

# **SALT/NUTRIENT MANAGEMENT PLAN STAKEHOLDER MEETING MINUTES**

**March 9, 2011**

**Location: Lancaster City Hall – EOC**

**Attendees:** Tom Barnes (AVEK), Jessica Bunker (LACWWD), Erika de Hollan (LACSD), Amy Frost (Edwards AFB), Lauma Jurkevics (DWR), Bob Large (Lake Town Council), Yvonne Malikowski (Lake LA Park Association), Vickie Nelson (Antelope Acres Town Council), Dave Rydman (LACWWD), Chris Vidal (PWD), Jennifer Wong (DWR), Jamshed Yazdani (City of Lancaster), Jan Zimmerman (Lahontan RWQCB)

## **RWQCB/DWR Updates**

Final Proposition 84 Integrated Regional Water Management Planning Grant awards have been approved and the Department of Water Resources will begin the contracting process at this time.

## **Scope of Work/Work Plan**

The Salt/Nutrient Management Plan (SMP) Scope of Work was submitted to the Lahontan RWQCB (Board) to ensure that all the required Recycled Water Policy elements in the SMP are addressed. The Board would like to approve each region's SMP scope of work/work plan prior to substantial further SMP development so that there is an agreement between the RWQCB and the stakeholders regarding the plan's contents. The stakeholders are waiting to hear from Cindy Wise, the Antelope Valley's designated SMP contact, whether she has additional comments prior to taking it to her Board.

Jan Zimmerman, Lahontan RWQCB, mentioned that the process could take up to six months depending on the required form of approval by the Board. The stakeholders will need to coordinate with Cindy Wise to obtain an approval target date and to make sure the approval of the SMP scope of work gets on the Board's agenda. The stakeholders will need to obtain a schedule from Cindy to determine what the next steps are and what the Board is requiring for approval and/or adoption.

## **Projects Contributing to Salt/Nutrient Impacts**

The group reviewed the updated tables listing current and future projects that have the potential to contribute to salt/nutrient impacts to the basin and the 25-year projected water quantities associated with each project (*see Appendix 1*). The group discussed the water quality concentrations for each constituent of concern coming out of each projects water sources (i.e. California Aqueduct, Quartz Hill Treatment Plant, Lancaster and Palmdale Wastewater Reclamation Plants). A table showing the potential constituents studied under the SMP and source water quality was distributed (*see Appendix 2*). This information will help in determining the basin's salt mass balance and water quality concentration projections. We will eventually use these numbers in conjunction with the water quantity projections to determine the amount of water and salts/nutrients going into and leaving the basin for the 25-year projection period. Rosamond Community Services District (RCSA) will provide information for their treatment

plant using predicted numbers. Once the plant is running in May, the concentration values will be revised by RCSD.

Stakeholders were provided new spreadsheets (*see Appendix 3*) that analyzed the amount of TDS and Nitrates projects could potentially contribute to the basin. There was also a discussion on what concentration values to use for stormwater projects. Jan Zimmerman volunteered to check the Board's database and look into what values the stakeholder group should use, since the Antelope Valley currently does not have a stormwater permit. Chris Vidal, Palmdale Water District (PWD), also volunteered to check if PWD monitors stormwater for the recommended constituents of concern. Since the meeting, Chris confirmed that PWD does not monitor stormwater. The group also discussed what should be used as the concentration values for extraction of the water from groundwater banks. Appendix 3 shows TDS and Nitrate recharge and extraction water quality values based on the same concentration values. Amy Frost, Edwards Air Force Base, suggested talking to other water banks to obtain extraction concentration values for the recommended constituents of concern. LA County Waterworks District is currently taking samples for their In-situ Arsenic Removal Pilot-Project, and will be providing the water quality data for project as soon as it is available. Additional constituents will be analyzed based on the water quality concentrations and the volumes projected in the SMP current and future project list. Revisions will be incorporated based on stakeholder input.

### **Data Analysis and Map**

Maps identifying current and future project locations along with data points indicating groundwater concentration averages (ranging from 1990-2010) for Total Dissolved Solids, Nitrates, Boron, Arsenic, Chloride, and Fluoride were distributed at the meeting (*see Appendix 4*). The purpose of these maps is to show where the wells are located in relation to the SMP projects and to show the concentration limits in those wells. For water quality values where the limit was ND (non-detect), zero was used for the analysis. It was suggested that perhaps the Method Detection Limit (MDL) or Practical Quantitation Limit (PQL), which is normally 3 to 10 times the MDL, be used for conservative concentration calculations. The next step will be to analyze the depth of the wells, to determine whether the wells are in the lower or upper aquifer. The wells shown on the map are all supply wells, except for the USGS monitoring wells.

### **Next Meeting**

The next SMP stakeholder meeting is scheduled to be held after the Antelope Valley Integrated Regional Water Management Plan stakeholder meeting on Wednesday, May 11, 2011 - location to be determined.

***\*See Attachments Below***

Appendix 1 – Current and Future Basin Use Projects & 25-Year Water Quantity Projections

## Current and Future Projects Contributing to Potential Salt/Nutrient Impacts

Agency	Project Name	Project Type	IRWMP Project	Source/Type of Water (imported/ sw/ gw/ rw)	Expected Implementation Date
AVEK/LACWWD40	Water Supply Stabilization Project (WSSP-2 Project)	Groundwater Banking	Y	imported	2015
California City	Golf Course Irrigation Project	Landscape Irrigation	N	recycle	
Edwards Air Force Base	EAFB Irrigation Project	Landscape Irrigation	N	recycle	implemented
Edwards Air Force Base	Main Base Evaporation Ponds	Evaporation Pond/ RW Management	N	recycle	implemented
Edwards Air Force Base	AFRL Treatment Plant (Air Force Research Laboratory)	Wastewater Treatment Plant	N	recycle	implemented
LACWWD40	Aquifer Storage and Recovery Project	Groundwater Banking	Y	Imported	2010
LACWWD40	In-Situ Arsenic Removal on Unsaturated Alluvium (pilot-project)	Groundwater Treatment/Recharge	N	groundwater	2010-2012
LACWWD40/Palm./Lanc.	North LA/Kern County Regional Recycled Water Project	Landscape Irrigation (may include other M&I)	Y	recycle	2011
LACSD 14	Apollo Park	Recreational Impoundments/Landscape Irrig.	N	recycle	implemented
LACSD 14	Piute Ponds	Recreational Impoundments/Landscape Irrig.	N	recycle	implemented
LACSD 14	Agricultural Reuse Project	Agricultural Irrigation	N	recycle	implemented
LACSD 14	Lancaster Water Reclamation Plant	Wastewater Treatment Plant	Y	recycle	2010
LACSD 20	Agricultural Reuse Project	Agricultural Irrigation	N	recycle	implemented
LACSD 20	Palmdale Water Reclamation Plant	Wastewater Treatment Plant	Y	recycle	2011
Lancaster	Amargosa Water Banking & Stormwater Retention Project	Groundwater Banking/Recharge/Recreation	Y	imported / sw/ rw	on hold
Lancaster	eSolar Power Plant at Division and Avenue G	Evaporation Pond/ RW Management	N	recycle	2011
Palmdale	Barrel Springs Detention Basin and Wetlands	Groundwater Recharge	Y	stormwater	2035
Palmdale	Hunt Canyon Groundwater Recharge & Flood Control Basin	Groundwater Recharge	Y	stormwater	2035
Palmdale/LACWWD40	Amargosa Creek Recharge Project	Groundwater Recharge	Y	imported / sw	2015
Palmdale	Palmdale Hybrid Power Plant Project	Evaporation Pond/ RW Management	N	recycle	2011
Palmdale Water District	Groundwater Recharge - Recycle Water Project	Groundwater Recharge	Y	rw/ imported/ sw	2015
Rosamond	Antelope Valley Water Bank	Groundwater Banking	Y	imported	implemented
Rosamond	Evaporation Ponds	Evaporation Pond/ RW Management	N	recycle	implemented
Rosamond	Golden Queens Mining Project	Agricultural Irrigation	N	recycle	2012
Rosamond	RCSD Wastewater Treatment Plant Expansion	Wastewater Treatment Plant	N	recycle	2012

**Project Water Quantity Projections (AFY)**

Current and Future Projects Contributing To Potential Salt/Nutrient Impacts															
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Expected Implementation Date	Water Quantity Projections (AFY)											
				2010		2015		2020		2025		2030		2035	
				Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction
<b>Groundwater Recharge/Banking</b>															
AVEK/LACWWD40	Water Supply Stabilization Project (WSSP-2 Project)	imported	2015	10,000	9,000	25,000	22,500	25,000	22,500	25,000	22,500	25,000	22,500	25,000	22,500
LACWWD40	Aquifer Storage and Recovery Project	Imported	2010	4,500	4,500	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800
LACWWD40	In-Situ Arsenic Removal on Unsaturated Alluvium (pilot-project)	groundwater	2010-2012	1,600	1,600										
Lancaster	Amargosa Water Banking & Stormwater Retention Project	imported / sw/ rw	on hold					50,000	48,000	50,000	48,000	50,000	48,000	50,000	48,000
Palmdale	Barrel Springs Detention Basin and Wetlands	stormwater	2035											878	0
Palmdale	Hunt Canyon Groundwater Recharge & Flood Control Basin	stormwater	2035											3,000	0
Palmdale/LACWWD40	Amargosa Creek Recharge Project	imported / sw	2015			25,000	0	25,000	0	25,000	0	25,000	0	25,000	0
Palmdale Water District	Groundwater Recharge - Recycle Water Project	rw/ imported/ sw	2015			10,000	0	10,000	0	10,000	0	10,000	0	10,000	0
Rosamond	Antelope Valley Water Bank	imported	implemented	1,300	0	22,000	19,900	19,900	22,000	19,900	22,000	19,900	22,000	19,900	21,200
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Expected Implementation Date	Water Quantity Projections (AFY)											
				2010		2015		2020		2025		2030		2035	
				flow	flow	flow	flow	flow	flow	flow	flow				
<b>Irrigation/Impoundments</b>															
California City	Golf Course Irrigation Project	recycle													
Edwards Air Force Base	EAFB Irrigation Project	recycle	implemented	650	650	650	650	650	650	650	650	650	650	650	650
LACSD 14	Apollo Park	recycle	implemented	250	250	250	250	250	250	250	250	250	250	250	250
LACSD 14	Piute Ponds	recycle	implemented	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
LACSD 14	Agricultural Reuse Project*	recycle	implemented	1,100	9,500	10,500	11,500	11,500	12,500	12,500	13,500	13,500	13,500	13,500	13,500
LACSD 20	Agricultural Reuse Project**	recycle	implemented	8,500	9,500	10,500	11,500	11,500	12,500	12,500	13,500	13,500	13,500	13,500	13,500
LACWWD40/Palm./Lanc.	North LA/Kern County Regional Recycled Water Project	recycle	2011			7,121		8,673		10,225		11,777		13,330	
Rosamond	Golden Queens Mining Project	recycle	2012												
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Expected Implementation Date	Water Quantity Projections (AFY)											
				2010		2015		2020		2025		2030		2035	
				flow	flow	flow	flow	flow	flow	flow	flow				
<b>Treatment</b>															
Edwards Air Force Base	AFRL Treatment Plant	recycle	implemented	37	37	37	37	37	37	37	37	37	37	37	37
LACSD 14	Lancaster Water Reclamation Plant	recycle	2011 (upgrades)		20,000	22,000	24,000	24,000	26,000	26,000	28,000	28,000	28,000	28,000	28,000
LACSD 20	Palmdale Water Reclamation Plant	recycle	2011 (upgrades)		15,000	16,500	18,000	18,000	19,500	19,500	21,000	21,000	21,000	21,000	21,000
Rosamond	RCSD Wastewater Treatment Plant Expansion	recycle	2012	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Expected Implementation Date	Water Quantity Projections (AFY)											
				2010		2015		2020		2025		2030		2035	
				flow	flow	flow	flow	flow	flow	flow	flow				
<b>Evaporation/Export</b>															
Edwards Air Force Base	Main Base Evaporation Ponds	recycle	implemented	80	80	80	80	80	80	80	80	80	80	80	80
Lancaster	eSolar Power Plant at Division and Avenue G	recycle	2011	80	80	80	80	80	80	80	80	80	80	80	80
Palmdale	Palmdale Hybrid Power Plant Project	recycle	2011	400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
Rosamond	Evaporation Ponds	recycle	2012	500	500	500	500	500	500	500	500	500	500	500	500

\* Estimated Flow = (recycled water produced at Lancaster WRP) - (M&I use) - (Apollo Park flow) - (Piute Ponds flow)

\*\* Estimated Flow = (recycled water produced at Palmdale WRP) - (M&I use)

## Appendix 2 – Source Water Quality Table

## Source Water Quality

Parameter	Units	California Aqueduct <sup>(a)</sup>	Acton Plant <sup>(a)</sup>	Eastside Plant <sup>(a)</sup>	Quartz Hill Plant <sup>(a)</sup>	Rosamond Plant <sup>(b)</sup>	Recycled Water <sup>(c)</sup>	EAFB AFRL WWTP <sup>(d)</sup>
Total Dissolved Solids	mg/L	210	250	230	220	240	550	520
Ammonia - N	mg/L						1	4
Nitrate - N	mg/L	0.86	0.57	0.70	0.61	0.63	< 10	5.7
Nitrite - N	mg/L	ND (< 0.4)	ND (< 0.4)	ND (< 0.4)	ND (< 0.4)	ND (< 0.4)	< 1	NA
Nitrate+Nitrite - N	mg/L	1.0	1.0	1.0	1.0	1.0	8	NA
Chloride	mg/L	76	88	65	76	75	140	75
Arsenic	ug/L	4.6	4	3.3	3.1	2.6	< 10	8.4
Boron	ug/L	150	240	180	170	160	500	330
Fluoride	mg/L	0.11	0.14	0.12	0.10	0.10	< 1	NA

(a) Antelope Valley-East Kern Water Agency 2009 Annual Water Quality Report - Los Angeles County System

(b) Antelope Valley-East Kern Water Agency 2009 Annual Water Quality Report - Kern County System

(c) Predicted water quality for tertiary treatment at Lancaster and Plamdale WRPs (LACSD)

(d) Air Force Research Laboratory (AFRL) 2010 Annual Monitoring Report (average values provided)

Appendix 3 – Project Water Quality Projection for TDS & Nitrates

**Project Water Quality Projections - Total Dissolved Solids (tons/year)**

Potential Salt/Nutrient Impacts - TOTAL DISSOLVED SOLIDS															
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Total Dissolved Solids (tons/year)											
				2010		2015		2020		2025		2030		2035	
				Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction
<b>Groundwater Recharge/Banking</b>															
AVEK/LACWWD40	Water Supply Stabilization Project (WSSP-2 Project)	imported	California Aqueduct	2,855	2,570	7,138	6,424	7,138	6,424	7,138	6,424	7,138	6,424	7,138	6,424
LACWWD40	Aquifer Storage and Recovery Project	Imported	Quartz Hill Plant	1,346	1,346	2,034	2,034	2,034	2,034	2,034	2,034	2,034	2,034	2,034	2,034
LACWWD40	In-Situ Arsenic Removal on Unsaturated Alluvium (pilot-project)	groundwater													
Lancaster	Amargosa Water Banking & Stormwater Retention Project	imported / sw/ rw	Recycled Water					37,391	35,895	37,391	35,895	37,391	35,895	37,391	35,895
Palmdale	Barrel Springs Detention Basin and Wetlands	stormwater													
Palmdale	Hunt Canyon Groundwater Recharge & Flood Control Basin	stormwater													
Palmdale/LACWWD40	Amargosa Creek Recharge Project	imported / sw	Quartz Hill Plant			7,478	0	7,478	0	7,478	0	7,478	0	7,478	0
Palmdale Water District	Groundwater Recharge - Recycle Water Project	rw/ imported/ sw	Recycled Water			7,478	0	7,478	0	7,478	0	7,478	0	7,478	0
Rosamond	Antelope Valley Water Bank	imported	California Aqueduct	371	0	6282	5682	6282	5,682	6,282	5,682	6,282	5,682	6,282	6,053
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Total Dissolved Solids (ton/year)											
				2010		2015		2020		2025		2030		2035	
				flow	flow	flow	flow	flow	flow	flow	flow				
<b>Irrigation/Impoundments</b>															
California City	Golf Course Irrigation Project	recycle													
Edwards Air Force Base	EAFB Irrigation Project	recycle	AFRL Treatment Plant	460	460	460	460	460	460	460	460	460	460	460	460
LACSD 14	Apollo Park	recycle	Recycled Water	187	187	187	187	187	187	187	187	187	187	187	187
LACSD 14	Piute Ponds	recycle	Recycled Water	3,739	3,739	3,739	3,739	3,739	3,739	3,739	3,739	3,739	3,739	3,739	3,739
LACSD 14	Agricultural Reuse Project*	recycle	Recycled Water	823	7,104	7,852	8,600	9,348	10,095						
LACSD 20	Agricultural Reuse Project**	recycle	Recycled Water	6,356	7,104	7,852	8,600	9,348	10,095						
LACWWD40/Palm./Lanc.	North LA/Kern County Regional Recycled Water Project	recycle	Recycled Water		5,325	6,486	7,646	8,807	9,968						
Rosamond	Golden Queens Mining Project†	recycle	Recycled Water												
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Total Dissolved Solids (tons/year)											
				2010		2015		2020		2025		2030		2035	
				outflow	outflow	outflow	outflow	outflow	outflow	outflow	outflow				
<b>Treatment</b>															
Edwards Air Force Base	AFRL Treatment Plant	recycle	AFRL Treatment Plant	26	26	26	26	26	26	26	26	26	26	26	26
LACSD 14	Lancaster Water Reclamation Plant	recycle	Recycled Water		14,956	16,452	17,948	19,443	20,939						
LACSD 20	Palmdale Water Reclamation Plant	recycle	Recycled Water		11,217	12,339	13,461	14,582	15,704						
Rosamond	RCSD Wastewater Treatment Plant Expansion†	recycle	RCSD Treatment Plant												
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Total Dissolved Solids (tons/year)											
				2010		2015		2020		2025		2030		2035	
				inflow	inflow	inflow	inflow	inflow	inflow	inflow	inflow				
<b>Evaporation/Export</b>															
Edwards Air Force Base	Main Base Evaporation Ponds	recycle	AFRL Treatment Plant	57	57	57	57	57	57	57	57	57	57	57	57
Lancaster	eSolar Power Plant at Division and Avenue G	recycle	Recycled Water	60	60	60	60	60	60	60	60	60	60	60	60
Palmdale	Palmdale Hybrid Power Plant Project	recycle	Recycled Water	299	2,543	2,543	2,543	2,543	2,543	2,543	2,543	2,543	2,543	2,543	2,543
Rosamond	Evaporation Ponds†	recycle	RCSD Treatment Plant												

\* Estimated Flow = (recycled water produced at Lancaster WRP) - (M&I use) - (Apollo Park flow) - (Piute Ponds flow)

\*\* Estimated Flow = (recycled water produced at Palmdale WRP) - (M&I use)

† RCSD does not have water quality values from the discharge side of their existing wastewater treatment plant

**Project Water Quality Projections - Nitrates (ton/year as nitrogen)**

Potential Salt/Nutrient Impacts - NITRATES															
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Nitrate (tons/year as nitrogen)											
				2010		2015		2020		2025		2030		2035	
				Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction	Recharge	Extraction
<b>Groundwater Recharge/Banking</b>															
AVEK/LACWWD40	Water Supply Stabilization Project (WSSP-2 Project)	imported	California Aqueduct	12	11	29	26	29	26	29	26	29	26	29	26
LACWWD40	Aquifer Storage and Recovery Project	Imported	Quartz Hill Plant	4	4	6	6	6	6	6	6	6	6	6	6
LACWWD40	In-Situ Arsenic Removal on Unsaturated Alluvium (pilot-project)	groundwater													
Lancaster	Amargosa Water Banking & Stormwater Retention Project	imported / sw/ rw	Recycled Water					272	261	272	261	272	261	272	261
Palmdale	Barrel Springs Detention Basin and Wetlands	stormwater	Stormwater Runoff												
Palmdale	Hunt Canyon Groundwater Recharge & Flood Control Basin	stormwater	Stormwater Runoff												
Palmdale/LACWWD40	Amargosa Creek Recharge Project	imported / sw	Quartz Hill Plant			21	0	21	0	21	0	21	0	21	0
Palmdale Water District	Groundwater Recharge - Recycle Water Project	rw/ imported/ sw	Recycled Water			54	0	54	0	54	0	54	0	54	0
Rosamond	Antelope Valley Water Bank	imported	California Aqueduct	2	0	26	23	26	23	26	23	26	23	26	25
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Nitrate (tons/year as nitrogen)											
				2010		2015		2020		2025		2030		2035	
				flow		flow		flow		flow		flow		flow	
<b>Irrigation/Impoundments</b>															
California City	Golf Course Irrigation Project	recycle													
Edwards Air Force Base	EAFB Irrigation Project	recycle	AFRL Treatment Plant	5		5		5		5		5		5	
LACSD 14	Apollo Park	recycle	Recycled Water	1		1		1		1		1		1	
LACSD 14	Piute Ponds	recycle	Recycled Water	27		27		27		27		27		27	
LACSD 14	Agricultural Reuse Project*	recycle	Recycled Water	6		52		57		63		68		73	
LACSD 20	Agricultural Reuse Project**	recycle	Recycled Water	46		52		57		63		68		73	
LACWWD40/Palm./Lanc.	North LA/Kern County Regional Recycled Water Project	recycle	Recycled Water			39		47		56		64		72	
Rosamond	Golden Queens Mining Project†	recycle	Recycled Water												
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Nitrate (tons/year as nitrogen)											
				2010		2015		2020		2025		2030		2035	
				outflow		outflow		outflow		outflow		outflow		outflow	
<b>Treatment</b>															
Edwards Air Force Base	AFRL Treatment Plant	recycle	AFRL Treatment Plant	0		0		0		0		0		0	
LACSD 14	Lancaster Water Reclamation Plant	recycle	Recycled Water			109		120		131		141		152	
LACSD 20	Palmdale Water Reclamation Plant	recycle	Recycled Water			82		90		98		106		114	
Rosamond	RCSD Wastewater Treatment Plant Expansion†	recycle	RCSD Treatment Plant												
Agency	Project	Source of Water (imported/ sw/ gw/ rw)	Water Quality Source	Nitrate (tons/year as nitrogen)											
				2010		2015		2020		2025		2030		2035	
				inflow		inflow		inflow		inflow		inflow		inflow	
<b>Evaporation/Export</b>															
Edwards Air Force Base	Main Base Evaporation Ponds	recycle	AFRL Treatment Plant	1		1		1		1		1		1	
Lancaster	eSolar Power Plant at Division and Avenue G	recycle	Recycled Water	0		0		0		0		0		0	
Palmdale	Palmdale Hybrid Power Plant Project	recycle	Recycled Water	2		18		18		18		18		18	
Rosamond	Evaporation Ponds†	recycle	RCSD Treatment Plant												

\* Estimated Flow = (recycled water produced at Lancaster WRP) - (M&I use) - (Apollo Park flow) - (Piute Ponds flow)

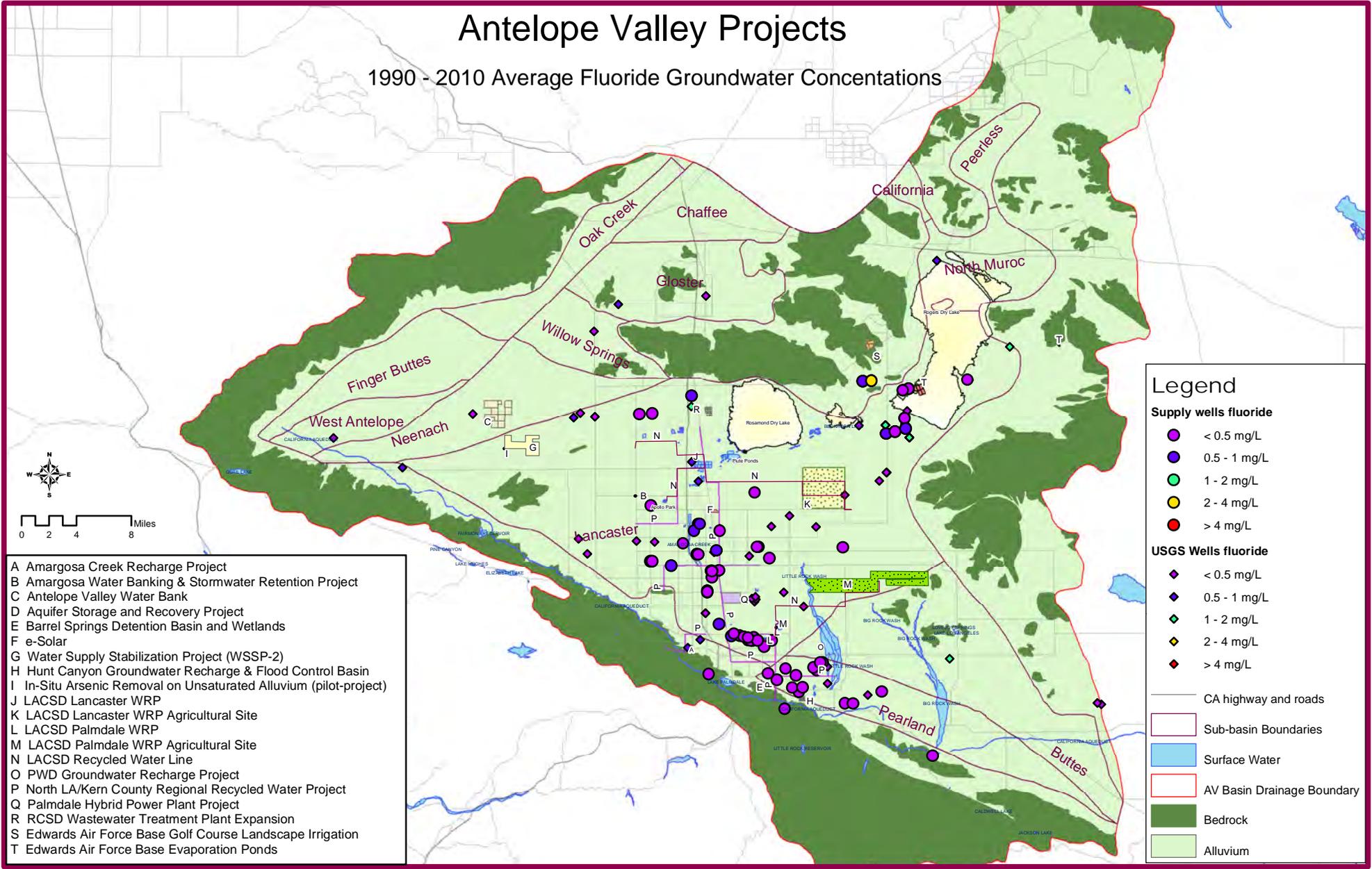
\*\* Estimated Flow = (recycled water produced at Palmdale WRP) - (M&I use)

† RCSD does not have water quality values from the discharge side of their existing wastewater treatment plant

Appendix 4 – Map of Project Locations and Various Constituent Levels

# Antelope Valley Projects

1990 - 2010 Average Fluoride Groundwater Concentrations



- A Amargosa Creek Recharge Project
- B Amargosa Water Banking & Stormwater Retention Project
- C Antelope Valley Water Bank
- D Aquifer Storage and Recovery Project
- E Barrel Springs Detention Basin and Wetlands
- F e-Solar
- G Water Supply Stabilization Project (WSSP-2)
- H Hunt Canyon Groundwater Recharge & Flood Control Basin
- I In-Situ Arsenic Removal on Unsaturated Alluvium (pilot-project)
- J LACSD Lancaster WRP
- K LACSD Lancaster WRP Agricultural Site
- L LACSD Palmdale WRP
- M LACSD Palmdale WRP Agricultural Site
- N LACSD Recycled Water Line
- O PWD Groundwater Recharge Project
- P North LA/Kern County Regional Recycled Water Project
- Q Palmdale Hybrid Power Plant Project
- R RCSD Wastewater Treatment Plant Expansion
- S Edwards Air Force Base Golf Course Landscape Irrigation
- T Edwards Air Force Base Evaporation Ponds

**Legend**

**Supply wells fluoride**

- < 0.5 mg/L
- 0.5 - 1 mg/L
- 1 - 2 mg/L
- 2 - 4 mg/L
- > 4 mg/L

**USGS Wells fluoride**

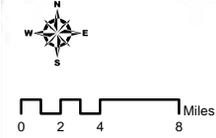
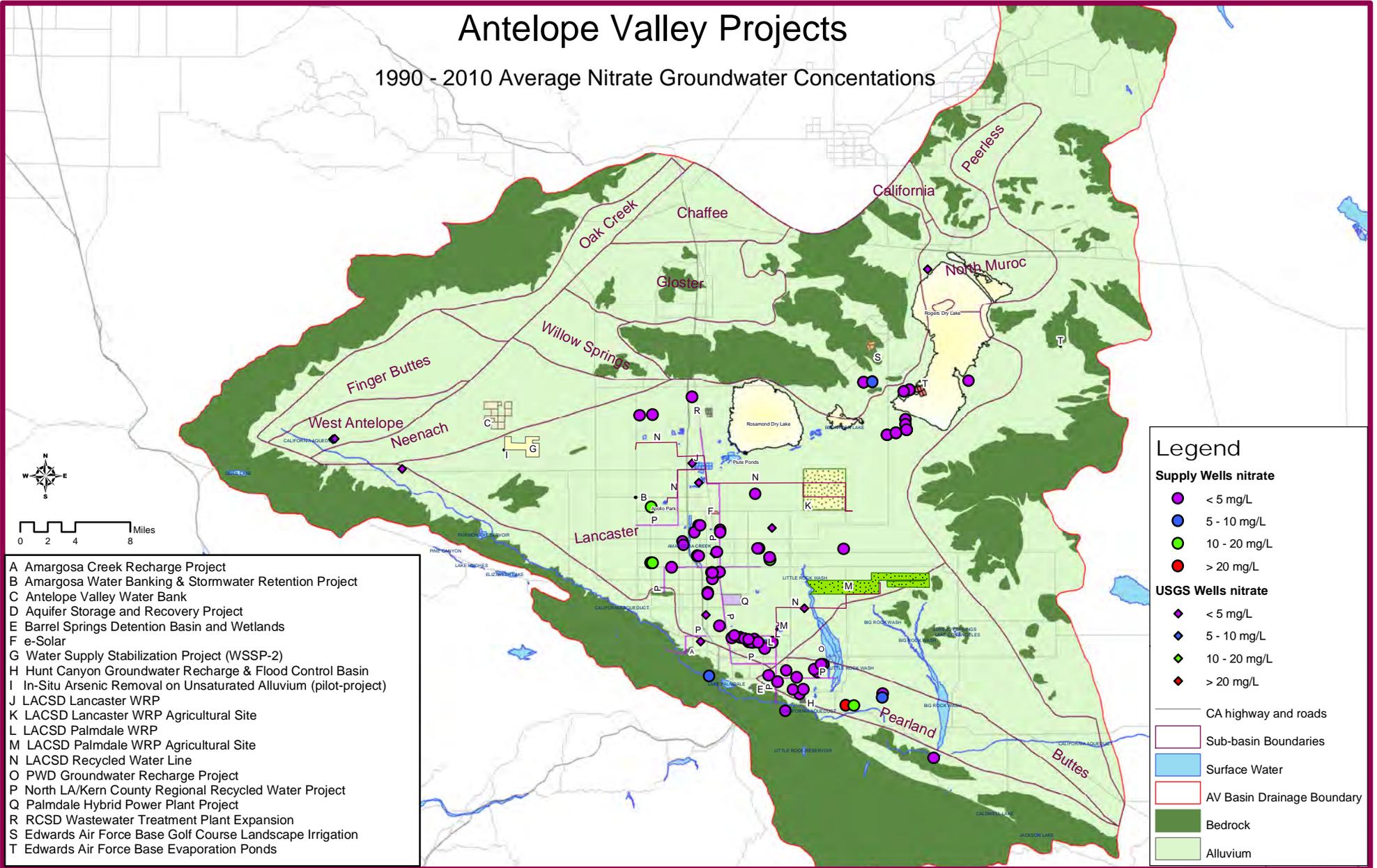
- ◆ < 0.5 mg/L
- ◆ 0.5 - 1 mg/L
- ◆ 1 - 2 mg/L
- ◆ 2 - 4 mg/L
- ◆ > 4 mg/L

- CA highway and roads
- Sub-basin Boundaries
- Surface Water
- AV Basin Drainage Boundary
- Bedrock
- Alluvium

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# Antelope Valley Projects

1990 - 2010 Average Nitrate Groundwater Concentrations



- A Amargosa Creek Recharge Project
- B Amargosa Water Banking & Stormwater Retention Project
- C Antelope Valley Water Bank
- D Aquifer Storage and Recovery Project
- E Barrel Springs Detention Basin and Wetlands
- F e-Solar
- G Water Supply Stabilization Project (WSSP-2)
- H Hunt Canyon Groundwater Recharge & Flood Control Basin
- I In-Situ Arsenic Removal on Unsaturated Alluvium (pilot-project)
- J LACSD Lancaster WRP
- K LACSD Lancaster WRP Agricultural Site
- L LACSD Palmdale WRP
- M LACSD Palmdale WRP Agricultural Site
- N LACSD Recycled Water Line
- O PWD Groundwater Recharge Project
- P North LA/Kern County Regional Recycled Water Project
- Q Palmdale Hybrid Power Plant Project
- R RCSD Wastewater Treatment Plant Expansion
- S Edwards Air Force Base Golf Course Landscape Irrigation
- T Edwards Air Force Base Evaporation Ponds

**Legend**

**Supply Wells nitrate**

- < 5 mg/L
- 5 - 10 mg/L
- 10 - 20 mg/L
- > 20 mg/L

**USGS Wells nitrate**

- ◆ < 5 mg/L
- ◆ 5 - 10 mg/L
- ◆ 10 - 20 mg/L
- ◆ > 20 mg/L

— CA highway and roads

▭ Sub-basin Boundaries

▭ Surface Water

▭ AV Basin Drainage Boundary

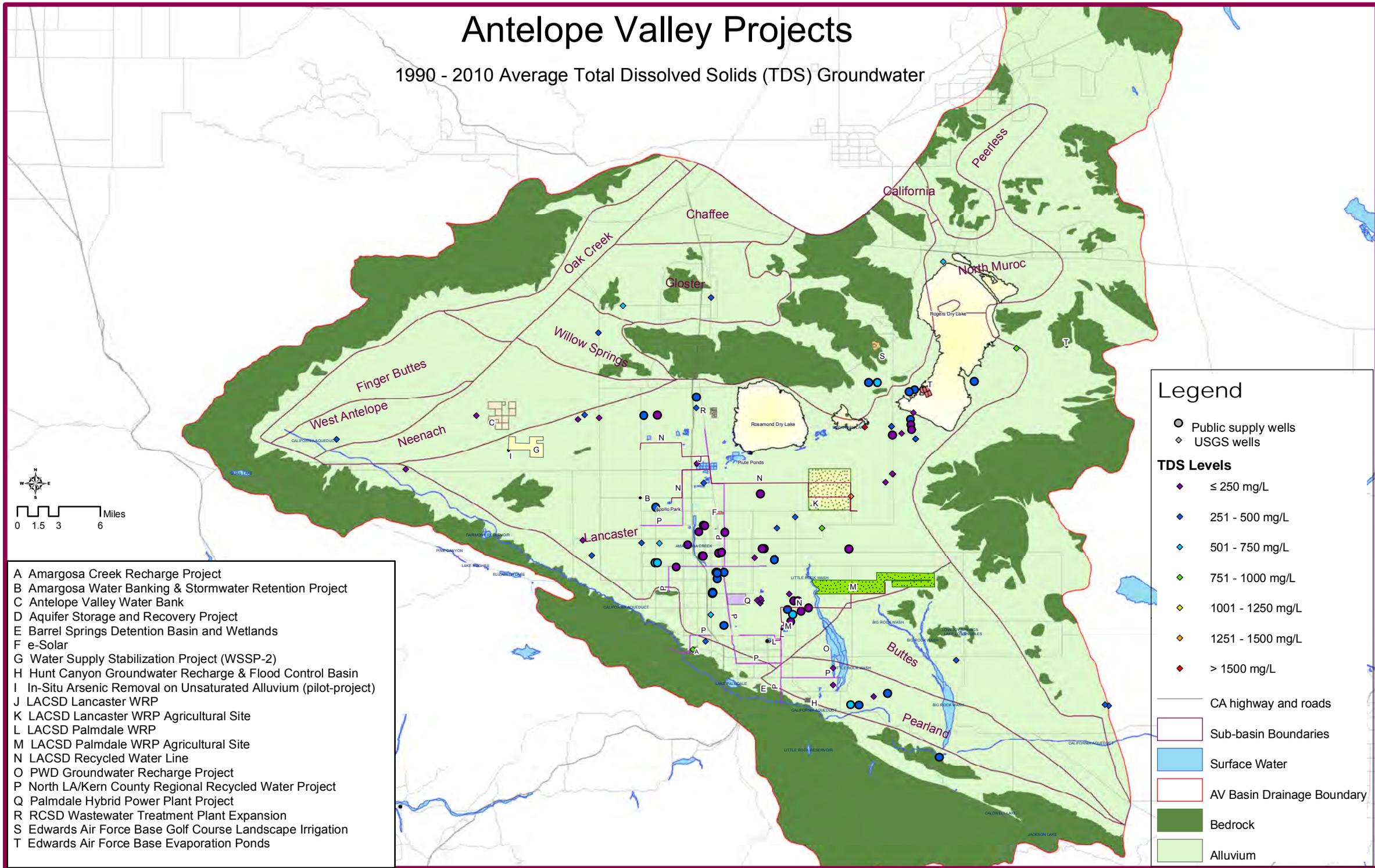
▭ Bedrock

▭ Alluvium

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# Antelope Valley Projects

1990 - 2010 Average Total Dissolved Solids (TDS) Groundwater



- A Amargosa Creek Recharge Project
- B Amargosa Water Banking & Stormwater Retention Project
- C Antelope Valley Water Bank
- D Aquifer Storage and Recovery Project
- E Barrel Springs Detention Basin and Wetlands
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**Legend**

- Public supply wells
- ◇ USGS wells

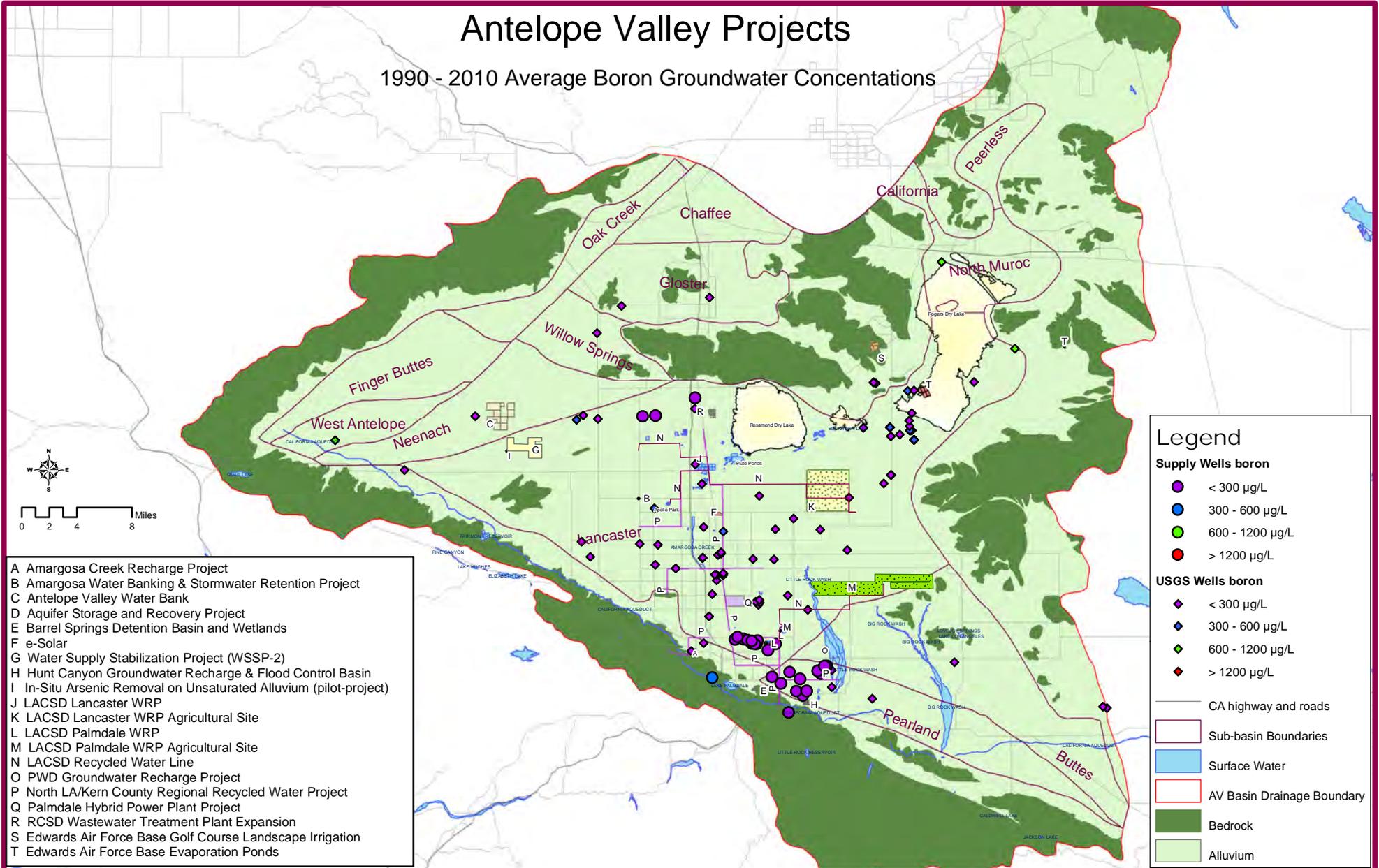
**TDS Levels**

- ◆ ≤ 250 mg/L
- ◆ 251 - 500 mg/L
- ◆ 501 - 750 mg/L
- ◆ 751 - 1000 mg/L
- ◆ 1001 - 1250 mg/L
- ◆ 1251 - 1500 mg/L
- ◆ > 1500 mg/L

- CA highway and roads
- ▭ Sub-basin Boundaries
- ▭ Surface Water
- ▭ AV Basin Drainage Boundary
- ▭ Bedrock
- ▭ Alluvium

# Antelope Valley Projects

1990 - 2010 Average Boron Groundwater Concentrations



- A Amargosa Creek Recharge Project
- B Amargosa Water Banking & Stormwater Retention Project
- C Antelope Valley Water Bank
- D Aquifer Storage and Recovery Project
- E Barrel Springs Detention Basin and Wetlands
- F e-Solar
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- T Edwards Air Force Base Evaporation Ponds

**Legend**

**Supply Wells boron**

- < 300 µg/L
- 300 - 600 µg/L
- 600 - 1200 µg/L
- > 1200 µg/L

**USGS Wells boron**

- ◆ < 300 µg/L
- ◆ 300 - 600 µg/L
- ◆ 600 - 1200 µg/L
- ◆ > 1200 µg/L

— CA highway and roads

▭ Sub-basin Boundaries

▭ Surface Water

▭ AV Basin Drainage Boundary

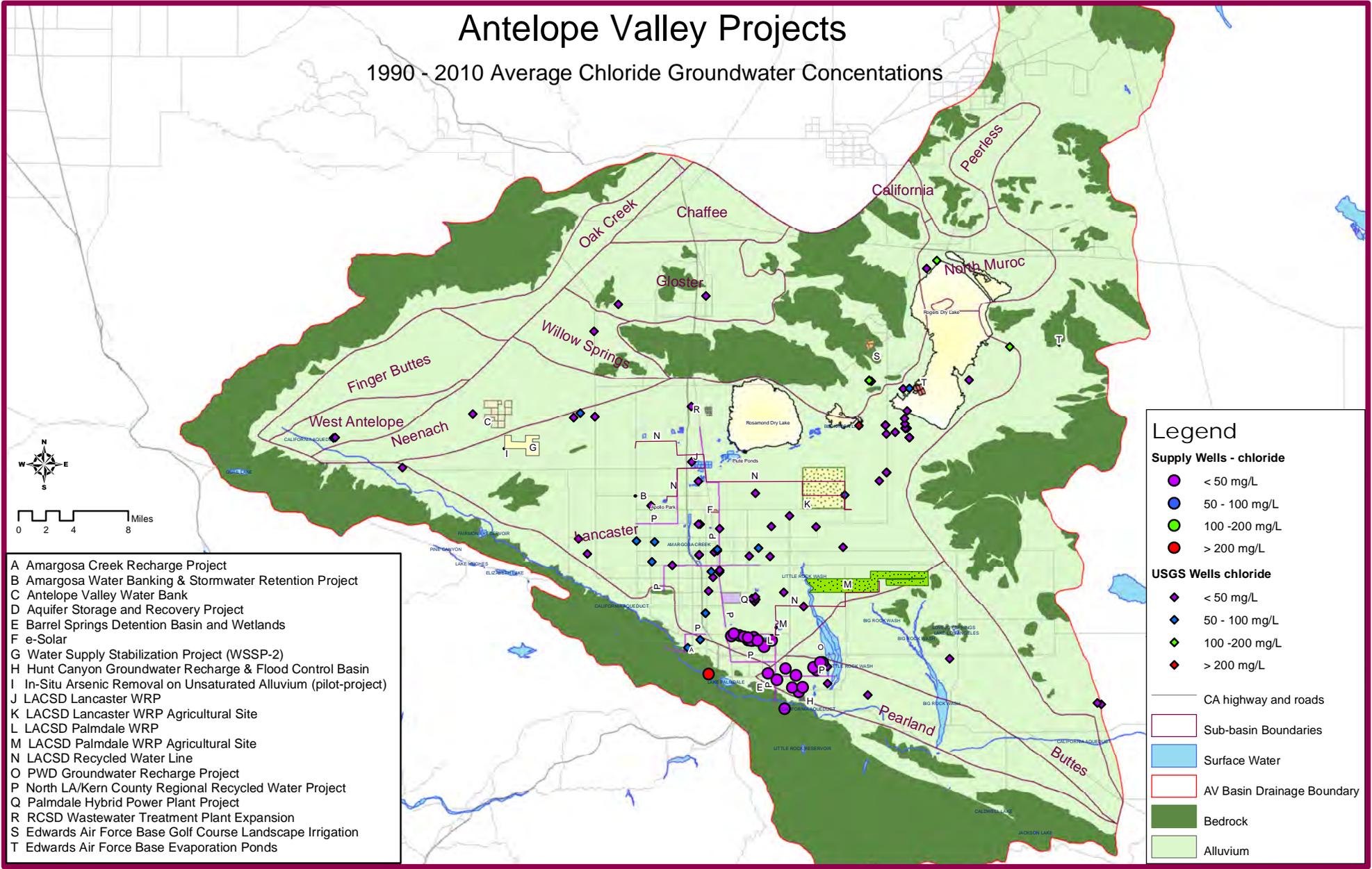
▭ Bedrock

▭ Alluvium

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# Antelope Valley Projects

1990 - 2010 Average Chloride Groundwater Concentrations



- A Amargosa Creek Recharge Project
- B Amargosa Water Banking & Stormwater Retention Project
- C Antelope Valley Water Bank
- D Aquifer Storage and Recovery Project
- E Barrel Springs Detention Basin and Wetlands
- F e-Solar
- G Water Supply Stabilization Project (WSSP-2)
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- T Edwards Air Force Base Evaporation Ponds

**Legend**

**Supply Wells - chloride**

- < 50 mg/L
- 50 - 100 mg/L
- 100 -200 mg/L
- > 200 mg/L

**USGS Wells chloride**

- ◆ < 50 mg/L
- ◆ 50 - 100 mg/L
- ◆ 100 -200 mg/L
- ◆ > 200 mg/L

— CA highway and roads

▭ Sub-basin Boundaries

▭ Surface Water

▭ AV Basin Drainage Boundary

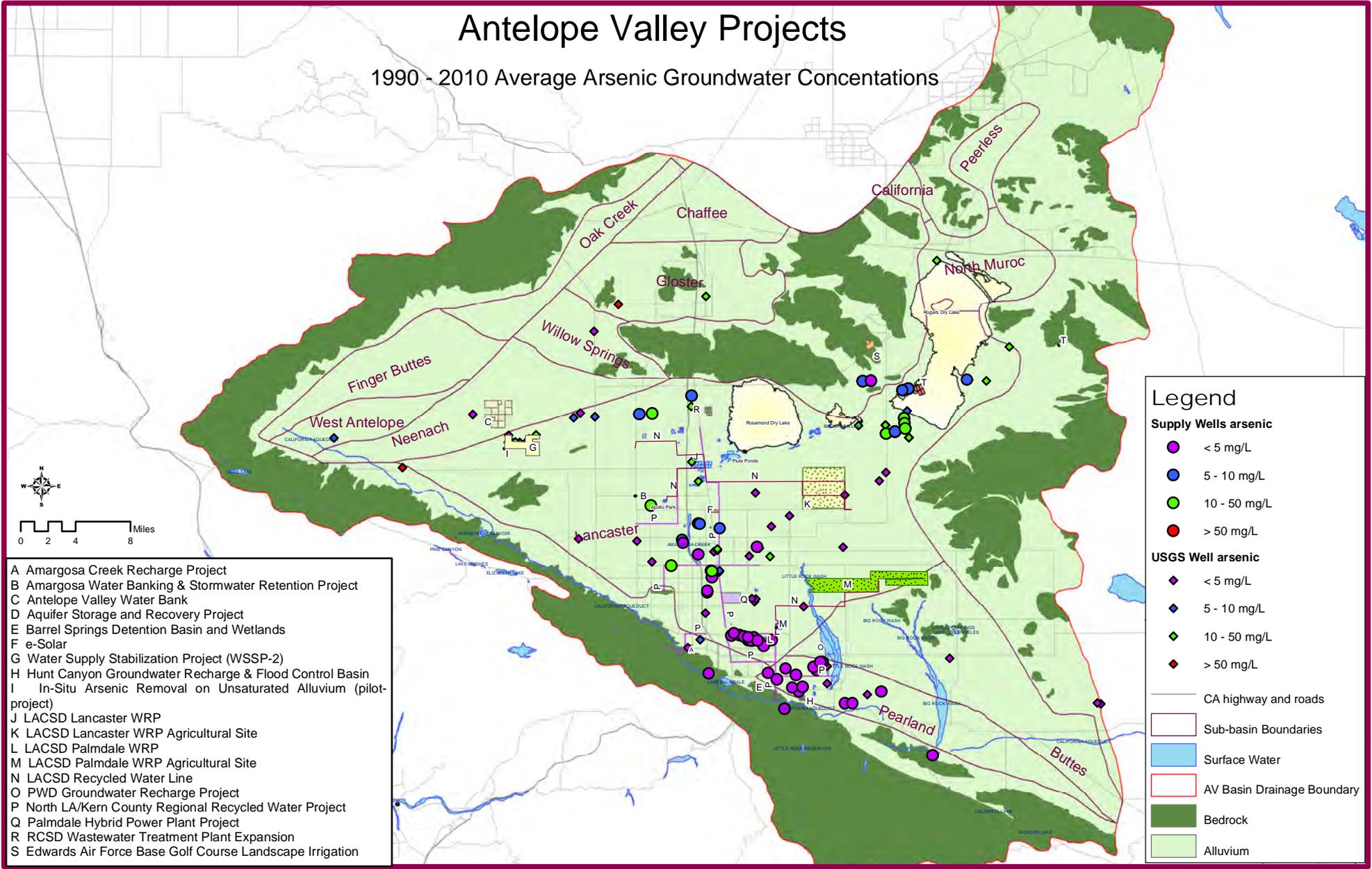
▭ Bedrock

▭ Alluvium

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# Antelope Valley Projects

1990 - 2010 Average Arsenic Groundwater Concentrations



- A Amargosa Creek Recharge Project
- B Amargosa Water Banking & Stormwater Retention Project
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- D Aquifer Storage and Recovery Project
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- S Edwards Air Force Base Golf Course Landscape Irrigation

**Legend**

**Supply Wells arsenic**

- < 5 mg/L
- 5 - 10 mg/L
- 10 - 50 mg/L
- > 50 mg/L

**USGS Well arsenic**

- ◆ < 5 mg/L
- ◆ 5 - 10 mg/L
- ◆ 10 - 50 mg/L
- ◆ > 50 mg/L

— CA highway and roads

▭ Sub-basin Boundaries

▭ Surface Water

▭ AV Basin Drainage Boundary

▭ Bedrock

▭ Alluvium

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