	0

5. Do you provide landscape water use efficiency information to new customers and customers changing services? yes

a. If YES, describe below:

In 2003/04 NCWD expanded its library of water conservation information and resources to include more landscape and irrigation guidebooks, references and other helpful material for customers. The District provided the Sunset Magazine series to all new homeowners and made them available to customers attending public events and to customers at the NCWD office. The Sunset magazine series included; ìSmart Water & Energy Use in the West,î ìHow to Water Your Garden,î and ìWater-Wise Gardening for California.î NCWD also offers basic landscape design manuals (published by AWWA) to help customers incorporate native and drought tolerant plants with consideration to the unique conditions found in the Santa Clarita Valley. Information on efficient gardening is also provided to children in the Culver and AWWA published coloring and activity books provided to customers at events and the NCWD office. The local wholesaler (CLWA) continues to provide a list of native and drought tolerant vegetation on their website and offer various courses on water efficient landscape design and irrigation. The resources provided by CLWA are available to all NCWD customers and other residents of the Santa Clarita Valley. NCWD will continue to expand its efforts to promote water efficient landscape and irrigation practices throughout the district. At the end of 2003/04, The Engineering and Conservation Department began applying customer data to the districtís GIS mapping system to start gathering necessary information and data to establish water budgets. The information will also help the district in identify ideal candidates for landscape surveys and/or water budgets based on their lot size, location, topographic features and water usage history.

6. Do you have irrigated landscaping at your facilities? yes

a. If yes, is it water-efficient? yes

b. If yes, does it have dedicated irrigation metering? yes

7. Do you provide customer notices at the start of the irrigation season? yes

8. Do you provide customer notices at the end of the irrigation season? yes

D. Landscape Conservation Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

E. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

F. Comments

There are no listed expenditures for BMP 5 for 2002/03 since any costs for landscape /irrigation educational material and guidebooks was included in expenditures for BMP 7 (Public Information Programs). Estimated expenditures specifically for educational material on water

efficient landscape/irrigation are $2,343.30 for the 3 Sunset Magazine guidebooks, and approximately $1,500 to $2,000 for various education materials from AWWA and the Culver Company. Staff hours and miscellaneous costs are also calculated under BMP 7. NCWD is investigating installing a CIMIS weather station for district customers to use to obtain accurate (local) ET values to improve the efficiency of their irrigation systems. The district will be increasing its efforts to promote water efficient irrigation and will be developing a landscape survey program targeting top water using meters (per square foot landscape area). NCWD filed a late exemption in November 2004 for the District's second reporting period (2005/06) for implementing BMP 5. The exemption was filed since NCWD currently does not have the staff or budgeted funds to implement a landscape survey program, however the district will actively seek funding sources for such a program.

Reported as of 5/18/05

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers? — no

   a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.

   NCWD did not offer a rebate program in 2002-03. Los Angeles County Sanitation Districts 32 & 26 (LACSD) and Southern California Edison did not offer any type of rebate for water efficient clothes washers.

2. Does your agency offer rebates for high-efficiency washers? — no
3. What is the level of the rebate? — 0
4. Number of rebates awarded. — 0

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? — no

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

   N/A

D. Comments

N/A

Reported as of 5/18/05

BMP 06: High-Efficiency Washing Machine Rebate Programs

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Do any energy service providers or waste water utilities in your service area offer rebates for high-efficiency washers? no

   a. If YES, describe the offerings and incentives as well as who the energy/waste water utility provider is.

   Los Angeles County Sanitation Districts or LACSD, (specifically 32 & 26) offer a cost reduction of 20%, 40% or 60% for customers that reduce their wastewater (sewer) discharge by 20% or more. The reduction is calculated based on a 12 month comparison of water usage as shown on the customer's water bill (from NCWD). If they reduced their bill 20%, they receive a 20% reduction on their fees. Customers must reduce their water usage (and thus discharge) by at least 20% in order to qualify for the financial incentives. Installing a water efficient clothes washer could generate 20% water savings and therefore qualify the customer for a reduction. However, neither LACSD nor Southern California Edison offers a rebate specifically for high efficiency clothes washers. Thus, at this time NCWD is not offering a complementing rebate to customers.

2. Does your agency offer rebates for high-efficiency washers? no
3. What is the level of the rebate? 0
4. Number of rebates awarded. 0

B. Rebate Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

   a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

   N/A

D. Comments

NCWD currently does not have the staff or funds to implement a water efficient clothes washer rebate program. NCWD will reassess the cost-effectiveness of such a program as funding sources change and/or Southern California Edison or LACSD implement a specific clothes washer rebate program.

Reported as of 5/18/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

NCWD has a comprehensive public outreach and education program to promote water conservation and water use efficiency. The district efforts are designed to target the various classes of customers including (single & multi-family) residential, CII and large landscape. For several years the district has been releasing a quarterly newsletter to the entire customer base to inform customers on district upgrades and additions to improve the water quality and service, recognition of employee excellence, and education on new district policies and programs. Most importantly, the newsletter includes a "Water Awareness" section that provides customers with useful tips and recommendations to be water efficient and to reduce water waste. The newsletters also include a seasonal article describing how to increase water efficiency such as how to set your summer irrigation schedule or how to protect pipes from freezing temperatures in the winter. In addition to the newsletter, NCWD includes a bill notice (or by-line) with important reminders and water conservation tips. For example, the bill notice in May 2003 reminded customers to change out their old toilets and receive a ULFT rebate voucher from the district. NCWD also includes bill stuffers in the customer*s monthly water bill several times a year to promote conservation programs and/or to provide general information on conservation. NCWD participates in 4 major community events (River Rally, CLWA Open House, Emergency Expo and The Street Fair) to further reach out to the customers and the general public. At these events and at the district office, customers can obtain pamphlets, guidebooks, conservation promo items and children*s coloring and activities books on water conservation, and other informative material. NCWD maintains an extensive inventory of information resource material on conservation, leak detection, water safety, district operations, water quality (annual reports), and more. In FY 2002-03 NCWD expanded its website to include a úWater Conservationî section which includes easy tips for conserving water. NCWD continues to expand all areas of public outreach and education

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	no	0
b. Public Service Announcement	no	0
c. Bill Inserts / Newsletters / Brochures	yes	5
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	1
f. Special Events, Media Events	yes	4
g. Speaker's Bureau	no	
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	14930.85	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

In 2002/03 the BMP 7 (Public Information Programs) budget was not separately defined and therefore only actual expenditures are provided. Expenditures were taken from a general account that is used for various uses including public outreach and education, employee supplies and uniforms, and other marketing uses. The expenditures were calculated based on the development and production (printing, mailing, etc.) costs associated with the PR material and events, as well as the employee time expended. Various levels of staff participated in public outreach efforts including management, customer service, accounting, and technical field staff. Therefore, an average hourly employee rate of $37.14 was used which includes auxiliary costs such as insurance, worker*s compensation, taxes and other fees. With a total of 7,715 meter accounts and an estimated population of 28,000, NCWD expended $1.94 per meter account or $0.53 per person.

Reported as of 5/18/05

BMP 07: Public Information Programs

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Does your agency maintain an active public information program to promote and educate customers about water conservation? yes

a. If YES, describe the program and how it's organized.

NCWD continued to maintain a comprehensive public outreach and education program to promote water conservation and water use efficiency in FY 2003/04. In 2003/04 NCWD identified that irrigation constituted a significant portion of the districtÌs water usage and therefore added new information material to educate and promote water efficient irrigation (to residential customers). The District provided the Sunset Magazine series to all new homeowners and made them available to customers attending public events and to customers at the NCWD office. The Sunset magazine series included; Ïsmart Water & Energy Use in the West,Ó ÏHow to Water Your Garden,Ó and ÏWater-Wise Gardening for California.Ó NCWD continued to release a quarterly newsletter to the entire customer base to inform customers on district upgrades and additions to improve the water quality and service, recognition of employee excellence, education on new district policies and programs and water conservation. The newsletters also continued to include seasonal articles describing how to increase water efficiency for indoor and outdoor water usage. In May of 2003, NCWD included a bill notice (or by-line) in the customerÌs monthly water bill to remind customers to change out their old toilets and receive a ULFT rebate voucher from the district. A separate postcard was also sent to advertise the valley wide Residential ULFT Rebate Program sponsored and organized by the local wholesaler (CLWA). The district works with the wholesaler and the other local water retailers in the Santa Clarita Valley to promote water efficiency and conservation through various PR campaigns, advertising and newspaper articles. Since the annual city Street Fair was not held September 2003, NCWD only participated in 3 major community events (River Rally, CLWA Open House, and the Emergency Expo) to further reach out to the customers and the general public. At these events and at the district office, customers can obtain pamphlets, guidebooks, conservation promo items and childrenÌs coloring and activities books on water conservation, and other informative material. NCWD maintains an extensive inventory of information resource material on conservation, leak detection, water safety, district operations, water quality (annual reports), and more. NCWD continued to expand the ÏWater ConservationÓ section of the district website adding new easy tips for conserving water and links to useful information sites.

2. Indicate which and how many of the following activities are included in your public information program.

Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	no	0
b. Public Service Announcement	no	0
c. Bill Inserts / Newsletters / Brochures	yes	6
d. Bill showing water usage in comparison to previous year's usage	yes	
e. Demonstration Gardens	yes	1
f. Special Events, Media Events	yes	3

g. Speaker's Bureau	no	0
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	10000
2. Actual Expenditures	25692.01	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

In mid 2003/04 a separate BMP budget account was created to better record expenses related to the BMP programs. Therefore, the expenditures for BMP 7 in 2003/04 are recorded under two separate accounts in the districtÌs budget and expenditures report. Most of the recorded BMP expenses were for BMP 7 (Public Information Programs) such as design and printing costs, educational and promotional item purchases and other related costs. The expenditures were calculated based on the development and production (printing, mailing, etc.) costs associated with the PR material and events, as well as the employee time expended. Various levels of staff participated in public outreach efforts including management, customer service, accounting, and technical field staff. Therefore, an average hourly employee rate of $37.14 was used which includes auxiliary costs such as insurance, workerÌs compensation, taxes and other fees. With a total of 8,531 meter accounts and an estimated population of 32,000, NCWD expended $3.01 per meter account or $0.80 per person.

Reported as of 5/18/05

BMP 08: School Education Programs

Reporting Unit:
Newhall County Water District

BMP Form Status:
100% Complete

Year:
2003

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	47	1410	0
Grades 4th-6th	yes	23	700	0
Grades 7th-8th	yes	0	0	0
High School	yes	0	0	0

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 01/01/1993

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

The education program is provided entirely by our wholesaler (CLWA) on our behalf since 1993 for K-6 and 7-12, however the program has been unsuccessful at reach students and teachers in grades 7-12. Students travel to CLWA for their workshops and presentations which include a tour of CLWA's drought tolerant and native vegetation garden and classes how water science, conservation and composting. The actual number of workshops held was not provided to NCWD, therefore an estimated value is provided in this report. The estimated number of presentations was based on the total number of participating students assuming 30 students per workshop or presentation. Currently, CLWA does not offer curriculum workshops teachers on water conservation and related topics.

Reported as of 5/18/05

BMP 08: School Education Programs

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1.Has your agency implemented a school information program to promote water conservation? yes

2. Please provide information on your school programs (by grade level):

Grade	Are grade-appropriate materials distributed?	No. of class presentations	No. of students reached	No. of teachers' workshops
Grades K-3rd	yes	29	844	0
Grades 4th-6th	yes	22	650	0
Grades 7th-8th	yes	0	0	0
High School	yes	0	0	0

3. Did your Agency's materials meet state education framework requirements? yes

4. When did your Agency begin implementing this program? 01/01/1993

B. School Education Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

CLWA continues to organize and implement a school education program on our behalf of NCWD and the other water retailers in the Santa Clarita Valley since 1993 for K-6. In 2003-04, grades and 7-12 students and teachers did not participate. CLWA is working on developing a program in 2005 specifically targeted at grades 7-12. The actual number of workshops held was not provided to NCWD for 2003-04, therefore an estimated value is provided in this report. The estimated number of presentations was based on the total number of participating students assuming 30 students per workshop or presentation. Currently, CLWA does not offer curriculum workshops teachers on water conservation and related topics.

Reported as of 5/18/05

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	no

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered	0	0	0
b. Number of New Surveys Completed	0	0	0
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)	0	0	0
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)	0	0	0

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	no	no	no
f. Evaluation of all water-using apparatus and processes	no	no	no
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	no	no	no

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	0	0	0
i. Loans	0	0	0
j. Grants	0	0	0
k. Others	0	0	0

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water	no

savings for the purpose of complying with BMP 9 under this option?

6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	no
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	0
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	0

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

Based on NCWD signatory date of the MOU, the district does not need to implement a CII conservation program until FY 2004-05. NCWD's Customer Service staff began preparations for a CII program in 2002-03 by sorting accounts by the BMP class codes such as commercial, industrial, large landscape, etc. The class codes were applied to the Inhance (customer service and billing database) System to use for future CII programs.

Reported as of 5/18/05

BMP 09: Conservation Programs for CII Accounts

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Has your agency identified and ranked COMMERCIAL customers according to use?	yes
2. Has your agency identified and ranked INDUSTRIAL customers according to use?	yes
3. Has your agency identified and ranked INSTITUTIONAL customers according to use?	yes

Option A: CII Water Use Survey and Customer Incentives Program

4. Is your agency operating a CII water use survey and customer incentives program for the purpose of complying with BMP 9 under this option?	no

CII Surveys	Commercial Accounts	Industrial Accounts	Institutional Accounts
a. Number of New Surveys Offered	0	0	0
b. Number of New Surveys Completed	0	0	0
c. Number of Site Follow-ups of Previous Surveys (within 1 yr)	0	0	0
d. Number of Phone Follow-ups of Previous Surveys (within 1 yr)	0	0	0

CII Survey Components	Commercial Accounts	Industrial Accounts	Institutional Accounts
e. Site Visit	no	no	no
f. Evaluation of all water-using apparatus and processes	no	no	no
g. Customer report identifying recommended efficiency measures, paybacks and agency incentives	no	no	no

Agency CII Customer Incentives	Budget ($/Year)	No. Awarded to Customers	Total $ Amount Awarded
h. Rebates	0	0	0
i. Loans	0	0	0
j. Grants	0	0	0
k. Others	0	0	0

Option B: CII Conservation Program Targets

5. Does your agency track CII program interventions and water	no

savings for the purpose of complying with BMP 9 under this option?	
6. Does your agency document and maintain records on how savings were realized and the method of calculation for estimated savings?	no
7. Estimated annual savings (AF/yr) from site-verified actions taken by agency since 1991.	0
8. Estimated annual savings (AF/yr) from non-site-verified actions taken by agency since 1991.	0

B. Conservation Program Expenditures for CII Accounts

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP?	No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

NCWD did not have a CII Survey program in 2003-04 as the MOU was signed in March 2002. During 2003-04, NCWD began gather necessary data and information to implement a CII Survey or conservation program for the next reporting period (2005-06) as scheduled.

Reported as of 5/18/05

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10.	No

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.	Consumption ranking Potential savings Oldest meter

a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

NCWD did not implement a CII ULFT program during the 2003-04 reporting period, however a program is in potential development (as part of a CII survey program) for the 2004-05 that will identify target customers based on the facilities water usage (consumption) volume, water savings potential and if the site has plumbing fixtures installed or replaced prior to January 1992.

2. How does your agency advertise this program? Check all that apply.	Direct letter Bill insert Bill message Newsletter Telephone Web page Radio PSAs Newspapers Trade publications Other print media Trade shows and events Telemarketing

a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

All BMP programs are advertised in our district newsletter, through newspaper articles, our website, customer calls, bill inserts and other applicable and other cost effective means. Although a CII toilet rebate program was not implemented in 2003-04 reporting period, the above marked advertising efforts were included for the residential ULFT rebate program (5/2003 & 5/2004).

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)	Yes
2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency?	Yes
3. What is the total number of customer accounts participating in the program during the last year ?	0

CII Subsector	Number of Toilets Replaced			
4.	Standard	Air	Valve Floor	Valve Wall

	Gravity Tank	Assisted	Mount	Mount
a. Offices	0	0	0	0
b. Retail / Wholesale	0	0	0	0
c. Hotels	0	0	0	0
d. Health	0	0	0	0
e. Industrial	0	0	0	0
f. Schools: K to 12	0	0	0	0
g. Eating	0	0	0	0
h. Govern-ment	0	0	0	0
i. Churches	0	0	0	0
j. Other	0	0	0	0

5. Program design.

Rebate or voucher
Direct installation
Direct installation with customer co-payment
Direct distribution
Direct distribution with customer co-payment
Retrofit on resale

6. Does your agency use outside services to implement this program? Yes

a. If yes, check all that apply.

Community Based Organization
Plumbing contractors/subcontracts

7. Participant tracking and follow-up.

Letter
Telephone

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business	4
b. Inadequate payback	5
c. Inadequate ULFT performance	2
d. Lack of funding	4
e. American's with Disabilities Act	1
f. Permitting	2
g. Other. Please describe in B. 9.	3

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

Although a specific program has not been implemented, several CII customers have been informally surveyed during customer service phone calls and at public events. regarding participation in district programs. From the provided customer input, the above rankings were determined for reasons for not participating in conservation and rebate programs.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and

budgeting?

N/A - CII ULFT Retrofit program was not implemented in NCWD.

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor	0	0
b. Materials	0	0
c. Marketing & Advertising	0	0
d. Administration & Overhead	0	0
e. Outside Services	0	0
f. Total	0	0

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution	0
b. State agency contribution	0
c. Federal agency contribution	0
d. Other contribution	0
e. Total	0

D. Comments

N/A - CII ULFT Retrofit program was not implemented in NCWD.

Reported as of 5/18/05

BMP 09a: CII ULFT Water Savings

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

1. Did your agency implement a CII ULFT replacement program in the reporting year? If No, please explain why on Line B. 10. — No

A. Targeting and Marketing

1. What basis does your agency use to target customers for participation in this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

   N/A

2. How does your agency advertise this program? Check all that apply.

   a. Describe which method you found to be the most effective overall, and which was the most effective per dollar expended.

   N/A

B. Implementation

1. Does your agency keep and maintain customer participant information? (Read the Help information for a complete list of all the information for this BMP.)
2. Would your agency be willing to share this information if the CUWCC did a study to evaluate the program on behalf of your agency? — Yes
3. What is the total number of customer accounts participating in the program during the last year ? — 0

CII Subsector	Number of Toilets Replaced			
4.	Standard Gravity Tank	Air Assisted	Valve Floor Mount	Valve Wall Mount
a. Offices	0	0	0	0
b. Retail / Wholesale	0	0	0	0
c. Hotels	0	0	0	0
d. Health	0	0	0	0
e. Industrial	0	0	0	0
f. Schools: K to 12	0	0	0	0
g. Eating	0	0	0	0
h. Govern-ment	0	0	0	0
i. Churches	0	0	0	0
j. Other	0	0	0	0

5. Program design.
6. Does your agency use outside services to implement this program? — No

a. If yes, check all that apply.

7. Participant tracking and follow-up.

8. Based on your program experience, please rank on a scale of 1 to 5, with 1 being the least frequent cause and 5 being the most frequent cause, the following reasons why customers refused to participate in the program.

a. Disruption to business	4
b. Inadequate payback	5
c. Inadequate ULFT performance	2
d. Lack of funding	4
e. American's with Disabilities Act	1
f. Permitting	2
g. Other. Please describe in B. 9.	3

9. Please describe general program acceptance/resistance by customers, obstacles to implementation, and other isues affecting program implementation or effectiveness.

N/A - NCWD did not implement a CII ULFT Rebate program in 2003/04. Refer to BMP 9(a) 2002/03 regarding general acceptance/resistance by customers for all BMP and other conservation programs within in NCWD.

10. Please provide a general assessment of the program for this reporting year. Did your program achieve its objectives? Were your targeting and marketing approaches effective? Were program costs in line with expectations and budgeting?

N/A

C. Conservation Program Expenditures for CII ULFT

1. CII ULFT Program: Annual Budget & Expenditure Data

	Budgeted	Actual Expenditure
a. Labor	0	0
b. Materials	0	0
c. Marketing & Advertising	0	0
d. Administration & Overhead	0	0
e. Outside Services	0	0
f. Total	0	0

2. CII ULFT Program: Annual Cost Sharing

a. Wholesale agency contribution	0
b. State agency contribution	0
c. Federal agency contribution	0
d. Other contribution	0
e. Total	0

D. Comments

A CII ULFT Rebate Program was not implemented in 2003/04. The district is reviewing the cost-effectiveness of incorporating a ULFT Rebate program with the CII Survey project.

Reported as of 5/18/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$2610115.2
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$4971003.58
2. Commercial	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$195845.76
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$426019.58
3. Industrial	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$26484.48
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$37008.69
4. Institutional / Government	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$220239.36
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
5. Irrigation	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$468008.64
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$605189.36
6. Other	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided

c. Total Revenue from Volumetric Rates	$48438.72
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$490129.57

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

All NCWD customers are metered and billed based on their usage and standard monthly fees and other miscellaneous charges. NCWD received $6,704,884.61 in revenue for volumetric and non-volumetric charges (as a total for all classes). Non-volumetric revenue collected from institutional customers is incorporated in the commercial class non-volumetric revenue. The volumetric revenue for each class was calculated using the flat rate of $0.80/ccf and the class usage values as provided in the Customer Account and Usage Worksheet.

Reported as of 5/18/05

BMP 11: Conservation Pricing

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

Rate Structure Data Volumetric Rates for Water Service by Customer Class

1. Residential	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$2695841.28
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$5672106.46
2. Commercial	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$182603.52
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$458349.06
3. Industrial	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$40423.68
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$67094.02
4. Institutional / Government	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$213618.24
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$0
5. Irrigation	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric Rates	$507735.36
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$809294.6
6. Other	
a. Water Rate Structure	Uniform
b. Sewer Rate Structure	Service Not Provided
c. Total Revenue from Volumetric	

Rates	$18817.92
d. Total Revenue from Non-Volumetric Charges, Fees and other Revenue Sources	$462445.13

B. Conservation Pricing Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	30000
2. Actual Expenditures	0	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? No

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

D. Comments

All NCWD customers are metered and billed based on their usage and standard monthly fees and other miscellaneous charges. NCWD received $7,603,691.87 in revenue for volumetric and non-volumetric charges (as a total for all classes). Non-volumetric revenue collected from institutional customers is incorporated in the commercial class non-volumetric revenue. The volumetric revenue for each class was calculated using the flat rate of $0.80/ccf and the class usage values as provided in the Customer Account and Usage Worksheet. NCWD budgeted for a water rate structure study to identify the most effective rate structure for residential customers to increase water conservation while meeting revenue goals. The study evaluated several water districts' and other retailers' rate structures based on the impact on conservation, revenue, customer service and satisfaction, and implementation and maintenance time and effort. The NCWD Board voted to implement a tiered rate structure for individually metered residential customers starting January 2005.

Reported as of 5/18/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	no
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	yes
4. Partner agency's name:	Castaic Lake Water Agency (Wholesaler)
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	35%
b. Coordinator's Name	Paula Forsberg
c. Coordinator's Title	Customer Service Manager
d. Coordinator's Experience and Number of Years	Customer Service 22 years
e. Date Coordinator's position was created (mm/dd/yyyy)	03/01/2002
6. Number of conservation staff, including Conservation Coordinator.	5

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	30000	30000
2. Actual Expenditures	27000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

The budget and expenditures are strictly estimates based on the number of estimated staff hours used for BMP programs including gathering the Base Year data for the BMP reporting requirements. An estimated 535-550 hours of staff time went into BMP programs for 2002-03. An average employee per hour estimated cost including benefits and other miscellaneous charges is approximately $37.14, however management and supervisory level staff also participated in BMP efforts.

Reported as of 5/18/05

BMP 12: Conservation Coordinator

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

1. Does your Agency have a conservation coordinator?	yes
2. Is this a full-time position?	yes
3. If no, is the coordinator supplied by another agency with which you cooperate in a regional conservation program ?	no
4. Partner agency's name:	Castaic Lake Water Agency (CLWA)
5. If your agency supplies the conservation coordinator:	
a. What percent is this conservation coordinator's position?	85%
b. Coordinator's Name	Melinda Weinrich
c. Coordinator's Title	Environmental Conservation Specialist
d. Coordinator's Experience and Number of Years	Conservation/Program Management/Consulting 10 years
e. Date Coordinator's position was created (mm/dd/yyyy)	05/10/2004
6. Number of conservation staff, including Conservation Coordinator.	6

B. Conservation Staff Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	30000	60000
2. Actual Expenditures	35000	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

A new position was created in May of 2004 in order to address the conservation issues within the district and to meet the requirements of the BMP under CUWCC. The Conservation Coordinator works with the Customer Service staf, field team, engineering and other departments as needed. As a small district, the entire staff works on some aspect of the BMP and other water conservation programs at the district such as working at public events, providing data and reports, mapping participation, etc.

Reported as of 5/18/05

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? yes

a. If YES, describe the ordinance:

NCWD's Ordinance (Water Conservation) was adopted in 2/1991 due to water supply conditions in the district's service area. The purpose of the ordinance is to provide a water conservation plan to minimize the effect of shortage of water supplies on the customers of the district. The ordinance sets parameters or irrigation hours and schedules to optimize water efficiency and prevent water waste. The ordinance also states that it is the duty of all persons to inspect for leaks and damages to indoor and outdoor plumbing and fixtures and to repair as necessary as soon as possible. The ordinance also lists prohibited use of water for washing vehicles, for cleaning and operating decorative fountains and for serving water in restaurants, cafeterias and other food service locations. A copy of the complete ordinance was submitted to the CUWCC as an attachment to this BMP report.

2. Is a copy of the most current ordinance(s) on file with CUWCC? no

a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

1. LA County Sanitation District (32 & 26) 2. City of Santa Clarita 3. County of Los Angeles	1. Ordinance Prohibiting the Installation of Certain Water Softening Appliances 2. City Code, Title 9 Health & Safety, Chapter 9.38 (Water Conservation & Water Waste), Chapter 10.04 Runoff Water & Pollution 3. County Code, Title 11 Health & Safety, Chapter 11.38 (Water & Sewer) * All the above listed ordinances and codes were submitted to the CUWCC for reference.

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

a. Gutter flooding	yes
b. Single-pass cooling systems for new connections	no
c. Non-recirculating systems in all new conveyor or car wash systems	no
d. Non-recirculating systems in all new commercial laundry systems	no
e. Non-recirculating systems in all new decorative fountains	yes
f. Other, please name See listed measures below (B2) & in attached Ordinance 101	yes

2. Describe measures that prohibit water uses listed above:

1. Watering lawns and landscaped areas more than once a day. 2.

Watering lawns and landscaped areas between 10am through 5pm 3. Causing water to runoff into the street, storm drains, gutters, parking lots, etc. 4. Not repairing leaks or broken indoor and outdoor plumbing and fixtures. 5. Serving water to customers in restaurants, cafeterias or other food service location unless the customer specifically request water

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

a. Allow the sale of more efficient, demand-initiated regenerating DIR models.	yes
b. Develop minimum appliance efficiency standards that:	
i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used.	yes
ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced.	yes
c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply.	yes
4. Does your agency include water softener checks in home water audit programs?	no
5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models?	yes

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

E. Comments

Copies of NCWD's Ordinance 101 as well as the LA County, Los Angeles County Sanitation District (LACSD) and city of Santa Claritaís ordinances and codes related to water waste were submitted to the CUWCC as an attachment to these 2003-04 BMP reports.

Reported as of 5/18/05

BMP 13: Water Waste Prohibition

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Requirements for Documenting BMP Implementation

1. Is a water waste prohibition ordinance in effect in your service area? yes

a. If YES, describe the ordinance:

NCWD's Ordinance (Water Conservation) was adopted in 2/1991 due to water supply conditions in the district's service area. The purpose of the ordinance is to provide a water conservation plan to minimize the effect of shortage of water supplies on the customers of the district. The ordinance sets parameters or irrigation hours and schedules to optimize water efficiency and prevent water waste. The ordinance also states that it is the duty of all persons to inspect for leaks and damages to indoor and outdoor plumbing and fixtures and to repair as necessary as soon as possible. The ordinance also lists prohibited use of water for washing vehicles, for cleaning and operating decorative fountains and for serving water in restaurants, cafeterias and other food service locations. A copy of the complete ordinance was submitted to the CUWCC as an attachment to this BMP report.

2. Is a copy of the most current ordinance(s) on file with CUWCC? yes

a. List local jurisdictions in your service area in the first text box and water waste ordinance citations in each jurisdiction in the second text box:

1. City of Santa Clarita 2. County of Los Angeles	1. Title 9 Health & Safety, Chapter 9.38 & Chapter 10.4 Stormwater & Urban Runoff Pollution Control (see submitted documents) 2. County Codes, Title 11 Health & Safety, Chapter 11.38 (Water & Sewers)

B. Implementation

1. Indicate which of the water uses listed below are prohibited by your agency or service area.

a. Gutter flooding	yes
b. Single-pass cooling systems for new connections	no
c. Non-recirculating systems in all new conveyor or car wash systems	no
d. Non-recirculating systems in all new commercial laundry systems	no
e. Non-recirculating systems in all new decorative fountains	yes
f. Other, please name See list of measures below & in Ordinance 101 (attached)	yes

2. Describe measures that prohibit water uses listed above:

1. Watering lawns and landscaped areas more than once a day. 2. Watering lawns and landscaped areas between 10am through 5pm 3. Causing water to runoff into the street, storm drains, gutters, parking lots, etc. 4. Not repairing leaks or broken indoor and outdoor plumbing and fixtures. 5. Serving water to customers in restaurants, cafeterias or other food service location unless the customer specifically request water.

Water Softeners:

3. Indicate which of the following measures your agency has supported in developing state law:

a. Allow the sale of more efficient, demand-initiated regenerating DIR models. yes

b. Develop minimum appliance efficiency standards that:

i.) Increase the regeneration efficiency standard to at least 3,350 grains of hardness removed per pound of common salt used. yes

ii.) Implement an identified maximum number of gallons discharged per gallon of soft water produced. yes

c. Allow local agencies, including municipalities and special districts, to set more stringent standards and/or to ban on-site regeneration of water softeners if it is demonstrated and found by the agency governing board that there is an adverse effect on the reclaimed water or groundwater supply. yes

4. Does your agency include water softener checks in home water audit programs? no

5. Does your agency include information about DIR and exchange-type water softeners in educational efforts to encourage replacement of less efficient timer models? yes

C. Water Waste Prohibition Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	0
2. Actual Expenditures	0	

D. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

E. Comments

Copies of NCWD's Ordinance 101 as well as the LA County and city of Santa ClaritaÃs ordinances and codes related to water waste were submitted to the CUWCC as an attachment to these 2003-04 BMP reports.

Reported as of 5/18/05

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2003**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	no

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	69	0
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**69**	**0**

6. Describe your agency's ULFT program for single-family residences.

The ULFT (residential) Rebate program was conducted by the area wholesaler (CLWA) for pre-1993 single family homes in the Santa Clarita Valley. All the local retailers participated including Valencia Water Company, Santa Clarita Water District and LA County District 36. CLWA promoted the program in the local paper and throughout the community. NCWD released additional PR notices to district customers in the quarterly newsletter, on the monthly water bill (by-line) and with a postcard notices regarding the program. The program started May 1, 2003. Customers were required to contact the district (by phone or in person) to receive a rebate form to complete. NCWD made a copy of the rebate form for district records and to log which customers received rebates and those who also returned the voucher forms. Customers had 30 days upon receiving their voucher sheet and rebate number to purchase a ULFT and return the voucher form and their receipt to NCWD or the wholesaler. NCWD forwarded all forms to CLWA for final processing. Santa Clarita Water District coordinated the processing of the rebate checks and tallied participation. Once a customer returned their voucher form and ULFT receipt, they were mailed a rebate check for either $20 or $40. Customers who purchased ULFT between $50 and $75 received a $20 rebate and $40 for ULFT above $75. There was no limit on the number of rebates allocated per customers, however no customer took more than 3 voucher forms. The program lasted until the end of May 2003 with NCWD customers receiving 69 total rebates.

7. Describe your agency's ULFT program for multi-family residences.

CLWA selected to only target single-family residents for the 2003 ULFT Rebate Program.

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

1. City of Santa Clarita 2. Los Angeles County	There is currently no ordinance requiring retrofit of toilets (to ULFT) upon resale in the Santa Clarita Valley.

B. Residential ULFT Program Expenditures

	This Year	Next Year
1. Budgeted Expenditures	0	5000
2. Actual Expenditures	3946.57	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

The 2003-03 ULFT Rebate Program Budget was based on the employee time and effort, program marketing and PR efforts and miscellaneous supplies and costs. The costs are as follows: 1. Printing cost for ULFT Rebate Program notification postcard - $393.21 2. Postcard Postage to 3,500 qualified customers (at $0.23/postcard) - $805.00 3. Staff Time of 74 hours at $37.14/hour (average wage with benefit costs) - $2,748.36 Total Costs $3,946.57

Reported as of 5/18/05

BMP 14: Residential ULFT Replacement Programs

Reporting Unit:	BMP Form Status:	Year:
Newhall County Water District	**100% Complete**	**2004**

A. Implementation

	Single-Family Accounts	Multi-Family Units
1. Does your Agency have program(s) for replacing high-water-using toilets with ultra-low flush toilets?	yes	yes

Number of Toilets Replaced by Agency Program During Report Year

Replacement Method	SF Accounts	MF Units
2. Rebate	104	5
3. Direct Install	0	0
4. CBO Distribution	0	0
5. Other	0	0
Total	**104**	**5**

6. Describe your agency's ULFT program for single-family residences.

CLWA coordinated a residential ULFT rebate program for all the local retailers in the Santa Clarita Valley (including NCWD). The rebate program starts on May 1st offering rebates to eligible customers (with toilets installed prior to 1992) to receive a rebate for purchasing a ULFT. Customers received a $30 rebate for ULFT from $50 to $75, and $60 rebate for ULFTs over $75. Retailers receive a percentage of the available rebate funds ($20,000 for entire program) based on their customer population or eligible residents. Customers had 30 days to return their voucher form with their ULFT receipt in order to receive their rebate check. NCWD had such a high demand from customers that a waiting list had to be created. Over 135 customers were signed up on the waiting list to receive a voucher form if additional program funding became available.

7. Describe your agency's ULFT program for multi-family residences.

NCWD allowed multi-family residents to receive a rebate for the purchase of a ULFT through the CLWA. Previously, the rebate was only offered to single-family residents. Two landlords (or property owners) received rebates to update their rental facilities and two tenants received rebates. There was no limit on the number of rebates allocated per person; however District staff confirmed the number of toilets needed for any customers who request more than 3 rebates.

8. Is a toilet retrofit on resale ordinance in effect for your service area? no

9. List local jurisdictions in your service area in the left box and ordinance citations in each jurisdiction in the right box:

City of Santa Clarita & LA County	There is no retrofit on resale ordinance in the Santa Clarita Valley.

B. Residential ULFT Program Expenditures

	This Year	Next Year

1. Budgeted Expenditures	5000	3000
2. Actual Expenditures	4417.31	

C. "At Least As Effective As"

1. Is your AGENCY implementing an "at least as effective as" variant of this BMP? no

a. If YES, please explain in detail how your implementation of this BMP differs from Exhibit 1 and why you consider it to be "at least as effective as."

N/A

D. Comments

Budget for Residential ULFT Rebate Program includes the following calculated costs: 1. Staff time (approximately 50 hours) - Preparation & implementation - Planning meetings - PR efforts, mail outs, bill stuffers, etc. - Creating rebate forms and database - Translating program documents into Spanish 2. Printing and postage cost for postcard notice to customers 3. Creating & incorporating bill stuffers 4. Miscellaneous Costs (supplies & materials & other costs)

Reported as of 5/18/05

Appendix G
Draft Water Shortage Contingency Resolution/Ordinance

(This appendix contains examples that were adopted in 1991 to address water shortage conditions and will be used as the model for future water shortage contingency ordinance.)

Appendix I

DROUGHT EMERGENCY WATER SHARING AGREEMENT

1. Parties. The parties to this agreement are: Valencia Water Company, Santa Clarita Water Company, Los Angeles County Waterworks District No. 36-Val Verde, Newhall County Water District, and the Castaic Lake Water Agency.

2. Critical Water Shortage Conditions. The State of California is experiencing a fifth year of drought, which has caused critical water shortages in many areas of the state, including the service area of the Castaic Lake Water Agency. The Agency has recently been informed that the State Water Project will have insufficient water to meet its demands for the coming year.

3. Water Sharing Agreement. In order to alleviate the emergency water shortage caused by the Drought and by insufficient agency water to meet demands, the undersigned parties agree to cooperate in sharing available water from all sources among themselves without regard to water, contractual or other rights for the duration of the emergency, and to facilitate among themselves water transfers, exchanges, and wheeling arrangements.

4. Preservation of Rights. By entering into this emergency water pooling and transfer, the parties do not waive their individual claims to water rights, or to contractual or other claims to water or the use of water. Each party agrees that no party hereto will lose any water right, contract right, or other entitlement to water by entering into this agreement,

nor shall any party attempt to use this agreement or the emergency exchange of water as a basis for a claim against any other party of a continued right to the use of that water. This agreement shall not be construed as constituting any alteration in the respective priorities or terms of any of the rights held by any party, nor as an admission with respect to any rights or claims. Each party further agrees that no party hereto will lose any water or other right by a claim of non-use by another party, prescription, or dedication to public use by entering into this agreement.

5. Termination. This agreement shall terminate upon the cessation of drought conditions affecting the service area of the Castaic Lake Water Agency, or January 1, 1992, whichever is sooner, but may be extended by mutual consent of all the parties.

6. Counterparts. This agreement shall be executed in counterparts, each of which shall be deemed an original.

7. Effective Date. The effective date of this agreement shall be that date upon which all the parties hereto have executed the agreement.

Valencia Water Company

Date: FEBRUARY 13, 1991

Attest:

by

Santa Clarita Water Company

by W. J. Manthe

Date: February 26, 1991

Attest:

Benjamin P. Borelli

Los Angeles County Waterworks District No. 36

by ORIGINAL SIGNED BY

Date: 8/27/91

Attest:

Pg 21

Newhall County Water District

by ORIGINAL SIGNED BY

Date: 2/19/91

Attest:

Pg 22

Castaic Lake Water Agency

by ORIGINAL SIGNED BY

Date: 2/28/91

Attest:

Pg 23

s/Los Angeles County Waterworks District No. 36

Date: AUG 27 1991

by Michael D. Antonovich

Attest:
ATTEST: LARRY J. MONTEILH
EXECUTIVE OFFICER —
CLERK OF THE BOARD OF SUPERVISORS
By Lynne C. Walker, Deputy

s/Newhall County Water District

Date:

Attest:

by

s/Castaic Lake Water Agency

Date: 2/28/91

Attest:

by Robert C. Stephens

Betty L. Cattell

ADOPTED
BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES

S 9 1 AUG 27 1991

LARRY J. MONTEILH
EXECUTIVE OFFICER

APPROVED AS TO FORM
[illegible], County Counsel

BY
DEPUTY

15647

s/ Newhall County Water District

Date: 2/19/91

Attest:

by [signature] President [signature] Secy

s/ Castaic Lake Water Agency

Date: _____

Attest:

by _____

_____

s/Los Angeles County Waterworks District No. 36

Date:

Attest:

by

s/Newhall County Water District

Date:

Attest:

by

s/Castaic Lake Water Agency

Date: 2/28/91

Attest:

by

Appendix II

RESOLUTION NO.804

RESOLUTION OF THE BOARD OF DIRECTORS OF CASTAIC LAKE WATER AGENCY RECOGNIZING REDUCTIONS IN REQUESTED DELIVERY OF STATE WATER PROJECT SUPPLY FOR YEAR 1991 AND MANDATING A PROGRAM OF WATER CONSERVATION IN THE SANTA CLARITA VALLEY

WHEREAS, the Castaic Lake Water Agency is a public entity organized and operating pursuant to the California Water Code, Appendix, Chapter 103, and is primarily empowered to supply water at wholesale to retail water distributors within the Santa Clarita Valley; and

WHEREAS, the Agency's source of water is by contract with the State Water Project of the California Department of Water Resources; and

WHEREAS, the State Water Project, and the entire State of California is experiencing protracted drought conditions of unprecedented recent duration; and

WHEREAS, the California Department of Water Resources in a letter dated February 2, 1991 advised the Agency to plan for "severe reductions" in its State Water Project supply; and

WHEREAS, the letter further reported, "there is a 50% probability that the Department will only be able to deliver about half of the water requested for municipal and industrial use in 1991"; and

WHEREAS, half of the requested State Water Project supply of the Castaic Lake Water Agency would be 13,050 acre feet: and

WHEREAS, the retail water distributors within the Santa Clarita Valley operate ground water production facilities that have been planned to make up some portion of the delivery reductions in State Project Water; and

WHEREAS, the retail water distributors and the Agency, have pursuant to Water Code, Sections 10610 through 10656, adopted a URBAN WATER MANAGEMENT PROGRAM for retail sales which contains water conservation measures including, metering, leak detection, public education, public information, home retrofit devices, drip and sprinkler irrigation restrictions, and a landscape suggestion for use of drought tolerant plantings; and

WHEREAS, heretofore, the Castaic Lake Water Agency adopted Resolution No. 667 relating to a voluntary water conservation program to reduce water consumption by 10 percent; and

WHEREAS, it is now essential to enact a mandatory program;

NOW, THEREFORE, BE IT RESOLVED that this Agency's Board of Directors does hereby find and determine the following:

1. That the General Manager of the Agency be authorized to execute a "Drought Emergency Water Sharing Agreement" with the local water purveyors to make it clear that emergency drought sharing of Agency water supplies during year 1991 not result in any waiver of contractual or other right to use of Agency water.

2. That the General Manager confer with the retail water purveyors to coordinate the distribution and use of the limited State Project Water supply to maximize the distribution of the ground water production capacity of the combined facilities operated by the retail water purveyors.

3. That the Agency request both the City of Santa Clarita and the County of Los Angeles to adopt mandatory water use ordinances with terms generally as follows:

I. A WATER CONSERVATION ORDINANCE WHICH SHALL TERMINATE ON JANUARY 1, 1992 UNLESS RENEWED OR TERMINATED EARLIER

A. Hose Watering-Prohibition.

No person shall hose-water or wash down any sidewalks, walkways, driveways, parking areas, or other paved surfaces. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infraction.

B. Watering of Lawns and Landscaping

1. No person shall water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 5:00 p.m.

2. No person shall water or cause to be watered any lawn or landscaping more than once a day.

3. No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

4. It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

5. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

C. Indoor Plumbing and Fixtures.

1. It shall be the duty of all persons to inspect all accessible indoor plumbing and faucets for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

2. Any new or replacement toilets installed in any residence or business shall be of a low-flow variety.

3. Willful violation hereof shall be an infraction punishable by a fine of $500.00.

D. Washing Vehicles

No vehicle of any type may be washed, except at a commercial car wash, unless such vehicle is washed by using a hand-held bucket or a water-hose equipped with an automatic shutoff nozzle. No person shall leave a water hose running while washing a vehicle or at any other time. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infraction.

E. Public Eating Places

No restaurant, cafeteria, coffee shop, or other public place where food is sold or served shall serve drinking water to any customer unless specifically requested to do so by such customer. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

F. Decorative Fountains

No person shall use water to clean, fill, or maintain levels in decorative fountains unless such water flows through a recycling system. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

4. That the above cited three paragraphs are deemed appropriate as PHASE ONE of the Agency's mandatory conservation program with recognition of the possibility that the California Department of Water Resources may declare deeper finite reductions for the municipal and industrial water supplies of the State Water Project. Residents of the Agency are put on notice that further and additional phases of the mandatory conservation program may be enacted by the Agency and could include the following:

A. Odd/Even landscape irrigation restriction, based upon address

B. A financial penalty of say triple the water rate for metered water service that exceeds historic use

C. Complete prohibition of landscape irrigation

I, the undersigned, hereby certify: That I am the duly appointed and acting Secretary of the Castaic Lake Water Agency, and that at a special meeting of the Board of Directors of said Agency held on Monday, February 11, 1991, the foregoing Resolution No. 804 was duly and regularly adopted by said Board, and that said resolution has not been rescinded or amended since the date of its adoption, and that it is now in full force and effect.

Betty L. Castleberry
Secretary

DATED: 2/12/91

Appendix III

ORDINANCE NO. 101

WATER CONSERVATION ORDINANCE OF
NEWHALL COUNTY WATER DISTRICT

* * * * * * * * * * * * * * *

BE IT ORDAINED BY THE BOARD OF DIRECTORS OF NEWHALL COUNTY WATER DISTRICT, LOS ANGELES COUNTY, CALIFORNIA AS FOLLOWS:

Section 1: Because of the water supply conditions prevailing within the District's service area, the general welfare requires that water resources available to the District be put to the maximum beneficial use to the extent to which they are capable, and that the waste or unreasonable use, or unreasonable method of use of water be prevented, and that the conservation of such water be practiced with the view to the reasonable and beneficial use thereof in the interest of the people of the District, and for the public welfare. The purpose of this Ordinance is to provide a water conservation plan to minimize the effect of a shortage of water supplies on the customers of the District.

Section 2: No customer of the District shall make, cause, use or permit the use of water from the District in a manner contrary to any provision of this Ordinance.

Section 3: Watering of Lawns or Landscaping.

(a) No person shall water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 5:00 p.m.

(b) No person shall water or cause to be watered any lawn or landscaping more than once a day.

(c) No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining strects, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

(d) It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

Section 4: Indoor Plumbing and Fixtures.

(a) It shall be the duty of all persons to inspect all accessible indoor plumbing and faucets for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

(b) For new or replacement toilets installed in any residence or business, local low-flow types are recommended.

Section 5: Washing Vehicles. No vehicle of any type may be washed, except at a commercial car wash, unless such vehicle is washed by using a hand-held bucket or a water-hose equipped with an automatic shutoff nozzle. No person shall leave a water hose running while washing a vehicle or at any other time.

Section 6: Public Eating Places. No restaurant, cafeteria, coffee shop or other public place where food is sold or served shall serve drinking water to any customer unless specifically requested to do so by such customer.

Section 7: No person shall use water to clean, fill or maintain levels in decorative fountains unless such water flows through a recycling system.

Section 8: Water Conservation Kits. Water conservation kits are available without charge to the District's customers at the District's office. In most cases, the kits include a plastic displacement bag, two sets of shower flow restrictors, two dye tablets to check for toilet leaks and a brochure which explains the use of the kit. The kits are to be installed by the District's customers.

Section 9: Effective Date. The water use restrictions of this Ordinance are effective immediately. Other provisions of this Ordinance are effective on March 21, 1991.

ADOPTED, SIGNED AND APPROVED by the Board of Directors of NEWHALL COUNTY WATER DISTRICT this 19th day of February, 1991.

MARY JUNE HERRINGTON, President
of the Board of Directors of the
NEWHALL COUNTY WATER DISTRICT

A T T E S T:

JAMES E. JINKS, Secretary of
the Board of Directors of the
NEWHALL COUNTY WATER DISTRICT

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I hereby certify that the foregoing Ordinance No. 101 was duly and regularly adopted and passed by the Board of Directors of the NEWHALL COUNTY WATER DISTRICT at a regular meeting thereof on the 19th day of February, 1991 by the following vote of the members thereof:

AYES:	DIRECTORS:	Herrington, Hayes, Wade, Agajanian and Whiteside
NOES:	DIRECTORS:	None
ABSENT:	DIRECTORS:	None
ABSTAINED:	DIRECTORS:	None

JAMES E. JINKS, Secretary of
the Board of Directors of the
NEWHALL COUNTY WATER DISTRICT

ORDINANCE NO. 102

ORDINANCE AMENDING SECTION 3 OF ORDINANCE NO. 101 OF NEWHALL COUNTY WATER DISTRICT RE WATER CONSERVATION

* * * * * * * * * * * * * * *

BE IT ORDAINED BY THE BOARD OF DIRECTORS OF NEWHALL COUNTY WATER DISTRICT, LOS ANGELES COUNTY, CALIFORNIA AS FOLLOWS:

Section 1: Section 3 of Ordinance No. 101 is amended to provide as follows:

"Section 3: Watering of Lawns or Landscaping.

(a) No person shall water or cause to be watered any lawn or landscaping between the hours of 8:00 a.m. and 6:00 p.m.

(b) No person shall water or cause to be watered any lawn or landscaping more than once a day, or for a period of time not to exceed ten minutes per watering station or cycle.

(c) No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

(d) It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable."

Section 2: The provisions of this Ordinance shall be effective on November 19, 1991.

ADOPTED, SIGNED AND APPROVED by the Board of Directors of NEWHALL COUNTY WATER DISTRICT this 15th day of October, 1991.

MARY JUNE HERRINGTON, President of the Board of Directors of the NEWHALL COUNTY WATER DISTRICT

A T T E S T:

JAMES E. JINKS, Secretary of the Board of Directors of the NEWHALL COUNTY WATER DISTRICT

STATE OF CALIFORNIA)
) ss.
COUNTY OF LOS ANGELES)

I hereby certify that the foregoing Ordinance No. 102 was duly and regularly adopted and passed by the Board of Directors of the NEWHALL COUNTY WATER DISTRICT at a regular meeting thereof on the 15th day of October, 1991 by the following vote of the members thereof:

AYES:	DIRECTORS:	Herrington, Hayes, Wade, Agajanian and Whiteside
NOES:	DIRECTORS:	None
ABSENT:	DIRECTORS:	None
ABSTAINED:	DIRECTORS:	None

JAMES E. JINKS, Secretary of the Board of Directors of the NEWHALL COUNTY WATER DISTRICT

Appendix IV

ORDINANCE NO. 91-16

AN ORDINANCE OF THE CITY OF SANTA CLARITA
ADDING CHAPTER 9.38 TO TITLE 9
OF THE SANTA CLARITA MUNICIPAL CODE

WHEREAS, the State of California is experiencing a prolonged drought; and

WHEREAS, the delivery of State Project Water to the Castaic Lake Water Agency has been reduced by 90% of the requested delivery levels.

THE CITY COUNCIL OF THE CITY OF SANTA CLARITA DOES HEREBY ORDAIN AS FOLLOWS:

Section 1. The Santa Clarita Municipal Code is amended adding Chapter 9.38 to Title 9 relating to water conservation to read as follows:

CHAPTER 9.38

WATER CONSERVATION

Sections:

9.38.010 Drought Committee
9.38.015 Water Conservation Regulations
9.38.020 Penalties
9.38.025 Termination of Ordinance
9.38.030 Ordinance 91-16 Amended

9.38.010 Drought Committee

A. A drought committee shall be established, whose function shall be:

1. to review all available data on water consumption, water supply and ground water conditions;

2. to evaluate the level of compliance with the terms of this Ordinance;

3. to evaluate the level of achievement of the stated water consumption reductions;

4. to make recommendations to the City Council concerning the timing of and need for implementation of future additional water restrictions as may be developed; and

5. to make recommendations to the water purveyors in the City of Santa Clarita concerning additional measures to encourage water conservation, including but not limited to; conservation goals for individual water accounts, surcharges for excessive water use and the installation of flow restriction devices in water services.

B. The members of the Drought Committee shall include representatives from the staff of the City of Santa Clarita, the Upper Santa Clara Water Committee, other appointees as the City Council deems appropriate, and the staff of the Castaic Lake Water Agency.

9.38.015 Water Conservation Regulations

A. Water conservation shall be achieved through the restriction and/or prohibition of various types of water use. The restrictions and prohibitions shall be implemented immediately.

B. The following conditions and restrictions shall apply to the use of water within the City of Santa Clarita:

1. Hose Water Prohibition.

a. No person shall hose-water or wash down any sidewalks, walkways, driveways, parking areas, or other paved surface.

2. Watering of Lawns and Landscaping.

a. No person shall water or cause to be watered any lawn or landscaping between the hours of 8:00 a.m. and 6:00 p.m. except as provided in Section 9.38.015.B.2.e.

b. Lawns and landscaping shall be watered no more frequently than every other day.

c. No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or to excessive watering.

d. It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

e. Commercial gardeners and landscapers, municipal water uses, commercial nurseries, golf courses and other water-dependent industries shall not water or cause to be watered any lawn of landscaping between the hours of 10:00 a.m. and 3:00 p.m., and no more frequently than every other day, unless reclaimed water is used.

f. The maintenance and testing of irrigation systems may be performed without the restrictions specified in Section 9.38.015.B.2.a and 9.38.015.B.2.e.

3. Indoor Plumbing.

   a. Accessible indoor plumbing and fixtures must be inspected for leaks and repaired as soon as reasonably practicable.

   b. New and replacement toilets, showers and faucets shall be of a low-flow type. New or replacement faucets shall be equipped with aerators.

4. Washing Vehicles.

   a. Vehicles must be washed by hand-held bucket or with a hose equipped with automatic shutoff nozzle. Hoses may not be left running.

   b. These restrictions shall not be applied to commercial vehicle washing facilities and operations.

5. Public Eating Places.

   a. Water may be served only upon request by the customer.

6. Decorative Fountains.

   a. Water may not be used to clean, fill or maintain levels in decorative fountains unless the fountain has a water recycling system.

7. Landscaping and Irrigation Plans.

   a. All new landscaping and irrigation improvements shall be approved by the City of Santa Clarita Director of Parks and Recreation prior to construction.

   b. No person or entity shall be required to implement any landscaping requirements of any association, developer or governing agency until the termination of this ordinance.

C. Conservation Goal

1. The goal of this Water Conservation Ordinance is to achieve at least 25% reduction of overall water consumption within the City of Santa Clarita.

9.38.020 Penalties.

A. Willful violations of the terms of this Ordinance shall be subject to written warnings and/or citations. A written warning shall be issued upon the first violation of any part of this Ordinance. The second violation shall result in a fine of $50.00. The third violation shall result in a fine of $100.00, and all subsequent violations shall result in a fine of $300.00 for each violation.

9.38.025 Termination of Ordinance.

A. This Ordinance shall terminate on January 1, 1992, unless renewed or termination earlier by ordinance.

Section 2. The City Council hereby declares that the provisions of this Ordinance are severable and if for any reason a court or competent jurisdiction shall hold any sentence, paragraph or section of this Ordinance to be invalid, such decision shall not affect the validity of the remaining parts of this Ordinance.

Section 3. This Ordinance is adopted as an urgency measure. The facts of the urgency are these: The State of California is currently suffering from the effects of a five-year drought, and the deliveries of State Project water to local water agencies are being reduced. This Ordinance restricts or prohibits certain types of water usage. The immediate enactment of this Ordinance is therefore necessary to ensure the adequacy of the water supply for the City of Santa Clarita and is thereby directly related to public health, safety and welfare. Therefore, this Ordinance shall be effective immediately upon adoption.

Section 4. The City Clerk shall certify to the passage of this Ordinance and shall cause it to be published in the manner prescribed by law.

9.38.030 Ordinance 91-12 Amended

A. Ordinance 91-12 is hereby amended, deleting Section 9.38.015.b.8 in its entirety.

PASSED, APPROVED AND ADOPTED this 13th day of March, 1991.

Carl Boyer
CARL BOYER, MAYOR

ATTEST:

Donna M. Grindey
DONNA GRINDEY, CITY CLERK

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss.
CITY OF SANTA CLARITA)

I, Donna M. Grindey, City Clerk of the City of Santa Clarita, do hereby certify that the foregoing Ordinance No. 91-16 was duly adopted as an urgency ordinance at a regular meeting of the City Council on the 13th day of March, 1991, by the following four-fifths vote, to wit:

AYES: COUNCILMEMBERS Darcy, Heidt, McKeon, Boyer

NOES: COUNCILMEMBERS Klajic

ABSENT: COUNCILMEMBERS None

Donna M. Grindey
CITY CLERK

AGN:gmm-394

ORDINANCE NO. 91-48

AN ORDINANCE OF THE CITY COUNCIL OF THE
CITY OF SANTA CLARITA, CALIFORNIA,
AMENDING CHAPTER 9.38 OF THE SANTA CLARITA
MUNICIPAL CODE RELATING TO
WATER CONSERVATION

THE CITY COUNCIL OF THE CITY OF SANTA CLARITA, CALIFORNIA, DOES ORDAIN AS FOLLOWS:

SECTION 1. The Santa Clarita Municipal Code is hereby amended at Subsection 9.38.015.B.2.b to read as follows:

b. Lawns and landscaping shall be watered no more than 10 minutes per watering station or cycle per day.

SECTION 2. The Santa Clarita Municipal Code at Subsection 9.38.015.B.2.e is hereby amended to read as follows:

e. Commercial gardeners and landscapers, municipal water uses, commercial nurseries, golf courses and other water-dependent industries shall not water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 3:00 p.m., and no more than 10 minutes per watering station or cycle per day unless reclaimed water is used. This subsection does not apply to residential lawns which are subject to the time limitations indicated in the other subsections of this Ordinance.

SECTION 3. Section 9.38.015.C.1 is hereby amended to read as follows:

1. The goal of this Water Conservation Ordinance is to achieve a significant reduction of overall water consumption within the City of Santa Clarita.

SECTION 4. This Ordinance is adopted as an urgency measure. The facts of the urgency are these: The State of California is currently suffering from the effects of a five-year drought, and the deliveries of State Project water to local water agencies are being reduced. This Ordinance restricts or prohibits certain types of water usage. The immediate enactment of this Ordinance is therefore necessary to ensure the adequacy of the water supply for the City of Santa Clarita and is thereby directly related to public health, safety and welfare. Therefore, this Ordinance shall be effective immediately upon adoption.

SECTION 5. The City Clerk shall certify to the passage of this Ordinance and shall cause it to be published in the manner prescribed by law.

PASSED, APPROVED AND ADOPTED this 8th day of October, 1991.

Carl Boyer

Carl Boyer, Mayor

ATTEST:

Donna M. Grindey

Donna M. Grindey, City Clerk

STATE OF CALIFORNIA)
COUNTY OF LOS ANGELES) ss
CITY OF SANTA CLARITA)

I, Donna M. Grindey, City Clerk of the City of Santa Clarita, do hereby certify that the foregoing Ordinance No. 91-48 was duly adopted as an urgency ordinance at a regular meeting of the City Council on the 8th day of October, 19 91 by the following four-fifths vote, to wit:

AYES: COUNCILMEMBERS: Darcy, Heidt, McKeon, Boyer

NOES: COUNCILMEMBERS: Klajic

ABSENT: COUNCILMEMBERS: None

Donna M. Grindey

Donna M. Grindey, City Clerk

Appendix V

ORDINANCE NO. 91-0046U

An urgency ordinance amending Title 11, Chapter 11.38 of the Los Angeles County Code relating to Water and Sewers to add Part 4, Water Conservation.

The Board of Supervisors of the County of Los Angeles ordains as follows:

Section 1. Title 11, Chapter 11.38 of the County Code is amended by adding Part 4, to read:

Part 4. Water Conservation Requirements For The Unincorporated Los Angeles County Area.

Section 11.38.620 Hose Watering Prohibition.
No person shall hose water or wash down any sidewalks, walkways, driveways, parking areas or other paved surfaces, except as is required for the benefit of public health and safety. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.630 Watering of Lawns and Landscaping.

a). No person shall water or cause to be watered any lawn or landscaping between the hours of 10:00 a.m. and 5:00 p.m.

b). No person shall water or cause to be watered any lawn or landscaping more than once a day.

c). No person shall water or cause to be watered any lawn or landscaping to such an extent that runoff into adjoining streets, parking lots or alleys occurs due to incorrectly directed or maintained sprinklers or excessive watering.

d). It shall be the duty of all persons to inspect all hoses, faucets and sprinkling systems for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

e). Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.640 Indoor Plumbing and Fixtures.

a). It shall be the duty of all persons to inspect all accessible indoor plumbing and faucets for leaks and to cause all leaks to be repaired as soon as is reasonably practicable.

b). Willful violation hereof shall be an infraction punishable by a fine of $500.00.

Section 11.38.650 Washing Vehicles.
No motor vehicle, boat, trailer or other type of mobile equipment may be washed, except at a commercial car wash or with reclaimed water, unless such vehicle is washed by using a hand-held bucket or a water-hose equipped with an automatic shutoff nozzle. No person shall leave a water hose running while washing a vehicle or at any other time. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.660 Public Eating Places.
No restaurant, hotel, cafeteria, cafe or other public place where food is sold or served shall serve drinking water to any customer unless specifically requested to

do so by such customer. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 11.38.670 Decorative Fountains.
No person shall use water to clean, fill or maintain levels in decorative fountains, ponds, lakes, or other similar aesthetic structures unless such water flows through a recycling system. Willful violation hereof shall be an infraction punishable by a fine of $100.00 for the first infraction and $500.00 each for subsequent infractions.

Section 2. This ordinance shall terminate on January 1, 1993, unless renewed or terminated earlier by ordinance.

Section 3. Due to the severity of the drought in the State of California, there is an immediate need to prohibit the wasting of water in the Los Angeles County unincorporated area to better utilize the available water supplies. This ordinance is urgently needed for the preservation of the public health, safety and general welfare and shall take effect immediately.

Section 4. This ordinance shall be published in

Metropolitan News Enterprise

a newspaper printed and published in the County of Los Angeles.

Michael D. Antonovich
Chairman

ATTEST:

Executive Officer
Board of Supervisors
of the County of Los Angeles

I hereby certify that at its meeting of March 21, 1991, the foregoing ordinance was adopted by the Board of Supervisors of said County of Los Angeles by the following vote, to wit:

Ayes:	Noes:
Supervisors Gloria Molina	Supervisors None
Edmund D. Edelman	
Deane Dana	
Michael D. Antonovich	

Executive Officer
Board of Supervisors
of the County of Los Angeles

Effective Date: March 21, 1991

~~Operative Date~~

I hereby certify that pursuant to Section 25103 of the Government Code, delivery of this document has been made.

LARRY J. MONTEILH
Executive Officer
Clerk of the Board of Supervisors

By DEPUTY

APPROVED AS TO FORM:

DE WITT W. CLINTON
County Counsel

By
GERALD F. CRUMP
Chief Assistant County Counsel

. . . S A M P L E N O T I C E . . .

LOS ANGELES COUNTY WATER WASTING ORDINANCE
NOTICE OF WARNING

Date _____

Address: _____
_____
_____
_____

Dear Customer:

Due to the severity of the current drought, the County Board of Supervisors, on March 21, 1991, adopted an Ordinance that specifies a number of water saving measures. The Ordinance applies to the unincorporated areas of the County and includes the following provisions:

__ Washing down of paved surfaces is prohibited, except as required for public health and safety.

__ Lawn and landscape watering is prohibited between the hours of 10:00 a.m. and 5:00 p.m.

__ Landscape watering that results in runoff into adjoining streets, parking lots or alleys due to misdirected sprinklers or excessive watering is prohibited.

__ Leaking hoses, faucets and sprinkling systems must be repaired as soon as is reasonably practicable.

__ Leaks to indoor plumbing systems must be repaired as soon as is reasonably practicable.

__ Washing of a motor vehicle, boat or trailer is prohibited except at a commercial car wash or with a hand-held bucket or water hose equipped with an automatic shutoff nozzle.

__ Serving drinking water to customers at public eating places is prohibited unless specifically requested by such customers.

__ Water cannot be used in decorative fountains, ponds, lakes and other similar aesthetic structures unless the water flows through a recycling system.

We observed the violation(s) of the above noted provisions on your property. We request your support in complying with the provisions of this ordinance so that we can avoid unnecessary waste and stretch our limited water supplies for the duration of the drought. Violation of this Ordinance is punishable by a fine of up to $500. If you have any questions regarding this ordinance or its enforcement please contact (your office and phone number).

(WW3901)

Appendix VI

RESOLUTION

ADOPTING A WATER SHORTAGE CONTINGENCY PLAN FOR THE SANTA CLARITA WATER COMPANY

WHEREAS, the California Legislature enacted Assembly Bill 11X during the 1991 Extraordinary Session of the California Legislature (an act to amend the California Water Code Sections 10620, 10621, 10631, and 10652, and to add Section 10656 to the California Water Code, relating to water); and

WHEREAS, AB 11X mandates that every urban water supplier providing municipal water directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre feet of water annually to develop a Water Shortage Contingency Plan; and

WHEREAS, AB 11X mandates that said Plan be filed with the California Department of Water Resources by January 31, 1992; and

WHEREAS, the Santa Clarita Water Company is an urban supplier of water providing water to more than 3,000 customers, and has therefore prepared and circulated for public review a Draft Water Shortage Contingency Plan, in compliance with the requirements of AB 11X, has held a properly noticed public hearing on January 29, 1992, regarding said Draft Plan, and has thereafter prepared a Final Water Shortage Contingency Plan;

NOW, THEREFORE, BE IT RESOLVED by the Santa Clarita Water Company's Board as follows:

1. A Final Water Shortage Contingency Plan is hereby adopted and is attached hereto as Exhibit "A" hereof, which exhibit is hereby incorporated herein;

2. The President is hereby authorized and directed to file the Plan with the California Department of Water Resources;

3. The President is hereby also authorized to follow lawful procedures to declare a Water Shortage Emergency and to implement this Water Shortage Contingency Plan; and

4. The President shall recommend to the Santa Clarita Water Company's Board additional procedures, rules, and regulations to carry out effective and equitable allocation of water resources during a water shortage.

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<u>ORDINANCE NO. 112</u>
AN ORDINANCE AMENDING ORDINANCE 101
WATER CONSERVATION, SHORTAGE, DROUGHT AND
EMERGENCY RESPONSE
ORDINANCE OF
NEWHALL COUNTY WATER DISTRICT

* * * * * * * * * * * * * * * * ** * * * * * *

Be it ordained by The Board of Directors of Newhall County Water District, Los Angeles County, California, Ordinance No. 101 is amended to read as follows:

***<u>Section 1</u>: PURPOSE*:** The specific provisions of this Ordinance are necessary and proper to conserve water resources and minimize cost to the District and its customers. The District requires that water resources available to the District be put to the maximum beneficial use, and that water efficient practices be used to reach this objective. The District further finds that its water supplies may be reduced because of drought, failure of facilities, or catastrophic events such as earthquakes and regional power failures. Anti-waste and water conservation requirements are necessary to achieve demand reduction without unneeded hardship.

<u>Section 2</u>: DEFINITIONS AND TERMS:

A. Water efficient practices: Cost-effective practices that require the least amount of water to generate the greatest benefit (water and cost savings) to the customer.

B. Water Waste: To use or expend water carelessly or needlessly.

C. Water User: Business or residential customer of the District.

D. Water Conservation Stages: The General Manager shall determine the conservation stage, except that the Board shall determine any conservation stage more restrictive than Stage 1. A water deficiency occurs when the current or near-term water demand exceeds the current or near-term water supply.

Stage 1. Water deficiencies range between 1 and 15 percent.

Stage 2. Water deficiencies range from more than 15 and up to 25 percent.

Stage 3. Water deficiencies range from more than 25 and up to 35 percent.

Stage 4. Water deficiencies are more than 35 percent.

E. Water Deficiency: A water deficiency occurs when the current or near-term water demand exceeds the current or near-term water supply, based on a yearly assessment. (Percent or deficiency = (1 – water supply/water demand) x 100

<u>Section 3:</u> WATER CONSERVATION ACTION PLAN: This plan establishes water conservation measures to be taken in response to current and anticipated levels of deficiency in State and/or local water supplies. No Water User shall waste water or make, cause, or permit the use of water for any purpose contrary to any provision of this Ordinance, or in quantities in excess of the use permitted by the conservation stage in effect pursuant to this Ordinance.

3.1 ***<u>Efficient Water Use.</u>*** *Because more severe effects of a water shortage are often brought about due to wasteful water use habits carried over from times of sufficient supply, certain voluntary water-use practices are encouraged at all times.*

3.1.1 ***<u>Outdoor Water Use Efficiency Guidelines and Recommendations</u>:***

a) Sprinklers should be maintained and adjusted so that overspray, runoff, and water waste is avoided. The most effective and water-efficient irrigation should be used, and drip irrigation should be considered where appropriate.

b) All leaks in plumbing and irrigation systems should be repaired promptly

c) Vehicles should be washed using a hose equipped with automatic shutoff nozzle.

d) Sidewalks, walkways, driveways, parking lots or any other hard-surfaced areas should not be washed down, except for health and safety purposes.

e) Low-water-use native or drought-tolerant vegetation should be used to minimize the need for irrigation. Plants and trees with similar water needs should be grouped together for most efficient irrigation. (Please see our website ncwd.org for more information and links to other websites listing drought tolerant plants.)

f) Landscape should be installed in a manner that will reduce the amount of water needed for irrigation. For example, the use of mulches and watering basins is encouraged where appropriate.

g) Irrigation should occur during optimal watering hours, avoiding wind and heat. The following hours are considered the most efficient hours for NCWD customers to effectively irrigate lawns and landscaped areas:

Winter/Fall (November through April) – 6 PM to 10 AM

Spring/Summer (May through October) –8 PM to 9 AM

h) Water usage on any decorative fountains, ponds or other types of water streams should be minimized by incorporating a water recycling system so the water is continually recovered and reused.

i) Pool and spa safety covers or evaporation-reducing water treatments should be considered if safe and appropriate for the situation. These will help minimize water loss due to evaporation. Pool and spa chemistry should be balanced and maintained to help reduce the frequency of pool/spa draining and refilling.

3.1.2 ***<u>Indoor Water Use Efficiency Guidelines and Recommendations</u>:***

a) All leaks and/or damage to faucets, toilets, and indoor pipes should be repaired immediately.

b) Low flow devices for indoor plumbing fixtures including faucets, kitchen spray nozzles, toilets, and showers should be used where possible.

c) Install 1.0 gallon per flush (gpf) ultra low-flow toilets or dual-flush toilets.

d) Water-efficient Energy Star® approved appliances including, but not limited to, clothes washers and dishwashers should be used.

e) Clothes washers and dishwashers should be run using full loads to maximize water efficiency.

f) A source specific hot water dispenser or a whole house hot water recirculation system should be considered. These devices generate hot water within seconds, minimizing running the water until it is hot.

g) All commercial establishments where food or beverages are provided should encourage the serving of water to their customers only when specifically requested by the customer.

3.1.3 ***New Construction Water Efficiency Guidelines:*** As new technology advances, builders of new structures or persons retrofitting existing facilities should consider options such as evapotranspiration-controlled sprinkler systems, grey water or non-potable water systems (where legally acceptable), storm water cisterns, and landscape designs minimizing the use of turf and water-intensive plants. Businesses should review industry-specific guidance for ways to reduce water usage and should consider programs such as multi-pass cooling towers and process water recycling.

3.2 ***Water Conservation Stage 1 –:*** *At this stage of water deficiency, the Water Users are strongly encouraged to adhere to all the guidelines in section 3.1, Water Use Efficiency Guidelines. The following practice is also strongly suggested during Stage 1 water deficiencies:*

a) Outdoor irrigation of all vegetation including lawns and landscaping is limited to three times per week and no more than 10 minutes per watering station. Irrigation should occur during the following hours:

Winter/Fall (November through April) – 6 PM to 10 AM

Spring/Summer (May through October) – 8 PM to 9 AM

3.3 ***Water Conservation Stage 2:*** *At this stage of water deficiency, Efficient Water Use Guidelines (3.1.1-3.1.2 above) and Stage 1 practices (3.2 above) become mandatory requirements. Further mandatory practices during Stage 2 are as follows:*

a) All new landscaping shall be limited to widely accepted drought-tolerant plants requiring less than typical water requirements.

b) No new lawns, whether by seed or sod, shall be installed.

c) No filling of pools or spas. Water levels may be maintained.

3.4 ***<u>Water Conservation Stage 3:</u>*** *At this stage of water deficiency, Efficient Water Use Guidelines (3.1.1-3.1.2 above), Stage 1 practices (3.2 above), and Stage 2 practices (3.3 above) become mandatory requirements. Further mandatory practices during Stage 3 are as follows:*

a) No new applications for service will be accepted.

b) No water for grading will be allowed.

c) Washing vehicles is prohibited, except at commercial facilities that recycle water.

d) Street cleaning with potable water is prohibited.

3.5 ***<u>Water Conservation Stage 4:</u>*** *At this stage of water deficiency, Efficient Water Use Guidelines (3.1.1- 3.1.2 above), Stage 1 practices (3.2 above), Stage 2 practices (3.3 above), and Stage 3 practices (3.4 above) become mandatory requirements. Further mandatory practices during Stage 4 are as follows:*

a) Outdoor irrigation of all vegetation including lawns and landscaping is prohibited. Existing trees and larger shrubs will be exempt.

b) No new landscaping shall be permitted.

<u>Section 4:</u> ***ENFORCEMENT:***

4.1 ***<u>Efficient Water Use and Stage 1 Enforcement:</u>***

a) Any notification to the District of signs or indications of water leaks or water waste will be documented. The District will confirm the water waste prior to any further action.

b) The District shall determine the action to be taken to inform the Water User of the guidelines in this Ordinance and to encourage more efficient and cost-effective water use.

4.2 ***<u>Stage 2, 3 and 4 Enforcement.</u>*** *The General Manager, and other District authorized representatives have the duty and are authorized to enforce provisions of Stage 2, 3, and 4 of this Ordinance. If a violation is ongoing, the District may disconnect service until the violation is corrected.*

4.2.1 ***<u>First Violation.</u>*** For a first violation, the District shall issue a verbal warning to the Water User and recommend corrective action.

4.2.2 ***<u>Second Violation.</u>*** For a second violation, the District shall issue a written warning to the Water User, and a fine of $40 shall be added to the Water User's bill at the property where the violation occurred if the corrective action is not taken within 30 days after receiving the written warning.

4.2.3 ***<u>Third Violation.</u>*** For a third violation, a fine of $100 shall be added to the Water User's bill at the property where the violation occurred if the corrective action is not taken within 30 days after receiving the written warning. In addition to the fine, the Board or the General Manager may require installation of a flow-restricting device on the Water User's service connection.

4.2.4 ***Fourth Violation.*** For the fourth and any additional violations, a fine of $250 shall be added to the Water User's bill at the property where the violation occurred. The District may also discontinue the Water User's water service at the property where the violation occurred. Re-connection shall be permitted only when there is reasonable protection against future violations, such as a flow-restricting device on the customer's service connection, as determined at the District's discretion.

4.3 ***District Enforcement Costs.*** District shall be reimbursed for its costs and expenses in enforcing the provisions of this Ordinance, including such costs as District incurs for District staff to investigate and monitor the Water User's compliance with the terms of this Ordinance. Charges for installation of flow-restricting devices or for discontinuing or restoring water service, as the District incurs those charges, shall be added to the Water User's bill at the property where the enforcement costs were incurred.

Section 5: ***ADMINISTRATION:***

5.1 ***General.*** The provisions of this Ordinance shall be administered and enforced by the District through the General Manager, who may delegate such enforcement to one or more employees or contractors of the District. The District may implement additional demand reduction practices, including surcharges, rationing, and specific water allocations, in times of severe shortage or emergency situations.

5.1.1 ***Water Utility Accounts.*** Accounts shall not be established for new customers, including the transfer of accounts upon change of ownership, until the customer agrees to comply with the provisions of this Ordinance. In pursuing the objectives of this Ordinance, the General Manager shall seek the cooperation of other water purveyors within the District's service area. The District will request that other water purveyors not permit the establishment of new accounts until the customer agrees to comply with the provisions of this Ordinance.

5.1.2 ***Discretionary Exemptions.*** The Board may, in its discretion, exempt Water Users and individual facilities of Water Users from the provisions of this Ordinance, or impose reasonable conditions in lieu of compliance with this Ordinance, if the Board finds that any of the following conditions exist:

a) Hardship. The requirements of this Ordinance would cause an unnecessary and undue hardship upon the Water User, the Water User facility or the public.

b) Health and Safety. Strict compliance with the requirements of this Ordinance would create an emergency condition, as determined by the Board or other governmental entity with appropriate jurisdiction, affecting the health, protection or safety of the Water User or the public.

c) No Impact on Water Use. The granting of the exemption or imposition of reasonable conditions in lieu of compliance with this Ordinance would not increase the quantity of water consumed by the Water User or otherwise adversely affect service to other Water Users. In other words, the Water User will create an offset. In granting any such relief, the departure from the requirements of this Ordinance shall be limited to the minimum necessary to address the circumstances upon which such departure is required by a Water User.

5.1.3 ***Appeals.*** Any customer or applicant for a water service may appeal any decision under this Ordinance to the Board whose decision shall be final.

ADOPTED, APPROVED AND SIGNED by the Board of Directors of NEWHALL COUNTY WATER DISTRICT this 14th day of July, 2005.

_____
MARIA GUTZEIT, President of the
Board of Directors of
NEWHALL COUNTY WATER DISTRICT

ATTEST:

_____
Karin J. Russell, Secretary of the
Board of Directors of
NEWHALL COUNTY WATER DISTRICT

Appendix H
References

Appendix H
REFERENCE LIST

The following documents were used in the preparation of the 2005 Urban Water Management Plan for the Santa Clarita Valley:

2000 Urban Water Management Plan, Castaic Lake Water Agency, Newhall County Water District, Santa Clarita Water Company, Valencia Water Company, December 2000, prepared by SA Associates, Reiter/Lowry/Consultants, and Black & Veatch.

2000 Urban Water Management Plan Groundwater Perchlorate Contamination Amendment and Other Amendments, Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Newhall County Water District, Valencia Water Company, January 2005, prepared by Luhdorff & Scalmanini Consulting Engineers.

2001 Update Report: Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems, prepared for Santa Clarita Valley Water Purveyors, July 2002, prepared by Richard C. Slade and Associates, LLC (RCS).

2004 Santa Clarita Valley Water Report, Castaic Lake Water Agency, CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, Newhall County Water District, Valencia Water Company, May 2005, prepared by Luhdorff & Scalmanini Consulting Engineers.

2004a. Regional Groundwater Flow Model for the Santa Clarita Valley: Model Development and Calibration, prepared for the Upper Basin Water Purveyors (Castaic Lake Water Agency, Santa Clarita Water Division of CLWA, Newhall County Water District, and Valencia Water Company), April, prepared by CH2M HILL.

2004b. Final Report: Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, presented in Support of the 97-005 Permit Application, prepared for the Upper Basin Water Purveyors (Castaic Lake Water Agency, Santa Clarita Water Division of CLWA, Newhall County Water District, and Valencia Water Company), December, prepared by CH2M HILL.

Analysis of Groundwater Basin Yield, Upper Santa Clara River Groundwater Basin, East Subbasin, Los Angeles County, California, prepared for Upper Basin Water Purveyors: Castaic Lake Water Agency, Newhall County Water District, Santa Clarita Water Division of CLWA, and Valencia Water Company, August 2005, prepared by CH2M HILL and Luhdorff & Scalmanini Consulting Engineers.

California Department of Water Resources, California's Groundwater, Bulletin 118, Santa Clara River Valley Groundwater Basin, Santa Clara River Valley East Subbasin, February, 2004.

California Department of Water Resources, Excerpts from the Working Draft of 2005 State Water Project Delivery Reliability, May 25th, 2005.

Castaic Lake Water Agency 2002 Groundwater Banking Project (Semitropic Groundwater Banking Program) Negative Declaration, August 2002, prepared by Science Applications International Corporation.

Castaic Lake Water Agency 2003 Groundwater Banking Project (Semitropic Groundwater Banking Program) Negative Declaration, December 2003, prepared by Science Applications International Corporation.

Castaic Lake Water Agency Draft Environmental Impact Report – Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount, June 2004, prepared by Science Applications International Corporation.

Castaic Lake Water Agency Draft Report, Recycled Water Master Plan, May 2002, prepared by Kennedy/Jenks Consultants.

Castaic Lake Water Agency Final Environmental Impact Report – Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount, December 2004, prepared by Science Applications International Corporation.

Castaic Lake Water Agency Groundwater Containment, Treatment, and Restoration Project, Mitigated Negative Declaration, August 2005, prepared by Black & Veatch.

Castaic Lake Water Agency Groundwater Management Plan – Santa Clara River Valley Groundwater Basin, East Subbasin, December 2003, prepared by Luhdorff & Scalmanini Consulting Engineers.

Castaic Lake Water Agency Recycled Water Master Plan Program Environmental Impact Report Notice of Preparation and Initial Study, April 2005, prepared by BonTerra Consulting.

Castaic Lake Water Agency/Rosedale-Rio Bravo Water Storage District (RRBWSD) Water Banking and Exchange Program Draft Environmental Impact Report, August 2005, prepared by Science Applications International Corporation.

Castaic Lake Water Agency, Water Supply Reliability Plan Draft Report, September 2003, prepared by Kennedy/Jenks Consultants.

Hydrogeologic Assessment of the Saugus Formation in the Santa Clara Valley of Los Angeles County, California, February 1988, prepared by Richard C. Slade and Associates, LLC (RCS).

Hydrogeologic Investigation: Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California, December 1986, prepared by Richard C. Slade and Associates, LLC (RCS).

Impact and Response to Perchlorate Contamination, Valencia Water Company Well Q2, prepared for Valencia Water Company, April 2005, prepared by Luhdorff & Scalmanini Consulting Engineers.