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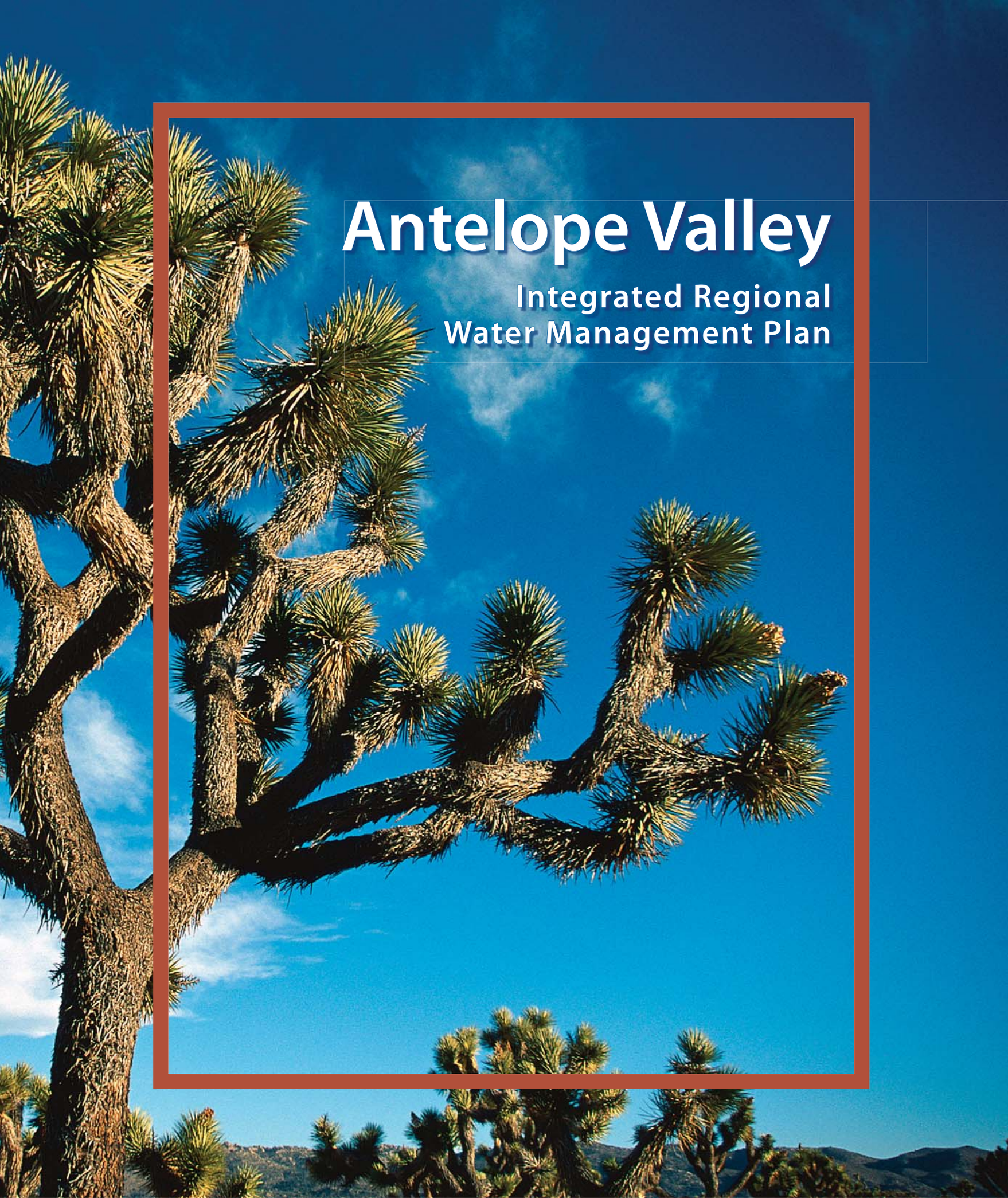

Antelope Valley

Integrated Regional Water Management Plan

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Acknowledgements

Prepared by the Regional Water Management Group of the
Antelope Valley Integrated Regional Water Management Plan

With the assistance of Kennedy/Jenks Consultants

The Regional Water Management Group would like to thank the Department of Water Resources, the State Water Resources Control Board, and the many dedicated stakeholders of the Antelope Valley for their time, guidance, and thoughtful participation in the creation of this truly integrated plan.

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Compliance with Proposition 50 Required Elements

The AV IRWM Plan meets all the necessary required elements identified in Proposition 50 for an IRWM Plan as shown below.

Quick Reference Guide: Proposition 50 Guidelines Required Elements	
Standard	**IRWM Plan Reference/Section (§)**
A. Regional Agency or Regional Water Management Group	1.2.1
B. Region Description	1.0, 2.1 3.1.1, 3.1.2, 3.1.3 , 3.1.4, 3.1.5, 3.1.8, 3.2, 3.4.1, 3.4.2, 2.6, 2.7
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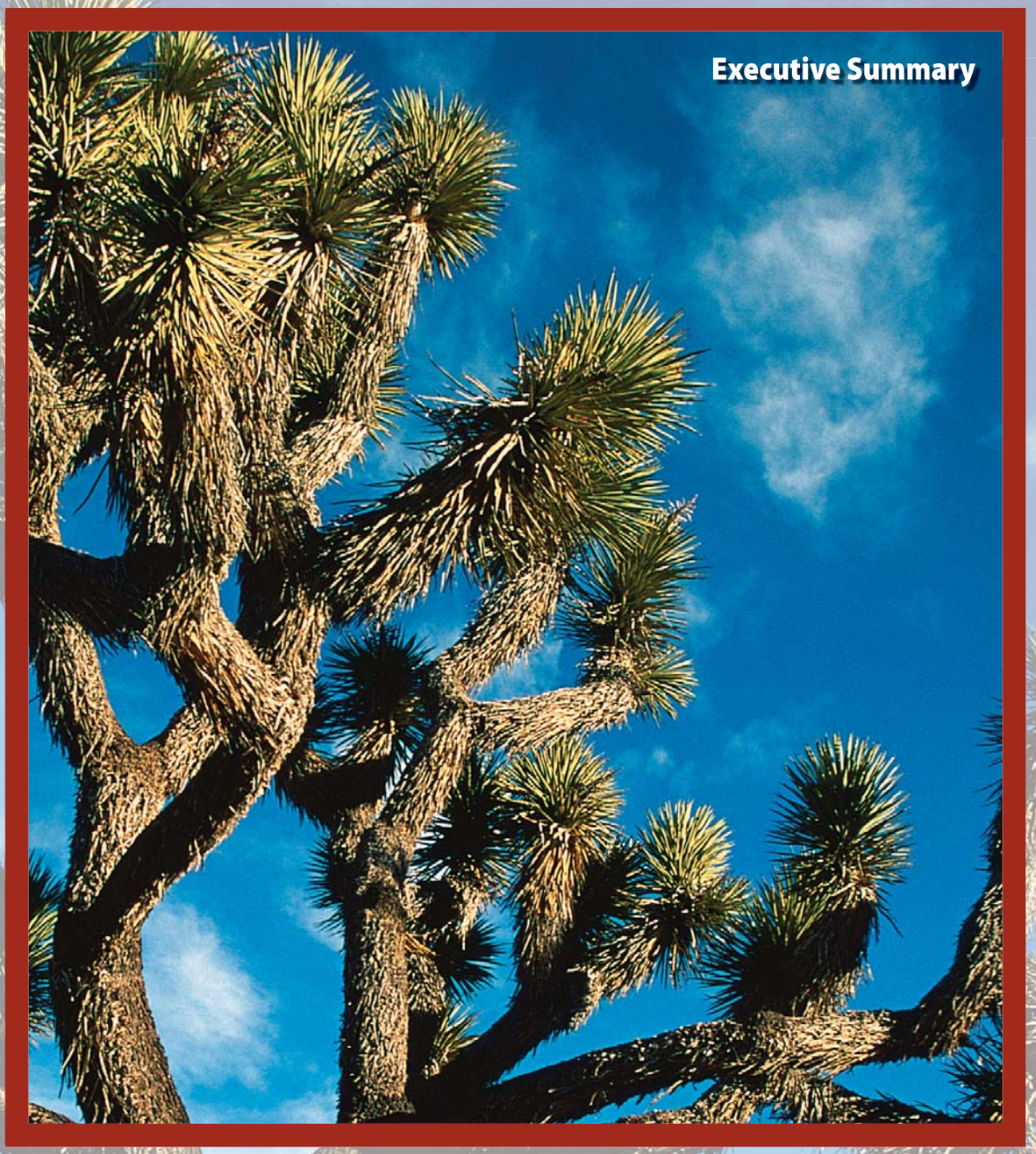
Executive Summary

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This plan defines a clear vision and direction for the sustainable management of groundwater reserves in the Antelope Valley Region.

Executive Summary

ANTELOPE VALLEY INTEGRATED REGIONAL WATER MANAGEMENT PLAN OVERVIEW

The California Water Plan 2005 update is the basis for all Integrated Regional Water Management (IRWM) planning efforts underway throughout the State, including this IRWM Plan for the Antelope Valley Region. It represents a fundamental transition in how the State looks at water resource management, and how the State government needs to be more involved at a local and regional level with governing agencies and interest groups to better identify and address State-wide water concerns.

The State recognizes that there is a need to consider a broader range of resource management issues, competing water demands, new approaches to ensuring water supply reliability, and new ways of financing.

IRWM planning was derived from Proposition 50 which was passed by California voters in November 2002, authorizing $3.4 billion in general obligation bonds to fund a variety of specified water and wetlands projects. It set aside $380 million for grants related to the implementation of IRWM Plans and is jointly administered by the California Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB).

Proposition 50 states that IRWM Plans should include a description of the region and participants, regional objectives and priorities, water management strategies, implementation, impacts and benefits, data management, financing, stakeholder involvement, relationship to local planning, and state and federal coordination. This Antelope Valley Integrated Regional Water Management (IRWM) Plan includes a discussion of the specified elements, as summarized below.

INTRODUCTION (SECTION 1)

Several years ago, leaders and agencies in the Antelope Valley Region recognized the need for regional cooperation and planning. In an effort to represent the broad interests within the Antelope Valley Region, a number of organizations joined to form a Regional Water Management Group (RWMG) to work together and create this IRWM Plan. Members of the RWMG include the Antelope Valley-East Kern Water Agency (AVEK), Antelope Valley State Water Contractors Association (AVSWCA), City of Lancaster, City of Palmdale, Littlerock Creek Irrigation District, Los Angeles County Sanitation District (LACSD) Nos. 14 and 20, Los Angeles County Waterworks District No. 40 (LACWWD 40), Palmdale Water District (PWD), Quartz Hill Water District (QHWD), and Rosamond Community Services District (RCSD). These agencies agreed to contribute funds to help develop the AV IRWM Plan, provide and share information, review and comment on drafts, adopt the final AV IRWM Plan, and assist in future grant applications for the priority projects identified in this IRWM Plan.

> *"We have a responsibility for future generations, and we have a responsibility just as responsible citizens, to protect this groundwater resource and make sure that we use it in the best way possible."*
>
> – Adam Ariki,
> Los Angeles County Waterworks District No. 40

In January 2007, the RWMG and other community participants (the Stakeholders) set about developing a broadly supported water resource management plan that defines a meaningful course of action to meet the expected demands for water within the entire Antelope Valley Region through 2035. They chose to create the water resource management plan consistent with the State sponsored Integrated Regional Water Management Program that makes grant funds available to support sound regional water management. The goals of the AV IRWM Plan are to address:

- How municipal and industrial (M&I) purveyors can reliably provide the quantity and quality of water that will be demanded by a growing population;
- Options to satisfy agricultural users' demand for reliable supplies of reasonable cost irrigation water; and
- Opportunities to protect and enhance the current water resources (including groundwater) and the environmental resources within the Antelope Valley Region.

The RWMG acknowledged that a separate process (called adjudication) related to groundwater management was also underway. Members of the RWMG and other stakeholders discussed at length whether it was possible (and if possible, how) to develop a Regional Water Management Plan before the adjudication was settled. The members of the RWMG agreed that since the IRWM Plan and the adjudication were focused on different aspects of water management, they could proceed in parallel. This IRWM Plan contains information to help take action to meet shared objectives for long-term water management for the entire region. The results of the adjudication will help provide important clarity and certainty between groundwater users about how the groundwater resources will be managed, but other important water management actions can and should be taken without waiting for a final adjudicated solution. Members of the RWMG agreed that no information developed for the purposes of the IRWM Plan should be interpreted to interfere in any way with the adjudication process. The data provided in this report were not prepared in a manner suitable to answer the questions being addressed in the adjudication.

REGION DESCRIPTION (SECTION 2)

The Antelope Valley Region of California is home to over 444,000 people living in many different communities. Residents within this Region have experienced tremendous changes over the past generation due to a rapid increase in population coming from nearby large cities. Current forecasts of population growth suggest even larger changes

Surface water for the Antelope Valley Region comes from the state aqueduct and Littlerock Reservoir

will occur before 2035. Water plays a central role in the health and well being of all residents within the Antelope Valley Region. People use water for drinking, bathing, household and outdoor activities, agriculture, business endeavors, recreation, and to sustain and enhance natural habitats. This common need for water links communities together in many ways. When anyone uses water, the ability of other people to use water within the Antelope Valley Region can be affected.

The Antelope Valley Region encompasses approximately 2,400 square miles in northern Los Angeles County, southern Kern County, and western San Bernardino County. Major communities within the Antelope Valley Region include Boron, California City, Edwards Air Force Base, Lancaster, Mojave, Palmdale and Rosamond. All of the water currently used in the Antelope Valley Region comes from two sources: (1) naturally occurring water within the Antelope Valley Region (surface water and groundwater accumulated from rain and snow that falls in the Antelope Valley and surrounding mountains), and (2) State Water Project water (surface water that is collected in northern California and imported into the Antelope Valley and other areas around the state).

"This plan is going to provide a long-range benefit to the Antelope Valley and will be able to continue to provide for economic development, particularly with residential development throughout the Antelope Valley Region."

– Gretchen Gutierrez,
Antelope Valley Building Industry Association

The number of residents within the Antelope Valley Region expanded more than 330 percent between 1970 and 2005, growing from 103,000 people in 1970 to 444,000 people in 2005. Forecasters expect the population to continue to swell, potentially reaching 1,174,000 residents by the year 2035. As the number of people living and working in the

Antelope Valley Region increases, the competition for water supply increases, and the challenge of maintaining good water quality and managing the interconnected water cycle becomes more challenging.

Creation of a proactive, "smart" design for the fast-developing Antelope Valley Region makes this IRWM Plan essential to efficient and effective water management.

ISSUES AND NEEDS (SECTION 3)

Water managers and local planners face many daunting challenges related to supporting the well being of the Antelope Valley Region. Past activities have created problems that need to be addressed and expected increases in population growth make resolving these problems even more difficult. In order to help address the broad challenges, the AV IRWM Plan was organized to address issues and needs in the following categories. Section 3 of the Plan describes these issues and needs in detail.

Supplies are Variable and Uncertain

Determining the amount of water available for use at any given time (now or in the future) is more challenging than one might imagine. The amount of water supply available varies considerably due to changes in weather, rain and snow, and other conditions. All water supplies within the Antelope Valley Region come from two sources: (1) local rain and snow, or (2) imports of water from outside the Antelope Valley Region. The local water supplies come from rainfall and snowmelt that percolate into the groundwater aquifers or are captured in Littlerock Reservoir. Current estimates of water supplies made available from local rainfall and snowmelt vary widely (30,300 to 81,400 acre-feet per year (AFY).[1,2] Imported water comes from the State Water Project, which has historically varied. The currently available supplies from imported water can also vary widely from year to year (6,400 to 74,300 AFY).

Demand is Greater than Supply

One fundamental challenge in the Antelope Valley Region is that demand for water exceeds available supplies. The

The expected rapid growth in the Antelope Valley Region will affect water demand and increase the threat of water contamination from additional wastewater and urban runoff without proper management.

demand for water clearly exceeds even the higher estimates of currently available supplies. By 2010 the demand for water in an average year by 2010 will be 274,000 AFY and by 2035 could be 447,000 AFY. Even using the higher estimates of available supply, this means demand could exceed supply by 73,600 AFY in 2010 and by 236,800 AFY in 2035. The expected imbalance between supply and demand in 2035 is about the same as currently available supplies. If communities do not begin conserving water more effectively, the Region will need twice the water as it currently has in order to meet demand in 2035.

Historically, water supplies within the Antelope Valley Region have been used primarily for agriculture; however, due to population growth, water demands from residential and business uses have increased significantly and this trend is expected to continue. The expected continuation of rapid growth in the Antelope Valley Region will affect water demand and increase the threat of water contamination from additional wastewater and urban runoff. More residents will also lead to higher demand for water-based recreation.

Much of the water used within the Antelope Valley Region is extracted from groundwater aquifers. The amount of water pumped within the Antelope Valley Region has varied tremendously since the early 1900s. The United States Geological Survey estimated that groundwater pumping in 1919 was about 29,000 AFY and reached as high as 400,000 AFY in the 1950's. For many of those years, the amount of water being pumped was greater than the amount of water being replenished, creating an imbalance within the groundwater aquifers. Because the amounts pumped were greater than the amounts being replenished, groundwater levels have declined significantly throughout the Antelope Valley Region. The long-term depletion of aquifers cannot be continued indefinitely without serious

1 An acre-foot per year is enough water to cover an acre of land one foot deep and meet the water needs of a family of four for one year.

2 The analyses provided in the IRWM Plan are strictly for long-term planning purposes and have not been conducted to answer the questions being addressed within the adjudication. Once the detailed analysis of available local water supply are completed within the adjudication, the supply numbers for the IRWM Plan will need to be updated.

consequences. The historical declines in groundwater levels within the Antelope Valley Region have caused permanent damage to aquifers in some areas through land subsidence, or sinking.

In order to prevent further damage from declining groundwater levels, many water providers and managers within the Antelope Valley Region recognize the need to balance the water being pumped from the aquifers with the water being put back. In response to this need, a legal process called adjudication is currently underway. If the adjudication process is successful, groundwater users within the Antelope Valley Region will create and abide by a plan to stabilize groundwater levels and prevent further damage that can result from declining groundwater levels. While determining a method to balance groundwater use with the amount of water being replenished is a necessary piece to creating a viable water management strategy within the Antelope Valley Region, the adjudication likely will not provide any additional water supplies needed to meet the growing demands within the Antelope Valley Region.

Recognizing the need to identify meaningful actions beyond the adjudication, members of the Group and other community participants agreed to focus on actions beyond the adjudication in the Plan. Participants in developing the AV IRWM Plan encourage a quick and collaborative settlement of the adjudication process, but the contents of the AV IRWM Plan identify and recommend actions that go well beyond the adjudication. The actions identified in the AV IRWM Plan can help meet the larger needs of the Antelope Valley Region but will require a solution from the adjudication to stabilize groundwater levels. Nothing in the IRWM Plan shall be interpreted to interfere in any way with the adjudication process.

Water Quality and Flood Management

The groundwater basin within the Antelope Valley Region is an undrained, closed basin, meaning there is no outlet for water to flow to the ocean. When water enters a closed basin, any minerals or chemicals in the water typically accumulate in the basin. Currently, groundwater quality is excellent within the principal aquifer but is not as good toward the northern portion of the dry lake areas. Some portions of the basin contain groundwater with high fluoride, boron, total dissolved solids, and nitrate concentrations. Arsenic is another emerging contaminant of concern in the Antelope Valley Region and has been observed in LACWWD 40, PWD, Boron, and QHWD wells. Research conducted by the LACWWD and the United States Geological Survey has shown the problem to reside primarily in the deep aquifer,

The need for regional coordination of flood control efforts is readily apparent with the increase of paved surfaces, along with the increase of local flood events.

The preservation of the Antelope Valley Region's unique environmental features can be achieved through integrated surface and groundwater management actions.

and it is not anticipated that the existing arsenic problem will lead to future loss of groundwater as a water supply resource for the Antelope Valley.

Portions of the Antelope Valley Region are also subject to flooding from uncontrolled runoff in the nearby foothills, which can be aggravated by lack of proper drainage facilities and defined flood channels. This runoff can negatively affect the water quality of the underlying groundwater basin, and can create stagnant ponds in places where clay soils beneath the surface do not allow for percolation to occur. The need for regional coordination of flood control efforts becomes more readily apparent as urban development and paved surfaces increase throughout the Antelope Valley Region, along with the frequency of local flood events.

Environmental Resources

The Antelope Valley Region has many unique environmental features, and several plant and animal species are only found in this area. As the pressure for growth expands out into undeveloped or agricultural lands, the need to balance industry and growth against protection of endangered species and sensitive ecosystems requires difficult decisions and trade-offs, each resulting in a variety of unique impacts on water demands and supplies in the Region. The actions identified in the AV IRWM Plan can help to preserve open space and natural habitats in the greater the Antelope Valley Region while maximizing surface water and groundwater management efforts.

Water Management and Land Use

What people do on the land of the Antelope Valley and how they do it directly impacts many aspects of life, including the water cycle, within the Antelope Valley Region. Historically throughout California, land use planning and water use planning have been done almost independently of one another. The challenges identified within the Plan clearly show a need for much closer collaboration between

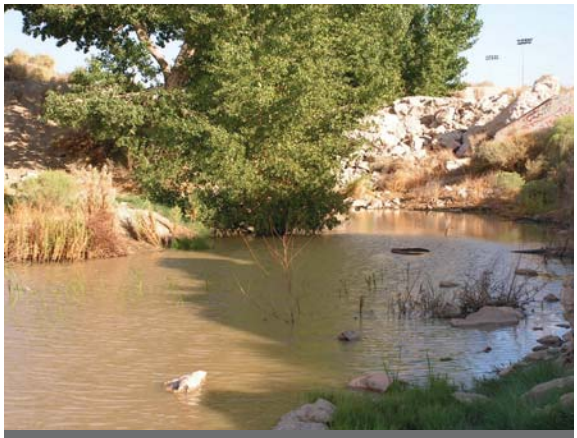
The expected rapid growth in the Antelope Valley Region will affect water demand and increase the threat of water contamination from additional wastewater and urban runoff without proper management.

land use planning efforts and water management planning efforts. Continued development within the Antelope Valley Region depends heavily on the successful completion of the objectives presented in the Plan to meet the growing demand for recreational opportunities while minimizing or avoiding the loss of local culture and values.

OBJECTIVES (SECTION 4)

The Stakeholders worked together to identify clear objectives and planning targets they want to accomplish by implementing the AV IRWM Plan (see Table ES-1). Although the AV IRWM Plan is intended to address the Antelope Valley Region's water resource management needs, this document also identifies several open space, recreation, and habitat targets as well. Refer to Section 4 of the AV IRWM Plan for details on how the objectives and targets were determined.

These objectives and planning targets represent the most important things the Stakeholders have chosen to work together to accomplish over the next several years. Everything done within the context of this IRWM Plan should contribute in some way to achieving these objectives. Also, because the planning targets are measurable, residents within the Antelope Valley Region can monitor how well the Plan is being implemented.



Stephen Sorenson County Park, a community recreation facility within the Antelope Valley, is home to "Lovejoy Springs" as it is known by the community.

Apollo Park Lake

Table ES-1 Antelope Valley Region Objectives and Planning Targets

Objectives	Planning Targets
Water Supply Management	
Provide reliable water supply to meet the Antelope Valley Region's expected demand between now and 2035.	Reduce (73,600 to 236,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.
	Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.[3]
	Provide adequate reserves (0 to 62,000 AF/4 year period) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.[4]
Establish a contingency plan to meet water supply needs of the Antelope Valley Region during a plausible disruption of SWP water deliveries.	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by June 2010.
Stabilize groundwater levels at current conditions.	Manage groundwater levels throughout the basin such that a 10-year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.
Water Quality Management	
Provide drinking water that meets customer expectations.	Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetics throughout the planning period.
Protect aquifer from contamination.	Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.
	Map contaminated sites and monitor contaminant movement, by December 2008.
	Identify contaminated portions of aquifer and prevent migration of contaminants, by June 2009.
Protect natural streams and recharge areas from contamination.	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.
Maximize beneficial use of recycled water.	Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.
Flood Management	
Reduce negative impacts of stormwater, urban runoff, and nuisance water.	Coordinate a regional flood management plan and policy mechanism by the year 2010.
Environmental Resource Management	
Preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region.	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat, to integrate and maximize surface water and groundwater management by 2015.
Land Use Planning/Management	
Maintain agricultural land use within the Antelope Valley Region.	Preserve 100,000 acres of farmland in rotation[5] through 2035.
Meet growing demand for recreational space.	Contribute to local and regional General Planning documents to provide 5,000 acres[6] of recreational space by 2035.
Improve integrated land use planning to support water management.	Coordinate a regional land use management plan by the year 2010.

3 Dry year reserves determined by taking the dry year mismatch and adding the average year supplement. Assumes that the average year supplement equals the average year mismatch for any given year. Range determined from the maximum and minimum reserves.

4 As with single-dry year, multi-dry year reserves determined by summing the 4-year dry year mismatch and adding the 4-year average year supplement. Assumes that the average year supplement equals the average year mismatch for any given year. Range determined from the maximum and minimum reserves.

5 The phrase "in-rotation" means that not all 100,000 acres will be in agricultural production at one time rather the land will be rotated in cycles to make most efficient use of the land.

6 The City of Palmdale and City of Lancaster's General Plans provide a standard of 5 acres of parkland per 1,000 City residents. The Kern County General Plan provides a standard of 2.5 acres per 1,000 residents. The other local and regional General Plans do not provide a standard for "recreation or parkland" preservation. This planning target assumes a 2035 population of 1.17 million residents in the Antelope Valley Region.

WATER MANAGEMENT STRATEGIES (SECTION 5)

An overview and description of each of the Proposition 50 Water Management Strategies required to be considered in the AV IRWM Plan is provided in Section 5. These water management strategies include those that are currently utilized by the agencies and organizations in the Antelope Valley Region on an ongoing basis, the strategies now being implemented, and those that are planned for the future.

Additionally, in the AV IRWM Plan, the 20 different water management strategies identified in the IRWM Plan Guidelines (CWC §§ 79562.5 and 79564) were compared with those identified in the California Water Plan and then grouped into the AV IRWM Plan's five regional and broad-based water management strategy areas: water supply management; water quality management; flood management; environmental resource management; and land use management.

To help identify the many potential projects in the Antelope Valley Region and to assess the contribution of these projects towards meeting the AV IRWM Plan objectives and planning targets (as identified in Table ES-1, above), a "Call for Projects" form was sent out to all the Stakeholders to give them the opportunity to submit their project concepts for consideration. The Call for Projects provided an avenue to engage the Stakeholders in the information-sharing aspect of Plan development, and resulted in identification of many projects that provide multiple benefits that span more than one water management strategy.

IRWM PLAN AND PROJECTS INTEGRATION, EVALUATION AND PRIORITIZATION (SECTIONS 6 AND 7)

Many local agencies and other community participants have worked well together to create a Plan that identifies challenging issues and needs being faced by all Antelope Valley residents. Fortunately, this IRWM Plan also identifies actions that can help meet the objectives for the Antelope Valley Region and identifies methods for cooperative implementation of those actions.

Table ES-2 lists the projects and actions that the Stakeholders believe will help meet the Regional objectives. Implementing the high priority actions will require focused effort, broad community support, political resolve, and money. The Stakeholders are actively pursuing financial assistance through several grant programs to help leverage local investments. The RWMG is also working to establish a secure and long-lasting way to coordinate resources to meet the growing needs of the entire Antelope Valley Region.

Table ES-2 Stakeholder Prioritized Projects

Priority	Project	Project Sponsor
Water Supply Groundwater Recharge/Banking Infrastructure Projects		
High	Antelope Valley Water Bank	Western Development and Storage
	Aquifer Storage and Recovery Project - Injection Well Development	LACWWD 40
	Upper Amargosa Creek Recharge, Flood Control & Riparian Habitat Restoration Project	City of Palmdale, AVEK
	Water Supply Stabilization Project – Westside	AVEK/AVSWCA/ LACWWD 40
Medium	Aquifer Storage and Recovery Project: Additional Storage Capacity	LACWWD 40
	Lower Amargosa Creek Recharge & Flood Control Project	J. Goit/City of Palmdale
	Water Supply Stabilization Project – Eastside Project	AVEK
Water Infrastructure Projects		
High	Avenue K Transmission Main, Phases I-IV	LACWWD 40
	Littlerock Dam Sediment Removal Project	PWD
	Wastewater Pipeline	RCSD
Low	Avenue M and 60th Street West Tanks	LACWWD 40
	Place Valves and Turnouts on Reclaimed Water Pipeline	RCSD

Table ES-2 Stakeholder Prioritized Projects (continued)

Priority	Project	Project Sponsor
Recycled Water Projects		
High	Antelope Valley Recycled Water Project Phase 2	LACWWD 40/Palmdale/ LACSD
	Groundwater Recharge Using Recycled Water Project	City of Lancaster
Medium	Groundwater Recharge – Recycled Water Project	PWD
	Kern County and Los Angeles County Interconnection Pipeline	RCSD
	Regional Recycled Water Project Phase 3	LACWWD 40/Palmdale/LACSD
	Tertiary Treated Water Conveyance and Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H	City of Lancaster
Low	Regional Recycled Water Project Phase 4	LACWWD 40/Palmdale/ LACSD
Water Conservation/Water Use Efficiency		
High	Comprehensive Water Conservation/Efficient Water Use Program	Antelope Valley Water Conservation Coalition/ LACWWD/PWD
Water Quality Projects		
High	Lancaster Water Reclamation Plan Stage V	LACSD
	Palmdale Water Reclamation Plan Existing Effluent Management Sites	LACSD
	Palmdale Water Reclamation Plan Stage V	LACSD
	Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation	LACWWD 40
Medium	Lancaster Water Reclamation Plan Stage VI	LACSD
	Lancaster Water Reclamation Plan Proposed Effluent Management Sites	LACSD
	Palmdale Water Reclamation Plan Stage VI	LACSD
	Palmdale Water Reclamation Plan Proposed Effluent Management Sites	LACSD
	Palmdale Water District New Treatment Plant	PWD
Low	42nd Street East, Sewer Installation	City of Palmdale
Flood Management Projects		
High	Development of Coordinated Antelope Valley Flood Control Plan	Cities of Lancaster, Palmdale, Los Angeles Department of Public Works (LADPW), Kern County
Medium	Quartz Hill Storm Drain	LADPW
	Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park	City of Palmdale
	Barrel Springs Detention Basin and Wetlands	City of Palmdale
	Hunt Canyon Groundwater Recharge and Flood Control Basin	City of Palmdale
Low	45th Street East Flood Control Basin (Q East Basin)	City of Palmdale
	Avenue Q and 20th Street East Basin (Q West Basin)	City of Palmdale
	Storm water Harvesting	Leona Valley Town Council
Environmental Resource Management Projects		
High	Ecosystem and Riparian Habitat Restoration of Amargosa Creek; Avenue J to Avenue H	City of Lancaster
Medium	Tropico Park Pipeline Project	RCSD
Land Use Management Projects		
High	Development of a Coordinated Land Use Management Plan	Cities of Lancaster, Palmdale, LADPW, Kern County /Antelope Valley Conservancy
	Amargosa Creek Pathways Project	City of Lancaster

FRAMEWORK FOR IMPLEMENTATION (SECTION 8)

The AV IRWM Plan is a dynamic document that identifies monitoring guidelines and sets forth procedures for measuring the success, benefits, and impacts of the AV IRWM Plan. An ongoing management process is proposed for evaluating, updating and maintaining the Plan, and a comprehensive implementation framework has been developed to establish and identify a capital improvement program and financial plan for both construction and operation and maintenance of the projects and management actions selected as "high priority" (see Table ES-2, for a list of the high priority projects).

The 11 public agencies that have joined together to create the RWMG have recognized the value of working collectively towards meeting the regional goals identified in this Plan. In order to do this, they have signed a Memorandum of Understanding (MOU) to define what their roles and responsibilities are in developing and moving forward with implementation of the AV IRWM Plan. The decision-making structure of the MOU provides the RWMG with the responsibility to make formal decisions regarding the scope and content of the AV IRWM Plan. While the structure and approach has been successful to create the plan, the RWMG discussed whether the MOU and facilitated broad agreement approach would work well to implement and update the Plan after it is adopted. Several potential options were discussed including selection of one willing existing agency within the RWMG, (the City of Palmdale for example), that would serve on behalf of the entire stakeholder group, or creation of a new legal entity, such as a new Joint Powers Authority (JPA) to lead the collaboration with the stakeholder group and help implement the IRWM Plan.

The stakeholders decided that they would like to continue using the current approach of facilitated broad agreement to implement and update the AV IRWM Plan. However, several of the RWMG Members expressed a desire to form a more formal governance structure to implement the Plan over the next several years. The stakeholders understand that creating a new, more formal governance structure that will maintain the positive momentum the group has demonstrated during the past year until the year 2035 will likely require a few years.

Implementation of the high priority projects in the IRWM Plan is currently the responsibility of the individual lead agency with the jurisdictional authority to approve the project. The Stakeholders and RWMG have chosen these projects because they want to take action on them within the next two to three years, and they directly address the objectives and targets of better management of resources within the Antelope Valley Region. Furthermore, implementing the projects together yield greater benefits to the Region then if each agency implemented on their own.

The collection, management, distribution and use of data collected as part of this IRWM Planning effort, and through implementation, are essential to making this a sustainable effort that will benefit the Antelope Valley Region for years to come. Data regarding water quantity and quality are currently collected and distributed by a number of different agencies. The Stakeholders have identified strategies in this IRWM Plan to ensure quick identification of data gaps, avoiding duplicative (and costly) studies that result in the same information, and integrating with other important regional, statewide programs, and federal needs.

This IRWM Plan identifies performance measures that will be used to evaluate strategy performance, monitoring systems that will be used to gather actual performance data, and mechanisms to change these strategies if the data collected shows the Antelope Valley Region's IRWM planning targets are not being met. The Stakeholders also recognized that additional technical detail is needed for several of the IRWM Plan's performance measures to be properly implemented and measurable. The Stakeholder group has agreed to continue to refine these performance measures as the AV IRWM Plan is implemented.

This IRWM Plan is necessarily a Stakeholder-driven Plan. The RWMG invites the public and interested Stakeholders to become active participants in the Region's ongoing efforts to:

- Identify, evaluate, prioritize, and implement solutions to the Region's complex water management issues, challenges, and conflicts; and
- Continue the development and evolution of this Plan.

The San Gabriel Mountains provide a beautiful, natural backdrop to many Antelope Valley households.

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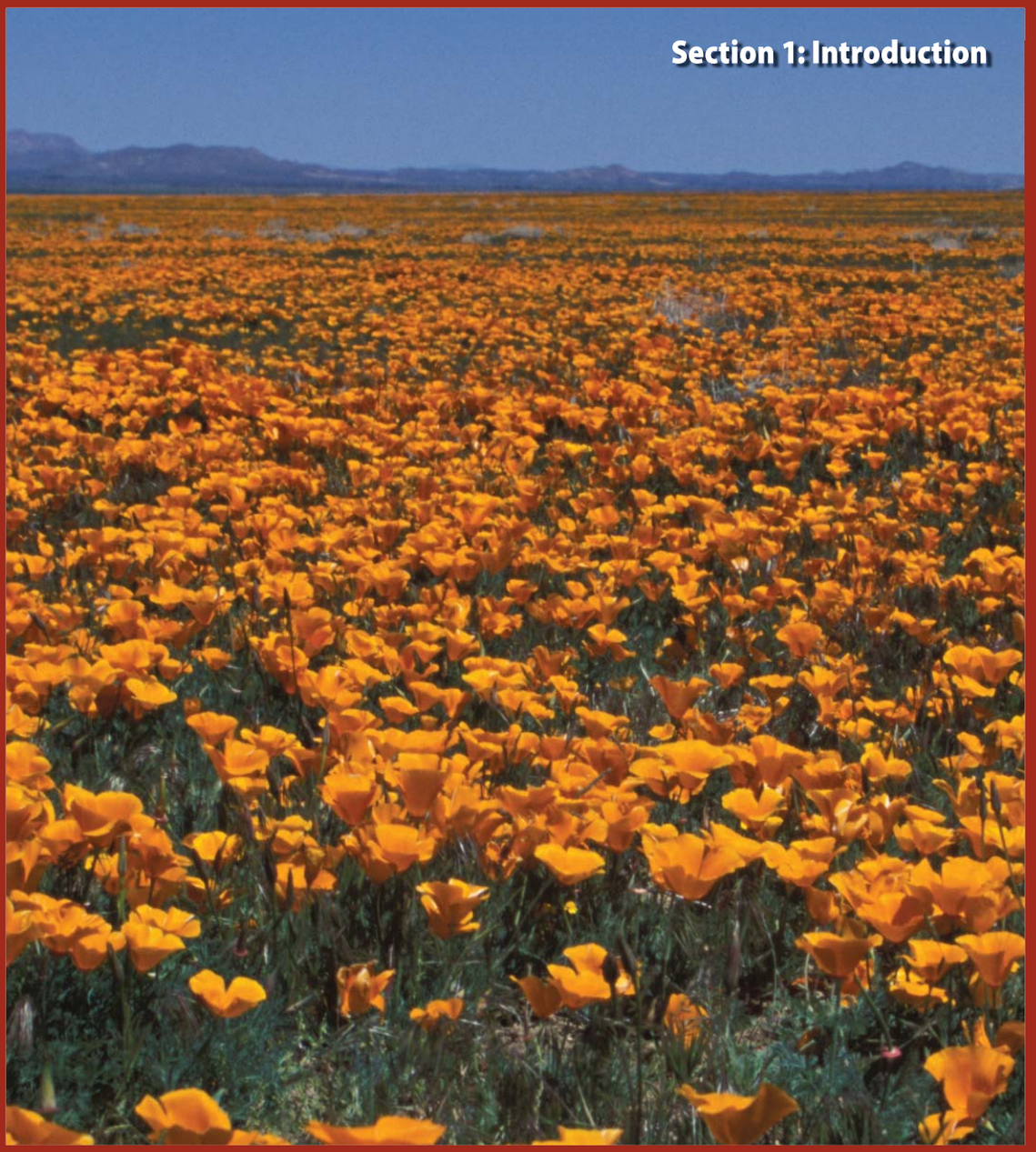
Section 1: Introduction



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When in bloom, the desert floor of the Antelope Valley can be seen bathed in the rich color of the prized California poppy.

Section 1: Introduction

This Integrated Regional Water Management Plan (IRWM Plan) defines a clear vision and direction for the sustainable management of water resources in the Antelope Valley Region through 2035. Although this IRWM Plan contains a viable action plan to provide a wide range of crucial water-related services necessary to support the well-being of people living in this unique and vibrant part of Southern California, this Plan is simply a planning and feasibility study and no implementation or any project is being approved or required through the adoption of this Plan. Implementation of this IRWM Plan will require further discretionary approvals either individually or jointly by the Group members. The IRWM Plan identifies existing key water-related challenges being faced by the residents of the Antelope Valley Region, along with projections of how these challenges will change by 2035. In response to current and expected challenges, this IRWM Plan provides a thorough inventory of possible actions to address the challenges, along with estimated costs and benefits of implementing each action. This IRWM Plan documents an extensive collaborative process that led to the selection of a robust combination of actions that may be implemented cooperatively by the stakeholders in the Antelope Valley Region.

Before efforts began to create this IRWM Plan, individual water purveyors and users were actively studying the effects of recent accelerated development of the Antelope Valley Region and were attempting to identify appropriate actions to address the growing pressure on water services. The recent acceleration of industrial and residential activity stimulated demand for both more water and higher quality water. Attempts by individual agencies to meet the growing challenges were frequently criticized and the atmosphere was one of mistrust with fierce competition among water users for limited water supplies. Water managers and stakeholders in the Antelope Valley Region began to recognize that some of the challenges being faced by residents could not be addressed using a single-agency or single-purpose perspective. They agreed that water resource needs in the Antelope Valley Region are highly interconnected and require a broad and integrated perspective in order to provide efficient and effective services throughout the Antelope Valley Region.

Acknowledging the need for a more comprehensive view, proactive stakeholders (including agencies with an interest in water and other resource management) in the Antelope Valley Region began meeting in May 2006 to improve communication and explore opportunities to leverage their resources. As a result, eleven public agencies formed the Antelope Valley Regional Water Management Group (RWMG) to lead stakeholders' collaborative efforts to resolve a growing number of water management challenges.

Early in their discussions, the stakeholders decided to develop a plan with a regional focus designed to identify a set of integrated solutions addressing goals for water supply, water quality, habitat improvement, and increased recreational parks and open space. The stakeholders acknowledged that no single funding source will be sufficient to pay for all of the warranted actions. This IRWM Plan addresses how to make wise use of all available funding sources, with an emphasis on improving regional self-sufficiency. This IRWM Plan identifies local and regional funding sources that may also be used to obtain state and federal funds from a variety of sources that require a local cost share.

The RWMG acknowledged that a separate process (called adjudication) related to groundwater management was also underway. Members of the RWMG and other stakeholders discussed at length whether it was possible (and if possible, how) to develop a Regional Water Management Plan before the adjudication was settled. The members of the RWMG agreed that since the IRWM Plan and the adjudication were focused on different aspects of water management, they could proceed in parallel. This IRWM Plan contains information to help take action to meet shared objectives for long-term water management for the entire region. The results of the adjudication will help provide important clarity and certainty between groundwater users about how the groundwater resources will be managed, but other important water management actions can and should be taken without waiting for a final adjudicated solution. Members of the RWMG agreed that no information developed for the purposes of the IRWM Plan should be interpreted to interfere in any way with the adjudication process. The data provided in this report were not prepared in a manner suitable to answer the questions being addressed in the adjudication.

This IRWM Plan creates opportunities for new partnerships and collaboration as well as documents a collective vision to meet water resource needs and improve the ecological health of the Antelope Valley Region. The quantitative planning targets provide investors the means to measure progress and account for the tangible community benefits. In short, this IRWM Plan describes a specific and financially feasible set of actions necessary to manage the precious water resources within this Antelope Valley Region through 2035 for the benefit of every resident.

1.1 BACKGROUND

The Antelope Valley Region is a triangular-shaped, topographically closed basin bordered on the southwest by the San Gabriel Mountains, on the northwest by the Tehachapi Mountains, and on the east by a series of hills and buttes that generally follow the Los Angeles/San Bernardino County line (Figure 1-1, Antelope Valley IRWM Plan Region). The Antelope Valley Region encompasses approximately 2,400 square miles in northern Los Angeles County, southern Kern County, and western San Bernardino County, and covers the majority of the service area of the Antelope Valley-East Kern Water Agency (AVEK), the largest water wholesaler in the Antelope Valley Region. Major communities within the Antelope Valley Region include Boron, California City, Edwards Air Force Base (AFB), Lancaster, Mojave, Palmdale and Rosamond.

Water supply for the Antelope Valley Region comes from three primary sources: the State Water Project (SWP), surface water stored in the Littlerock Reservoir, and the Antelope Valley Groundwater Basin. The Antelope Valley Region's SWP contractual Table A Amount is approximately 160,000 acre-feet per year (AFY). With proper treatment, SWP water is generally high quality water well-suited for municipal and industrial (M&I) uses; however, the reliability of the SWP water supply is variable. Surface water stored at the Littlerock Reservoir, which has a storage

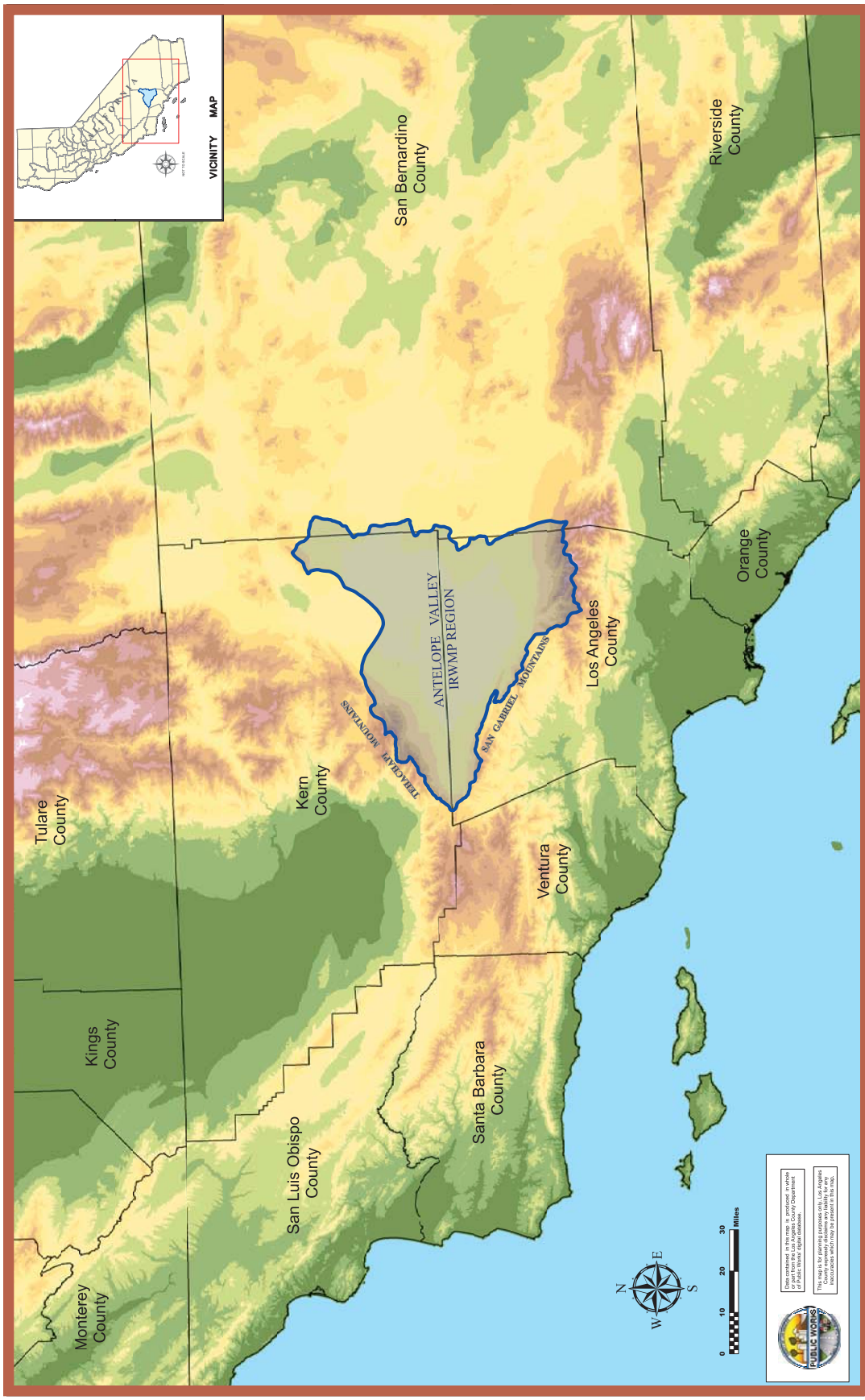


Figure 1-1 Antelope Valley Integrated Regional Water Management Plan Region

Mojave Desert floor landscape

capacity of 3,500 acre-feet (AF), is used directly for agricultural uses and for M&I purposes following treatment.

The Antelope Valley Groundwater Basin is a large basin comprised of a principal aquifer that yields most of the current groundwater supplies, and several less-used deep aquifers. Groundwater levels in some areas have declined significantly since the early 1900s due to over-extraction. Groundwater quality is excellent within most of the principal aquifer but degrades toward the northern portion of the dry lakes areas. High levels of arsenic, fluoride, boron, and nitrates are a problem in some areas of the Basin. The groundwater in the Basin is currently used for both agricultural and M&I uses.

Reclaimed water and stormwater are secondary sources of water supply. A portion of the effluent from the Antelope Valley Region's two large wastewater treatment plants, Los Angeles County Sanitation Districts' (LACSD) plants in Palmdale and Lancaster, are used for maintenance of wetlands, agricultural irrigation, landscape irrigation, and a park impoundment. Stormwater runoff from the Antelope Valley and the surrounding mountains and hills is usually carried by ephemeral streams. Except during the biggest rainfall events of a season, stormwater runoff quickly percolates into the stream bed and recharges the groundwater basin. Any runoff that reaches the dry lakes is generally lost to evaporation. Historically, water supplies within the Antelope Valley Region had been used primarily for agriculture; however, due to population growth beginning in the mid-1980s, water demands from residential and industrial uses have increased significantly and this trend is expected to continue. Projections indicate that approximately 1.17 million people will reside in the Antelope Valley Region by the year 2035, nearly 161 percent more than currently live in the Antelope Valley Region.

The expected continuation of rapid growth in the Antelope Valley Region will affect water demand and increase the threat of water contamination from additional wastewater and urban runoff. More residents will also lead to higher demand for water-based recreation. Increasing demands coupled with recent curtailments of SWP deliveries have intensified the competition for available water supplies. This competition has often limited the water available for natural habitat within the Antelope Valley.

Thus, these potential impacts could affect most residents within the Antelope Valley Region. In order to establish a viable action plan that will inspire action, a broad representation of stakeholders throughout the Antelope Valley must be involved in formulating this IRWM Plan.

1.2 STAKEHOLDER PARTICIPATION

An extensive stakeholder outreach process is crucial to ensure that this IRWM Plan reflects the needs of the entire Antelope Valley Region, promotes the formation of partnerships, and encourages coordination with state and federal agencies. One of the benefits of this planning process is that it brings together a broad array of groups into a forum to discuss and better understand shared needs and opportunities. Residents of the Antelope Valley Region are facing rapidly changing conditions that increase the likelihood of serious disruption in water-related services or long-term degradation of water supply or environmental resources. Agencies and planning jurisdictions must work closely together in order to assure the delivery of clean reliable water while maintaining the quality of life in the Antelope Valley Region. If sufficient planning and preventative action is not taken, the consequences for the Antelope Valley Region are likely to be severe.

A section of the California Aqueduct, the principal water-conveyance structure of the California SWP.

This IRWM Plan benefited from active participation by a wide range of stakeholders. Members of the RWMG and other stakeholders participated in fifteen stakeholder meetings, reviewed draft document materials, and provided extensive collaborative input to shape this IRWM Plan. For those topics that required further discussion during Plan development, stakeholders engaged in smaller, focused group dialogue to ensure that all stakeholder concerns were being considered while continuing to expedite this IRWM Plan development process. Through participation in stakeholder meetings (at a minimum, monthly, and maximum of three times a month) stakeholders have been exposed to a variety of opportunities for discovering and establishing mutually beneficial partnerships.

1.2.1 Regional Water Management Group

As described earlier, agencies in the Antelope Valley Region recognized the need for, and benefits of, regional cooperation and planning. In an effort to adequately represent the Antelope Valley Region, the RWMG was formed through a Memorandum of Understanding (MOU) (Appendix A). By signing the MOU, the agencies agreed to contribute funds to help develop this IRWM Plan, provide and share information, review and comment on drafts of this IRWM Plan, adopt the final IRWM Plan, and assist in future grant applications for the priority projects selected in this IRWM Plan.

The RWMG includes AVEK, Antelope Valley State Water Contractors Association (AVSWCA), City of Lancaster (Lancaster), City of Palmdale (Palmdale), Littlerock Creek Irrigation District (LCID), LACSDs14 and 20, Los Angeles County Waterworks District No. 40 (LACWWD 40), Palmdale Water District (PWD), Quartz Hill Water District (QHWD), and Rosamond Community Services District (RCSD). These participants' roles and responsibilities for managing water, natural resources, and land use within the Antelope Valley Region are discussed below:

1.2.1.1 Antelope Valley-East Kern Water Agency

AVEK is a wholesale supplier of SWP water to the Antelope Valley Region. AVEK's service area encompasses nearly 2,400 square miles in northern Los Angeles and eastern Kern Counties as well as a small portion of Ventura County. AVEK was granted charter by the State in 1959 and became a SWP contractor in 1962.

AVEK is the third largest SWP contracting agency with a current contractual Table A amount of 141,400 AFY. Table A water is a reference to the amount of water listed in "Table A" of the contract between the SWP and the contractors and represents the maximum amount of water a contractor may request each year. This volume includes both agricultural and M&I SWP water, which AVEK distributes to M&I

The Stakeholders are presented with funding opportunities from the California Department of Public Health during the 16th Stakeholder meeting in Lancaster, CA

retailers in the Antelope Valley Region. AVEK estimates that it currently provides water to a population of approximately 285,000 persons through seventeen retail water agencies and water companies. Currently AVEK customers utilize approximately 75,000 AFY of its Table A Amount.

AVEK does not have production groundwater wells and does not provide recycled water. AVEK, however, does provide a small amount of SWP water to areas outside of the Antelope Valley. AVEK is also a partner in the Joint Powers Authority (JPA) for the AVSWCA.

1.2.1.2 Antelope Valley State Water Contractors Association

The AVSWCA is a JPA of the three local SWP contractors of the Antelope Valley (AVEK, LCID, and PWD) that was formed in May 1999.

The AVSWCA has a declared Statement of Principals and Objectives to frame its roles and responsibilities:

- to make optimum use of available water supplies to meet current and anticipated demands;
- to confirm that the AVSWCA will not take away any water rights within the Antelope Valley;
- to develop plans for maximum cooperative use of the available water resources;
- to establish an equitable means of apportioning the benefit and burdens of water resource management;
- to prevent the export of native surface water and groundwater from the Antelope Valley and to develop reasonable limitations upon the export of any other water from the Antelope Valley;
- to provide a mechanism for the storage and recovery of water;
- to encourage the protection and preservation of surface water and groundwater quality;
- to develop conservation plans to promote reasonable beneficial use of water;
- to respect existing jurisdictional authority of the public agencies and water suppliers in the Antelope Valley;
- to solicit and welcome the advice, council and support of interested parties and the public in the implementation of these principals and objectives; and
- to conduct regularly scheduled meetings to advance these principles and objectives and discuss other matters of common interest.

In August 2006, the AVSWCA accepted responsibility as the facilitator for groundwater banking projects in the Antelope Valley.

1.2.1.3 City of Lancaster

Lancaster is located at the northern edge of Los Angeles County in the Antelope Valley and borders the northern edge of Palmdale to the south. It is located 60 miles northeast of the Los Angeles Civic Center and is approximately 2,400 feet above sea level. It serves as a commercial, cultural and educational center for the high desert Antelope Valley. Lancaster is suburban in nature and enjoys a temperate year-round climate.

Lancaster is a highly acclaimed, award winning municipality. Lancaster has received seventeen League of California Cities Helen Putnam Awards of excellence and was one of ten cities in the nation to be honored with the City Livability award in 2000. It is the eighth-largest city in Los Angeles County, is also the County's fastest growing city, with a population of approximately 138,000 and an area of 94 square miles.

The Planning Department is responsible for development and implementation of a variety of short-, mid-, and long-range plans, including the City's General Plan, various specific plans, and the City's zoning and subdivision ordinances. The Public Works Department has received National Awards for Economic Development Programs and innovative Public Works projects, and it is responsible for various environmental compliance and conservation projects as well as flood control and stormwater management. The Parks, Recreation and Arts Department manages eleven City parks with more than 500 acres, including athletic fields, swimming pools, playgrounds and walking trails.

Lancaster is a General Law City, incorporated in 1977, and operating under Council-Manager form of government. The City government provides various municipal services related to water and natural resources management. Utility services within Lancaster are provided by several public and private agencies. Water service is primarily provided by LACWWD 40; and sewer service is provided by the LACSD 14.

1.2.1.4 City of Palmdale

Palmdale, the first community within the Antelope Valley to incorporate as a city in 1962, is

located in the northeast reaches of Los Angeles County, separated from Los Angeles by the San Gabriel Mountain range. Over the last 20 years, Palmdale has consistently been ranked in the top ten fastest growing cities in the U.S. based on percentage change. As of spring 2005, the population is estimated at 143,000, making Palmdale the sixth largest city in Los Angeles County and the largest "desert city" in California. With 105 square miles of land in its incorporated boundaries, Palmdale is in the top 100 largest cities in the U.S. in geographic area and as of 2005 ranks 150th by population in the U.S.

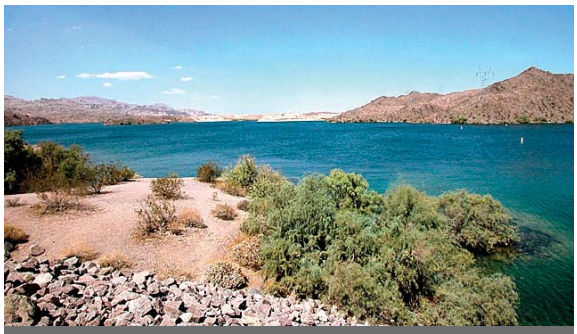
The Palmdale government provides various municipal services related to water and natural resource management. The Planning Department is responsible for the development and implementation of a variety of short-, mid-, and long-range plans, including the City's General Plan, various specific plans, and the City's zoning and subdivision ordinances. The Public Works Department is responsible for the development and maintenance of the City's flood control and stormwater management facilities. The Parks and Recreation Department's responsibilities include the administration, management and implementation of programs that maintain and beautify Palmdale's parklands and recreational facilities.

Utility services within Palmdale are provided by several public and private agencies. Water service is primarily provided by PWD and LACWWD 40; sewer service is provided by the LACSD 20; and refuse pickup and disposal service is provided by Waste Management, Inc. of the Antelope Valley under a franchise agreement with the City.

1.2.1.5 Littlerock Creek Irrigation District

LCID is the smallest of the three SWP Contractors within the Antelope Valley. LCID's service area comprises approximately 17 square miles within the southeastern region of the Antelope Valley. The majority of LCID consists of unincorporated land east of the City of Palmdale, though a small portion of the city is within LCID's boundaries.

LCID receives raw water from the SWP, local surface water from Littlerock Reservoir and pumps groundwater. LCID's SWP contractual Table A amount is 2,300 AF and provides



Scenic vista across Littlerock Reservoir

water to approximately 1,130 active service connections (LAFCO 2004).

LCID is a partner in the JPA for the AVSWCA and also participates in a joint use agreement with PWD for shared use of Littlerock Dam for treated water. LCID's surface water source is from surface runoff collected in Littlerock Reservoir. Littlerock Reservoir, which is co-owned with PWD, is fed by the runoff from the San Gabriel Mountains and has a useable storage capacity of 3,500 AF of water. PWD and LCID jointly have long-standing water rights to 5,500 AFY from Littlerock Creek flows (PWD 2001). LCID has an agreement with PWD to treat LCID's SWP and Littlerock Creek water when it is needed for potable use. LCID has one groundwater well for agriculture, four groundwater wells producing potable water and five one-million gallon tanks to store potable water for residential use (personal communication, LCID, 2005).

1.2.1.6 Los Angeles County Sanitation District Nos. 14 and 20

LACSDs are a confederation of independent special districts serving about 5.1 million people in Los Angeles County. LACSD's service area covers approximately 800 square miles and encompasses 78 cities and unincorporated territory within the County. The agency is made up of 24 separate Sanitation Districts working cooperatively under a Joint Administration Agreement with one administrative staff headquartered near the City of Whittier. Each Sanitation District has a separate Board of Directors consisting of the Mayor of each city within that District and the Chair of the Board of Supervisors for county unincorporated territory. Each Sanitation District pays for its proportionate share of joint administrative costs. The Antelope Valley is served by the LACSD 14 and 20.

The Antelope Valley Stakeholders are presented with an update on their Proposition 50 Round 2 Step 1 application during the 16th Stakeholder meeting in Lancaster, CA.

LACSD 14 was formed on August 31, 1938, to provide wastewater management services in the Antelope Valley. LACSD 14, whose service area is 45 square miles, serves a large portion of Lancaster as well as portions of Palmdale and adjacent unincorporated areas of Los Angeles County. LACSD 20 was formed on August 7, 1951, to provide wastewater management services for the Palmdale area. Its service area is approximately 31.4 square miles and serves the majority of residents within Palmdale, as well as adjacent unincorporated Los Angeles County areas.

The LACSD owns, operates, and maintains over 1,300 miles of main trunk sewers and eleven wastewater treatment plants with a total permitted capacity of 636.8 million gallons per day (mgd). The LACSD sewerage system currently conveys and treats approximately 510 mgd of wastewater. During 2004, a total of approximately 187 mgd of wastewater was treated to a tertiary level and approximately 35 percent (65 mgd) of the effluent was reused for a variety of applications. Operation of LACSD facilities influence the community and environment in the Antelope Valley by providing effluent to landscape and agricultural irrigation, industrial process water, recreational impoundments, wildlife habitat maintenance, and groundwater replenishment.

1.2.1.7 Los Angeles County Waterworks District No. 40

LACWWD 40 is a public water agency that serves portions of the Cities of Lancaster and Palmdale, and several small communities in the eastern portion of the Antelope Valley. LACWWD 40 was formed in accordance with Division 16 Sections 55000 through 55991 of the State Water Code to supply water for urban use throughout the Antelope Valley. It is governed by the Los Angeles County Board of Supervisors with the Waterworks Division of the County Department of Public Works providing administration, operation and maintenance of LACWWD 40's facilities.

LACWWD 40 provides water service to approximately 162,000 residents through 53,000 service connections, and operates and maintains 46 wells, approximately 923 miles of water mains, 30 booster pumping stations, 59 water storage tanks with 65 million gallons of storage capacity. LACWWD 40's service area encompasses approximately 554 square miles which is comprised of eight regions serving customers in the communities of Lancaster (Region 4), Pearblossom (Region 24), Littlerock (Region 27), Sun Village (Region 33), Desert View Highlands (Region 34), Northeast Los Angeles County (Region 35), Lake Los Angeles (Region 38), and Rock Creek (Region 39). It is noted that Regions 4 and 34 are integrated and operated as one system. Regions 24, 27, and 33 are also integrated and operated as one system.

LACWWD 40's permanent water supply is from its own groundwater wells. In order to protect this invaluable resource, LACWWD 40 utilizes water from the SWP to meet its customers' demands whenever the SWP supply is available. SWP water is obtained through connections to AVEK's facilities. During 2005, LACWWD 40 supplied 54,421 AF of water to its customers. Approximately 66 percent of the water served in its service area was purchased water from AVEK and the remaining 34 percent was groundwater from its wells.

1.2.1.8 Palmdale Water District

PWD is a wholesaler and retailer of potable water. PWD was established in 1918 as the Palmdale Irrigation District (PID). The name was changed in 1973 to reflect the absence of agricultural water service. As stated above, PWD is also a partner in the JPA for the AVSWCA. PWD boundaries encompass approximately 187 square miles. Approximately 35 square miles are directly served by PWD and an additional two square miles are served through agreements with AVEK (the majority of the remaining area falls within the Angeles National Forest).

PWD has three sources for water: (1) imported water from SWP, of which it has a contractual Table A amount of 21,300 AFY, (2) local groundwater, and (3) surface water (Littlerock Reservoir, which is jointly owned by LCID, and PWD). Littlerock Reservoir has a storage capacity of 3,500 AF of water. Palmdale Lake stores the SWP water and any Littlerock Reservoir discharges until treatment and distribution. Groundwater wells produce approximately 40 percent of PWD's water supply. Recycled water is projected for use within the PWD service area in the future.

In general, PWD serves the eastern half of the City of Palmdale and adjacent unincorporated areas of Los Angeles County, and maintains over 26,000 service connections.

1.2.1.9 Quartz Hill Water District

QHWD is an independent special district that was incorporated in 1955, with a service area of about 4.5 square miles located in the southwest end of the Antelope Valley at the north end of Los Angeles County.

QHWD's service area includes portions of both Cities of Lancaster and Palmdale as well as unincorporated County land between the two. Water service is provided to residential, commercial, industrial, and agricultural customers, as well as for environmental and fire protection uses.

QHWD is a retailer of imported water from AVEK and produces local groundwater. In 2004, QHWD imported approximately 4,099 AF of water from AVEK, and pumped approximately 1,348 AF of groundwater for distribution in its service area.

1.2.1.10 Rosamond Community Services District

RCSD was formed in 1966 under the Community Services District Law, Division 3, Section 61000 of Title 6 of the Government code of the State of California. RCSD's service area boundary encompasses approximately 31 square miles of unincorporated residential, industrial, and undeveloped land. The majority of the land located within the RCSD's service area is undeveloped. The developed property focuses around central Rosamond, with the exception of the Tropico Hills.

RCSD provides water, sewer, lighting service, and public park maintenance services to residential, commercial, industrial, and agricultural customers, as well as water for environmental and fire protection uses.

RCSD is a retailer of imported water from AVEK and produces local groundwater. In 2004, RCSD imported approximately 1,191 AF of water from AVEK, and pumped approximately 1,990 AF of groundwater for distribution in its service area.

The composition of the RWMG provides a good cross-sectional representation of all water/natural resource and land-use management activities for the Antelope Valley Region. Table 1-1 provides a summary of participating agencies' roles and responsibilities specific to this IRWM Plan development and implementation.

1.2.2 Planning Group ("Stakeholders")

In addition to the RWMG, this IRWM Plan has had the input of many other interested agencies and organizations. Membership in the stakeholder group was broadly extended to a number of entities and membership continues to grow. Neither a financial contribution nor agency status were required to be part of the collaborative IRWM Plan development process. Through extensive outreach efforts, individuals from disadvantaged, small, and rural communities as well as other interested groups are continually encouraged to participate, and are being informed of IRWM Plan development efforts through

The Stakeholders review the goals for the planning process during the 7th Stakeholder meeting on December 13th.

Table 1-1 Participating Entities

Agency	Roles and Responsibility
AVEK	Wholesaler of imported water to the Antelope Valley Region
AVSWCA	Members provide imported water to Antelope Valley
City of Lancaster	Provides land-use planning, environmental, flood management, and parks and recreation services
City of Palmdale	Provides land-use planning, environmental, flood management, and parks and recreation services
LCID	Supplies surface and imported water to the Antelope Valley Region
LACSD 14	Provides collection and treatment of wastewater and supplies recycled water to portions of the Antelope Valley Region
LACSD 20	Provides collection and treatment of wastewater and supplies recycled water to portions of the Antelope Valley Region
LACWWD 40	Supplies water to portions of Los Angeles County
PWD	Supplies water to portions of Palmdale and adjacent unincorporated areas of Los Angeles County
QHWD	Supplies water to portions of the southwest end of Antelope Valley
RCSD	Supplies water to portions of unincorporated Kern County

presentations, media relations, and information disseminated in their communities.

In an effort to reduce existing conflicts in the Antelope Valley Region, many of which have traditionally been experienced in areas that include both large and small communities, urban, rural, and agricultural interests, and no mechanism for joint planning and prioritization, this IRWM Plan has been prepared through a collaborative process of many agencies and organizations with an interest in improving water supply reliability and sufficiency, water quality, water conservation, flood control, natural habitat, and land-use planning in the Antelope Valley Region. This subsection lists all current stakeholders grouped into several categories and describes their roles in the planning process. The broad array of participants include the agencies that comprise the RWMG as well as an extensive mix of other cities and regulatory, environmental, industrial, agricultural, and land-use planning agencies that represent all areas of the Antelope Valley Region. A brief discussion of coordination efforts with local planning, State, and Federal agencies is also provided where appropriate.

Planning group meetings were held, at a minimum, monthly, to allow for discussion of issues facing the Antelope Valley Region. These meetings were open to the public and all other interested parties. Copies of the meeting minutes and presentations from these meetings are available on the project website (www.avwaterplan.org).

1.2.2.1 State Water Project Contractors

The State Water Project Contractors include agencies that provide distribution of SWP water to the Antelope Valley. Each of these agencies is a member of the RWMG and was described in Section 1.2.1. These agencies include AVSWCA, AVEK, LCID, and PWD.

1.2.2.2 Retail Water Purveyors

The retail water purveyors include agencies that have water management responsibilities in the Antelope Valley Region. A majority of these agencies is a member of the RWMG and was described in Section 1.2.1. These agencies include LACWWD 40, QHWD, Palm Ranch Irrigation District, and RCSD.

1.2.2.3 Local Jurisdictions/Land-Use Planning Agencies

Several land-use planning departments and agencies have been involved in the development and implementation of the projects and objectives of this IRWM Plan. Their participation provides a link between local planning agencies and this IRWM Plan by offering input in meetings, providing accurate and consistent land-use planning information, and incorporating local planning documents and goals into the IRWM Plan objectives. In addition, representatives of the Cities of Palmdale, Lancaster, California City, and Boron, and the Los Angeles and Kern County Departments of Regional Planning, participate in the meetings.

1.2.2.4 Federal Agencies

Several federal agencies have been involved in the development and implementation of the objectives and projects for the IRWM Plan. Coordination with federal regulatory agencies is essential to the development and implementation of all recommended projects due to the need for

regulatory and environmental approval prior to implementation. The federal agencies involved include: the United States Department of Agriculture, Natural Resources Conservation District, United States Geological Survey, and Edwards AFB. The role of Edwards AFB is to ensure that their natural resource management goals are incorporated into this IRWM Plan.

1.2.2.5 Regulatory Agencies/State Agencies

Several state regulatory agencies have been involved in the development and implementation of the objectives and projects for this IRWM Plan. Their participation has focused particularly on water quality issues pertaining to groundwater recharge within the Antelope Valley Region. Coordination with state regulatory agencies is essential to the development and implementation of all recommended projects due to the need for regulatory and environmental approval prior to implementation. The Lahontan Regional Water Quality Control Board (RWQCB) has participated in preparing this IRWM Plan, and coordination regarding projects within this IRWM Plan has already begun. Furthermore, these agencies have had the chance to address items of concern on these projects at the monthly stakeholder meetings. The roles and responsibilities of these agencies are to ensure that regulatory compliance standards and goals are incorporated in this IRWM Plan. The agencies include: the Lahontan RWQCB, the California Department of Health Services, the California State Parks, and the California State Department of Fish and Game.

1.2.2.6 Environmental Community

The role and responsibility of the environmental community is to ensure that goals for conservation and protection of the natural resources and habitat within the Antelope Valley are incorporated in this IRWM Plan. The environmental communities involved include the Antelope Valley Conservancy, the Antelope Valley Water Conservation Coalition, Antelope Valley Resource Conservation District and the Sierra Club.

1.2.2.7 Building Industry

The Building Industry Association's role is to ensure land-use planning and growth management within the Antelope Valley is incorporated in this IRWM Plan. The building industry entities involved include two chapters of the Building Industry Association, the Antelope Valley Chapter and the Kern County Chapter.

1.2.2.8 Agricultural/Farm Industry

Agricultural and Farm interests for the Antelope Valley Region have been represented by the Los Angeles County and Kern County Farm Bureaus as well as individual farm and land owners. Their role is to ensure that agricultural and farm interests are incorporated in this IRWM Plan.

1.2.2.9 Wastewater Agency

Wastewater service for the Antelope Valley is provided by the LACSDs 14 and 20. The LACSD is a member of the RWMG and its roles and responsibilities are described in Section 1.2.1.

1.2.2.10 Mutual Water Companies

There are several mutual water companies in the Antelope Valley that provide water-related services to the Antelope Valley Region. Their role is to ensure that their water management goals are incorporated in to this IRWM Plan. Mutual water companies involved include: Antelope Park Mutual Water Company, Edgemont Acres Mutual Water Company, El Dorado Mutual Water Company, Evergreen Mutual Water Company, Golden Valley Mutual Water, Land Projects Mutual Water, Little Baldy Water Company, Westside Park Mutual Water Company, and White Fence Farms Mutual Water Company.

1.2.2.11 Media

Representatives of the Antelope Valley Press and the Mojave Desert News regularly attended RWMG stakeholder meetings and informed their readership of the goals and objectives of this IRWM Plan. Progress was regularly reported on in these two major area newspapers as well as other local papers.

A variety of agricultural and flora prosper in the Antelope Valley climate. Photo courtesy of Nevel Burke, U.S. Army Retired.

1.2.2.12 Others

Other agencies involved in the planning process include the Boron Community Services District, the Mojave Chamber of Commerce, California City Economic Development Commission, the Association of Rural Town Councils, and individual town councils throughout the Antelope Valley Region. The various town councils' roles are to ensure that their water, natural resource, fire suppression, flood control, and land-use planning goals are incorporated in this IRWM Plan. Inclusion and participation by these organizations marks a first for the area and ensures that the resulting IRWM Plan is truly regional. A copy of a sign-in sheet from one of the many Stakeholder meetings can be found in Appendix B.

1.2.3 Activities

This IRWM Plan was developed to evaluate and address regional issues while recognizing and honoring local conditions and preferences. In order to accomplish this delicate balance, an effective process to involve stakeholders and incorporate their input was necessary. The process centered on, at a minimum, monthly stakeholder meetings open to the public where attendees were invited to participate in several ways. Attendees were asked to participate in facilitated discussions of major items of interest, to review draft plan chapters, and to provide input on the agenda for upcoming stakeholder meetings. These meetings were announced to a broad distribution list via e-mail and all materials developed for use in stakeholder meetings were made available on the project website. The methods for stakeholder involvement and input are described below:

- **Review of Plan Sections:** This IRWM Plan synthesizes and extends a significant body of work related to water supply, water quality, and open space for the Antelope Valley Region. This information was synthesized and generated incrementally and provided to all interested stakeholders periodically for review. Given the incremental development and review cycle, stakeholders had multiple opportunities to provide input and the material was adopted only after the stakeholders reached facilitated broad agreement on the material. The subjects of the chapters include: introduction, Region description, key issues and needs, Plan objectives, water management strategy development, water management strategy integration, water management strategy prioritization and selection, and framework for implementation. These chapters incorporate and integrate stakeholder-generated information and aggregate this information across the entire Antelope Valley Region. In addition, a summary of existing plans, reports, studies, and interviews with selected stakeholders to obtain the individual perspective of those entities have been compiled for reference.
- **Monthly Stakeholder Meetings:** These meetings provide background on the planning process; identify issues, opportunities and constraints; consider opportunities for project integration, and identify comments on the chapters and draft plans. They also provide a forum for more detailed discussion of the issues related to development of this IRWM Plan, including the prioritization and selection of projects for Round 2 of Proposition 50, Chapter 8, Proposition 84, and Proposition 1E.
- **Project Website:** A project website was developed (www.avwaterplan.org) to facilitate the distribution of project information to stakeholders. The website contains background information about Plan development, a schedule of meetings, and contact information. The website also includes a database tool through which stakeholders could submit or review projects or project concepts. Since the project website was created in November 2006, it has received over 9,750 hits. A print out of the home page is included in Appendix C.
- **Electronic and Written and Communications:** Electronic mail was the main tool used to maintain a high level of stakeholder communication and engagement. All meetings and public hearing announcements were sent as far in advance as possible to stakeholders. Various stakeholder groups also forwarded these messages to their constituencies, thereby reaching additional stakeholders. In addition, written communications in the form of letters to cities and press releases to the media were utilized to expand awareness of, and participation in, this IRWM Plan development. Regular attendance at stakeholder meetings by members of the local press also went a long way toward keeping the residents of the Antelope Valley Region informed. Sample letters are provided in Appendix C.

The delicate balance between the natural and man-made environment will be dependent on the future security of our water.

Public Outreach Subcommittee members meet to discuss various opportunities to involve more Antelope Valley communities in the development of the plan.

1.2.4 Community Outreach

Community outreach within the Antelope Valley Region is a key component to a successful IRWM Plan. Simply stated, a regional plan should have regional input, and would incorporate the widest variety of stakeholders possible. Initial outreach efforts began in the early stages of the planning process and were targeted at improving overall stakeholder participation through increased agency and organized committee involvement. However, it soon became clear that this method of solicitation was not as effective with many of the smaller communities in the Antelope Valley with valuable input were not being represented at the general group meetings. Therefore, outreach efforts were accelerated in January of 2007 to broaden the scope to improve outreach to smaller communities in the region through the formation of the Public Outreach Subcommittee (Subcommittee).

> *"We see an interaction that is taking place now that hasn't happened before."*
>
> – Claud Seal,
> Rosamond Community Services District

The Subcommittee was composed of volunteer members representing a diverse cross section of the active Antelope Valley IRWM Plan stakeholders including cities, a farming entity, a local town council member, and wastewater and water agencies. The members soon developed and implemented a multifaceted outreach campaign to support the IRWM Plan that would more actively address the general public through improved media relations with the local press, increased information accessibility at the www.avwaterplan.org website, and more focused community outreach. The outreach strategy outlined subcommittee objectives, key messages, and tasks needed to reach the objectives. Overall, the two main goals of the Subcommittee were to:

- Encourage participation and solicit input into Antelope Valley IRWM Plan development, and
- Educate target audiences about the purpose and benefits of the Antelope Valley IRWM Plan

The varied background and knowledge and overall enthusiasm of the Subcommittee members proved very helpful in determining the most effective way to reach more Antelope Valley communities. As multiple tactics were discussed, a decision was made for Subcommittee members to begin outreach through the Antelope Valley Association of Rural Town Councils (Association) community meeting to obtain input from local leaders on the most effective ways to reach their residents. Members collectively prepared PowerPoint presentation materials that would introduce the collaborative IRWM Plan concept and its importance to the Antelope Valley while soliciting feedback about community outreach methods and project ideas that could be incorporated into the IRWM Plan. The Association unanimously advised the Subcommittee that the IRWM Plan presentation should be given at each of the individual Town Council meetings to reach the largest audience. The response was so positive that a couple town council meetings were scheduled immediately following the conclusion of the presentation.

With the newly-acquired information from the Association, the Subcommittee obtained a complete roster of the active rural town councils in the Antelope Valley from the Los Angeles County Board of Supervisor's Office and began an intense coordination effort to speak at the community meetings. At least two Subcommittee members volunteered to present at each outreach meeting scheduled. This allowed for a diversity of presenters to attend each meeting as well as demonstrated the united efforts being developed through participation in the IRWM Plan. In addition to the PowerPoint presentation, handouts were provided at each meeting that included detailed meeting schedules, project eligibility criteria, IRWM Plan goals, plan objectives, and technical assistance listings with contact information. Based upon community feedback, these materials were distributed to every attendee at each meeting in hardcopy and electronic formats and created in both English and Spanish. As meetings progressed, outreach materials continuously evolved to reflect the new information received. Table 1-2 contains a list of the community outreach meetings scheduled with the town councils.

Table 1-2 Community Outreach Meetings

Meeting/Event	Presenters	Meeting Date	Attendance
Hispanic Chamber of Commerce, Palmdale(a)	TBD	TBD	TBP
Division High School, Lancaster(a)	TBD	TBD	TBP
Association of Rural Town Councils(a)	LACWWD 40	April 26, 2007	14
Three Points Town Council	LACWWD 40	May 12, 2007	13
Antelope Acres Town Council	LACWWD/RCSD	May 16, 2007	16
Lake Los Angeles Town Council(a)	LACSD	May 22, 2007	17
Roosevelt Town Council(a)	City of Lancaster /LACWWD	May 29, 2007	19
The Lakes Town Council	Leona Valley/PWD	June 2, 2007	80+
Leona Valley Town Council	LACSD	June 11, 2007	NR
Juneteenth Festival - Sun Village	LACWWD 40/PWD	June 16 - 17, 2007	NR
California City Economic Development Corporation	City of Lancaster/RCSD	June 21, 2007	35
Boron Community Services District	LACWWD 40/RCSD	June 21, 2007	5
Sun Village & Littlerock Town Councils(a)	LACWWD 40/AV Resources Conservation District/Kennedy Jenks	June 25, 2007	20
Mojave Chamber of Commerce(a)	LACWWD 40/RCSD	June 28, 2007	25
Littlerock Town Council(a)	LACWWD 40/PWD	July 12, 2007	40
Southern AV Community Draft Plan Review	Multiple	July 10, 2007	30
Northern AV Community Draft Plan Review	Multiple	July 17, 2007	17
Juniper Hills Town Council	LACSD	August 1, 2007	NR
Junifer Hills Town Council	LACWWD 40	October 3, 2007	11

Note: (a) DAC or DAC leaders present
TBD: To Be Determined
TBP: To Be Provided
NR: Not Recorded

While additional presentation materials were generated for more effective town council meetings, members also began analyzing census data, interviewing additional community organizations, and consulting with state representatives to better identify disadvantaged communities (DACs), environmental justice problems, underrepresented, and rural populations within the region.

Initial Research and Feedback

The following subsection outlines multiple areas of research utilized and information gathered about the Antelope Valley Region the subcommittee gathered to tailor outreach efforts that would more effectively spread the word about the IRWM Plan and provide the best assistance to each community. As a part of this research phase, Subcommittee members proactively solicited advice and input from the Department of Water Resources (DWR), the Lahontan RWQCB, and the Environmental Justice Coalition for Water (EJCW).

Census Data and Community Categorization

Through outreach and data gathering, the subcommittee categorized the smaller, rural communities into three categories: disadvantaged, isolated, and underrepresented.

Disadvantaged Communities

As defined by Proposition 50, Chapter 8, DACs are defined as having an annual median household income (MHI) that is less than 80 percent of the statewide annual median household income, which is $37,994 using Census 2000 data. To begin identifying disadvantaged areas in the Antelope Valley Region, subcommittee members conducted an initial assessment of the Antelope Valley Region using 2000 Census data. In order to provide the most accurate determination of the DACs in the Antelope Valley Region, MHI was compared at the census tract level. The analysis showed that approximately 20 census tracts within the Region have an MHI less than 80 percent of the statewide MHI. This equates to approximately 20 percent of the Antelope Valley

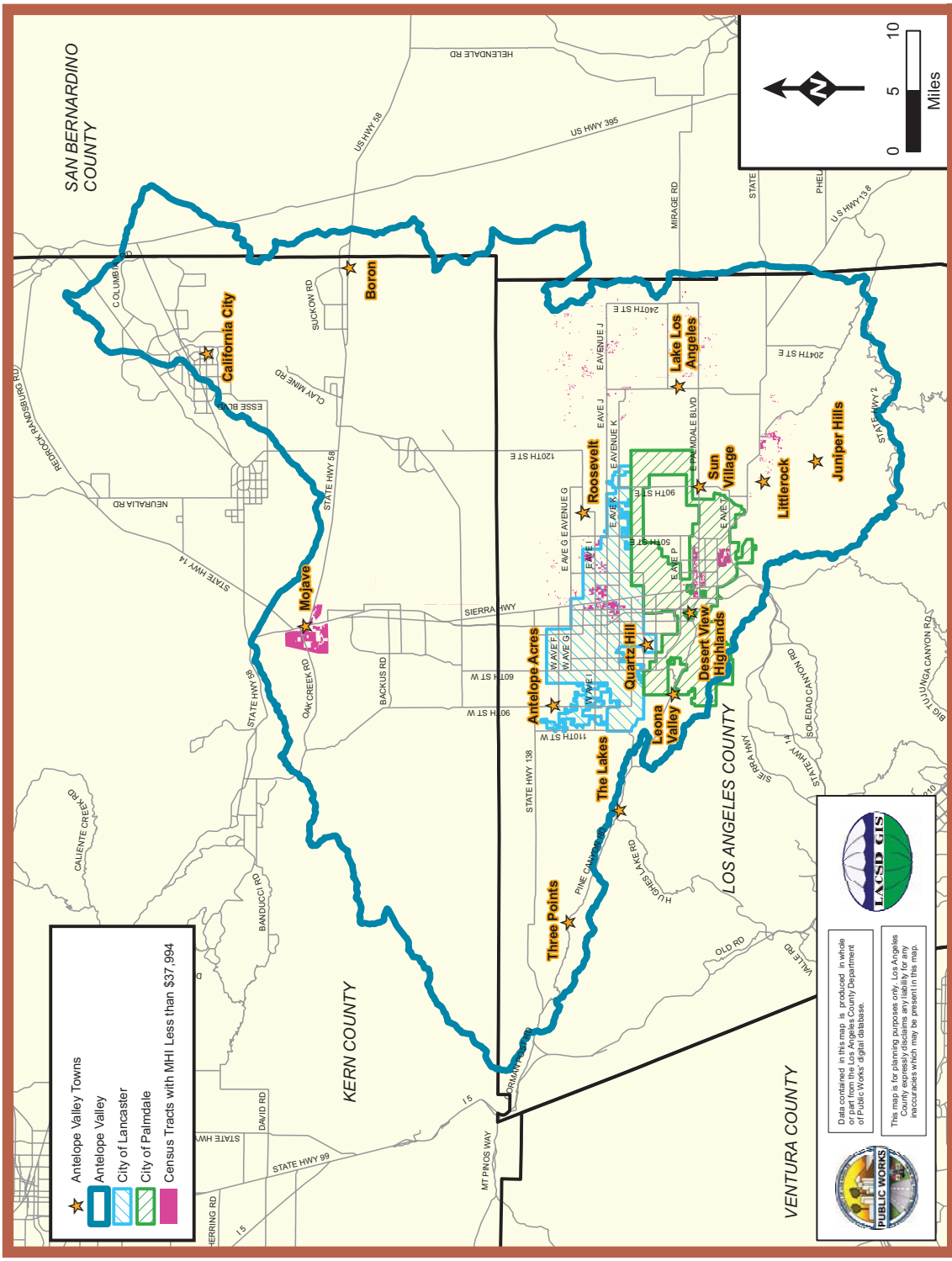


Figure 1-2 Antelope Valley Disadvantaged Communities Map

Region's population. Census block information, which is more detailed than census tract level information, was further refined through the creation of a map with residential household areas. This allowed members to compare census tract and residential information to more-accurately pinpoint specific communities within the census blocks that were disadvantaged, as census blocks tend to cover large areas with very few residents. By identifying the actual residential areas within the blocks, subcommittee members could then effectively locate the organizations that would ensure communication with DAC community members (see Figure 1-2). Using these methods, the following DACs and their critical water related needs were identified in the Antelope Valley Region:

Lake Los Angeles, Unincorporated Los Angeles County

- Interest in restoring Lake Los Angeles – could create reservoir for farming, fire usage, recreation, tourism/commercial, possible groundwater recharge site, possible use of recycled water.
- Provide flood control at Big Rock Creek Wash – heavy rains cause flooding along local roads.
- Transition from septic systems to sewer – they have some sewer lines installed but have not been used.

Littlerock, Unincorporated Los Angeles County

- Would like to see the creation and enforcement of zero-scaping ordinances designed for their community.
- Interested in opportunities for water recharge, banking, and conservation – although no specific examples were cited at the time.
- Concern about growth of communities vs. water reliability for the region.

Mojave, Unincorporated Kern County

- Water conservation concerns. Specifically, the Mojave School District is interested in constructing two new high schools in a water-efficient manner. The Outreach Subcommittee put the School District in contact with Mojave Utilities District and EJCW representative, Cindy Wise.

Portions of the City of Lancaster

- Critical water-related needs to be determined at scheduled community meetings.

Portions of the City of Palmdale (Desert View Highlands)

- Critical water-related needs to be determined at scheduled community meetings.

Roosevelt, Unincorporated Los Angeles County

- Primarily concerned with protecting their wells, protecting agricultural water rights, and preventing LACSD from "wasting water" on "new farms." An LACSD Outreach Subcommittee member followed up directly with community member concerns about the current and future LACSD water usage in their area.

Refer to Appendix C of the IRWM Plan for larger DAC Census Block and Residential Area Maps and Census data printouts.

Under-represented Communities

A subset of disadvantaged communities are under-represented communities. These communities are composed of minority communities living within disadvantaged communities. There are two areas within the Antelope Valley Region that were identified to meet this criterion, and they are both contained within the Cities of Lancaster and Palmdale. These cities are working to identify the exact community locations to receive public outreach, and additionally, the Hispanic Chamber of Commerce has been contacted in an effort to reach underrepresented minorities in these cities.

Rural/Isolated Communities

Many communities that do not face the economic constraints of disadvantaged communities must deal with obstacles due to limited resources and geographic location. Many smaller, rural communities in the Antelope Valley Region are isolated, both politically and physically, from the agency and organizational happenings in the Antelope Valley Region, and the subcommittee agreed that these communities would also be incorporated into our IRWM Plan outreach efforts as a result of this isolation.

Native American Tribal Identification

Research and outreach efforts were also made to identify and contact local Native American tribal communities through contacts with other Antelope Valley community groups and research. Although no organized tribes were identified through this outreach process, an invitation was extended to those Native Americans who had expressed

interest in water management planning activities in the area. Some Native American individuals within the Antelope Valley Region were reached but reported that their lineage groups were not land holders and, therefore, not recognized as tribes or nations.

The Antelope Valley Indian Museum further reports that during the late 19th and early 20th centuries, most American Indian residents remaining in the Antelope Valley integrated with the ever-expanding European culture in Southern California, and the binding group ties of earlier times began to be erode the cultural base. As such, there are no formal reservations or rancherias in the Antelope Valley.

1.2.4.1 Disadvantaged Community Outreach

This section discusses how DACs were engaged for this IRWM Plan and demonstrates how the planning process can provide benefits to their communities. As mentioned, DACs were identified as key target audiences identified in the outreach efforts. During the data-gathering process, work continued to identify disadvantaged communities and to ensure that their issues and needs in terms of water and environmental resources were included in this IRWM Plan. Presentations and outreach focused on soliciting input and participation. The subcommittee emphasized that within the IRWM Plan, project ideas are evaluated based on their merits and not on the size or relative power of the project proponent. For example, within the IRWM Plan there are examples of smaller projects that had already been judged as high priority by the Stakeholder Group whose project proponents were small, traditionally underserved communities.

The DAC outreach strategy and action steps took advantage of existing efforts and relationships, worked directly with community leaders and RWMG members, and gathered and used input from all stakeholders. The members provided technical assistance and other resources, as well as encouraged participation from the smaller, disadvantaged communities in the Stakeholder Group.

The outreach subcommittee proceeded to contact community groups within the identified DACs to schedule outreach meetings. Contacts were made with the Mojave Chamber of Commerce, Mojave School District, and Mojave Utilities District based on information received from the Mojave Desert News reporter who covered the Stakeholder Group meetings. Subcommittee members representing the Cities of Palmdale and Lancaster assisted in arranging community meetings to present this IRWM Plan and gathered information from residents in the identified DAC areas of their respective cities. Town Council meetings in Lake Los Angeles, Littlerock, and Roosevelt were held in order to reach the DACs living in those areas.

One of the main topics of concern that initially surfaced for the region occurred at the Association of Rural Town Council meeting: the pending, controversial groundwater adjudication in the Antelope Valley. They expressed the feeling of being excluded from most planning efforts that they felt were dominated by large jurisdictions and agencies. This concern, although a separate issue from the IRWM Plan, is undoubtedly connected to the water issues for the region, and subcommittee members found the need to open the floor for discussion about this important concern. As a result of the tensions surrounding the legal adjudication, communities were asked if they would prefer to talk about the groundwater adjudication issues upfront before presentations were given. All communities indicated that initial discussion of groundwater adjudication issues would be useful and desirable. This approach helped to clarify the relationship between the adjudication and the IRWM Plan and to alleviate potential tensions due to the sensitivity of the topic. During the meetings, we emphasized that the IRWM Plan has provided a new way of working together in the region despite traditional barriers or ongoing disputes.

Concurrent with identification of underrepresented DAC areas, subcommittee members provided all meeting materials in printed and electronic formats and also prepared all materials in English and Spanish for distribution. Meeting materials included PowerPoint presentation, a listing of RWMG general stakeholder meetings, a list of technical resources, IRWM Plan goals and objectives, and a list of proposed project ideas.

Additionally, the governance structure of the IRWM Plan will be designed to encourage regional participation, to accept project proposals on an ongoing basis, and to continue to reach out to DACs and provide technical assistance to those who need it. Representation from DACs in the stakeholder group will be beneficial in implementing the Plan in a fair and balanced way.

1.2.4.2 Rural Community Outreach

Outreach efforts were not limited to DACs, rather they extended to all communities in the Region to include taking the IRWM Plan message to traditionally-isolated and more rural areas of the Antelope Valley to include the following communities (see Figure 1-3):

- Antelope Acres
- Boron
- Juniper Hills

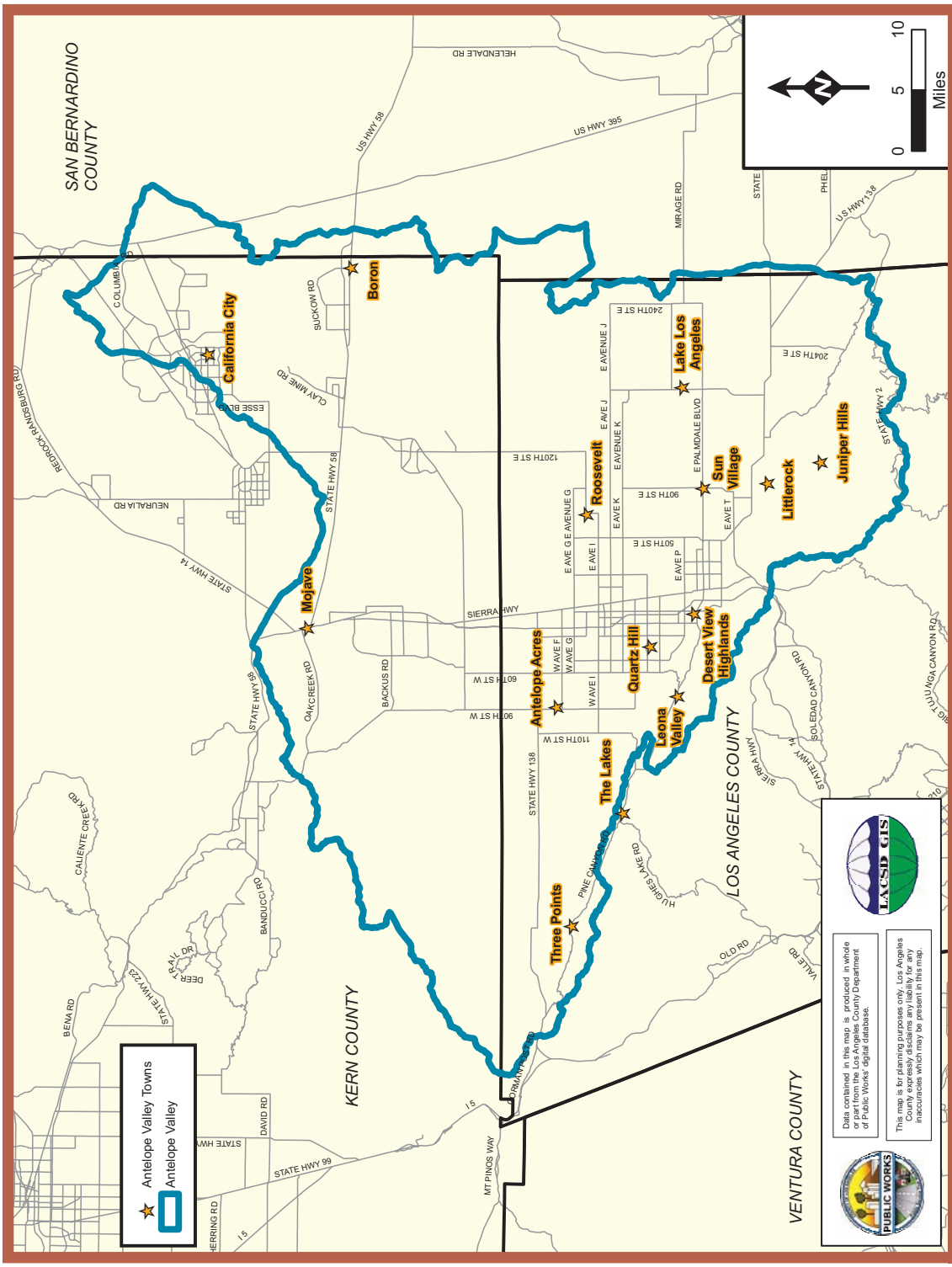


Figure 1-3 Antelope Valley Towns

- Leona Valley
- Sun Village
- The Lakes Community
- Three Points

Although they are not considered 'disadvantaged,' these are towns that are generally very small in population, have fewer resources, and thus, a smaller organizational structure. Most often, these towns are not able to participate in many of the larger projects that municipalities are engaging in with respect to water and environmental resource related issues in the Antelope Valley Region. However, these communities were eager to participate in a Regional group in what, for most, was the first such collaborative effort. Areas like Antelope Acres, Boron, Leona Valley, and Three Points have relatively high median household incomes but have been frustrated in trying to get specific projects implemented or tying in to regional efforts because of the long distances which separate many communities in the Antelope Valley Region. This approach was believed to be the most effective way to reach the largest possible number of stakeholders and gather information from DACs, underrepresented, rural communities, and, therefore, all areas within the Antelope Valley Region within the short timeframe required by this IRWM Plan schedule.

In incorporating these rural areas into our outreach efforts, we had the ability to tour communities like Antelope Acres and Three Points while having direct conversations with residents about the concerns and issues facing their communities. As a result of these outreach efforts, subcommittee members were also invited to attend community events such as the Juneteenth Festival in Sun Village to continue further promote the IRWM Plan, and although resources within these communities are typically very limited, several communities proactively nominated representatives to attend the RWMG stakeholder meetings to be part of Plan development and to carry news back to their members and their community.

1.2.4.3 Environmental Justice Outreach

Environmental justice is important to every community, and the Antelope Valley Region is no exception to this rule. The United States Environmental Protection Agency (EPA) defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Simply stated, this means that no group of people should bear a disproportionate share of negative environmental consequences resulting from industrial, governmental, and commercial operations or policies.

To begin identifying potential environmental justice issues facing the Antelope Valley, subcommittee members performed independent research and contacted the Environmental Justice Coalition for Water (EJCW) for further documented information and expert advice. The EJCW was not aware of any water-related environmental justice concerns in the Antelope Valley Region. Additionally, the Subcommittee used the EPA EnviroMapper maps found on www.city-data.com (provided in Appendix C) to locate any hazardous waste sites within the Region. The EPA maps did show some hazardous waste landfills within the Region, but they did not appear to be located in populated areas or concentrated in any one community. Based on review of the EPA maps and discussions with EJCW, other non-governmental organizations and community members, it was discovered that there were no documented environmental justice issues in the Antelope Valley Region. However, subcommittee members continued to solicit input from community groups at every outreach meeting in an effort to reveal any undocumented environmental justice issues.

The EJCW provided valuable advice in successfully incorporating DACs into the IRWM Plan process that would help prevent future environmental justice issues from developing. The major suggestions made by the EJCW were the following:

- Provide technical assistance, both to facilitate participation, and to assist with project development.

The California Aqueduct provides recreational benefits to the community in addition to water supply benefits. The Aqueduct contains fish such as striped bass and catfish.

- Include an Environmental Justice Community representative on the governing body.
- Ensure that the on-going governance structure defined in the Plan includes a prominent role for Environmental Justice communities, including some influence over which projects are selected for future implementation grants.
- Ensure that there is mechanism for Environmental Justice communities to participate in the evaluation of the plan over time.

Each of these suggestions were incorporated into the overall outreach strategy for the IRWM Plan. Technical resources were provided in the outreach presentation at each meeting with specific contact information of persons to call or email being identified directly. As feedback from individual communities was received, this resource list expanded, and community members had specific questions forwarded to appropriate agencies and organizations to receive further information. Additionally, the IRWM Plan was founded on the basis of broad agreement amongst all participating stakeholders. The selection of projects, the development of a governance structure, and the mechanism for updating the IRWM Plan are all dependent upon this foundation, and the DACs located in the Antelope Valley Region are ensured an equal voice in the Plan processes, current and future. This kind of collaboration is implemented as more members of the rural Town Councils, like Antelope Acres, Lake Los Angeles, and Roosevelt, join the RWMG stakeholder group after hosting IRWM Plan outreach meetings. Also of note is a potential environmental justice issue: water quality, specifically arsenic and nitrate contamination. Naturally-occurring arsenic contamination problems occur in many areas of the Antelope Valley, including DAC areas. There are projects included in the Plan to address arsenic contamination through treatment as well as efforts to develop additional projects to better understand the regional problem for arsenic and other contaminants. Therefore, arsenic contamination that could impact DACs are being addressed. Nitrate contamination is a water quality issue that has not been linked to an environmental justice concern because the disposal does not occur in or near any DAC.

> *"This process is very important to the Antelope Valley and the future of the Antelope Valley."*
>
> – Adam Ariki,
> Los Angeles County Waterworks District No. 40

The main concern regarding environmental justice seems to be directed toward the future. As the Antelope Valley Region continues to grow (Lancaster was designated as the fastest growing city in California in 2007), care will need to be taken to prevent creating environmental justice issues

that unfairly affect certain communities. The IRWM Plan objectives of ensuring water supply, water quality, flood protection, wise land use management, and environmental protection must be consistently applied to future projects and development to benefit all residents equally. Land use planning must take into account to designate enough open space to meet the recreational needs of all communities and include habit preservation and restoration throughout the Valley.

As the Antelope Valley communities expand and evolve, the IRWM Plan Stakeholder group will continue to assess environmental justice concerns throughout implementation of the Plan.

1.2.4.4 Media Coverage of Plan Preparation

Progress of the RWMG plan development was also covered by two reporters who regularly attended stakeholder meetings representing the Antelope Valley Press and the Mojave Desert News. Subcommittee members found that many residents were already aware of this IRWM Plan because of the continuous coverage by these two newspapers. Their exposure has greatly helped keep members of the general public and DACs informed about the IRWM Plan updates.

Additionally, two general public meetings were held in July to give an overview of the Draft IRWM Plan, answer questions and gather public feedback and comments. To increase involvement, one meeting was held in the southern portion of the region and the other, in the northern portion of the region.

1.2.4.5 Requests for Follow-up Outreach

Once presentations were underway, Subcommittee members began to be contacted by individual community members with project ideas, and by the Mojave School District, a large school district serving one of the largest DAC areas in the Region. We also received invitations to attend community events, such as the Juneteenth Festival in Sun Village. Additionally, numerous town councils have requested a second presentation to discuss specific project ideas (Antelope Acres, Lake Los Angeles, Roosevelt, and Sun Village).

Thus far, subcommittee members have shared the responsibility of traveling and presenting the IRWM Plan at 14 community meetings throughout the Antelope Valley Region, all of which were disadvantaged, underrepresented, and/or rural communities. These meetings collectively reached hundreds of community members directly and many more indirectly when the information was shared by those attending, and the response has been overwhelmingly positive from all sects. Overall, presentation at these community meetings further solidified the two most important aspects of the IRWM Plan outreach strategy:

- To physically attend the individual community meetings held in areas to present information and solicit input, rather than holding a meeting and inviting community members to attend, and
- To provide resources and technical assistance so that these communities could fully develop any potential project proposals.

As a result of these direct interactions, the individual communities expressed appreciation at the genuine interest of the IRWM Plan group members to incorporate the ideas and willingness to listen to all community members as exhibited through the outreach meetings. These outreach efforts, motivated through the development of the IRWM Plan, have provided an invaluable step towards helping unify the very diverse region that is the Antelope Valley Region. Together, the Public Outreach Subcommittee activities, in combination with the IRWM Plan Stakeholder meetings have reached over 40 public and non-governmental organizations, of which 20 percent represent disadvantaged communities. Six of the outreach meetings were in DACs, two of which reached primarily underrepresented minority communities. Our stakeholders believe the IRWM Plan to be a living document, and as such, community outreach will be ongoing and will continue to change as the plan and the region evolve.

All community outreach materials, including the DAC Outreach Plan, the Outreach Subcommittee meeting agendas and meeting minutes, various outreach materials, the Antelope Valley Water Plan presentation on CD-Rom (CD), Stakeholder testimonial videos on CD, press releases, correspondence from the EJCW and Native American Tribes, and other relevant community outreach information can be found in Appendix C of the IRWM Plan.

We expect the topics listed below to be updated as they are developed through additional DAC outreach and Plan Development:

- Specific critical water-related needs of such communities
- Document how the Plan identifies any water-related Environmental Justice concerns for the region.
- Discuss what mechanisms were used in development of the Plan to ensure that implementation of the Plan addresses Environmental Justice concerns.

1.3 PLAN DEVELOPMENT

This subsection provides a brief overview of the planning process utilized to develop this IRWM Plan.

1.3.1 Goals for Planning Group

The primary objective of this IRWM Plan is to develop a broadly supported water resource management plan that defines a meaningful course of action to meet the expected demands for water and other resources within the entire Antelope Valley Region through 2035. This IRWM Plan will address:

- How M&I purveyors can reliably provide the quantity and quality of water that will be demanded by a growing population;
- Options to satisfy agricultural users' demand for reliable supplies of reasonable cost irrigation water; and
- Opportunities to protect and enhance the current water resources (including groundwater) and the environmental resources within the Antelope Valley Region.

In order to achieve this objective, the Planning Group developed the following goals for the planning process:

1. Develop and Adopt an Integrated Regional Water Management Plan for a planning period between 2005 and 2035 by December 31, 2007 that:
   a. is written to be a useful tool to a broad range of organizations within our region;
   b. describes reasonably foreseeable water demands for our region during the planning period;
   c. characterizes the available water supplies for our region during the planning period;
   d. describes and evaluates potential management actions that we can take to meet the expected water demand of everyone within the region during the planning period;
   e. sets workable planning targets to be accomplished by specified future dates within the planning period;
   f. identifies potential and promising sources of money to pay to implement this IRWM Plan;
   g. sets priorities for implementation;
   h. is flexible and responsive to changing conditions;
   i. satisfies the guidelines published by DWR for IRWM Plans;
   j. satisfies the requirements published by DWR for AB 3030 groundwater management plans; and
   k. qualifies entities within our region to apply for water related grant funds from State sources such as Proposition 50, and Proposition 84, and Proposition 1E.
2. Discuss and describe how all broad-based regional planning efforts are related and how they will be coordinated:

Water plays a central role in the health and well-being of all Antelope Valley residents, including local wildlife.

a. IRWM Plan;
b. Adjudication;
c. Water Storage District Proposal;
d. Water Banking JPA; and
e. Others.

3. Establish cooperative relationships, new partnerships, and an optimistic approach to create a useful regional plan.

4. Each member of the RWMG will take ownership in this IRWM Plan and collaborate to produce, implement, and update a widely accepted plan.

5. Conduct strategic education and outreach to the public informing the target audiences of the following:
   a. the need for regional planning;
   b. benefits of a cooperative approach;
   c. the priorities for implementation;
   d. how the public can participate; and
   e. others?

6. Identify a back-up plan for meeting grant application deadlines.

While these goals for the planning group were envisioned to be reached by the end of 2007, many of these goals are recognized to continuing value and will require further efforts in the future.

1.3.2 Planning Process

This planning process recognized the importance of three key elements to any successful public policy planning exercise: people, information, and action. First and foremost, this planning process was for the benefit of the people in the Antelope Valley Region. This regional planning process was designed to provide a forum for safe and effective dialogue among the various groups of stakeholders. The group agreed to the following steps for interaction through a professionally facilitated process while developing this IRWM Plan:

- Adopt Specific Measurable Attainable Relevant Time-based (SMART) goals;
- Create a safe place for interaction;
- Establish a clear course of action;
- Demonstrate tangible progress; and
- Iterate until group is satisfied.

Second, the regional planning process must provide useful, broadly accepted information that can support clear action. The information gathering and generation portion of this process is summarized in Figure 1-4, Antelope Valley IRWM Plan Planning Process. It includes the following key steps:

- **Identify the Antelope Valley Region's issues and needs:** Illustrate the issues and needs of the Antelope Valley Region related to water resources in a manner that reflects the majority of Stakeholder concerns. These issues and needs are what drives the Stakeholders into taking action, and are discussed in Section 3.
- **Identify clear plan objectives:** Collectively establish the quantifiable objectives that the regional entities will work together to accomplish between now and 2035. These objectives and the planning targets that will be used to help measure their progress are discussed in Section 4.
- **Water Management Strategy Development:** Involves reviewing existing documents to identify projects within the following water management strategy areas (WMSA) that could satisfy these IRWM Plan objectives: water supply, water quality, flood management, environmental management, and land use management. Also includes a discussion of the Call for Projects in which Stakeholders submitted projects for inclusion in the IRWM Plan. Water Management Strategy development is discussed in more detail in Section 5.
- **Integration:** Includes intra- and inter-water management strategy integration between projects of a particular WMSA and between WMSAs themselves. Integration is discussed in more detail in Section 6.
- **Evaluation and Prioritization:** Includes identifying short-term and long-term regional priorities, evaluating and ranking Stakeholder-identified projects and management actions, and identifying which projects the group would take "action" on first. This step is presented in Section 7. This section also includes a discussion of the impacts and benefits of the IRWM Plan, and a discussion of the benefits and costs of the prioritized projects chosen for implementation.

Third, this planning process must empower the entities within the Antelope Valley Region to take meaningful action. The implementation plan presented in Section 8 provides the linkage to local planning entities, the governance structure and framework for implementing the Plan, options for financing, sources of funding and a list of performance measures that will be used to gauge progress, data management tools, and a means to update the Plan into the future.

Throughout the development of the IRWM Plan, from the Administrative Draft to this Final Plan, public comments

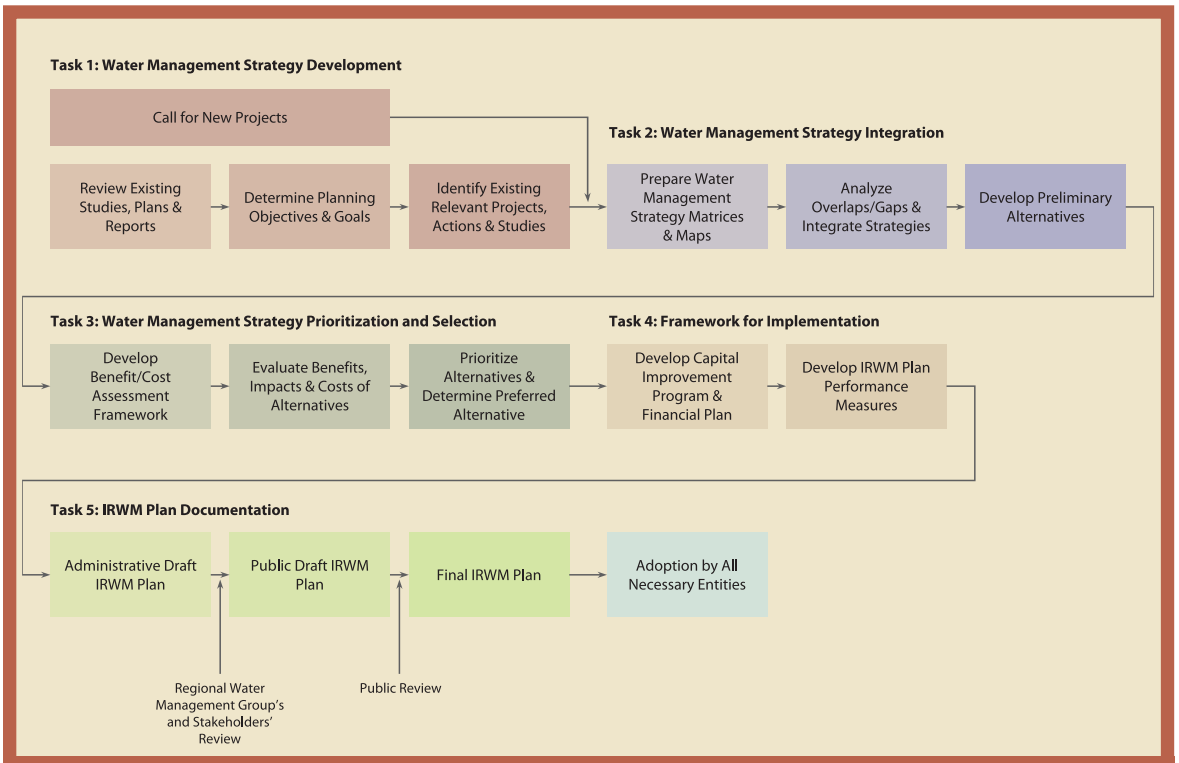


Figure 1-4 Antelope Valley Integrated Regional Water Management Planning Process

as well as Stakeholder comments on the Plan's content have been reviewed, evaluated, discussed amongst the Stakeholder group as necessary, and incorporated into the document as appropriate. These comments have been summarized into a comment response matrix and can be found in Appendix I.

1.3.3 Potential Obstacles to Plan Implementation

One potential obstacle to implementation of the IRWM Plan is the pending adjudication of the Antelope Valley Groundwater Basin. The IRWM Plan's water supply analysis is based on assumptions made regarding availability and reliability of the groundwater supply and was used to identify specific objectives and planning targets for the IRWM Plan. Thus it is possible that the outcome of the adjudication may require a change in the assumptions as well as the objectives and planning targets, which may delay implementation of the IRWM Plan. Additionally, the adjudication may place limitations not considered on the groundwater banking and recharge projects included for implementation. However, the IRWM Plan is meant to be a dynamic planning document and as such will be updated at a minimum of every two years with the project priority list being kept up-to-date as discussed in Section 8.6.2.

1.3.4 Groundwater Management Plan

This IRWM Plan defines a clear vision and direction for the sustainable management of water resources in the Antelope Valley Region through 2035. Inherent to this discussion is how groundwater will be managed to help meet the needs within the Antelope Valley Region now, and into the future. While a groundwater management plan currently does not exist for the Antelope Valley Groundwater Basin as a whole, one has been developed for the RCSD service area. There is the need, however, to develop a groundwater management plan for the Antelope Valley Region in order to provide a better understanding of the Antelope Valley Groundwater Basin and to recommend various strategies that result in a reliable water supply for all basin users and help meet increasing water demands. Therefore, the IRWM Plan will also meet the requirements for an AB 3030 Plan and establish a groundwater management plan for the whole basin.

The Groundwater Management Act (California Water Code Part 2.75 Section 10753), originally enacted as Assembly Bill (AB) 3030 (1992) and amended by Senate Bill (SB) 1938 (2002), provides the authority to prepare groundwater management plans. The intent of AB 3030 is to encourage local public agencies and water purveyors to adopt formal plans to manage groundwater resources within their jurisdiction.

Within the scope of Water Code Section 10753.8, a local groundwater management plan can potentially include up to twelve technical components, although this IRWM Plan need not be restricted to those specific components. This IRWM Plan addresses all the relevant components related to Groundwater Management Plans in the Water Code, as well as the components recommended by the California DWR in California's Groundwater, Bulletin 118 (DWR, 2004). Nothing in this IRWM Plan will supersede or interfere with the pending adjudication of the Antelope Valley Groundwater Basin. Table 1-3 provides a checklist at the end of this section to indicate where in this IRWM Plan specific Groundwater Management Plan components are located.

Table 1-3 Groundwater Management Plan Checklist According to Required Components

Required Components		
Items to Address	**Section of Law**	**Location in Plan**
Provide 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.	10753.4(b)	Appendix C (Community Outreach Materials)
Provide basin management objectives for the groundwater basin that is subject to this IRWM Plan.	10753.7(a)(1)	Section 4
Describe 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 pumping.	10753.7(a)(1)	Section 3
Describe plan 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 .	10753.7 (a)(2)	Section 1 and Section 8
Adoption of monitoring protocols for the components in Water Code Section 10753.7(a)(1)	10753.7 (a)(4)	Table 8-8
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 this IRWM Plan as well as the boundaries of other local agencies that overlie the basin in which the agency is developing a groundwater management plan.	10753.7 (a)(3)	Figure 2-10

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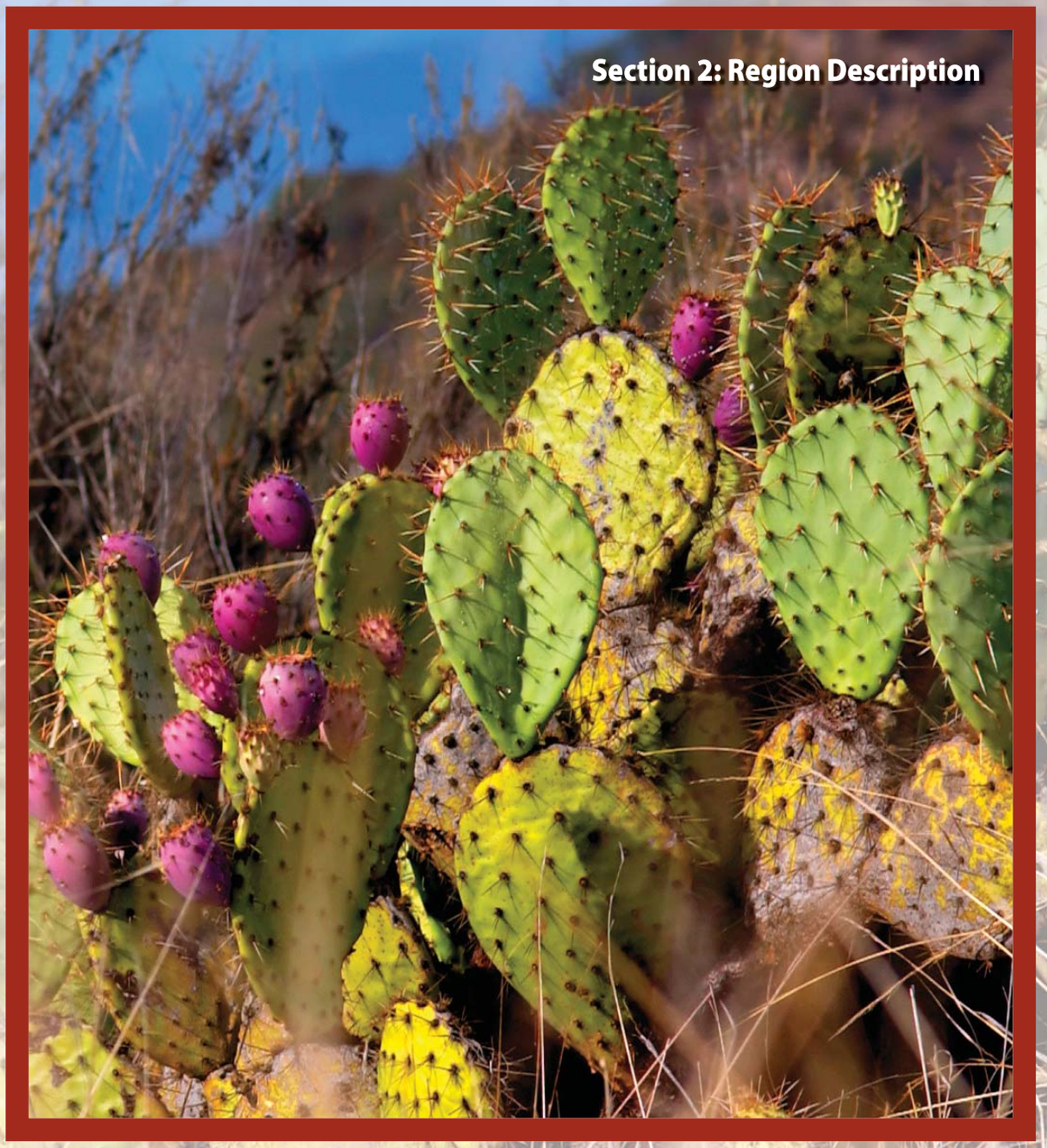
Section 2: Region Description



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Beavertail Cacti are one of many of the beautiful, drought tolerant plants that are native to the Antelope Valley.

Section 2: Region Description

This section presents a regional description for the Antelope Valley Region including location, climate, hydrologic features, land uses, population and demographic information, and regional growth projections. The Antelope Valley Region description emphasizes that the combination of the increasing population growth, the lack of proper water-related infrastructure, the need to maintain existing water levels in the groundwater basin, and the unparalleled opportunity to create a proactive, "smart" design for the fast-developing Antelope Valley Region makes this Integrated Regional Water Management (IRWM) Plan essential to efficient and effective water management in the Antelope Valley Region.

2.1 REGION OVERVIEW

The 2,400 square miles of the Antelope Valley Region lie in the southwestern part of the Mojave Desert in southern California. Most of the Antelope Valley Region is in Los Angeles County and Kern County, and a small part of the eastern Antelope Valley Region is in San Bernardino County. For the purposes of this IRWM Plan, the Antelope Valley Region is defined by the Antelope Valley's key hydrologic features; bounded by the San Gabriel Mountains to the south and southwest, the Tehachapi Mountains to the northwest, and a series of hills and buttes that generally follow the San Bernardino County Line to the east, forming a well-defined triangular point at the Antelope Valley Region's western edge. The drainage basin was chosen as the boundary for this IRWM Plan because it has been used in several older studies such as "Land Use and Water Use in the Antelope Valley" by the United States Geological Survey (USGS) and "The Antelope Valley Water Resource Study" by the Antelope Valley Water Group. The area within the boundary also included key agen-

cies dealing with similar water management issues such as increasing population, limited infrastructure, and increasing pumping costs with shared water resources and, therefore, it was an appropriate boundary to define the Antelope Valley Region for this IRWM Plan.

> *"The Water Plan is a very significant effort to coordinate a number of activities between a number of different agencies that are responsible for managing water supply in the Antelope Valley."*
>
> – Leon Swain, City of Palmdale

Water demands within the Antelope Valley Region are serviced by a variety of water purveyors, including large wholesale agencies, irrigation districts, special districts providing primarily water for municipal and industrial

The desert floor is where the natural and built environments interface.

(M&I) uses, investor-owned water companies, mutual water companies, and private well owners. Water supply for the Antelope Valley Region comes from three primary sources: the State Water Project (SWP), local surface water runoff that is stored in Little Rock Reservoir, and the Antelope Valley Groundwater Basin, with recycled water and storm-water used as secondary sources of water supply. Rapid development demands on water availability and quality, coupled with the potential curtailments of SWP deliveries due to prolonged drought periods, have intensified the

The drive along Highway 14 connects Los Angeles to the expanding communities of the Antelope Valley.

competition for available water supplies. Consensus is needed to develop a water resource management plan and strategy that addresses the needs of the M&I purveyors to reliably provide the quantity and quality of water necessary to serve the continually expanding Antelope Valley Region, while concurrently addressing the need of agricultural users to have adequate supplies of reasonably-priced irrigation water. For these reasons, the Antelope Valley Region is an appropriate area for integrated regional water management. Figure 1-1, Antelope Valley IRWM Plan Region, provides an overview of the Antelope Valley Region.

2.2 LOCATION

As discussed above, the Antelope Valley Region, as defined for the purposes of this IRWM Plan, encompasses most of the northern portion of Los Angeles County and the southern region of Kern County. Bordered by the mountain ranges to the north, south, and west and the hills and buttes along the east, the Antelope Valley Region is composed of the following major communities: Boron, California City, Edwards Air Force Base (AFB), Lancaster, Mojave, Palmdale, and Rosamond. Smaller communities include Littlerock and Quartz Hill. The communities are predominantly concentrated in the eastern portions of the Antelope Valley Region.

Four major roadways traverse the Antelope Valley Region. The Antelope Valley Freeway (State Route 14) and the Sierra Highway both bisect the Antelope Valley Region from north to south. The Pearblossom Highway (Highway 138) traverses the southeastern and central-western portions of the Antelope Valley Region in an east-west direction. Highway 58 traverses the northern portion of the Antelope Valley Region in an east-west direction. Refer to Figure 2-1, Antelope Valley Service Districts, and Figure 2-2, Antelope Valley City Boundaries and Special Districts, for maps showing the locations of the major roads, county lines, city lines, special districts, and water agency service areas within the Antelope Valley Region.

There are four nearby areas that are currently represented by, or that are in the process of developing, IRWM Plans. These consist of the Mojave Water Agency IRWM Plan in the Lahontan Hydrologic Region; the Upper Santa Clara River IRWM Plan in the Los Angeles Hydrologic Region; the Los Angeles IRWM Plan in the Los Angeles Hydrologic Region; and the Watersheds Coalition of Ventura County IRWM Plan, which includes the Ventura River, lower Santa Clara River and Calleguas Creek watersheds, also within the Los Angeles Hydrologic Region. The relatively small portions of the Antelope Valley that are located in San Bernardino County are served by the Mojave Water Agency (MWA) and were included in the MWA IRWM Plan. Thus demands from these areas and any proposed projects serving these areas were not accounted for in this IRWM Plan to avoid significant overlap with the MWA IRWM Plan. The MWA has submitted a letter of support for our Region boundary. Letters of Support are provided in Appendix H. These four plan areas nearly surround the Antelope Valley Region (the Kern County areas north and northwest of the Antelope Valley Region are not currently covered by an IRWM Plan), which means that the Antelope Valley IRWM Plan will play an integral role in completing watershed analyses for the Lahontan Region and provide an important link to the neighboring Los Angeles Hydrologic Regions. The collective efforts of these interconnected IRWM Plan will not only benefit their respective regions, but the watersheds of Southern California as a whole.

2.3 CLIMATE STATISTICS

Comprising the southwestern portion of the Mojave Desert, the Antelope Valley Region ranges in elevation from approximately 2,300 feet to 3,500 feet above sea level. Vegetation native to the Antelope Valley Region are typical

Native vegetation includes the regal joshua tree.

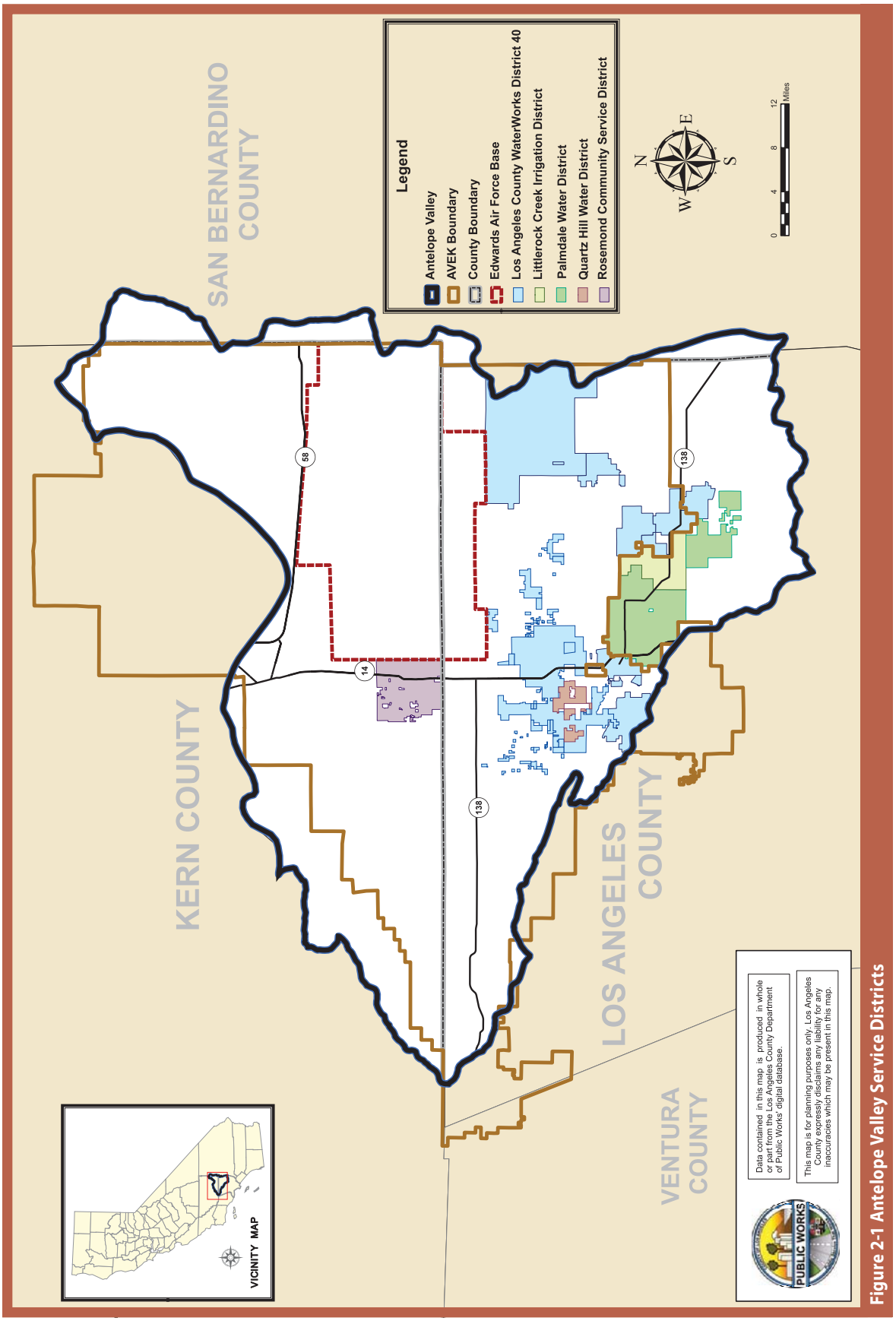

Figure 2-1 Antelope Valley Service Districts

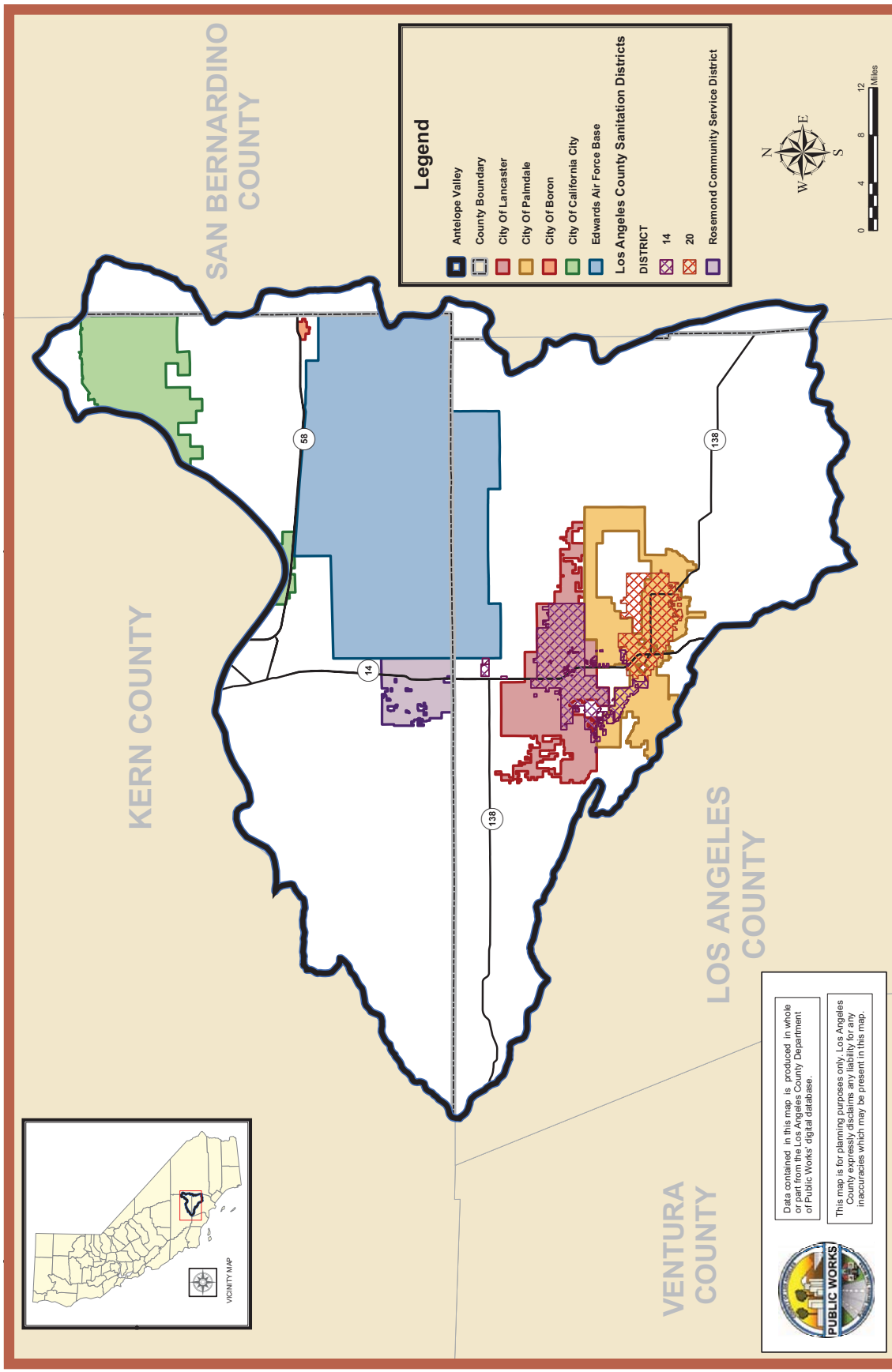

Figure 2-2 Antelope Valley City Boundaries and Special Districts

Littlerock Reservoir provides not only water supply storage but valuable recreational opportunities.

of the high desert and include Joshua trees, saltbush, mesquite, sagebrush, and creosote bush. The climate is characterized by hot summer days, cool summer nights, cool winter days, and cool winter nights. Typical of a semi-arid region, mean daily summer temperatures range from 63 degrees Fahrenheit (°F) to 93°F, and mean daily winter temperatures range from 34°F to 57°F. The growing season is primarily from April to October. However, most rainfall occurs between December and March, and cultivated crops and non-native plants must rely heavily on irrigation.

Surface runoff for the Antelope Valley Region is divided between Little Rock and Santiago Canyons and precipitation ranges from 5 inches per year along the northern boundary to 10 inches per year along the southern boundary. Annual variations in precipitation are important to the annual variations in applied water required for crop production and landscape maintenance. Rainfall records indicate that runoff may be available and retained for artificial groundwater recharge use (USGS 1995).

, Annual Precipitation, summarizes the historical annual precipitation for the Antelope Valley Region, based on the data for rain guage Station 455B Lancaster.

Table 2-1 and the following charts provide a summary of the Antelope Valley Region's climate. Climatic data is based on data collected from 1931 to 2005. Figures 2-4 and 2-6 present the average maximum and minimum temperature and the average rainfall and monthly evapotranspiration (ETo) in the Antelope Valley Region.

2.4 HYDROLOGIC FEATURES

The Antelope Valley Region is a closed topographic basin with no outlet to the ocean. All water that enters

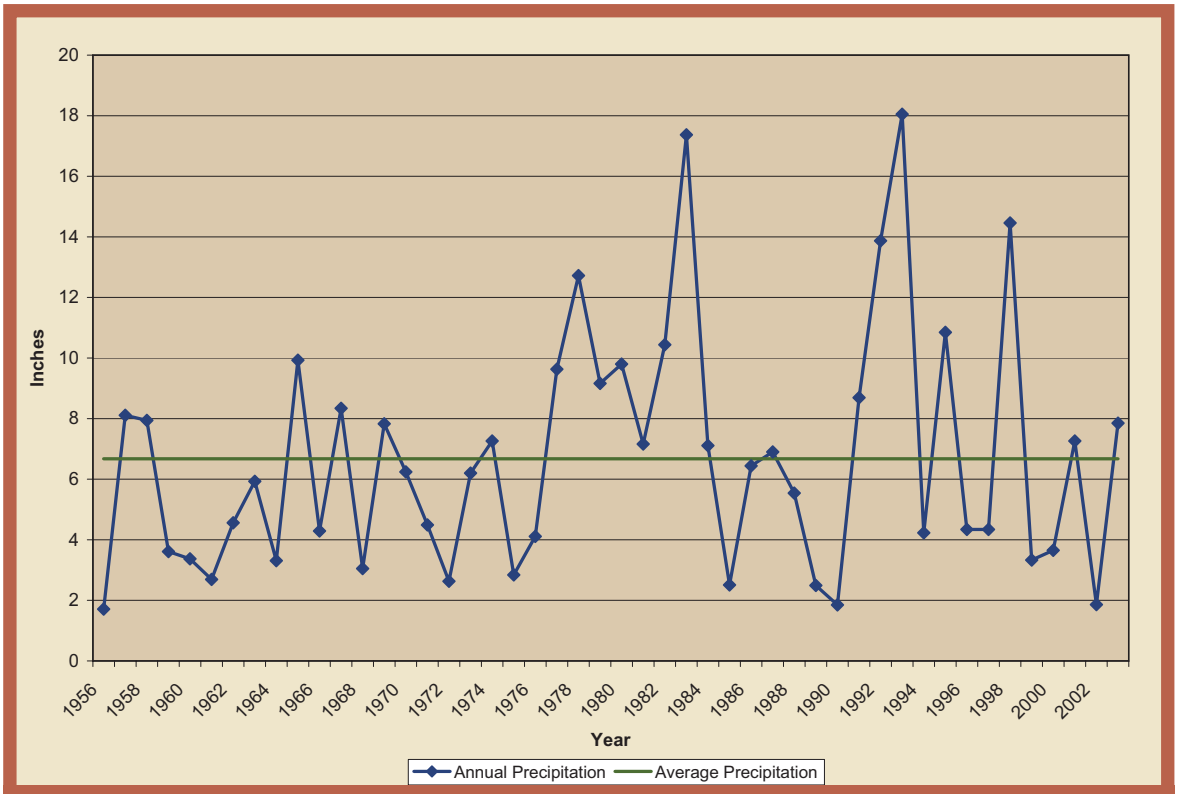

Figure 2-3 Annual Precipitation

Source: 1956-1990, NOAA Climatological Data, as presented in Law Environmental (1991); 1991-2006, LACDPW, Water Resources Division Station 455B

Table 2-1 Climate in the Antelope Valley Region

	Jan	Feb	Mar	Apr	May	Jun
Standard Monthly Average ETo (inches)[a]	2.02	2.61	4.55	6.19	7.30	8.85
Average Rainfall (inches)[b]	1.51	1.65	1.28	0.48	0.13	0.04
Average Max Temperature(°F)[b]	58.3	62.1	67.1	73.9	81.8	90.1
Average Min Temperature (°F)[b]	32.4	35.6	38.9	43.7	50.7	57.8

	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Standard Monthly Average ETo (inches)[b]	9.77	8.99	6.52	4.66	2.68	2.05	66.19
Average Rainfall (inches)[b]	0.05	0.18	0.20	0.34	0.68	1.37	7.91
Average Max Temperature(oF)[b]	97.5	96.9	91.3	80.3	67.2	58.8	77.1
Average Min Temperature (oF)[b]	65.0	63.7	57.4	48.0	38.0	32.7	47.0

(a) CIMIS Data for Palmdale No. 197 Station since April 2005.
(b) Western Regional Climate Center, Palmdale Station for the Years 1931 to 2005.

the Valley Region either infiltrates into the groundwater basin, evaporates, or flows toward the three dry lakes on Edwards AFB; Rosamond Lake, Buckhorn Lake, and Rogers Lake. In general, groundwater flows northeasterly from the mountain ranges to the dry lakes. Due to the relatively impervious nature of the dry lake soil and high evaporation rates, water that collects on the dry lakes eventually evaporates rather than infiltrating into the groundwater (LACSD 2005). The surface water and groundwater features of the Antelope Valley Region are discussed in more detail below and depicted in Figure 2-7.

2.4.1 Surface Water

Surface water flows are carried by ephemeral streams. The most hydrologically significant streams begin in the San Gabriel Mountains on the southwestern edge of the Antelope Valley Region and include, from east to west, Big

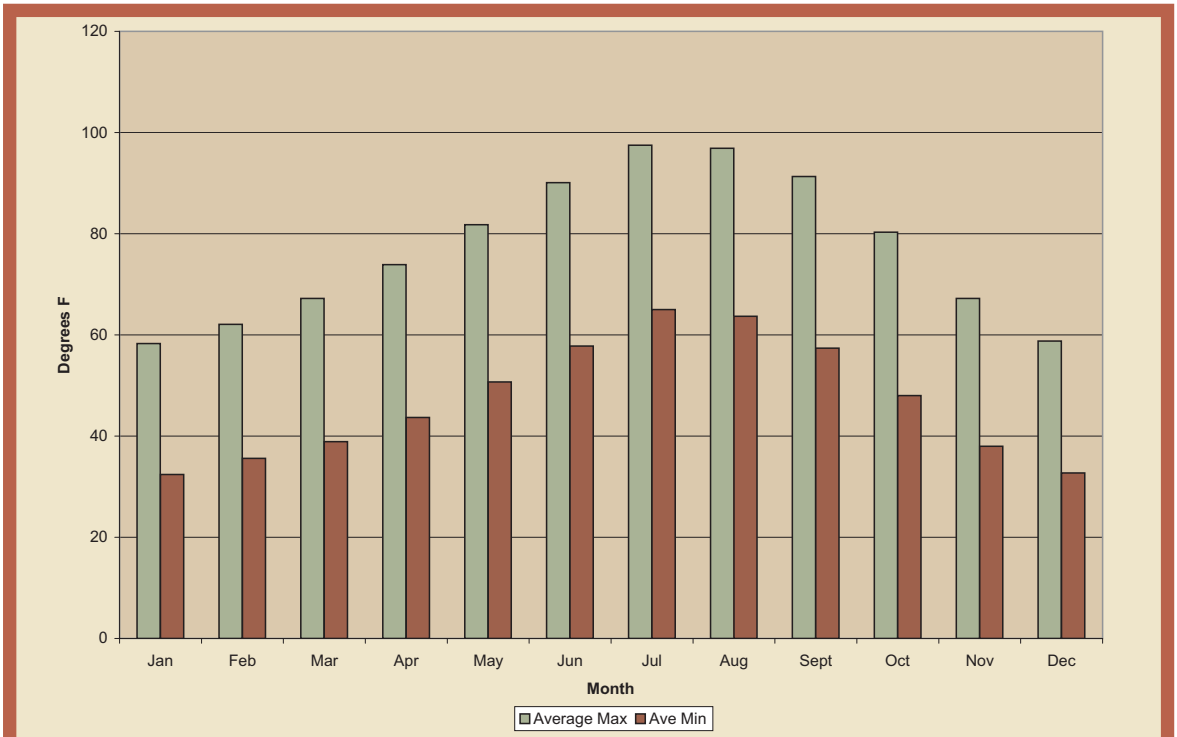

Figure 2-4 Average Maximum and Minimum Temperature in the Antelope Valley Region

Source: Western Regional Climate Center, Palmdale Station for the Years 1931 to 2005.

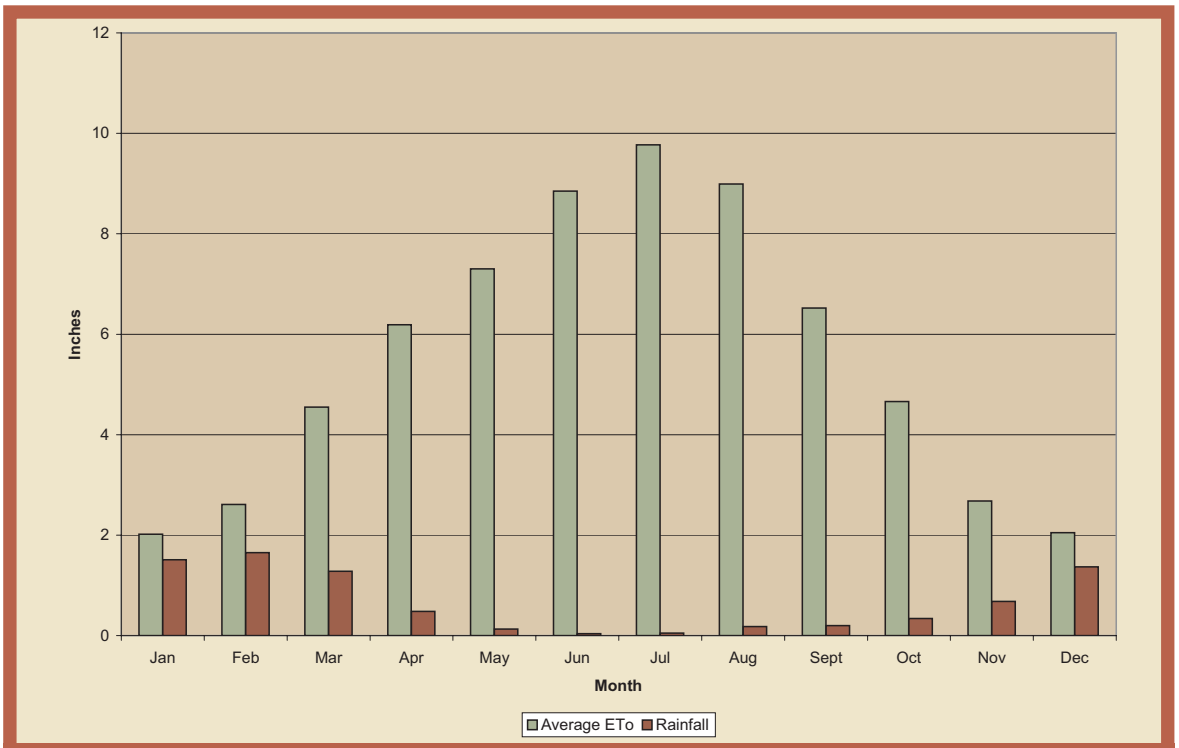

Figure 2-5 Average Rainfall and Monthly Evapotranspiration (ETo) in the Antelope Valley Region

Source: CIMIS Data for Palmdale No. 197 Station since April 2005 and Western Regional Climate Center, Palmdale Station for the Years 1931 to 2005.

Rock Creek, Little Rock Creek and Amargosa Creek, and Oak Creek from the Tehachapi Mountains. Amargosa Creek runs south/north and is between the State Route 14 and Sierra Highway. The hydrologic features are shown on Figure 2-7.

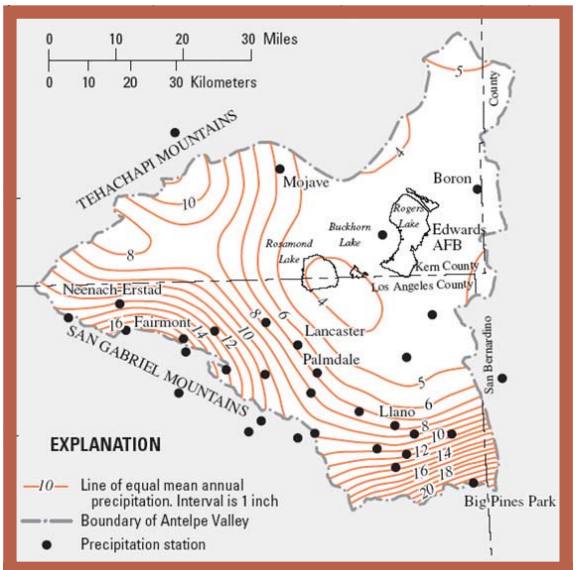

Figure 2-6 Map of Annual Precipitation for the Antelope Valley Region

Source: "Precipitation depth-duration and frequency characteristics for Antelope Valley, Mojave Desert, California" Author(s): Blodgett, J. C., Los Angeles County (Calif.), Geological Survey (U.S.) Sacramento, Calif. : U.S. Geological Survey ; Denver, CO : Earth Science Information Center, Open-File Report Section [distributor], 1996.

2.4.1.1 Little Rock Reservoir

Little Rock Creek is the only developed surface water supply in the Antelope Valley Region. The Little Rock Reservoir, jointly owned by Palmdale Water District (PWD) and Littlerock Creek Irrigation District (LCID), collects runoff from the San Gabriel Mountains. The reservoir currently has a useable storage capacity of 3,500 acre-feet (AF) of water (PWD 2001). Historically, water stored in the Little Rock Reservoir has been used directly for agricultural uses within LCID's service area and for M&I uses within PWD's service area following treatment at PWD's water purification plant.

2.4.1.2 Dry Lakes and Percolation

Surface water from the surrounding hills and from the Antelope Valley Region floor flows primarily toward the three dry lakes on Edwards AFB. Except during the largest rainfall events of a season, surface water flows toward the Antelope Valley Region from the surrounding mountains, quickly percolates into the stream bed, and recharges the groundwater basin. Surface water flows that reach the dry lakes are generally lost to evaporation. It appears that little

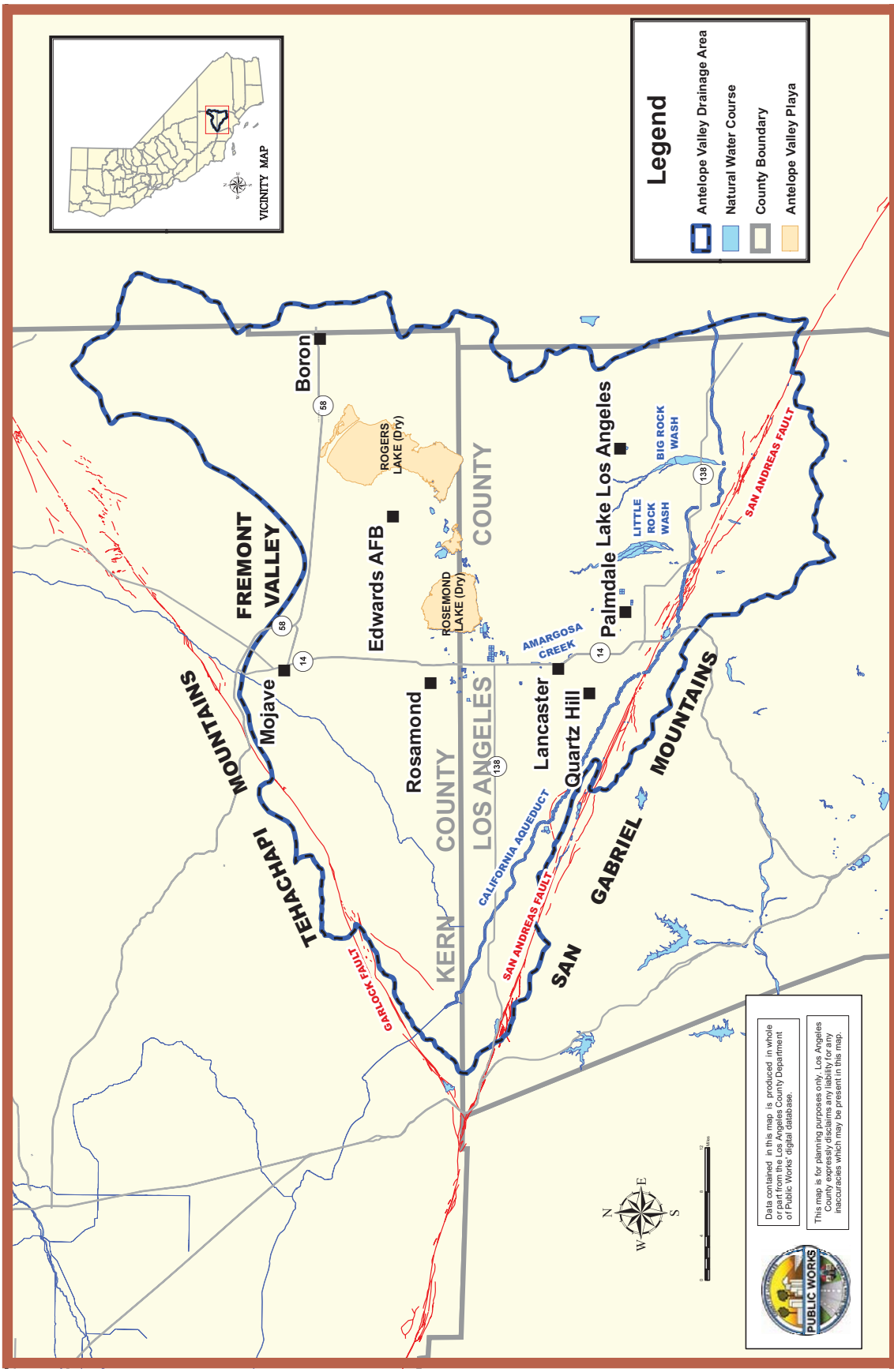

Figure 2-7 Antelope Valley Hydrologic Features

percolation occurs in the Antelope Valley Region other than near the base of the surrounding mountains due to impermeable layers of clay overlying the groundwater basin. See Figure 2-8 for a sample cross-sectional illustration of the clay layer as it is positioned between the upper and lower aquifers in the Antelope Valley Region.

USGS estimates that of the 1.5 million AF of precipitation in the Antelope-Fremont Valley each year, approximately 76,000 AF percolate to the groundwater reservoirs, while the remaining is lost to evaporation (1987).

2.4.1.3 Geology and Soils

The Antelope Valley represents a large topographic and groundwater basin in the western part of the Mojave Desert in southern California. It is a prime example of a single, undrained, closed basin, and it is located at an approximate elevation of 2,300 to 2,400 feet above mean sea level. Antelope Valley Region occupies part of a structural depression that has been downfaulted between the Garlock, Cottonwood-Rosamond, and San Andreas Fault Zones. The Antelope Valley Region is bounded on the southwest by the San Andreas Fault and San Gabriel Mountains, the Garlock Fault and Tehachapi Mountains to the northwest, and San Bernardino County to the east. Consolidated rocks that yield virtually no water underlie the basin and crop out in the highlands that surround the basin. They consist of igneous and metamorphic rocks of pre-Tertiary age that are overlain by indurated continental rocks of Tertiary age interbedded with lava flows (USGS 1995).

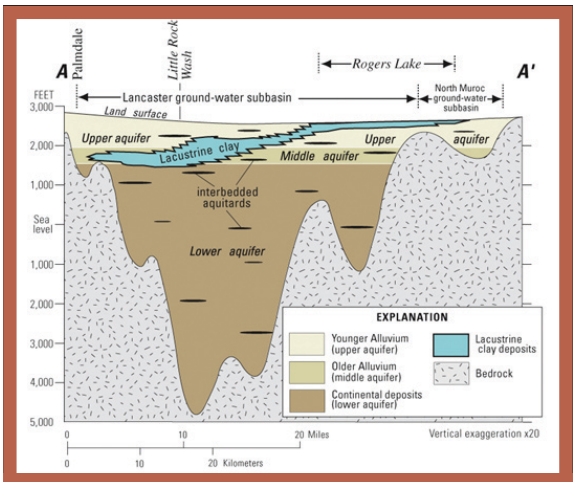

Figure 2-8 Cross Sectional View of the Clay Layer Between the Upper and Lower Aquifers in the Antelope Valley Region

Source: USGS 2000b

Alluvium and interbedded lacustrine deposits of Quaternary age are the important aquifers within the closed basin and have accumulated to a thickness of as much as 1,600 feet. The alluvium is unconsolidated to moderately consolidated, poorly sorted gravel, sand, silt, and clay. Older units of the alluvium are somewhat coarser grained, and are more compact and consolidated, weathered, and poorly sorted than the younger units. The rate at which water moves through the alluvium, also known as the hydraulic conductivity of the alluvium, decreases with increasing depth.

During the depositional history of the Antelope Valley Region, a large intermittent lake occupied the central part of the basin and was the site of accumulation of fine-grained material. The rates of deposition varied with the rates of precipitation. During periods of relatively heavy precipitation, massive beds of blue clay formed in a deep perennial lake. During periods of light precipitation, thin beds of clay and evaporative salt deposits formed in playas or in shallow intermittent lakes. Individual beds of the massive blue clay can be as much as 100 feet thick and are interbedded with lenses of coarser material as much as 20 feet thick. The clay yields virtually no water to wells, but the interbedded, coarser material can yield considerable volumes of water.

Soils within the area are derived from downslope migration of loess and alluvial materials, mainly from granitic rock sources originating along the eastern slopes of the Tehachapi and San Gabriel Mountains. Additional detailed information on soil types and their distribution can be found in the Lancaster Water Reclamation Plant (WRP) 2020 Plan Final Environmental Impact Report (EIR). Figure 2-9 provides a soil map of the Antelope Valley Region.

2.4.2 Groundwater

The Antelope Valley Groundwater Basin is comprised of two[1] primary aquifers: (1) the upper (principal) aquifer and (2) the lower (deep) aquifer. The principal aquifer is an unconfined aquifer and historically had provided artesian flows due to perched water tables in some areas. These artesian conditions are currently absent due to extensive pumping of groundwater. Separated from the principal aquifer by clay layers, the deep aquifer is generally considered to be confined. In general, the principal aquifer is thickest in the southern portion of the Antelope Valley Region near the San Gabriel Mountains, while the

1 USGS is currently investigating the possibility of a third aquifer. The IRWM Plan may need to be updated with information regarding the third aquifer when it is available.

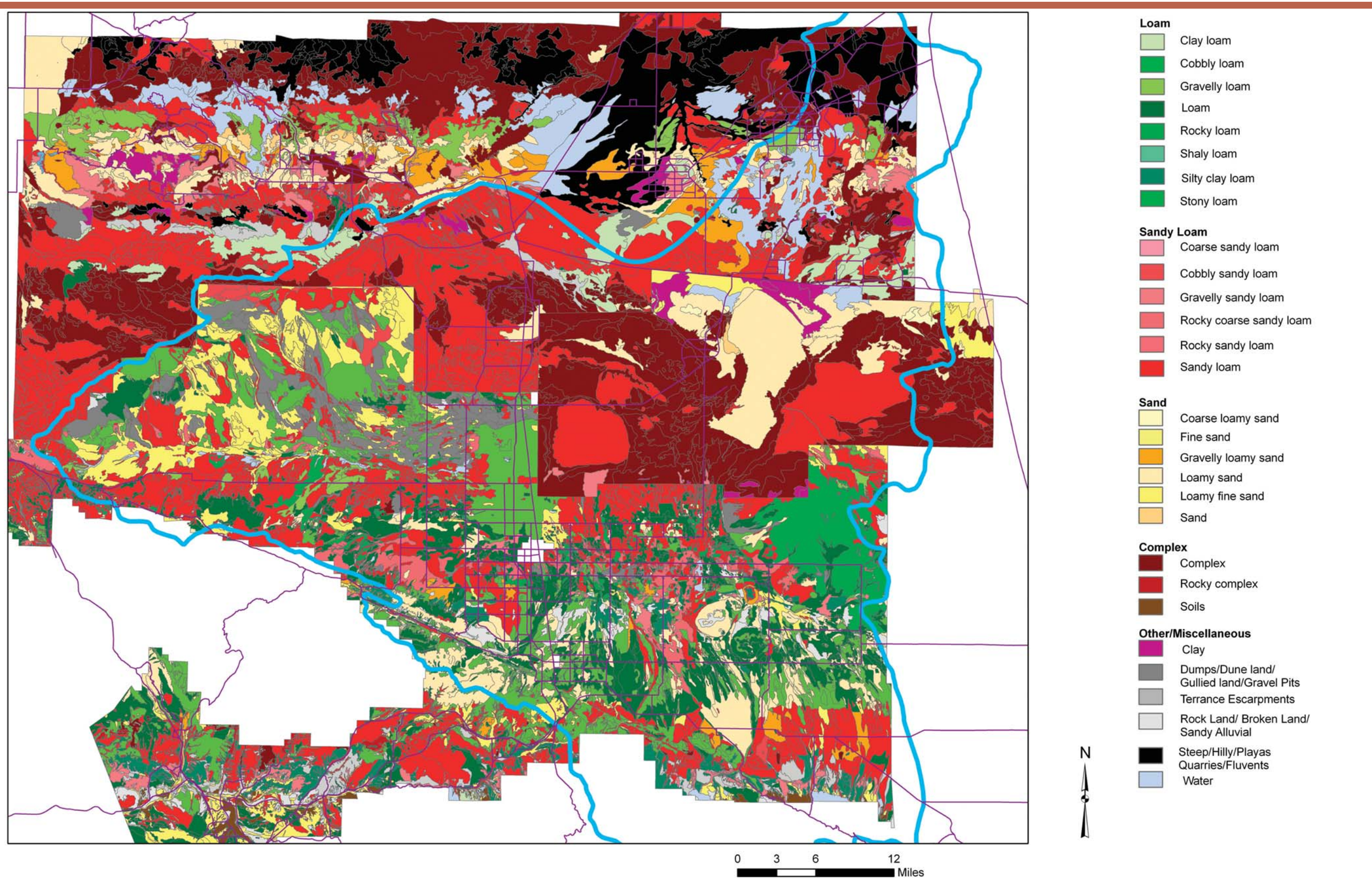

Figure 2-9 Antelope Valley Soils Map

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Infrastructure capacity is an important concern in the Antelope Valley, especially during the summer months when demand is high.

deep aquifer is thickest in the vicinity of the dry lakes on Edwards AFB.

Groundwater has been, and continues to be, an important resource within the Antelope Valley Region. Prior to 1972, groundwater provided more than 90 percent of the total water supply in the Antelope Valley Region; since 1972, it has provided between 50 and 90 percent (USGS 2003). Groundwater pumping in the Antelope Valley Region peaked in the 1950s (USGS 2000a), and it decreased in the 1960s and 1970s when agricultural pumping declined due to increased pumping costs from greater pumping lifts and higher electric power costs (USGS 2000a). The rapid increase in urban growth in the 1980s resulted in an increase in the demand for municipal and industrial (M&I) water and an increase in groundwater use. Projected urban growth and limits on the available local and imported water supply are likely to continue to increase the reliance on groundwater.

Although the groundwater basin is not currently adjudicated, an adjudication process has begun and is in the early stages of development. Although there are no existing restrictions on groundwater pumping, pumping may be altered or reduced as part of the adjudication process.

2.4.2.1 Groundwater Subunits

The complex Antelope Valley Groundwater Basin is divided by the USGS into twelve subunits as shown on Figure 2-10. Groundwater basins are generally divided based upon differential groundflow patterns, recharge characteristics, and geographic location, as well as controlling geologic structures. The Antelope Valley Groundwater Basin's subunits are: Finger Buttes, West Antelope, Neenach, Willow Springs, Gloster, Chaffee, Oak Creek, Pearland, Buttes, Lancaster, North Muroc, and Peerless. The USGS mentions that groundwater levels in these subunits have improved in some areas due to the importation of SWP water to the Antelope Valley Region, and declined in others due to increased groundwater pumping. Each subunit has varying characteristics, and the current conditions in each subunit are briefly summarized below (USGS 1987).[2]

Subunit Characteristics, listed generally from north to south and west to east (USGS 1987):

- **Finger Buttes:** A large part of this subunit is in range and forest lands. Flow is generally from southwest to southeast. Depth to water varies, but is commonly more than 300 feet.
- **West Antelope:** Groundwater flows southeasterly to become outflow into the Neenach subunit. Depth to water ranges from 250 to 300 feet.
- **Neenach:** Groundwater flow is mainly eastward into the "principal" and "deep" aquifers of the Lancaster subunit. Depth to water ranges from 150 to 350 feet.
- **Willow Springs:** Groundwater flows southeast and ultimately enters the Lancaster subunit. This subunit receives recharge for intermittent surface flows from the surrounding Tehachapi Mountain area. Depth to water ranges from 100 to 300 feet.
- **Gloster:** Groundwater flows to the east and southeast as outflow to the Chaffee subunit. Depth to water levels for the southeast area of the subunit are 50 and 100 feet; other water level data is sparse.
- **Chaffee:** Groundwater moves into this subunit from Cache Creek, adjacent alluvial fans to the west and, in lesser amounts, from the Gloster subunit. Water moves eastward in the western part of the subunit, and northward in the southern part, generally toward the City of Mojave. Water levels range from 50 to 300 feet.
- **Oak Creek:** This unit is recharged by flows from the Tehachapi Mountains. Groundwater flows are generally to the southeast, with some southward flows toward the Koehn Lake area. Data for depth to water is not available.
- **Pearland:** Substantial recharge to this subunit comes from Littlerock and Big Rock Creeks. Groundwater generally moves from southeast to northwest, with outflow to the Lancaster subunit. Water levels range from 100 to 250 feet.
- **Buttes:** Groundwater generally moves from southeast to northwest, with outflow to the Lancaster subunit. Depth to water ranges from 50 to 250 feet.
- **Lancaster:** This is the largest and most economically important subunit, in both size and water use. Due

2 As part of information being complied during the adjudication process, the Basin may be divided into different subunits and potentially sub-basins in the future, at which time the IRWMP would be updated.

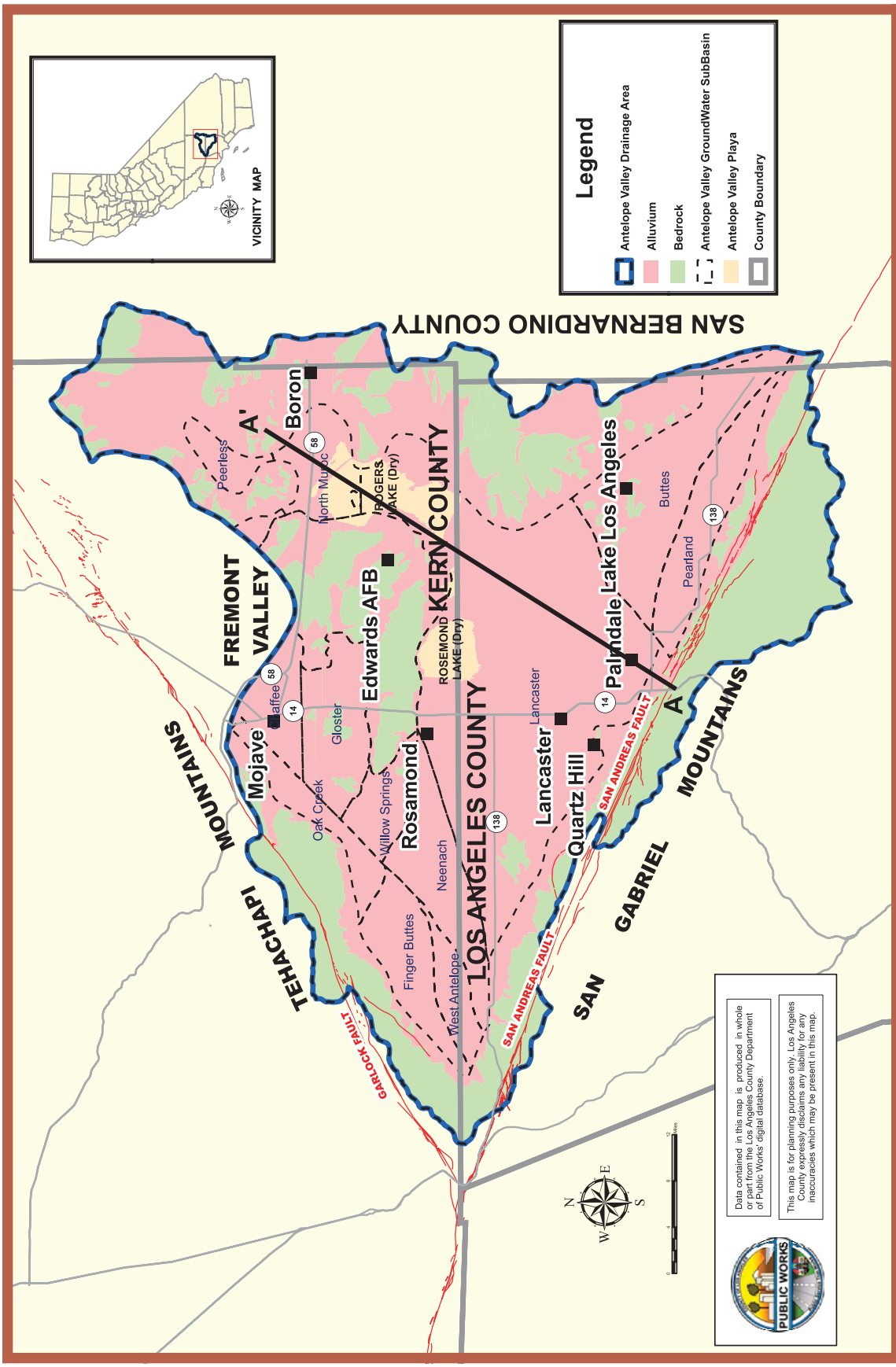

Figure 2-10 Antelope Valley Groundwater Basin Subunits

Reliance on imported water is variable and uncertain. A diversified mix of water resources is needed to increase viability.

to the use of this subunit, depths to water levels vary widely, being generally greater in the south and west. Pumping depressions can be observed in various locations. There are two major aquifers in the subunit, the "principal" and "deep" aquifers, separated by clay layers. As noted above, groundwater moves into the subunit from the Neenach, West Antelope and Finger Buttes subunits. Groundwater also moves into the principal aquifer from the Buttes and Pearland subunits. The Lancaster subunit underlies Lancaster, Palmdale, Quartz Hill, Rosamond, Antelope Acres and other smaller communities.

- **North Muroc:** This unit underlies part of the Rogers Lake and Edwards AFB area. Groundwater moves north and west, then north again and possibly into the Peerless subunit. Data on depth to groundwater is not available.
- **Peerless:** Little information is available on this subunit, which cannot be clearly delineated, but represents the eastern limit of highly developed water-bearing deposits. As of the date of the USGS report, water levels had declined by as much as 150 feet and flow was toward a pumping depression.

2.4.2.2 Groundwater Quality

Groundwater quality is excellent within the principal aquifer but degrades toward the northern portion of the dry lake areas. Considered to be generally suitable for domestic, agricultural, and industrial uses, the water in the principal aquifer has a total dissolved solids (TDS) concentration ranging from 200 to 800 milligrams per liter (mg/L). The deeper aquifers typically have higher TDS levels. Hardness levels range from 50 to 200 mg/L and high fluoride, boron, and nitrates are problematic in some areas of the basin. Arsenic is another emerging contaminant of concern in the Antelope Valley Region and has been observed in Los Angeles County Waterworks District (LACWWD) 40, PWD, and Quartz Hill Water District (QHWD) wells. Research conducted by the LACWWD and the USGS has shown the problem to reside primarily in the deep aquifer, and it is not anticipated that the existing arsenic problem will lead to future loss of groundwater as a water supply resource for the Antelope Valley Region. Additionally, portions of the Basin have experienced nitrate levels above the maximum contamination limit (MCL) of 10 mg/L.

2.4.2.3 Groundwater Storage Capacity and Recharge

The total storage capacity of the Antelope Valley Groundwater Basin has been reported at 68 million acre-feet (MAF) (Planert and Williams 1995 as cited in DWR 2004) to 70 MAF (DWR 1975 as cited in DWR 2004). The groundwater basin is principally recharged by deep percolation of precipitation and runoff from the surrounding mountains and hills (see Figure 2-10 for a depiction of groundwater basin boundaries). Estimates of groundwater natural recharge rates range from about 31,200 to 80,400 acre-feet per year (AFY) based on a variety of approaches (USGS 2003, USGS 1993).[3] Other sources of recharge to the basin include artificial recharge and return flows from agricultural irrigation, urban irrigation, and wastewater management activities. Depending on the thickness and characteristics of the unsaturated zone of the aquifer, these sources may or may not contribute to recharge of the groundwater. As previously stated, precipitation over the Antelope Valley Region floor is generally less than 10 inches per year and ETo rates (along with soil requirements) are high; therefore, recharge from direct infiltration of precipitation is considered negligible (Snyder 1955; Durbin 1978 as cited in USGS 2003). Estimates of the amount of recharge to the basin attributable to the types of recharge (other than mountain-front or precipitation infiltration) could not be found.

The basin has historically shown large fluctuations in groundwater levels. Data from 1975 to 1998 show that groundwater level changes over this period ranged from an increase of 84 feet to a decrease of 66 feet (Carlson and Phillips 1998 as cited in DWR 2004).

In general, data collected by the USGS (2003) indicate that groundwater levels appear to be falling in the southern and eastern areas of the Antelope Valley Region and rising in the rural western and far northeastern areas of the Antelope Valley Region. This pattern of falling and rising groundwater levels correlates directly to changes in land use over the past 40 to 50 years. Falling groundwater levels are generally associated with areas that are developed and rising groundwater levels are generally associated with areas that were historically farmed, but have been largely fallowed during the last 40 years. However, recent increases in agricultural production, primarily carrots, in the northeastern and western portions of the Antelope Valley Region may have reduced rising groundwater trends in these areas (LACSD 2005).

2.4.2.4 Groundwater Extraction

According to the USGS (2003)[4], groundwater extractions have exceeded the estimated natural recharge of the basin since the 1920's. This overdraft has caused water levels to decline by more than 200 feet in some areas and by at least 100 feet in most of the Antelope Valley Region (USGS 2003). Extractions in excess of the groundwater recharge can cause groundwater levels to drop and associated environmental damage (e.g., land subsidence).

Groundwater extractions are reported to have increased from about 29,000 AF in 1919 to about 400,000 AF in the 1950's, when groundwater use in the Antelope Valley Region was at its highest (USGS 1995). Use of SWP water has since stabilized groundwater levels in some areas of the Antelope Valley Region. In recent years, groundwater pumping has resulted in subsidence and earth fissures in the Lancaster and Edwards AFB areas, which has permanently reduced storage by 50,000 AF (DWR 2004). Although an exact groundwater budget for the basin is not available, data estimates pertaining to groundwater production are available from the early 1900's through 1995. The most recent estimates from the USGS contend that during the 1991 through 1995 period, groundwater pumpage averaged 81,700 AFY (USGS 2003).

In the Lancaster basin, the groundwater generally moves northeasterly from the San Gabriel and Sierra Pelona Mountains to Rosamond and Rogers dry lakes. Heavy pumping has caused large groundwater depressions that disrupt this movement (LACSD 2005).

2.5 LAND USE

Figure 2-11 presents a map of major existing land use categories within the Antelope Valley Region, characterized and grouped together according to broad water use sectors. The map was created with Los Angeles County and Kern County Planning Department GIS parcel level data. Each major land use category is identified, below, including the types of "like water uses" assigned to each category.

- **Residential:** Residential uses include a mix of housing developed at varying densities and types. Residential uses in the Antelope Valley Region include single-family, multiple-family, condominium, mobile home, low-density "ranchettes," and senior housing.

3 The analyses provided in the IRWM Plan are strictly for long-term planning purposes and have not been conducted to answer the questions being addressed within the adjudication. Once the detailed analysis of available local water supply are completed within the adjudication, the supply numbers for the IRWM Plan will need to be updated.

4 The analyses provided in the IRWM Plan are strictly for long-term planning purposes and have not been conducted to answer the questions being addressed within the adjudication. Once the detailed analysis of groundwater extractions are completed within the adjudication, the values for the IRWM Plan will need to be updated.

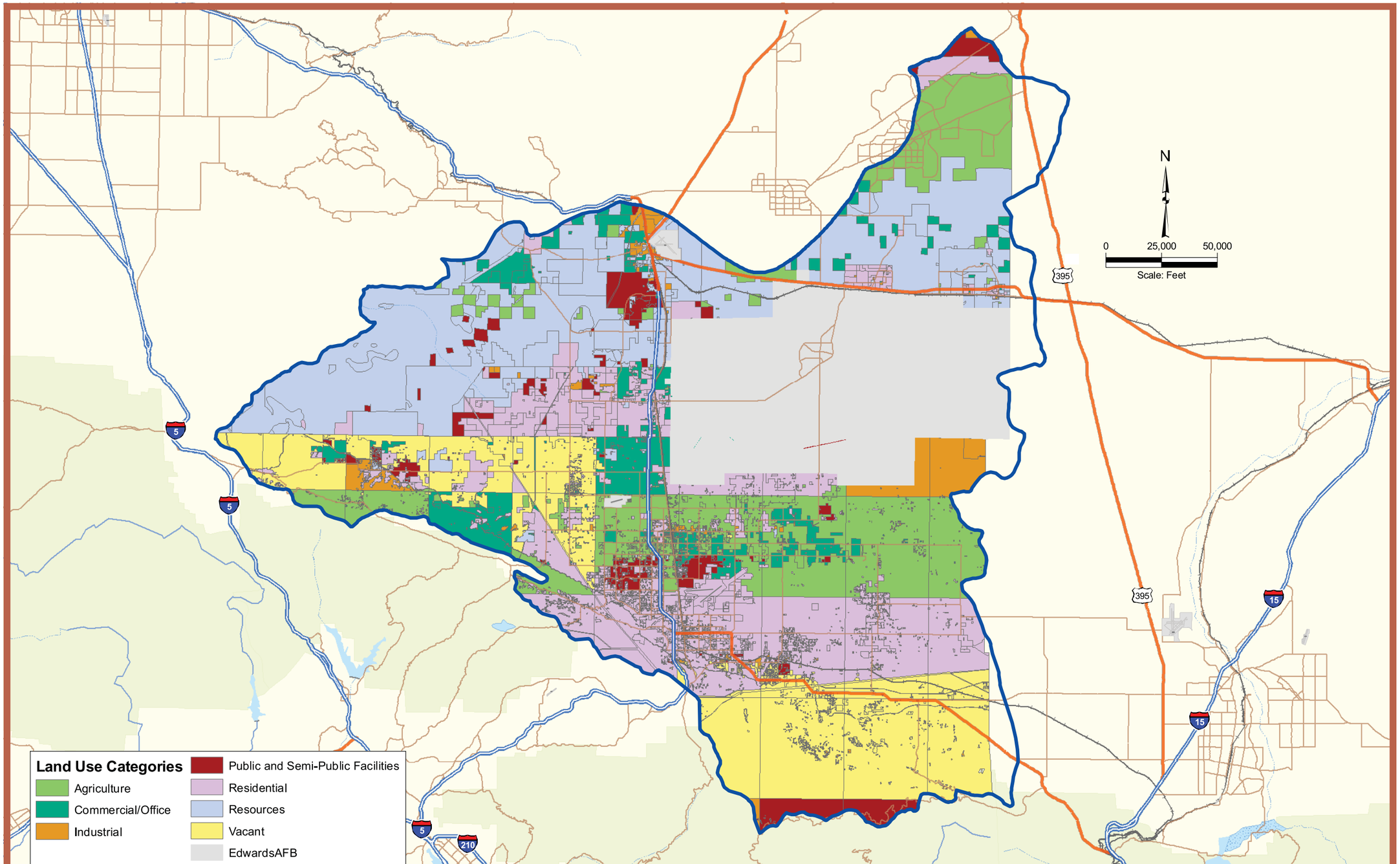

Figure 2-11 Current Land Use Designations for the Antelope Valley Region

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The aerospace industry was influential in bringing economic development and growth to the Antelope Valley.

- **Commercial/Office:** This category includes commercial uses that offer goods for sale to the public (retail) and service and professional businesses housed in offices (doctors, accountants, architects, etc.). Retail and commercial businesses include those that serve local needs, such as restaurants, neighborhood markets and dry cleaners, and those that serve community or regional needs, such as entertainment complexes, auto dealers, and furniture stores. Also included in this category are government offices that have similar water duty requirements as a typical commercial/office use.

Edwards AFB and the U.S. Air Force Flight Production Center (Plant 42) provide a strong aviation and military presence in the Antelope Valley Region.

- **Industrial:** The industrial category includes heavy manufacturing and light industrial uses found in business, research, and develo pment parks. Light industrial activities include some types of assembly work, utility infrastructure and work yards, wholesaling, and warehousing.
- **Public and Semi-Public Facilities:** Libraries, schools, and other public institutions are found in this category. Uses in this category support the civic, cultural, and educational needs of residents.
- **Resources:** This category encompasses land used for private and public recreational open spaces, and local and regional parks. Recreational use areas also include golf courses, cemeteries, water bodies and water storage. Also included in this category are mineral extraction sites.
- **Agriculture:** Agricultural lands are those in current crop, orchard or greenhouse production, as well as any fallow lands that continue to be maintained in agricultural designations or participating in tax incentive agricultural programs.
- **Vacant:** Vacant lands are undeveloped lands that are not preserved in perpetuity as open space or for other public purposes.

Historically, agriculture was the predominant land use in the Antelope Valley. Photo courtesy of the Los Angeles County Farm Bureau.

2.6 SOCIAL AND CULTURAL VALUES

The story of the Antelope Valley Region's development helps to unveil the range of local cultural values that characterize the area. The continuing tradition of its historically rural character, combined with the emergent influence of the aerospace industry and metropolitan Los Angeles, give meaning to the diverse and, in some cases divergent, lifestyles and values that define the Antelope Valley Region's collective goals and challenges for the future.

Historically, agriculture was the Antelope Valley Region's predominant land use, characterized by dry wheat farming in the west, alfalfa on the Antelope Valley Region floor, and orchards on its southern fringes. The City of Palmdale was settled over 100 years ago as a residential community by Swiss and German migrants from the Midwest. At the time, land in the Antelope Valley Region sold for fifty cents an acre. The development of the Southern Pacific Railroad connected the Antelope Valley Region to Los Angeles and the Central Valley and spurred the first large influx of white settlers to the Antelope Valley Region. Most of the Antelope Valley Region's smaller communities emerged around this same time as agricultural settlements or local farm trade centers.

In 1933, the U.S. Department of Defense established Edwards Air Force Base (AFB), (then called Muroc Army Air Field) east of Rosamond and roughly 60 kilometers northeast of Palmdale's current city limits. Because of the vast landing area provided by Edwards AFB's dry lake beds, it was the original site of NASA space shuttles landings, as well as the site of other important aeronautical events. To this day U.S. military flight testing is a large and important part of Edwards AFB operations.

As a result of increased governmental defense spending in the 1950s, the Antelope Valley Region underwent a dramatic change in character. In 1952, the aerospace industry officially took hold at U.S. Air Force Plant 42. Plant 42 in northeast Palmdale is home to Lockheed Martin, Boeing, Northrop Grumman and BAE systems, among other significant aeronautical companies.

Increasing development pressures in the 1980s were in part driven by the continuing appeal of the Antelope Valley Region's high desert climate as well as land values lower than those in the Los Angeles metropolitan area. As the Los Angeles population rapidly expanded into the Antelope Valley Region, the desire for more cultural amenities and new skills and resources increased and the Antelope Valley Region became more metropolitan in character. The increase in population and the development of tract housing, retail centers and business parks has altered the

formerly low density, rural and agrarian character of many local communities.

Today, competing demands are placed on limited available resources. Many of these competing demands stem from the range of local cultural values that characterize the Antelope Valley Region. Decisions regarding future land use and the dedication of water resources will need to weigh varying agricultural, metropolitan, and industrial needs as they continue to develop and as the balance between these interests continues to change.

The Lancaster Community Visioning Report helps to shed light on the current interplay of these interests and how they may influence the direction of future planning and growth Antelope Valley Region-wide. The Visioning Report presents a common vision for the future of Lancaster and the Antelope Valley Region that is focused on the following priorities:

- Balancing growth
- Ensuring economic well-being
- Strengthening Community Identity
- Improving public safety
- Promoting Active Living
- Focusing on Education and Youth
- Supporting Environmental Conservation

These priorities were echoed throughout the IRWM Plan visioning process, where Stakeholders routinely expressed the need to develop a balance of resources, while preserving the area's natural environment and rural history. These ideals were further emphasized during each of the outreach meetings with the Rural Town Councils and community members in the Antelope Valley Region. Despite the need to ensure economic vitality and longevity by bringing new industry and employment opportunities to the Antelope Valley Region, residents of the Antelope Valley Region believe that preserving a hometown feel and developing a strong sense of neighborhood stability are critical to maintaining the identity of the community and, in turn, that of the Antelope Valley Region. The preservation of existing natural open space, achieved in part through a development strategy focused on infill and parcel redevelopment combined with environmental conservation, are key components of preserving the Antelope Valley Region's rural character and strengthening the health, vitality and security of growing urban areas.

2.7 ECONOMIC CONDITIONS AND TRENDS

Historically, the economy within the Antelope Valley Region has focused primarily on agriculture, and crops grown in the Antelope Valley Region have included alfalfa, wheat, barley, and other livestock feed crops. However, the area is in transition as the predominant land use shifts from agricultural uses to residential and industrial uses.

The increase in residential land use and its impact on the economy is evident from the population growth in the Antelope Valley Region, which is discussed in Section 2.8. With significantly lower home prices than in other portions of Los Angeles County, the Antelope Valley Region housing market has seen an increase as people choose to commute to the Los Angeles area. According to the Antelope Valley Building Industry Association (BIA) (2006), a number of trends over the last couple of years can be seen from single- and multi-family households in the Antelope Valley Region. Even after acknowledging the recent slowing of the housing market, the BIA recognized that the Antelope Valley Region is the last large available open space "opportunity" for development in Southern California, whether it be for residential, commercial/industrial/retail or agricultural land uses. As such, the BIA predicted that the Antelope Valley Region is expected to continue to grow in population and sustained residential growth is necessary for a strong, vibrant economy (BIA, 2006).

Industry in the Antelope Valley Region consists primarily of manufacturing for the aerospace industry and mining. Edwards AFB and the U.S. Air Force Flight Production Center (Plant 42) provide a strong aviation and military presence in the Antelope Valley Region. Mining of borate in the northern areas and of salt extract, rock, gravel, and sand in the southern areas contribute to the Antelope Valley Region's industrial economy.

As previously mentioned, ensuring economic well-being is a key social and cultural value of the Antelope Valley Region's community.

As shown in Table 2-2 and Figure 2-12, approximately 55 percent of the Antelope Valley Region's population has a household income of less than $50,000, approximately 22 percent of the population has a household income between $50,000 and $74,999, and approximately 22 percent has a household income of $75,000 or higher.

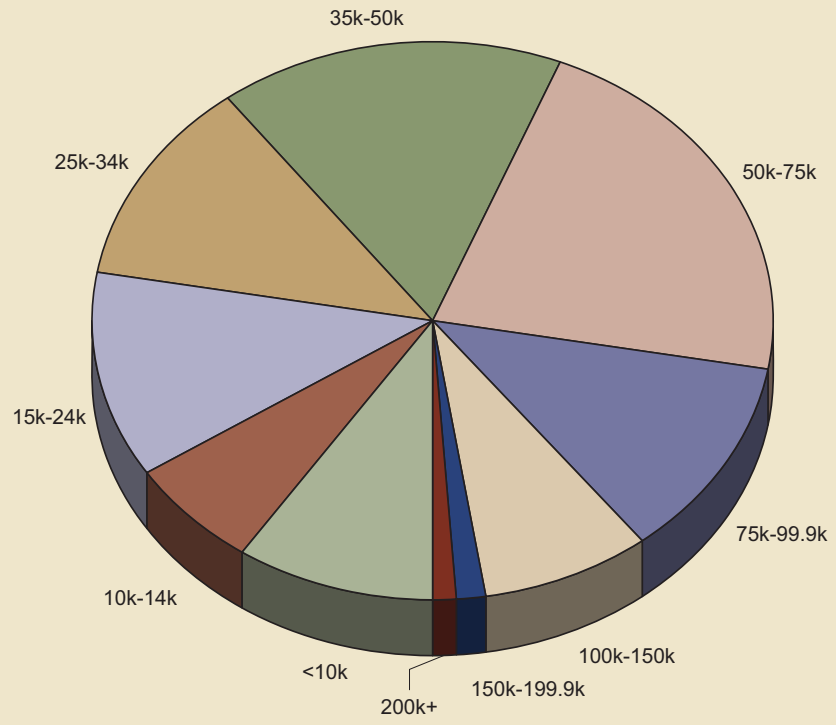

Figure 2-12 Income Levels for the Antelope Valley Region

Table 2-2 Demographics Summary for the Antelope Valley Region

Area	Lancaster	Palmdale	Unincorp. LA County	California City	Boron	Mojave	Rosamond	Edwards AFB	Unincorp. Kern County	Antelope Valley Region
Age Structure (by %)										
under 5	8.0	9.3	6.9	6.7	7.3	9.1	7.6	14.0	5.8	8.1
5-9	9.5	11.5	9.4	8.2	6.7	9.5	9.8	10.6	7.5	10.0
10-14	9.2	11.5	10.3	9.8	8.4	8.8	9.9	8.7	8.7	10.3
15-19	8.6	8.9	7.9	8.6	8.0	8.0	8.4	5.7	7.2	8.2
20-24	6.4	5.4	5.3	4.7	4.4	5.9	5.0	17.0	2.6	5.6
25-34	13.8	12.7	12.2	10.3	9.5	12.1	12.6	25.1	6.6	12.3
35-44	17.5	18.4	20.2	17.5	15.7	15.6	19.4	17.0	18.0	18.5
45-54	11.6	11.3	13.3	14.6	15.2	11.6	12.2	1.6	15.8	12.1
55-59	3.7	3.2	3.9	4.9	5.9	4.2	3.9	0.1	6.2	3.7
60-64	2.9	2.2	3.0	4.0	5.8	4.4	3.3	0.1	5.6	3.0
65-74	4.6	3.4	4.5	6.8	7.7	6.3	5.0	0.1	11.4	4.8
75-85	3.0	1.7	2.4	3.2	4.8	3.6	2.3	0.1	4.4	2.6
85 and over	1.0	0.4	0.6	0.8	0.7	0.9	0.6	0	0.4	0.7
Median Household Income	$41,127	$46,941	NA	$45,735	$40,625	$24,761	$42,307	$36,915	NA	--

Table 2-2 Demographics Summary for the Antelope Valley Region (continued)

Area	Lancaster	Palmdale	Unincorp. LA County	California City	Boron	Mojave	Rosamond	Edwards AFB	Unincorp. Kern County	Antelope Valley Region
Income Levels (by %)										
< $10,000	9.7	8.8	8.5	10.6	14.8	24.9	6.8	0	6.8	9.6
$10k to $14.9k	7.0	5.7	5.6	6.4	11.9	6.6	5.4	1.3	4.7	6.2
$15k to $24.9k	13.4	10.5	9.8	11.4	11.7	18.8	10.4	19.0	10.4	11.9
$25k to $34.9k	13.0	11.3	10.6	12.0	8.6	12.8	13.2	24.7	8.8	12.0
$35k to $49.9k	16.2	16.7	17.1	12.7	19.4	15.9	17.0	25.3	12.7	16.2
$50k to $74.9k	20.5	23.0	22.6	25.3	19.4	11.8	26.6	21.1	29.1	21.8
$75k to $99.9k	10.4	12.9	13.1	12.1	8.9	5.4	13.8	6.6	11.2	11.6
$100k to $149k	7.3	8.8	9.9	7.2	4.0	3.9	5.2	2.0	11.8	8.0
$150k to $199k	1.3	1.5	1.3	1.4	0	0	0.7	0	2.6	1.4
$200k or more	1.2	0.8	1.5	0.9	1.2	0	0.9	0	1.7	1.2
Population Density (persons per sq. mile)	1,263	1,112	70.1	107.0	88.8	9.7	91.9	19.4	14.5	96.6
Languages spoken(a)										
English	78%	66%	75%	85%	78%	79%	77%	88%	91%	75%
Spanish	17%	29%	19%	9%	19%	17%	20%	6%	6%	20%
French	1%	<1%	<1%	1%	<1%	<1%	<1%	<1%	<1%	<1%
Tagalog	1%	1%	1%	1%	2%	<1%	2%	2%	<1%	1%
German	<1%	<1%	<1%	<1%	<1%	<1%	<1%	1%	1%	<1%
Other (all <1%)	2%	4%	5%	4%	1%	4%	1%	3%	2%	4%

Note: (a) For age 5 and up, 2000 Census Tract Data.

2.8 POPULATION

This subsection provides demographic information from the 2000 Census as well as regional growth projections.

2.8.1 Demographics

Table 2-2 provides a summary of the human demographics for the Antelope Valley Region as determined by 2000 U.S. Census Bureau data. Regional data was estimated from the data for the census tracts within the regional boundaries. Although Figure 1-5 shows several Disadvantaged Communities (DACs) near Boron, the Median Household Income (MHI) for Boron does not reflect this. This is mainly a direct result of the 1.2 percent of the Boron population with average salary above $200,000, which increases the overall median income level for Boron.

Figure 2-12 shows the breakdown of the income levels in the Antelope Valley Region as laid out in Table 2-2.

2.8.2 Regional Growth Projections

Growth in the Antelope Valley Region proceeded at a slow pace until 1985. Between 1985 and 1990, the growth rate increased approximately 1,000 percent from the average growth rate between the years 1956 to 1985 as land uses shifted from agricultural to residential and industrial. The historical and projected population for the Antelope Valley Region is shown in Table 2-3. Historical population estimates were based on the Geolytics normalization of past U.S. Census tract data to 2000 census tract boundaries. This normalization allows for a direct comparison of the past U.S. Census tract population data. These Census tracts were then assigned to the individual jurisdictions in the Antelope Valley Region to determine the jurisdiction's population. Projections for the Cities of Lancaster and Palmdale were derived from Southern California Association of Governments (SCAG) estimates. Projections for the City of Rosamond and Unincorporated Kern County were derived from the Rosamond and Willow Springs Specific Plans. Population projections for the rest of the Kern County portion of the Antelope Valley Region and unincorporated Los Angeles County portion of the Antelope Valley Region assume the annual growth rate similar to the City

Table 2-3 Population Projections

	1970(a)	1980(a)	1985(b)	1990(a)	2000(a)	2005	2015	2035
Boron (d)	3,000	3,000	3,000	3,000	2,000	2,000	3,000	5,000
California City (d)	2,000	3,000	4,000	6,000	8,000	9,000	12,000	20,000
Edwards AFB (d)	10,000	9,000	8,000	7,000	7,000	7,000	10,000	16,000
Mojave (d)	4,000	5,000	5,000	7,000	6,000	7,000	9,000	14,000
Rosamond (e)	4,000	5,000	6,000	9,000	15,000	21,000	39,000	137,000
Unincorporated Kern County (e)	1,000	2,000	3,000	8,000	12,000	16,000	29,000	103,000
Lancaster (c)	41,000	51,000	55,000	98,000	113,000	142,000	192,000	283,000
Palmdale (c)	17,000	22,000	24,000	67,000	96,000	146,000	218,000	380,000
Unincorporated Los Angeles County (d)	20,000	29,000	33,000	69,000	88,000	100,000	129,000	215,000
Antelope Valley Region	**103,000**	**128,000**	**140,000**	**275,000**	**346,000**	**450,000**	**641,000**	**1,174,000**

Notes: Projections Rounded to the nearest 1,000 people.

(a) Based on Geolytics Normalization of Past U.S. Census Tract Data to 2000 Census Tract Boundaries.

(b) Based on an Interpolation of the 1980 and 1990 U.S. Census Data.

(c) SCAG projections for North Los Angeles County Subregion. 2035 Estimates assume same growth rate as in 2030.

(d) Projections assume the Antelope Valley Region would have a similar annual growth rate as the City of Lancaster, estimated as approximately 2.6 percent from SCAG projections.

(e) Projections based on the Rosamond and Willow Springs Specific Plans.

of Lancaster, estimated as approximately 2.6 percent from SCAG projections. Projections indicate that approximately 1.17 million people will reside in the Antelope Valley Region by the year 2035. This represents an increase of approximately 161 percent from the 2005 population. Figures 2-13 and 2-14 graphically depict these population projections.

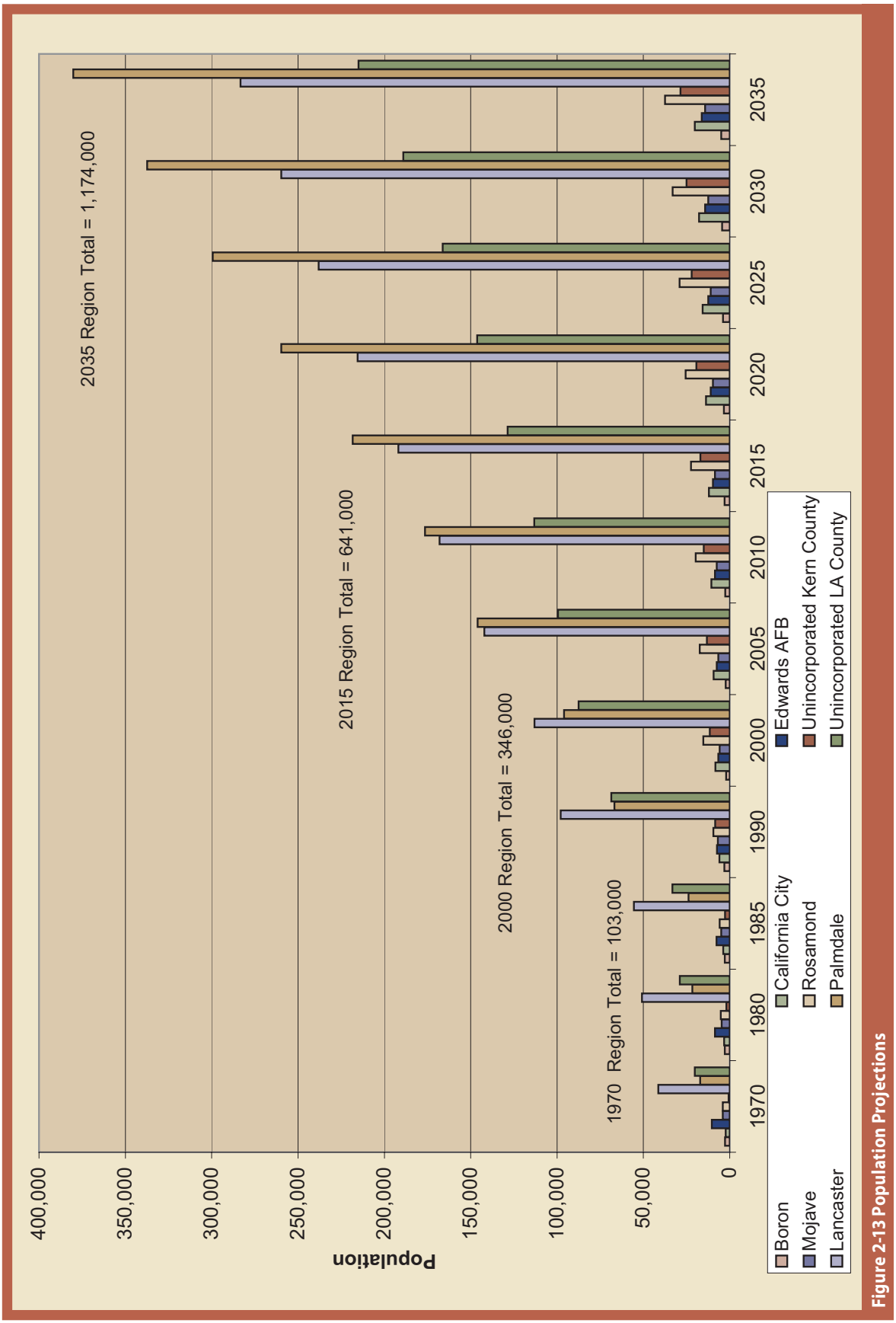

Figure 2-13 Population Projections

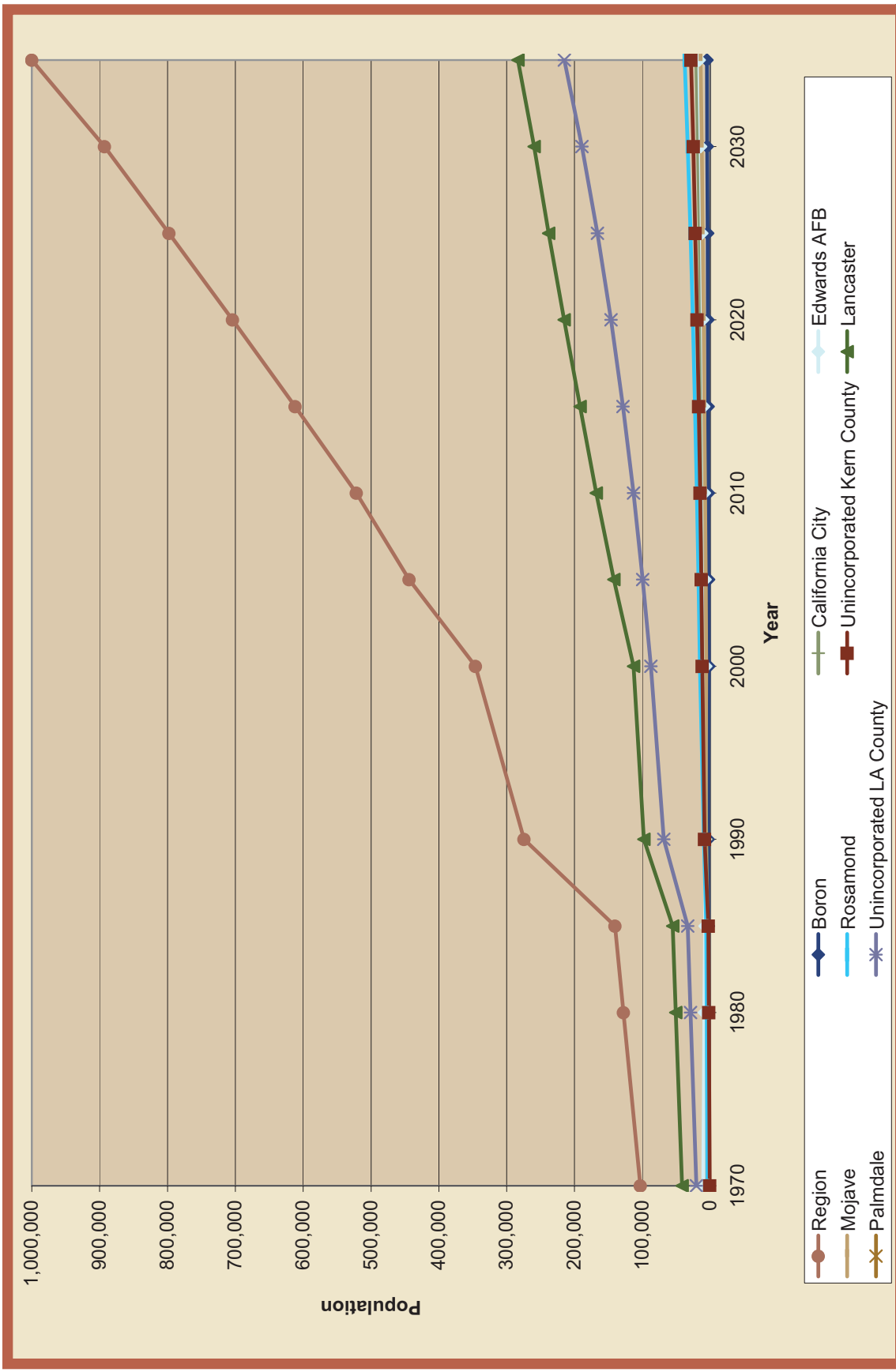

Figure 2-14 Antelope Valley Region Population

Section 3: Issues and Needs

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One fundamental challenge in the Antelope Valley Region is that demand for water exceeds available supplies. If communities do not begin conserving water more effectively, the Region will need twice as much water as it currently has in order to meet demand in 2035.

Section 3: Issues & Needs

The purpose of this section is to identify the issues, needs, challenges and priorities for the Antelope Valley Region through the year 2035 related to water supplies and other resources within the Antelope Valley Region. The section will assess the current and projected water demands of the Antelope Valley Region, which include agricultural and municipal and industrial (M&I) demands on groundwater, imported water, and recycled water as well as an analysis of the current and projected supplies[1] needed to meet those demands. In addition, an assessment of the water quality issues and challenges affecting these sources will be presented. A discussion of the flood management, environmental resource management, and land use planning issues will be presented, as these issue areas affect the water supply and demand requirements within the Antelope Valley Region. Finally, a discussion of the issues and needs specific to the underrepresented communities within the Antelope Valley Region are discussed.

1 During the analysis for this Integrated Regional Water Management (IRWM) Plan, the Regional Water Management Group (RWMG) was aware that a separate analysis of water supplies was being conducted by a Technical Advisory Committee (TAC) to the adjudication. The analyses provided in the IRWM Plan are strictly for long-term planning purposes and have not been conducted to answer the questions being addressed within the adjudication. Once the detailed analysis of historic water use and available groundwater are completed within the adjudication, the supply numbers for the IRWM Plan will need to be updated.

3.1 WATER SUPPLY MANAGEMENT ASSESSMENT

As rapid development has increased the demand for both more and higher quality water in the Antelope Valley Region, the competition for available water supplies has also increased. Developing new water supplies and protecting existing water supplies, recognizing the lack of proper infrastructure and the need to maintain the groundwater levels, is crucial to successfully meeting the future water demands within the Antelope Valley Region.

In order to assess the water supply for the Antelope Valley Region, a water budget approach was utilized in-lieu of a direct comparison of supply and demand to better capture the regional understanding of the groundwater basin. Figure 3-1 presents a schematic of the water budget elements and their relationships to each other. The main components of the water budget include water entering, surface storage, groundwater storage, direct deliveries, recycle/reuse, demands, and water leaving. Each of these components is discussed in more detail below.

3.1.1 Water Entering

This component of the water budget includes sources of water from outside of the Antelope Valley Region entering the water budget boundary, such as precipitation and imported water.

3.1.1.1 Precipitation

As discussed in Section 2, the average annual precipitation for the Antelope Valley Region is approximately 7 inches per year. Precipitation entering the Antelope Valley Region is either lost to evaporation (see Section 3.1.7), percolates to groundwater storage as natural recharge (see Section 3.1.3.3), or is carried as runoff to surface storage (see Section 3.1.2.1).

3.1.1.2 Imported Water

Imported water entering the Antelope Valley Region could come from a number of sources including the State Water Project (SWP), desalination, or transfers/exchanges with surrounding agencies. Currently, the only source of imported water to the Antelope Valley Region is SWP water. SWP water enters the Antelope Valley Region as direct

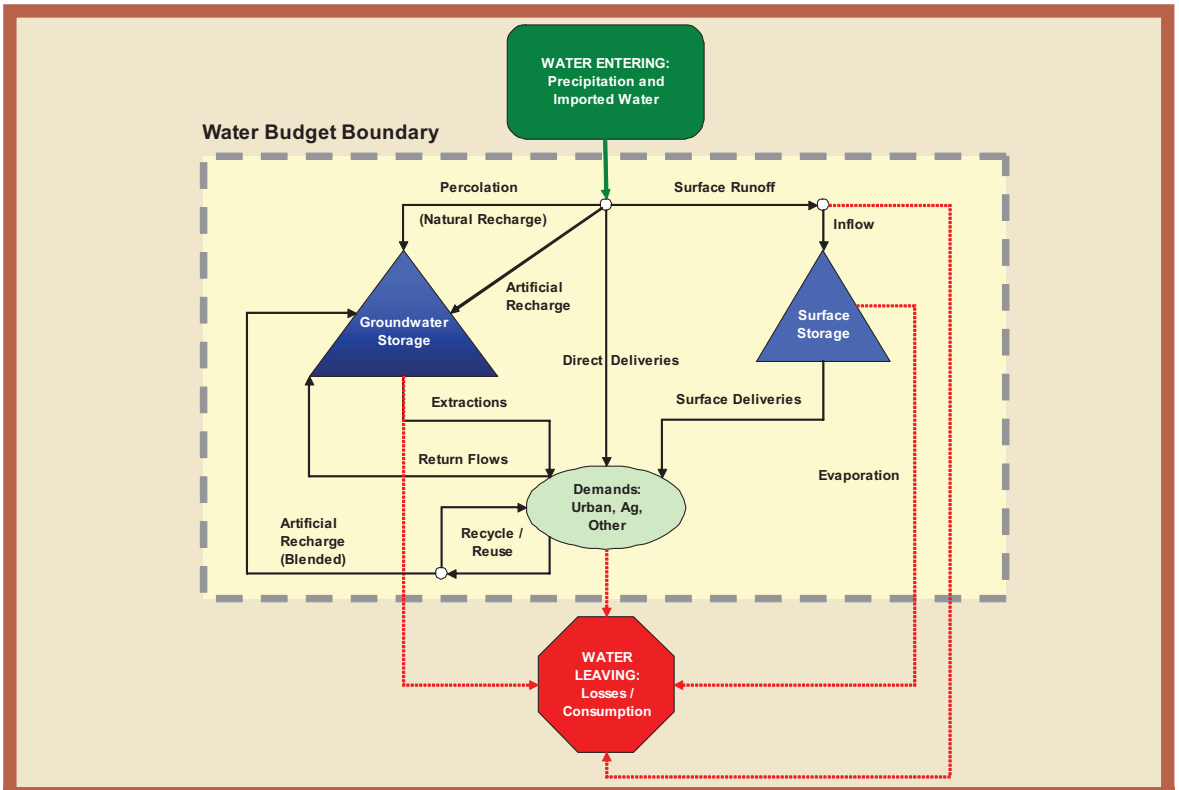


Figure 3-1 Water Budget Schematic

deliveries (see Section 3.1.4) or artificial recharge to groundwater storage (see Section 3.1.3.4).

3.1.1.2.1 Imported Water Infrastructure

Imported water to the Antelope Valley Region is generally SWP water that is released from Lake Oroville into the Feather River where it then travels down the river to its convergence with the Sacramento River, the state's largest waterway. Water flows down the Sacramento River into the Sacramento-San Joaquin Delta. From the Delta, water is pumped into the California Aqueduct. The Antelope Valley Region is served by the East Branch of the California Aqueduct. Water taken from the California Aqueduct from the local SWP Contractors is then treated before distribution to their customers.

The Antelope Valley-East Kern Water Agency (AVEK) currently treats SWP water with four Water Treatment Plants (WTPs) that are capable of treating approximately 104,260 acre-feet per year (AFY) of imported water. The main WTP, Quartz Hill WTP, is rated for 65 million gallons per day (mgd) (72,870 AFY). The Eastside WTP, expanded in 1988, provides a treatment capacity of 10 mgd (11,210 AFY). Rosamond WTP is a 14 mgd (15,695 AFY) capacity treatment plant. The fourth AVEK plant, Acton WTP, has a capacity of 4 mgd (4,484 AFY) and is located outside of the Antelope Valley Region boundaries. Los Angeles County Waterworks District 40 (LACWWD 40), Quartz Hill Water District (QHWD), and Rosamond Community Services District (RCSD) all receive treated water from AVEK and thus have no SWP treatment facilities of their own.

Palmdale Water District's (PWD's) water treatment plant capacity is 30 mgd (33,632 AFY), but it is limited to treating 28 mgd (31,390 AFY) in accordance with the California Department of Public Health (DPH) (formerly the Department of Health Services) requirements to keep one filter offline in reserve (PWD 2001). Planned improvements at the plant will increase its capacity to 35 mgd. PWD is also in the preliminary design stage for a new water treatment plant with an initial capacity of 10 mgd.

Littlerock Creek Irrigation District (LCID) has an agreement with PWD to treat its raw SWP water and thus has no treatment facilities of its own.

Major water-related infrastructure in the Antelope Valley Region is shown on Figure 3-2.

3.1.1.2.2 Reliability

The amount of SWP supply that would be available for a given water demand is highly variable and depends on 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 variability of SWP deliveries is described in the California Department of Water Resources (DWR's) "Final 2005 SWP Reliability Report" (Reliability Report), the intent of which is to assist SWP contractors in assessing the reliability of the SWP component of their overall supplies.

In the Reliability 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 hydrology history. The results are interpreted as the capability of the SWP to meet the assumed demand, over a range of historic conditions, for that assumed set of physical facilities and operating constraints. Although new facilities are planned to increase the water delivery capability of the SWP (such as delta improvements), the analyses contained in the Reliability Report assume no additional facilities.

The Reliability Report shows that existing SWP facilities will on average receive 69 percent of their full Table A Amount for current demand conditions and 77 percent of their full Table A Amount for 2025 demand conditions. This means 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 basis. The Reliability Report also projects 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 (the driest in 73 years of historical hydrology). DWR set the 2006 SWP allocation at 100 percent. The initial allocation for 2007 has been set at 60 percent of Contractor requested amounts and may increase during the winter months (DWR 2006).

On August 31, 2007, a U.S. District Judge ruled that the SWP was in violation of the federal Endangered Species Act because it is threatening the existence of the Delta smelt, a fish species living in the Sacramento Delta. To help protect the species, the Judge ordered water imports from the north to be cut by up to 35 percent from the SWP and the Central Valley Project, until the Biological Opinion for

the species can be prepared. SWP allocations for 2008 are anticipated to be lower than average, and could foreseeably be as low as the Judge's initial ruling.

The SWP supply estimates in this IRWM Plan rely on the projections made in DWR's Reliability Report for future supply. This Plan acknowledges that the current supply will be impacted by the delta smelt ruling, and the supply analysis will be updated when DWR prepares its next Reliability Report Update. This Plan also acknowledges that the Integrated UWMP is currently being updated to reflect the Judge's decision.

3.1.2 Surface Storage

3.1.2.1 Runoff

Surface water in the Antelope Valley Region is generally runoff from Littlerock and Santiago Canyons in the Angeles National Forest that is intercepted by the Littlerock Dam and Reservoir. Littlerock Reservoir is co-owned by PWD and LCID. PWD and LCID jointly have long-standing water rights to 5,500 AFY from Littlerock Creek flows. Raw water is conveyed to Lake Palmdale for treatment and use via the Palmdale Ditch.

One of the existing actions of the PWD is to conduct a study to determine the feasibility of enhancing the yield at Littlerock Reservoir. This study may show or quantify any additional source of runoff available to the Antelope Valley Region that is currently lost due to inadequate storage facilities. Additionally, there may be the potential for additional runoff from Amargosa Creek. However, at this time, there is no quantification of additional runoff available to the Antelope Valley Region.

3.1.2.2 Surface Deliveries

LCID is currently able to purchase 1,000 AFY, or 25 percent yield from the reservoir from PWD, whichever is less (PWD 2001). This amount exists until the 1992 reservoir rehabilitation agreement between PWD and LCID ends in 2042. When the 50-year term of the agreement expires, LCID regains its water rights according to the 1922 agreement between PWD and LCID. The 1922 agreement states that LCID has the exclusive right to the first 13 cubic feet per second (cfs) measured at the point of inflow to the reservoir. Flows greater than 13 cfs will be shared by PWD and LCID, with 75 percent to PWD and 25 percent to LCID. In addition, each district is allotted 50 percent of the Littlerock Reservoir storage capacity (PWD 2001). Currently, water from Littlerock Reservoir is only used for M&I uses.

A hydrological model of the Littlerock Reservoir has indicated that annual diversions (surface deliveries) range between 1,180 to 15,900 acre-feet (AF) (PWD 2001). Table 3-1 provides a summary of the historical surface deliveries from Littlerock Reservoir.

3.1.2.2.1 Surface Water Infrastructure

The surface water storage facilities in the Antelope Valley Region include Littlerock Reservoir and Lake Palmdale. Littlerock Reservoir has a useable storage capacity of 3,500 AF of water.

Littlerock Reservoir discharges into Lake Palmdale, which has a capacity of approximately 4,129 AF (PWD 2001). Lake Palmdale stores both surface water runoff and SWP imported water until the water is conveyed from the lake through a 42-inch pipeline to PWD's water treatment plant.

3.1.2.2.2 Reliability

In the PWD 2005 Urban Water Management Plan (UWMP), historical data was used to determine how the reliability

Table 3-1 Historical Surface Deliveries From Littlerock Reservoir (AFY)

Year	PWD Diversions	LCID Diversions	Total Diversions
1975	1,586	1,513	3,099
1980	913	1,950	2,863
1985	1,460	1,375	2,835
1990	110	200	310
1995	3,771	0	3,771
2000	6,500	0	6,500
2005	6,900	0	6,900

Source: PWD 2001.

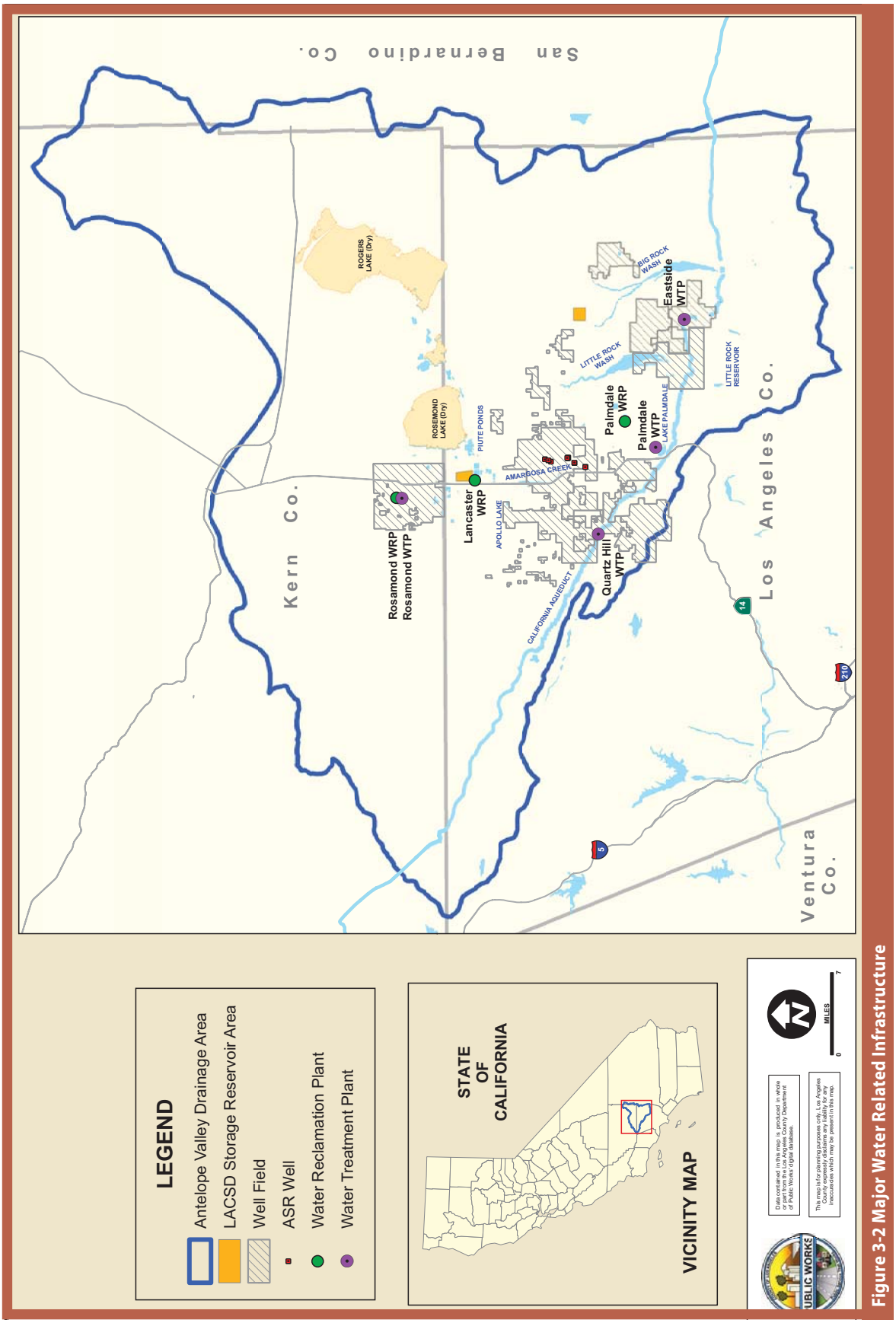


Figure 3-2 Major Water Related Infrastructure

of the Littlerock Dam and Reservoir surface water supplies would be affected for an average, single-dry, and multi-dry water years. An average water year results in approximately 4,400 AFY, which includes allotments for both LCID and PWD. This estimate is based on annual averages for years with average precipitation and should not be confused with the average expected yield of the reservoir, which is the annual average for all water years. For a single-dry water year, the annual yield is approximately 300 AFY. In a multi-dry water year, Littlerock Dam and Reservoir is expected to yield 2,200 AFY.

According to the PWD 2001 Water Master Plan, a reliability analysis was performed for the reservoir yield using actual hydrology from 1949 to 1999, obtained from the Los Angeles Department of Public Works (LADPW). This analysis projected surface deliveries ranging from 1,178 to 15,900 AFY. The average annual yield was estimated to be 7,396 AFY.

3.1.2.3 Evaporative/Conveyance Losses

There is an estimated conveyance loss of 9 percent for surface water deliveries (PWD 2001). This reduces the expected average annual yield to approximately 6,920 AFY. Additionally, there are evaporative losses at the reservoir site. In the PWD 2001 Water Master Plan, evaporative loss was estimated using monthly data for the Antelope Valley Region and reservoir area-capacity curve. Evaporative losses were incorporated into the expected annual surface deliveries and therefore do not need to be accounted for separately.

3.1.3 Groundwater Storage

3.1.3.1 Overview of Groundwater Storage

3.1.3.1.1 Groundwater Infrastructure

LCID has five (5) groundwater wells that supplied approximately 2,160 AFY of water in 2004. Four (4) of the wells provide potable water and one well is strictly for agricultural use.

LACWWD 40 has 42 wells with a combined maximum pumping capacity of approximately 55.5 mgd (62,172 AFY).

PWD has twenty-six (26) equipped groundwater wells and four (4) additional drilled, unequipped wells throughout the Lancaster and Pearland groundwater subunits, and the San Andreas Rift Zone. Two of the equipped groundwater wells have been taken out of production due to water quality concerns. The total instantaneous capacity for all PWD wells operating is 15,737 gpm. PWD's total groundwater pumping in 2004 was 11,046 AFY.

QHWD currently operates seven (7) wells for a total maximum pumping capacity of 6,831 AFY. The District is currently constructing a pipeline to two (2) more wells drilled a couple of years ago (QHWD 2006). In total, these nine (9) wells are expected to increase capacity to 8,448 AFY. QHWD pumped approximately 1,450 AFY until 2001 when a shortage in SWP water required the QHWD to increase pumping to 3,050 AFY (QHWD 2002).

Rosamond Community Service District (RCSD) pumps about 1,800 to 2,000 AFY from five (5) wells.

3.1.3.1.2 Reliability

Since long-term recharge is expected to be stable, it is anticipated that groundwater pumping, and hence supply, will be reliable even in short-term and multiple year droughts. Thus groundwater is considered a very reliable supply for the Antelope Valley Region. However, the pending adjudication may affect how much groundwater can physically be supplied to the Antelope Valley Region in the future. It is important to note that the return flows are dependent upon anticipated demand and may fluctuate with any change in the anticipated demand. The return flows estimates are meant to indicate a sense of the impact of return flows to the groundwater basin.

3.1.3.2 Percolation

For purposes of this IRWM Plan, direct percolation from precipitation on the Antelope Valley Region floor is assumed to be 0 AFY. However, indirect percolation from irrigation return flows on the Antelope Valley Region floor do occur as discussed in Section 3.1.3.5. There is the potential for direct percolation on the Antelope Valley Region floor to have an impact to the overall water budget. This component of the water budget is currently being studied in the Antelope Valley Region, and if new information is discovered that greatly differs from this assumption, this IRWM Plan may be amended to reflect this.

3.1.3.3 Natural Recharge

Natural recharge can be variable and difficult to quantify. Historical estimates of natural recharge have ranged from 30,300 AFY to 81,400 AFY based on a variety of approaches (USGS 2003, USGS 1993). The earliest estimates of natural recharge ranged from 50,000 AFY to 81,400 AFY and were

based on limited streamflow and rainfall data (USGS 1993). Later estimates were based on developing a relationship between rainfall and runoff and ranged from 40,280 AFY to 53,000 AFY (USGS 1993). The most recent estimate of recharge was based on a groundwater model, which modified the natural recharge estimate to 30,300 AFY to achieve balance within the model (USGS 2003).

For the purposes of this IRWM Plan, the full range of estimates (30,300 AFY to 81,400 AFY) is utilized to approximate natural recharge.[2] Furthermore, natural recharge is assumed to occur from direct percolation in the surrounding alluvial and from stream runoff to the alluvial fans. This IRWM Plan may be amended to incorporate any new information regarding natural recharge that is developed in the future. As with agricultural return flows, time delays likely exist for natural recharge as well. These delays are extremely difficult to estimate and may vary by geographic location. However, for the purposes of this IRWM Plan, no time-delay is included since the water budget comparison is for long-term averages over the entire basin (or steady-state conditions), which absorb the variations from the time-delay.

3.1.3.4 Artificial Recharge

One typical source of artificial recharge is through Aquifer Storage and Recovery (ASR) projects. ASR projects involve the storage of water in an aquifer via artificial groundwater recharge when water is available (usually during spring runoff), and recovery of the stored water from the aquifer when water is needed (usually late summer). The source of water used for ASR can vary. Currently, the only sources of ASR water available to the Antelope Valley Region are SWP water and recycled water. These two sources of water may be injected individually or blended (mixed) before being injected. Although the City of Lancaster is developing a groundwater recharge project with blended recycled water, currently only SWP water is utilized for ASR in the Antelope Valley Region.

LACWWD 40 is currently the only agency within the Antelope Valley Region that is actively using ASR as a water supply management practice. Their program includes the use of new or existing wells for direct injection of water into the aquifer. LACWWD 40's ASR program operates under a Conditional Waiver of Waste Discharge Requirements, for a period of 5 years with groundwater monitoring requirements stipulated in the waiver. The waiver stipulates that LACWWD 40 can only inject water to fill the basin to the 2,150 feet groundwater contour interval. This groundwater depression has a radius of approximately 2 miles centered around the middle of Lancaster. The permit allows for injection up to 6,843 AFY. During Winter 2005/06, LACWWD 40 used four (4) wells to store approximately 1,500 AF in the groundwater basin (personal communication, David Pedersen, LADPW).

3.1.3.4.1 Aquifer Storage and Recovery (ASR) Infrastructure

LACWWD 40 started the 2006 ASR program in November with 6 wells in operation, with a combined injection rate of 2,500 to 3,000 gallons per minute (gpm) (personal communication, David Pedersen, LADPW). Approximately 10 additional new ASR wells are currently planned for development with operation potentially beginning as early as 2008.

3.1.3.4.2 Reliability

ASR water is only to be used during dry water year conditions (personal communication, David Pedersen, LADPW) and is assumed to be 100 percent reliable. Future estimates of availability will assume maximum injection rates and continuation of the permitting Waiver. For average year conditions, it was assumed that the maximum injection rate (6,843 AF) of SWP would be added to the ASR each year, with the exception of 2005 in which only 1,500 AFY was injected. Thus by 2010, a total of 29,000 AFY will have been injected (1,500 [for 2005] plus 4 × 6,843 [for 2006 to 2009]). This stored ASR water will then be available for pumping in dry year conditions. The volume available from storage in dry years was assumed to be the difference in the existing and maximum pumping rates, or approximately 31,600 AF. Thus, for a single dry year occurring in 2010, the stored 29,000 AFY is assumed to be available for pumping in 2010. For a multi-dry year starting in 2010, again 29,000 AFY is assumed to be available with the lesser of the 31,600 AFY available pumping capacity or the full supply deficit being pumped. Any remaining water in ASR storage is then considered to be available in 2011. This process is repeated for each subsequent year in that 5-year interval. Availability of water in ASR storage for 2015, 2020, 2025, and 2030, assumes average water year conditions have occurred prior to that year (i.e., full availability of ASR stored water).

2 During the analysis for this IRWM Plan, the RWMG was aware that a separate analysis of water supplies (including revised estimates of natural recharge) was being conducted by a TAC to the adjudication. The range of possible natural recharge provided in the IRWM Plan is strictly for long-term planning purposes and has not been conducted to answer the questions being addressed within the adjudication. Once the detailed analysis of historic water use and available groundwater are completed within the adjudication, the supply numbers for the IRWM Plan will need to be updated.

3.1.3.5 Return Flows

The term return flows refers to the part of applied water that is not consumed by evapotranspiration and that migrates to an aquifer or surface water body. For purposes of this IRWM Plan return flows were determined by the following equations:

$$\text{Return Flows} = \text{Water}_{\text{applied}} - \text{Water}_{\text{required}}$$

$$\text{Water}_{\text{required}} = \text{Irrigation Efficiency (IE)} \times \text{Water}_{\text{applied}}$$

Substituting the second equation into the first,

$$\text{Return Flows} = \text{Water}_{\text{applied}} - \text{IE} \times \text{Water}_{\text{applied}}$$
$$= (1 - \text{IE}) \times \text{Water}_{\text{applied}}$$

For the Antelope Valley Region there are three types of return flows: agricultural, urban, and recycle/reuse return flows. Each of these is discussed in more detail below.

3.1.3.5.1 Agricultural Return Flow

Agricultural return flow rates were determined using the projected range of supply available for agricultural use and an irrigation efficiency of 75 percent. Assuming an irrigation efficiency of 75 percent and the equation above, agricultural return flows would be 25 percent (1 – 0.75 = 0.25) of the agricultural water applied. The agricultural water applied was assumed to be the water available for agricultural use and was determined by applying the projected percentages of agricultural demand to the total projected water deliveries (sum of the surface deliveries, imported water deliveries, recycled water, banked ASR water, natural recharge, and return flows). Projected percentages of agricultural demand are presented in Table 3-9. Basing the return flows on the available supply, as opposed to demand, allows for a better representation of future supplies. Estimates based on demand can overestimate supply since they include return flows on future demands which may not be met if there is not sufficient supply. Table 3-2 provides the projected agricultural return flows.

Previous studies have indicated that there is some time-delay between when the water is applied to when it actually reaches the aquifer, however these estimates have varied from 1 to 2 years to as much as 10 years (USGS 2003). Time delays are extremely difficult to estimate and may vary by geographic location. However, for the purposes of this IRWM Plan, no time-delay is included since the water budget comparison is for long-term averages over the entire basin (or steady-state conditions), which absorb the variations from the time-delay.

It is important to note that any changes in the projected agricultural land-use will directly affect the agricultural return-flow. Increasing temperatures due to global warming also influence agricultural demand by increasing natural plant evapotranspiration (ETo) rates and crop water use, resulting in declining agricultural return flows.

3.1.3.5.2 Urban Return Flows

The ratio of indoor to outdoor water use for the Antelope Valley Region was used to estimate the return flows from deep percolation resulting from urban water use. The statewide average for outdoor water use is approximately 50 percent of total residential demand. However, estimates of outdoor water use for the Antelope Valley Region are closer to 70 percent (personal communication, David Pedersen, LADPW).

Table 3-2 Projected Agricultural Return Flow (AFY)

	Average Year				Single Dry Water Year				Multi-Dry Water Year			
Year	Total Water Delivered	% Ag	Applied Ag Water(a)	Ag Return Flow(b)	Total Water Delivered	% Ag	Applied Ag Water(a)	Ag Return Flow(b)	Total Water Delivered	% Ag	Applied Ag Water(a)	Ag Return Flow(b)
2010	201,000	47	95,000	24,000	159,000	49	78,000	19,000	219,000	49	107,000	27,000
2015	205,000	43	89,000	22,000	160,000	45	72,000	18,000	221,000	45	99,000	25,000
2020	208,000	40	83,000	21,000	160,000	41	66,000	17,000	221,000	41	92,000	23,000
2025	211,000	37	78,000	19,000	163,000	38	62,000	16,000	221,000	38	85,000	21,000
2030	211,000	34	72,000	18,000	163,000	36	58,000	15,000	222,000	36	79,000	20,000
2035	211,000	32	67,000	17,000	163,000	33	54,000	14,000	221,000	33	74,000	18,000

Notes: Numbers rounded to the nearest 1,000 AF.

(a) The agricultural water applied was assumed to be the water available for agricultural use and was determined by applying the projected percentages of agricultural demand from Table 3-9 to the total projected water deliveries (sum of the surface deliveries, imported water deliveries, recycled water, banked ASR water, natural recharge, and return flows).

(b) Assumes return flow rate of 25 percent of water applied.

[NOTE TO READER: This 70 percent will be compared to a calculation of outdoor water use involving summer water demand and winter treatment plant flows upon receipt of additional data. Winter treatment plant flows will be assumed to be equivalent to indoor water use since there is minimal outdoor water use during winter months. Summer water demand is then assumed to be equivalent to the total indoor and outdoor water use. Thus subtracting the winter treatment plant flow from the summer water demand would yield an estimate of outdoor water use for the Antelope Valley Region. The outdoor water use is then compared to the total water demand to get a percentage of outdoor water usage. At the time this report was finalized this necessary data had not yet been received and thus the calculation could not be made. The comparison will be included in the next update of this IRWM Plan.]

As with agricultural use, an irrigation efficiency of 75 percent is assumed, and thus urban return flows are 25 percent of outdoor urban applied water. Outdoor urban applied water was assumed to be 70 percent of total urban applied water. As with agricultural use, the total urban applied water was assumed to be the water available for urban use and was determined by applying the projected percentages of urban demand (shown in Table 3-9) to the total projected water deliveries. Table 3-3 provides a summary of anticipated urban return flows.

3.1.3.5.3 Recycle/Reuse Return Flows

To determine the projected recycle/reuse return flows, projected recycled water demands (see Section 3.1.5) are subtracted from the future water reclamation plant (WRP) capacities, since return flows from urban outdoor use are considered separately. Historically, a significant portion of treated effluent was lost to evaporation from both the Palmdale and Lancaster WRPs effluent management sites. However, due to recent changes in effluent management, effluent not used for urban recycled water use will be applied to agricultural re-use sites throughout the Antelope Valley Region, thus evaporative losses are limited to oxidation ponds and storage sites. Palmdale WRP currently has 149 acres of effluent management sites and, with an evaporation rate of 83 inches per year (6.9 feet/year), approximately 1,030 AF are lost to evaporation annually (personal communication, Brian Dietrick, Los Angeles County Sanitation District [LACSD]). Similarly, Lancaster WRP plans for approximately 600 acres for storage reservoirs (240 acres existing and 360 acres planned) for a loss of 4,150 AFY due to evaporation. Assuming no urban recycled water demand, the LACSD would require approximately 11,400 acres of agricultural re-use sites to be developed over the next 15 years. It is anticipated that these re-use sites would mostly be alfalfa with some wheat/sudan grass. Application rates at these sites would be less than agronomic rates. An argonomic rate is the rate of nutrient application to fulfill a plant's nitrogen requirements while minimizing the amount of nutrients that pass to groundwater. From personal communication with LACSD, the return flow at these sites is expected to be between 10 and 20 percent. A return flow of 10 percent has been used in this IRWM Plan as it represents a more conservative estimate of the return flow.

Table 3-4 presents the projected wastewater return flows for both Palmdale and Lancaster WRPs. These estimates will vary with changes in recycled water use and changes in effluent management at the agricultural re-use sites.

Table 3-3 Projected Urban Return Flow (AFY)

	Average Year				Single Dry Water Year				Multi-Dry Water Year			
Year	Total Water Delivered	% Urbn	Outdoor Urban Applied Water(a)	Urban Return Flow(b)	Total Water Delivered	% Urbn	Applied Ag Water(a)	Outdoor Urban Applied Water(a)	Total Water Delivered	% Urbn	Outdoor Urban Applied Water(a)	Urban Return Flow(b)
2010	201,000	53	74,000	19,000	159,000	51	57,000	14,000	219,000	51	78,000	20,000
2015	205,000	57	81,000	20,000	160,000	55	62,000	15,000	221,000	55	85,000	21,000
2020	208,000	60	88,000	22,000	160,000	59	66,000	16,000	221,000	59	90,000	23,000
2025	211,000	63	93,000	23,000	163,000	62	70,000	18,000	221,000	62	95,000	24,000
2030	211,000	66	97,000	24,000	163,000	64	74,000	18,000	222,000	64	100,000	25,000
2035	211,000	68	101,000	25,000	163,000	67	76,000	19,000	221,000	67	104,000	26,000

Notes: Numbers rounded to the nearest 1,000 AF.

(a) Outdoor urban applied water was assumed to be 70 percent of total urban applied water. The urban water applied was assumed to be the water available for urban use and was determined by applying the projected percentages of urban demand from Table 3-9 to the total projected water deliveries (sum of the surface deliveries, imported water deliveries, recycled water, banked ASR water, natural recharge, and return flows).

(b) Assumes a return flow rate of 25 percent of outdoor water applied.

Table 3-4 Projected Recycle/Reuse Return Flow

Year	MGD(a)	AFY(a)	Recycled Water Demand (AFY)	Evaporation Loss at Effluent Management Sites (AFY)(b)	Total Applied to Ag Reuse Sites (AFY)(c)	Return Flow from Ag Reuse Sites (AFY)(d)
Palmdale WRP						
2010	13.2	14,800	0	1,000	13,800	1,400
2015	16.4	18,400	0	1,000	17,400	1,700
2020	19.5	21,800	0	1,000	20,800	2,100
2025	22.4	25,100	0	1,000	24,100	2,400
2030	25.5	28,600	0	1,000	27,600	2,800
2035	25.5	28,600	0	1,000	27,600	2,800
Lancaster WRP						
2010	14.8	16,600	3,400	4,200	9,000	900
2015	19.0	21,300	3,400	4,200	13,700	1,400
2020	23.0	25,800	3,400	4,200	18,200	1,800
2025	27.1	30,400	3,400	4,200	22,800	2,300
2030	31.2	34,900	3,400	4,200	27,300	2,700
2035	31.2	34,900	3,400	4,200	27,300	2,700

Notes: All values rounded to nearest 100 AFY.

(a) LACWWD 40 2006.

(b) Assumes an evaporation rate of 6.9 AF/acre (personal communication, Brian Dietrick, LACSD). For Palmdale WRP, assumes 149 acres of effluent management sites. For Lancaster WRP, assumes 600 acres of effluent management sites (LACSD 2004).

(c) Total plant capacity less recycled water demand and evaporative losses rounded to nearest 500 AF.

(d) Assumes a return flow rate of 10 percent.

3.1.3.6 Extractions

Groundwater for the Antelope Valley Region is extracted from the Antelope Valley Groundwater Basin, as described in Section 2. Historically, groundwater has been the primary water supply source for the Antelope Valley Region.

When significant pumping in the Antelope Valley Region began (early 1900s), a decline in groundwater levels ensued in response to the change in the extraction versus recharge ratio. These changes varied spatially and temporally across the Antelope Valley Region. For instance, the eastern portion of the Buttes and Pearland subunits (described in Section 2.4.2.1) had relatively unchanged groundwater levels (declines of approximately 20 feet), whereas the western portion of these subunits had declines up to 100 feet. The groundwater level changes in the Lancaster subunit were more dramatic and varied with land use, with depressions of up to 200 feet in 1961 in areas with increased agricultural pumping (City of Lancaster 2007). With the introduction of SWP water and increasing urbanization, the water table depressions have either stabilized or increased in the Antelope Valley Region. However, a significant pumping depression from concentrated municipal groundwater pumping is still evident within the southern portion of the Lancaster subunit, between the Cities of Palmdale and Lancaster. Figures 3-3 to 3-7 provide a set of contour maps of the groundwater levels for the Antelope Valley Region from 1915 to 2006.

In order to ensure a zero net change in groundwater levels, it is assumed that future extractions of groundwater will be limited to the available groundwater supplies (sum of the natural recharge and the allowable extractions of banked ASR water).

3.1.3.7 Losses/Subsurface flow

Losses from evaporation and riparian evapotranspiration are discussed in Section 3.1.7 and have been included in the overall estimate of water loss for the water budget. Since the basin is a relatively closed basin, losses from subsurface flow are assumed to be negligible for the purposes of this IRWM Plan.

3.1.4 Direct Deliveries

Direct deliveries to the Antelope Valley Region consist of the SWP water contracted through the AVEK, LCID, and PWD. The SWP is operated by DWR for the benefit of the SWP contractors. The SWP is the nation's largest state-built water and power development and conveyance system.

The SWP includes 660 miles of aqueduct and conveyance facilities from Lake Oroville in the north to Lake Perris in the south. It also includes pumping and power plants, reservoirs, lakes, storage tanks, canals, tunnels, and pipelines that capture, store, and convey water to 29 water agencies.

The SWP is contracted to deliver a maximum 4.17 million AFY of Table A water to the 29 contracting agencies. Table A water is a reference to the amount of water listed in "Table A" of the contract between the SWP and the contractors and represents the maximum amount of water a contractor may request each year. AVEK, which is the third largest state water contractor, has a Table A Amount of 141,400 AFY. Approximately three (3) percent of AVEK's Table A Amount has historically been delivered to areas outside of the Antelope Valley Region.

By October 1st of every year, each contractor provides DWR a request for water delivery up to their full Table A Amount. Actual delivery from DWR may vary from the request due to variances in supply availability resulting from hydrology, storage availability, regulatory or operating constraints. When supply is limited, water is allocated based on a percentage of full contractual Table A Amounts.

A summary of the historical deliveries of SWP to the Antelope Valley Region are provided in Table 3-5. The table illustrates the Antelope Valley Region's increasing dependence on SWP water.

Future availability of the SWP water was estimated by DWR in its Reliability Report (2005). For an average water year, it is anticipated that 69 percent of the Table A Amount in 2005 and 77 percent in year 2025 would be available for delivery to contractors. For a single dry water year, delivery of Table A water decreases to 4 percent for 2005 and 5 percent in year 2025. For a multi-dry water year, delivery of Table A water is estimated at 32 percent for 2005 and 33 percent in year 2025. For the purposes of this IRWM Plan, 2030 and 2035 deliveries were estimated at the 2025 delivery percentages. Table 3-6 provides a summary of future SWP availability to the Antelope Valley Region.

Table 3-5 Summary of Historical Wholesale (Imported) Supply (AFY) Antelope Valley Region

Year	AVEK Deliveries	AVEK Table A	PWD Deliveries	PWD Table A	LCID Deliveries	LCID Table A	Region Deliveries	Region Table A
1975	8,068	35,000	0	5,580	520	520	8,588	41,100
1980	72,407	69,200	0	11,180	191	1,150	72,598	81,530
1985	37,064	40,000	1,558	14,180	0	1,730	38,622	55,910
1990	47,206	132,100	8,608	17,300	1,747	2,300	57,561	151,700
1995	47,286	138,400	6,961	17,300	480	2,300	54,727	158,000
2000	83,577	138,400	9,060	21,300	0	2,300	92,637	162,000
2004	97,203	141,400	13,176	21,300	0	2,300	110,379	165,000

Source: DWR 2005a

Table 3-6 Summary of Projected Wholesale (Imported) Supply (AFY) Antelope Valley Region

	2010	2015	2020	2025	2030	2035
Average Year(a)	74,000	77,000	79,000	81,000	81,000	81,000
Reliability(b,c)	70%	73%	75%	77%	77%	77%
Single Dry Year(d)	6,000	6,000	6,000	8,000	8,000	8,000
Reliability(b)	4%	4%	4%	5%	5%	5%
Multi-Dry Year(d)	51,000	53,000	53,000	53,000	53,000	53,000
Reliability(b)	32%	33%	33%	33%	33%	33%

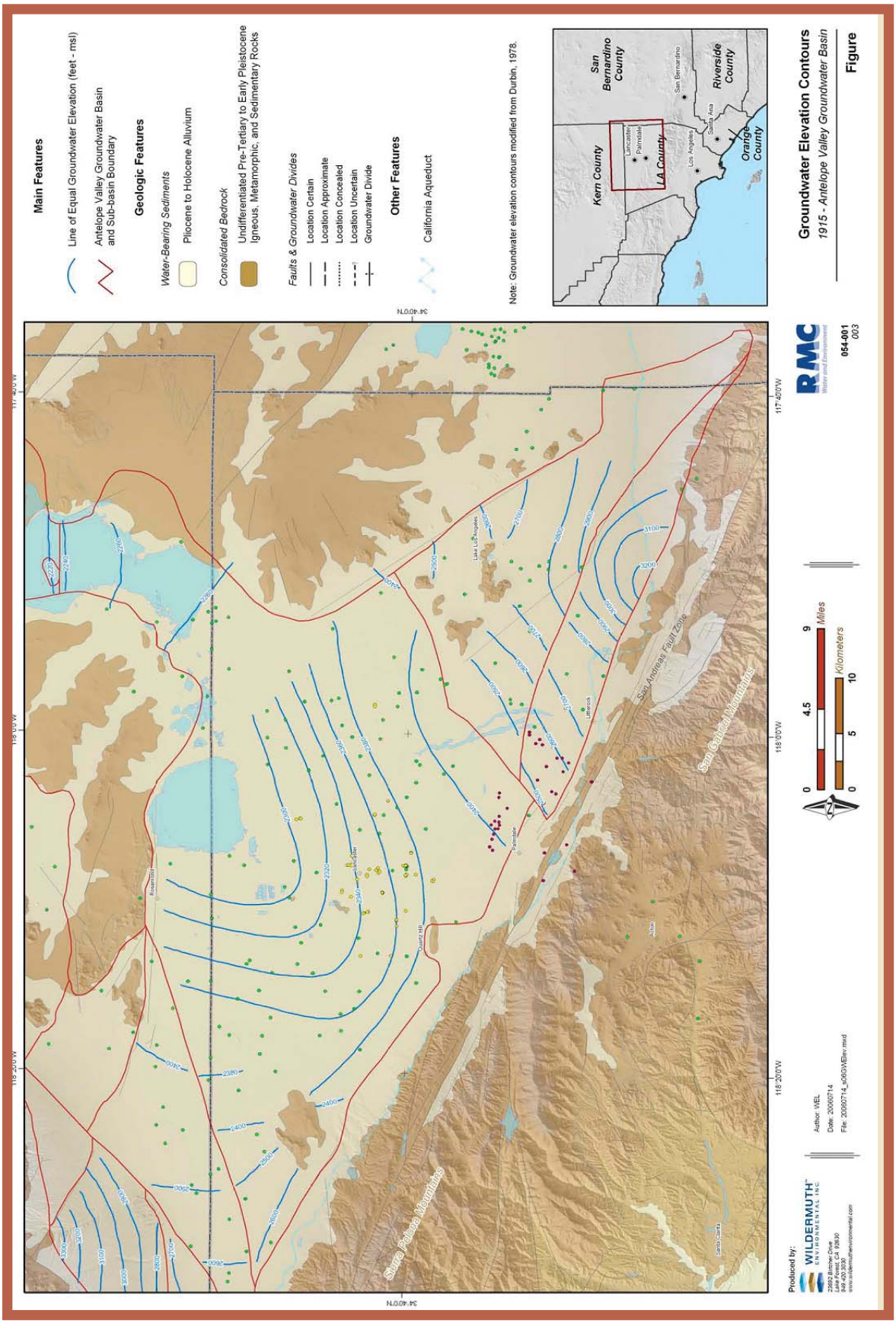
Notes: Numbers rounded to nearest 1,000 AFY.

(a) Assumes supply equivalent to the Antelope Valley Region's total Table A Amount (105,350 AFY) times the reliability, after adjusting for the local conveyance facility constraints.

(b) Determined from DWR's Final 2005 "State Water Project Reliability Report" (DWR 2005b).

(c) Future construction, facility improvements, or other actions can increase the reliability of SWP supplies (e.g., the CALFED Bay-Delta Program, the Napa Accord, and the South Delta Improvement Program). As these improvements are made and Contractor demands increase, the SWP is currently projected to be able to deliver an average of about 77 percent.

(d) Assumes supply equivalent to the Antelope Valley Region's total Table A Amount (160,750 AFY) times the reliability.


Main Features
Line of Equal Groundwater Elevation (feet - msl)
Antelope Valley Groundwater Basin and Sub-basin Boundary
Geologic Features
Water-Bearing Sediments
Pliocene to Holocene Alluvium
Consolidated Bedrock
Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks
Faults & Groundwater Divides
Location Certain
Location Approximate
Location Concealed
Location Uncertain
Groundwater Divide
Other Features
California Aqueduct
Note: Groundwater elevation contours modified from Durbin, 1978.
Kern County
San Bernardino County
Riverside County
Orange County
LA County
Lancaster
Palmdale
Los Angeles
Santa Ana
San Bernardino
Groundwater Elevation Contours
1915 - Antelope Valley Groundwater Basin
Figure
RMC
Water and Environment
054-001
003
Miles
Kilometers
Produced by:
WILDERMUTH ENVIRONMENTAL INC.
Author: MEL
Date: 20060714
File: 20060714_s06GWElev.mxd
Rosamond
Edwards
Tehachapi Hills
Lake Los Angeles
Palmdale
Lancaster
Acton
Santa Clarita
San Andreas Fault Zone
San Gabriel Mountains
Sierra Pelona Mountains
34°40'0"N
118°20'0"W
118°0'0"W
117°40'0"W

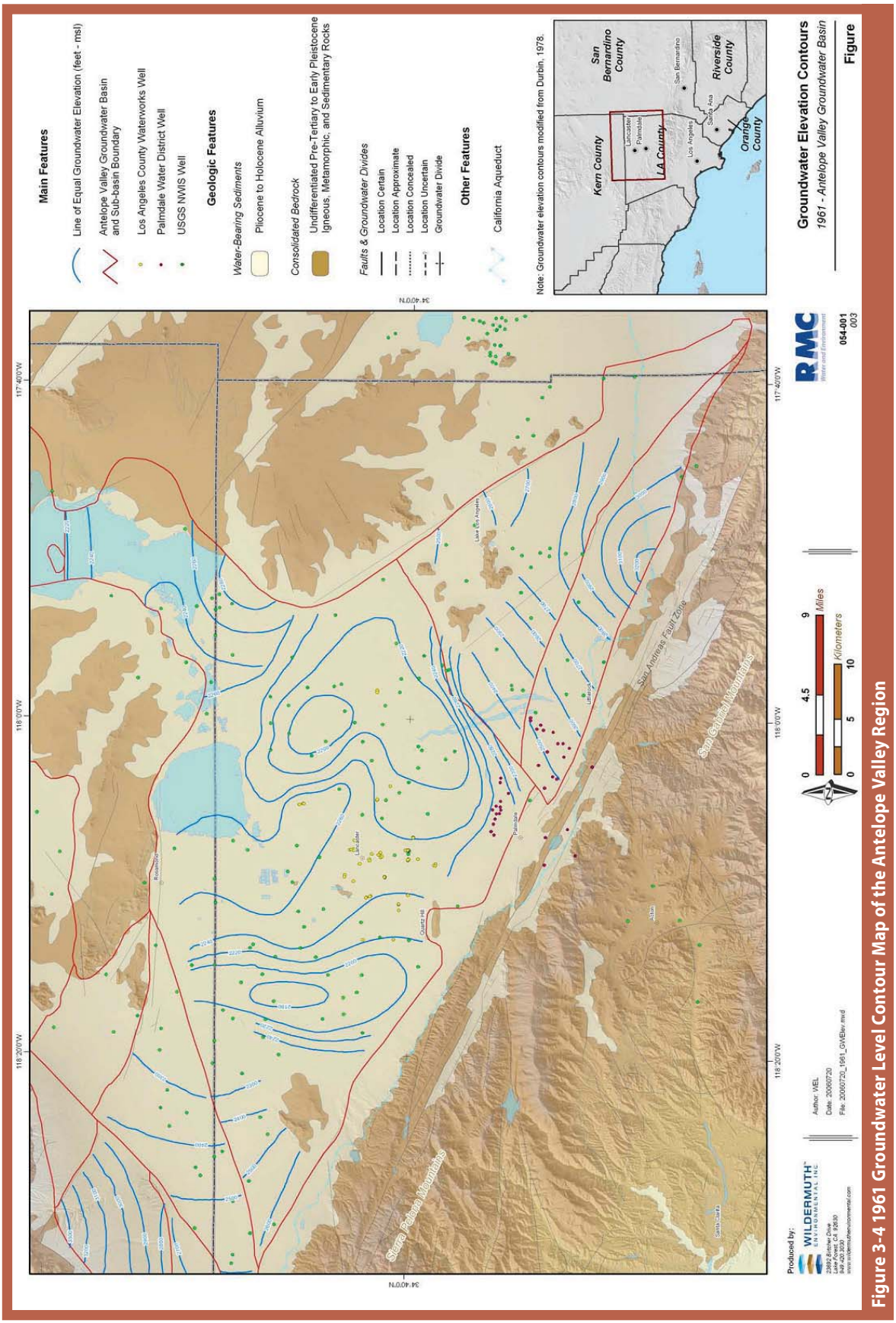


Figure 3-4 1961 Groundwater Level Contour Map of the Antelope Valley Region

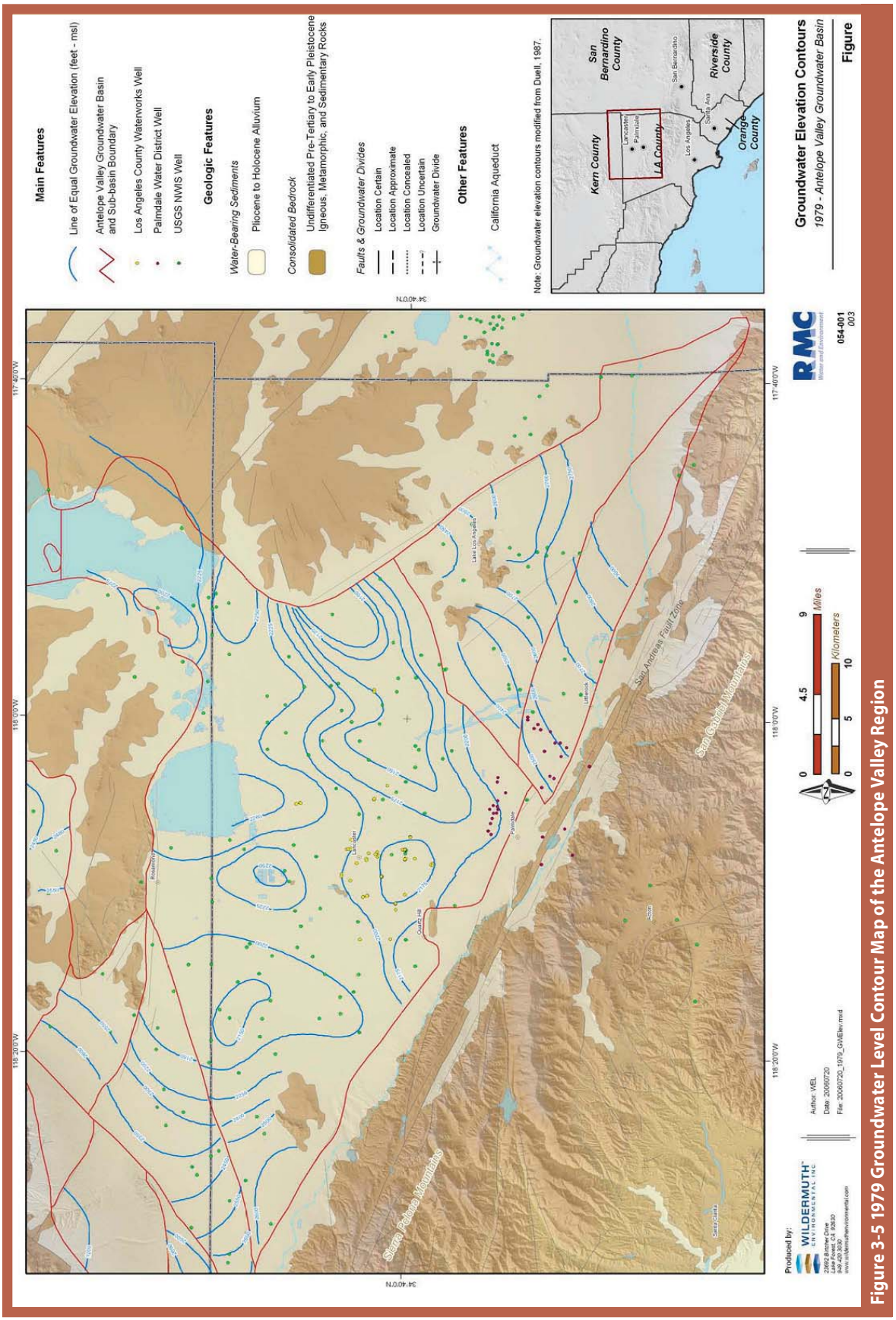


Figure 3-5 1979 Groundwater Level Contour Map of the Antelope Valley Region

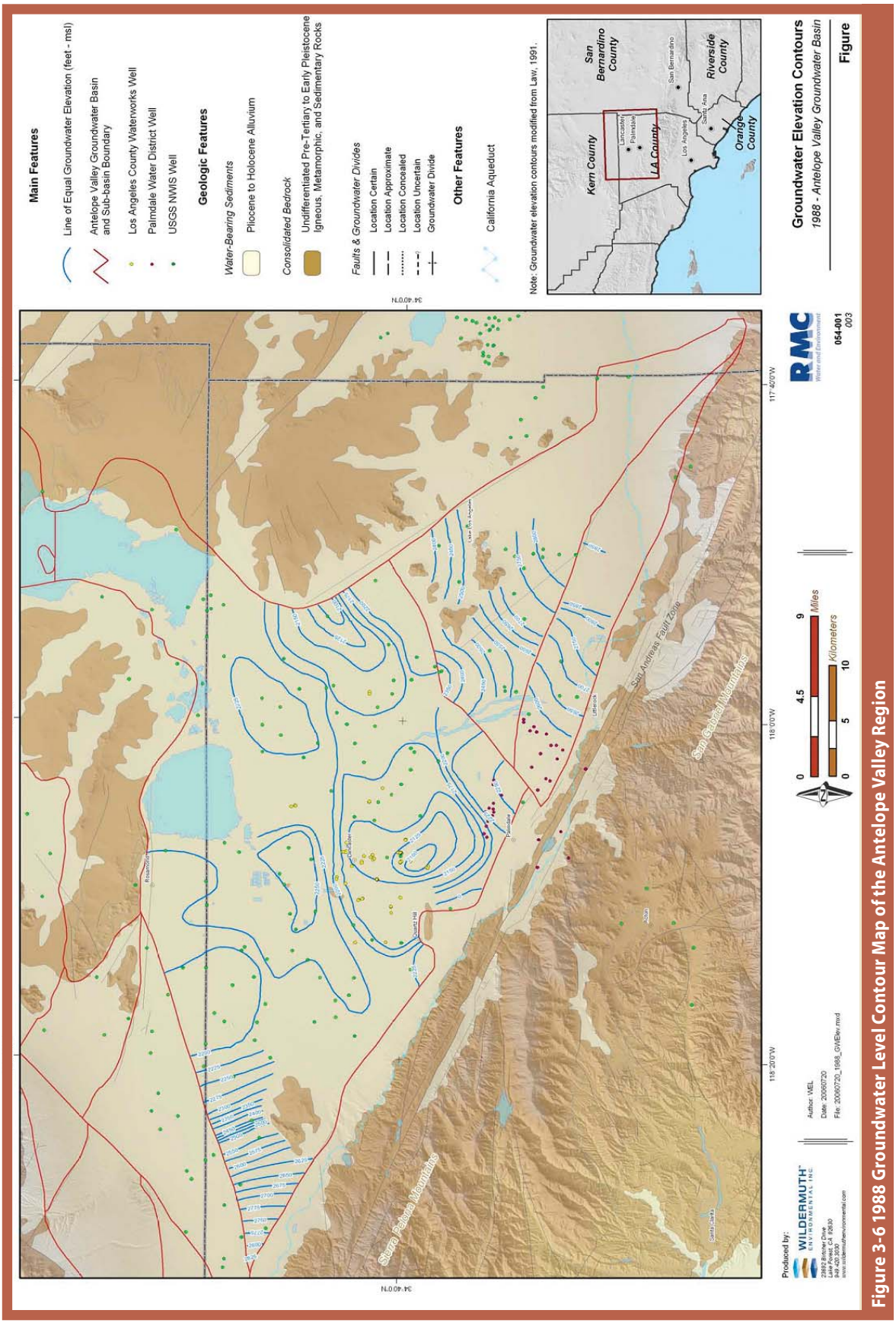


Figure 3-6 1988 Groundwater Level Contour Map of the Antelope Valley Region

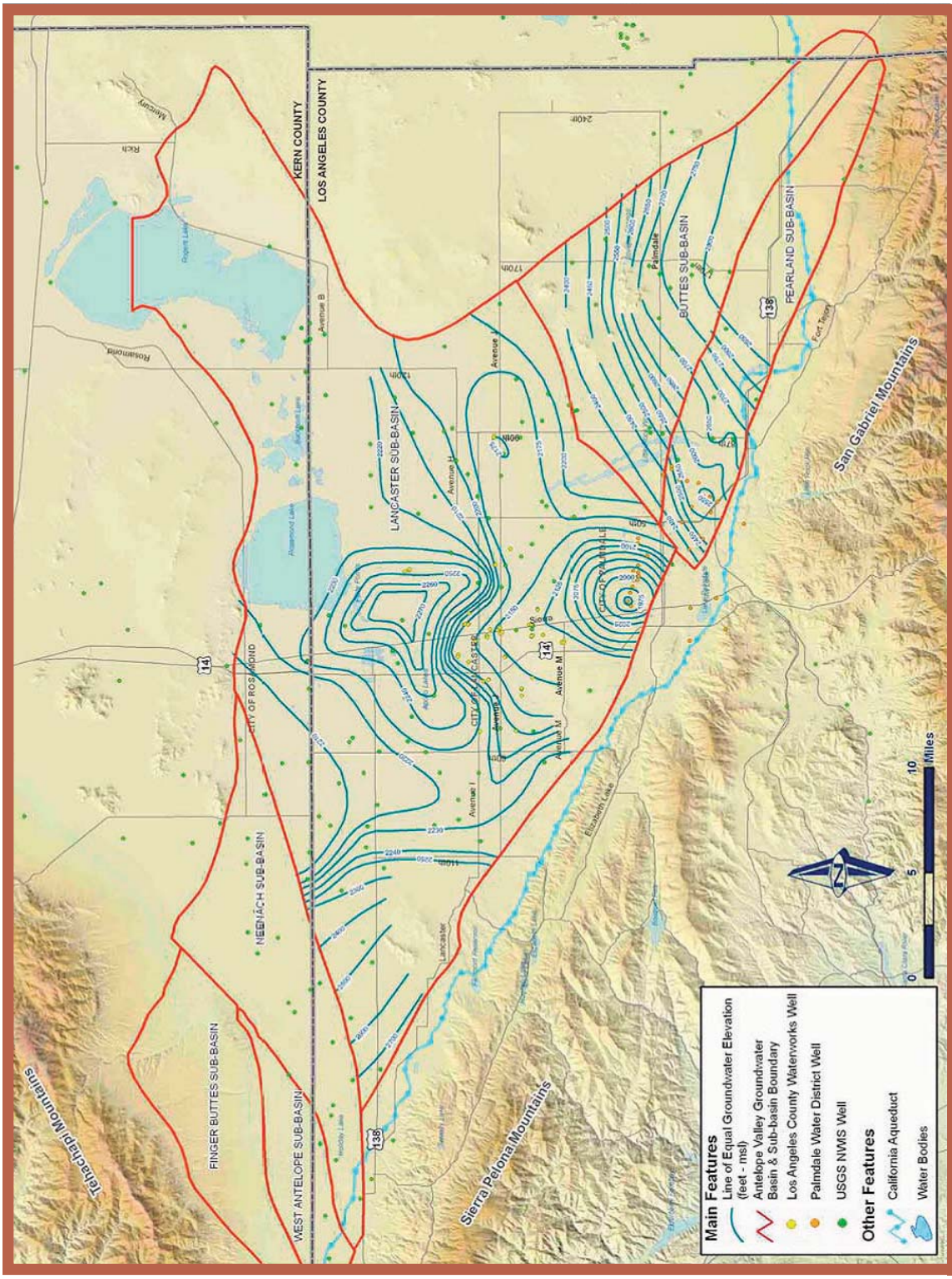


Figure 3-7 2006 Groundwater Level Contour Map of the Antelope Valley Region

However, AVEK is currently unable to beneficially apply its entire Table A amount of SWP water, even during years when the full Table A amount is available. This inability to fully use available supply stems from the variability of demand during winter and summer, and the existing infrastructure to receive, store, and deliver water to users. AVEK currently provides most of their water through direct deliveries to meet current demand. When demand is high during summer months, the aqueduct bringing water to AVEK has a conveyance capacity below the demand for water. During the winter months, demand is much lower than aqueduct capacity. If AVEK had sufficient infrastructure to receive and store the water when it can take delivery during the winter months, it could then deliver that water during higher demands or during times when less SWP water is available.

The maximum amount of Table A water AVEK currently can put to beneficial use in an average water year is approximately 81,750 AFY (assuming 400 gpm deliveries from June 15 to September 31 and 150 gpm deliveries for the rest of the year). However, this conveyance constraint into the Antelope Valley Region does not affect dry year conditions since the availability of SWP water in a dry year is significantly less than the aqueduct capacity. Therefore, for the purposes of this IRWM Plan AVEK's Table A Amounts available for use within the Antelope Valley Region for dry year conditions is calculated to be 137,150 AFY. LCID and PWD have Table A Amounts of 2,300 AFY and 21,300 AFY, respectively. Thus, the total available Table A Amount for the Antelope Valley Region is 105,350 AFY and 160,750 AFY for average and dry year conditions, respectively.

3.1.5 Recycle/Reuse

3.1.5.1 Recycled Water Sources

Currently, the only recycled water in the Antelope Valley Region that is treated to a tertiary level is a small percentage of the wastewater at the Lancaster WRP through additional onsite facilities of the Antelope Valley Tertiary Treatment Plant (TTP). In the future, recycled water may be available from three primary sources: (1) Lancaster, (2) Palmdale WRPs, and (3) the Rosamond Wastewater Treatment Plant (WWTP). Since the RWMG emphasized the need to maximize beneficial use of water supplies within the Antelope Valley Region, the proposed recycled water users served by these WRPs and identified in the "2005 Antelope Valley Water Facilities Planning Report" have been included in the Water Budget estimates for this Plan. This presumes that significant investments will be made to expand and upgrade treatment plants to develop these recycled water supplies (as described in Section 5.2.2). If the necessary investments are not made, the expected future water supplies for the Antelope Valley Region must be reduced by the amounts shown in Table 3-7. Figure 3-8 shows the locations of the proposed facilities and infrastructure necessary to provide the recycled water quantities shown in Table 3-7.

Table 3-7 provides a summary of the projected availability of the recycled water to the Antelope Valley Region through 2035.

3.1.5.1.1 Recycled Water Infrastructure

Distribution Pipeline: As shown in Figure 3-8, the existing recycled water distribution in Lancaster, which serves Apollo Lakes and Nebeker Ranch, will be expanded for urban reuse as part of the Division Corridor Project over the next 10 years. Figure 3-8 also shows the LACWWD 40 Recycled Water Backbone distribution pipeline proposed to expand urban reuse in the Antelope Valley Region. This expansion through out the Antelope Valley Region is a direct result of the substantial coordination and cooperation between Kern and Los Angeles Counties.

Lancaster WRP: The Lancaster WRP, built in 1959 and located north of the City of Lancaster, is owned, operated, and maintained by Los Angeles County Sanitation District No. 14 (LACSD 14). Lancaster WRP, which has a permitted capacity of 16.0 mgd, treated an average flow of 13.3 mgd in 2004 to secondary standards for agricultural irrigation, wildlife habitat, maintenance, and recreation. Additionally, up to 0.5 mgd is currently treated to tertiary standards and used to replace evaporative losses at the Apollo Lakes Regional County Park.

Table 3-7 Potential Availability of Recycled Water (AFY) to Antelope Valley Region

	2005	2015	2035
Lancaster WRP	13,000	21,000	35,000
Palmdale WRP	12,000	18,000	29,000
Rosamond WWTP	0	1,000	1, 000
Total Study Area	25,000	40,000	65,000

Source: LACWWD 40 2006, rounded to nearest 1,000 AFY.

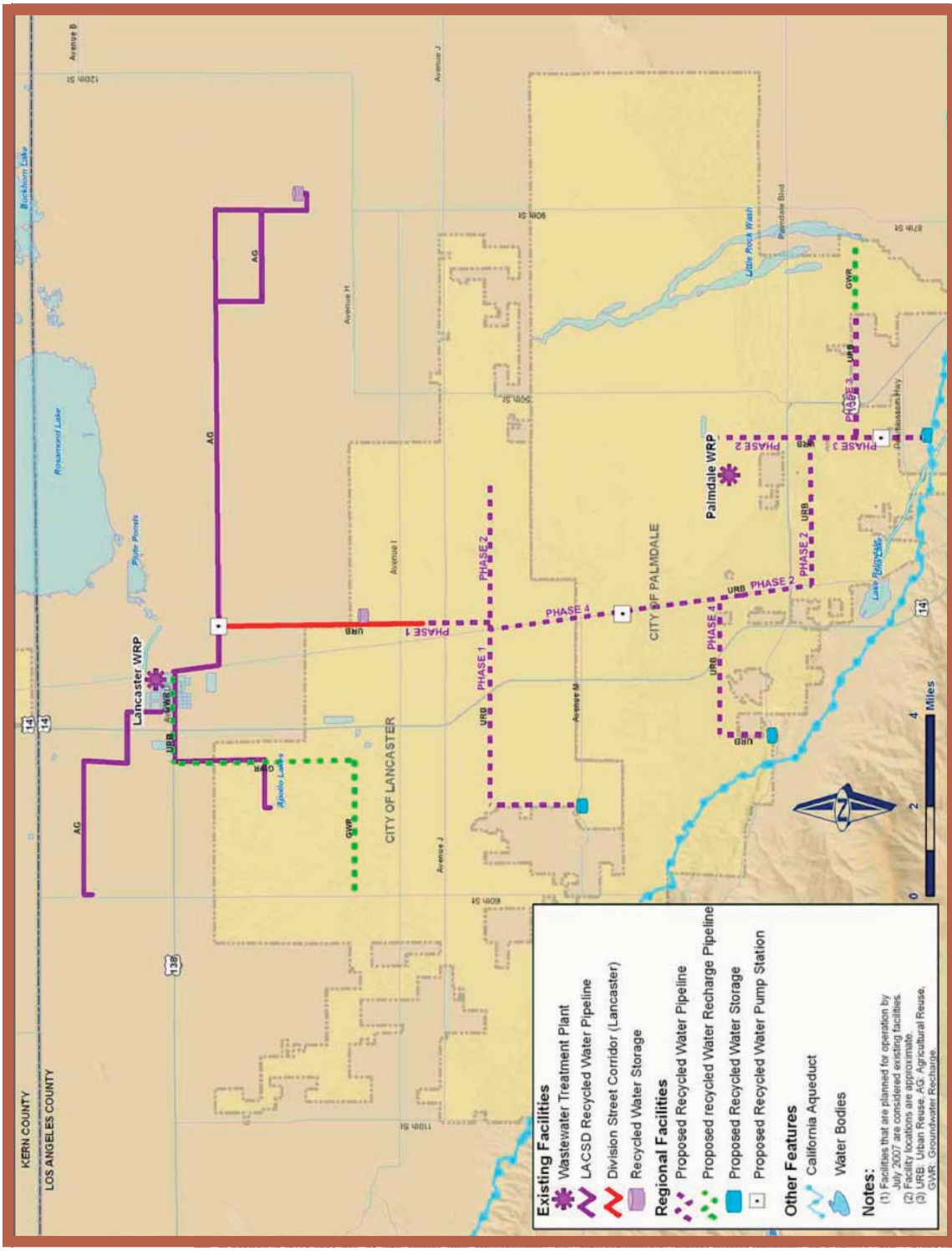


Figure 3-8 Proposed Recycled Water Infrastructure

LACSD 14 plans to upgrade the existing Lancaster WRP to a total capacity of 18 mgd by 2010 with a proposed future upgrade to 21 mgd by 2012. Tertiary treated effluent from the upgraded Lancaster WRP will be available for municipal reuse in addition to the existing uses.

Palmdale WRP: Palmdale WRP, built in 1953 and located on two sites adjacent to the City of Palmdale, is owned, operated, and maintained by LACSD 20. Palmdale WRP, which has a permitted capacity of 15.0 mgd, treated an average flow of 9.4 mgd in 2004 to secondary standards for land application or agricultural irrigation. A recent revision to the Waste Discharge Requirements, due to concerns about nitrate in the groundwater, required LACSD 20 to eliminate their existing practice of land application and agricultural irrigation above agronomic rates of treated effluent by October 15, 2008. By November 15, 2009, LACSD 20 is required to prevent the discharge of nitrogenous compounds to the groundwater at levels that create a condition of pollution or violate the water quality objectives identified in the 1994 Water Quality Control Plan for the Lahontan Region (1994 Basin Plan). In response, Palmdale WRP will be upgraded to 15.0 mgd with full tertiary treatment by 2011. All tertiary treated water is anticipated to be used for agricultural and municipal reuse.

Rosamond WTTP: Rosamond WWTP, located in the City of Rosamond, is owned, operated, and maintained by the RCSD. Rosamond WWTP, which has a permitted capacity of 1.3 mgd, treated an average flow of 1.1 mgd to undisinfected secondary standards for landscape irrigation on-site in 2005. RCSD plans to increase the capacity to 1.8 mgd through the addition of a 0.5 mgd tertiary treatment facility. Thus far, the expansion has been approved for State Revolving Funding and is currently obtaining the necessary permits from the Lahontan Regional Board. Construction on the 0.5 MGD plant expansion is expected to start in November or December, 2007, with completion 16 to 18 months afterwards. Through coordination with LACSD, RCSD also plans on incorporating two connecting points with LACSD tertiary water pipelines on 20th and 60th Streets West, at Avenue A. RCSD is also considering construction of a new WWTP in the western portion of the Antelope Valley Region that will handle the new developments to the west and northwest. Rough calculations indicate it will be a 3.5 mgd plant with tertiary capabilities, with construction potentially around 2012 (personal communication, Claud Seal, RCSD). Once constructed, the plants would provide tertiary treated recycled water for landscape irrigation at median strips, parks, schools, senior complexes and new home developments.

3.1.5.1.2 Reliability

Recycled water is assumed to be 100 percent reliable since it is based on a consistent water supply and is not expected to change for average, single-dry, or multi-dry year water conditions. Usefulness of recycled water as a supply is limited more by recycled water infrastructure and demand for recycled water than reliability of such water as a supply.

3.1.5.2 Recycled Water Demand

Table 3-8 summarizes the existing recycled water demand from existing urban contracts that any of the WRPs or WTPs already have in place. These existing contracts are discussed below:

3.1.5.2.1 Lancaster WRP Existing Contracts for Recycled Water

There are three (3) existing commitments for recycled water from the Lancaster WRP as follows:

1. The Lancaster WRP 2020 Facilities Plan Final Environmental Impact Report (EIR) commits LACSD 14 to maintain Piute Ponds (specifically at a rate sufficient to maintain a minimum of 400 wetted acres of habitat). LACSD 14 staff calculates this to be an average of 2.62 mgd excluding any overflows.

2. The Los Angeles County Parks and Recreation Department has an existing contract with the LACSD 14 to deliver tertiary water to Apollo Park where it is used to for recreational uses. The park's usage averages approximately 0.15 mgd, and peaks to 0.5 mgd during summer months.

Table 3-8 Summary of Projected Recycled Water (AFY) to Antelope Valley Region

	Reliability	2010	2015	2020	2025	2030	2035
Average Water Year	100%	3,400	3,400	3,400	3,400	3,400	3,400
Single-Dry Water Year	100%	3,400	3,400	3,400	3,400	3,400	3,400
Multi-Dry Water Year	100%	3,400	3,400	3,400	3,400	3,400	3,400

Notes: All numbers rounded to nearest 100 AF.

3. There is a Memorandum of Agreement (MOA) between LACSD 14 and Edwards Air Force Base (AFB) for discharge to a series of shallow impoundments south of Piute Ponds for recreational duck hunting. The effluent is discharged between November 1 and April 15 and averages approximately 0.26 mgd.

Items 1 through 3 above total 3.03 mgd (or 3,400 AFY) of recycled water that is already contracted to users from Lancaster WRP and is thus assumed as the Antelope Valley Region's recycled water demand.

3.1.5.2.2 Palmdale WRP Existing Contracts for Recycled Water

There are two (2) existing commitments for recycled water from the Palmdale WRP as follows:

1. LACSD 20 entered into a 20-year lease agreement with LAWA in 2002 for a 2,680 acre effluent management site on the WRP property. As part of the lease agreement, the LAWA has first right of refusal for any tertiary treated water that comes from the WRP.

2. There is one (1) existing contract with Harrington Farms, a pistachio grower, which expires in 2008, for secondary effluent. This contract expires before tertiary effluent is available in 2010. The contract with Harrington Farms for secondary effluent states that the farmer is NOT guaranteed use of the tertiary treated water if another user wants to buy the tertiary water. Therefore, this contract is not included for future commitments of recycled water from the Palmdale WRP.

Although there is the potential to provide 65,000 AFY of recycled water, this is not an accurate estimate of future recycled water supply since distributions systems and end users are required to make use of that supply. Thus it is more accurate to estimate future recycled water supply by the anticipated demand. Demand estimates tend to be less than available supply due to limitations of infrastructure, willingness to use recycled water, and seasonal variations in demand. Thus Table 3-8 provides the anticipated future recycled water demand to be served by the proposed backbone system developed in the LACWWD 40 2006 "Antelope Valley Facilities Planning Report." Additionally, at this time, no recycled water users have been identified for Rosamond and thus recycled water demand for this area was assumed to be zero. The Facilities Report only provides estimates of M&I demand and therefore it does not include any potential recycled water use for agriculture or for recharge. In order to serve the users identified in the Facilities Report (approximately 13,300 AFY), the necessary treatment plant upgrades at the two WRPs and regional recycled water distribution system would need to be implemented as described in Section 5.2.2. Additionally, this section describes the City of Lancaster's pilot project aimed at using recycled water for groundwater recharge.

Additionally, the City of Palmdale is considering the development of a power plant that would provide power for local residents and businesses in the greater Antelope Valley Region area. According to a Draft 2006 "Palmdale Power Plant: Overview of Water Supply Issues" report, the hybrid Power Plant includes a 525 megawatt (MW) combined cycle process unit with a 50 MW solar system for a total capacity of 575 MW. Startup is expected in 2010.

The cooling water demands of the Power Plant are expected to be approximately 3,400 AFY and would vary depending on the time of year and Power Plant operation. Using recycled water produced by the Palmdale WRP is considered to be the preferred source for cooling water.

3.1.6 Water Demands

The following subsection discusses the historical, current and projected water demands for the Antelope Valley Region. The demands are presented with urban demand (based on per capita estimates) and two agricultural scenarios (average and dry year estimates). Projected water demands for the Antelope Valley Region are presented in Table 3-9 and graphically presented in Figures 3-9 and 3-10.

3.1.6.1 Urban (Municipal and Industrial) Demand

Urban water demands were developed from the population projections presented in Table 2-3 (in Section 2) and assume a regional water use per capita estimate of 243 gallons per day (gpd) per person (or 0.273 AFY per person). This per capita water use estimate was determined using a weighted average of total per capita water use estimates for the major water supply agencies in the Antelope Valley Region as shown by Table 3-10. As discussed in Section 2, growth rates within an agency are consistent and thus an average per capita water use is an appropriate estimate of demand. The rate of water use in areas provided by other urban water suppliers were assumed to have minimal impact on the average and therefore were not included in this average water use determination.

The per capita water use values could be reduced in the future with the implementation of more robust demand management measures, which could reduce the average use per person.

Table 3-9 Water Demand Projections (AF) for the Antelope Valley Region

	2010	2015	2020	2025	2030	2035
Urban Demand						
Boron	1,000	1,000	1,000	1,000	1,000	1,000
California City	3,000	3,000	4,000	4,000	5,000	6,000
Edwards AFB(a)	2,000	3,000	3,000	3,000	4,000	4,000
Mojave	2,000	2,000	3,000	3,000	3,000	4,000
Rosamond	8,000	10,000	14,000	20,000	27,000	37,000
Unincorporated Kern County	6,000	8,000	11,000	15,000	20,000	28,000
Lancaster	46,000	52,000	59,000	65,000	71,000	77,000
Palmdale	48,000	60,000	71,000	82,000	92,000	104,000
Unincorporated LA County	31,000	35,000	40,000	45,000	52,000	59,000
Subtotal Urban Demand	147,000	175,000	205,000	239,000	276,000	320,000
Agricultural Demand						
Agricultural Demand Dry Year	136,000	136,000	136,000	136,000	136,000	136,000
Agricultural Demand Average Year	127,000	127,000	127,000	127,000	127,000	127,000
Total Region Dry Year Demand	**274,000**	**302,000**	**332,000**	**366,000**	**403,000**	**447,000**
Total Region Average Year Demand	**283,000**	**311,000**	**341,000**	**375,000**	**412,000**	**456,000**
Average Year Percent Urban	54	58	62	65	68	72
Average Year Percent Agricultural	46	42	38	35	32	28
Dry Year Percent Urban	52	56	60	64	67	70
Dry Year Percent Agricultural	48	44	40	36	33	30

Notes: All numbers rounded to nearest 1,000 AF.
(a) Projections subject to review and update by Edwards AFB.

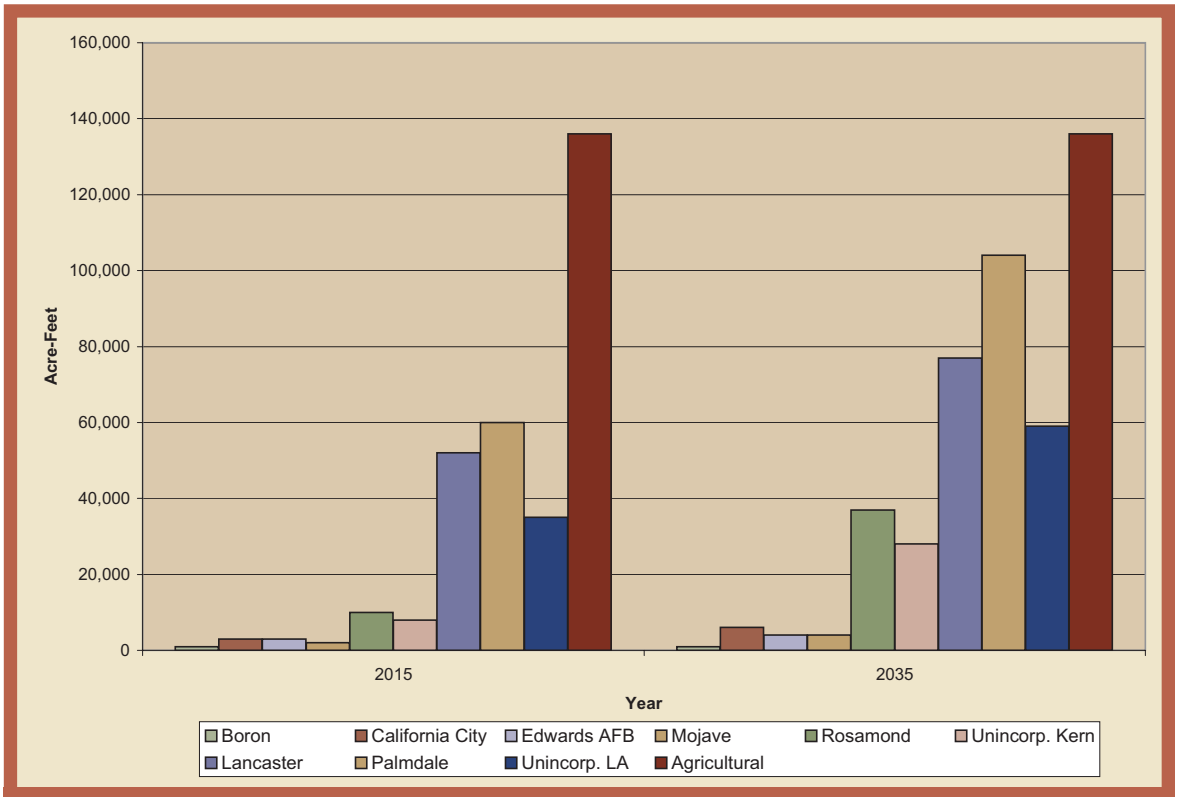


Figure 3-9 Regional Dry Year Water Demand

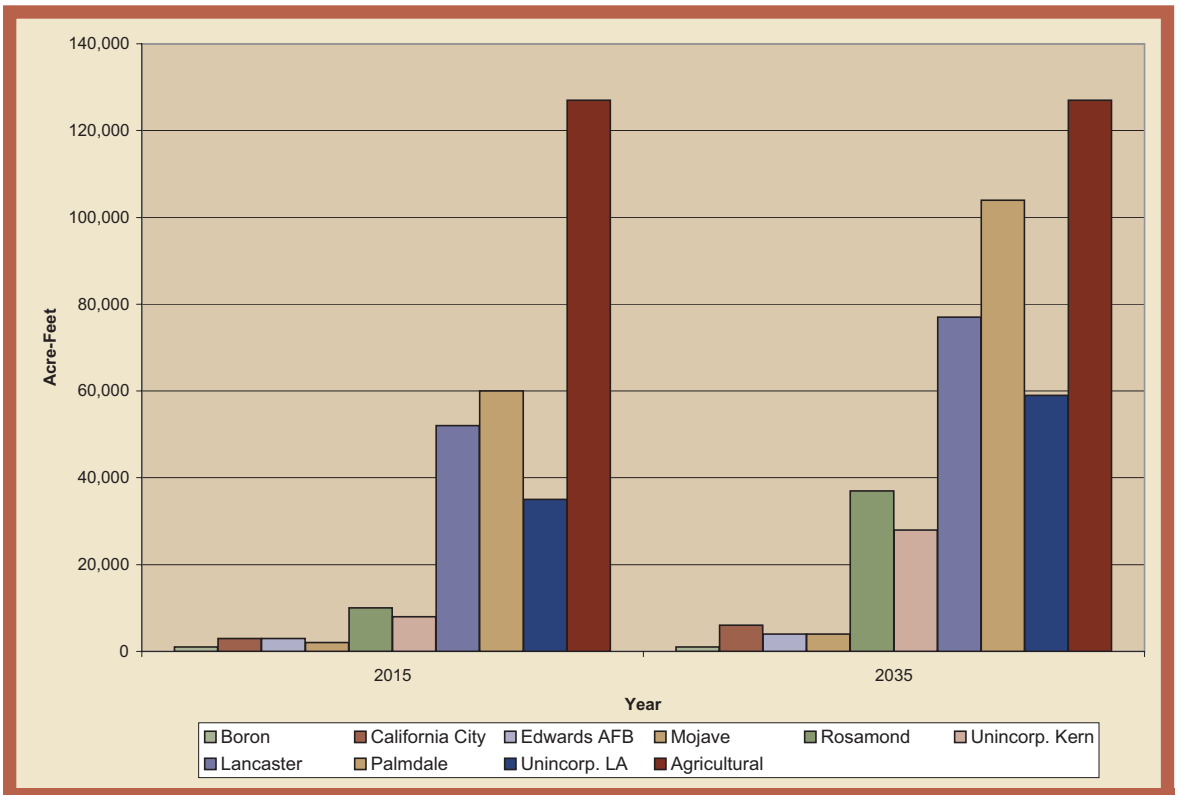


Figure 3-10 Regional Average Year Water Demand

Table 3-10 Per Capita Urban Water Use in the Antelope Valley Region

Agency	Average Per Capita Urban Water Use (AFY/person)	2005 Population	Average Urban Water Demand (AFY)(e)
AVEK(a)	0.101	98,000	10,000
LCID(b)	0.367	2,900	1,000
LACWWD 40(c)	0.373	157,000	59,000
PWD(d)	0.280	106,000	30,000
QHWD(c)	0.353	16,000	5,000
RCSD(c)	0.191	16,000	3,000
Total	---	**394,000**	**107,000**
Region Average Per Capita Water Use(f) (AFY/person)			0.273

Notes: All numbers rounded to the nearest 1,000.

(a) As determined from data in the AVEK's 2005 Urban Water Management Plan (UWMP). Values exclude Los Angeles County Waterworks District 40 (LACWWD 40), QHWD, and RCSD population and demand from AVEK totals. Per capita use was calculated from the 2005 population and urban water demand from the table.

(b) Values exclude Littlerock Creek Irrigation District (LCID) agricultural demand.

(c) Based on values provided in the Antelope Valley 2005 Integrated UWMP.

(d) Per capita water use based on 12-month running average of PWD demands and data from PWD's 2005 UWMP.

(e) Demand determined by multiplying per capita water use by the current population.

(f) Antelope Valley Region per capita water use determined by divided total water demand by total population.

For comparison, a total urban water demand based on the number of households in the Antelope Valley Region was calculated. For this calculation, LACWWD 40 per capita demand was multiplied by 3.14 people per household to yield household demand of 1.18 AFY/household, which is similar to the 1.2 AFY/household typically assumed for the Antelope Valley Region. The 3.14 people per household was determined from the 2000 Census data (345,973 people/110,053 households). The resulting urban water demand of 441,000 AFY in 2035 represents an approximately 27 percent increase in the per capita demand estimate. This was expected since the household demand estimate was based on the per capita demand for LACWWD 40, which is approximately 27 percent higher than the region average per capita use. The LACWWD 40 per capita estimate was used for this calculation since LACWWD 40 represented the highest percent population in Table 3-10 as well as the highest per capita water use. Therefore, this value provides an estimate of the maximum urban demand for the Antelope Valley Region and is not an accurate representation of average water demand for the Antelope Valley Region. Thus, the per capita estimate of water demand is assumed for the remainder of this report. The Region average per capita water use of 0.273 AFY/person results in a household demand of 0.86 AFY/household.

3.1.6.2 Private Pumping/Small Mutual Water Demand

Water demand from private pumping and from small mutual water companies in the Antelope Valley Region are difficult to quantify as accurate data is not always available. Although, water demand from these minor water users was not used in the average water use calculation, their water demand was accounted for in Table 3-9 since people served by private wells and by small mutual water companies were included in the population estimates. The Antelope Valley Region average per capita water use was assumed for these populations.

3.1.6.3 Agricultural Water Demand

Historical total applied agricultural water demand (1972 to 1995) for the Antelope Valley Region is summarized in Table 3-11. Historical agricultural demand was determined by multiplying estimated crop water requirements from the County Farm Advisors by the crop acreages provided by the Los Angeles and Kern County Agricultural Commissioners Inspection Reports. Please note that these crop water requirements are currently undergoing review by the University of California Cooperative Extension (UCCE) but have already been agreed upon by the County Farm Bureaus. The crop water requirements are discussed in more detail below.

Prior to 2000, an accounting of the agricultural acreage within the Kern County portion of the Antelope Valley Region was not available. Historically, it has been assumed that Kern County agricultural groundwater demand was 18 percent of Los Angeles County agricultural groundwater demand. The 18 percent was determined by the USGS in 2003 from land-use maps and agricultural pumpage data for Los Angeles County in 1961 and 1987. The ratio of pumpage per acre of agricultural land was then applied to agricultural land-use data for Kern County to estimate agricultural pumpage for the Kern County part of the Antelope Valley Region for those years. In both 1961 and 1987, agricultural pumpage in the Kern County part of the Antelope Valley Region was about 18 percent of the annual agricultural pumpage in the Los Angeles County part of the Antelope Valley Region. However, from the recent Kern County Crop Inspection Reports, it is evident that the Kern County portion total agricultural demand is closer to 35 percent of the total agricultural water demand of the Los Angeles County portion. This is due to increased carrot and potato farming in the Kern County portion.

Table 3-11 Historical Agricultural Water Use in the Antelope Valley Region

Year	Los Angeles County Ag Demand (AF)	Kern County Ag Demand (AF)	Total Ag Demand (AF)
1999	97,000	35,000	132,000
2000	109,000	36,000	145,000
2001	101,000	37,000	138,000
2002	105,000	39,000	144,000
2003	110,000	34,000	144,000
2004	104,000	27,000	131,000
2005	98,000	29,000	127,000

Note: Numbers rounded to the nearest 1,000 AF and assume average water year crop requirements.

3.1.6.3.1 Crop Water Requirements

Crop water use in the Antelope Valley Region can vary significantly from State-wide averages due to the unique requirements presented by the Antelope Valley Region's climate and physical characteristics, including low rainfall, sandy soils, and heavy winds. Thus, it is appropriate to develop crop water requirements specific to the Antelope Valley Region. It is anticipated that a similar approach will be used in the adjudication process.

Crop water requirements have been developed, in a draft report that is currently undergoing review, by the Los Angeles County Agricultural Commissioner in collaboration with UCCE. These estimates are roughly two times larger than the State-wide averages.

The first step in determining the crop water requirements involves determining the evapotransipiration for each crop (ETc) using the following equation:

$$ETc = Kc \times ETo$$

Where Kc is the crop coefficient and ETo is the reference evapotranspiration.

An estimate of the ETo for Lancaster was developed based on data from the California Irrigation Management Information System (CIMIS) weather station in Victorville, CA and historical water use ETo values for Palmdale. The Kc varies with the crop, its stage of development and the frequency of irrigation, but is independent of the location. Crop coefficients were adapted from a variety of published reports. The crop coefficients are presented in Table 3-12. Table 3-13 provides the ETc estimates for the Antelope Valley Region.

The ETc is an estimate of the net water requirements for a crop (i.e., the amount of water) that is required for proper plant growth. Additionally, there are net water requirements for the crop which occur outside of the growing season. These include water applied to prepare the soil for planting, fumigation, and to prevent wind erosion. The sum of the ETc and these non-growing water requirements consist of the overall net crop requirement. The net water requirement does not account for water losses from inefficient irrigation systems, deep percolation, or runoff. In order to determine the gross water requirement, or the total amount of water which must be applied to the crop, the following calculation is used:

$$\text{Gross Water Requirement} = \frac{\text{Net Water Requirement}}{\text{Irrigation System Efficiency}}$$

The irrigation system efficiency used in this study, 75 percent, was developed from field observations by the University of California researchers and the Natural Resources Conservation Service (NRCS). Irrigation efficiency is the ratio of irrigation water used in evapotranspiration to the water applied or delivered to a field or farm.

A summary of the crop water requirements is presented in Table 3-14. The crop water requirements for a single dry year and multi-dry years are the same. It is assumed that approximately 3 inches of net water requirement would be met by rainfall for average water years and thus average year water requirements include a reduction in the total net water requirements.

3.1.6.3.2 Crop Acreages

Data regarding crop acreages in the Antelope Valley Region were available from a variety of sources as discussed below. Table 3-15 provides a comparison of the acreages from these sources.

Agricultural Commissioner Crop Reports: Each year, the Los Angeles County Agricultural Commissioner issues crop reports for the Los Angeles County portion of Antelope Valley Region. The benefit of these reports is that they are published and available for public review. The disadvantage is they tend to group crops with varying water use requirements together, making an accurate estimate of agricultural demand difficult.

Agricultural Inspection Reports: Another more detailed source of crop acreages are the Pesticide Inspection Reports from the Agricultural Farm Advisors. The benefit is that the data is crop-specific and based on actual visits to the various farms in both Los Angeles and Kern County portions of the Antelope Valley Region. The disadvantage is that this data is not generally available and limited to farms that use pesticides. However, the data for the Los Angeles County portion of the Antelope Valley Region was consistent with the Agricultural Commissioner Crop Reports, with a difference of only 2 to 3 percent. Therefore, crop acreages from the agricultural inspection reports are used to project demand since they have the added benefit of consisting of Kern County data as well as being crop-specific.

AVEK Agricultural Data: The third source of agricultural acreage available for the Antelope Valley Region are AVEK records. Acreages were determined from satellite imagery from the Landsat program by Dr. Hong-lie Qui California State University. Acreages of irrigated fields within the AVEK service area were determined for summer and winter periods. A composite acreage was also determined from

Table 3-12 Crop Coefficient (Kc) Estimates

Date	Alfalfa(a)	Sudan(b)	Sod	Onions	Melons	Peas/ Beans	Deciduous Fruit Trees(c)	Carrots	Potatoes
1-Jan	0.40		0.87						
15-Jan	0.40		1.07						
1-Feb	1.00		1.19					0.31	
15-Feb	1.15		1.45					0.31	
1-Mar	1.15		2.08	0.30	0.18		0.25	0.31	0.55
15-Mar	1.05		2.54	0.30	0.18	0.14	0.54	0.55	0.61
1-Apr	1.05		2.80	0.30	0.34	0.14	0.60	0.82	0.88
15-Apr	1.05		3.20	0.53	0.72	0.46	0.66	1.03	1.16
1-May	1.05		3.60	0.83	1.11	1.11	0.72	1.11	1.21
15-May	1.05		4.01	1.14	1.11	1.15	0.79	1.13	1.19
1-Jun	1.05		4.25	1.14	1.11	1.15	0.84	1.05	0.87
15-Jun	1.05	0.3	4.52	1.14	0.78	0.93	0.86	1.00	0.55
1-Jul	1.05	0.85	4.85	1.04	0.29	0.49	0.92		
15-Jul	1.05	1.10	4.83	0.92			0.94		
1-Aug	1.05	0.85	4.50	0.80			0.94		
15-Aug	1.05	1.10	4.28	0.68			0.94		
1-Sep	1.05	0.85	3.75				0.94		
15-Sep	1.05	1.00	3.27				0.91		
1-Oct	1.05	1.10	2.90				0.85		
15-Oct	1.05	1.10	2.48				0.79		
1-Nov	1.05		1.70				0.70		
15-Nov	0.40		1.07						
1-Dec	0.40		0.97						
15-Dec	0.40		0.90						

Sources:

Hansen, B.R.; Shwannkl, L.; and Fulton, A. "Scheduling Irrigation: When and How much Water to Apply," Water Management Series Publication Number 3396, Department of Land, Air & Water Resources, University of California, Davis.

Pruitt, W.O.; Fereres, E.; Kelta, K.; and Snyder, R.L., "Reference Evapotranspiration (ETo) for California," UC Bull. 1922.

Notes:

(a) Kc of 1.05 takes into account reduced ETo during the cuttings throughout the season.

(b) Sudan was cut on 7/1, 8/16, and 10/16. ETo reduced for 1 to 2 weeks after cutting.

(c) Deciduous Fruit Tree Crop Coefficient were adapted from Orloff, S.B., "Deciduous Orchard Water Use: Clean Cultivated Trees for a Normal Year in Littlerock," Local Extension Publication.

at least two images of different seasons to represent areas that were cultivated at least once in that year. The benefit of this data is that it includes acreages for both Los Angeles and Kern County portions of the Antelope Valley Region. The disadvantage of this data is that it is limited to the AVEK service area and thus does not provide estimates for the Antelope Valley Region as a whole. Furthermore, agricultural data is from satellite imagery and therefore, the exact crop grown is difficult to identify and multiple cropping patterns are difficult to ascertain because the imagery is not done frequently enough. However, total estimates of acreage are consistent with the other sources of acreage data, given that AVEK's service area is smaller than the Regional boundaries.

3.1.6.3.3 Projected Agricultural Demand

Projected water year agricultural demand is summarized in Table 3-16. Projections assume that crop acreages will remain approximately the same as in 2005 with the understanding that some shifting of acreages between crops may occur.

Table 3-16 provides the estimates of agricultural water use for average and dry water years.

3.1.7 Water Leaving

The final component to the Water Budget is water leaving the Antelope Valley Region. This includes water lost

Table 3-13 Crop Evapotranspiration (ETC) Estimates for the Antelope Valley Region

Date	Pasture/ Sod ETo(a)	Alfalfa	Sudan	Sod	Onions	Melons	Peas/ Beans	Deciduous Fruit Trees	Carrots	Potatoes
1-Jan	0.87	0.35	0.00	0.87	0.00	0.00	0.00	0.00	0.00	0.00
15-Jan	1.07	0.43	0.00	1.07	0.00	0.00	0.00	0.00	0.00	0.00
1-Feb	1.19	1.19	0.00	1.19	0.00	0.00	0.00	0.00	0.37	0.00
15-Feb	1.45	1.67	0.00	1.45	0.00	0.00	0.00	0.00	0.45	0.00
1-Mar	2.08	2.39	0.00	2.08	0.62	0.37	0.00	0.52	0.64	1.14
15-Mar	2.54	2.41	0.00	2.54	0.76	0.46	0.36	1.37	1.40	1.55
1-Apr	2.80	2.94	0.00	2.80	0.84	0.95	0.39	1.68	2.30	2.46
15-Apr	3.20	3.36	0.00	3.20	1.70	2.30	1.47	2.11	3.30	3.71
1-May	3.60	3.78	0.00	3.60	2.99	4.00	4.00	2.59	4.00	4.36
15-May	4.01	4.21	0.00	4.01	4.57	4.45	4.61	3.17	4.53	4.77
1-Jun	4.25	4.46	0.00	4.25	4.85	4.72	4.89	3.57	4.46	3.70
15-Jun	4.52	4.75	1.36	4.52	5.15	3.53	4.20	3.89	4.52	2.49
1-Jul	4.85	5.09	4.12	4.85	5.04	1.41	2.38	4.46	0.00	0.00
15-Jul	4.83	5.07	5.31	4.83	4.44	0.00	0.00	4.54	0.00	0.00
1-Aug	4.50	4.73	3.83	4.50	3.60	0.00	0.00	4.23	0.00	0.00
15-Aug	4.28	4.49	4.71	4.28	2.91	0.00	0.00	4.02	0.00	0.00
1-Sep	3.75	3.94	3.19	3.75	0.00	0.00	0.00	3.53	0.00	0.00
15-Sep	3.27	3.43	3.27	3.27	0.00	0.00	0.00	2.98	0.00	0.00
1-Oct	2.90	3.05	3.19	2.90	0.00	0.00	0.00	2.47	0.00	0.00
15-Oct	2.48	2.60	2.73	2.48	0.00	0.00	0.00	1.96	0.00	0.00
1-Nov	1.70	1.79	0.00	1.70	0.00	0.00	0.00	1.19	0.00	0.00
15-Nov	1.07	0.43	0.00	1.07	0.00	0.00	0.00	0.00	0.00	0.00
1-Dec	0.97	0.39	0.00	0.97	0.00	0.00	0.00	0.00	0.00	0.00
15-Dec	0.90	0.36	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL (inches)	**67.08**	**66.88**	**31.70**	**67.08**	**37.48**	**22.18**	**22.29**	**48.27**	**25.96**	**24.18**

Note: (a) Pasture ETo was drafted by B.L. Sanden, Kern County Farm Advisor 2002 and modified by G.L. Poole, Los Angeles County Farm Advisor 2004.

Table 3-14 Crop Water Requirements for the Antelope Valley Region

Water Requirements	Pasture	Alfalfa	Sudan	Sod	Onions	Melons	Peas/ Beans	Deciduous Fruit Trees	Carrots	Potatoes
Net ETo	67.08	66.88	31.70	67.08	37.48	24.01	22.29	48.27	25.96	24.18
Net Soil					3.54				4.46	
Net Non-Growing	0.00	6.00(a)	4.00	4.00	6.00(b)	4.00	4.00	0.00	6.50(b)	4.00
Total Net Dry Years (in.)	67.08	72.88	35.70	71.08	47.02	28.01	26.29	48.27	36.92	28.18
Total Net Average Years (in.)	64.08	69.88	32.70	68.08	44.02	25.01	23.29	45.27	33.92	25.18
Irrigation Efficiency (%)	75	75	75	75	75	75	75	75	75	75
Total Gross for Dry Years (in.)	89.44	97.17	47.60	94.77	62.69	37.35	35.06	64.36	49.23	37.57
Total Gross for Dry Years (AF)	7.45	8.10	3.97	7.90	5.22	3.11	2.92	5.36	4.10	3.13
Total Gross for Average Years (in.)	85.44	93.17	43.60	90.77	58.69	33.35	31.06	60.36	45.23	33.57
Total Gross for Average Years (AF)	7.12	7.76	3.63	7.56	4.89	2.78	2.59	5.03	3.77	2.80

Notes:

(a) Assumes a 5-year life of an alfalfa stand. Includes the water requirement for pre-irrigation before field preparation and planning, and irrigation before and after application of herbicides.

(b) Includes water requirements for pre-irrigation before field preparation, fumigation, and "water capping" after fumigation.

Table 3-15 Comparison of Estimates of Crop Acreages

	1999	2000	2001	2002	2003	2004	2005
LA Ag Commissioner(a)							
Field Crops	NA	NA	11,592	11,234	11,305	10,624	11,975
Vegetable/Root Crops	NA	NA	12,282	15,804	14,763	13,312	10,760
Fruits/Nut/Grapes Crops	NA	NA	2,866	1,947	1,955	1,920	2,117
Misc Nursery	NA	NA	621	617	599	608	675
Antelope Valley Region Total	----	----	**27,361**	**29,602**	**28,622**	**26,464**	**25,526**
Farm Advisor Inspection Reports							
Field Crops	10,840	11,718	12,055	10,960	10,420	10,063	10,645
Vegetable/Root Crops	11,387	13,727	11,996	16,096	16,300	13,501	12,015
Fruits/Nut/Grapes Crops	1,943	2,133	2,197	1,541	1,647	1,618	1,638
Misc Nursery	375	300	325	321	375	413	450
Antelope Valley Region Total	**24,545**	**27,878**	**26,573**	**28,918**	**28,742**	**25,594**	**24,748**
AVEK Satellite Imagery(b)							
AVEK Composite Total	**23,424**	**18,543**	**24,726**	**23,288**	**28,943**	**23,452**	**21,109**

Notes:
(a) Acreages for Kern County were estimated using the ratios of LA County Ag to Kern County Ag from the Inspection Reports.
(b) Acreages listed here are for the AVEK service area only and thus should be less than Antelope Valley Region Totals.

Table 3-16 Agricultural Water Use in the Antelope Valley Region

		Average Water Year		Dry Water Years	
Crop	Acreage(a)	Gross Crop Water Requirements (AF/acre)(b)	Gross Water Demand (AFY)(c)	Gross Crop Water Requirements (AF/acre)(b)	Gross Water Demand (AFY)(c)
Field Crops					
Alfalfa Hay	6,720	7.76	51,100	8.10	54,400
Grain Hay	3,455	3.63	12,500	3.97	13,700
Sudan Hay	220	3.63	800	3.97	900
Irrigated Pasture	250	7.12	1,800	7.45	1,900
Vegetable Crops					
Onions	3,125	4.89	15,300	5.22	16,300
Melons & Pumpkins	60	2.78	200	3.11	200
Fruits/Nuts/Grapes	1,638	5.03	8,200	5.36	8,800
Root Crops	8,830	3.77	33,300	4.10	36,200
Misc. Nursery (mostly SOD)	450	7.12	3,200	7.45	3,400
Total Projected Ag Demand (AFY)	**24,748**		**127,000**		**136,000**

Notes: Totals rounded to the nearest 1,000 AF.
(a) Data from Farm Advisors Inspection Reports.
(b) From Farm Advisor gross crop water requirements specific to Antelope Valley Region.
(c) Acreage multiplied by crop water requirements.

(either to evaporation or from subsurface flow) and water consumed. Total losses in the Antelope Valley Region have been estimated at approximately 10,000 AFY (USGS 1993). This estimate includes losses attributed to streambed wetting, riparian evapotranspiration, surface and soil evaporation, and diversions. However, further investigation and study is needed to more accurately determine the water losses in the Antelope Valley Region.

3.1.8 Water Budget Comparisons

3.1.8.1 Average Water Year

Table 3-17 and Figure 3-11 provide a comparison of the supply and demand for the Antelope Valley Region for an average water year. As shown by the comparison, future demand exceeds the existing and planned water supplies through 2035. From the information in Table 3-17, projected reserves needed in an average year were determined and are summarized in Figure 3-14. It is assumed that average year required reserves equal the average year mismatch. A range for the required reserves was determined from the maximum and minimum of the individual year reserves. For an average water year the range of required reserves is 73,600 AFY to 236,800 AFY.[3] Additional projects and management actions to remedy these supply deficits are discussed in Section 5, Water Management Strategies, and Section 6, Project Integration and Objectives Assessment.

3 During the analysis for this IRWM Plan, the RWMG was aware that a separate analysis of water supplies (including revised estimates of natural recharge) was being conducted by a TAC to the adjudication. The range of possible natural recharge provided in the IRWM Plan is strictly for long-term planning purposes and has not been conducted to answer the questions being addressed within the adjudication. Once the detailed analysis of historic water use and available groundwater are completed within the adjudication, the supply numbers for the IRWM Plan will need to be updated.

3.1.8.2 Single-Dry Water Year

Table 3-18 and Figure 3-12 provide a comparison of the supply and demand for the Antelope Valley Region for a single-dry water year. As shown by the comparison, future demand exceeds the existing and planned water supplies through 2035. From the information in Table 3-18, projected reserves needed in a single dry year were determined and are summarized in Figure 3-15. It is assumed that single dry year required reserves equal the single dry year mismatch plus the average year reserve. A range for the required reserves was determined from the maximum and minimum of the individual year reserves. For a single dry water year the range of required reserves is 50,600 AFY to 57,400 AFY. Additional projects and management actions to remedy these supply deficits are discussed in Section 5, Water Management Strategies, and Section 6, Project Integration and Objectives Assessment.

Table 3-17 Water Budget Comparison for an Average Water Year

	2010	2015	2020	2025	2030	2035
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	0	0	0	0	0	0
Return Flows						
Ag RF	23,200	21,500	19,900	18,300	16,600	14,900
Urban RF	18,800	20,800	22,400	24,100	25,300	26,300
WW RF	2,300	3,100	3,900	4,700	5,500	5,500
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries(a)	66,900	70,100	72,200	74,300	74,300	74,300
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	4,400	4,400	4,400	4,400	4,400	4,400
Total Supply	**200,400**	**204,700**	**207,600**	**210,600**	**210,900**	**210,200**
Demands(b)						
Urban Demand	(147,000)	(175,000)	(205,000)	(239,000)	(276,000)	(320,000)
Ag Demand	(127,000)	(127,000)	(127,000)	(127,000)	(127,000)	(127,000)
Total Demand	**(274,000)**	**(302,000)**	**(332,000)**	**(366,000)**	**(403,000)**	**(447,000)**
Supply and Demand Mismatch	**(73,600)**	**(97,300)**	**(124,400)**	**(155,400)**	**(192,100)**	**(236,800)**

Notes:

(a) Direct Deliveries consist of the total SWP water available as shown in Table 3-6 minus the 6,800 AFY of SWP water that is banked to ASR in average water years and is thus not available to meet demand.

(b) Demand includes groundwater extractions.

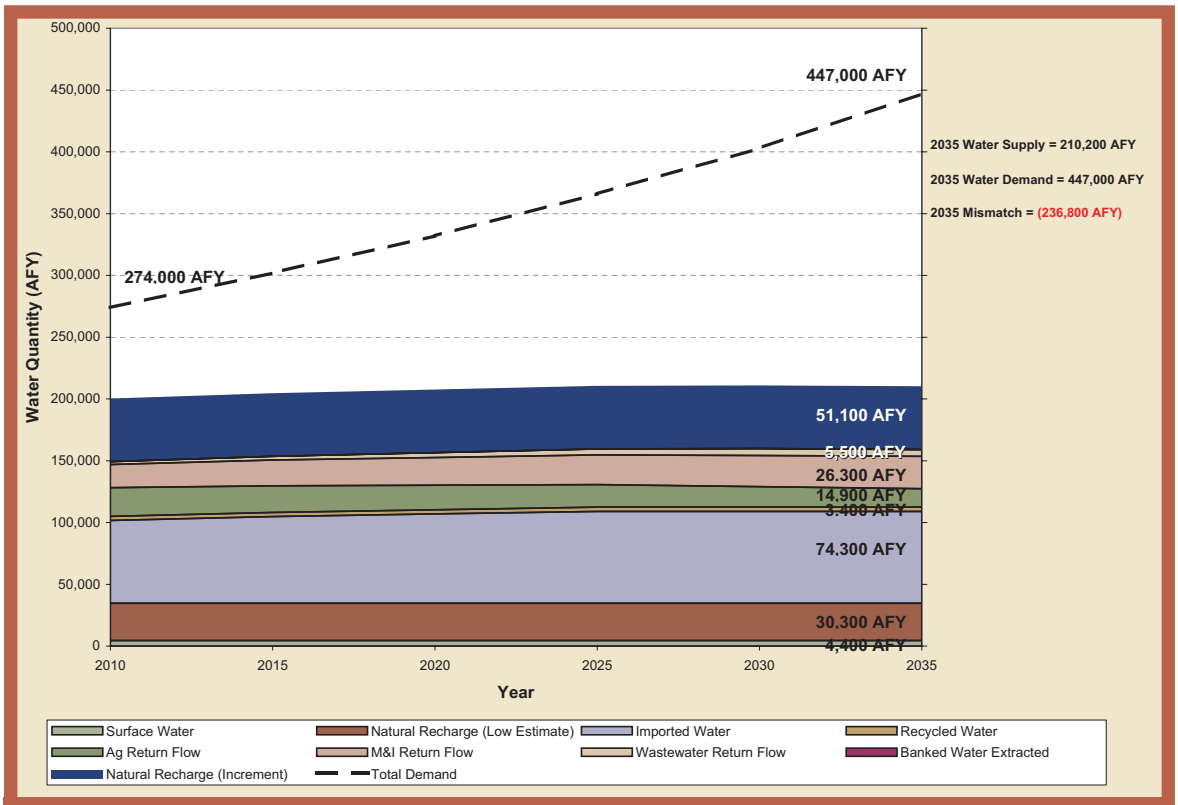


Figure 3-11 Water Supply Summary for an Average Water Year

Table 3-18 Water Budget Comparison for a Single-Dry Water Year

	2010	2015	2020	2025	2030	2035
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	29,000	31,600	31,600	31,600	31,600	31,600
Return Flows						
Ag RF	19,100	17,400	15,900	14,700	13,400	12,100
Urban RF	14,500	15,700	16,800	18,100	19,100	19,900
WW RF	2,300	3,100	3,900	4,700	5,500	5,500
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries	6,400	6,400	6,400	8,000	8,000	8,000
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	300	300	300	300	300	300
Total Supply	**156,400**	**159,300**	**159,700**	**162,200**	**162,700**	**162,200**
Demands(a)						
Urban Demand	(147,000)	(175,000)	(205,000)	(239,000)	(276,000)	(320,000)
Ag Demand	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)
Total Demand	**(283,000)**	**(311,000)**	**(341,000)**	**(375,000)**	**(412,000)**	**(456,000)**
Supply and Demand Mismatch	**(126,600)**	**(151,700)**	**(181,300)**	**(212,800)**	**(249,300)**	**(293,800)**

Note: (a) Demand includes groundwater extractions.

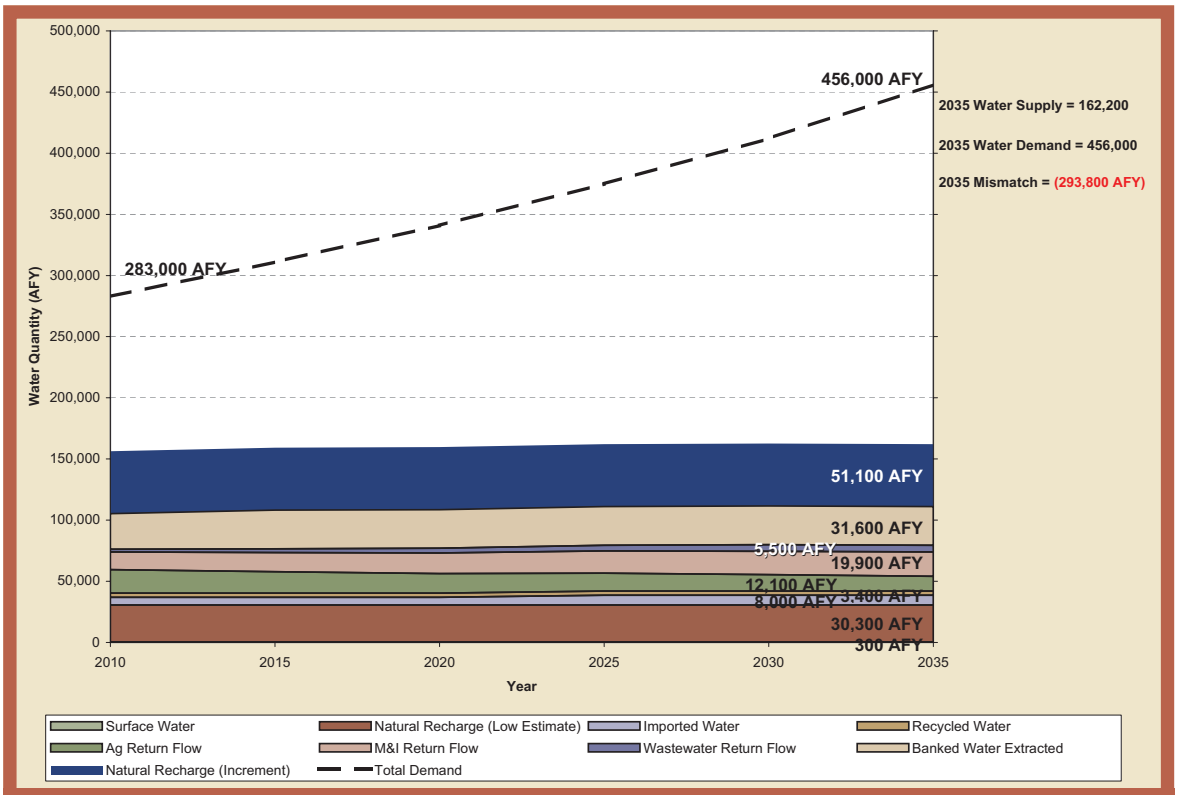


Figure 3-12 Water Supply Summary for a Single Dry Water Year

3.1.8.3 Multi-Dry Water Year

Figure 3-13 provides a comparison of the supply and demand for the Antelope Valley Region for a multiple-dry water year. Tables 3-19 through 3-24 provide a comparison of the supply and demand for the Antelope Valley Region for a multi-dry water year in 5-year increments. As shown by the comparisons, future demand exceeds the existing and planned water supplies through 2035. From supply and demand projections, projected reserves needed in a 4-year multi dry year were determined and are summarized in Figure 3-16. It is assumed that multi-dry year required reserves equal the multi-dry year mismatch plus the average year reserves for the same 4-year period. A range for the required reserves was determined from the maximum and minimum of the 4-year reserves. For multi-dry water years the range of required reserves is 0 AFY to 62,000 AFY. Additional projects and management actions to remedy these supply deficits are discussed in Section 5, Water Management Strategies, and Section 6, Project Integration and Objectives Assessment.

3.1.9 Regional Water Supply Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Antelope Valley Region with respect to water supplies include the following, which are discussed in greater detail below:

- Regional reliance on imported water;
- Groundwater use is not managed;
- Existing facilities have limitations;
- Land subsidence effects; and
- Global warming effects.

3.1.9.1 Reliance on Imported Water

As shown from the supply and demand comparison, the Antelope Valley Region depends on SWP for approximately 65 percent of its total supply in an average year, approximately 35 percent of its total supply in a multi-dry year, and less than 10 percent of its total supply in a single-dry year.

The availability of SWP supply is known to be variable. It fluctuates from year to year depending on precipitation, regulatory restrictions, legislative restrictions, and operational conditions, and is particularly unreliable during

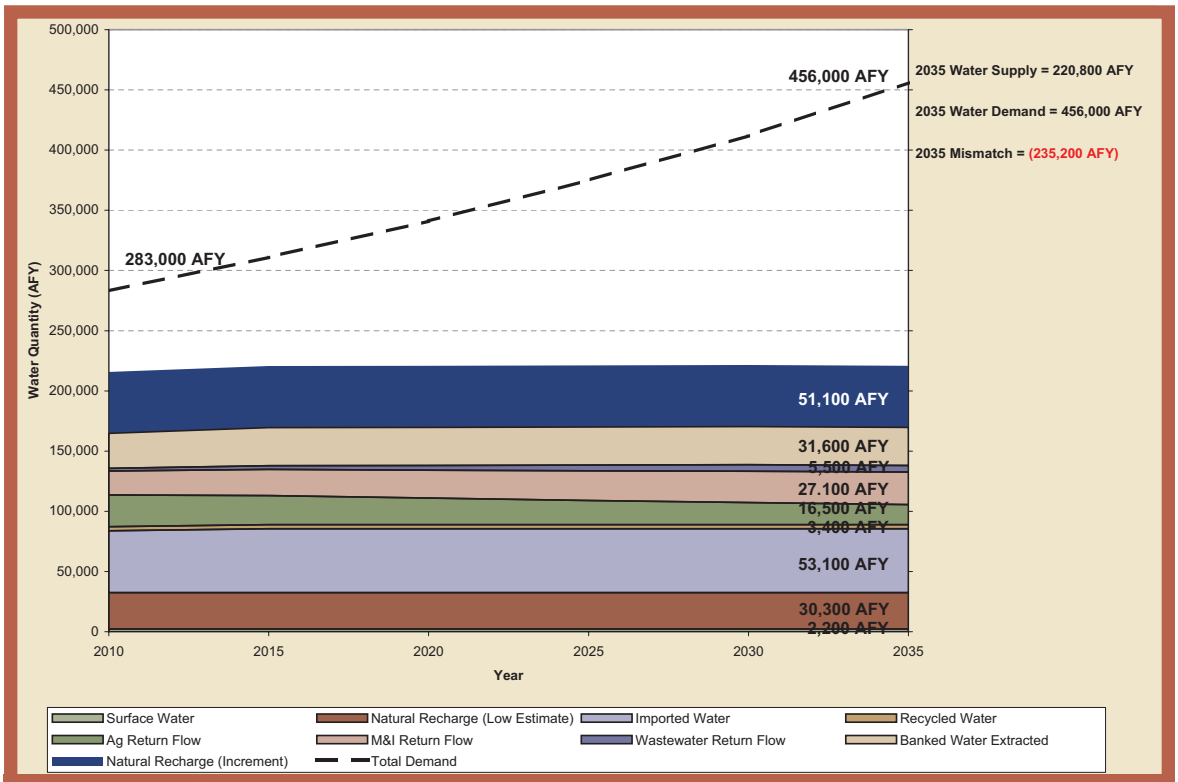


Figure 3-13 Water Supply Summary for a Multi-Dry Water Year

Table 3-19 Water Supply and Demand Comparison for a Multi-Dry Water Year, Years 2010 to 2035

	2010	2015	2020	2025	2030	2035
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	29,000	31,600	31,600	31,600	31,600	31,600
Return Flows						
Ag RF	26,200	24,100	22,000	20,000	18,300	16,500
Urban RF	19,900	21,700	23,200	24,700	26,000	27,100
WW RF	2,300	3,100	3,900	4,700	5,500	5,500
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries	51,400	53,100	53,100	53,100	53,100	53,100
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	2,200	2,200	2,200	2,200	2,200	2,200
Total Supply	**215,800**	**220,600**	**220,800**	**221,100**	**221,500**	**220,800**
Demands(a)						
Urban Demand	(147,000)	(175,000)	(205,000)	(239,000)	(276,000)	(320,000)
Ag Demand	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)
Total Demand	**(283,000)**	**(311,000)**	**(341,000)**	**(375,000)**	**(412,000)**	**(456,000)**
Supply and Demand Mismatch	**(67,200)**	**(90,400)**	**(120,200)**	**(153,900)**	**(190,500)**	**(235,200)**

Notes: Values assume 4-year dry period begins in the year shown.

(a) Demand includes groundwater extractions.

Table 3-20 Water Supply and Demand Comparison for a Multi-Dry Water Year, Years 2010 to 2015

	2010	2011	2012	2013	2014	2015
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	29,000	0	0	0	0	0
Return Flows						
Ag RF	26,200	25,800	25,400	25,000	24,600	24,100
Urban RF	19,900	20,300	20,700	21,100	21,500	21,700
WW RF	2,300	2,500	2,700	2,900	3,100	3,100
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries	51,400	51,400	51,400	51,400	51,400	53,100
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	2,200	2,200	2,200	2,200	2,200	2,200
Total Supply	**215,800**	**187,000**	**187,200**	**187,400**	**187,600**	**189,000**
Demands(a)						
Urban Demand	(147,000)	(152,600)	(158,200)	(163,800)	(169,400)	(175,000)
Ag Demand	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)
Total Demand	**(283,000)**	**(288,600)**	**(294,200)**	**(299,800)**	**(305,400)**	**(311,000)**
Supply and Demand Mismatch	**(67,200)**	**(101,600)**	**(107,000)**	**(112,400)**	**(117,800)**	**(122,000)**

(a) Demand includes groundwater extractions.

Table 3-21 Water Supply and Demand Comparison for a Multi-Dry Water Year, Years 2015 to 2020

	2015	2016	2017	2018	2019	2020
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	31,600	31,400	0	0	0	0
Return Flows						
Ag RF	24,100	23,700	23,300	22,900	22,500	22,000
Urban RF	21,700	22,000	22,300	22,600	22,900	23,200
WW RF	3,100	3,300	3,500	3,700	3,900	3,900
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries	53,100	53,100	53,100	53,100	53,100	53,100
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	2,200	2,200	2,200	2,200	2,200	2,200
Total Supply	**220,600**	**220,500**	**189,200**	**189,300**	**189,400**	**189,200**
Demands(a)						
Urban Demand	(175,000)	(181,000)	(187,000)	(193,000)	(199,000)	(205,000)
Ag Demand	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)
Total Demand	**(311,000)**	**(317,000)**	**(323,000)**	**(329,000)**	**(335,000)**	**(341,000)**
Supply and Demand Mismatch	**(90,400)**	**(96,500)**	**(133,800)**	**(139,700)**	**(145,600)**	**(151,800)**

(a) Demand includes groundwater extractions.

Table 3-22 Water Supply and Demand Comparison for a Multi-Dry Water Year, Years 2020 to 2025

	2020	2021	2022	2023	2024	2025
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	31,600	31,600	31,600	2,200	0	0
Return Flows						
Ag RF	22,000	21,600	21,200	20,800	20,400	20,000
Urban RF	23,200	23,500	23,800	24,100	24,400	24,700
WW RF	3,900	4,100	4,300	4,500	4,700	4,700
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries	53,100	53,100	53,100	53,100	53,100	53,100
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	2,200	2,200	2,200	2,200	2,200	2,200
Total Supply	**220,800**	**220,900**	**221,000**	**191,700**	**189,600**	**189,500**
Demands(a)						
Urban Demand	(205,000)	(211,800)	(218,600)	(225,400)	(232,200)	(239,000)
Ag Demand	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)
Total Demand	**(341,000)**	**(347,800)**	**(354,600)**	**(361,400)**	**(368,200)**	**(375,000)**
Supply and Demand Mismatch	**(120,200)**	**(126,900)**	**(133,600)**	**(169,700)**	**(178,600)**	**(185,500)**

(a) Demand includes groundwater extractions.

Table 3-23 Water Supply and Demand Comparison for a Multi-Dry Water Year, Years 2025 to 2030

	2025	2026	2027	2028	2029	2030
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	31,600	31,600	31,600	31,600	4,600	0
Return Flows						
Ag RF	20,000	19,700	19,400	19,100	18,800	18,300
Urban RF	24,700	25,000	25,300	25,600	25,900	26,000
WW RF	4,700	4,900	5,100	5,300	5,500	5,500
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries	53,100	53,100	53,100	53,100	53,100	53,100
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	2,200	2,200	2,200	2,200	2,200	2,200
Total Supply	**221,100**	**221,300**	**221,500**	**221,700**	**194,900**	**189,900**
Demands(a)						
Urban Demand	(239,000)	(246,400)	(253,800)	(261,200)	(268,600)	(276,000)
Ag Demand	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)
Total Demand	**(375,000)**	**(382,400)**	**(389,800)**	**(397,200)**	**(404,600)**	**(412,000)**
Supply and Demand Mismatch	**(153,900)**	**(161,100)**	**(168,300)**	**(175,500)**	**(209,700)**	**(222,100)**

(a) Demand includes groundwater extractions.

Table 3-24 Water Supply and Demand Comparison for a Multi-Dry Water Year, Years 2030 to 2035

	2030	2031	2032	2033	2034	2035
Groundwater Storage						
Natural Recharge (Low Estimate)	30,300	30,300	30,300	30,300	30,300	30,300
Natural Recharge (Increment)	51,100	51,100	51,100	51,100	51,100	51,100
Banked ASR Water Extracted	31,600	31,600	31,600	31,600	31,600	7,000
Return Flows						
Ag RF	18,300	17,900	17,500	17,100	16,700	16,500
Urban RF	26,000	26,200	26,400	26,600	26,800	27,100
WW RF	5,500	5,500	5,500	5,500	5,500	5,500
Subsurface Flow Loss	0	0	0	0	0	0
Direct Deliveries	53,100	53,100	53,100	53,100	53,100	53,100
Recycle/Reuse	3,400	3,400	3,400	3,400	3,400	3,400
Surface Storage						
Surface Deliveries	2,200	2,200	2,200	2,200	2,200	2,200
Total Supply	**221,500**	**221,300**	**221,100**	**220,900**	**220,700**	**196,200**
Demands(a)						
Urban Demand	(276,000)	(284,800)	(293,600)	(302,400)	(311,200)	(320,000)
Ag Demand	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)	(136,000)
Total Demand	**(412,000)**	**(420,800)**	**(429,600)**	**(438,400)**	**(447,200)**	**(456,000)**
Supply and Demand Mismatch	**(190,500)**	**(199,500)**	**(208,500)**	**(217,500)**	**(226,500)**	**(259,800)**

(a) Demand includes groundwater extractions.

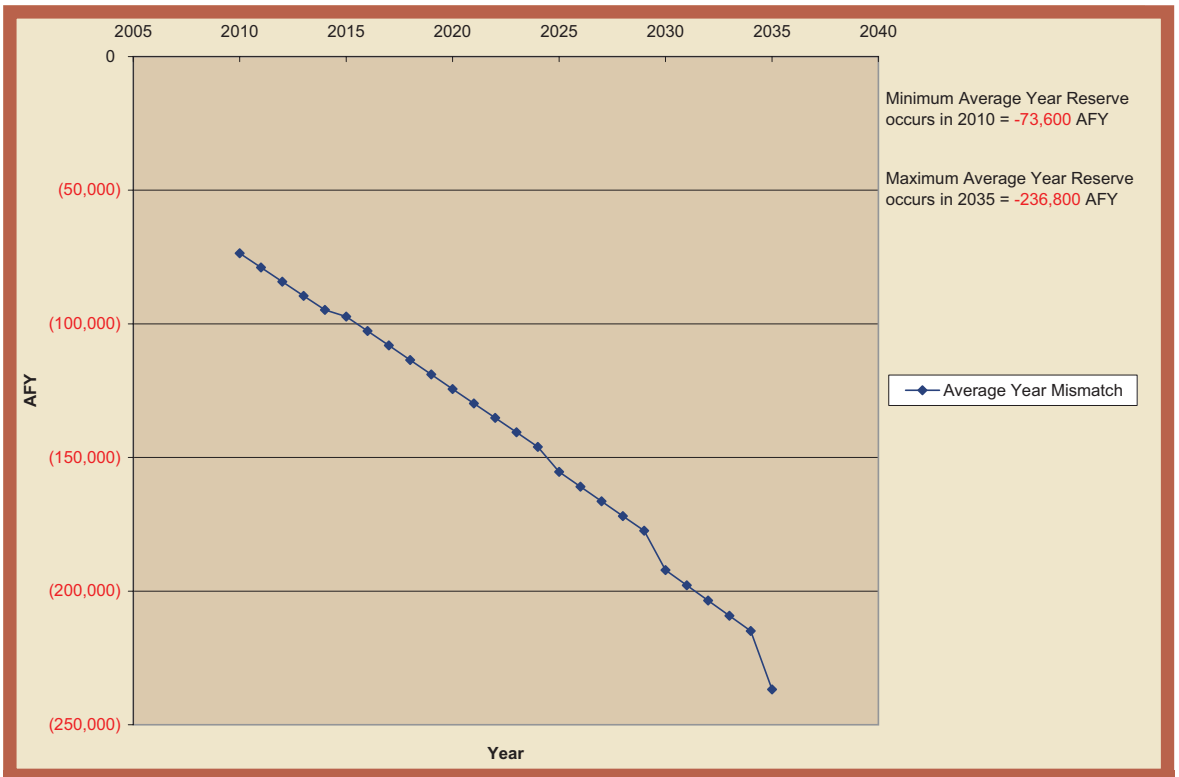


Figure 3-14 Average Water Year Reserves

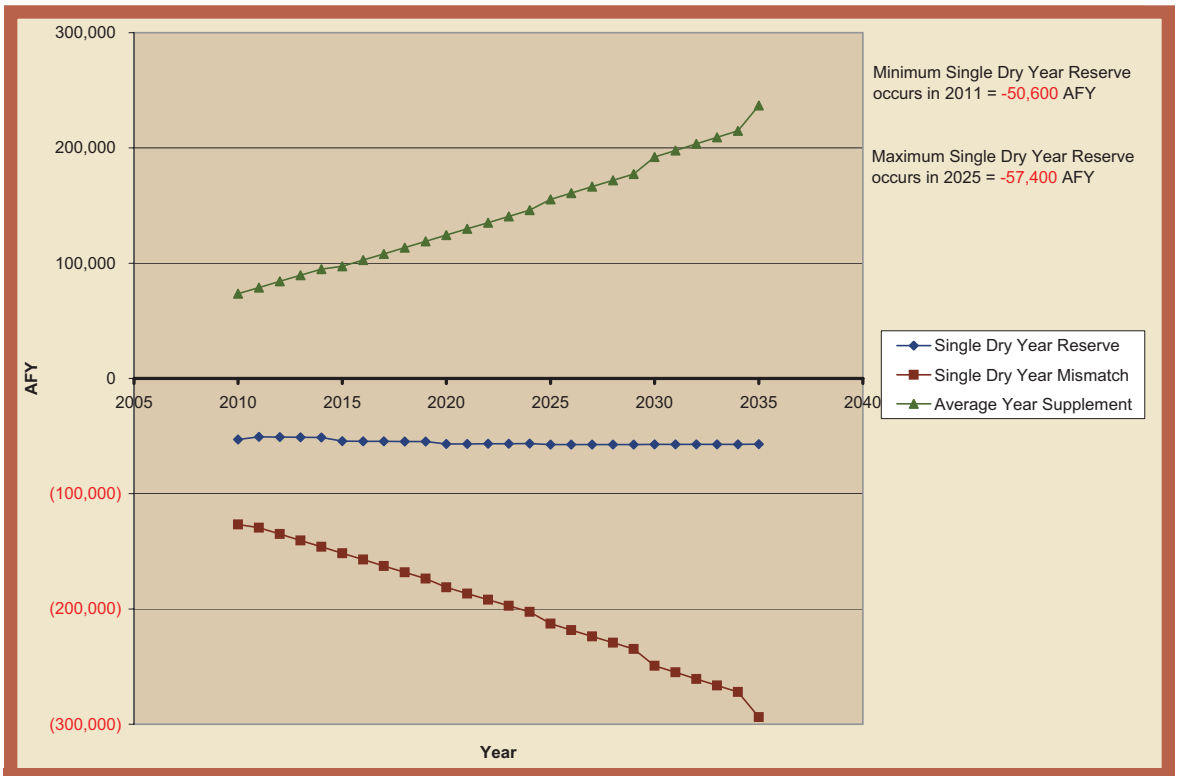


Figure 3-15 Single Dry Water Year Reserves

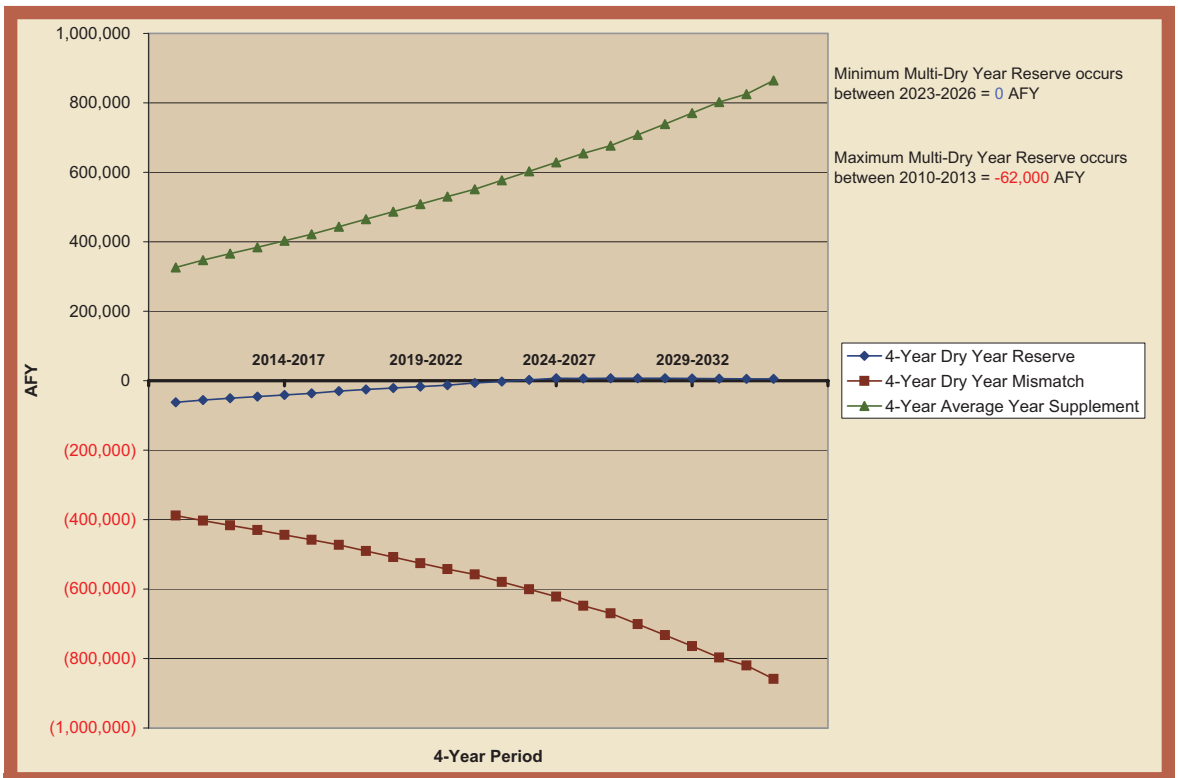


Figure 3-16 Multi-Dry Water Year Reserves

dry years. The DWR Reliability Report (2005b) anticipates a minimum delivery of 4 percent of full Table A Amounts for 2005 demand conditions and 5 percent of full Table A Amounts for 2025 demand conditions. The Antelope Valley Region likely cannot meet expected demands without imported water, and the variable nature of the supply presents management challenges to ensure flexibility.

3.1.9.2 Groundwater is Not Managed

One of the more prevalent concerns in the Antelope Valley Region relates to management of the Antelope Valley Groundwater Basin. Groundwater has and continues to be an important resource within the Antelope Valley Region. As discussed in Section 2, groundwater has provided between 50 and 90 percent of the total water supply in the Antelope Valley Region since 1972 (USGS 2003). Projected urban growth, coupled with limits on the available local and imported water supply, are likely to continue to increase the reliance on groundwater. If the groundwater basin is not managed wisely, the basin can become overdrafted and reduce the long-term viability of the groundwater supply.

The following Assembly Bill (AB) 3030 elements are also associated with groundwater supply management within the Antelope Valley Region. A discussion of how these elements are addressed in this IRWM Plan is provided below.

Mitigation of Conditions of Overdraft. Although the groundwater basin is not currently adjudicated, an adjudication process has begun and is in the early stages. Although there are no existing restrictions on pumping, water rights may be assigned as part of the adjudication process. The groundwater adjudication process is a management action discussed in this IRWM Plan.

Replenishment of Groundwater Extracted by Water Producers. Several groundwater recharge and banking projects are being considered and evaluated as part of this IRWM Plan. Additionally, Edwards AFB has been actively involved in projects aimed at refilling the depleted aquifers. The goals of these projects are to recharge/bank sufficient groundwater supply in wet years for use during dry years, thereby minimizing long-term impacts to groundwater levels.

Monitoring of Groundwater Levels and Storage. Groundwater level and storage monitoring is a direct indicator of the groundwater supply. The Water Supply Management Strategy (WSMS) (provided in Section 5) will include management and compilation of existing water levels and water quality monitoring data to facilitate analysis of current conditions, and to help plan for the future.

Facilitating Conjunctive Use Operations. Conjunctive use operations relate to the combined use of surface water and groundwater to optimize resources and minimize adverse effects of using a single source. Conjunctive use will be facilitated as part of this IRWM Plan through many of the water supply management projects in the WSMS described in more detail in Section 5. Conjunctive use opportunities with native water is limited, however, due to the relatively small amount of native surface and groundwater available. Thus, the success of conjunctive use operations will depend heavily on the ability to import water from outside of the Antelope Valley Region.

3.1.9.3 Limitations of Existing Supply

The Antelope Valley Region water agencies have typically relied on imported water and/or groundwater for their water supply needs. Currently, these water supplies are limited by SWP supply fluctuations, groundwater basin overdraft and the need for facility improvements. The water agencies and municipalities are pursuing various alternatives, such as recycled water and recharge programs, to decrease their reliance on imported water and groundwater sources.

SWP water reliability is a function of hydrologic conditions, state and federal water quality standards, protection of endangered species and water delivery requirements. Though the SWP contracts contain maximum Table A Amounts for each contractor, this is not a guarantee of how much imported water will be available for delivery each year.

Water agencies in the Antelope Valley Region cannot entirely rely on groundwater pumping either, because excessive pumping for many years has stressed the basin. According to the USGS, groundwater pumping in the Antelope Valley Region has exceeded the recharge rate every year since the early 1920s (USGS 2003). This approach to groundwater pumping will change in the future, as the adjudication process for establishing groundwater rights in the Antelope Valley Region began in 2005.

Additionally, as detailed below in Section 3.5, "Land Use Management Assessment" water is a limiting factor of the Antelope Valley Region's growth rate. In order to accommodate this projected growth the supply of water in the Antelope Valley Region must be increased.

3.1.9.4 Limitations of Existing Facilities

In order to address the deficiency in supply, the water supply agencies in the Antelope Valley Region will need to modify existing infrastructure to accommodate an increase in delivery capacity for the new supply.

AVEK's Quartz Hill WTP will require an expansion to approximately 97 mgd to treat LACWWD 40's projected demands (LACWWD 40 1999). Furthermore, as previously mentioned, AVEK has capacity constraints in the summer and limited demand for water during the winter months. Thus, additional storage or recharge in the winter months is required in order for them to beneficially use their full Table A amount.

LACWWD 40's facilities improvements will include new wells, reservoirs and pipelines throughout its system to meet current and projected water supply requirements. Additional connections with AVEK will be needed to maximize use of available imported water. LACWWD 40 is pursuing the use of recycled water as an alternative source for irrigation and recharge purposes. LACWWD 40 has also started the Lancaster ASR Project in an effort to recharge treated SWP water for extraction at a later time (LACWWD 40 1999).

PWD's plan for improvements and expansion of its existing infrastructure is currently being developed in its 2006 Water System Master Plan Update. According to PWD's 2006 Strategic Plan, PWD is identifying additional water sources by investigating the potential to increase the yield from Littlerock Reservoir, water conservation, recycled water (urban irrigation and groundwater recharge), additional Table A SWP water, and water transfers. The 2006 Master Plan Update will also provide a plan for infrastructure upgrades, which includes development of an existing system hydraulic model and identifying improvements needed to mitigate existing deficiencies.

QHWD plans to enlarge existing wells or drill new wells to meet additional demands. There are no plans for QHWD to invest in recycled water in the near future because tertiary treatment and recycled water pipelines are too costly. QHWD does intend to recharge local aquifers when excess surface water is available and is currently equipping new wells with appropriate piping (QHWD 2002).

RCSD will need new wells, a reservoir, and additional transmission mains to meet projected demands (RCSD 2004).

Furthermore, the current planned regional recycled water distribution system would only deliver water to M&I users. Additional infrastructure would be required to deliver recycled water to any potential agricultural users other than the LACSD effluent management sites or adjacent users.

3.1.9.5 Effects of Land Subsidence

Groundwater use in the Antelope Valley Region was at its highest in the 1950s and 1960s as a result of agricultural demands (USGS 1994a). According to USGS, land subsidence in Antelope Valley Region was first reported by Lewis and Miller in the 1950s (USGS 1992). Since then, studies have shown subsidence levels of up to 7 feet occurring in some areas of Antelope Valley Region (see Figure 3-17). Conversations held with various agencies and companies indicate that within the Antelope Valley Region, the Lancaster and Edwards AFB areas are currently experiencing problems or damages that appear to be related to land subsidence (see Figure 3-18). Edwards AFB has been actively involved in projects aimed at preventing future land subsidence.

Land subsidence results in the following impacts:

- Development of cracks, fissures, sink-like depressions and soft spots.
- Change in natural drainage patterns often resulting in increased areas of flooding or increased erosion.
- Degradation of groundwater quality.
- Permanent reduction in groundwater storage capacity.
- Change in gradient in gravity pipelines (sanitary and storm sewers) or canals often resulting in lost capacity.
- Damage to well casings, pipelines, buildings, roads, railroads, bridges, levees, etc.
- Costs associated with repairs and rebuilding.
- Costs associated with construction of new facilities such as pumping stations for gradient changes.
- Reduction in land value.
- Lawsuits.
- Increased pumping costs.

Table 3-25 lists land subsidence problems identified in Antelope Valley Region.

The following paragraphs present brief discussions on several studies done on land subsidence in Antelope Valley Region.

USGS Report 92-4035. USGS (1992) reported that as much as 2 feet of land subsidence had affected Antelope Valley Region by 1967 and was causing surface deformations at Edwards AFB. Fissures, cracks and depressions on Rogers Lake were affecting the use of the lakebed as a runway for airplanes and space shuttles. In addition, depressions,

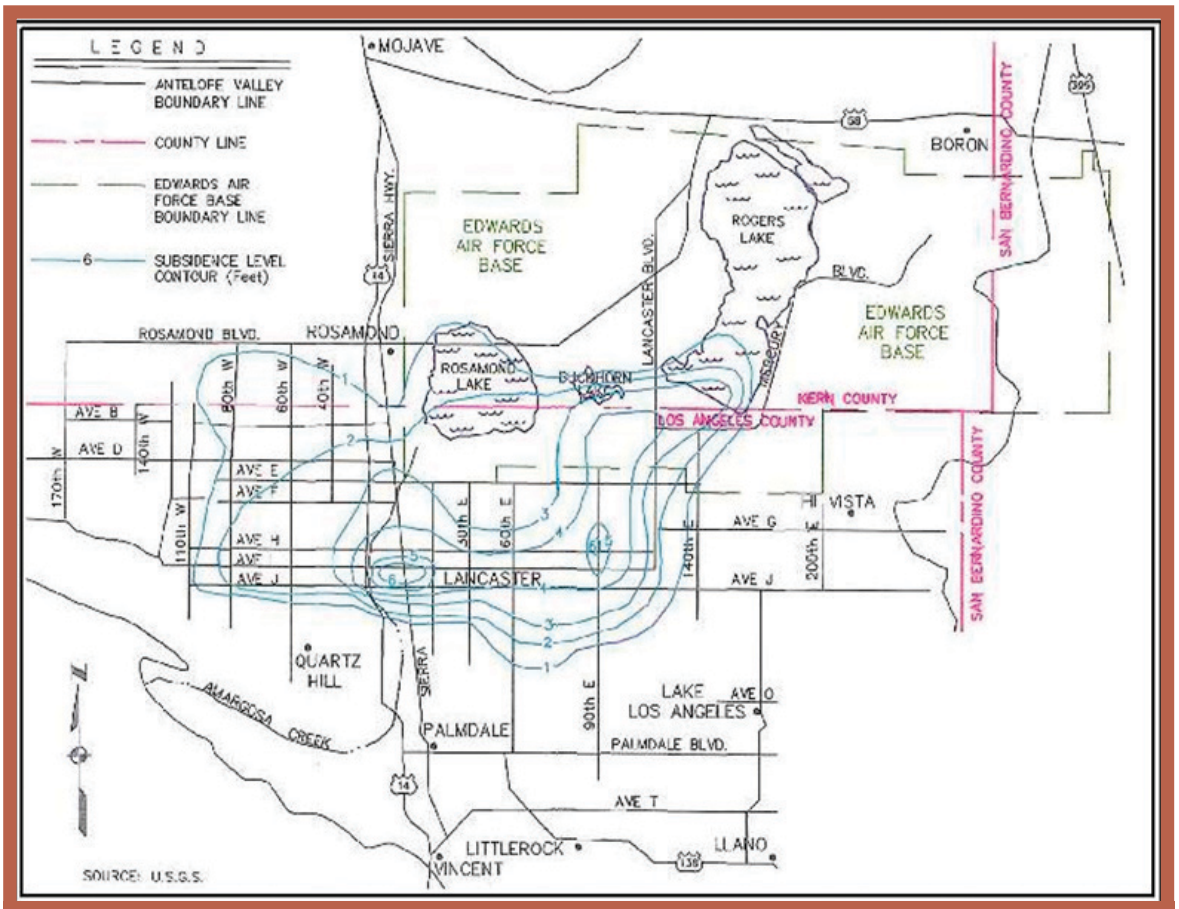


Figure 3-17 Subsidence Levels in the Antelope Valley

fissures and cracks on the lakebed may not be detected until aircraft or space shuttles exceed the load capacity of the soil. Another concern was potential contamination of the water table through fissures which can provide direct access for toxic materials.

To determine the significance of land subsidence conditions, bench marks were surveyed using a Global Positioning System (GPS) in 1989. Differential levels were surveyed for 65 bench marks from 1989 to 1991. It was discovered that total land subsidence ranged from 0.3 to 3.0 feet.

USGS Report 93-4114. USGS (1993b), reported that land subsidence effects had been noted on Rogers Lake in the form of depressions, fissures and cracks. The report identified pumping of groundwater as the cause of the land subsidence. As much as 90 feet of groundwater level decline has occurred in the South Base well field, and an average annual compaction rate of 5.57 × 10-2 feet was measured at the Holly site near the South Track well field (see Location 3 on Figure 3-18).

USGS 1994 Draft Report. USGS (1994) revealed that land subsidence throughout Antelope Valley Region has reached nearly 7 feet. As shown on Figure 3-18, USGS indicated that subsidence levels of 6.6 feet have occurred near Avenue I and Division Street, and Avenue H and 90th Street East. The draft report stated that there was a general correlation between groundwater level declines and the distribution and rate of subsidence. In addition, the report estimated a conservative loss of approximately 50,000 AF of storage in the groundwater subbasin in the area that has been affected by 1 foot or more of land subsidence.

Geolabs, February 1991. A study done by Geolabs - Westlake Village (1991) studied a 10 square mile area in Lancaster identified to have fissures and sink-like depressions (see Location 2 on Figure 3-18). The report identified fissures ranging in width from one inch to slightly over one foot. The lengths of the fissures ranged mainly between 50 to 200 feet, with the longest continuous fissures in the 600-700 foot range. Sinkholes ranged mainly between one to five feet deep and less than four feet in diameter. One sinkhole measured 20 feet long and 15 feet wide. The report concluded that the fissures were due to tensional

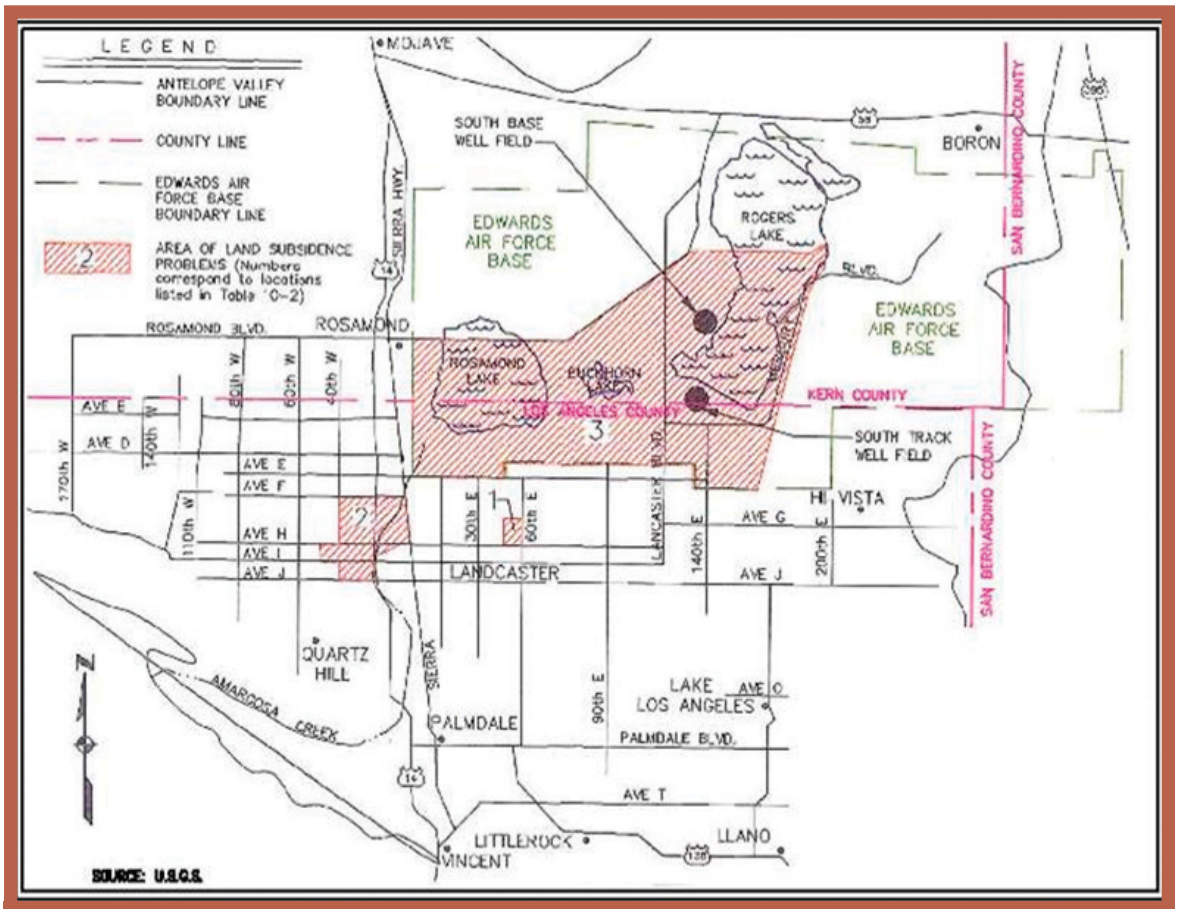


Figure 3-18 Areas of Potential Land Subsidence in the Antelope Valley

forces created by subsidence, which may be related to groundwater withdrawal due to the correlation between areas of significant subsidence and areas of pronounced groundwater level decline. Areas of concern identified in the report are included in Table 3-25.

1995 Water Resource Study. In addition to reviewing the reports summarized above, companies and agencies within the Antelope Valley Region were surveyed regarding potential damages attributable to groundwater level declines and field visits of affected areas were conducted. Companies and agencies surveyed include the following:

- AVEK
- CALNEV Pipelines
- Lancaster, Redevelopment Center
- Lancaster, Road Maintenance Department
- Palmdale, Engineering Department
- Palmdale, Road Maintenance Department
- LACSD
- Edwards AFB
- Kern County Flood Plain Management Section
- Los Angeles County Waterworks District, Sewer Department
- RCSD
- Southern California Gas Company
- Southern Pacific Railroad
- State Fire Marshall, Pipeline Safety Division

Other than those damages identified in the reports summarized above, structural damage to the wastewater treatment plant building on Edwards AFB was the only other potentially significant damage identified and may or may not be attributable to land subsidence. Other minor existing damage that may or may not be attributable to groundwater level declines includes cracked sidewalks and pavement. To assess existing and potential degradation to the groundwater supply, an attempt was made to correlate typical stormwater runoff constituents and similar constituents in the groundwater supply. The hypothesis was that areas of fissuring should show higher degrees of contamination if runoff was reaching the aquifers through the fissures.

Table 3-25 Land Subsidence Concerns for the Antelope Valley Region

Location	Description	Maximum Subsidence (ft)	Problems/Damages/Concerns
1	Area bounded by 50th and 60th Streets east and Avenues G and H (T7N-R11W-S3)	3-4	• Development of cracks and fissures
2	Northwest portion of Lancaster	4-5	• Development of cracks and fissures in the following areas of concern: » In the vicinity of KAVL and KBVM radio towers near the proposed site for High Desert Hospital complex » East of a residential project at the southeast corner of 30th St. West and Ave. "I" » In the vicinity of LA County Detention Facility south of Ave. "I" » The "H" Street Bridge over Amargosa Creek where up to 4" of lateral separation is present across the central expansion joint(a).
3	Edwards AFB	3.3	• Failure of several well casings. • Increase in area subject to flooding. • Structural damage to wastewater treatment plant building. • Wells protruding above the ground. • Development of cracks, fissures, sinkholes and softspots on Rogers Lakebed, affecting use of the lakebed as a runway for planes and space shuttles.

Note: (a) Geolabs reports that the separation may be due to differential settlement or, may be related to the same mechanism which is causing the fissuring in the area.

The Los Angeles County Watershed Management Division monitors surface water; however it does not monitor typical stormwater constituents, only general minerals. Therefore, it is currently unknown whether groundwater degradation due to subsidence is occurring in Antelope Valley Region. However, should fissuring continue, degradation to the groundwater supply could be a potential problem and should be investigated. Individual water purveyors servicing the area where fissuring is occurring may test for some of the constituents found in stormwater, from which data may be obtained.

In addition to subsidence-related problems, groundwater level declines of up to 200 feet in the Antelope Valley Region have resulted in increased pumping costs. USGS (1994) cites the increased pumping costs as the primary reason for a decline in agricultural production during the 1970s. The LACWWDs adds that attractive land development areas along with increased pumping costs have contributed towards agricultural decline.

It is recommended that monitoring of subsidence levels and groundwater levels continue in the Antelope Valley Region as indicators of future problems due to subsidence and current progress toward balancing groundwater use.

Monitoring of groundwater quality for typical stormwater constituents in areas of fissures is recommended as an indicator of the degradation potential due to fissures.

3.1.9.6 Effects of Global Warming

In the recent update of DWR's Water Plan (2005c), an assessment of the impacts of global warming on the State's water supply was conducted using a series of computer models that incorporated decades of scientific research. Model results indicate increased temperatures, a reduction in Sierra Nevada mountain snow depth, early snow melt, and a rise in sea level. These changing hydrological conditions could affect future planning efforts, which are typically based on historic conditions. Difficulties that may arise include:

- Hydrological conditions, variability, and extremes that are different than current water systems were designed to manage;
- Changes occurring too rapidly to allow sufficient time and information to permit managers to respond appropriately; and
- Requiring special efforts or plans to protect against surprises and uncertainties.

DWR will continue to provide updated results from these models as further research is conducted.

In July 2006, DWR issued "Progress on Incorporating Climate Change into Management of California's Water Resources," as required by Executive Order S-3-05, which instituted biennial reports on potential climate change effects on several areas, including water resources. This IRWM Plan describes the progress made in incorporating current climate change data and information into existing water resources planning and management tools and methodologies. The report, whose purpose is to demonstrate how various analytical tools currently used by DWR could be used to address issues related to climate change, focuses on assessment methodologies and preliminary study results from four climate change scenarios.

Potential impacts of climate change are presented for the SWP and for the Sacramento-San Joaquin Delta, both of which are related to the Antelope Valley Region's imported water supplies. Since the Antelope Valley Region is reliant on imported SWP supplies as part of its overall supply mix, any reduction or change in the timing of availability of those supplies could have negative impacts on the water supply of the Antelope Valley Region. Reductions in the quantity of SWP water available would force the Antelope Valley Region to rely more heavily on local groundwater and local surface flows, or other sources of imported water. It is possible that local surface flows could also be reduced by changes in snow pack altitude levels and/or quantity of snow pack in the San Gabriel Mountains from global warming, which would reduce natural recharge, thus exacerbating groundwater availability problems.

The SWP analysis presents potential impacts on SWP operations, including reservoir inflows, delivery reliability, and average annual carryover storage, as well as many other operational parameters. The analysis assumes forecast levels of climate change in year 2050, with 2020 land use levels. Some of the main impacts include changes to south of Delta Table A Amount deliveries (from an increase of about 1 percent in a wetter scenario to about a 10 percent reduction for a drier climate change scenario), increased winter runoff and lower Table A allocations in the three driest climate change scenarios, lower carryover storage in drier scenarios, and higher carryover storage in a wetter scenario.

The Sacramento-San Joaquin Delta analysis of the four climate change scenarios included the operational impacts to the SWP and other water delivery systems, as well as meeting Delta water quality standards. The analysis indicated that meeting these water quality standards will be a "larger challenge" due to climate change. Using assumed climate change scenarios and a sea level increase of one foot, the ability to meet chloride standards for M&I uses would be more difficult and may cause water supply impacts which DWR could not quantify at this time.

In addition, the report presents potential impacts of climate change that could cause increases in ETo rates and crop water use statewide. The analysis of potential impacts of climate change on ETo and crop water use showed that with a rise of 3 degrees Celsius (°C) in air temperature, increases in ETo for a reference crop ranged from 3 to 6 percent. While a small percentage, this volume of water, when summed statewide, would be substantial. DWR assumes that other crops would show similar responses. DWR is developing modeling tools to use in future analyses of crops and other plant species to determine the potential impacts to agriculture. The Antelope Valley Region, while experiencing rapid urbanization, remains an active agricultural area. Global warming may impact water supply availability, but it also increases crop (and residential landscaping) ETo rates. Actual water demand of various crops in the Antelope Valley Region could rise just at a time when water supplies are becoming less available or reliable.

Future studies will include DWR working with other agencies to incorporate climate change information into the management of the state's water resources. Additional climate change scenarios will be developed and analyzed, with the goal of providing them to water resource planners to utilize in making water operations and management decisions. DWR states that the preliminary results in this current report are not sufficient by themselves to make policy decisions regarding water resources.

Assembly Bill 32: Global Warming Solutions Act

A recent legislative development in California is the passing of Assembly Bill (AB) 32, Global Warming Solutions Act. The Global Warming Solutions Act of 2006 has committed California to reducing the state's greenhouse gas emissions to 2000 levels by 2010 (approximately 11percent below business as usual), to 1990 levels by 2020 (approximately 25 percent below business as usual), and to 80 percent below 1990 levels by 2050. The California Air Resources Board (CARB) is charged with developing the appropriate regulations and reporting system to effectively implement the caps on emissions. AB 32 requires that CARB use the following principles to implement the caps: distribute benefits and costs equitably; ensure that there are no direct, indirect, or cumulative increases in air pollution in local communities; protect entities that have reduced their emissions through actions prior to this mandate; and allow

for coordination with other states and countries to reduce emissions.

Counties, cities, water agencies, water purveyors, and water consumers can all expect to be affected by this legislation. As heavily documented by the media in recent months, climate change has large consequences for California's water supply and environment, including reduced snow pack in the Sierra Nevada Mountains, sea level rise, flash floods, drought, reduced supply from the Colorado River, etc. To curb these devastating effects, actions ranging from assessments of one's carbon footprint and carbon trading, to use of alternative energies, to reduction of emissions through direct conservation of both water and energy, for example, will likely be expected of many organizations and even individuals dealing directly and indirectly with water throughout the state.

3.2 WATER QUALITY MANAGEMENT ASSESSMENT

Given the Antelope Valley Region's dependence on its groundwater source, it is vital that the quality of the groundwater be protected. With the increase of groundwater recharge projects, which are essential to ensuring the availability of groundwater and preventing land subsidence, it is crucial to monitor the quality of the injected water and its impacts to the groundwater basin.

Water quality management in the Antelope Valley Region is therefore focused on maintaining and improving existing water quality and preventing future contamination. Recycled water activities have also been included in this discussion since the recharge of the recycled water may impact water quality.

3.2.1 Local Groundwater Quality

Groundwater quality in the Antelope Valley Region is excellent within the principal aquifer but degrades toward the northern portion of the dry lakes areas. The groundwater is typically calcium bicarbonate in character near the surrounding mountains and is sodium bicarbonate or sodium sulfate character in the central part of the basin (Duell 1987 as cited in DWR 2004). Considered to be generally suitable for domestic, agricultural, and industrial uses, the water in the principal aquifer has a total dissolved solids (TDS) concentration ranging from 200 to 800 mg/L. The deep aquifer typically has a higher TDS level. Hardness ranges from 50 to 200 mg/L and high fluoride, boron, and nitrates are a problem in some areas of the basin. The groundwater in the basin is used for both agricultural and M&I purposes.

An emerging contaminant of concern is arsenic. Arsenic is a naturally occurring inorganic contaminant often found in groundwater and occasionally found in surface water. Anthropogenic sources of arsenic include agricultural, industrial and mining activities. In California, there are 763 sources in 404 water systems in 45 counties that show arsenic levels greater than the new federal drinking water standard of 10 parts per billion[4] (ppb) (DHS 2005). Arsenic can be toxic in high concentrations, and is considered a chronic carcinogen when accounting for lifetime exposures.

Arsenic levels above the current MCL of 10 ppb have been observed in the Antelope Valley Region. Approximately 20 LACWWD 40 wells have tested above the Maximum Contaminant Level (MCL), and as a result six (6) wells have been placed on inactive status. Five (5) active wells with high arsenic levels are undergoing a partial abandonment process that would restrict flow from areas containing arsenic and allow pumping in arsenic free zones. PWD has arsenic levels below 2 ppb. QHWD has also observed levels above the MCL in a number of wells, however, it has the ability to blend the water to acceptable levels. Similarly, RCSD has observed levels of arsenic in the range of 11 to 14 ppb in three (3) of its wells. RCSD is utilizing similar methods to LACWWD 40 to manage arsenic levels so that delivered water meets the arsenic MCL. It is not anticipated that the existing arsenic problem will lead to future loss of groundwater as a supply for the Antelope Valley Region.

In addition to arsenic issues, there have also been concerns with nitrate levels above the current MCL of 10 ppb and high TDS levels in portions of the Basin. Groundwater monitoring data from the mid-to-late 1990s indicate nitrate (as N) concentrations periodically exceeding the primary MCL for drinking water of 10 mg/L in two wells located in the southern portion of the groundwater basin near the Palmdale WRP. Agricultural fertilization practices and discharge of treated wastewater has likely contributed to the elevated levels. Actions have already been implemented by LACSD to address these concerns and to minimize any impact from treated wastewater, including, treatment upgrades, a change in effluent management practices, the implementation of a recycled water distribution system, and performing groundwater remediation activities near the Palmdale WRP site. As part of this IRWM Plan, contaminated sites would be identified,

4 The State of California is in the process of developing its own regulation for arsenic in drinking water, which could include a revised, lowered MCL. While by statute, the regulation should have been proposed by 30 June 2004, DPH is still continuing to work on the regulatory process.

mapped, and monitored within the basin to further aid the remediation efforts.

3.2.2 Imported Water Quality

DWR regulates the water quality of the SWP through the following two documents: *Department of Water Resources Water Quality Criteria for Acceptance of Non-Project Water into the State Water Project* (Acceptance Criteria) and *Implementation Procedures for the Review of Water Quality from Non-Project Water Introduced into the State Water Project* (Implementation Procedures). DWR has provided draft criteria that are still undergoing revision. In the interim, between the time of when the criteria were established and the current proposed criteria, new or modified regulations for some additional constituents of concern have been developed.

As of January 2006, the Federal arsenic MCL was revised to 10 micrograms per liter (µg/L) (down from 50 µg/L), which will have significant impacts on water utilities in California that will need to install or modify treatment to remove arsenic. Additionally, this lowering of the standard likely will affect what DWR will establish as the appropriate criteria for arsenic in the SWP system, which is currently set at 4 µg/L.

Another constituent of concern is chromium VI. There is currently no proposed or existing drinking water standard for chromium VI. There are, however, federal and state standards for total chromium in drinking water. The California standard is 50 µg/L (half the federal standard, which is 100 µg/L). According to SB 351 (Ortiz), the California Department of Public Health (DPH) was required to set a drinking water standard specific to chromium VI by January 1, 2004. However, this deadline has been missed due to delays in developing the Public Health Goal. The Office of Environmental Health Hazard Assessment (OEHHA) is currently working on the Public Health Goal (PHG) for chromium VI, which will be used by DPH in setting the standard. There is a PHG for total chromium, which is 2.5 µg/L.

The current water quality criteria for the SWP are compared to current water quality conditions in the California Aqueduct (data taken from Station KA017226, Check 21 near Kettleman City) and to the current federal primary and secondary drinking water standards, and provided in Table 3-26. It is important to note that not all constituents currently in the draft Acceptance Criteria are sampled for by DWR. It is also important to note that while some constituents do not have SWP pumpback criteria and/or an MCL (bromide, total organic carbon, TDS, and chloride) high levels of these constituents can be of concern, especially with regard to potential treatment costs to downstream users.

3.2.2.1 Imported Water Quality Infrastructure

SWP water is treated by PWD's treatment plant for use by PWD and LCID, and by the four AVEK facilities (Quartz Hill WTP, Eastside WTP, Rosamond WTP, and Acton WTP) prior to delivery to the other water purveyors.

PWD's water treatment plant is a conventional design plant using chlorine as the disinfectant, and has a permitted capacity of 28 mgd. Screening and metering are provided at the outlet of Palmdale Lake and head of the plant, followed by treatment chemical addition, flash mixing, three-stage tapered energy flocculation, clarification utilizing plate settlers and sediment removal systems, multi-media filters, and disinfection. Treated water is stored in a 6 million-gallon reservoir, which supplies water into the distribution system. Decanted water from the solids removal process is returned to Palmdale Lake. The plant is currently undergoing a second phase of improvements designed to meet Stage II Disinfection-by-Products regulations. Improvements include additional filters and adding Granulated Activated Carbon contactors to the processes. This will allow the continued use of chlorine as the disinfectant and increase the capacity to 35 mgd.

The Quartz Hill WTP was the first plant built by AVEK. The treatment plant receives water by gravity flow from the California Aqueduct. Screening and metering are provided at the head of the plant, followed by treatment chemical addition, flash mixing, tapered energy flocculation, clarification utilizing traveling bridges for sediment removal, dual media filters, and disinfection. Treated water is stored in a 9.2 million-gallon reservoir which supplies water by gravity into the distribution system. Decanted water from the solids removal process is returned to the plant influent. After the completion of a second expansion in 1989, the Quartz Hill WTP became capable of producing 65 mgd, enough to serve the needs of 280,000 consumers. The Quartz Hill WTP is planning a conversion of its disinfection system from chlorine to ozone/chloramines. This conversion will significantly reduce the levels of trihalomethanes (THMs) from the treated water, which was previously limiting LACWWD 40 from implementing their ASR program.

Expansion of the Eastside WTP located between Littlerock and Pearblossom to 10 mgd was completed in late 1988. It now serves the needs of about 44,000 consumers.

Table 3-26 Comparison of SWP Water Quality Criteria (2004) to SWP Actual Data (All values in µg/L unless otherwise noted)

Constituent	SWP Pumpback Criteria (Max)	SWP Water Quality Data (Sta. KA017226)(a)(b)			Current Drinking Water Standards (2006)
		Max.	Min.	Avg.	
Aluminum	527				50-200[2]
Antimony	5	1	1	1	6
Arsenic	4	3	1	2	10
Barium	680				2,000
Beryllium	1	1	1	1	4
Bromide	540	400	70	180	No standard
Cadmium	5				5
Chromium	110	3	1	1.8	100
Copper	280	3	1	1.9	1,300
Fluoride	550	<100	<100	<100	4,000
Iron	416	40	8	19	300[2]
Manganese	60	5	5	5	50[2]
Mercury	1				2
Nickel	4				No standard
Nitrate as N (mg/L)	9.6	1.5	0.31	0.78	10
Selenium	2	2	1	1.3	50
Silver	5				100[2]
Sulfate (mg/L)	99	72	20	38.2	250[2]
Total Organic Carbon (mg/L)	9.3	6.9	2.6	4.14	No standard
Zinc	210	5	5	5	5,000[2]
TDS (mg/L)	No criteria	368	124	232.9	500[2]
Specific Conductance (µS/cm)	No criteria	620	218	407.6	No standard
Chloride (mg/L)	No criteria	124	24	60.1 l	250[2]

Notes:

(2) a secondary standard.

(a) SWP Water Quality data collected by DWR between 2/01/05 and 2/01/06.

(b) SWP Water Quality data not shown was not sampled by DWR.

The 14 mgd Rosamond WTP was established to support the needs of consumers in southeastern Kern County, an area that includes Rosamond, Mojave, California City, Edwards AFB and Boron. Rosamond WTP is capable of providing water for 60,000 consumers.

The 4 mgd Acton WTP was completed in 1989. Water is pumped from the plant site near Barrell Springs Road, on Sierra Highway, to Vincent Hill Summit. From there it is pumped into a Los Angeles County Waterworks pipeline for transport to the Acton area. The plant's capacity is sufficient to supply the needs of 17,000 consumers. The treated water from these facilities is generally considered to be excellent quality.

3.2.3 Wastewater and Recycled Water Quality

Once the Palmdale and Lancaster WRPs, and the RCSD WWTP are upgraded, as outlined in the Antelope Valley Facilities Planning Report (LACWWD 40 2006), the tertiary treated effluent will be of sufficient quality to meet unrestricted use requirements. It may then be used for irrigating the landscapes of freeways, parks, schools, senior complexes and new home developments. The effluent will also meet all Waste Discharge Requirements (WDRs). Revised WDRs for the Lancaster WRP were issued in spring 2007 and are expected near the end of 2007 for the Palmdale WRP. For recharge of recycled water, blending or additional water quality requirements may be needed.

3.2.4 Local Surface Water and Stormwater Runoff Quality

Littlerock Reservoir, jointly owned by PWD and LCID, is the only developed surface water source in the Antelope Valley Region. This reservoir collects runoff from the San Gabriel Mountains, and has a storage capacity of 3,500 AF (PWD 2001). The reservoir discharges to Lake Palmdale and the water is ultimately treated by PWD's WTP. The quality of the water in Lake Palmdale is considered good.

Draft amendments to the Basin Plan dated August 2007 are currently under public review. These amendments include a specific ammonia objective for Amargosa Creek downstream of the LACSD 14 discharge point, and to the Piute Ponds and associated wetlands based on the USEPA 1999 freshwater criteria for total ammonia. This objective is pH and temperature dependent and shall not exceed the acute and chronic limits more than once every three years, on average. In addition, the highest four-day average concentration for total ammonia in a 30-day period can not exceed 2.5 times the chronic toxicity limit.

3.2.5 Regional Water Quality Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Antelope Valley Region with respect to water quality include the following, which are discussed in greater detail below:

- Concern for meeting water quality regulations for groundwater recharge;
- Closed basin with no outfall for discharge;
- Must provide wastewater treatment for growing population;
- Meeting evolving regulations; and
- Handling emerging contaminants.

3.2.5.1 Concern for Meeting Water Quality Regulations for Groundwater Recharge

There are a variety of source waters that could be available for recharge into the groundwater of the Antelope Valley Region. They include, but are not limited to:

State Water Project:

- Treated potable water or
- Untreated raw water direct from the California Aqueduct.

Reclaimed Water (for spreading only or blending):

- Secondary or
- Tertiary treated.

Additional water from outside of the basin (such as imported desalinated water) with water quality such that its use would not compromise the water quality within the basin.

The water quality of the recharged water depends on which supply is used. There are restrictions to the quality of the water recharged as outlined in the Lahontan Regional Water Quality Control Board (RWQCB) Basin Plan. Recharge source water would need to meet these requirements before recharge could occur. Additionally, requirements are stricter for water that is injected versus water that is infiltrated.

The current waiver prevents injection of water that has THM levels greater than 40 ppb. AVEK's current treatment process does not consistently produce water that meets this requirement. However, their planned conversion of disinfection facilities to the use of a combination of ozone and chloramines will achieve the THM levels required for injection. The conversion is currently underway. However, LACWWD 40 continues injection as long as the average THM levels are under 40 ppb for the injection cycle.

3.2.5.2 Closed Basin with No Outfall for Discharge

As described in Section 2, the Antelope Valley Groundwater Basin is a closed topographic basin with no outlet to the ocean. Therefore, any treated effluent (recycled water) generated in the Antelope Valley Region must be percolated, reused, evaporated, or transpired by plants. This places great responsibility on the wastewater treatment providers in the Antelope Valley Region to provide alternative effluent management methods while still being compliant with their WDRs.

3.2.5.3 Must Provide Wastewater Treatment for Growing Population

Population increases in the Antelope Valley Region will result in higher wastewater flow rates and the need to provide additional wastewater treatment and effluent management capacity. As mentioned above, the groundwater basin is a closed basin, so all treated effluent must be managed (e.g., reuse, evaporation, and percolation) and cannot simply be discharged to an ocean outlet. The ability to meet increased wastewater demands is a great concern.

The Lancaster WRP has a current design capacity of 16.0 mgd; it is projected that its wastewater flow rate will be

26.0 mgd in the year 2020 (LACSD 2004). As the volume of wastewater treated at the Lancaster WRP has increased, the effluent volume has exceeded the capacity of the Lancaster WRP's effluent management sites, which results in overflows onto Rosamond Dry Lake, located on Edwards AFB, for up to nine months of the year (LACSD 2004).

The Palmdale WRP is also planning for increased demand, since the current 15.0 mgd capacity of the WRP is projected to be reached by 2013 (LACSD 2005). The Palmdale WRP has a planned capacity of 22.4 mgd by 2025. In the past, Palmdale WRP handled its effluent in three ways: land application, agricultural irrigation above agronomic rates, and agricultural reuse (LACSD 2005). Revised WDRs for the Palmdale WRP in 2000 phased out land application and agricultural irrigation above agronomic rates as effluent management methods caused the WRP to provide for alternative effluent management methods in its 2025 Plan (LACSD 2005).

3.2.5.4 Meeting Evolving Regulations

In response to groundwater quality concerns, the RWQCB Lahontan Region is revising the WDRs for WRPs in the Antelope Valley Region. The ability to comply with these evolving regulations is expected to be both economically and technologically challenging.

3.2.5.5 Emerging Contaminants

Emerging contaminants of concern such as arsenic and nitrate will require water suppliers, WRPs, and WTPs to conduct routine monitoring and sampling of their systems and could impact their treatment methods. The ability to remove these emerging contaminants also has a positive economic impact on the agricultural community since it reduces the damage to crops. It also benefits the WRPs and WTPs striving for compliance with more stringent WDRs.

Additionally, the following AB 3030 elements relate to water quality management within the Antelope Valley Region. A discussion of how these elements are addressed in this IRWM Plan is provided below.

The Control of Saline Water Intrusion. Seawater intrusion is a natural process that occurs in nearly all coastal aquifers, and is a condition of salt water flowing in to freshwater aquifers. Seawater intrusion becomes a problem when excessive pumping of freshwater from an aquifer reduces the water pressure and draws seawater into new areas, degrading the water quality of those new areas. Since the Antelope Valley Region is not a coastal community, this AB 3030 plan element is not applicable. Furthermore, existing evidence suggests that the possibility of saline intrusion from other nearby aquifers is not likely because the basin is a closed basin.

Identification and Management of Wellhead Protection Areas and Recharge Areas. Identification and management of wellhead protection areas and recharge areas are important to both the quality of groundwater within the Antelope Valley Region, and for providing storage of available supplies in underground aquifers. Several groundwater recharge projects are being considered and evaluated as part of this IRWM Plan. The Antelope Valley State Water Contractors Association's (AVSWCA) "Study of Potential Recharge Areas in the Antelope Valley" (2002) evaluated, identified, and ranked potential recharge sites within the Antelope Valley Region. Additionally, AVEK is considering an agricultural in-lieu recharge program, and Lancaster, Palmdale, and PWD are all proposing recharge projects or feasibility studies as part of this IRWM Plan. Each of these projects is discussed in detail in Section 5, Water Management Strategies.

Identification of wellhead protection areas will also be examined in this IRWM Plan.

Regulation of the Migration of Contaminated Groundwater. Groundwater quality within the Antelope Valley Groundwater Basin is excellent within the principal aquifer but degrades toward the north. The main emerging contaminant of concern in the Antelope Valley Region is arsenic. LACWWD 40's Arsenic Mitigation Project, part of this IRWM Plan, is one project under design to mitigate recent arsenic contamination. Other projects proposed to address this management component include recycled water projects that call for the regulation of the discharge of treated effluent into the local groundwater basins.

Administration of a Well Abandonment and Well Destruction Program. The purpose of a well abandonment and well destruction program is to regulate such activities for water, agricultural, or other wells (i.e., industrial, monitoring, observation, etc.) so that groundwater in the Antelope Valley Region will not be contaminated or polluted, and water obtained from wells will be suitable for beneficial use and will not jeopardize the health, safety or welfare of the people of the Antelope Valley Region. Administration of such a program could, for example, come through issuance of a countywide well destruction ordinance. This groundwater management component is considered as a potential management action within Section 6.

Identification of Well Construction Policies. Similar to the program purpose discussed above, a well construction

policy is intended to regulate the construction, reconstruction, or modification of water, agricultural, or other wells (i.e., industrial, monitoring, observation, etc.) so that groundwater in the Antelope Valley Region will not be contaminated or polluted, and water obtained from wells will be suitable for beneficial use and will not jeopardize the health, safety or welfare of the people of the Antelope Valley Region. Administration of such a policy could, for example, come through issuance of a countywide well construction ordinance. This groundwater management component is considered as a potential management action within Section 6.

Construction and Operation by Local Agency of Groundwater Contamination Cleanup, Recharge, Storage, Conservation, Water Recycling, and Extraction Projects. This IRWM Plan includes an assessment of potential groundwater contamination clean-up (i.e., Arsenic Mitigation Project), recharge, storage, conservation, and expansion of existing water recycling projects. The potential projects are discussed in Section 5, "Water Management Strategies."

3.3 FLOOD MANAGEMENT ASSESSMENT

The Antelope Valley Groundwater Basin is a closed basin without a natural outlet for storm runoff (LADPW 1987). Numerous streams originating in the mountains surrounding the Antelope Valley Region carry highly erodible soils onto the Antelope Valley Region floor, forming large alluvial river washes. Streams then meander across the alluvial fans in ill-defined paths subject to change. Precipitation ranges on average less than 10 inches per year on the Antelope Valley Region floor, to more than 12 inches in the surrounding mountains (Rantz, 1969 as cited in USGS 1995). Portions of the Antelope Valley Region floor are subject to flooding due to uncontrolled runoff from these nearby foothills (City of Lancaster 1997), and this situation is aggravated by lack of proper drainage facilities and defined flood channels in the Antelope Valley Region. Heavy discharge and flooding is also prevalent along Big Rock Creek, Little Rock Creek, Amargosa Creek, and Anaverde Creek. Heavy rainfall and summer thunderstorms increase the potential for flash floods.

Stormwater runoff that does not percolate into the ground eventually ponds and evaporates in the impermeable dry lake beds at Edwards AFB near the Los Angeles/Kern County line (LADPW 1987). This 60 square mile playa is generally

Portions of the Antelope Valley are subject to heavy flooding due to uncontrolled runoff from nearby foothills and lack proper drainage facilities.

The lack of coordinated flood control is problematic in the Antelope Valley Region.

dry but is likely to be flooded following prolonged precipitation. Fine sediments carried by the stormwater inhibit percolation as does the impermeable nature of the playa soils (LADPW 1987). Surface water can remain on the playa for up to five months, until the water evaporates (LADPW 2006).

Examples of existing flood control facilities include the engineered channels and retention basins on Amargosa Creek. Storms of a 20-year frequency or greater can, however, overflow these facilities (LACSD 2005). There is also a flood retention basin along Anaverde Creek; when this basin is overtopped flooding occurs in the vicinity of 20th Street East, 30th Street East, and Amargosa Creek.

Following severe flooding in the Antelope Valley Region in 1980, 1983, and 1987, the LADPW prepared the "Antelope Valley Comprehensive Plan of Flood Control and Water Conservation." This plan proposed flood plain management in the hillside areas, structural improvements in the urbanizing areas, and non-structural management approaches in the rural areas. In the hillside areas the plan recommended restricting development to areas outside of entrenched watercourses. In the Antelope Valley Region area, much of which is flood-prone, the plan recommended improvements such as open channel conveyance facilities and storm drains through communities, as well as detention and retention basins located at the mouths of the large canyons (LADPW 1987). Both the City of Palmdale and the City of Lancaster have incorporated major elements of the Los Angeles County "Comprehensive Plan of Flood Control and Water Conservation" into their own planning efforts. However, there are no identified funding mechanisms or schedule for major improvements except in the established areas of Palmdale, Lancaster, and along Amargosa Creek (City of Lancaster 1997, LADPW 2004). Cities have annexed portions of Los Angeles County, and this, coupled with a gradual decrease in housing construction since the early 1990s has limited County revenue from developer fees necessary to fund the construction of facilities in the unincorporated areas of Antelope Valley Region.

In 1991, LADPW teamed with the cities and unincorporated communities on a ballot measure whereby the entire Antelope Valley Region would be included within the Los Angeles County Flood Control District or a new Antelope Valley Flood Control District would be formed (LADPW 2004). That measure failed, as did a similar measure in Kern County, and new measures proposed regionally in 2006. The lack of coordinated flood control is problematic and will worsen as urban development and associated impervious surfaces increase the potential amount of runoff and local flooding.

3.3.1 Regional Flood Management Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Antelope Valley Region with respect to flood management include the following, which are discussed in greater detail below:

- Lack of coordination throughout Antelope Valley Region;
- Poor water quality of runoff;
- Nuisance water and dry weather runoff;
- Difficulty providing flood control without interfering with groundwater recharge; and,
- Desire of Edwards AFB to receive sediments into the dry lakes to maintain operations area.

3.3.1.1 Flood Management Efforts are not Well Coordinated throughout Antelope Valley Region

Flood management efforts are currently performed by local jurisdictions within their particular area (e.g., City of Palmdale undertakes flood control within its boundaries), but there is not a regional entity that coordinates flood control for the entire Antelope Valley Region. In the past, Los Angeles County prepared a regional plan for flood control, but its implementation has been hindered by a lack of funds. Ballot measures that would result in the creation of regional flood control districts have failed in the Antelope Valley Region.

3.3.1.2 Poor Water Quality of Runoff

Stormwater flow from the mountain areas to the Antelope Valley Region traverse highly erodible soils, which results in significant transport of sediments. On the Antelope

Valley Region floor natural drainage channels are poorly defined and runoff is almost entirely sheet flow. This sheet flow intermixes with the urban environment and picks up contaminants (pesticides, plastics, oil, gasoline, radiator fluid, and animal wastes). The end result is that toxic pollutants are found in stormwater runoff including lead, zinc, copper, arsenic, chromium, cadmium, nickel, cyanide, and asbestos (Lahontan RWQCB 1994). In mountainous areas, runoff containing salt and other de-icing chemicals used on roads and parking lots during the winter is of concern. Stormwater quality also varies with time. During dry periods pollutants accumulate on pavement and then are flushed into surface waters in high concentrations by the first significant rainstorm. Runoff from later storms may have lower pollutant concentrations. Desert flash floods and summer thunderstorms can result in high pollutant loads in stormwater.

Runoff from urban areas is increasing as the Antelope Valley Region develops. The heavy sediment content and urban runoff contaminants make this storm water flow undesirable for many uses. Poorly planned urban development further upsets the natural interactions within a watershed and degrades water quality through the following types of primary impacts: direct impacts, such as filling and excavation of wetlands, riparian areas, drainages, and other waters; generation of pollutants during and after construction; alteration of flow regimes and groundwater recharge by impervious surfaces and stormwater collector systems; and disruption of watershed-level aquatic functions, including pollutant removal, flood water retention, and habitat connectivity. These impacts typically degrade water quality, increase peak flows and flooding, and destabilize stream channels, resulting in engineered solutions to the disrupted flow patterns, and ultimately, near-total loss of natural functions and values in the affected basins. Impacts must be minimized through municipal stormwater programs that require use of Best Management Practices (BMPs) and conditions to be placed on new development proposals.

3.3.1.3 Nuisance Water and Dry Weather Runoff

Stagnant or nuisance water is standing water that ponds and fails to infiltrate even after prolonged periods. In the Antelope Valley Region there are several areas with impervious soils (including the dry lakes at Edwards AFB) and perched clay layers prone to supporting nuisance water.

Dry-weather runoff is defined as urban runoff water that enters the drainage system due to human activities (e.g., car washing, lawn irrigation). Dry-weather runoff can also result from illicit connections to the storm water or sewer systems. Dry-weather runoff concentrates contaminants in urban runoff and can negatively affect the water quality of receiving waters (e.g., groundwater).

3.3.1.4 Difficulty in Providing Flood Management without Interfering with Groundwater Recharge

The Antelope Valley Region is underlain by groundwater, which is a major source of water supply in the area. An aggressive flood management program could slow, limit, or direct groundwater recharge to unfavorable areas. In addition, groundwater recharge focused on recharge of stormwater flows could introduce urban runoff contaminants into the groundwater aquifer. Ideally, excess stormwater could be properly treated and directed to areas that allow recharge of groundwater.

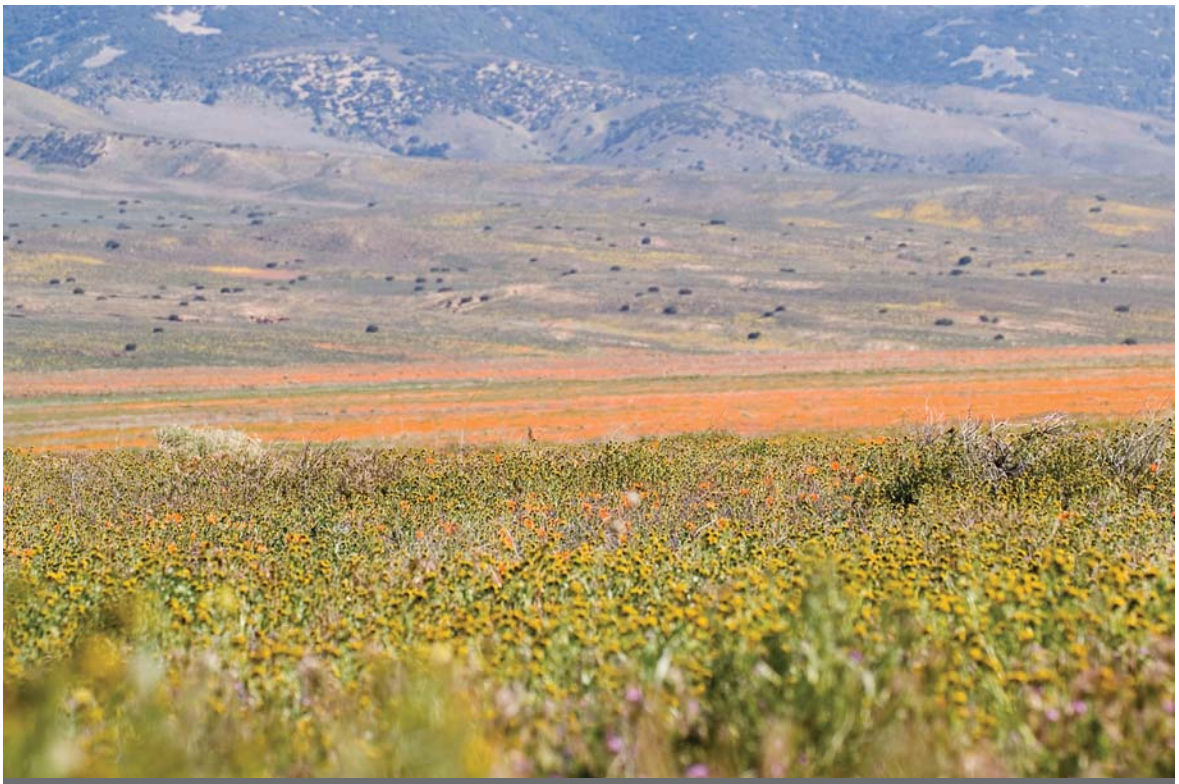
3.3.1.5 Desire of Edwards AFB to Receive Sediments into the Dry Lakes to Maintain Operations Area

Sediment carried by storm flows on Little Rock and Big Rock creeks eventually end up in the dry lake beds at Edwards AFB. Edwards AFB has established runways on these lake beds. Flood waters and the resulting siltation act to "resurface" and naturally restore the elevation of the dry lake beds. It is a challenge to design storm flow facilities that will both control flood flows while maintaining sedimentation at the dry lakes. In 1983, stormwater flows were too great and took the runways out of operation (LADPW 1987).

3.4 ENVIRONMENTAL RESOURCE MANAGEMENT ASSESSMENT

The Antelope Valley Region is part of a subbasin within the Mohave Desert. The climate and physical environment is typical of the high desert with the exception of the southern edge of the Antelope Valley Region which includes a cooler upland area. The area has many unique environmental features and several plant and animal species are endemic to this desert area.

General Habitat Types. The Antelope Valley Region is generally flat and sparsely vegetated, but is interspersed with buttes, mountain ranges, and dry lakes (Bureau of Land Management [BLM] 2005). Rogers Lake is the largest and flattest playa in the world (BLM 2005). Freezing temperatures are limited to a few winter days but in the summer temperatures often exceed 100 degrees



The area has many unique environmental features and several plant and animal species are endemic to this desert area.

Fahrenheit. The Antelope Valley Region is characterized by creosote bush and saltbush plant communities which make up approximately 75 percent of the natural lands in the Western Mojave Desert. A small percentage of natural lands in the area can be characterized as Mojave mixed woody scrub community. A very small percentage of the Antelope Valley Region could be characterized as freshwater or alkali wetlands (BLM 2005). A comprehensive delineation of wetlands in the Antelope Valley Region has not been conducted. However, the Antelope Valley Region is home to numerous desert washes (Little Rock Creek, Big Rock Creek), as well as man-made lakes (Little Rock Creek Reservoir, Lake Palmdale), sag ponds (an enclosed depression formed where active or recent fault movement results in impounded drainage), and areas of rising groundwater. Freshwater marsh and alkaline meadow habitat is found in the vicinity of Piute Ponds. While wetland and riparian areas are limited in the Antelope Valley Region, these areas are important resources to birds migrating along the Pacific Flyway (LACSD 2004).

The unique habitat of Antelope Valley Region means the Antelope Valley Region is also home to several special status species, including plants, reptiles, birds, and mammals. Several regulatory protections and practices for these special status species are in place in the Antelope Valley Region, such as Significant Ecological Area (SEA) designations by Los Angeles County, Desert Wildlife Management Area (DWMA) designations by U.S. Fish and Wildlife Service (USFWS), and development of a Habitat Conservation Plan (HCP) by the (BLM).

Significant Ecological Areas. SEAs are defined by Los Angeles County and generally encompass ecologically important or fragile areas that are valuable as plant or animal communities and often important to the preservation of threatened or endangered species. Preservation of biological diversity is the main objective of the SEA designation. SEAs are neither preserves nor conservation areas, but areas where Los Angeles County requires development to be designed around the existing biological resources (Los Angeles County 2006). Design criteria in SEAs include maintaining watercourses and wildlife corridors in a natural state, set-asides of undisturbed areas, and retaining natural vegetation and open space (Los Angeles County 1986).

Significant Ecological Areas in the Antelope Valley Region include:

- **Edwards AFB (SEA No. 47).** This area contains botanical features unique and limited in distribution, including the Mojave spineflower and the only healthy stands of mesquite in Los Angeles County (Los Angeles County 1986). The Edwards AFB SEA also has an alkali sink community, a plant community adapted to salty soils (Los Angeles County 1986).

- **Big Rock Wash (SEA No. 48) and Little Rock Wash (SEA No. 49).** These areas have been designated as SEAs because desert washes act as wildlife movement corridors, possess a greater diversity than surrounding areas, and are important to the stability of the desert ecosystem. Little Rock wash is the largest wash habitat in Los Angeles County. Scrub habitats and desert riparian plant communities are found within these wash areas. The comparatively dense plant growth found in Big Rock Wash and Little Rock Wash provides nesting habitat for many bird species. The wash banks provide habitat for burrowing mammal species (Los Angeles County 1986).
- **Rosamond Lake (SEA No. 50).** Rosamond Lake is home to both shadescale scrub communities and the Great Basin kangaroo rat; both species are rare in southern California. Rosamond Lake also supports an alkali sink biotic community. The Piute Ponds, which are within this SEA, provide over 300 acres of wetlands and act as important wintering grounds for waterfowl and open water for birds traveling along the Pacific Flyway (Los Angeles County 1986, LACSD 2004).
- **Saddleback Butte State Park (SEA No. 51), Alpine Butte (SEA No. 52), Lovejoy Butte (SEA No. 53), and Piute Butte (SEA No. 54).** Desert butte habitat has increased biological diversity relative to surrounding areas. The steep slopes of buttes act as refuges for many biological resources. Desert buttes provide roosting and nesting areas for birds, as well as den sites for mammals. The butte SEAs include desert wildflower habitat and Joshua tree woodland areas. Saddleback Butte has a desert wash area. The Mojave ground squirrel (listed as "Threatened" under the California Endangered Species Act and "Special Concern" by the federal Endangered Species Act) is known to exist at Saddleback Butte State Park, and suitable habitat for the species is also found at Alpine Butte, Lovejoy Butte, and Piute SEAs.
- **Desert-Montane Transect (SEA No. 55).** The Desert-Montane transect is representative of the transition between the Mojave Desert and the northern slopes of the San Gabriel Mountains. The combination of desert and montane habitats makes this one of the most diverse areas in the County. Beside creosote bush scrub, sagebrush scrub, and Joshua tree woodland found in the desert floor, this area also includes pinyon-juniper woodland, desert chaparral, and mixed conifer forest habitat. While some of these are considered common habitats, the area is valuable because this SEA is the only site where these communities are found in an uninterrupted band (Los Angeles County 1986).
- **Fairmont and Antelope Buttes (SEA No. 57).** These buttes have benefits similar to those described above. However, as these are the westernmost buttes in the Antelope Valley Region, they have a different species composition than other buttes in the Antelope Valley Region (Los Angeles County 1986).

In addition to the existing SEAs, Los Angeles County has proposed an Antelope Valley Region SEA. This proposed SEA would encompass or consolidate many of the existing SEAs in the Antelope Valley Region and as proposed extends from the area south of Palmdale to the area north of Edwards AFB (LACSD 2004).

Ritter Ridge and Portal Ridge/Liebre Mountain SEAs are also described in the Antelope Valley Region Areawide Plan. However, they reside in the Sierra Pelona foothills, which is outside of this IRWM Plan boundary.

West Mojave Plan. The West Mojave Plan is an HCP developed by the BLM with collaboration from multiple other jurisdictions and agencies, including the City of Palmdale, City of Lancaster, Los Angeles County, the California Department of Fish and Game, and the US Fish and Wildlife Service (USFWS). The West Mojave Plan also acts to amend the California Desert Conservation Area Plan. The Planning Area for the West Mohave HCP includes the entire Antelope Valley Region. The objective of the West Mojave HCP is to develop a comprehensive strategy to preserve and protect the desert tortoise, the Mohave ground squirrel, and over 100 other sensitive plants, animals and habitats. The West Mohave HCP would establish additional conservation areas for the desert tortoise and Mohave ground squirrel and alter allowable motorized vehicle routes on BLM managed lands. Jurisdictions that have adopted the West Mojave HCP must follow the selected conservation strategies, but benefit from a streamlined process when permitting activities that may affect endangered species covered by the plan (BLM 2005).

Open Space Areas. The open space and rural character of the Antelope Valley Region is treasured by many of its residents. During a poll conducted as part of its General Plan Update, the City of Lancaster found that "open space," "views," and "desert environment" were commonly cited as key to the area's quality (City of Lancaster 2006). Typical population densities in southern California suburban areas generally range from roughly 2,500 persons per square mile and increase to more than 7,500 persons per square mile in urbanized areas. By comparison, the high desert area (Mohave Desert in general) only averages about 680 persons per square mile (BLM 2005). The Census Bureau utilizes a minimum threshold of 1,000 persons per square mile to denote an urbanized setting. The Antelope Valley Region is characteristic of a large rural environment.

3.4.1 Important Ecological Processes

The ecological integrity of the Antelope Valley Region includes a critical range of variability in its overall biodiversity, important ecological processes and structures, regional and historical context, and sustainable cultural practices. The ability to maintain biodiversity and ecosystem health while accommodating new growth is a challenge in the Antelope Valley Region, which is home to a variety of unique and sensitive species endemic to the area. An overriding consideration becoming more prevalent with the implementation of the West Mojave Plan is the promotion of ecosystem processes that sustain a healthy desert ecosystem. Knowledge to support management decisions will require improved understanding of desert ecology.

We need to understand processes that change ecosystem dynamics because they are the most effective tools available to land managers who are asked to maintain or restore the health of the natural environment. Important ecological processes in the Antelope Valley Region include competition (for nutrients, water, and light), fire, animal damage, nutrient cycling, carbon accumulation and release, and ecological genetics.

Understanding genetic structure is basic knowledge for implementing biologically sound programs dealing with breeding, restoration, or conservation biology, all of which is at the basis of the West Mojave Plan for endangered species in the Region (e.g., desert tortoise and Mohave ground squirrel). Genetic structure also determines responses to changing conditions regardless of whether change is induced by management, lack of management, fluctuating climatic gradients, or global warming.

3.4.2 Regional Environmental Resource Issues, Needs, Challenges, and Priorities

The following is a list of the key issues, needs, challenges, and priorities for environmental management within the Antelope Valley Region, as determined by the stakeholders:

- Conflict between industry, growth, and preserving open space;
- Desire to preserve open space;
- Protecting endangered species (desert tortoise, Mojave ground squirrel, burrowing owl); and
- Removing invasive non-native species from sensitive ecosystems.

3.4.2.1 Conflict between Industry, Growth and Open Space/Desire to Preserve Open Space

As described earlier, because of its proximity to the Los Angeles Area, the Antelope Valley Region is subject to increasing demand for community development, recreation, and resource utilization. As described in Section 2.6, population in the Antelope Valley Region is expected to increase by 121 percent between 2005 and year 2020. Some of this growth will result in conversion of agricultural land but some of this growth will occur in areas that are currently natural areas. Loss of both agricultural acreage and natural areas decreases the amount of open space in the Antelope Valley Region.

3.4.2.2 Threatened and Endangered Species

Pressures for growth and recreational activities in the Antelope Valley Region have been linked to significant declines in desert species. Growth of urban areas results in loss of available or suitable habitat for sensitive species. Studies of the desert tortoise have shown a significant downward decline in the population from 1975 to 2000 (USFWS 2006). Besides loss of habitat, proximity to human development can be harmful to sensitive species. Human development introduces roadway traffic, pesticides, urban runoff, and non-native species, which degrade habitat and food sources for sensitive species. Land use practices, such as cattle and sheep grazing and mining are also considered harmful to many species. Recreational uses, such as off-highway vehicle use are known to conflict with sensitive species habitat. For example, a vehicle traveling over a tortoise burrow could cause a desert tortoise to be trapped inside the burrow or make the burrow unusable when they are needed to escape predation or extreme weather conditions (USFWS 2006). In recreational areas sensitive wildlife may seek shelter in the shade of vehicles and be crushed when those vehicles are subsequently moved. Improper disposal of food wastes and trash by recreational users often attracts predators of the sensitive species, such as common ravens. Dogs brought onto public lands by recreational visitors can also disturb, injure, or kill sensitive species.

3.4.2.3 Non-native Species

Non-native species (such as arundo and tamarisk) are listed as 'A-1' invaders (the most invasive and widespread wildland pest plants) by the California Invasive Plant Council and as noxious weeds by the California Department of Food and Agriculture (CDFA). While the degree and specifics of problems associated with these species vary, general nega-

tive effects associated with the establishment of tamarisk within the Antelope Valley Region include the following:

- **Water Quality:** Reduction in the shading of surface water, thereby resulting in reduction of bank-edge river habitats, higher water temperature, lower dissolved-oxygen content, elevated pH, and conversion of ammonia to toxic unionized ammonia. Tamarisk also increases salinity by depositing its highsalt leaves.
- **Water Supply:** Loss of surface and groundwater through heavy consumption and rapid transpiration.
- **Flooding:** Obstruction of flood flows with associated damage to public facilities, including bridges and culverts, and to private property, such as farmland.
- **Erosion:** Increased erosion of streambanks, associated damage to habitats and farmlands due to channel obstructions, and decreased bank stability associated with shallow-rooted arundo.
- **Fire Hazards:** Substantially increased danger of wildfire occurrences, intensity, and frequency, and a decrease in the value that riparian areas provide as firebreaks or buffers when infested with arundo.
- **Native Habitats:** Displacement of critical riparian habitat through monopolization of soil moisture by dense monocultures of arundo and tamarisk.
- **Native Wildlife:** Reduction in diversity and abundance of riparian-dependent wildlife due to decreased habitat quality, loss of food and cover, and increased water temperatures.
- **Threatened and Endangered Species:** Substantial reductions in suitable habitat available for state and federally listed species such as the least Bell's vireo.

> *"[The Integrated Regional Water Management Plan] will be that final mechanism necessary for us to take action and actually show progress to our community…"*
>
> – Adam Ariki,
> Los Angeles Waterworks District No. 40

In particular, tamarisk is a growing concern in the area near Piute Ponds.

3.5 LAND USE MANAGEMENT ASSESSMENT

Cities and counties (for unincorporated areas) are the regulatory agencies responsible for land use planning within the State of California. Land use regulations and policies such as general plans, zoning ordinances, California Environmental Quality Act (CEQA) compliance, and permit conditions can be valuable policy and implementation tools for effective water management. The California Government Code establishes requirements for the development of General Plans to guide land use decisions, of which water resources play an important role. Water resources is typically not an 'element' of a General Plan, but is discussed within the context of the General Plans required 'elements'; land use, circulation, housing, conservation, open space, noise, and safety.

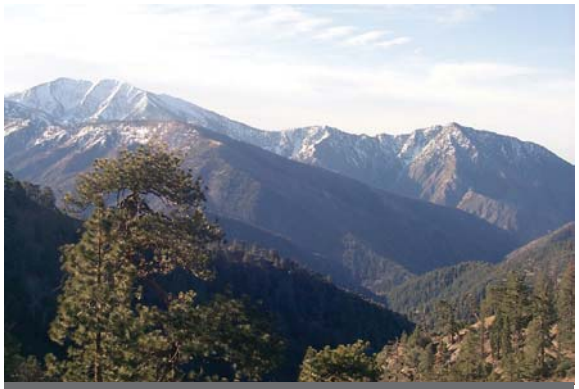
Land uses within the Antelope Valley Region are provided for in local and regional policies and regulations, including the Los Angeles County General Plan (adopted in 1980), the Antelope Valley Areawide General Plan (adopted December 1986), Kern County General Plan (approved June 2004), the City of Palmdale General Plan (last updated 1993) and the City of Lancaster General Plan (last updated 1997). The Los Angeles County General Plan has not been comprehensively updated since its adoption in 1980; the County is currently involved in a multi-year planning effort to update its General Plan.

Recent legislation has also addressed the gap between land use planning and water resource management. In 2001, two water supply planning bills, Senate Bill 610 (SB 610) and Senate Bill 221 (SB 221), were enacted that require greater coordination and more extensive data to be shared between water suppliers and local land use agencies for large development projects and plans. SB 610, codified as Water Code sections 10910 and 10911, requires the public water system that may supply water to a proposed residential development project of more than 500 dwelling units (or a development project with similar water use), to prepare a water supply assessment for use by the lead planning agency in its compliance with the CEQA. Such a water supply assessment (WSA) is performed in conjunction with the land use approval process associated with the project and must include an evaluation of the sufficiency of the water supplies available to the water supplier to meet existing and anticipated future demands. SB 221 requires projects which include tentative tract maps for over 500 dwelling units to obtain verification from the water system operator that will supply the project with water, that it has a sufficient water supply to serve the proposed project and all other existing and planned future uses, including agricultural and industrial uses, in its area over a 20-year period, even in multiple dry years. SB 221 is intended as a "fail safe" mechanism to ensure that collaboration on finding the needed water supplies to serve a new large subdivision occurs before construction begins.

As growth in the Antelope Valley Region is rapidly increasing, and larger development projects are being proposed, the preparation of WSAs or written verifications pursuant to these Bills is becoming increasingly more common, forcing water purveyors in the area to question their ability to provide service to these developments. If water supplies are deemed not available, developers in the Antelope Valley Region will be required to find water outside the Antelope Valley Region in sufficient quantities to serve their projects.

3.5.1 Recreation

The Antelope Valley Region offers many recreational opportunities. The Antelope Valley Region has over 410 acres of developed park land including 21 parks, 18 lighted softball fields, two baseball fields, 15 soccer fields and 17 tennis courts. In addition there are over 3,000 acres of natural park land. Antelope Valley Region is also home to the 1,700 acre California Poppy Reserve and the Arthur B. Ripley Desert Woodland State Park. A portion of the Sierra Highway between Avenue H and the Kern County line is designated as a bikeway in the Antelope Valley Areawide Plan. Many recreational activities take place in the eastern, less populated areas of the Antelope Valley Region. BLM has identified the following types of recreational activities in the high desert: motorcycle activities, four wheel drive exploring, sight seeing, target shooting, hunting, experimental vehicles/aircraft, model rocketry, dry land wind sailing, endurance equestrian rides, hiking, mountain biking, bird watching, botany, rockhounding, camping, and picnicking.



The Tehachapi Mountains provide a scenic northern border in the Antelope Region.

3.5.2 Regional Land Use Issues, Needs, Challenges, and Priorities

The key issues, needs, challenges, and priorities for the Antelope Valley Region with respect to land use management include the following, which are discussed in greater detail below:

- Growing public demand for recreational opportunities;
- Tremendous pressure for growth in the Antelope Valley Region; and
- Loss of local culture and values.

3.5.2.1 Growing Public Demand for Recreational Opportunities

The Antelope Valley Region is located only 90 miles from downtown Los Angeles; the proximity allows residents to utilize the Antelope Valley Region as their "recreational backyard." The high desert Antelope Valley Region has attracted nearly 2 million visitor-trips a year for off-highway vehicle recreation and nearly 1.5 million visitors to State and National Parks in the area (BLM 2005). BLM estimates that 85 percent of recreational visitors to the high desert are from the urban areas of Southern California. Demand for recreational resources in the Antelope Valley Region is particularly acute due to the lack of other similar resources near these urban areas and due to a decrease in recreational opportunities elsewhere. For example, since 1980 the number of acres of off-highway vehicle recreation areas has decreased by 48 percent in California. In the same time period off-highway vehicle registrations in California increased by 108 percent (BLM 2005). As population increases in Southern California and the Antelope Valley Region, there will be increasing pressure to maintain and expand the Antelope Valley Region's recreational opportunities.

3.5.2.2 Tremendous Pressure for Growth in the Antelope Valley Region

Historically, land uses within the Antelope Valley Region have focused primarily on agriculture. This is partly dependent on the types of soils found in the area, the majority of which have been classified by the U.S. Soil Conservation Service as prime soils, which are best for agricultural production. Coupled with lower water costs and favorable climactic conditions, productivity has been maintained throughout the years, although pressures for developable land have also increased (Los Angeles County 1993). Approximately 73,000 acres of land in the Antelope Valley Region was in agricultural production in the early 1950s (USGS 1995). There was a surge in irrigated acreage when AVEK introduced SWP water to the western Antelope Valley Region in 1972 at prices competitive with the costs of pumping ground water (LADPW 1989). However, the overall trend for agricultural land use continued to decrease through the 1980s and 1990s. DWR predicts that agricultural land use will continue to decrease to approximately 900 acres in 2020 (DWR as cited in USGS 1995). This prediction does not however, account for the approximately 5,500 acres for carrot production that was developed in the Antelope Valley Region between 1995 and 2000. During the late 1980s, carrot farmers in the San Joaquin Valley undertook marketing efforts to assess the acceptability of a potential new product, "baby carrots," to the public. Response was so positive that within only a few years, an entirely new market was created. Demand for these new, smaller carrots was so high, and they were so profitable, that farmers expanded into the Antelope Valley Region and other desert regions in search of additional planting acreage. The profit margin of this crop is such that cost of water is not a limiting factor for carrot farmers.

Currently, land uses within the Antelope Valley Region are in transition as the predominant land use is shifting from agriculture, to residential and industrial. The increase in residential land use is evident from the population growth in the Antelope Valley Region. As presented in Section 2.5, growth in the Antelope Valley Region was slow until 1985, but increased rapidly (approximately 1,000 percent of the average growth rate between the years 1956 to 1985) as these land uses shifted. Population projections for the Antelope Valley Region indicate that approximately 1.26 million people will reside in the Antelope Valley Region by the year 2035, an increase of approximately 149 percent from the 2005 population (refer to Section 2.6.2 for population projections analysis). The two most populous cities in the Valley Region are Lancaster and Palmdale. As residential development continues to grow within the middle of the Antelope Valley Region, the agricultural operations are now found farther to the west and east than in previous decades.

The large migration of people to the Antelope Valley Region is primarily based on economics. With significantly lower home prices than in other portions of Los Angeles County, the Antelope Valley Region has become an attractive and affordable alternative to living in the congested and expensive Los Angeles area. Additionally, it was recognized that the Antelope Valley Region is the last large available open space "opportunity" for development, including residential, commercial/industrial, retail, and agricultural. According to the Antelope Valley Building Industry Association (BIA) (2006), the Antelope Valley Region is expected to continue to grow in population and

sustained "residential growth is necessary for a strong, vibrant economy" (BIA 2006).

3.5.2.3 Local Culture and Values Could be Lost

The Stakeholders of this IRWM Plan have expressed concerns about the changing land use trends in the Antelope Valley Region, and feel that with the tremendous pressure for growth in the Antelope Valley Region, local culture and values could ultimately be lost.

Currently, industrial land use in the Antelope Valley Region consists primarily of manufacturing for the aerospace industry and mining. Edwards AFB and the U.S. Air Force Flight Production Center (Plant 42) provide a strong aviation and military presence in the Antelope Valley Region. Reductions or realignments in the defense industry could adversely affect this presence. Mining operations also contribute to the Antelope Valley Region's industrial land uses. However, gold is no longer mined at Tropico in the Rosamond Hills, and the mining area is now operated as a tourist attraction. Borax is actively mined near Kramer. Rock and gravel quarrying is conducted in the southeastern part of the Antelope Valley Region along the mountain front. Clay used for drilling mud formerly was mined from Rosamond and Rogers Dry Lakes.

Land use shifts increase the demand for water supply and higher quality water, thereby increasing the competition for available water supplies. This change in land use and increase in supply competition affects the dependence on imported SWP and groundwater supply, affects fluctuations in groundwater levels, and heightens concerns over the potential for contamination and reliability of these sources. The ability to continue to meet the water demands of the Antelope Valley Region, while not losing focus of the local culture and values, will be a challenge for the Antelope Valley Region.

Increasing development pressures in the 1980s were in part driven by the continuing appeal of the Antelope Valley Region's high desert climate, land values lower than those in the Los Angeles metropolitan area. As the Los Angeles population rapidly expanded into the Antelope Valley Region, bringing with it the desire for more cultural amenities and new skills and resources, the Antelope Valley Region became more metropolitan in character. The increase in population and development of tract housing, retail centers and business parks has altered the formerly low density, rural and agrarian character of many local communities.

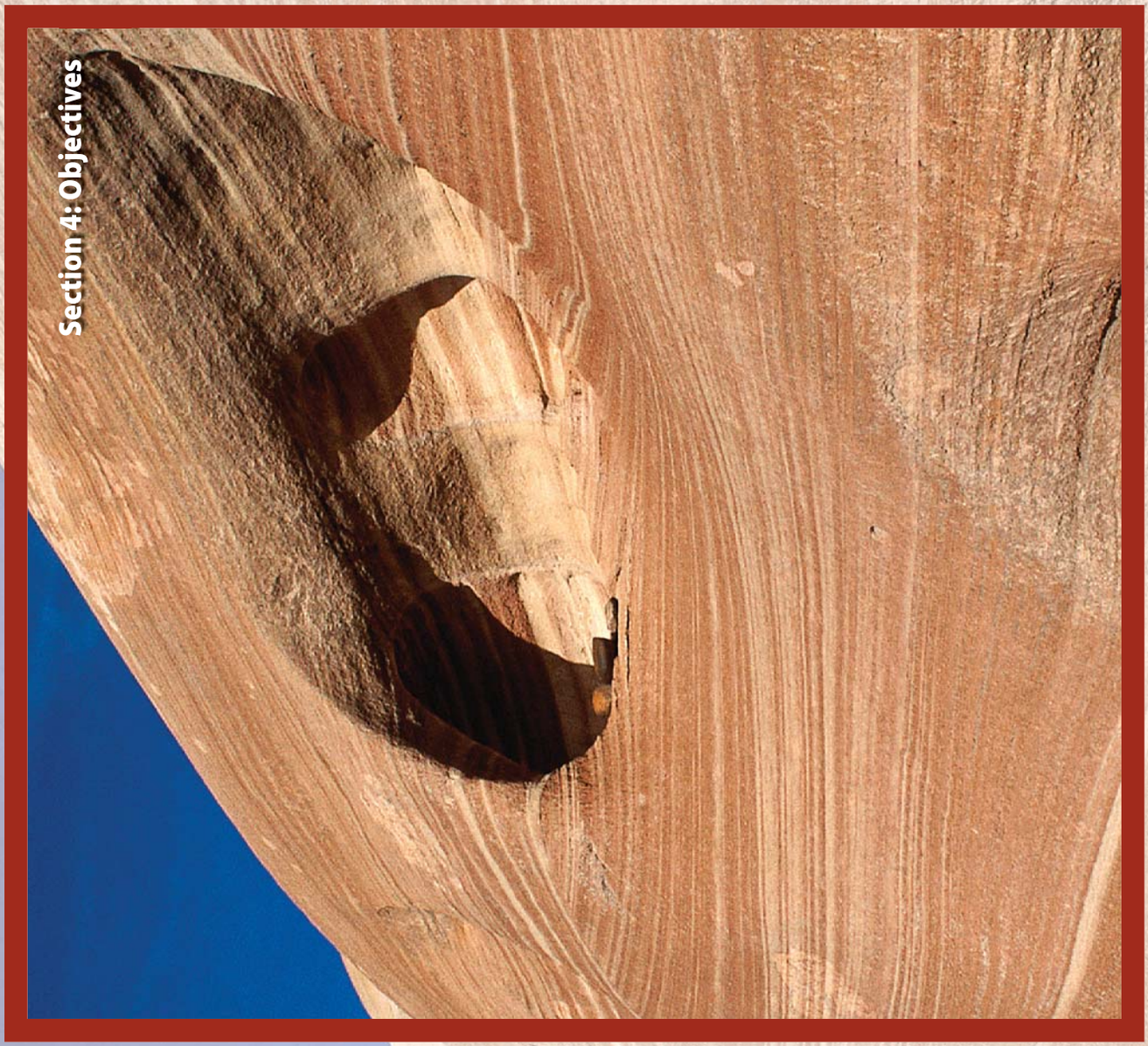
Today, competing demands are placed on limited available resources. Many of these competing demands stem from the range of local cultural values that characterize the Antelope Valley Region. Decisions regarding future land use and the dedication of water resources will need to weigh varying agricultural, metropolitan, and industrial needs as they continue to develop and as the balance between these interests continues to change.

Stakeholders commonly expressed the need to develop a balance of resources, while preserving the area's natural environment and rural history. Despite the need to ensure economic vitality and longevity by bringing new industry and employment opportunities to the Antelope Valley Region, residents of the Antelope Valley Region believe preserving a hometown feel and developing a strong sense of neighborhood stability are critical to strengthening the identity of the community and, in turn, that of the Antelope Valley Region. The preservation of existing natural open space, achieved in part through a development strategy focused on infill and parcel redevelopment combined with environmental conservation, are key components of preserving the Antelope Valley Region's rural character and strengthening the health, vitality and security of growing urban areas.

Additionally, the following AB 3030 elements also concern land use planning within the Antelope Valley Region. A discussion of how these elements are addressed in this IRWM Plan is provided below.

Development of Relationships with State and Federal Regulatory Agencies. As discussed in Section 1.2.1, several State regulatory agencies have participated in the development of this IRWM Plan and thus a relationship with these agencies has been established.

Review of Land Use Plans and Coordination with Land Use Planning Agencies to Assess Activities which Create a Reasonable Risk of Groundwater Contamination. As discussed in Section 1.2.1, several land use planning departments and agencies have participated in the development of this IRWM Plan and thus a level of coordination has been established. Additionally, as part of this IRWM Plan, projects selected for implementation are assessed for water quality and land-use impacts and integration, as well as for consistency with local and regional General Plan documents.



Section 4: Objectives

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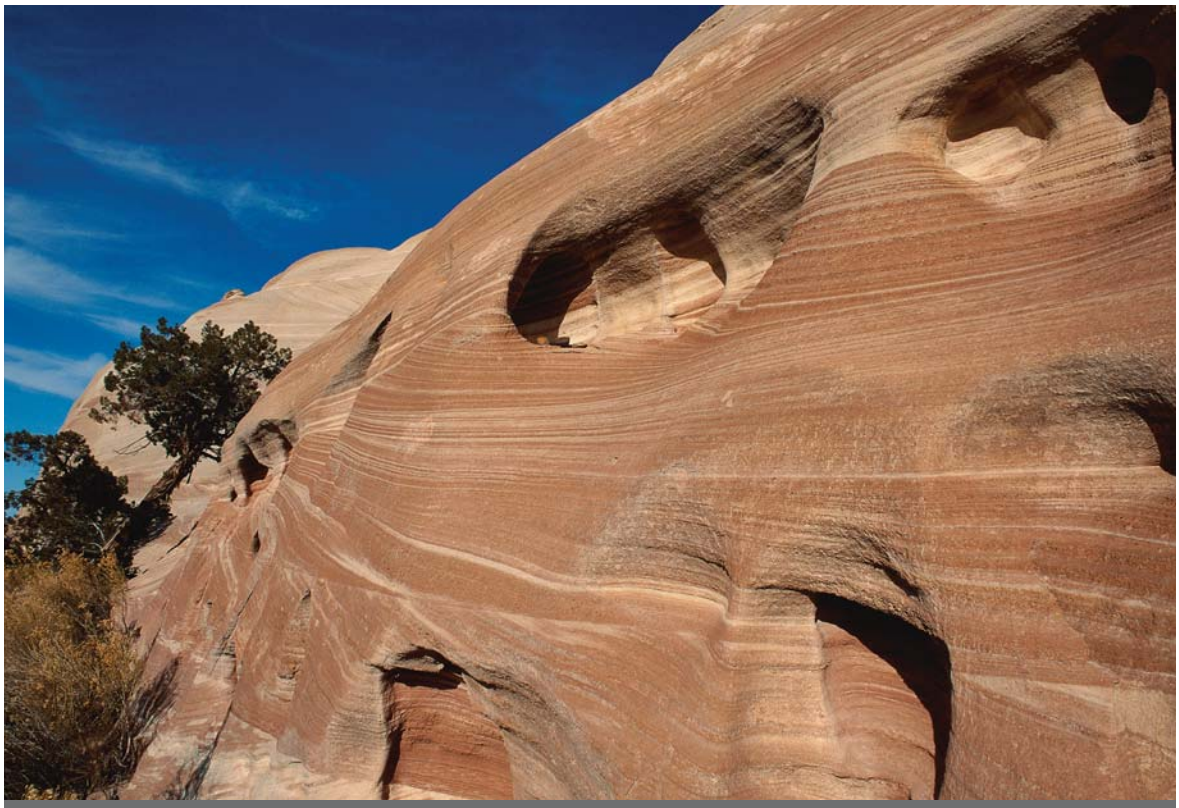

The steep slopes of desert buttes act as refuges for many sensitive and protected biological resources.

Section 4: Objectives

The following section presents the Integrated Regional Water Management (IRWM) Plan objectives and establishes planning targets for the Antelope Valley Region that can be used to gauge success in meeting these objectives. Objectives refer to the general intent for planning within the Antelope Valley Region, whereas the targets refer to specific measurable goals intended to meet the objectives.

4.1 OBJECTIVES DEVELOPMENT

As stated in Section 1, the primary focus of this IRWM Plan is to develop a broadly supported water resource management plan that defines a meaningful course of action to meet the expected demands for water and related resources within the entire Antelope Valley Region between now and 2035. Goals to meet this primary focus include developing a plan that will address:

- How municipal and industrial (M&I) purveyors can reliably provide the quantity and quality of water that will be demanded by a growing population;
- Options to satisfy agricultural users' demand for reliable irrigation water supplies at reasonable cost; and
- Opportunities to protect and enhance current water resources (including groundwater) and the other environmental resources within the Antelope Valley Region.

Early in the development of the IRWM Plan, the Stakeholder group was asked to brainstorm preliminary objectives for the issues and needs of concern for the Antelope Valley Region to meet these broad goals. This list was revised and a draft list of objectives presented to the Stakeholder group in December 2006. At the January 2007 Stakeholder meeting, a

draft list of objectives was discussed amongst the entire group and new stakeholder comments were reviewed and incorporated into the objectives, as appropriate. The list was then finalized and incorporated into the IRWM Plan. By accomplishing these objectives, significant benefits to the Antelope Valley Region can be achieved.

> *"The time for action has arrived, and I believe that the Integrated Regional Water Management Plan provides us the tool."*
>
> – Randy Williams, City of Lancaster

To establish quantified benchmarks for implementation of the IRWM Plan, planning targets have been identified to amplify the objectives and provide more definition to the Antelope Valley Region's major water resource needs over the planning horizon. Although the IRWM Plan is intended to address the Antelope Valley Region's water resource management needs, this document also identifies several open space, recreation, and habitat targets, as the implementation of water supply, flood management, and water quality projects have the potential to contribute towards these other Regional needs. In addition, habitat and open space projects have the potential to generate additional water supply and water quality benefits.

The objectives and planning targets are presented below (and summarized in Table 4-1) and are presented under this IRWM Plan element to which they most closely correspond.

4.2 WATER SUPPLY MANAGEMENT OBJECTIVES AND TARGETS

Water supply management objectives and targets are directly related to addressing the key issues and needs identified in the water supply assessment in Section 3, including water supply and groundwater management issues.

Objective: Provide reliable water supply to meet the Antelope Valley Region's expected demand between now and 2035.

Reliability is defined herein as "how much one can count on a certain amount of water being delivered to a specific place at a specific time," and depends on the availability of water from the source, availability of the means of conveyance, and the level and pattern of water demand at the place of delivery.

Reliability criteria identify the maximum acceptable level of supply shortage an agency is willing to sustain during a drought. For this study, a reliability criterion has been used to evaluate water supply plans. This criterion requires water supply to be sufficient to meet projected demands 95 percent of the time. In the remaining 5 percent of the time, it is assumed that the maximum allowable supply shortage will be 5 percent of the demand. This level is chosen because a 5 percent water demand reduction is anticipated

Table 4-1 Antelope Valley Region Objectives and Planning Targets

Objectives	Planning Targets
Water Supply Management	
Provide reliable water supply to meet the Antelope Valley Region's expected demand between now and 2035.	Reduce (73,600 to 236,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009. Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.[1] Provide adequate reserves (0 to 62,000 AF/ 4 year period) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.[2]
Establish a contingency plan to meet water supply needs of the Antelope Valley Region during a plausible disruption of SWP water deliveries.	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by June 2010.
Stabilize groundwater levels at current conditions.	Manage groundwater levels throughout the basin such that a 10-year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.
Water Quality Management	
Provide drinking water that meets customer expectations.	Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetics throughout the planning period.
Protect aquifer from contamination.	Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period. Map contaminated sites and monitor contaminant movement, by December 2008. Identify contaminated portions of aquifer and prevent migration of contaminants, by June 2009.
Protect natural streams and recharge areas from contamination.	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.
Maximize beneficial use of recycled water.	Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.
Flood Management	
Reduce negative impacts of stormwater, urban runoff, and nuisance water.	Coordinate a regional flood management plan and policy mechanism by the year 2010.
Environmental Resource Management	
Preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region.	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat, to integrate and maximize surface water and groundwater management by 2015.
Land Use Planning/Management	
Maintain agricultural land use within the Antelope Valley Region.	Preserve 100,000 acres of farmland in rotation[3] through 2035.
Meet growing demand for recreational space.	Contribute to local and regional General Planning documents to provide 5,000[4] acres of recreational space by 2035.
Improve integrated land use planning to support water management.	Coordinate a regional land use management plan by the year 2010.

to be readily attainable by voluntary conservation. Typically when a shortage occurs, water customers increase their awareness of water usage and voluntarily reduce water demands, avoiding water rationing.

As discussed in Section 3, the Antelope Valley Region's expected demand between 2010 and 2035 is approximately 274,000 and 447,000 acre-feet per year (AFY) for an average water year. However, the planned water supply for

an average water year is approximately 200,400 to 210,200 AFY, resulting in a mismatch of approximately 73,600 to 236,800 AFY. Assuming average year supplemental water is equivalent to the average year mismatch, there is an additional mismatch of 50,600 to 57,400 AF for a single dry water year and 0 to 62,000 AF/4-yrs for a 4-year multi-dry year condition. This additional mismatch (or reserve) was determined by taking the drought year mismatch and adding the average year supplement. The range of the reserve is the maximum and minimum reserves. In order to assure a reliable water supply, the following three planning targets have been identified. The targets are based on the assumption of a regional population estimates shown in Table 2-3. However, if actual growth is less than projected or if average annual water use per capita decreases due to conservation efforts, then the overall demand for the Antelope Valley Region would decrease as well. Any reduction in demand would reduce the mismatch. Similarly, this target assumes the supply from only currently planned sources presented in Section 3 and that groundwater extractions are limited to groundwater recharge. Thus, any changes or limitations to the groundwater supply resulting from the pending adjudication could significantly alter the mismatch as well.

Target: Reduce (73,600 to 236,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.

Target: Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.

Target: Provide adequate reserves (0 to 62,000 AFY) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.

1 Dry year reserves determined by taking the dry year mismatch and adding the average year supplement. Assumes that the average year supplement equals the average year mismatch for any given year. Range determined from the maximum and minimum reserves.

2 As with single-dry year, multi-dry year reserves determined by summing the 4-year dry year mismatch and adding the 4-year average year supplement. Assumes that the average year supplement equals the average year mismatch for any given year. Range determined from the maximum and minimum reserves.

3 The phrase "in-rotation" means that not all 100,000 acres will be in agricultural production at one time rather the land will be rotated in cycles to make most efficient use of the land.

4 The City of Palmdale and City of Lancaster's General Plans provide a standard of 5 acres of parkland per 1,000 City residents. The Kern County General Plan provides a standard of 2.5 acres per 1,000 residents. The other local and regional General Plans do not provide a standard for "recreation or parkland" preservation. This planning target assumes a 2035 population of 1.17 million residents in the Antelope Valley Region.

Objective: Establish a contingency plan to meet water supply needs of the Antelope Valley Region during a plausible disruption of SWP water deliveries.

Given the Antelope Valley Region's dependence on State Water Project (SWP) water, as discussed in Section 3, all elements of its reliability should be considered. Fluctuations in SWP deliveries due to climatic changes have already been incorporated in the supply and demand comparisons for average, single-dry, and multi-dry year conditions, as provided in Section 3.However, impacts to the Antelope Valley Region in the event of an outage or disruption of SWP water due to emergency situations (e.g., a flood, earthquake, power outage, or other disaster) also need to be considered and a response planned. In the event of a temporary loss of SWP for 6 months over the summer, the Antelope Valley Region would be short approximately 37,150 AFY from the normal supply (assumes lost of half of average year 2035 expected SWP supply.) The Antelope Valley Region needs to address and identify necessary actions to accommodate for such a loss and to ensure imported water supply; therefore, the following target has been identified.

Target: Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by June 2010.

Objective: Stabilize groundwater levels at current conditions.

As previously mentioned, a decrease in groundwater levels has led to incidences of land subsidence within the Antelope Valley Region, which may result in the loss of groundwater storage as well as a possible degradation of groundwater quality. Accordingly, maintaining groundwater levels is a key component to managing the groundwater basin and ensuring its reliability by preventing future land subsidence.

Addressing the following AB 3030 elements for stabilizing groundwater would also assist the Region in achieving this objective and planning target: (a) mitigation of conditions of overdraft; (b) replenishment of groundwater extracted by water producers; and (c) monitoring of groundwater levels and storage. To track and prevent future land subsidence and ensure the reliability of the Region's groundwater supply, the planning target below would monitor and identify changes in groundwater levels to demonstrate that management actions are having a positive impact to the groundwater basin.

It is recognized and acknowledged that the on-going adjudication of the Antelope Valley Ground Water Basin and the

Physical Solution that may be adopted by the Court may require the target set forth below to be modified.

Target: Manage groundwater levels throughout the basin such that a 10 year moving average of change in observed groundwater levels is greater than or equal to 0, starting in January 2010.

4.3 WATER QUALITY MANAGEMENT OBJECTIVES AND TARGETS

Addressing the following AB 3030 elements for improving and maintaining water quality would assist the Antelope Valley Region in achieving the water quality objectives and planning targets discussed below: identification and management of wellhead protection areas and recharge areas; regulation of the migration of contaminated groundwater; construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects; development of relationships with State and Federal regulatory agencies; and review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.

Objective: Provide drinking water that meets customer expectations.

As discussed in Section 3.2, water quality is generally good Valley-wide except for the northeast part of the Antelope Valley Region, the borders of the Lancaster subunit, and some shallow wells in north Edwards Air Force Base (AFB) and Boron. Poorer water quality appears to be associated with areas containing hard-rock outcrops and areas underlain by the shallow playa deposits where evaporation has concentrated solutes. In general, the water quality over time has remained relatively unchanged across the entire Antelope Valley Region and generally meets Maximum Contaminant Levels (MCLs). The exceptions to the good groundwater quality are some high concentrations of boron associated with naturally-occurring boron deposits, high nitrates associated with fertilizer use and poultry farming near the areas of Little Rock and Quartz Hill, and high arsenic levels due to recent changes (lowering) of the MCL.

However, in addition to meeting the Federal and State standards for water quality, other secondary standards (such as taste, color, and odor) may also affect a customer's overall satisfaction with the water. Although these constituents do not result in any health effects to the customer, they do impact the customer's desire to drink and use the water. Thus the following planning target has been identified.

Target: Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetic throughout the planning period.

Objective: Protect aquifer from contamination.

Groundwater is a main component of the Antelope Valley Region's water supply. Any loss of supply due to water quality degradation[5] would significantly hinder the Antelope Valley Region's ability to meet anticipated demands. As the Antelope Valley Region begins to reduce its dependence on imported water, utilize more recycled water, and implement recharge and storage projects, protecting the aquifer will become increasingly more important. All of these non-groundwater sources can potentially cause degradation to the existing groundwater supply during recharge. Thus the following planning target has been identified, which will involve monitoring these recharge sources to ensure they have negligible impacts to the groundwater supply.

Target: Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.

Identifying sources of contaminants and taking appropriate measures to reduce or eliminate the potential for contamination is crucial to ensuring a reliable water supply. Where contamination has occurred, programs and projects must be implemented to prevent its migration to other areas of the Basin. In some cases, treatment or remediation may be required to prevent migration. An area of the Basin that has been identified as contaminated is the portion of the aquifer near the Los Angeles World Airport where the spreading of wastewater effluent has contributed to a decline in water quality within to top 50 feet of the aquifer. Other sources of potential contamination are from wells no longer in service that that have not been properly abandoned. These wells are suspected of drawing on water of a lesser quality from the deep aquifer to intermix with the water of the upper aquifer, degrading its quality. These areas and others not yet identified should be identified, mapped, and monitored to prevent any future migration. The mapped information should include constituent concentrations in areas of concern that exceed 50 percent of drinking water quality standards. Mapping contami-

5 For the purposes of this IRWM Plan, any increase in constituent levels over naturally occurring levels is considered degradation; any increase in constituent levels over the State or Federal standards is considered contamination.

nant concentrations within geographic areas of concern exceeding 50 percent of the drinking water standard will allow resource managers to monitor areas that may be moving toward contaminated status. Accordingly, the following planning targets have been identified.

Target: Map contaminated sites and monitor contaminant movement, by December 2008.

Target: Identify contaminated portions of the aquifer and prevent migration of contaminants, by June 2009.

Objective: Protect natural streams and recharge areas from contamination.

In addition to protecting the aquifer, it is also important to protect the surface water areas of the Antelope Valley Region from contamination. Natural streams feed the Littlerock Creek Reservoir as well as recharge areas in the Antelope Valley Region. Thus, any degradation in water quality in the streams could result in the loss of this surface water supply as well as degradation in the recharge areas. Thus the following planning target has been identified.

Target: Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.

Objective: Maximize beneficial use of recycled water.

As discussed in Section 3, approximately 65,000 AFY of recycled water will be available for use by 2035, assuming treatment plant upgrades and distribution system development occur as planned. However, currently only 16,700 AFY are planned to be utilized by 2035 for M&I users, through the planned projects. Beneficial use of the remaining 48,300 AFY would require additional infrastructure to treat and deliver the recycled water, as well as development of policies to encourage or require recycled water use for irrigation for existing beneficial uses or for groundwater recharge. The Los Angeles County and Antelope Valley Areawide General Plans currently identify general goals and policies to promote water conservation and protection of water quality through encouraging groundwater recharge, reuse of storm and reclaimed water, and development of water conservation programs. The development of this infrastructure and time to implement such policies is likely to occur in phases as resources are made avail-

Urban runoff is a large contributor to wasteful water use and can be easily rectified with current technologies and better management.

able. Therefore, the following planning target has been identified.

Target: Increase infrastructure and establish policies to use 33 percent of recycled water to help meet expected demand by 2015, 66 percent by 2025, and 100 percent by 2035.

4.4 FLOOD MANAGEMENT OBJECTIVES AND TARGETS

Objective: Reduce negative impacts of stormwater, urban runoff, and nuisance water.

As described in Section 3.3, the Antelope Valley is prone to flash flooding, and this situation is aggravated by the lack of a coordinated and comprehensive drainage infrastructure system for managing stormwater and urban runoff. Stormwater tends to be of poor quality and high in sediment, and is further degraded by urban runoff. In some areas of the Valley, underlying impervious soils will cause stormwater to pool and become nuisance water until it eventually evaporates.

Extensive growth in the Antelope Valley has occurred in both cities as well as unincorporated County areas. This growth both increases the amount of impervious surfaces in the Valley and the number of homes and businesses subject to the negative impacts of flooding and in need of flood protection. Natural communities and wildlife habitat may also suffer as a result of flooding. Conversely, flood waters can also have positive impacts. For example, flood waters can result in siltation that acts to "resurface" and naturally restore the elevation of the dry lake beds.

To adequately address any desires to maintain flood effects, and to limit flood damage in a cost-effective manner, flood management efforts should take place on a regional scale and should be coordinated across jurisdictions. This scope and level coordination would also provide some consistency both in costs associated with flood prevention and mitigation and in permitting requirements for Antelope Valley residents, businesses and developers. With the Antelope Valley Region having a great water need there is the added incentive for the flood management systems to convey waters of suitable quality to rechargeable systems for the benefit of multiple communities.

Furthermore, urban development and revitalization efforts implemented on a regional scale that can protect natural and man-made amenities, while avoiding severe hazard areas such as flood prone areas, would be consistent with the goals and policies of the Los Angeles County and the Antelope Valley Areawide General Plans. New development is currently encouraged to protect drainage courses in as natural a state as possible, while minimizing modification of the natural carrying capacity or production of excessive siltation.

Flood Plain Management Areas are identified within the Antelope Valley Areawide General Plan, and include areas that are subject to a high risk flooding during storm events such as Amargosa Creek, Anaverde Creek, Big Rock Creek, Little Rock Creek, the frontal canyons on the north slope of the San Gabriel Mountains, drainages from the north face of Portal Ridge, and the upper reaches of the Santa Clara River through Acton. Development is regulated within these areas by either not permitting (due to extreme hazard) or limiting new development to adhere to special performance requirements in the flood fringe areas adjacent to a waterway, to ensure the hazard of inundation can be mitigated without increasing the hazard to adjacent properties.

The Antelope Valley is in need of both short- and long-term solutions to the various flood management needs presented in Section 3.3. Such solutions can best be designed and implemented through coordination of a regional flood management plan, which has been identified as a planning target for integrated regional water management. Important goals under the plan include reducing flood damage, maximizing groundwater recharge, controlling stormwater runoff and curbing nuisance water runoff (for example by educating residents or installing proper sprinkler heads and timers), and managing sediment transport by 2010.

In addition to these goals, a regional plan that provides a multi-objective management approach would aim towards ecosystem restoration and the protection of farmland and natural habitat. The flood management plan and its resulting projects should be flexible enough to adjust to future changes in the Antelope Valley Region, including changes in population and resource needs, as well as changes in the climate and landscape.

A flood management plan for the Antelope Valley should include a comprehensive set of strategies that seek both to preventively reduce flood hazards and to respond effectively to direct and indirect threats associated with flooding. First, it should outline a strategic plan to improve and update mapping and technology necessary to meet planning objectives. Since many flood maps used by public agencies and the public do not reflect the most accurate information available, land use decisions in California are in some cases based on poor or outdated information regarding the seriousness of the flood threat. This leads to

much of the State's new development occurring in areas that are especially prone to flooding.

Most water quality impacts of urban development are best avoided by directing the location, pattern, and design of the development rather than through traditional regulation of discharges. A flood mitigation plan that addresses the level of risk associated with flood-prone areas within the Antelope Valley Region should be a central component of the flood management plan. Such a plan should prompt investigation of the feasibility of mitigation activities such as the relocation, redevelopment or modification of structures existing within areas especially at risk; an assessment of existing and needed flood management infrastructure to redirect stormwater and control flooding; and zoning and other regulatory measures that address the need for regulation of development patterns and improved site design and building practices. The plan should promote the establishment of land use ordinances that restrict development within hazardous floodplain areas and establish buffers to allow the natural hydrologic function within remaining natural or restored floodplains to occur.

In addition to spurring formal changes in land use policy, the plan should contain regional design guidelines and best management practices for flood prevention and on-site stormwater management, and a public outreach and education program related to stormwater quality and urban runoff. The plan should also include regional and local contingency plans and communication plans, prepared so that regional and local authorities have the means to coordinate responses to different flood events.

The local and regional General Plan policies pertaining to flood management within the Antelope Valley Region can be found in Table 8-2 in Section 8.

The Mojave Desert supports animal life that is unique and intimately connected to the future of biodiversity in the Antelope Valley.

Target: Coordinate a regional flood management plan and policy mechanism by the year 2010.

4.5 ENVIRONMENTAL RESOURCE MANAGEMENT OBJECTIVES AND TARGETS

Objective: Preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region.

As described earlier, due to its proximity to the Los Angeles Area, the Antelope Valley is subject to increasing demand for community development, recreation, and resource utilization. Population in the Antelope Valley is expected to increase by 121 percent between 2005 and year 2020. Some of this growth will result in the conversion of agricultural land, while some of this growth will occur in areas that are currently natural and undeveloped areas. Loss of both agricultural acreage and natural areas decreases the amount of open space in the Valley. Open space can mean natural open space, passive and active recreation which may or may not be compatible with natural habitats or natural open space preservation. As an example, open space can mean soccer fields, playgrounds, etc and should not be considered as natural habitat. This growth and the associated loss of open space could adversely affect local water resources through the loss of wetland areas and the watershed functions these areas provide (filtration of surface water, stormwater detention), and the loss of groundwater recharge areas.

Also of concern is the negative effect of urban growth on the unique biological resources of the Antelope Valley. Besides a direct loss of habitat, increasing proximity to urban development is harmful to the sensitive desert species, several of which are found only in the Antelope Valley Region.

Thus, the following planning target has been identified to preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region.

Target: Contribute to the preservation of an additional 2,000 acres of open space and natural habitat, to integrate and maximize surface and groundwater management by 2015.

This planning target needs to be consistent with local planning objectives such as those identified in the Antelope Valley Areawide General Plan, the Kern County

General Plan, and other management plans approved for the Antelope Valley Region, some of which are discussed below. This target is not limited to 2,000 acres, and conservation of acreages greater than 2,000 acres is encouraged.

Policies within the Antelope Valley Areawide General Plan implement Los Angeles County's General Plan (anticipated completion summer 2008), and further specify objectives and goals specific to that Antelope Valley Region. The Antelope Valley Areawide General Plan identified several priority areas for habitat acquisition and preservation including the Santa Clara River, Fairmount/Antelope Buttes, steeper butte areas in the eastern Antelope Valley, and riparian areas within Little-rock Wash, Big Rock Wash, Portal Ridge-Liebre Mountain and Tehachapi Foothills and other Significant Ecological Areas (SEAs). Educational, observational, and light recreational uses could be allowed in these preserves and the preserves would also act as open space areas, enhancing the rural character of the Antelope Valley.

Through the identification and designation of SEAs within the Los Angeles County General Plan and the Antelope Valley Areawide General Plan, new urban growth or encroaching uses and activities would be conditioned to ensure protection of ecological resources and habitat areas by regulating and establishing compatible land uses, and requiring design and performance criteria to be met. Although SEAs are neither preserves nor conservation areas, requiring development to be designed around the existing biological resources (Los Angeles County 2006) would help to ensure protection of sensitive species and their habitats as well as helping to make the location and size of the preserved area scientifically defensible.

The Kern County General Plan does not identify specific open space or habitat areas to be preserved (Kern County 2004). The Kern County General Plan does, however, state that "The County will seek cooperative efforts with local, state, and federal agencies to protect listed threatened and endangered plant and wildlife species through the use of conservation plans and other methods promoting management and conservation of habitat lands."

The West Mojave Plan covers 9.3 million acres in the western portion of the Mojave Desert, including portions of Los Angeles and Kern counties. This habitat conservation plan and federal land use plan amendment presents a comprehensive strategy to conserve and protect the desert tortoise, the Mohave ground squirrel and over 100 other sensitive plants and animals and the natural communities of which they are a part. The Plan accomplishes such by: designating 14 new Areas of Critical Environmental Concern (ACEC), adjusting four existing ACEC boundaries, and establishing other special management areas specifically designed to promote species conservation; designating allowed routes of travel on public lands to reduce species mortality from off-road vehicles; and, establishing other management prescriptions to guide grazing, mineral exploration and development, recreation, and other public land uses (BLM 2006). The West Mojave Plan is consistent with the existing conservation plans in the area, and would further the preservation of important species and their habitats that protect and enhance the Antelope Valley Region's watershed.

Conservation and protection of the desert tortoise, the Mohave ground squirrel and over 100 other sensitive plants and animals and the natural communities of which they are a part, as described within the West Mojave Plan,[6] would help the area meet this planning target (BLM 2006). The Plan is consistent with conservation plans and local policies for furthering habitat protection by prescribing appropriate uses within protected ACEC areas that limit human and non-native animal interaction with sensitive species to reduce mortality and habitat degradation.

Preservation lands in other areas could also be targeted, based on qualities that maintain and enhance the watershed and aquifer.

4.6 LAND USE MANAGEMENT OBJECTIVES AND TARGETS

Objective: Maintain agricultural land use within the Antelope Valley Region.

As discussed in Section 3, there is an estimated 24,700 acres of irrigated crop land in the Antelope Valley Region. Agriculture is an important industry for the Antelope Valley area. In addition to direct production of food and fiber, secondary employment is created by the agricultural production, including transportation and food manufacturing. In Kern County it is estimated that one out of every four jobs is tied to the agricultural industry (Kern County Agricultural Commissioner 2007). In addition, agriculture plays an important role in community identity. The types of crops grown in an area may be unique to that place. Community festivals are often planned around the commodities unique to a place, or for which a community is known. The physical landscape of a place can be defined

6 "While many of the general conservation concepts and species accounts are valid in the West Mohave Plan the Plan relies heavily upon habitat protection within BLM lands as mitigation for impacted habitats from development occurring elsewhere, perhaps many miles away . . . the Department of Fish and Game did not endorse the WMP as a habitat protection planning document (personal communication, S. Harris, Department of Fish and Game.)"

by its agriculture as the crops create a distinct color mosaic and pattern. Residents also can take advantage of the open space and views allowed by nearby agriculture. In addition, some agricultural crops may provide wildlife habitat (nesting, temporary foraging).

> *"The preservation of natural lands is good for nature, but the prime beneficiary is human beings."*
>
> – Wendy Reed,
> Antelope Valley Conservancy

As described in earlier sections of this IRWM Plan, demand for urban development is resulting in a conversion of agricultural land, and is introducing conflicts between agricultural and residential development. As a result, agricultural land is increasingly found only on the urban fringes. There is a desire to preserve agriculture as an industry and as a cultural asset. Both Los Angeles County and Kern County have adopted policies intended to preserve agricultural resources. These policies include right-to-farm ordinances, reduced property tax programs for farm businesses, and policies discouraging provision of urban services in agricultural areas. The Los Angeles County General Plan and the Antelope Valley Areawide Plan have designated "Agricultural Opportunity Areas," or prime agricultural land that has been identified for preservation and protection from the intrusion of incompatible uses that would conflict with or preclude viable agricultural activity. This is intended to be accomplished through use of incentives that establish a voluntary agricultural preserve. To encourage the retention and expansion of agricultural use both within and outside a potential agricultural preserve, the policies promote compatible land use arrangements and offer technical assistance in support of farming interests. In addition, expansion of agricultural into underutilized lands, such as utility rights-of-way and flood prone areas is encouraged. The following planning target, which furthers these existing goals and policies, has been identified to maintain agricultural land use within in the Antelope Valley Region.

Target: Preserve 100,000 acres of farmland in rotation[7] through 2035.

Objective: Meet growing demand for recreational space.

Demands for recreational space are similar to the demands for biological habitat and agricultural land. These demands for land uses are competing with one another due to an increasing population. Growth in the Antelope Valley threatens recreational lands and increases demands for recreational opportunities. However, population increases in Southern California as a whole also add to the pressure to maintain and expand the Antelope Valley Region's recreational opportunities, particularly since recreational resources found in the Antelope Valley, such as off-highway vehicle (OHV) use areas, are not found anywhere else in near proximity to Southern California population centers. Optimally, recreational resources could be preserved in a way that does not conflict with other land uses or resource protection.

Currently, recreation resources in the Antelope Valley are provided by multiple jurisdictions. Often recreational facilities are dedicated as part of a specific local development project or fees are paid in-lieu of providing recreational facilities. However, most local jurisdictions have policies in place that would encourage cooperation to develop, expand, or enhance regional recreation facilities. For example, several goals and policies within Los Angeles County's General Plan identify the need for development of community parks and recreational amenities within areas deficient in such resources, and suggest such could be accomplished through preserving large natural and scenic areas while focusing new urban growth into areas with suitable land. To achieve such a balance between increased intensity of development and the capacity of needed facilities to serve the population, the General Plan encourages use of open space easements and dedications, or recycling of "brownfield" sites (e.g., abandoned mineral extraction sites, remediated industrial or commercial areas, etc.) as a means of achieving recreational, open space and scenic needs.

Development of new regulatory controls, similar to those in place for SEAs to ensure compatibility of development adjacent to or within major public open space and recreational areas, including the Angeles and Los Padres National Forests are also encouraged.

Thus the following planning target has been identified to meet the growing demand for recreational resources in the Antelope Valley Region.

Target: Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.

Objective: Improve integrated land use planning to support water management.

Coordination between land use planning agencies and water management agencies is crucial to implementation of a successful IRWM Plan. A regional land use management plan to guide the Antelope Valley Region's physical development would be a key step towards improving coordination and identifying future water needs throughout the Antelope Valley Region. Growth management, the protection of various land uses and the efficient use of natural resources such as land, water and energy are three of the principal goals of regional land use planning. A regional land use management plan that directs the Antelope Valley Region's growth towards existing centers will not only encourage natural resource efficiency and the preservation of surrounding agricultural land uses and recreational open space, but it will also improve the efficient use of economic resources dedicated towards utilities infrastructure improvements and expansions.

A regional land use management plan would identify the actions necessary in order to gauge success on meeting the land use management objectives. Ideally, a regional land use plan would serve as a master plan for the Antelope Valley Region's physical development. As such, it could provide the opportunity to conduct design studies to test the physical capacity of the Antelope Valley Region's urban areas and centers of development. Such a focus on physical design can help regional agencies to understand and visualize the impact of new structures on the natural and built environment, and thus to better understand the consequences of planning policy. Consideration of building codes, zoning laws, and other regulations affecting development should also be a central component of the regional land use plan. The plan should provide for the periodic review of its major elements, in order to remain a useful tool as the Antelope Valley Region undergoes various changes.

Accordingly, the following planning target has been identified.

Target: Coordinate a regional land use management plan by the year 2010.

7 The phrase "in-rotation" means that not all 100,000 acres will be in agricultural production at one time rather the land will be rotated in cycles to make most efficient use of the land.

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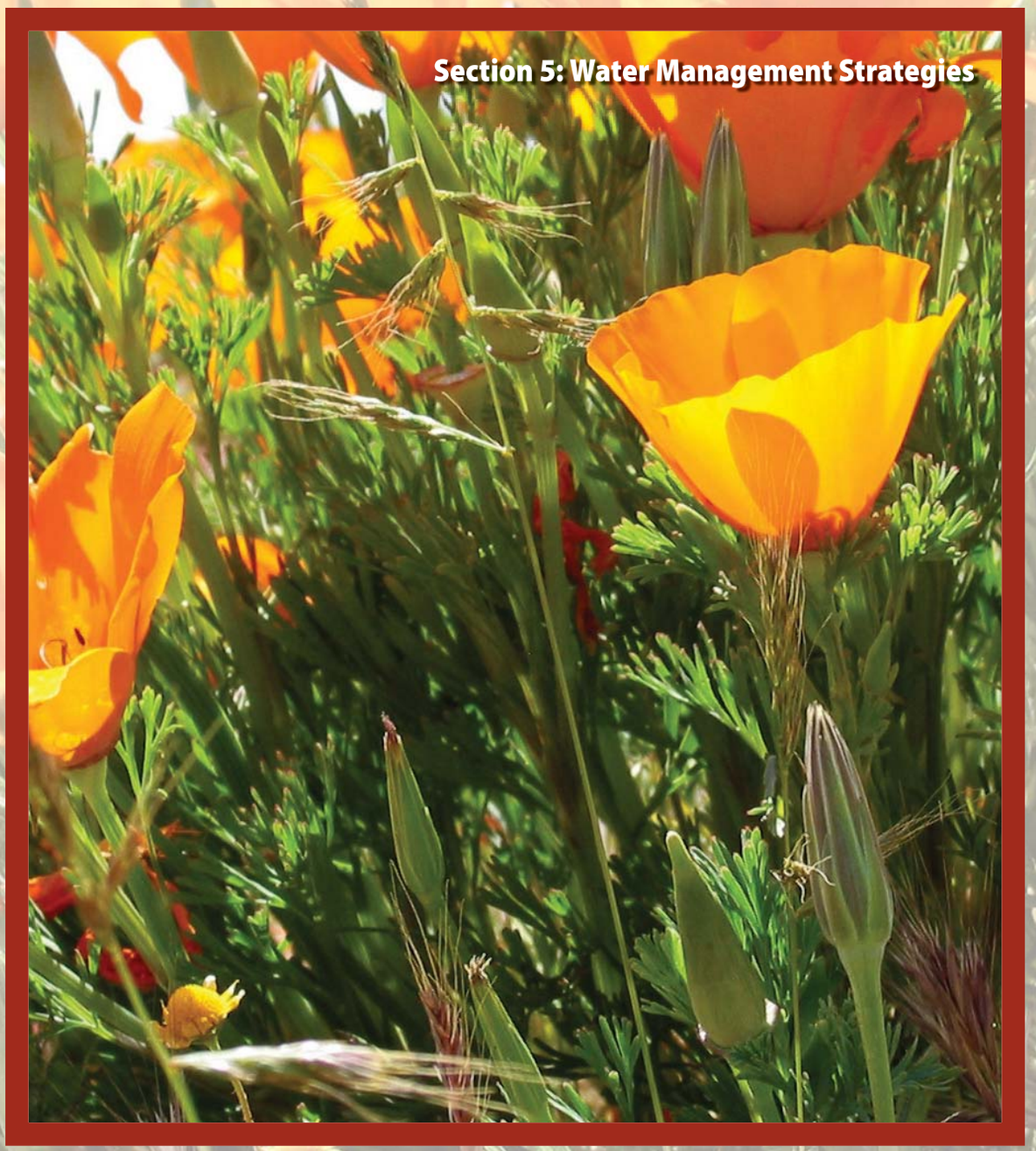
Section 5: Water Management Strategies



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Without water management strategies put into action, the beauty of the California poppy may be lost by the Antelope Valley region.

Section 5: Water Management Strategies

5.1 INTRODUCTION

The following section introduces a diverse menu of water management strategies available to meet the water management objectives for the Antelope Valley Region. The State of California, through the Proposition 50, Chapter 8 Integrated Regional Water Management (IRWM) Plan Grant Program Guidelines (Guidelines), has identified 20 different water management strategies that are required for discussion to improve regional water resource management (11 are required for discussion). The IRWM Plan discusses the following 11 required water management strategies:

- *Water supply reliability*
- *Groundwater management*
- *Water quality protection and improvement*
- *Water recycling*
- *Water conservation*
- *Stormwater capture and management*
- *Flood management*
- *Recreation and public access*
- *Ecosystem restoration*
- *Wetlands enhancement and creation*
- *Environmental and habitat protection and improvement*

Additionally, the Regional Water Management Group (RWMG) evaluated the 9 additional management strategies identified in the State IRWM Plan Guidelines (CWC §§ 79562.5 and 79564) within the IRWM Plan, and not just those that are required to be considered. Therefore, the following strategies were also addressed:

- Conjunctive use
- Desalination
- Imported water
- Land use planning
- NPS pollution control
- Surface storage
- Watershed planning
- Water and wastewater treatment
- Water transfers

Additionally, Proposition 84 has suggested that IRWM Plans also consider those resource management strategies identified in the California Water Plan. In this report, we have aggregated the 20 different management strategies identified in the IRWM Plan Guidelines with those identified in the California Water Plan, into five water management strategy areas, as shown in Table 5-1. Descriptions of these water management strategies are provided below in Section 5.1.1. The five water management strategies are: Water Supply Management, Water Quality Management, Flood Management, Environmental Resource Management, and Land Use Management. For each management strategy, the actions and activities that are either underway or proposed for implementation in order to meet the objectives identified in Section 4 are described.

Many of the water management strategies described in the IRWM Plan Guidelines are currently being utilized in the management of water resources in the Antelope Valley Region. Strategies already practiced include: imported water, water and wastewater treatment, water quality protection and improvement, wetlands enhancement and creation, environmental and habitat protection and improvement, and stormwater capture and management.

The following water management strategies are being implemented in the Antelope Valley Region, but their application may not be widespread, and opportunities exist to expand and better integrate these strategies: flood management, groundwater management, conjunctive use, non-point source (NPS) pollution control, surface storage, water conservation, water recycling, watershed planning, and water supply reliability.

The following water management strategies are not currently utilized in the Antelope Valley Region because they are either infeasible (i.e., desalination), or underfunded: ecosystem restoration, recreation and public access, land use planning, and water transfers. Expanded utilization of these strategies could be implemented to enhance water supplies and improve water supply reliability.

5.1.1 Water Management Strategy Descriptions

Water Supply Management

Water supply reliability: Reliability is defined in this IRWM Plan as "how much one can count on a certain amount of water being delivered to a specific place at a specific time," and depends on the availability of water from the source, availability of the means of conveyance, and the level and pattern of water demand at the place of delivery. Opportunities for increased supply reliability in the Antelope Valley Region include the establishment of groundwater recharge basins, the implementation of conjunctive use projects utilizing recycled water and storm runoff, and the development of natural treatment systems, such as constructed habitat or open space area, to improve both water quality and storage capability.

Groundwater management: Groundwater has historically provided the majority of the total water supply in the Antelope Valley Region. Projected urban growth coupled with limits on the available local and imported water supply is likely to continue to increase the reliance on groundwater. Issues concerning water quality are also likely to influence how groundwater is managed in the Antelope Valley Region. Opportunities for management of the basin include reductions in impervious surfaces to increase infiltration, creation of recharge areas and spreading basins, management of stormwater flows and appurtenant water capture and conveyance systems. Future groundwater Basin management will depend on the pending adjudication.

Water conservation: Water conservation is a demand management measure which stresses the efficient utilization of water resources. Minimizing the use of water where possible through water efficiency measures helps to combat the inherent variability in the heavily relied upon imported and local supplies. Opportunities to expand water conservation in the Antelope Valley Region include, but are not limited to, implementation of Best Management Practices (BMPs), establishment of water efficiency ordinances, and development of evapotranspiration (ET) controllers for more efficient irrigation.

Table 5-1 Water Management Strategy Matrix

Proposition 50 IRWMP Strategies Note: (a) Those strategies that must be considered to meet the minimum IRWM Plan Standards.	California Water Plan Strategies																						
	Agricultural lands stewardship	Agricultural water use efficiency	Conjunctive management and groundwater storage	Conveyance	Desalination	Drinking Water Treatment and Distribution	Economic incentives	Ecosystem restoration	Floodplain management	GW/aquifer remediation	Matching water quality to water use	Pollution prevention	Precipitation enhancement	Recharge areas protection	Recycled municipal water	Surface storage – CALFED	Surface storage – regional/local	System reoperation	Urban land use management	Urban runoff management	Urban water use efficiency	Water transfers	Water-dependent recreation	Watershed management
Water Supply Management																								
Water supply reliability(a)	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪
Groundwater management**			▪						▪	▪		▪		▪	▪				▪	▪		▪		▪
Water conservation(a)		▪					▪								▪				▪		▪			▪
Water recycling(a)			▪							▪	▪				▪				▪		▪			▪
Conjunctive use			▪							▪				▪								▪		▪
Surface storage				▪												▪	▪	▪						▪
Water transfers			▪	▪						▪				▪								▪		▪
Desalination					▪																			
Imported water						▪										▪	▪	▪				▪		▪
Water Quality Management																								
Water quality protection and improvement(a)						▪			▪	▪	▪	▪		▪	▪				▪	▪				▪
Water and wastewater treatment					▪	▪				▪	▪				▪									▪
Non-point source pollution control								▪	▪		▪	▪		▪					▪	▪				▪
Flood Management																								
Flood management(a)									▪					▪					▪	▪				▪
Environmental Resource Management																								
Storm water capture and management(a)								▪	▪			▪		▪					▪	▪				▪
Ecosystem restoration(a)								▪				▪												▪
Env. and habitat protection and improvement(a)								▪						▪										▪
Recreation and public access(a)																	▪						▪	▪
Wetlands enhancement and creation(a)								▪	▪	▪				▪					▪					▪
Land Use Management																								
Land use planning	▪	▪	▪	▪			▪	▪	▪	▪	▪	▪		▪	▪		▪		▪	▪	▪		▪	▪
Watershed planning	▪	▪	▪	▪		▪	▪	▪	▪	▪	▪	▪	▪	▪	▪		▪	▪	▪	▪	▪		▪	▪

Water recycling: Recycled water is defined in the California Water Code to mean "water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur." Water recycling is a term which encompasses the process of treating wastewater, storing, distributing, and using the recycled water. The uses to which recycled water can be applied (e.g., landscape and agricultural irrigation, cooling, etc.) depend upon the quality of the treated water and the quality required for subsequent uses. Currently the only recycled water in the Antelope Valley Region that is treated to a tertiary level is a small percentage of the wastewater at the Lancaster Water Reclamation Plant (WRP). This IRWM Plan includes a number of current and planned management actions to increase recycled water use in the Antelope Valley Region.

Conjunctive use: Conjunctive use refers to the coordination of surface water and groundwater resources to maximize the utility of an area's collective water resources. Conjunctive use involves using surplus surface water when available (e.g., storm runoff, surplus surface water flows, or recycled water) to recharge the groundwater basin containing adequate storage capacity. Groundwater banking is a form of conjunctive use wherein surplus surface water or other available waters are injected or recharged for storage in the aquifer, and then extracted at a later time when surface water supplies are limited.

Surface storage: Surface storage is the use of reservoirs, whether on-stream or off-stream, or storage tanks, to collect water for later release and use. Surface water in the Antelope Valley Region is stored mainly in Littlerock Creek Reservoir and Lake Palmdale. Opportunities to enhance surface storage in the Antelope Valley Region include modification of these local reservoirs to increase storage capacity and operational flexibility, as well as the creation of new surface impoundments for recycled water and/or treated stormwater runoff.

Water transfers: A water transfer is defined in the California Water Code as "a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer or exchange of water or water rights." Transferring water supplies, or water rights, from one area to another is an important tool for water management in California, particularly agricultural to urban transfers. There is an opportunity in the Antelope Valley Region to integrate conjunctive use programs with water transfer projects.

Desalination: Desalination is a water treatment process for the removal of dissolved salts from water for beneficial use. Desalination is used on brackish (high-salinity) water as well as seawater. Due to the fact that groundwater within the Antelope Valley Region is not high in total dissolved solids (TDS), and that the basin is geographically distant from the ocean, desalination as a water management strategy is of low priority in the Antelope Valley Region. However, it could become a source of future imported water supply through inter-jurisdictional agreements.

Imported water: Imported water as a management strategy generally refers to bringing in, or importing, water from other areas. The largest source of imported water in California is the State Water Project (SWP). This strategy can be applied in three ways; by reducing dependence on imported water, by increasing use of imported water from new or existing sources, or by using imported water more efficiently. Imported water to the Antelope Valley Region is contracted through the Antelope Valley-East Kern Water Agency (AVEK), Littlerock Creek Irrigation District (LCID), and Palmdale Water District (PWD). Currently AVEK does not have enough storage available for its imported water, and therefore is unable to utilize its full Table A amount.

Water Quality Management

Water quality protection and improvement: This strategy regards the quality of potable water, the quality of the groundwater, and the quality of stormwater and urban runoff. The focus of water quality management in the Antelope Valley Region is on maintaining and improving the existing water quality and preventing future contamination. Opportunities for water quality protection and improvement include creation of water capture, conveyance, and recharge basins, which act as natural treatment systems, identification and mapping of potential contaminant areas, and upgrading treatment processes at existing WRPs and water treatment plants.

Water and wastewater treatment: As previously stated, the principle sources of water supply in the Antelope Valley Region are imported water and groundwater. Water treatment facilities in the Antelope Valley Region that treat this water are designed to treat raw water and produce drinking water that is safe for human consumption, which meets all regulatory State and Federal standards. Wastewater treatment facilities are designed to treat water that is discarded by a community to a point that it becomes safe to return back to the environment or for reuse. Opportunities exist for recycled water through tertiary treatment of existing supplies.

Non-point source (NPS) pollution control: NPS pollution may come from a variety of sources; one specific point cannot usually be identified. NPS pollution primarily occurs when rainfall, snowmelt, or irrigation runs over land or

through the ground, picks up pollutants, and deposits them into rivers, lakes, and coastal waters or introduces them into groundwater. The runoff can pick up both naturally-occurring and human-deposited pollutants and transport them to waterbodies. NPS control in the Antelope Valley Region is needed to address dry weather and nuisance water runoff.

Flood Management

Flood management: Flood management includes minimizing impacts of floods on buildings and farmland, removing obstacles in the floodplain, voluntarily or with compensation, preventing interference with the safe operation of flood management systems, preserving or restoring natural floodplain processes, educating the public about avoiding flood risks and about planning for emergencies, and reducing flooding risks to humans. Opportunities exist in the Antelope Valley Region for regional coordination of flood management activities.

Environmental Resource Management

Stormwater and urban runoff capture and management: Stormwater capture and management is linked to flood management. Stormwater capture involves inlets and conveyances that will deliver flows to detention and/or retention (recharge) basins. Any attempts to recharge flows should not worsen existing drainage conditions. There is an opportunity to address urban runoff and improve water quality utilizing the same stormwater infrastructure. Challenges include short duration/high intensity storm events, sedimentation, contaminants in the stormwater, and urban runnoff. Opportunities exist for regional coordination of stormwater, urban runoff and flood management activities.

Ecosystem restoration: The California Water Plan defines ecosystem restoration as "improving the condition of modified natural landscapes and biotic communities to provide for the sustainability and for the use and enjoyment of those ecosystems by current and future generations." The benefits of ecosystem restoration in the Antelope Valley Region are numerous, and depending on the type of ecosystem restored, they can include: capturing and storing stormwater, groundwater recharge, flood protection, increasing water supply reliability, wildlife habitat creation, restoration and enhancement, water quality enhancement, flood management, and recreation.

Environmental and habitat protection and improvement: Risks to the environment and habitat in the Antelope Valley Region include pressures from growth and development, the loss of open space, invasive species, channelization, incompatible land uses, and other common problems associated with urbanization and pollution. Restoration, improvement, and protection of the Antelope Valley Region's environmental resources have the potential to provide benefits related to water supply and water quality of the local surface and groundwater.

Recreation and public access: Open space used for recreation and public access has the potential to enhance water supply by preserving or enhancing groundwater recharge and thereby improving water supply reliability. Opportunities exist in the Antelope Valley Region for protecting and/or creating new recreational areas or open space that can provide multiple benefits to other strategies including groundwater management, improvements in stormwater or urban runoff management, and to enhance flood management.

Wetlands enhancement and creation: The Antelope Valley Region does not have a significant amount of wetlands, and for this reason this scarce resource should be protected. Wetland and riparian projects can provide water quality, groundwater recharge, flood management and recreational opportunities. Thus, there may be opportunities in the future for the creation of wetland areas in the Antelope Valley Region to provide these additional benefits.

Land Use Management

Land use planning: Land use planning as a strategy generally refers to actions that can be taken by agencies with land use decision-making authority (i.e., cities, counties) to further the objectives set out in this IRWM Plan to better manage and protect local water and related environmental resources. Land use strategies can include long-range planning goals, objectives, general plan policies, ordinances, regulations, education and outreach programs, etc. Opportunities exist in the Antelope Valley Region for increased land use planning efforts such as the addition of water resource elements in the Antelope Valley Areawide General Plan, and the enactment of natural resource protection and efficiency ordinances. Other mechanisms for increased land use planning efforts can include the cities and counties providing incentives for private development that promotes features to improve water quality, enhance groundwater recharge, and reduce water demand.

Watershed planning: The California Water Plan defines watershed management as "the process of evaluating, planning, managing, restoring and organizing land and other resource use within an area of land that has a single common drainage point." The Antelope Valley Region is a good example of a geographical watershed. Managing the

water and environmental resources within the Antelope Valley Region, as is being investigated through this IRWM Plan, is a means of watershed management.

5.1.2 Call for Projects

To identify the many potential projects in the Antelope Valley Region and to assess the collective contribution of these projects towards meeting the IRWM Plan objectives and planning targets, development of this IRWM Plan included a "Call for Projects" which gave stakeholders the opportunity to directly submit their projects and project concepts for consideration. Stakeholders could submit projects at any stage of development, including ideas about projects or project concepts. Avenues available for participating in the Call for Projects included the submission of projects via a project identification form, either submitted via electronic mail, by facsimile, or directly on-line via this IRWM Plan website (www.avwaterplan.org). Additionally, to increase participation and awareness in this IRWM Plan, a Call for Projects "Road Show" was conducted, in which the IRWM Plan consultant team visited one-on-one with many members of the Antelope Valley Regional Water Management Group (RWMG) to discuss project ideas. As of June 2007, approximately 50 projects were submitted for inclusion in this IRWM Plan.

While many of the projects lack detailed supporting information, the Call for Projects provided a mechanism to engage stakeholders in the process of sharing project information and discussing the issues related to the integration of projects. Many of the projects discussed in this section provide multiple benefits, spanning more than one strategy. Therefore, some assumptions were made with regard to what water management strategy a particular project would benefit the most, to begin the initial organization of the projects. For example, a groundwater recharge project generally was assumed to provide water supply benefits, with a secondary benefit of addressing water quality needs. Section 6, Water Management Strategy Integration, will delve into this issue further, by examining in more detail how these projects can be integrated to provide multiple benefits.

The information provided herein represents the outcome of the initial step in a process of bringing individual projects into the collaborative process implied by this IRWM Plan. Additional projects are likely to be added to the database, and it is expected that stakeholders will revise and update information on projects submitted.

5.2 WATER MANAGEMENT STRATEGIES

In the following sections, each of the five water management strategies are described generally; their objectives and planning targets are presented in Table 5-2; and current and planned activities and actions to meet those objectives are listed along with new project ideas and concepts submitted during the Call for Projects.

Table 5-2 Water Supply Objectives

Objective	Planning Target
Provide reliable water supply to meet the Antelope Valley Region's expected demand between now and 2035.	Reduce (73,600 to 236,800 acre-feet per year [AFY]) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009. Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single dry year conditions, starting 2009. Provide adequate reserves (0 to 62,000 acre-feet [AF]/4-yr period) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.
Establish contingency plan to meet water supply needs of Antelope Valley Region during a plausible disruption of SWP water deliveries.	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by June 2010.
Stabilize groundwater levels at current conditions.	Manage groundwater levels throughout the basin such that a 10 year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.

5.2.1 Water Supply Management Strategy

The water supply management strategy must include projects and actions that meet the water supply issues and needs of the Antelope Valley Region as discussed in Section 3. The key issues are: regional reliance on imported water; unmanaged groundwater use; limitations of existing facilities; and global warming effects. In order to gauge success in addressing these issues, the water supply management strategy must meet the following objectives as defined in Section 4.

5.2.1.1 Completed (Recent) Water Supply Management Activities/Actions

A number of recent activities have been conducted to investigate the water supply situation in the Antelope Valley Region. These activities have helped to identify the issues and needs of the Antelope Valley Region, and are the framework for the development of many of the supply management actions and activities that are listed in below.

Plans and Studies

Antelope Valley Integrated Urban Water Management Plan	
Project Sponsor:	Los Angeles County Department of Public Works (LADPW), Rosamond Community Services District (RCSD), Quartz Hill Water District (QHWD), Los Angeles County Sanitation Districts (LACSD)
Goals and Project Description:	The goal of the Integrated Urban Water Management Plan (UWMP) was to coordinate water resource planning throughout the Antelope Valley Region. The California Urban Water Planning Act requires urban water suppliers to describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs. This information is used by the urban water supplier for development of an urban water management plan (UWMP) which is submitted to the Department of Water Resources (DWR) every five years. The Final Integrated UWMP was submitted to DWR in December 2005.
Antelope Valley Water Resource Study	
Project Sponsor:	The Antelope Valley Water Group (AVWG) is the Study's lead and sponsor. AVWG members include the Cities of Palmdale and Lancaster, Edwards Air Force Base (AFB), AVEK, Antelope Valley United Water Purveyors Association, Los Angeles County Waterworks Districts (LACWWDs), PWD, RCSD, and LACSD. The City of Palmdale was the contracting agency for the Study.
Goals and Project Description:	AVWG was formed in 1991 to provide a means of communication for the Antelope Valley Region agencies with an interest in water. In an attempt to prepare a water resource study with a regional focus, rather than an individual focus, the AVWG initiated the Antelope Valley Water Resource Study. The primary objective of the AVWG's water resource study was to develop consensus on a water resource management plan that addresses the need of the municipal and industrial purveyors to reliably provide the quantity and quality of water necessary to serve the growth projected by the planning agencies while concurrently addressing the need of agricultural users to have adequate supplies of reasonable cost irrigation water. The Study, which was completed in 1995, provides an assessment of the water resources in the Antelope Valley Region, develops a water conservation program for the Antelope Valley Region, evaluates the feasibility of recycled water use, evaluates the feasibility of aquifer storage and recovery, discusses the effects of changes in groundwater levels, and provides a water resource protection plan.

AVEK Urban Water Management Plan	
Project Sponsor:	AVEK
Goals and Project Description:	The goal of the UWMP was to assess the current and projected water supplies for AVEK's service area. The California Urban Water Planning Act requires urban water suppliers to describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs. This information is used by the urban water supplier for development of an UWMP which is submitted to DWR every five years. The AVEK UWMP was submitted to DWR in December 2005.
Palmdale Water District Final Master Plan Update	
Project Sponsor:	PWD
Goals and Project Description:	The goal of the Final Master Plan Update, completed in 2001, was to evaluate the District's existing water distribution system and to determine system improvements over the next ten years, covering only the District's main system.
Final Facilities Planning Study, Antelope Valley Recycled Water Project	
Project Sponsor:	LACWWD 40
Goals and Project Description:	The Antelope Valley Facilities Planning Study evaluated recycled water opportunities for the Antelope Valley Region and recommended a plan for delivering recycled water to the area. This project is discussed below as the North Los Angeles/Kern County Regional Recycled Water System. Project benefits include: Saving a significant amount of potable water currently provided either by local groundwater, local surface water or from imported SWP; Potential to provide water for recharging the Antelope Valley Region's groundwater basin; Saving money that is currently being spent for potable water; Providing a valuable alternative for effluent management; and Promoting the State's policies of beneficial reuse of recycled water to replace potable water where possible.
Palmdale Water District Urban Water Management Plan	
Project Sponsor:	PWD
Goals and Project Description:	The goal of the UWMP was to assess the current and projected water supplies for PWD's service area. The California Urban Water Planning Act requires urban water suppliers to describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs. This information is used by the urban water supplier for development of an UWMP which is submitted to DWR every five years.
Study of Potential Recharge Sites in the Antelope Valley	
Project Sponsor:	Antelope Valley State Water Contractors Association (AVSWCA)
Goals and Project Description:	This report was commissioned by the AVSWCA, to evaluate potential recharge and ground-water banking sites in the Antelope Valley Region, with the goal of increasing SWP water supply reliability. Several viable sites were identified that could recharge surplus SWP water for later use. Sites that ranked high in the evaluation process were sites on Amargosa Creek, Littlerock Creek, Big Rock Creek, and in the Kings Canyon/Myrick Canyon area. Big Rock Creek ranked highest.

Groundwater Recharge/Banking

LACWWD 40 Aquifer Storage and Recover (ASR) Project	
Project Sponsor:	LACWWD 40
Goals and Project Description:	This past winter ('05-'06), LACWWD 40 used 4 wells to store approximately 1,500 AF in the groundwater basin (personal communication, David Pedersen, LACWWD 40). LACWWD 40 started the 2006 ASR program in November with 6 wells in operation, with a combined injection rate of 2,500 to 3,000 gallons per minute (gpm) (personal communication, David Pedersen, LACWWD 40). As proposed by the LACWWD 40, this project in the future could involve the expansion of the existing ASR project to include 15 injection wells to allow for the maximum injection rate.

5.2.1.2 Current Water Supply Management Activities/Actions

Current strategies being used to address the water supply issues include development of plans and studies, court action, investigations into groundwater recharge and groundwater banking programs, use of recycled water, demand management through conservation and water use efficiency, and efficiency upgrades through infrastructure improvements. These projects submitted are grouped into these categories, as shown below.

Plans and Studies

Antelope Valley Integrated Regional Water Management Plan	
Project Sponsor:	As required under the Guidelines, the IRWM Plan must be prepared by a Regional Water Management Group (RWMG) which consists of at least three agencies with water related responsibilities for the Antelope Valley Region. The RWMG includes AVEK, AVSWCA, Lancaster, Palmdale, LCID, LACSD 14 and 20, LACWWD 40, PWD, QHWD, and RCSD.
Goals and Project Description:	The Antelope Valley IRWM Plan would allow for a more efficient management of the water resources for the Antelope Valley Region by encouraging coordination of all affected agencies within the Antelope Valley Region. Through the IRWM Plan process, agencies will work together to identify solutions to key water management issues for the Antelope Valley Region and thereby facilitate the implementation of necessary projects to reach the Antelope Valley Regions objectives. The IRWM Plan will also meet the requirements for the Assembly Bill (AB) 3030 plan.
City of Lancaster Groundwater Recharge Feasibility Study	
Project Sponsor:	City of Lancaster
Goals and Project Description:	The purpose of this project was to investigate the feasibility of utilizing recycled water to recharge the groundwater within the Antelope Valley Region. The groundwater recharge feasibility study was initiated in March 2006, and a draft released in January 2007. The study area for the report encompasses the Lancaster, Buttes and Pearland hydrogeologic subunits of the Antelope Valley groundwater basin. Potential recycled water sources in the study area include the Lancaster WRP, the Palmdale WRP and the Rosamond Wastewater Treatment Plant (WWTP). This study assessed institutional, regulatory, technical, and financial opportunities and challenges of groundwater recharge. These opportunities and challenges were studied in sufficient detail to provide local officials with the basis for decision on if and how the Antelope Valley Region should move forward with groundwater recharge. The draft report found that groundwater recharge using recycled water could provide up to 30,000 AFY of new water supply to the Antelope Valley Region by 2025.

Palmdale Water District Reconnaissance Level Feasibility and Scoping Study for Recycled Water Recharge	
Project Sponsor:	PWD
Goals and Project Description:	PWD's intent for this study is to build on prior work and identify potential projects to provide the planned use of recycled and other water sources for groundwater recharge and banking in the southeast portion of the Antelope Valley Region. It will also identify regulatory requirements, possible obstacles for permitting, and strategies for addressing them.
Palmdale Water District 2006 Water System Master Plan Update	
Project Sponsor:	PWD
Goals and Project Description:	PWD's plan for improvements and expansion of its existing infrastructure is currently being developed in its 2006 Water System Master Plan Update. According to PWD's 2006 Strategic Plan, PWD is identifying additional water sources by investigating increasing the yield from Littlerock Reservoir, water conservation, recycled water (urban irrigation and groundwater recharge), additional Table A SWP water, and water transfers. The 2006 Update will also provide a plan for infrastructure upgrades, which include development of a hydraulic model for the existing system and identifying improvements needed to mitigate existing deficiencies.

Court Actions

Adjudication of the Groundwater Basin	
Project Sponsor:	Involves multiple agencies, land owners, and stakeholder interests in the Antelope Valley Region
Goals and Project Description:	The Antelope Valley Groundwater Basin is currently in the early stages of adjudication. The adjudication will provide a means to effectively manage the basin to prevent future overdraft. A general adjudication has begun in the Los Angeles County Superior Court and the case is in the early stages (Antelope Valley Groundwater Cases, Judicial Council Coordination Proceeding No. 4408). One of the issues in the adjudication is whether the Antelope Valley Groundwater Basin, particularly the Lancaster Sub-Basin, may be in "overdraft," meaning that current pumping rates exceed the sustainable yield.

Groundwater Recharge/Banking

Antelope Valley Water Agencies' Water Bank	
Project Sponsor:	RCSD, LCID, QHWD, AVEK
Goals and Project Description:	This water banking option would be similar to that proposed by Western Development and Storage below, with the exception that the three water purveyors and potentially AVEK would own and operate the water bank themselves. Potential advantages include reduced costs, more control, and an abbreviated schedule. Disadvantages include the need to conduct further study and the lack of an experienced agency with water banking experience. Furthermore, the water purveyors would be responsible for conducting the necessary technical studies, environmental documentation, and all capital costs.
Tejon Ranch Water Bank	
Project Sponsor:	Tejon Ranch
Goals and Project Description:	In 2006, Tejon Ranch constructed and is operating a groundwater bank on its property. The bank is located less than 1 mile north of the East branch of the California Aqueduct. The recharge area of the bank currently includes nine basins and covers 120 acres. Thus far, Tejon Ranch has banked over 4,000 acre-feet of water imported into the Antelope Valley from the State Water Project. The approximate storage capacity of this bank in its current configuration is roughly 60,000 acre-feet. Tejon Ranch is willing to negotiate cooperative arrangements with public agencies and private parties who want to store and/or withdraw water from this water bank. Interested parties may contact Dennis Atkinson at Tejon Ranch (661-663-4240).

Water Infrastructure Improvements

Expansion of Treatment Facilities	
Project Sponsor:	RWMG
Goals and Project Description:	Expansion of the treatment facilities in the Antelope Valley Region would allow for the utilization of all the available SWP water from AVEK, PWD, and LCID for water banking or ASR. Additional water from AVEK is a key element in the majority of the water supply strategies available to the Antelope Valley Region. AVEK's current treatment capacity to LACWWD 40 is 65 million gallons per day (mgd) (73,000 AFY). However, in order for the LACWWD 40 to utilize all of AVEK's additional water for water banking or ASR they would need to receive around 98,000 AFY. Thus, there is a significant need for expansion of the Quartz Hill Water Treatment Plant to meet the LACWWD 40's needs. It is anticipated that an expansion to 97 mgd should be sufficient to meet LACWWD 40 future demand (LACWWD 40 1999). Planned LACWWD 40 facility improvements include new wells, reservoirs and pipelines throughout its system to meet current and projected water supply requirements. Additional connections with AVEK will be needed to maximize use of available imported water. PWD also plans to expand its existing treatment plant to 35 mgd and is in the preliminary design stage for a new 10 mgd treatment plant. QHWD plans to enlarge existing wells or drill new wells to meet additional demands. This will become increasingly more important as QHWD utilizes more groundwater to meet projected demands. RCSD has expressed a need for new wells, a reservoir and additional transmission mains to meet projected demands (RCSD 2004). Additionally, RCSD will need to expand their imported water facilities to account for their significant increase in the use of SWP water.

Water Conservation/Water Use Efficiency

Best Management Practices	
Project Sponsor:	LACWWD 40, AVEK, PWD, QHWD, RCSD
Goals and Project Description:	Currently, all water agencies in the Antelope Valley Region utilize water conservation methods as a means to reduce demand during drought conditions. Additionally, LACWWD 40 is a member of the California Urban Water Conservation Council (CUWCC) and a signatory of the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). Signatories pledge to develop and implement the 14 Best Management Practices (BMPs) that are intended to reduce long-term urban water demands. These BMPs are functionally-equivalent to the demand management measures (DMMs) in CWC §10631(f)(1) and are as listed below. DMM 1. Water survey programs for single-family residential and multi-family residential customers. DMM 2. Residential plumbing retrofit. DMM 3. System water audits, lead detection, and repair. DMM 4. Metering with commodity rates for all new connections and retrofit of existing connections. DMM 5. Large landscape conservation programs and incentives. DMM 6. High-efficiency washing machine rebate programs. DMM 7. Public information programs. DMM 8. School education programs. DMM 9. Conservation programs for commercial, industrial, and institutional accounts. DMM 10. Wholesale agency programs. DMM 11. Conservation pricing. DMM 12. Water conservation coordinator. DMM 13. Water waste prohibition. DMM 14. Residential ultra-low-flush toilet replacement programs. AVEK is not a signatory to the CUWCC MOU and is not a member of CUWCC. The only DMM that applies directly to a wholesaler is DMM 10, which AVEK currently implements. Additionally AVEK implements the following DMMs: 3, 4, 7, 8, and 12. AVEK also supports and encourages its retailers to implement the remaining DMMs. LACWWD 40 has been a signatory to the CUWCC MOU since April 1996. LACWWD 40 has implemented or plans to implement 11 of the 14 DMMs as early as 2005. DMM 6 and DMM 14 are not planned for implementation since neither DMM is cost effective at this time. DMM 10 does not apply to water retailers. PWD is not a signatory to the CUWCC MOU and is not a member of CUWCC. However, PWD currently implements or plans to implement 13 of the 14 DMMs as early as 2005. DMM 10 does not apply to water retailers. QHWD is not a signatory to the CUWCC MOU and is not a member of CUWCC. However, QHWD currently implements or plans to implement 13 of the 14 DMMs as early as 2005. DMM 10 does not apply to water retailers. RCSD is not a signatory to the CUWCC MOU and is not a member of CUWCC. However, RCSD currently implements or plans to implement 13 of the 14 DMMs as early as 2005. DMM 10 does not apply to water retailers.

5.2.1.3 Planned Water Supply Management Activities/Actions

The following projects were submitted during the "Call for Projects" to address the water supply management needs of the Antelope Valley Region. Strategies to address the water supply issues include groundwater recharge and groundwater banking, use of recycled water, demand management through conservation and water use efficiency, and efficiency upgrades through infrastructure improvements. These projects submitted are grouped into these categories, as shown below.

Groundwater Recharge/Banking

Upper Amargosa Creek Recharge and Channelization Project	
Project Sponsor:	City of Palmdale
Project Goals and Purposes:	This project will increase the Antelope Valley Region's water supply, increase the amount of protected natural habitat and provide improved flood prevention within the Amargosa Creek watershed.
Project Description:	Proposed project improvements include: expanding the size and capacity of the spreading ground of the natural recharge area; developing and preserving an ephemeral stream habitat; and channelization of Amargosa Creek (soft bottom) and providing a grade separation of 20th Street West over Amargosa Creek.
Quantifiable Benefits:	5,000 to 10,000 AFY; 15 acres open space/habitat; 20 acres flood protection.
Amargosa Water Banking and Storm Water Retention Project	
Project Sponsor:	Submitted on behalf of John Goit, Sundale Mutual Water
Project Goals and Purposes:	The purpose of the project is to restore depressed water table levels in addition to providing stormwater, flood control, and open space benefits.
Project Description:	The Amargosa Water Banking and Storm Water Retention (Amargosa) Project involves banking water to restore the depressed water table to 250 to 335 feet below ground, thereby saving pumping costs. Additionally, the Amargosa Project may include the addition of check dams and holding basins to facilitate stormwater capture and improve flood control. These sites may double as open space/recreation areas.
Quantifiable Benefits:	Restoration of the depressed water table through water recharge could save approximately $450,000 annually in pumping costs.
Antelope Valley Water Bank	
Project Sponsor:	Western Development and Storage (WDS)
Project Goals and Purposes:	Increase water supply reliability in the Antelope Valley Region by providing storage through development of a water bank.
Project Description:	The Antelope Valley Water Bank will provide 500,000 AF of storage in the Neenach Subbasin of the Antelope Valley Basin and the ability to recharge and recover 100,000 AFY. This storage could be used to regulate supplies on a seasonal and year-to-year basis by storing water when it is plentiful for later use when needed. The project is strategically located near imported water supply wheeling infrastructure (1 mile from AVEK West Feeder and 8 miles from East Branch of the SWP California Aqueduct) providing a geographically logical means to store and regulate supplies.
Quantifiable Benefits:	Recharge and recover 100,000 AFY; 1,630 acres open space/habitat

Aquifer Storage and Recovery Project: Injection Well Development	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	This project would improve the reliability of the AVEK water supply.
Project Description:	The project involves the construction of ten new well sites in a groundwater depression area of the Antelope Valley Region to improve water supply reliability. The additional wells would be available for water injection during wet years and for water extraction during dry years.
Quantifiable Benefits:	12,000 AFY
Aquifer Storage and Recovery Project: Additional Storage Capacity	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	This project would improve the efficiency of the AVEK water supply.
Project Description:	This project would increase the District's turnout capacity from AVEK through improvements made to existing infrastructure. Four older, smaller turnout pipelines would be replaced with larger ones to supply water to ASR wells.
Quantifiable Benefits:	More information required to quantify benefit.
Deep wells to Recapture Banked Water	
Project Sponsor:	RCSD
Project Goals and Purposes:	To provide a way to capture banked groundwater when needed.
Project Description:	Drill and equip 6 deep wells between Avenue A and Rosamond Boulevard, 70th to 140th Street West.
Quantifiable Benefits:	More information required to quantify benefit.
Gaskell Road Pipeline	
Project Sponsor:	RCSD
Project Goals and Purposes:	To provide a way to capture banked groundwater when needed.
Project Description:	Construct and operate a 30-inch diameter potable water pipeline on Gaskell Road, in Southeast Kern County, from 60th Street West to 140th Street West, with pumps, valves, meters, telemetry and remote controls from a centralized SCADA control point in Rosamond Community Services District's Operational Center.
Quantifiable Benefits:	100 to 1,000 AF
Groundwater Banking	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	Increase water supply reliability through creation of a groundwater banking program.
Project Description:	The project would establish a groundwater bank to include 63,500 AF extraction capacity during dry years and 170,000 AF storage capacity.
Quantifiable Benefits:	63,500 AF
LCID East-Side Groundwater Recharge Project[1]	
Project Sponsor:	Littlerock Creek Irrigation District
Project Goals and Purposes:	Increase imported water supply reliability in the Antelope Valley Region by developing storage and allowing for recharge.
Project Description:	The project is a groundwater recharge project on approximately 120 to 160 acres of Los Angeles County owned land on the east-side of the Valley at 117 and T. There are currently nonproductive County wells that could be used to recharge SWP water. LCID has wells on the property that could be used to facilitate the recharge operations.
Quantifiable Benefits:	More information required to quantify benefit.

Purchasing Spreading Basin Land	
Project Sponsor:	RCSD
Project Goals and Purposes:	To provide land to spread water for percolation and water banking for other entities.
Project Description:	Purchase water spreading basins land in West Kern County from Avenue A to Rosamond B.
Quantifiable Benefits:	More information required to quantify benefit.
Water Supply Stabilization Project – Westside Project	
Project Sponsor:	AVEK, AVSWCA
Project Goals and Purposes:	Increase imported water supply reliability in the Antelope Valley Region by developing storage and allowing for recharge.
Project Description:	Imported water stabilization program that utilizes SWP water delivered to the Antelope Valley Region's westside for groundwater recharge and supplemental supply required for the Antelope Valley Region during summer peaking demand and anticipated dry years. This project includes additional facilities necessary for the delivery of untreated water for direct recharge (percolation basins) or indirect (in-lieu) recharge and for wells and pipeline for treated water conveyance.
Quantifiable Benefits:	5,000 AFY to 10,000 AFY; 15 acres open space; 20 acres flood management
Water Supply Stabilization Project – Eastside Project	
Project Sponsor:	AVEK, AVSWCA
Project Goals and Purposes:	Increase imported water supply reliability in the Antelope Valley Region by developing storage and allowing for recharge.
Project Description:	This project is similar to AVEK's Westside Project, but is meant for the eastside of the Antelope Valley Region.
Quantifiable Benefits:	More than 1,000 AFY

Recycled Water

Groundwater Recharge Using Recycled Water Pilot Project	
Project Sponsor:	City of Lancaster (LADPW, AVEK, LACSD 14)
Project Goals and Purposes:	Increase water supply reliability through use of recharged recycled water.
Project Description:	The Pilot Project would assess maximization of available recycled water by utilizing this valuable source to recharge the local over-draft groundwater basin, increasing the Antelope Valley Region's overall water resources. This project would recharge a blend of recycled water from the 1 mgd membrane bioreactor (MBR) plant at the Lancaster WRP with storm water and/or treated imported water at the City of Lancaster-proposed 100-acre storm water basin at 60th Street West and Avenue F. The Pilot project would allow of extraction of 2,500 AFY and create 100 acres of open space. Ultimately, this recharge project would recharge 50,000 AFY of blend water, with blend water consisting of 40,000 AFY of imported SWP water and 10,000 AFY of recycled water from Lancaster WRP. The baseline project would extract 48,000 AFY of recharged water, on average, via a new well field and deliver the water to wholesaler/retailer distribution system(s) and private agricultural users.
Quantifiable Benefits:	2,500 AFY and 100 acres open space; ultimately 48,000 AFY and 1,000 acres of open space.

1 This project was not submitted in time to be evaluated against the Plan objectives, water management strategies, AB 3030 guidelines, and IRWM Plan Preferences and shown in the Section 6 tables. It will evaluated in this manner along with any other project ideas that are submitted after the final plan is adopted in the first plan update.

Groundwater Recharge - Recycled Water Project	
Project Sponsor:	PWD
Project Goals and Purposes:	Increase water supply reliability through stabilizing the groundwater supply and by using recycled water for recharge purposes whereas potable water would have been used otherwise.
Project Description:	This project involves groundwater recharge using recycled water from the Palmdale WRP. This project is anticipated to be similar to the Lancaster groundwater recharge project described below and have similar blending and extraction numbers (e.g., a blend of 10,000 AFY of recycled water and 40,000 AFY of SWP water). In order to have 40,000 AFY of SWP water to blend, this project would most likely end up being an AVSWCA project (or at least a joint venture type project with AVEK and/or LCID).
Quantifiable Benefits:	48,000 AFY
KC and LAC Interconnection Pipeline	
Project Sponsor:	RCSD (LACSD as joint partner)
Project Goals and Purposes:	To carry recycled water from/to LA County Tertiary Treatment Plant into Kern County to LA County.
Project Description:	Place 36-inch piping between RCSD and Los Angeles County at Avenue A at 20th and 60th Streets West. Place piping north and south on 20th Street and 60th Street to existing recycled water pipelines.
Quantifiable Benefits:	More information required to quantify benefit.
North Los Angeles/Kern County Regional Recycled Water Project	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	The overall goal of this project is to provide recycled water to the Antelope Valley Region, thereby reducing the Antelope Valley Region's dependence on SWP water.
Project Description:	The Los Angeles/Kern County Regional Recycled Water Project outlines the foundation of a regional recycled water system in the Antelope Valley Region. The proposed system would distribute recycled water throughout the service area and provide a backbone system that could accommodate minimum and maximum demands and allow significant deliveries of recycled water to recharge areas. The recommended plan's placement of the system components is based on an analysis of the service area demands, topography, and desired operating pressures. Specifically, the proposed system components of the recommended plan consist of: recycled water supply, a main pump station, booster pump stations, storage reservoirs, and distribution system. The construction of the recycled water supply system would be phased overtime and it is anticipated that all phases of construction would be completed by 2011. Recycled water users would include municipal medians, agriculture, commercial, golf courses, school yards, and parks as allowed by California Department of Health Services, Division 4, Title 22 (Title 22).
Quantifiable Benefits:	Quantifiable benefits include the increased use of approximately 64,780 AFY of recycled water by 2025.
Palmdale Power Project	
Project Sponsor:	City of Palmdale
Project Goals and Purposes:	Construct a power generating facility that utilizes available recycled water.
Project Description:	Construction of a 570 Mega-Watt (MW) electricity generating facility. The Palmdale Power Project will be a hybrid design, utilizing natural gas combined cycle technology and solar thermal technology. The Palmdale Power Project would be a customer and end user of 3,200 AFY of reclaimed water.
Quantifiable Benefits:	Identified users of approximately 3,200 AFY of recycled water.

Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H	
Project Sponsor:	City of Lancaster
Project Goals and Purposes:	The proposed project would create a demand for utilizing tertiary treated recycled water from the Lancaster WRP and provide a reliable means to dispose of recycled water.
Project Description:	This project involves the construction of a 12-inch lateral pipeline off the Regional Backbone at/near Ave M conveying tertiary treated water to a point approximately one mile west and designed to deliver recycled water into the Amargosa Creek channel. Tertiary treated water would travel northerly within the Amargosa Creek roughly 4.7 miles, creating incidental recharge en route until collecting at Lake Lancaster (retention basin north of Ave H). Here, it would be available for irrigation and dust control at the Antelope Valley Fair Grounds and extended use to the west side of Lancaster and surrounding Antelope Valley Region.
Quantifiable Benefits:	100 to 1,000 AFY

Water Conservation & Water Use Efficiency

ET-Based Controller Program	
Project Sponsor:	PWD
Project Goals and Purposes:	Improve water use efficiency on landscaped areas.
Project Description:	This project involves the installation of ET-based irrigation controllers for landscaped areas. This project can assist water purveyors in the Antelope Valley Region in meeting BMPs for water use efficiency and will reduce runoff from over watering of landscaped areas.
Quantifiable Benefits:	Approximately 240 AFY if used on 14 large landscape users in PWD's service area.
Implement Evapotranspiration (ET) Controller Program	
Project Sponsor:	LACWWD 40 (potential joint partners: City of Lancaster, City of Palmdale, PWD, AVEK, Building Industry Association [BIA], Antelope Valley Water Conservation Coalition [AVWCC], and home-owner associations).
Project Goals and Purposes:	Improve water use efficiency on landscaped areas.
Project Description:	Develop and implement an ET controller pilot program in the Antelope Valley Region that can be used as a model to a future mandatory program for new development. The pilot program will include the purchase and installation of (estimated) two weather stations in a selected residential development and replace (approximately) 300 manually adjusted irrigation controllers with weather-sensitive irrigation controllers for the District's qualified customers.
Quantifiable Benefits:	100 to 1,000 AFY
Precision Irrigation Control System	
Project Sponsor:	Leona Valley Town Council
Project Goals and Purposes:	Improve water use efficiency on landscaped areas.
Project Description:	The project is a proposed irrigation control system using electronic sensor probes at root level. Sensors relay data to a computer which controls irrigation valves, delivering a precise amount of water and effectively eliminating over-irrigation.
Quantifiable Benefits:	More than 150 AFY

Ultra Low Flush Toilet (ULFT) Change Out Program	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	Improve urban water use efficiency.
Project Description:	The ULFT Change Out Program would distribute ULFTs to customers through one-day Saturday toilet distributions. The one-day distributions provide single-family residents with up to two free ULFTs. This proposal provides one annual one-day distribution events over a three-year duration. Each one-day event will include up to 1,500 ULFTs for District No. 40 per year. This proposal is consistent with BMP No. 14, Residential ULFT Replacement Programs to replace existing high-water-using toilets with ultra-low flush (1.6 gallons or less) toilets for residential customers.
Quantifiable Benefits:	1 to 100 AFY
Water Conservation Demonstration Garden	
Project Sponsor:	PWD
Project Goals and Purposes:	Demonstrate savings from water efficient gardens.
Project Description:	This project involves the construction of a water conservation demonstration garden that will educate the public on water use efficiency practices.
Quantifiable Benefits:	Approximately 86,000 AF savings over a 20 year period.
Water Conservation School Education Program	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	Promote water conservation awareness and encourage stewardship in the Antelope Valley Region.
Project Description:	Develop and implement a school education program to promote water conservation awareness and encourage stewardship among school-age children (kindergarten through twelfth grade). This program is consistent with BMP No. 8, School Education Program to promote water conservation and water conservation related benefits, including working with school districts and private schools with within the District's service area to provide instructional assistance, educational materials, and classroom presentations that identify urban, agricultural, and environmental issues and conditions in the local watershed.
Quantifiable Benefits:	More information required to quantify benefit.
Water Waste Ordinance	
Project Sponsor:	LACWWD 40 (potential joint partners: City of Lancaster, City of Palmdale, Los Angeles County for unincorporated areas, water suppliers, etc.)
Project Goals and Purposes:	Reduce water demand during drought years through enforceable ordinances requiring more efficient use of water.
Project Description:	Develop a year-round conservation program as an enforceable ordinance to reduce the impacts of water demand during drought years. May include watering schedule ordinance, water waste ordinance, and landscape ordinance for new development.
Quantifiable Benefits:	More information required to quantify benefit.

Water Infrastructure Improvements

Avenue K Transmission Main, Phases I-IV	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	Increase supply reliability through increases in infrastructure capacity and flexibility.
Project Description:	The project consists of four phases for a total of approximately 32,000 linear feet of 30-inch and 36-inch diameter steel transmission main. The proposed transmission main will have interconnections to the existing distribution system and will increase the capacity of the water system to meet the existing domestic and fire protection requirements.
Quantifiable Benefits:	Firms up existing supply
Avenue M and 60th Street West Tanks	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	This project would provide the necessary system pressure, if the water from AVEK was diminished or not available. Thus providing for greater water supply reliability.
Project Description:	This project would include the design and construction of four (4) 3 mgd water storage tanks.
Quantifiable Benefits:	More information required to quantify benefit.
Littlerock Dam Sediment Removal Project	
Project Sponsor:	PWD
Project Goals and Purposes:	Increase capacity and reliability of surface water storage in Littlerock Reservoir.
Project Description:	This project will remove up to 540,000 cubic yards of sediment that has been accumulated from runoff into Littlerock Reservoir, and up to 40,000 cubic yards on an annual basis after the initial sediment is removed. The project may include a grade control structure that will protect the identified habitat of the arroyo toad.
Quantifiable Benefits:	More than 1,000 AFY
Place Valves and Turnouts on Reclaimed Water Pipeline	
Project Sponsor:	RCSD
Project Goals and Purposes:	To provide valving and controls to direct water to various pipelines for use by RCSD, AVEK, LACWWDs, etc.
Project Description:	Place various required turnouts, remove controlled valves, treatment stations, other control features to move water around.
Quantifiable Benefits:	100 to 1,000 AFY
RCSD's Wastewater Pipeline	
Project Sponsor:	RCSD
Project Goals and Purposes:	This project would provide for a possible expansion of RCSD's recycled water services beyond the 0.5 mgd expansion in order to provide more recycled water in a quicker period of time. Bringing excess waste water from LAC would provide the inflow.
Project Description:	This project would include placing a 36-inch wastewater pipeline from LACSD to RCSD's WWTP. The total distance would be approximately 15 miles.
Quantifiable Benefits:	Increases potential users of recycled water

Other projects that could provide Water Supply Management benefits, as secondary to their main benefits include the following:

- 45th Street East Flood Control Basin (Q-East Basin)
- Avenue Q and 20th Street East Basin (Q-West Basin)
- Hunt Canyon Groundwater Recharge and Flood Control Basin (PWD)
- Stormwater Harvesting (Leona Valley Town Council)
- Lancaster WRP Stage V (LACSD)

- Lancaster WRP Stage VI (LACSD)
- Lancaster WRP Proposed Effluent Management Sites (LACSD)
- Palmdale WRP Existing Effluent Management Sites (LACSD)
- Palmdale WRP Stage V (LACSD)
- Palmdale WRP Stage VI (LACSD)
- Palmdale WRP Proposed Effluent Management Sites (LACSD)
- Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (LACWWD 40)
- Tropico Park Pipeline Project (RCSD)

5.2.2 Water Quality Management Strategy

The water quality management strategy must include projects and actions that meet the water quality issues and needs as discussed in Section 3. The key issues and needs are: meeting water quality regulations for groundwater recharge; needing to provide wastewater treatment for a growing population; being able to meet evolving regulations; and being able to handle emerging contaminants. In order to gauge success in addressing these issues, the water quality management strategy must meet the following objectives shown in Table 5-3 and as defined in Section 4.

Table 5-3 Water Quality Objectives

Objective	Planning Target
Provide drinking water that meets customer expectations.	Continue to meet Federal and State standards as well as customer standards for taste and aesthetic.
Protect aquifer from contamination.	Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.
	Map contaminated sites and monitor contaminant movement by December 2008.
	Identify contaminated portions of aquifer and prevent migration of contaminants by June 2009.
Protect natural streams and recharge areas from contamination.	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.
Maximize beneficial use of recycled water.	Increase infrastructure and policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.

5.2.2.1 Completed (Recent) Water Quality Management Activities/Actions

A number of recent plans and studies have been conducted to investigate water quality issues within the Antelope Valley Region, as shown below.

Plans and Studies

Final Lancaster WRP 2020 Facilities Plan and Environmental Impact Report	
Project Sponsor:	LACSD14
Goals and Project Description:	The intent of the Lancaster WRP 2020 Plan is as follows: Provide wastewater treatment and effluent management capacity adequate to meet the needs of LACSD 14 through the year 2020 in an environmentally sound and cost-effective manner., Eliminate unauthorized effluent-induced overflows from Piute Ponds to Rosamond Dry Lake in the most expeditious manner possible and in consideration of the Regional Water Quality Control Board (RWQCB), Lahontan Region, in order to avoid any threatened nuisance condition as determined by Edwards AFB; Ensure recycled water of sufficient quality and quantity is available to satisfy emerging municipal reuse needs; and Comply with the requirements to maintain Piute Ponds. The Lancaster WRP 2020 Plan project, 26 mgd Conventional Activated Sludge Tertiary Treatment, Agricultural Reuse, and Storage Reservoirs, addresses the aims listed above.
Final Palmdale WRP 2025 Facilities Plan and Environmental Impact Report	
Project Sponsor:	LACSD 20
Goals and Project Description:	The overall intent of the Palmdale WRP 2025 Plan is to identify a project that meets the wastewater treatment and effluent management needs of LACSD 20 through year 2025 in a cost-effective and environmentally sound manner. Specifically: Provide wastewater treatment capacity adequate to meet the needs of LACSD 20 through the year 2025; Provide effluent management capacity adequate to meet the needs of LACSD 20 through the year 2025; Provide a long-term solution for meeting water quality requirements set forth by regulatory agencies; and Provide a wastewater treatment and effluent management program that accommodates emerging recycled water reuse opportunities. The major components of the project are wastewater treatment facilities, effluent management facilities, and municipal reuse. Some processes of the wastewater treatment and effluent management facilities will be constructed to upgrade the treatment and effluent management level currently provided at the Palmdale WRP. For other processes, facilities will be expanded from 15.0 mgd to 22.4 mgd. These changes will be performed in stages.

Palmdale Water Reclamation Concept Study	
Project Sponsor:	City of Palmdale, PWD, LACWWD 40, LACSD 20
Goals and Project Description:	The purpose of the Water Reclamation Concept Study was to evaluate three potential conceptual uses of recycled water produced by the Palmdale WRP, owned and operated by LACSD. The concepts considered included the following: Discharge of effluent into existing sand and gravel pits located in the eastern portion of the City of Palmdale to create a recreational facility. Recharge of local groundwater basins with highly treated effluent. Discharge of highly treated effluent into Lake Palmdale, which serves as the forebay for the PWD WRP. Each of these alternatives was evaluated at the conceptual level in an effort to identify feasibility and preliminary costs. The findings of the Study indicated that utilizing effluent for recreational purposes within gravel pits would not result in the utilization of a significant quantity of effluent. With this finding, such use was found not to be feasible unless combined with another alternative. The introduction of highly treated effluent into Lake Palmdale was not considered feasible as such discharge would not comply with the preliminary requirements established by the California Department of Public Health (DPH) for a similar proposal developed by the City of San Diego. The third alternative, discharge of highly treated effluent into local groundwater basins, was found to be technically feasible and would have costs similar to alternative water supplies available within the Antelope Valley Region. Implementing a groundwater recharge program would require resolution of a number of key regulatory issues, the outcome of which could greatly impact the cost of the program.

5.2.2.2 Current Water Quality Management Activities/Actions

Current strategies being used to address the water quality issues focus on the use of recycled water within the Antelope Valley Region, as shown below.

Water Infrastructure Improvements

Chloramines Conversion Project	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	Prevent deterioration of water quality due to differing treatment methods between purveyors.
Project Description:	This project involves the system-wide conversion from chlorine disinfection methods to chloramines disinfection techniques. This allows for the system to be compatible with AVEK's disinfection method and prevent the deterioration of water quality in the distribution system.
Quantifiable Benefits:	Improved water quality.

RCSD Recycled Water Project/Treatment Plant Expansion	
Project Sponsor:	RCSD
Project Goals and Purposes:	The overall goal of the project is to provide approximately 1.5 mgd of recycled water to the RCSD service area, thereby reducing the dependence on SWP water.
Project Description:	Rosamond Wastewater Treatment Plant (WWTP), located in the City of Rosamond, is owned, operated, and maintained by the RCSD. Rosamond WWTP, which has a permitted capacity of 1.3 mgd treated an average flow of 1.1 mgd to undisinfected secondary standards for landscape irrigation on-site. RCSD planned to increase the capacity to 1.8 mgd in 2006 through the addition of 0.5 mgd tertiary treatment facility. The tertiary treatment facility will then be upgraded to 1.0 mgd in 2010. Design for the proposed treatment plant improvements is complete and has been approved by the State of California. Construction was delayed due to lack of funding. Once constructed, the plant would provide tertiary treated recycled water for landscape irrigation at median strips, parks, schools, senior complexes and new home developments.
Quantifiable Benefits:	The quantifiable benefits include the increased use of approximately 1.5 mgd of recycled water to the RCSD service area, thereby reducing dependence on SWP water.

Groundwater Management

Update of Antelope Valley Groundwater Basin Model	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	Evaluate how quickly the groundwater basin is being replenished by both natural and artificial recharge sources.
Project Description:	The County is partnering with the USGS to produce an updated groundwater flow model for Antelope Valley that can be used to better manage the basin's groundwater resources.
Quantifiable Benefits:	Development of a tool to help local water managers more effectively manage their water resources, both in quality and quantity.

5.2.2.3 Planned Water Quality Management Activities/Actions

The following planned activities and actions have been identified to improve water quality in the Antelope Valley Region by providing drinking water that meets customer expectations, protecting the aquifer from contamination, identifying and preventing future contaminant migration, and maximizing the beneficial reuse of wastewater. These projects were submitted by the stakeholders during the Call for Projects.

Recycled Water

42nd Street East, Sewer Installation	
Project Sponsor:	City of Palmdale
Project Goals and Purposes:	This project would reduce groundwater pollution by eliminating septic tanks currently in use by homes in the vicinity of 42nd Street East.
Project Description:	The City proposes to construct new sewer lines, and will require homes in the vicinity of 42nd Street East to connect to the system, thereby eliminating the use of septic tanks and the potential for groundwater pollution due to leaks and spills.
Quantifiable Benefits:	Groundwater quality would be improved and future contamination reduced through elimination of existing septic tanks.

Lancaster WRP Stage V	
Project Sponsor:	LACSD
Project Goals and Purposes:	The proposed upgrades will help to maximize the beneficial use of recycled water to agricultural and other end users.

Project Description:	The project involves construction and design of a new pump station, storage reservoirs, and other ancillary facilities needed to increase effluent storage capacity to 21 mgd. The project also includes land acquisition needed for site development.
Quantifiable Benefits:	Providing recycled water to the 16,700 AFY of users included in the Section 3 water budget analysis. Water Quality benefits are not quantifiable at this time.
Lancaster WRP Stage VI	
Project Sponsor:	LACSD
Project Goals and Purposes:	The proposed upgrades will help to maximize the beneficial use of recycled water to agricultural and other end users.
Project Description:	This next phase of project development includes the design and construction of a recycled water pump station, storage reservoir, and other ancillary facilities to increase capacity from 21 mgd to 26 mgd.
Quantifiable Benefits:	Providing recycled water to the 16,700 AFY of users included in the Section 3 water budget analysis. Water Quality benefits are not quantifiable at this time.
Lancaster WRP Proposed Effluent Management Sites	
Project Sponsor:	LACSD
Project Goals and Purposes:	The proposed upgrades to the effluent management sites will help to maximize the beneficial reuse of wastewater to agricultural and other end users.
Project Description:	This project includes the following series of activities at proposed new effluent management sites: land acquisition, purchase and installation of irrigation equipment, development of an area-wide farm management plan, site development, completion of associated studies and permits, soil sampling, and well investigation of proposed effluent management sites.
Quantifiable Benefits:	Reduces further elevation of nitrate levels at management sites
Palmdale WRP Existing Effluent Management Sites	
Project Sponsor:	LACSD
Project Goals and Purposes:	The proposed upgrades to the Palmdale WRP existing effluent management sites will improve overall water quality in the Antelope Valley Region and maximize the beneficial reuse of waste-water to agricultural and other end users.
Project Description:	This project includes monitoring, purchase and installation of irrigation equipment, and comple-tion of other capital cost projects associated with the existing effluent management sites.
Quantifiable Benefits:	Reduces further elevation of nitrate levels at management sites
Palmdale WRP Stage V	
Project Sponsor:	LACSD
Project Goals and Purposes:	The proposed upgrades will help to maximize the beneficial reuse of wastewater to agricultural and other end users.
Project Description:	This phase of the upgrade project includes the following series of activities: construction of an effluent pump station, force main, agricultural recycled water pump station, and an agricultural recycled water storage tank and reservoir; development of the new reservoir site and installation of monitoring wells; and design and construction of secondary/tertiary treatment facilities.
Quantifiable Benefits:	Providing recycled water to the 16,700 AFY of users included in the Section 3 water budget analysis. Water Quality benefits are not quantifiable at this time.
Palmdale WRP Stage VI	
Project Sponsor:	LACSD
Project Goals and Purposes:	The proposed upgrades will help to maximize the beneficial reuse of wastewater to agricultural and other end users.
Project Description:	This project includes the design and construction of another agricultural recycled water force main, effluent pump station, and storage reservoir. In addition, a treatment plant expansion of 5 mgd is proposed at this stage.
Quantifiable Benefits:	Providing recycled water to the 16,700 AFY of users included in the Section 3 water budget analysis. Water Quality benefits are not quantifiable at this time.

Palmdale WRP Proposed Effluent Management Sites	
Project Sponsor:	LACSD
Project Goals and Purposes:	The proposed upgrades to the Palmdale WRP proposed effluent management sites will improve overall water quality in the Antelope Valley Region and maximize the beneficial reuse of waste-water to agricultural and other end users.
Project Description:	This project includes the following series of activities at proposed new effluent management sites: land acquisition, purchase and installation of irrigation equipment, development of an area-wide farm management plan, site development, completion of associated studies and permits, groundwater monitoring, and well abandonment.
Quantifiable Benefits:	Reduces further elevation of nitrate levels at management sites

Water Infrastructure Improvements

Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation	
Project Sponsor:	LACWWD 40
Project Goals and Purposes:	Remediate groundwater contaminated by arsenic in a cost-effective manner.
Project Description:	This project proposes arsenic mitigation of five groundwater wells using a proven and cost-effective non-treatment alternative to expensive treatment methods.
Quantifiable Benefits:	Prevents loss of groundwater pumping and existing supply and ensures water quality that meets MCL requirements.
PWD New Treatment Plant	
Project Sponsor:	PWD
Project Goals and Purposes:	The proposed new treatment plant is intended to provide additional water treatment capacity for imported water, thereby improving water quality in the area and providing for additional supply.
Project Description:	This project involves the construction of a new water treatment plant at 47th Street East and the California Aqueduct, for the treatment of SWP and Littlerock Reservoir water. The initial capacity of the plant will be 10 mgd.
Quantifiable Benefits:	The new plant would be capable of treating up to 10 mgd of water.
QHWD Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation	
Project Sponsor:	Quartz Hill Water District (QHWD)
Project Goals and Purposes:	This project will decrease arsenic levels and thus will help QHWD reach compliance with EPA's new legal standard for arsenic (January 2006), This project will benefit several lower income regions of the district due to the location of the well.
Project Description:	This project will pull the pump from the well located on West Avenue L in Lancaster and "micro-grout" the region of strata that contains higher levels of arsenic. Doing so will localize these regions of strata using a cost-effective, non-treatment method.
Quantifiable Benefits:	Prevents loss of groundwater pumping and existing supply and ensures water quality that meets MCL requirements.

Other projects that could provide Water Quality Management benefits, as secondary to their main benefits include the following:

- Antelope Valley Water Bank (WDS)
- Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project (Lancaster)
- Groundwater Recharge - Recycled Water Project (PWD)
- North Los Angeles/Kern County Regional Recycled Water Project (LACWWD 40)
- RCSD Recycled Water Project/Treatment Plant Expansion (RCSD)
- Tertiary Treated Water Conveyance and Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H (Lancaster)

- Water Supply Stabilization Project – Westside Project (AVEK)
- Water Supply Stabilization Project – Eastside Project (AVEK)

5.2.3 Flood Management Strategy

The flood management strategy must include projects and actions that meet the flood issues and needs as discussed in Section 3. The key issues and needs are: lack of coordinated flood system or planning efforts throughout the Antelope Valley Region; poor water quality of runoff; nuisance water and dry weather runoff; difficulty providing flood management without interfering with groundwater recharge; incorporating water conservation where feasible; and desire of Edwards AFB to maintain operations on the dry lake beds. In order to gauge success in addressing these issues, the flood management strategy must meet the following objectives as defined in Section 4 and summarized in Table 5-4.

Table 5-4 Flood Management Objectives

Objective	Planning Target
Reduce negative impacts of stormwater, urban runoff, and nuisance water.	Coordinate a regional flood management plan and policy mechanism by the year 2010.

5.2.3.1 Completed (Recent) Flood Management Activities/Actions

The following are previous studies regarding flood and stormwater management and capture activities in the Antelope Valley Region.

Plans and Studies

Antelope Valley Comprehensive Plan of Flood Control and Water Conservation	
Project Sponsor:	LADPW
Project Goals and Description:	This 1987 plan depicts proposed locations for flood control and water conservation, which are intended to provide a regional flood management system consisting of floodplain management and a drainage infrastructure "backbone" system. The plan was not intended for land use regulation; the plan is meant to be a prerequisite to the collection of fees from future subdividers. The plan proposes floodplain management in the hillside areas, structural improvements in the urbanizing area, and nonstructural management approaches in the rural areas. Structural improvements include detention and retention facilities, groundwater recharge basins, storm channels, and stormdrain infrastructure.
QHWD Stormwater Evaluation Study	
Project Sponsor:	QHWD
Project Goals and Description:	The intent of the Study was to define the amount of stormwater flow into the basin, determine the amount lost to evaporation and percolation, evaluate the water quality, and estimate treatment costs. The study concentrated on a 15-acre stormwater basin within the district. Results from the study, if favorable, could lead to an expanded study of the Antelope Valley Region as a whole. Actual volumes of potential supply and associated operation costs have yet to be determined.
RCSD Master Control Plan	
Project Sponsor:	RCSD
Project Goals and Description:	RCSD plans to work with Kern County, LA County and property owners to develop a master control plan to capture stormwater runoff for beneficial purposes. The system would be designed to minimize property damage.

5.2.3.2 Current Flood Management Activities/Actions

No current flood management activities or actions have been identified at this time.

5.2.3.3 Planned Flood Management Activities/Actions

The following planned activities and actions have been identified to reduce the negative impacts of flood water, improve the quality of water runoff, and/or reduce the extent of nuisance water. These projects were submitted by the stakeholders during the Call for Projects.

Plans and Studies

45th Street East Flood Control Basin (Q-East Basin)	
Project Sponsor:	PWD
Project Goals and Purposes:	This project will integrate with the construction of the 45th Street East and Avenue P-8 detention basin for flood control, provide a possible groundwater recharge area, and provide for natural habitat preservation.
Project Description:	The project includes the construction of a new, approximately 2,083 AF drainage basin near 45th Street East and Avenue P-8, on property currently owned by the City of Los Angeles' Department of Airports.
Quantifiable Benefits:	Approximately 208 acres of new wildlife habitat would be created by this project. Water quality would also be expected to improve as a result of reduced contaminated stormwater runoff and capture of up to 2,083 AF.
Anaverde Detention Basin, Dam and Spillway at Pelona Vista Park	
Project Sponsor:	City of Palmdale
Project Goals and Purposes:	This project would provide a new multipurpose flood control basin that would result in the creation of new wildlife habitat, meet conservation efforts, capture stormwater runoff and reduce nuisance water.
Project Description:	The City proposes to construct the Pelona Vista Dam located along Tierra Subida between Avenue S and Rayburn Road, including all necessary and associated grading, inlet/outlet structures, spillway, and storm drain piping as part of its stormwater collection and conveyance system.
Quantifiable Benefits:	The project has the ability to provide for wildlife habitat, conservation, and stormwater capture.
Avenue Q and 20th Street East Basin (Q-West Basin)	
Project Sponsor:	PWD
Project Goals and Purposes:	Similar to the Q-East Basin described above, this project will integrate with the construction of the Avenue Q and 20th Street East detention basin for flood control, provide a possible groundwater recharge area, and provide for natural habitat preservation.
Project Description:	The project entails the acquisition and construction of an approximately 1,612 AF detention basin located between Avenue P-12 and Avenue Q, from 20th Street East to 30th Street East. (Conversely, and depending on site acquisition feasibility, the detention basin could be located on Los Angeles World Airport's property from Avenue P-8 to Avenue P-12.)
Quantifiable Benefits:	Approximately 161 acres of new wildlife habitat would be created by this project. Water quality would also be expected to improve as a result of reduced contaminated stormwater runoff and capture of up to 1,612 AF.

Barrel Springs Detention Basin and Wetlands	
Project Sponsor:	City of Palmdale
Project Goals and Purposes:	This project will provide flood control for the City of Palmdale and provide for wetland enhancement and habitat protection.
Project Description:	Construction of an 878 AF detention basin in the Barrell Springs area upstream of Old Harold Road and 25th Street East, on a 40-acre, City-owned property.
Quantifiable Benefits:	The project would provide flood control for the City of Palmdale, and provide approximately 40 acres of wetland enhancement and habitat protection.
Hunt Canyon Groundwater Recharge and Flood Control Basin	
Project Sponsor:	PWD
Project Goals and Purposes:	This project is intended to alleviate flooding concerns in the Antelope Valley Region through detention of excess stormwater runoff during severe storms. The basin would also provide new recharge area for raw aqueduct water.
Project Description:	The project entails construction of a new 3,000 AF detention/ recharge basin, located south of Pearblossom Highway at 57th Street East. The basin would be used to store aqueduct water to allow recharge into the aquifer, and would act as a detention basin during severe storms.
Quantifiable Benefits:	Approximately 300 acres of new wildlife habitat would be created by construction of this project. Water quality would be expected to improve as a result of reduced contaminated stormwater runoff and capture of up to 3,000 AF.
Quartz Hill Storm Drain	
Project Sponsor:	Los Angeles Department of Public Works
Project Goals and Purposes:	The project consists of the design and construction of a reinforced concrete pipe storm drain to provide stormwater collection and conveyance within the unincorporated Los Angeles area of Quartz Hill. The proposed project would alleviate local flooding and have the potential to provide water conservation and improved water quality.
Project Description:	As such, the project proposes construction of a storm drain, including several lateral connections and catch basins, to provide stormwater collection and conveyance. The project would connect to existing and new drainage facilities, with the improvements located mainly along 50th Street, from Avenue M-8 to Avenue K-8.
Quantifiable Benefits:	Flood protection of 95 acres of County street right-of-way, and 1,108 acres of private property.
Stormwater Harvesting	
Project Sponsor:	Leona Valley Town Council
Project Goals and Purposes:	Agriculture operations throughout the Leona Valley are an important economic and natural resource that requires a consistent and reliable source of irrigation water at reasonable cost. The collection and conveyance of stormwater for use as irrigation water would result in water conservation benefits, improved water supply, and reduced localized flooding.
Project Description:	This project includes the construction of stormwater collection of conveyance facilities, water filtration devices, and cisterns and collection tanks. Through advanced filtration methods, this project can also be expanded to create potable water for residential uses.
Quantifiable Benefits:	Once fully implemented, it is estimated that water conservation of up to 25 AFY could be realized. Expansion of the project to include the creation of potable harvested water for residential uses would further this benefit.

Other projects that could provide Flood Management benefits, as secondary to their main benefits include the following:

- 42nd Street East, Sewer Installation (Palmdale)
- Amargosa Creek Pathways Project (Lancaster)
- Amargosa Creek Recharge and Channelization Project (Palmdale)
- Amargosa Water Banking and Storm Water Retention Project (Goit)
- Groundwater Banking (LACWWD 40)
- Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project (Lancaster)

- Water Supply Stabilization Project – Westside Project (AVEK)
- Water Supply Stabilization Project – Eastside Project (AVEK)

5.2.4 Environmental Resource Management Strategy

The environmental resource management strategy must include projects and actions that meet the environmental issues and needs as discussed in Section 3. The key issues and needs are: growing public demand for recreational opportunities; conflict between industry, growth, and preserving open space; and protecting threatened and endangered species. In order to gauge success in addressing these issues, the environmental resource management strategy must meet the following objectives as defined in Section 4 and summarized in Table 5-5.

Table 5-5 Environmental Management Objectives

Objective	Planning Target
Preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region.	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat, to integrate and maximize surface and groundwater management by 2015.

5.2.4.1 Completed (Recent) Environmental Resource Management Activities/Actions

There is one completed (recent) environmental resource management activity identified at this time.

Plans and Studies

Integrated Natural Resources Management Plan (INRMP) for Edwards Air Force Base (AFB), California	
Project Sponsor:	Air Force Flight Test Center Environmental Management Office
Project Goals and Purposes:	The purpose of this plan is to help integrate environmental stewardship into the Base's military mission and to guide on-the-ground management of the installation's natural resources.
Project Description:	The final draft of Edwards AFB INRMP was completed in October 2002 to meet the requirements under the Sikes Improvement Act of 1997. The INRMP is based on ecosystem management principles and includes management plans for threatened and endangered species, fish and wildlife, forestry, grazing and cropland, pest management and land and outdoor recreation (Air Force 2002).
Quantifiable Benefits:	Identifies management principles to protect environmental habitat.

5.2.4.2 Current Environmental Resource Management Activities/Actions

The following presents two strategies currently being used to manage environmental resources in the Antelope Valley Region.

Plans and Studies

LA County General Plan Significant Ecological Areas (SEAs)	
Project Sponsor:	Los Angeles County
Project Goals and Purposes:	Preservation of diversity is the main objective of the SEA designation, and connectivity between important natural habitats plays an important role in maintaining biotic communities.
Project Description:	SEAs are ecologically important or vulnerable land and water areas that are valuable as plant or animal communities and often important to the preservation of threatened or endangered species. Cumulatively, the SEAs contain resources that represent the biodiversity of Los Angeles County. SEAs are neither preserves nor conservation areas; they do not prohibit a reasonable use of property, although new development must be designed and built to accommodate the existing biological resources in a functioning condition.
Quantifiable Benefits:	Protection and preservation of environmental habitat.

Recycled Water

Piute Ponds Reuse Sites	
Project Sponsor:	LACSD
Project Goals and Purposes:	This project proivdes reuse water to create and maintain wetlands for environmental habitat.
Project Description:	This project involves reusing tertiary treated effluent on the 400 acres at Piute Ponds and approximately 90 acres in three impoundment areas within Edwards AFB
Quantifiable Benefits:	Maintains approximately 490 acres of wetlands.

5.2.4.3 Planned Environmental Management Activities/Actions

The following planned activities and actions have been identified to preserve existing open space and protect endangered species through habitat protection. These projects were submitted by the stakeholders during the Call for Projects.

Habitat Restoration

Ecosystem and Riparian Habitat Restoration of Amargosa Creek: Avenue J to Avenue H	
Project Sponsor:	City of Lancaster
Project Goals and Purposes:	This project provides better land use and natural area connectivity by establishing a riparian corridor that combines ecosystem restoration, habitat protection, acoustic and visual buffers, and wetlands creation and enhancement.
Project Description:	This project establishes riparian habitat along the eastern edge of the Amargosa Creek in elongated segments and sections resulting in a "Riparian Curtain" approximately extending from Ave J north to Ave H. This project requires site reconnaissance, coordination with California Department of Fish and Game (CDFG), various bio-assessments and planting plans prior to implementation and creation. Restoration projects such as this are holistic and enhance the environment, providing physical buffers and off-sets to impacts on the overall ecosystem of ephemeral and riparian habitat associated with Amargosa Creek.
Quantifiable Benefits:	100 to 1,000 AF of open space created

Recycled Water

Tropico Park Pipeline Project	
Project Sponsor:	RCSD
Project Goals and Purposes:	This project will provide a way of using tertiary water to develop and water a regional park north to Tropico Hill.
Project Description:	Place 16-inch recycled water pipeline from Gaskell Road north to Tropico regional Park area.
Quantifiable Benefits:	100 to 1,000 AF of open space created

Other projects that could provide Environmental Management benefits, as secondary to their main benefits include the following:

- 45th Street East Flood Control Basin (Q-East Basin)
- Amargosa Creek Recharge and Channelization Project (Palmdale)
- Amargosa Creek Pathways Project (Lancaster)
- Amargosa Water Banking and Storm Water Retention Project (None)
- Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park (Palmdale)
- Antelope-Fremont Watershed Assessment and Plan (Antelope Valley Conservancy)
- Avenue Q and 20th Street East Basin (Q-West Basin)
- Barrel Springs Detention Basin and Wetlands (Palmdale)
- Hunt Canyon Groundwater Recharge and Flood Control Basin (PWD)
- Littlerock Dam Sediment Removal Project (PWD)
- Pelona Vista Project (PWD)

5.2.5 Land Use Management Strategy

The land use management strategy must include projects and actions that meet the land use issues and needs as discussed in Section 3. The key issues and needs are: tremendous pressure for growth in the Antelope Valley Region; and loss of local culture and values. In order to gauge success in addressing these issues, the environmental resource management strategy must meet the following objectives as defined in Section 4 and summarized in Table 5-6.

Table 5-6 Land Use Management Objectives

Objective	Planning Target
Maintain agricultural land use within the Antelope Valley Region.	Preserve 100,000 acres of farmland in rotation through 2035.
Meet growing demand for recreational space.	Contribute to local and regional General Planning documents to provide 5,000 acres of parkland by 2035.
Improve integrated land use planning to support water management.	Coordinate a regional land use management plan by the year 2010.

5.2.5.1 Completed (Recent) Land Use Management Activities/Actions

No completed (recent) land use management activities have been identified at this time.

5.2.5.2 Current Land Use Management Activities/Actions

Identified current activities to manage land uses in the Antelope Valley Region are the regional general plans as shown below.

Plans and Studies

Antelope Valley Regional Conservation Roundtable	
Project Sponsor:	Antelope Valley Conservancy
Project Goals and Purposes:	Facilitate consensus for regional approach to natural lands conservation.
Project Description:	Participants include City of Lancaster, City of Palmdale, County of Los Angeles, CDFG, Southern California Association of Governments (SCAG), California State Parks, County of Los Angeles Parks and Recreation, and project sponsor Antelope Valley Conservancy.
Quantifiable Benefits:	Preservation of natural lands.
Update Los Angeles County General Plan	
Project Sponsor:	County of Los Angeles
Project Goals and Purposes:	Manage and preserve existing land uses and community character, including agricultural, residential, open space, etc. within the growing Los Angeles County, which includes the Antelope Valley Region, while providing for new recreational opportunities and infrastructure to support the population's needs.
Project Description:	Project includes updating the existing Los Angeles County General Plan.
Quantifiable Benefits:	Improved land use designations.

Recycled Water

Apollo Lakes Reuse Project	
Project Sponsor:	LACSD
Project Goals and Purposes:	Project goals include maintaining Apollo Lake for recreation uses.
Project Description:	This project involves using tertiary treated effluent to maintain Apollo Lakes for recreational uses.
Quantifiable Benefits:	Maintenance of recreational space.

5.2.5.3 Planned Land Use Management Activities/Actions

Two projects were submitted for inclusion in the IRWM Plan through the Call for Projects that provide direct benefits associated with land use management. Additional activities and actions that can be taken to preserve the existing agricultural uses in the Antelope Valley Region and to meet the growing demand for recreational area could include projects such as: expansion of agricultural lands, land acquisition for agricultural or recreational purposes, updates of regional specific plans that include preservation of agricultural and recreational lands, etc.

Plans and Studies

Antelope-Fremont Watershed Assessment and Plan	
Project Sponsor:	Antelope Valley Conservancy
Project Goals and Purposes:	To facilitate a holistic, watershed-wide approach to land use planning that will help to ensure that watershed, conservation, and recreational assets creation will be equitably distributed and prudently planned throughout the Antelope Valley Region community.
Project Description:	The proposed project is the coordination and preparation of the Antelope-Fremont Watershed Assessment and Plan, a regional land use plan with emphasis on the preservation and restoration of sensitive natural systems of the Antelope-Fremont Watershed. Because this assessment and plan applies a systems approach -- the CalFed Approach -- to watershed stewardship, it will enhance capacity building of storage, aquifer recharge, and runoff treatment, reducing reliance on State Water supplies and enhancing water quality. It will inform regional projects and create land management plans to satisfy trustee agencies for regional conservation lands. Therefore, this project exponentially benefits all Antelope Valley Region projects' watershed habitat components, maximizing capacity building and integrating watershed stewardship in the community.
Quantifiable Benefits:	2,000 acres open space/habitat/conservation lands.

Recreation

Amargosa Creek Pathways Project	
Project Sponsor:	Lancaster
Project Goals and Purposes:	To construct a pathway in harmony with established riparian habitat within a flood control management basin, which captures stormwater and nuisance water runoff that sustains riparian habitat.
Project Description:	This project includes development of a top of bank trail or paseo along the eastern side of Lake Lancaster, and construction of a foot-bridge structure crossing the lake and connecting under Hwy 14 to link to the existing trailhead at the Antelope Valley Fairgrounds. The project integrates stormwater/flood control with natural riparian habitat enhancement and preservation, open/recreational space and land use management.
Quantifiable Benefits:	1 to 100 AF of open space

Other projects that could provide Land Use Management benefits, secondary to their main benefits include the following:

- Upper Amargosa Creek Recharge and Channelization Project (Palmdale)
- Antelope Valley Water Bank (WDS)
- North Los Angeles/Kern County Regional Recycled Water Project (LACWWD 40)
- Lancaster WRP Stage V (LACSD)
- Lancaster WRP Stage VI (LACSD)
- Lancaster WRP Proposed Effluent Management Sites (LACSD)
- Palmdale WRP Stage V (LACSD)
- Palmdale WRP Stage VI (LACSD)
- Palmdale WRP Existing Effluent Management Sites (LACSD)
- Palmdale WRP Proposed Effluent Management Sites (LACSD)
- Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project (Lancaster)
- Water Supply Stabilization Project – Westside Project (AVEK)
- Water Supply Stabilization Project – Eastside Project (AVEK)
- Ecosystem And Riparian Habitat Restoration of Amargosa Creek: Ave J to Ave. H (Lancaster)
- Piute Ponds Reuse Sites (LACSD)

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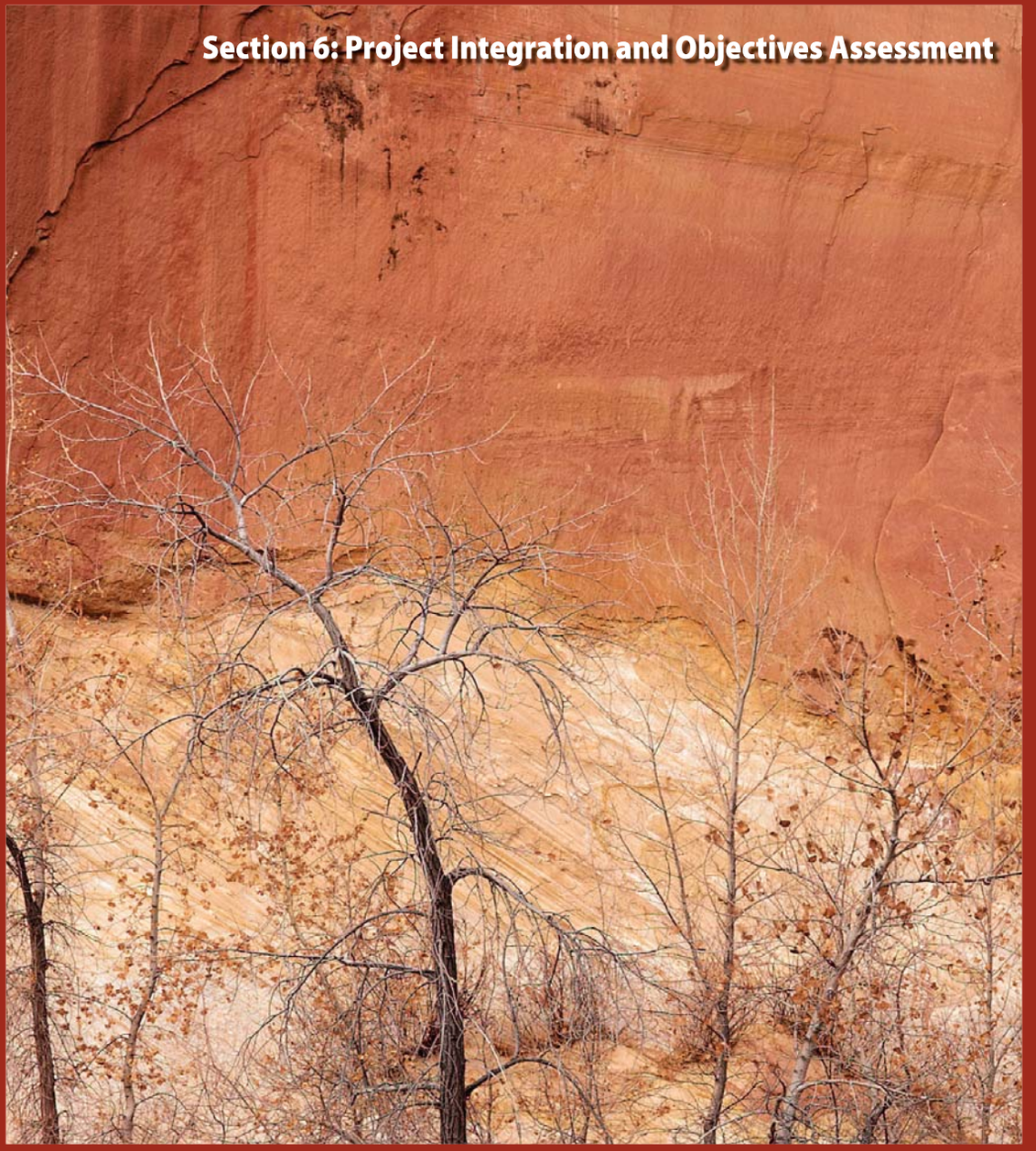
Section 6: Project Integration and Objectives Assessment



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Desert butte habitat fosters biological diversity relative to surrounding areas, and maintaining its integrity is important to the preservation of threatened or endangered species.

Section 6: Project Integration & Objectives Assessment

Water management strategy integration is a process to design water management strategy alternatives to maximize regional benefits by identifying potential synergies, linkages, and gaps between the projects, actions and studies identified in Section 5, as well as within and across the water management strategy areas. The aim of this section is to assess whether the projects identified in Section 5 are sufficient to meet the needs of the Antelope Valley Region, and if not, to identify future planning actions in order to meet this purpose. Integration of the water management strategies (WMS) could occur in several ways:

- Integration "within" a water management strategy area (WMSA), wherein the identified current and planned projects, and project concepts, actions, and studies, are evaluated against their specific WMSA objectives (i.e., projects benefiting water supply are compared to the water supply objectives); and
- Integration "across" each WMSA, wherein the identified current and planned projects, and project concepts, actions and studies are evaluated against ALL the water management strategy area objectives identified in Section 4 (i.e., projects benefiting water supply may also benefit flood management, or water quality objectives). Integration "across" each WMSA will also include the following:
  - » Geographical integration, wherein the areas benefited by the water management strategies are mapped to determine if any geographic overlaps or gaps exist, and then opportunities are identified to take advantage of being in the same geographical location and thus potentially provide multiple benefits, and

» Comparison of each of the identified current and planned projects, and project concepts, actions, and studies to the Integrated Regional Water Management (IRWM) Guideline Strategies (presented in Section 5), the Assembly Bill (AB) 3030 Groundwater Management Guidelines objectives, the Integrated Regional Water Management (IRWM) Plan Guidelines Program Preferences, and the California Department of Water Resources (DWR) Statewide Priorities.

6.1 INTEGRATION AND OBJECTIVES ASSESSMENT "WITHIN" A WMSA

Tables 6-1 and 6-2 illustrate whether the IRWM Plan objectives, for each WMSA, are met by a particular project, current or proposed, respectively. These tables allow for an evaluation of the projects within each WMSA; but also allows for an evaluation across the WMSAs, as described in more detail in Section 6.2 below.

Gaps are areas where the suite of current and proposed projects identified in Section 5 fail to meet or contribute to the IRWM Plan objectives. In order to address these gaps, alternative project concepts and ideas are presented and a preliminary evaluation of the pros and cons, as well as costs and benefits of the alternatives, are provided when available.

It was important to the Stakeholder group to identify objectives that were SMART,[1] and one way to be Measurable is to be quantifiable. Therefore, the objectives in Section 4 include quantifiable planning targets to help gauge whether a particular objective has been met. For those projects that were far enough along in the planning stages to quantify the benefit, their benefit could be evaluated against its respective planning target. However, many of the projects submitted identified a 'benefit category' to a particular WMSA (e.g., water supply, water quality), but because they may have been conceptual projects or in the initial stages of planning their 'benefit' may not yet be quantified. Thus, these projects were evaluated more qualitatively, as whether they could contribute to the attainment of a particular objective. For example, one project concept submitted for evaluation is the establishment of an evapotranspiration (ET) based-controller program. Because this program was submitted as a concept project, with the number of potential users and other technical details not yet quantified, the amount of savings from this program would have to be determined as the project scope was more clearly defined. However, it is logical to assume that the program would result in some amount of conservation, which would reduce the demand for irrigation water by some percentage, and would therefore go towards meeting the water supply planning target of reducing the mismatch of expected supply and demand and contribute to the objective of providing a reliable water supply to meet demands between now and 2035.

As the AV IRWM Plan is updated and as project scopes are refined opportunities exist to reevaluate these projects, and evaluate whether this IRWM Plan is meeting the issues and needs of the Antelope Valley Region.

6.1.1 Water Supply WMSA

Issues and needs relating to the water supply for the Antelope Valley Region generally regard providing a reliable water supply to meet demands, and protecting the groundwater resource. As detailed in Section 3, the Antelope Valley Region will need either to increase supplies or decrease demands to fill the 236,800 AFY of projected mismatch by 2035, for an average water year. Section 4 presented the following objectives and planning targets identified by the Stakeholder group in order to address this deficit and these concerns:

Water Supply Objective 1. Provide reliable water supply to meet the Antelope Valley Region's expected demand between now and 2035.

- **Target:** Reduce (73,600 to 236,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.
- **Target:** Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.
- **Target:** Provide adequate reserves (0 to 62,000 AF/4-year period) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.

Most of the water supply projects proposed by the stakeholders regard the establishment of recharge areas, water banking programs, and aquifer storage and recovery (ASR) programs. These projects demonstrate that the stakeholders view conjunctive use operations as essential in order to meet the water supply needs in the Antelope Valley Region, and lessen the gap between supply and demand currently and out into the future.

1 A SMART objective is one that is Specific, Measurable, Attainable, Relevant, and Time-Based.

Table 6-1 Current Projects vs. IRWM Plan Objectives and Planning Targets

"Current Project/ Program Types and Activities"	Water Supply Management								Water Quality Management										Flood Management		Environmental Management		Land Use Management						Contributes to Multiple Objectives
	Provide reliable water supply to meet the Region's expected demand between now and 2035.	Reduce (73,600 to 236,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.	Provide adequate reserves (57,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.	Provide adequate reserves (0 to 62,000 AFY) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.	Establish a contingency plan to meet water supply needs of the region during a plausible disruption of SWP water deliveries.	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer by June 2010.	Stabilize groundwater levels at current conditions.	Manage groundwater levels throughout the basin such that a 10 year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.	Provide drinking water that meets customer expectations.	Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetic.	Protect aquifer from contamination.	Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.	Identify contaminated portions of aquifer and prevent migration of contaminants by June 2009.	Map contaminated sites and monitor contaminant movement by December 2008.	Protect natural streams and recharge areas from contamination.	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.	Maximize beneficial use of recycled water.	Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.	Reduce negative impacts of storm water, urban runoff, and nuisance water.	Coordinate a regional flood management plan and policy mechanism by the year 2010.	Preserve open space and natural habitats that protect and enhance water resources and species in the region.	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat to integrate and maximize surface and groundwater management by 2015.	Maintain agricultural land use within the Region.	Preserve 100,000 acres of farmland in rotation through 2035.	Meet growing demand for recreational space.	Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.	Improve integrated land use planning to support water management.	Coordinate a regional land use management plan by the year 2010.	
WATER SUPPLY MANAGEMENT																													
Plans & Studies																													
Antelope Valley Integrated Regional Water Management Plan																													
City of Lancaster Groundwater Recharge Feasibility Study (Lancaster)	X	X	X	X			X	X			X	X			X	X	X	X	X		X								WS, WQ, FM, EM
Palmdale Water District Reconnaissance Level Feasibility and Scoping Study for Recycled Water Recharge (PWD)	X																X	X			X	X							WS, WQ, EM
Palmdale Water District 2006 Water System Master Plan Update (PWD)	X	X	X	X			X	X	X	X							X	X											WS, WQ
Court Action																													
Adjudication of the Groundwater Basin							X	X			X	X	X	X	X	X													WS, WQ
Groundwater Recharge/Banking																													
Antelope Valley Water Agencies' Water Bank (AVEK, LCID, QHWD, RCSD)	X	X	X	X			X	X													X	X					X		WS, EM
Tejon Ranch Water Bank (Tejon Ranch Water Company)	X	X	X	X			X	X													X	X							WS, WQ, EM
Water Infrastructure Improvements																													
Expansion of Treatment Facilities (RWMG)	X	X	X	X					X	X							X	X											WS, WQ
Water Conservation/Water Use Efficiency																													
Best Management Practices (AVEK, LACWWD40, PWD, QHWD, RCSD)	X	X	X	X	X	X																							WS
WATER QUALITY MANAGEMENT																													
Water Infrastructure Improvements																													
Chloramines Conversion Project (LACWWD40)									X	X	X	X	X		X	X													WQ
RCSD Recycled Water Project/Treatment Plant Expansion (RCSD)	X	X	X	X													X	X									X		WS, WQ
FLOOD MANAGEMENT																													
None identified at this time																													
ENVIRONMENTAL MANAGEMENT																													
Plans & Studies																													
LA County General Plan Significant Ecological Areas (SEAs)																					X						X		FM
Recycled Water																													
Piute Ponds Reuse Sites																					X	X			X				EM, LM
LAND USE MANAGEMENT																													
Plans & Studies																													
Antelope Valley Regional Conservation Roundtable (AV Conservancy)																					X		X		X	X	X	X	EM, LM
Update Los Angeles County General Plan																					X		X		X		X		EM, LM
Recycled Water																													
Apollo Lakes Reuse Project																									X	X			LM
SUMMARY	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**		**X**	**X**	**X**	**X**	

Legend

WS = Water Supply Management FM = Flood Management EM = Environmental Resources Management

WQ = Water Quality Management LM = Land Use Management

Table 6-2 Planned Projects vs. IRWM Plan Objectives and Planning Targets

Planned Project/ Program Types and Activities	Water Supply Management								Water Quality Management										Flood Management		Environmental Management		Land Use Management						Contributes to Multiple Objectives
	Provide reliable water supply to meet the Region's expected demand between now and 2035.	Reduce (73,600 to 263,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.	Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.	Provide adequate reserves (0 to 62,000 AFY) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.	Establish a contingency plan to meet water supply needs of the region during a plausible disruption of SWP water deliveries.	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer by June 2010.	Stabilize groundwater levels at current conditions.	Manage groundwater levels throughout the basin such that a 10 year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.	Provide drinking water that meets customer expectations.	Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetic.	Protect aquifer from contamination.	Prevent unacceptable degradation of a aquifer according to the Basin Plan throughout the planning period.	Identify contaminated portions of aquifer and prevent migration of contaminants by June 2009.	Map contaminated sites and monitor contaminant movement by December 2008.	Protect natural streams and recharge areas from contamination.	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.	Maximize beneficial use of recycled water.	Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.	Reduce negative impacts of storm water, urban runoff, and nuisance water.	Coordinate a regional flood management plan and policy mechanism by the year 2010.	Preserve open space and natural habitats that protect and enhance water resources and species in the region.	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat to integrate and maximize surface and groundwater management by 2015.	Maintain agricultural land use within the Region.	Preserve 100,000 acres of farmland in rotation through 2035.	Meet growing demand for recreational space.	Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.	Improve integrated land use planning to support water management.	Coordinate a regional land use management plan by the year 2010.	
WATER SUPPLY MANAGEMENT																													
Groundwater Recharge/Banking																													
Amargosa Creek Recharge and Channelization Project (Palmdale)	X	X	X	X			X	X											X		X	X					X		WS, FM, EM
Amargosa Water Banking and Storm Water Retention Project (No financial sponsor identified)	X	X	X	X			X	X											X		X	X			X	X	X		WS, FM, EM
Antelope Valley Water Bank (WDS)	X	X	X	X		X	X	X			X	X			X	X					X	X	X	X			X		WS, WQ, EM
Aquifer Storage and Recovery Project: Injection Well Development (LACWWD40)	X	X	X	X			X	X																					WS
Aquifer Storage and Recovery Project: Additional Storage Capacity (LACWWD40)	X																												WS
Deep wells to Recapture Banked Water (RCSD)	X	X	X	X			X	X																					WS
Gaskell Road Pipeline (RCSD)	X	X	X	X																									WS
Groundwater Banking (LACWWD40)	X	X	X	X		X	X	X											X		X	X					X		WS, FM, EM
Purchasing Spreading Basin Land (RCSD)																					X	X					X		EM
Water Supply Stabilization Project – Westside Project (AVEK, AVSWCA)	X	X	X	X	X	X	X	X			X	X			X	X					X	X	X	X			X		WS, EM, LM
Water Supply Stabilization Project – Eastside Project (AVEK, AVSWCA)	X	X	X	X	X	X	X	X			X	X			X	X					X	X	X	X			X		WS, EM, LM
Recycled Water																													
Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project (Lancaster)	X	X	X	X			X	X									X	X	X		X	X					X		WS, WQ, FM, EM
Groundwater Recharge - Recycled Water Project (PWD)	X	X	X	X			X	X									X	X	X		X	X					X		WS, WQ,FM, EM
KC & LAC Interconnection Pipeline (RCSD)																	X	X											WQ
North Los Angeles/Kern County Regional Recycled Water Project (LACWWD40)	X	X	X	X													X	X									X		WS, WQ
Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H (Lancaster)							X	X									X	X									X		WS, WQ
Water Conservation/Water Use Efficiency																													
ET-Based Controller Program (PWD)	X	X																	X								X		WS, FM
Implement Evapotranspiration (ET) Controller Program (LACWWD40)	X	X																	X								X		WS, FM
Precision Irrigation Control System (Leona Valley Town Council)	X	X															X	X	X	X			X				X		WS, WQ, FM, LM
Ultra Low Flush Toilet (ULFT) Change Out Program (LACWWD40)	X	X																											WS
Water Conservation Demonstration Garden (PWD)	X	X																	X								X		WS, FM, EM
Water Conservation School Education Program (LACWWD40)	X	X																	X										WS, FM, EM
Water Waste Ordinance (LACWWD40)	X	X																	X								X		WS, FM
Water Infrastructure Improvements																													
Avenue K Transmission Main, Phases I-V (LACWWD40)	X																												WS
Avenue M and 60th Street West Tanks (LACWWD40)	X				X	X																							WS
Littlerock Dam Sediment Removal Project (PWD)	X	X																			X								WS, EM
Place Valves and Turnouts on Reclaimed Water Pipeline (RCSD)	X																X	X											WS, WQ
RCSD's Wastewater Pipeline (RCSD)	X																X	X											WS, WQ
WATER QUALITY MANAGEMENT																													
Recycled Water																													

Table 6-2 Planned Projects vs. IRWM Plan Objectives and Planning Targets (continued)

Planned Project/ Program Types and Activities	Water Supply Management								Water Quality Management										Flood Management		Environmental Management		Land Use Management						Contributes to Multiple Objectives
	Provide reliable water supply to meet the Region's expected demand between now and 2035.	Reduce (73,600 to 263,800 AFY) mismatch of expected supply and demand in average year's by providing new water supply and reducing demand, starting 2009.	Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.	Provide adequate reserves (0 to 62,000 AFY) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.	Establish a contingency plan to meet water supply needs of the region during a plausible disruption of SWP water deliveries.	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer by June 2010.	Stabilize groundwater levels at current conditions.	Manage groundwater levels throughout the basin such that a 10 year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.	Provide drinking water that meets customer expectations.	Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetic.	Protect aquifer from contamination.	Prevent unacceptable degradation of a aquifer according to the Basin Plan throughout the planning period.	Identify contaminated portions of aquifer and prevent migration of contaminants by June 2009.	Map contaminated sites and monitor contaminant movement by December 2008.	Protect natural streams and recharge areas from contamination.	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.	Maximize beneficial use of recycled water.	Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.	Reduce negative impacts of storm water, urban runoff, and nuisance water.	Coordinate a regional flood management plan and policy mechanism by the year 2010.	Preserve open space and natural habitats that protect and enhance water resources and species in the region.	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat to integrate and maximize surface and groundwater management by 2015.	Maintain agricultural land use within the Region.	Preserve 100,000 acres of farmland in rotation through 2035.	Meet growing demand for recreational space.	Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.	Improve integrated land use planning to support water management.	Coordinate a regional land use management plan by the year 2010.	
42nd Street East, Sewer Installation (Palmdale)											X	X	X		X	X											X		WQ
Lancaster WRP Stage V (LACSD)	X	X															X	X			X		X	X			X		WQ, LM
Lancaster WRP Stage VI (LACSD)	X	X															X	X			X		X	X			X		WQ, LM
Lancaster WRP Proposed Effluent Management Sites (LACSD)																	X	X					X	X			X		WQ, LM
Palmdale Power Project (Palmdale)																	X	X											WQ
Palmdale WRP Existing Effluent Management Sites (LACSD)											X	X	X	X			X	X					X	X			X		WQ, LM
Palmdale WRP Stage V (LACSD)	X	X									X	X	X	X			X	X					X	X			X		WQ, LM
Palmdale WRP Stage VI (LACSD)	X	X									X	X	X	X			X	X					X	X			X		WQ, LM
Palmdale WRP Proposed Effluent Management Sites (LACSD)											X	X	X	X			X	X					X	X			X		WQ, LM
Water Infrastructure Improvements																													
Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (LACWWD40)											X	X	X		X	X													WQ
PWD New Treatment Plant (PWD)	X	X	X	X					X	X																			WS, WQ
QHWD Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (QHWD)											X	X	X		X	X													WQ
FLOOD MANAGEMENT																													
Water Infrastructure Improvements																													
45th Street East Flood Control Basin (Q-East Basin) (Palmdale)							X	X											X		X	X					X		WS, FM, EM
Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park (Palmdale)	X	X																	X		X	X					X		WS, FM, EM
Avenue Q and 20th Street East Basin (Q-West Basin) (Palmdale)	X	X																	X		X	X					X		WS, FM, EM
Barrel Springs Detention Basin and Wetlands (Palmdale)	X	X																	X		X	X					X		WS, FM, EM
Hunt Canyon Groundwater Recharge and Flood Control Basin (Palmdale)	X	X																	X		X	X					X		WS, FM, EM
Quartz Hill Storm Drain (LAFCD)																			X								X		FM
Stormwater Harvesting (Leona Valley Town Council)		X	X	X													X	X	X	X			X	X			X		WS, WQ, FM, LM
ENVIRONMENTAL MANAGEMENT																													
Habitat Restoration																													
Ecosystem & Riparian Habitat Restoration of Amargosa Creek: Avenue L to Avenue G (Lancaster)											X	X			X	X			X		X	X					X		EM, FM, LM
Recycled Water																													
Tropico Park Pipeline Project (RCSD)																	X	X							X	X	X		WQ, LM
LAND USE MANAGEMENT																													
Plans and Studies																													
Antelope-Fremont Watershed Assessment and Plan (Antelope Valley Conservancy)											X	X			X	X			X		X	X			X	X	X		LM, EM, FM
Recreation																													
Amargosa Creek Pathways: Phase II (Lancaster)							X				X				X		X		X	X	X	X			X	X	X	X	LM, EM
SUMMARY	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	

Legend

WS = Water Supply Management FM = Flood Management EM = Environmental Resources Management

WQ = Water Quality Management LM = Land Use Management

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A number of water conservation projects were also submitted by the stakeholder group. These projects aim to reduce the gap between supply and demand by managing the demand side of the water balance equation. Thus, integration of those projects that manage the supply side with those that manage the demand side have the potential to maximize the quantifiable benefits even further.

As discussed in more detail in Tables 6-9 and 6-10 below, the water supply projects submitted by the Stakeholders show a range of new supply benefits, from 1 AFY to 48,000 AFY to meet demands during an average year, and between 12,000 to 100,000 AFY for a dry/multi-dry year.

Water Supply Objective 2. Establish a contingency plan to meet water supply needs of the Antelope Valley Region during a plausible disruption of State Water Project (SWP) water deliveries.

- **Target:** Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer by June 2010.

Water Supply Objective 2 was more difficult to evaluate in terms of whether the proposed projects adequately met this objective without the physical creation of a contingency plan. In order to meet this objective, the Antelope Valley Region would be required to rely on groundwater, recycled water, and demand management measures to provide sufficient supply. Given that many of the projects proposed were recharge programs, some of which have quantifiable benefits as mentioned above, it is likely that this IRWM Plan will contribute towards meeting this objective. Additionally, each water purveyor in the Antelope Valley Region has already developed their own Contingency Plans to address emergency situations in general as discussed in their Urban Water Management Plans.

Water Supply Objective 3. Stabilize groundwater levels at current conditions.

- **Target:** Manage groundwater levels throughout the basin such that a 10-year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.

As mentioned above, many of the projects proposed by the stakeholders are groundwater recharge projects and water banking programs. These projects and programs will require monitoring to identify which regions of the aquifer are best suited for these activities, and will require continued monitoring to ensure they are operating effectively. Monitoring and data collection are the first step in managing groundwater levels throughout the basin.

Furthermore, this IRWM Plan limited groundwater extraction to the sum of natural recharge, artificial recharge, and return flow in the Water Budget analysis conducted in Section 3 to ensure future pumping in the Basin would not impact groundwater levels.

6.1.1.1 Future Planning Efforts and Actions to Fill the Identified Water Supply Management Gaps

Because it is difficult at this stage in the IRWM Plan process to quantify the potential benefits of all the projects, it is difficult to sufficiently assess whether the water supply projects adequately meet this IRWM Plan objectives. However, given the projected supply deficits, the uncertainty regarding the pending adjudication and the identified need for more data, the following future planning efforts and actions are options to better meet, or contribute towards meeting, the objectives identified for this strategy in addition to the proposed projects described in Section 5.

Aggressive Conservation. Implementing an aggressive water conservation program could conserve an average of 54,600 AFY in the Antelope Valley Region, assuming a 20 percent reduction in urban water demand by 2035. A determination would need to be made as to whether the amount of conservation that is required under this alternative would be achievable or insufficient.

As discussed in Section 5, all water agencies in the Antelope Valley Region currently utilize water conservation methods as a means to reduce demand during drought conditions. However, only Los Angeles County Waterworks District 40 (LACWWD 40) is a member of the California Urban Water Conservation Council (CUWCC) and a signatory of the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU). Antelope Valley East Kern County Water Agency (AVEK), Palmdale Water District (PWD), Quartz Hill Water District (QHWD), and Rosamond Community Service District (RCSD) are not signatories to the CUWCC MOU and are not members of CUWCC; however, they each implement or plan to implement their own conservation methods.

An aggressive water conservation program would also include agricultural water conservation. On-farm water use can be reduced substantially without decreasing productivity through improved irrigation technologies and efficient water management practices.

The 1995 Antelope Valley Water Resource Study (Kennedy/Jenks 1995) estimated that full development of an identified water conservation program involving the City of

Palmdale, City of Lancaster, Community of Rosamond, and an agricultural mobile lab program could save an estimated nearly 500,000 AF over the 1994 through 2020 planning period.

Develop Further Conjunctive Use Management. The number of water banking and ASR projects proposed by the Stakeholders are an indication of how important conjunctive use operations will be in order to meet the water supply needs in the Antelope Valley Region. Even more benefit can be seen from these conjunctive use types of projects by expanding their realm to include imported water, surface water, stormwater, and treated groundwater.

The first option is to increase the amount of imported SWP water into the Antelope Valley Region for injection, either directly after treatment, or through blending with other supplies such as recycled water. The main issues associated with increasing use of imported SWP for conjunctive uses include cost, availability, and quality of SWP water (generally high in Total Dissolved Solids [TDS]).

The capture and recharge of surface water is another conjunctive use method available to the Antelope Valley Region. Most of the runoff into the Antelope Valley Region originates in the surrounding mountains. Rainfall records indicate that runoff sometimes may be available that could be retained and used for artificial groundwater recharge (USGS 1995). Surface water recharge could be increased by limiting development in key recharge areas of the Antelope Valley Region as well as by establishing effective methods to capture surface water. Surface water capture and recharge would need to be evaluated for feasibility prior to implementation to identify recharge areas, as discussed in Section 6.1.3.

Opportunities for expansion of stormwater capture and management include development of local and regional facilities to capture and treat urban runoff and stormwater. This could include package treatment plants to remove contaminants, filtration systems, or natural treatment systems such as constructed wetlands. Water cleansed by such facilities could either be recharged to groundwater, or stored for delivery to local uses, such as landscape irrigation. Stormwater capture and recharge would also need to be evaluated for feasibility prior to implementation to identify recharge areas.

Lastly, conjunctive uses could be expanded to the treatment of poor quality groundwater which could be extracted, treated, and then reinjected into the aquifer. The extraction would be accomplished through the increased use of existing wells and by the installation of additional wells, pumps, and wellhead treatment facilities. Existing or new distribution facilities such as pipelines and pumping stations would be used to transport this water to existing and planned treated water distribution facilities. Pumps and treatment facilities would use electrical power. A detailed geohydrologic investigation would be necessary prior to drilling on a site-by-site basis. Field studies and groundwater modeling activities would be needed to hydraulically evaluate where in the aquifer the additional extraction should come from and if the basin could handle increased pumping without negatively affecting groundwater levels. The pending adjudication would determine the feasibility of this alternative, and to what extent it could be implemented in the Antelope Valley Region.

Participate in Water Banks Outside of the Antelope Valley Region. Another potential water supply option is to participate in water banking programs outside of the Antelope Valley Region to bring water into the Antelope Valley Region. Such additional banks could include Wheeler Ridge Maricopa Water Storage District White-Wolf Ridge, the Chino Basin Groundwater Basin Storage and Recovery Program, the Semitropic Water Banking and Exchange Program, Calleguas Municipal Water District (CMWD) and Metropolitan Water District of Southern California (MWD), Los Posas ASR, and the Rosedale-Rio Bravo Water Storage District. It should be noted that while water banks operating outside of Antelope Valley Region are possibilities for the Antelope Valley Region, the feasibility of utilizing each still needs to be determined. Benefits to the Antelope Valley Region from utilization of these banks would be to increase water supply reliability for the Antelope Valley Region by increasing the number and mix of sites potentially available in which to bank water for later withdrawal and use. This would provide redundancy, and thus, protection of banked supplies from the possibility of infrastructure outages or contamination events. For example, if all banked supplies were located within the Antelope Valley Region and they subsequently became contaminated by an unwanted constituent, those supplies might become unavailable for use. Having supplies banked in other areas would allow them to be transported to the Antelope Valley Region in such an event. Likewise, the impacts of an infrastructure outage (such as an earthquake event along the California Aqueduct) could be mitigated if some portion of banked supplies were located outside the Antelope Valley Region.

The cost to participate in banking programs outside of the Antelope Valley Region vary according to the particular banking program, water right contract terms, geographic location and access to infrastructure, and other negotiation costs. The Buena Vista Water Storage District/Rosedale-Rio Bravo Water Storage District Water Banking and Recovery Program, located west of Bakersfield in Kern County, is an example of an outside banking program. The Castaic Lake

Water Agency (CLWA) participates in the program by paying a basic unit price of $448/AF for 11,000 AF, paid annually, with an averaged 10-year "look-in" escalator tied to the Southern California consumer price index and Kern County Water Agency's SWP costs, whichever is higher (Kennedy/ Jenks Consultants 2007).

Another example of a banking program outside of the Antelope Valley Region is the Semitropic Water Storage District (Semitropic) groundwater storage program. Several participants in the Semitropic program may wish to sell all or part of their banked supplies. These participants include Vidler Water Company, the Newhall Land and Farming Company and various SWP contractors including MWD and Santa Clara Valley Water District (Kennedy/ Jenks 2007). These banked supplies represent either Table A Amount banked "in-lieu" by overlying pumpers within Semitropic, or previously stored groundwater supplies that were purchased in-place. The amounts of water stored and attendant costs vary for this program based on the contribution to capital and operations and maintenance (O&M) negotiated by the participants at the time they join the Semitropic program. There is also a "second priority" program that requires no capital or O&M contribution and has lower up front costs and participation fees, but which also has lower delivery priority during periods in which other, higher priority participants may be taking delivery of their previously banked supplies. One such higher-priority participant is MWD. MWD has a reserved storage capacity of 350,000 AF in the Semitropic program. According to MWD's 2006/2007 Budget (MWD 2007), $3.4 million dollars is budgeted for the 2006/2007 participation in the program, which equates to approximately $971/AF. This cost per AF would include the required annual fee, the injection and extraction costs, and any other miscellaneous costs not expressly stated. Lower priority participants, like CLWA, pay a reduced cost per AF, which for CLWA is on the order of $52/AF not including actual energy costs and transmission fees (Boschman, W. 2002).

Create Regional Database for Groundwater Pumping. The analysis in Section 3 helped to identify a number of issues regarding the availability of accurate water resource data for the Antelope Valley Region. Municipal and Industrial (M&I) and major agricultural pumpers generally measure their groundwater extractions and submit this information to DWR. The pumpers that do not measure groundwater extractions are anticipated to be agricultural and small

As the number of people living and working in the Antelope Valley Region increases, the competition for water supply increases, and the challenge of maintaining good water quality and managing the interconnected water cycle becomes more challenging.

domestic water users. The existing databases do not have broad agreement for pumping within the same areas and it is thought that pumping is generally underreported (USGS 1995). Furthermore, there is a significant lack of groundwater pumping data available for the Kern County portion of the Antelope Valley Region and for the smaller mutuals in the Antelope Valley Region. By creating a regional database for groundwater pumping and a methodology for its management, this sort of data can be regularly obtained and made available for research studies such as this IRWM Plan and contribute to meeting the objective of stabilizing groundwater at current conditions. It is recommended that these data be regularly collected and compiled. For pumpers that do not monitor groundwater extractions, indirect methods, such as estimates based on power or consumption use, can be utilized for groundwater management purposes.

Use Alternative Sources of Water. Groundwater and imported SWP water make up the majority of the water supplies in the Antelope Valley Region, with groundwater historically providing between 50 and 90 percent of overall supply. The pending adjudication and variability of SWP in light of global climate change conditions calls into question the reliability of these sources. Another solution is to use alternative sources of water to meet demands. These other sources could include water from the Central Valley of California (Central Valley Project [CVP] water) transfers from other water rights holders in the Sacramento Valley, water from other water supply systems (Los Angeles Department of Water and Power [LA DWP]), Article 21 water, treated stormwater captured and recharged into the ground, and desalinated water. In addition, alternative imported water sources from SWP contractors other than the Antelope Valley-East Kern Water Agency (AVEK) could be considered. There are a number of issues involved with the use of these other sources. The use of water from the CVP water would be transported to AVEK via SWP facilities, and as non-SWP water, its transmission by these facilities would have low priority. Therefore, the water supply would be less reliable than that of water that AVEK currently supplies, which would not meet Project objectives. Additionally, the permanent conveyance of this water through the Bay-Delta could result in economic and social impacts associated with transferring water from agricultural use to urban use. Water transfers from CVP contractors also would not likely be feasible because their water already has been allocated for other uses, including environmental restoration projects, and is not available for long-term, reliable sale or exchange. According to the Bureau of Reclamation website, annual payments shall be allocated so as not to exceed $6.00 per AF (October 1992 price levels) for agricultural water sold and delivered by the CVP, and $12.00 per AF (October 1992 price levels) for M&I water sold and delivered by the CVP (Section 3407[d][2][a] Restoration Fund).

Preservation of open space and natural habitat linkages is vital to ensuring long term viability of sensitive biological resources.

Various SWP contractors (or their member agencies) hold contractual SWP Table A Amounts in excess of their demands. Due to the high annual fixed costs of SWP Table A Amounts, these agencies may wish to sell this excess to another contractor. Such Table A Amounts would be subject to the SWP annual allocation and SWP delivery reliability constraints. Potential sellers include the County of Butte and Kern County Water Agency (from its member agencies). The financial terms are variable, but recent "face value" costs range from $1,500/AF to over $3,000/AF (Kennedy/Jenks 2007). The buyer assumes all prospective SWP Transportation Minimum, Capital, O&M and variable power cost payments to DWR from the time the Table A sale is effective, through the life of the SWP contract.

Article 21 water refers to the SWP contract provision defining this supply as 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. Due to the short duration of its availability and capacity constraints at Edmonston Pumping Plant, Article 21 water is generally delivered most readily to agricultural contractors and to San Joaquin Valley banking programs. Therefore, Article 21 water is not considered a long-term reliable supply for the Antelope Valley Region. The basic rate for Article 21 water is the current SWP variable transmission rate which is generally between $10 to $20/AF. However, this amount can fluctuate depending on the distance to move the water from the Delta to where it is to

be delivered, and the current conditions of the California energy market.

The SWP Contractors Authority (Authority) Dry-year Water Purchase Program allows for the purchase of water from many agents within the California water system on a one-time or short-term basis. Participants could increase reliability during drought years by participating in this program to supplement supplies. This program has historically operated only in years when the SWP allocation is below 50 percent, or when a potentially dry hydrologic season is combined with expected low SWP carryover storage; it thus provides a contingency supplemental water supply. Typical water costs include an option payment (to hold water); the call price (actual purchase price); and loss of water due to movement through the Sacramento/San Joaquin Delta, in addition to SWP transmission costs. In 2005, the initial sign-up deposits of $15/AF were collected with the execution of a participation agreement. Of the initial deposit, $5/AF were held by the Authority to cover administrative costs for Authority operations and for 50 percent of the sellers' incurred regulatory documentation costs, with the condition that any unused portions of the administrative cost would be refunded to the buyer at the end of the Dry-year Program. The remaining $10/AF of the deposit would be paid to the seller as an option payment within 30 days of signing a buyer-seller agreement. The $10/AF option payment would guarantee the requested quantity of water would be available for a "call" on April 1 for a total price of $125/AF (including the $10 option). Individual Agreements were established with each of the sellers and were signed by each of the buyers. Basic terms of the agreements included: A $125/AF price (including a $10/AF non-refundable option fee which was sent within 30 days of the contract signature) for an April 1 call date. Call dates for the options could be extended to mid-April for an additional $10/AF ($135/AF total), or to May 2 for an additional $20/AF ($145/AF total) (the additional expenses for option extensions would offset farming preparation costs that would be invested in early April and would therefore be sacrificed when the land was fallowed as part of the provision to provide the transfer water).

Water storage capabilities, such as tanks, are a key asset in a region where valuable water is lost daily due to a lack of available infrastructure.

Turnback Pools are a means in which SWP contractors with excess Table A Amount in a given hydrologic year may sell that excess to other contractors. This is included in a provision in the SWP water supply contracts. This provision is available in all year types, but is most in demand during dry periods, when Table A allocations are low and almost all contractors are seeking additional supplies. Of course, in those year types, less water is made available to the Turnback Pools. The program is administered by DWR and requires selling and buying contractors to adhere to a specific schedule by which options to water must be exercised. The total amount of water placed into the pools by the selling contractors is allocated to the participating buying contractors based on their contractual Table A Amounts. The water supply contract provides for Turnback Pools in a given water year. Pool "A," which must be purchased by March 1, is priced at 50 percent of the current SWP Delta water rate and the later Pool "B," which must be purchased by April 1, is priced at 25 percent of the current Delta water rate. In 2006, the Delta water rate was approximately $13/AF.

All of the above mentioned supply alternatives have issues related to capacity and delivery priority in the California Aqueduct and other SWP facilities. SWP contractors, via their water supply contracts with DWR, are allocated specified shares of "reach repayment" capacity in various reaches of the SWP system, starting at Banks Pumping Plant in the Delta and proceeding through the main stem of the Aqueduct and the Aqueduct branches to each contractor's delivery turnout(s). This share of capacity pertains to SWP supplies only, and provides each contractor with delivery priority for its SWP supplies. The water supply contracts also provide for the delivery of non-SWP supplies through the SWP system, provided that other contractors are not coincidentally utilizing all available capacity; these non-SWP supplies are delivered at a lower priority than SWP supplies.

Reach repayment capacity is often less than the actual constructed physical capacity of SWP facilities. Depending on location within the SWP system, some areas have ample capacity to move both full SWP Table A Amounts (including all of MWD's Table A Amount plus other contractors full Table A Amounts) plus other non-SWP supplies. Other points in the system, notably the Edmonston Pumping Plant and the East Branch, have considerable physical capacity limitations.

It is generally accepted among the SWP contractors that, based on future demand forecasts for all contractors, wet years (which tend to lower service area demands), will result in ample capacity in the southerly reaches of the SWP system, even though Table A allocations are high (i.e., not all water will be needed in the contactors' service areas, and much of it will be banked in other locations or sold into the SWP Turnback Pools). Dry years (which tend to cause higher service area demands), will cause capacity constraints as southern contractors take water from the various banking programs in the San Joaquin Valley or from various dry year supply programs and attempt to deliver them within the same window of time (i.e., peak demand periods), even though Table A allocations are low. It is also generally accepted that all contractors in a given repayment reach will work cooperatively with DWR and each other to attempt delivery of all requested supplies, whether SWP or non-SWP. As additional contractors obtain additional supplies through time, this cooperative arrangement will be tested.

Utilization of desalinated water is also an alternate source of water that could be made available in the Antelope Valley Region. It is not likely that a desalination plant would be constructed in the Antelope Valley Region due to the distance from the ocean and the associated construction and operation costs. However, it is plausible to obtain desalinated water by exchange. For example, in this situation, AVEK could contribute a portion of the funds needed by another agency to develop a seawater desalination facility along the southern California coast, and water produced by this facility would be exchanged with AVEK for SWP water. A likely partner in such an arrangement could be The Metropolitan Water District of Southern California (MWD). If both parties agreed, AVEK would enter into a contract with MWD indicating that a portion of MWD's annual SWP Table A Amount would be delivered to AVEK in exchange for AVEK's contribution to a desalination facility to be constructed by MWD. AVEK would treat and distribute SWP water in existing AVEK facilities, and MWD would use water from the desalination facility in lieu of the SWP water exchanged with AVEK. All of these options present challenges in terms of conveyance, water quality, and cost. In general, the cost to desalinate seawater can cost anywhere from $500 to $2,000/AF (DWR 2005c).

Make Further Use of Recycled. Many of the Stakeholder-identified projects involve the use of recycled water, whether it be for injection in conjunctive use projects, for effluent management, or otherwise. Increasing this amount beyond what is already planned could help to further reduce the gap between future supply and demand. Since the use of recycled water is limited to landscaping and other non-potable uses, it would be important to identify uses for the water beyond those for which its uses are currently dedicated or planned. Other potential uses of

Recycled water used on agricultural lands is a necessary alternative water source that helps to close the gap between water supply and demand.

recycled water include groundwater recharge. Particular concern should be paid to salinity concentrations in using recycled water. Numerous factors contribute to salinity in recycled water, including imported potable water sources and salts entering with each cycle of urban use for residential, commercial, or industrial purposes. Management of the salt imbalance is key because as salinity increases, irrigation water use increases to flush out salts that accumulate in the root zone, increasing overall water demand. Furthermore, industrial users incur extra costs for cooling towers, boilers, and manufacturing processes to deal with the high salinity water. This is especially important in a closed basin like the Antelope Valley Region. In addition, groundwater recharge can also be affected when source water quality does not satisfy regulatory requirements (i.e., Basin Plan Objectives). The annual cost to provide recycled water to the Antelope Valley Region is currently estimated at $860/AF (LACWWD 40 2006).

Inability to Approve Further Development. The inability to approve further development assumes that the local retail water purveyors within the Antelope Valley Region decide there is insufficient water to issue "will serve" letters to supply development, and that local land use agencies respond by imposing a moratorium on new development in the Antelope Valley Region. The inability to approve new developments could result in considerable economic and social impacts to residential, commercial, industrial, and public/governmental users in the Antelope Valley Region if water deliveries were cut back or rationing occurred. Reduced deliveries could affect the ability of public and private property owners to water lawns, parks, golf courses, landscaping and open space areas, and could result in these areas dying off with resulting economic loss. Businesses that use high volumes of water may be forced to cut back production or close. Prohibitions on new development would result in a delay or failure to meet County of Los Angeles and the Cities of Lancaster and Palmdale's General Plan population, housing, and job projections for which local governments have planned and/or constructed infrastructure and expended funds. Disallowing new development would have potential economic consequences related to increased costs of housing in an already expensive southern California housing market, and developers with approved or recorded and unbuilt projects may experience economic loss if projects are delayed or cannot be completed. In addition, businesses considering relocating or expanding in the Antelope Valley Region may be reluctant to invest capital because of uncertainties related to water supplies, lack of affordable housing for employees, and stagnant local markets for goods and services. From 2002 to 2005, retail sales in the Antelope Valley Region[2] grew from $2.5 billion to $3.5 billion and over the same

In the Antelope Valley, improvements such as channels, storm drains, and detention and retention basins are needed to control flood-prone areas in the region

time period the number of new housing units grew by over 300 percent[3] (Greater Antelope Valley Economic Alliance 2007 Economic Roundtable Report). Should a moratorium on development be enforced in 2010, this increase in revenue growth will likely flatten or even decrease.

6.1.2 Water Quality WMSA

The issues and needs for water quality management in the Antelope Valley Region generally regard the desire to provide drinking water that meets current and future standards, protecting existing and future water sources from potential contamination, and making beneficial use of tertiary treated wastewaters for recycled water applications. The objectives and planning targets identified for this WMSA are:

Water Quality Objective 1. Provide drinking water that meets customer expectations.

- **Target:** Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetic throughout the planning period.

Projects that would help to meet this first water quality objective included the LACWWD 40's chloramines conversion project, which aims to prevent deterioration of water quality due to differing treatment methods between purveyors, and PWD's proposed new treatment plant and expansion of AVEK's treatment plants which would increase the Antelope Valley Region's potable treatment capabilities. If the Antelope Valley Region is going to continue to meet this objective, these treatment facilities must be able to continue to meet current and emerging water quality standards.

2 Includes data for the Cities of Palmdale and Lancaster only.

3 Includes data for the Cities of Palmdale and Lancaster only.

Water Quality Objective 2. Protect aquifer from contamination.

- **Target:** Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.
- **Target:** Map contaminated sites and monitor contaminant movement by December 2008.
- **Target:** Identify contaminated portions of aquifer and prevent migration of contaminants by June 2009.

As with the 2nd water supply objective mentioned above, many of the projects proposed by the stakeholders are groundwater recharge projects and water banking programs. These projects and programs will require monitoring to identify which regions of the aquifer are best suited for these activities, and will require continued monitoring to ensure they are operating effectively. Monitoring and data collection are the first steps in protecting the aquifer from contamination. Additional projects submitted that meet these objectives are LACWWD 40's arsenic mitigation project to remediate arsenic groundwater contamination, Los Angeles County Sanitation District's (LACSD's) projects to monitor the potential for contamination from effluent management practices, and the City of Palmdale's sewer elimination project which would reduce groundwater pollution by eliminating septic tanks currently in use by homes in the vicinity of 42nd Street East.

Water Quality Objective 3. Protect natural streams and recharge areas from contamination.

- **Target:** Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.

Projects proposed by the stakeholders to address this objective include groundwater recharge projects, retention and detention basin projects, and flood control projects. These projects and programs will require monitoring to identify which locations best suited for these activities, and will require continued monitoring to ensure they are operating effectively. Monitoring and data collection are the first steps in protecting the natural streams and recharge areas from contamination.

Water Quality Objective 4. Maximize beneficial use of recycled water.

- **Target:** Increase infrastructure and establish policies to use 33 percent of recycled water to help meet expected demand by 2015, 66 percent by 2025, and 100 percent by 2035.

LACSD submitted a number of projects involving enhancements to their treatment facilities, helping to meet the increased infrastructure targets. Additionally, a number of the stakeholder-identified projects specify the use of recycled water for irrigation, effluent management, and recharge projects; many of which benefit not only water quality objectives, but also water supply and land use management objectives. There are a number of opportunities for integration between water quality projects, including a proposed recharge basin that uses effluent from the Palmdale or Lancaster Water Reclamation Plants (WRPs) as a source of recharge water.

6.1.2.1 Future Planning Efforts and Actions to Fill the Identified Water Quality Management Gaps

Where this WMSA falls short in terms of meeting the water quality objectives is in protecting the groundwater aquifer from contamination, which includes identifying and mapping the contaminated portions of the aquifer and identifying potential future sources of contamination. Therefore, the following future planning efforts and actions are suggested to better meet the objectives identified for this strategy.

Identify Contaminated Portions of the Aquifer. The planning target, which is provided in order to gauge success on meeting the water quality management objectives, is to identify and prevent migration of contaminated portions of the aquifer. As this planning target was not directly met (it was considered indirectly met by those projects that have the potential to help meet this objective, i.e., projects that included groundwater monitoring wells) by the projects proposed in this IRWM Plan, it is being suggested as a future planning effort for the Antelope Valley Region.

Map Contaminated Portions of Aquifer by December 2008. The planning target, which is provided in order to gauge success on meeting the water quality manage-

Protection of natural streams and recharge areas that originate in the surrounding mountain ranges from contamination is a key objective of Plan implementation.

ment objectives, is to map the contaminated portions of the aquifer and monitor contaminant movement. As this planning target was not directly met (it was considered indirectly met by those projects that have the potential to help meet this objective, i.e., projects which included groundwater monitoring wells) by the projects proposed in this IRWM Plan, it is being suggested as a future planning effort for the Antelope Valley Region.

Establish a Well Abandonment Ordinance. Abandoned wells in the Antelope Valley Region present water quality problems in that they act as conduits for surface and subsurface pollutants. The establishment of a well abandonment ordinance would provide the policing authority to enforce the timely destruction of abandoned wells. The ordinance could provide the authority to require well destruction or rehabilitation as a condition upon sale of property, change of ownership or change of use. The ordinance could also require that new well applications be processed only after the applicant has demonstrated that all existing wells on all property they own are not in violation of the well ordinance.

Develop and Implement a Regional Groundwater Wellhead Protection Program. A Wellhead Protection Program (WPP) is a pollution prevention and management program used to protect underground sources of drinking water. A national WPP was established in 1986 by the Federal Safe Drinking Water Act. Some of the elements of these types of programs include the identification of recharge areas, zones of influence, groundwater flow directions, and potential contamination sources. This information is then compiled into a management plan, based on the assessment of alternatives for addressing potential sources of contamination, describing the local ordinances, zoning requirements, monitoring program and other local initiatives. The development of a regional WPP could additionally promote smart land use practices, including prohibiting new industrial, commercial and residential development in areas of sensitive groundwater recharge.

Develop Management Program for Nitrate and TDS. TDS and nitrate are of particular concern with regard to water quality in the Antelope Valley Region. TDS is concentrated in the groundwater over prolonged recharge of SWP water, especially since the Antelope Valley Region is a closed basin. Nitrates result from irrigation practices and effluent management. Development of a management program for these pollutants of concern, as well as for other emerging contaminants as they are identified, would contribute to meeting the objective of protecting the aquifer from contamination.

Vegetation native to the Antelope Valley Region are typical of the high desert and include Joshua trees, saltbush, mesquite, sagebrush, and creosote bush.

Expand the Water Quality Monitoring Program. Monitoring activities in the Antelope Valley Region include groundwater levels, groundwater quality, land surface subsidence, aquifer compaction, and streamflow. According to the DWR Bulletin 118 (2004), the United States Geologic Survey (USGS) actively monitors 262 wells for groundwater levels, 10 wells for miscellaneous water quality, and the Department of Health Services and cooperators monitor 248 wells in the Antelope Valley Region for Title 22 water quality compliance. Expansion of the existing water quality monitoring efforts would allow for more current data collection to better assess the state of the Antelope Valley Region's water quality and other groundwater parameters. These groundwater quality monitoring programs need to be continued in order to capture the effects of changes in management practices. As Phillips states in his 1993 USGS report, "the need for an ongoing monitoring program transcends the importance of the selection of management alternatives." Further, in order for a water quality monitoring program to be successful in the Antelope Valley Region, the information collected needs to be shared regionally (i.e., by establishing a clearinghouse) in order to integrate and synthesize the data.

As mentioned above, both TDS and nitrate are problems in the Antelope Valley Region. It would particularly be important to continue to monitor discharger's actions to reduce impact of discharge on groundwater and remedial measures.

6.1.3 Flood Management WMSA

Flood management issues in the Antelope Valley Region generally relate to management of stormwater flows of variable water quality, and the management of nuisance

Historically, water supplies within the Antelope Valley Region were used primarily for agriculture, the predominant land use of the area. Photo courtesy of the Los Angeles County Farm Bureau.

water (dry weather runoff). The objectives and planning targets identified for this WMSA are:

Flood Management Objectives. Reduce negative impacts of stormwater, urban runoff, and nuisance water.

- **Target:** Coordinate a regional flood management plan and policy mechanism by the year 2010.

Stakeholder-identified projects proposed to address flood management needs in the Antelope Valley Region include recharge, retention, and detention basins to control stormwater flows, and new storm drains to route storm flows and flood flows to such basins. Many of these projects meet the flood management objectives. For example, the City of Palmdale's detention/recharge basin projects control flood water, thereby meeting the objective of reducing the negative impacts of flood water. By allowing the flood water to recharge into the underlying aquifer, which can act as a preliminary treatment method, the water quality of the runoff water is improved, thereby meeting the second objective of improving water quality of runoff. Lastly, if detention/retention basins are constructed in a manner that links them to strategically placed storm drain channels and outlets, the extent of nuisance water can be lessened, thereby meeting the third objective.

There are many opportunities for integration between flood management projects. Flood control basins can also be used to store raw aqueduct water, increasing groundwater recharge as well as supply reliability in the Antelope Valley Region. A debris basin can provide storage for silt, sand, gravel, or other debris from runoff. They can also be designated as open spaces, habitat and recreational areas or act as natural treatment areas for poor quality runoff.

Tables 6-1 and 6-2, however, indicate that there is an apparent gap in coordinating these flood management efforts throughout the Antelope Valley Region.

6.1.3.1 Future Planning Efforts and Actions to Fill the Identified Flood Management Gaps

To better meet the objectives identified for this strategy, the following future planning efforts and actions are suggested.

Coordinate a Flood Management Plan by 2010. The planning target, which is provided in order to gauge success on meeting the flood management objectives, is to coordinate a regional flood management plan and mechanism by the year 2010. As this planning target was not met by the proj-

ects proposed in this IRWM Plan, it is being suggested as a future planning effort for the Antelope Valley Region.

Stormwater Capture/Recovery Feasibility Study. Development of a regional stormwater capture/recovery feasibility study allows for a regional view of the existing stormwater management facilities (retention/detention basins, storm drains, etc.) to see how they can be better interconnected to provide a more comprehensive management system for the Antelope Valley Region. This type of planning effort would also identify opportunities for linkages to existing or planned recharge basins, open space, and habitat areas.

Increase small-scale flood management projects. Small-scale flood management projects could include modification of existing culverts and bridges, installation or modification of floodgates, stabilization of stream banks, and creation of small debris or flood/storm water retention basins throughout the Antelope Valley Region where needed. These minor physical flood mitigation projects wouldn't duplicate the more regional flood-prevention activities; rather, they would work to enhance them at a local level.

Encourage Low Impact Development (LID). LID is a relatively new concept for stormwater management. The objective of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source. Techniques are based on the premise that storm water management should not be seen as stormwater disposal. Instead of conveying and managing/treating stormwater in large, costly end-of-pipe facilities located at the bottom of drainage areas, LID addresses stormwater through small, cost-effective landscape features located at the lot level.

6.1.4 Environmental Resource WMSA

The main issues of concern regarding environmental resource management in the Antelope Valley Region are protection and preservation of open space and protection of endangered species. The following objectives and planning targets were identified to address these concerns:

Environmental Resource Objective 1. Preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region.

- **Target:** Contribute to the preservation of an additional 2,000 acres of open space and natural habitat to integrate and maximize surface and groundwater management by 2015.

Two projects submitted for inclusion in the IRWM Plan had environmental resource management as their main benefit: Lancaster's Ecosystem and Riparian Habitat Restoration of Amargosa Creek: Avenue J to Avenue H, and RCSD's Tropico Park Pipeline Project. However, some of the projects that propose groundwater recharge areas designate such areas as open space (approximately 2,500 acres), which would help to meet the objectives for this strategy. Ongoing efforts to update the LA County General Plan, which include Significant Ecological Areas (SEAs) designated to protect sensitive species, as well the other planning documents approved for the Antelope Valley Region (e.g., the West Mojave Habitat Conservation Plan [HCP], the Kern County General Plan) will help to identify and then meet the environmental resource needs in the Antelope Valley Region.

6.1.4.1 Future Planning Efforts and Actions to Fill the Identified Environmental Resource Management Gaps

To better meet the objectives identified for this strategy, the following future planning efforts and actions are suggested.

Preserve 2,000 Acres of Open Space and Natural Habitat. The planning target, which is provided in order to gauge success on meeting the environmental management objectives, is to preserve 2,000 additional acres of habitat consistent with adopted regional plans. As this planning target was not met by the projects proposed in this IRWM Plan, it is being suggested as a future planning effort for the Antelope Valley Region. One potential way of preserving 2,000 acres of habitat is for the local conservancies to either purchase and/or establish conservation easements through land acquisitions. Implementation of LID techniques where feasible are recommended.

Enhancement of unique habitat areas throughout the Antelope Valley Region benefits the natural environment and increases recreational opportunities for a growing population.

Develop a HCP for the Antelope Valley Region. HCPs are developed to outline what steps must be taken to minimize and mitigate the impact of a permitted "take" on a threatened or endangered species. Many HCPs designate open space or habitat as mitigations of "take." Therefore, an HCP is a tool that could be used in the Antelope Valley Region for preserving and protecting open space and habitat.

Promote Land Conservation Projects that Enhance Flood Control, Aquifer Recharge, and Watershed and Open Space Preservation. Promotion of conservation projects could be done through the adoption of a Memorandum of Understanding (MOU) with municipalities in the Antelope Valley Region to elicit and promote compliance with plans approved for the Antelope Valley Region including the area General Plans and the Mojave HCP.

6.1.5 Land Use Management WMSA

The main issues of concern regarding land use management in the Antelope Valley Region relate to the preservation of agricultural land, which includes a recognition of the historical relationship to the land and a support of a right to farm as well as the private property rights of all owners to economic benefits from their property, and the ability to provide recreational opportunities for a growing population. The following objectives and planning targets were identified to address these concerns:

Land Use Management Objective 1. Maintain agricultural land use within the Antelope Valley Region.

- **Target:** Preserve 100,000 acres of farmland in rotation through 2035.

Land Use Management Objective 2. Meet growing demand for recreational space.

- **Target:** Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.

Land Use Management Objective 3. Improve integrated land use planning to support water management.

- **Target:** Coordinate a regional land use management plan by the year 2010.

Two projects were submitted for inclusion in the AV IRWM Plan through the Call for Projects that provide direct benefits associated with land use management; Amargosa Creek Pathways Project Phase II and the Antelope-Fremont Watershed Assessment and Plan. A number of the projects proposed by the Stakeholders identify agricultural lands for effluent management, and agricultural and recreational lands are likely to be addressed through the update of local general planning documents. These types of projects indirectly benefit land use management, but do not directly meet the objectives identified for the Antelope Valley Region. Employing land use planning as a strategy provides a way to better manage and protect local water supplies. Programs can be made available to assist in water conservation, protect and improve water quality, address stormwater capture and flooding, protect and enhance environmental habitat areas and recreational opportunities. Thus, implementing land use planning strategies can assist in achieving not only the land use management objectives, but also the overall AV IRWM Plan objectives.

6.1.5.1 Future Planning Efforts and Actions to Fill the Identified Land Use Management Gaps

Below are additional future planning efforts and actions that have been identified in order to better meet the land use management objectives.

Preserve Farmland. The planning target, which is provided in order to gauge success in meeting the land use management objectives, is to preserve 100,000 acres of farmland in rotation through 2035. This means that at any given time, approximately 25,000 acres of farmland are actively being farmed in the Antelope Valley Region. While some of the proposed projects include farmland as a component that would contribute to this target, such as the Lancaster and Palmdale Effluent Management Sites which would effectively preserve approximately 12,000 acres of agricultural land, it is still being suggested as a future planning effort for the Antelope Valley Region because the planning target was not entirely met.

Build Public Parks and Recreational Amenities. The planning target, which is provided in order to gauge success in meeting the land use management objectives, is to increase public parks and recreational amenities by providing 5,000 acres of recreational space by 2035. As this planning target was not met by the projects proposed in this IRWM Plan, it is being suggested as a future planning effort for the Antelope Valley Region. As part of this planning effort, an Antelope Valley Region-wide inventory of existing water-related recreational opportunities could be developed that would aid in providing a needs assessment for future opportunities. Implementation of LID techniques where feasible are recommended.

Create a Watershed Management Plan. There is currently no watershed management plan for the Antelope Valley Region. Watershed management plans are similar to this

IRWM Plan in that they bring together a wide range of stakeholders, including city and county staff, resource managers and policy officials, and community organizations to protect and restore the aesthetic and function of the watershed where needed. Watershed management plans focus on the 'function' of a watershed, and thereby assess the health and value of watershed components.

Create Incentives for Landowners to Protect/Restore/Preserve Open Space. Land use agencies have the ability to create incentives and/or eliminate disincentives for landowners to protect and restore open spaces and habitat on their property. Technical assistance and financial incentives have proven effective in protecting and restoring privately held natural areas, which in turn helps to meet regional water quality, flood management and environmental management objectives. Implementation of LID techniques where feasible are recommended.

Coordinate a Regional Land Use Management Plan by the Year 2010. Traditionally, cities and counties have the responsibility for land use planning, much of which is continued in the local and regional General Plans. These planning documents to some extent address water and environmental resources in the context of land use planning. However, through the coordination of a regional land use plan, these efforts can be combined to better manage and protect local water supplies, to improve water quality, reduce flooding, restore habitats and ecosystems, and provide recreational, educational, and access opportunities to the public for a potentially greater regional benefit.

6.2 ASSESS PROJECTS FOR MULTIPLE BENEFITS "ACROSS" WSMAS

Tables 6-1 and 6-2 also show whether or not a particular project contributes to more than one WMSA objective, which is an indication of the potential to provide multiple benefits. To provide an indication of the current level of integration of stakeholder projects, this integration is also summarized in Table 6-3, which identifies the number of projects within each type of possible benefit combination.

Opportunities for maximizing the integration of water supply and water quality projects and simultaneously generating benefits for open space, habitat, and recreational uses can be accomplished with the projects proposed for the Antelope Valley Region, even if the identified stakeholder projects do not meet the planning targets. For example, a groundwater recharge project, which generally benefits water supply, can also benefit environmental resources by designating the recharge area as open space or habitat. Natural treatment systems can be integrated with storm drain systems to provide both flood management benefits and water quality improvements. If integrated with open space and habitat, natural treatment systems could also provide environmental benefits.

6.2.1 Geographic Integration

Geographic integration allows for further integration between the water management strategies. Proposed projects that could take advantage of being in the same geographical location could provide multiple benefits. In an Antelope Valley Region of over 2,400 square miles, opportunities for geographical integration are numerous. Figure 6-1 illustrates the location of the projects and management actions discussed in Section 5, and show the locations of

Table 6-3 Benefit Combination Groups

Single Benefit Type	Number of Projects	Two Benefit Types	Number of Projects	Three or More Benefit Types	Number of Projects
WS	8	WS/WQ	9	WS/FM/EM	10
WQ	6	WS/FM	3	WS/WQ/EM	3
FM	2	WS/EM	2	WS/EM/LM	2
EM	1	WQ/LM	8	EM/FM/LM	2
LM	0	LM/EM	3	WS/WQ/FM/EM	3
				WS/WQ/FM/LM	2
Total	**17**		**25**		**22**

Note: Each project is only represented once in the group that describes its benefits. For example, a project submitted with water supply and water quality benefits is only represented once as a WS/WQ project.
WS = Water Supply, WQ = Water Quality, FM = Flood Management, EM = Environmental Management, LM = Land Use Management

the areas benefited by the water management strategies. Table 6-4 provides a key to Figure 6-1. Geographic integration was considered in the evaluation and prioritization of the projects (discussed in Section 7) as well as in the packaging implementation approach discussed in Section 8.

Table 6-4 Project Reference Points

Project Number	Project Name	Sponsor
Water Supply Management		
23	Upper Amargosa Creek Recharge and Channelization Project	City of Palmdale
24	Amargosa Water Banking & Stormwater Retention Project	J. Goit/Sundale Mutual
25	Antelope Valley Water Bank	Western Development and Storage
26	Aquifer Storage and Recovery Project: Injection Well Development	LACWWD 40
27	Aquifer Storage and Recovery Project: Additional Storage Capacity	LACWWD 40
28	Deep wells to Recapture Banked Water	RCSD
29	Gaskell Road Pipeline	RCSD
30	Groundwater Banking	LACWWD 40
31	LCID East-Side Groundwater Recharge Project	LCID
32	Purchasing Spreading Basin Land	RCSD
33	Water Supply Stabilization Project – Westside Project	AVEK
34	Water Supply Stabilization Project – Eastside Project	AVEK
35	Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project	City of Lancaster
36	Groundwater Recharge Recycled Water Project	PWD
37	KC & LAC Interconnection Pipeline	RCSD
38	North Los Angeles/Kern County Regional Recycled Water Project	LACWWD 40
39	Palmdale Power Project	City of Palmdale
40	Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H	City of Lancaster
41	ET Based Controller Program	PWD
42	Implement ET Controller Program	LACWWD 40
43	Precision Irrigation Control System	Leona Valley Town Council
44	Ultra-Low Flush Toilet Change-out Program	LACWWD 40
45	Water Conservation Garden	PWD
46	Water Conservation School Education Program	LACWWD 40
47	Waste Water Ordinance	LACWWD 40
48	Avenue K Transmission Main, Phases I-V	LACWWD 40
49	Avenue M and 60th Street West Tanks	LACWWD 40
50	Littlerock Dam Sediment Removal	PWD
51	Place Values and Turnouts on Reclaimed Water Pipeline	RCSD
52	RCSD Wastewater Pipeline	RCSD
Water Quality Management		
12	42nd Street East, Sewer Installation	City of Palmdale
13	Lancaster WRP Stage V	LACSD
14	Lancaster WRP Stage VI	LACSD
15	Lancaster WRP Proposed Effluent Management Sites	LACSD
16	Palmdale WRP Proposed Effluent Management Sites	LACSD
17	Palmdale WRP Stage V	LACSD
18	Palmdale WRP Stage VI	LACSD
19	Palmdale WRP Existing Effluent Management Sites	LACSD

Table 6-4 Project Reference Points (continued)

Project Number	Project Name	Sponsor
20	Partial Well Abanondment of Groundwater Wells for Arsenic Mitigation	LACWWD 40
21	New PWD Treatment Plant	PWD
22	QHWD Partial Well Abanondment of Groundwater Wells for Arsenic Mitigation	QHWD
Flood Management		
5	45th Street East Flood Control Basin (Q-East Basin)	City of Palmdale
6	Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park	City of Palmdale
7	Avenue Q and 20th Street East Basin (Q-West Basin)	City of Palmdale
8	Barrel Springs Detention Basin and Wetlands	City of Palmdale
9	Hunt Canyon Groundwater Recharge and Flood Control Basin	City of Palmdale
10	Quartz Hill Storm Drain	LADPW
11	Stormwater Harvesting	Leona Valley Town Council
Environmental Management		
1	Ecosystem and Riparian Habitat Restoration of Amargosa Creek Ave J to Ave H	City of Lancaster
2	Tropico Park Pipeline Project	RCSD
Land Use Management		
3	Antelope-Fremont Watershed Assessment Plan	Antelope Valley Conservancy
4	Amargosa Creek Pathways Project	City of Lancaster

6.2.2 Compliance with, and Objectives Assessment for the IRWM Plan Guideline Strategies, AB 3030, IRWM Plan Guidelines Program Preferences, and Statewide Priorities

Tables 6-5 and 6-6 show how the Proposition 50 IRWM Guideline Strategies (which were correlated with the California Water Plan strategies in Table 5-1), the AB 3030 Groundwater Management Guidelines, the IRWM Plan Guideline Program Preferences, and the Statewide Priorities are met by each project, and project concept, action and study identified in Section 5, for current and planned projects, respectively.

Tables 6-7 and 6-8 additionally demonstrate how the identified future planning efforts, or "gap" projects, contribute to meeting these other objectives and priorities, as well as the IRWM Plan objectives.

The Proposition 50 IRWM Guideline Strategies were defined in Section 5.1.1, and the AB 3030 Guidelines defined throughout Section 3.

The IRWM Plan Guidelines include the following program preferences:

- Include integrated projects with multiple benefits. Support and improve local and regional water supply reliability.
- Contribute expeditiously and measurably to the long-term attainment and maintenance of water quality standards.
- Eliminate or significantly reduce pollution in impaired waters and sensitive habitat areas, including areas of special biological significance.
- Include safe drinking water and water quality projects that serve disadvantaged communities.
- Include groundwater management and recharge projects that are located (1) in San Bernardino or Riverside counties; (2) outside of the service area of the Metropolitan Water District of Southern California; or (3) within one mile of established residential and commercial development.

The following statewide priorities were established by the Department of Water Resources (DWR) and the State Water Resources Control Board (SWRCB):

- Reduce conflict between water users or resolve water rights.
- Implementation of Total Maximum Daily Loads (TMDLs) that are established or under development.
- Implementation of Regional Water Quality Control Board (RWQCB) Watershed Management Initiative chapters, plans, and policies.

  The Lahontan RWQCB Watershed Management Initiative includes the following regional priorities and targeted projects: monitor discharger actions to reduce adverse

impacts to Edwards AFB operations and develop requirements for new disposal options; use Basin Plan amendment process to prescribe site-specific objectives for Piute Ponds; pollution and degradation of groundwater by nitrate and TDS; continue to monitor discharger's actions to reduce impact of discharge on groundwater and remedial measures; develop IRWM Plans; implement irrigation management measures; evaluate impacts from large-scale development and integration of sustainable land uses and landscape designs; identify conflicts between water supply and water quality; investigate loading contributions from residential and urban activities; mitigate groundwater overdraft; investigate nitrogen and salt loading contributions to ground and surface water; demonstrate water reuse projects to lower demand on supply; and implement citizen monitoring.

- Implementation of the SWRCB's Nonpoint Source Pollution Plan.

  The Nonpoint Source Pollution Plan adopts a number of management measures as goals for six Nonpoint Source Pollution categories (agriculture, forestry, urban areas, marinas and recreational boating, hydromodification, and wetlands/riparian areas/vegetated treatment systems).

- Assist in meeting Delta Water Quality Objectives.

  Decision 1641 is an action by the SWRCB to establish water quality objectives for water users in the Delta. The Bay/Delta Water Quality Control Plan was developed as a means to attain these water quality objectives and includes the following components: implementation of flow objectives for specific water quality criteria in the Bay-Delta Estuary; a petition to change the point of diversion for the CVP and SWP in the southern Delta; and a petition to change 'in place of use' and 'purpose of use' of the CVP. Generally it was determined that projects within the Antelope Valley Region that increase the reliability of local supplies reduce the need for additional water supplies from the Bay-Delta region. Therefore, there is additional supply in the Bay-Delta available to contribute towards meeting Delta water quality objectives.

- Implementation of recommendations of the floodplain management task force, desalination task force, recycling task force or State species recovery plan.

  Recommendations of the floodplain management task force include, but are not limited to, floodplain mapping, land use planning in areas affected by flooding, alluvial floodplain management, and flood warning and local community flood response programs. Recommendations of the desalination task force were assumed not applicable due to it not being economical and environmentally appropriate in the Antelope Valley Region. Recommendations from the recycling task force include local agencies actively participating with the public in planning water recycling projects; creating recycled water ordinances; increasing public awareness to ensure a safe recycled water supply and encouraging economic and fiscal analyses for water recycling projects to provide true costs and benefits of such projects.

- Address environmental justice concerns.

  Projects that would benefit disadvantaged communities would go toward meeting this objective.

- Assist in achieving one or more goals of the CALFED Bay-Delta Program.

  The CALFED Bay-Delta Program objectives focus on water quality, ecosystem quality, water supply reliability, and levee system integrity in the Bay-Delta area. The potential for actions within the Antelope Valley Region to assist in achieving these goals is through the increase in the reliability of local water supplies, thereby reducing the need for additional imported water supplies from the Bay-Delta region.

6.3 ADDED BENEFITS OF INTEGRATION

Integration of the water management strategies may provide additional benefits, as compared to implementing stand alone alternatives. These added benefits may include:

- facilitating cost sharing among agencies (economy of scale) and organizations,
- resolving potentially conflicting water management needs,
- avoiding duplication of planning, design, compliance, or implementation efforts,
- identifying and resolving jurisdictional, legal, regulatory, administrative, or water rights issues,
- enhancing efficiency of monitoring (e.g., combining monitoring efforts and reducing monitoring duplication) and data management,
- increasing public awareness, public education and outreach, and stakeholder involvement, and
- providing synergistic effects to optimize attainment of IRWM Plan objectives.

6.4 CONCLUSIONS

This IRWM Plan identifies projects and management actions that can be used to implement the projects in an integrated fashion to meet the AV IRWM Plan objectives and

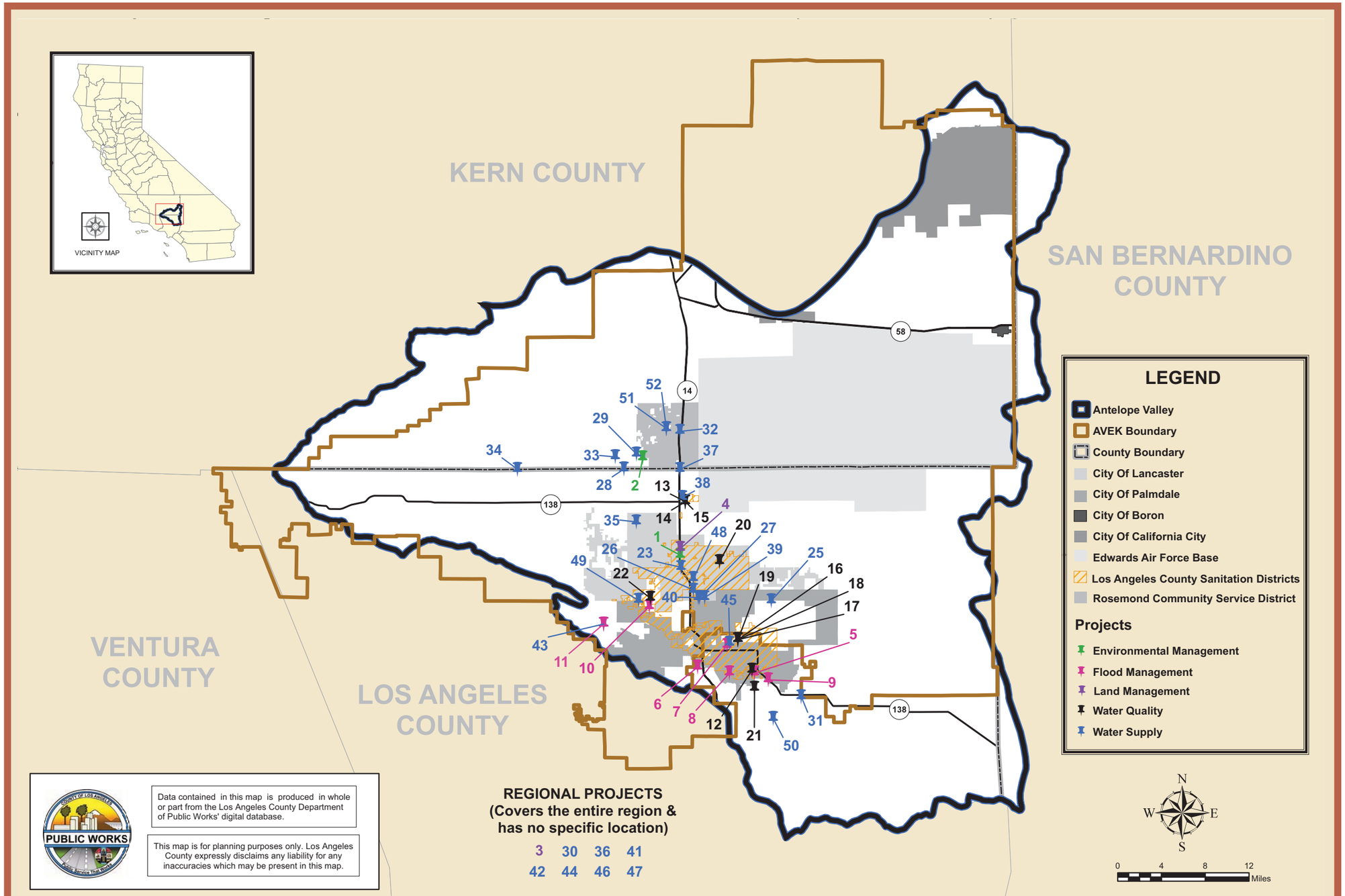

Figure 6-1 Antelope Valley IRWM Plan Project Locations

Table 6-5 Current Projects vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities

Current Project/Program Types and Activities	Water Supply								Water Quality			Flood Mngt.		Environmental Resource Management				Land Use Mngt.		AB 3030 Guidelines												IRWM Plan Program Preferences						Statewide Priorities							
	Water Supply Reliability	Groundwater Management	Water Conservation	Water Recycling	Water Banking & Conjunctive Use	Imported Water	Surface Storage	Water Transfers	Desalination	Water Quality Protection and Improvement	Non-Point Source Pollution Control	Water and Wastewater Treatment	Flood Management	Storm water Capture and Management	Ecosystem Restoration	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Wetlands Enhancement and Creation	Land Use Planning	Watershed Planning	The control of saline water intrusion.	Identification and management of wellhead protection areas and recharge areas	Regulation of the migration of contaminated groundwater.	The administration of a well abandonment and well destruction program.	Mitigation of conditions of overdraft.	Replenishment of groundwater extracted by water producers.	Monitoring of groundwater levels and storage.	Facilitating conjunctive use operations.	Identification of well construction policies.	The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling and extraction projects.	The development of relationships with state and federal regulatory agencies.	The review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.	Include integrated projects with multiple benefits.	Support and improve local and regional water supply reliability.	Contribute expeditiously and measurably to the long-term attainment and maintenance of water quality standards.	Eliminate or significantly reduce pollution in impaired waters and sensitive habitat areas, including areas of special biological significance.	Include safe drinking water and water quality projects that serve disadvantaged communities.	Include groundwater management and recharge projects that are located 1) in San Bernardino or Riverside counties; 2) outside of the service area of the Metropolitan Water District of Southern California; or 3) within one mile of established residential and commercial development.	Reduce conflict between water users or resolve water rights	Implementation of TMDLs that are established or under development.	Implementation of Regional Water Quality Control Board Watershed Management initiative Chapters, plans, and policies.	Implementation of the State Water Resource Control Board's Non-point Source Pollution Plan.	Assist in meeting Delta Water Quality Objectives.	Implementation of recommendations of the floodplain management task force, desalination ask force, recycling task force or State species recovery plan	Address environmental justice concerns.	Assist in achieving one or more goals of the CALFED Bay-Delta Program.
WATER SUPPLY MANAGEMENT																																														
Plans & Studies																																														
Antelope Valley Integrated Regional Water Management Plan	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	NA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
City of Lancaster Groundwater Recharge Feasibility Study (Lancaster)	X	X		X	X						X	X									NA	X			X	X	X	X		X			X	X					X			X	X	X	X		X
Palmdale Water District Reconnaissance Level Feasibility and Scoping Study for Recycled Water Recharge (PWD)	X	X		X	X																NA	X			X	X		X		X			X	X					X			X		X	X		X
Palmdale Water District 2006 Water System Master Plan Update (PWD)	X		X	X			X	X													NA	X						X		X			X	X								X		X	X		X
Court Action																																														
Adjudication of the Groundwater Basin		X																			NA				X	X	X	X			X	X								X		X					
Groundwater Recharge/Banking																																														
Antelope Valley Water Agencies' Water Bank (AVEK, LCID, QHWD, RCSD)	X	X			X	X		X													NA	X			X	X	X	X		X			X	X					X			X		X			X
Tejon Ranch Water Bank (Tejon Ranch Water Company)	X	X			X	X															NA	X			X	X	X	X		X			X	X					X			X		X			X
Water Infrastructure Improvements																																														
Expansion of Treatment Facilities (RWMG)	X			X							X										NA												X	X	X		X			X		X	X	X	X
Water Conservation/Water Use Efficiency																																														
Best Management Practices (AVEK, LACWWD40, PWD, QHWD, RCSD)	X		X																		NA				X					X			X	X								X		X		X	X
WATER QUALITY MANAGEMENT																																														
Water Infrastructure Improvements																																														
Chloramines Conversion Project (LACWWD40)	X									X											NA												X	X	X	X	X						X			X
RCSD Recycled Water Project/Treatment Plant Expansion (RCSD)	X			X		X						X									NA				X					X			X	X	X		X			X		X	X		X
FLOOD MANAGEMENT																																														
None identified at this time																																														
ENVIRONMENTAL MANAGEMENT																																														
Plans & Studies																																														
LA County General Plan Significant Ecological Areas (SEAs)															X	X	X	X	X	X	NA												X			X								X		
Recycled Water																																														
Piute Ponds Reuse Sites															X	X	X	X																												
LAND USE MANAGEMENT																																														
Plans & Studies																																														
Antelope Valley Regional Conservation Roundtable (Antelope Valley Conservancy)	X		X												X	X	X	X	X	X	NA										X	X	X	X						X		X		X			X
Update Los Angeles County General Plan															X	X	X	X	X	X	NA											X	X												X	
Recycled Water																																														
Apollo Lakes Reuse Project																	X		X																											
SUMMARY	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**NA**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

Legend

WS = Water Supply Management FM = Flood Management EM = Environmental Resources Management

WQ = Water Quality Management LM = Land Use Management

Table 6-6 Planned Projects vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities

Current Project/Program Types and Activities	Water Supply								Water Quality			Flood Mngt.		Environmental Resource Management				Land Use Mngt.		AB 3030 Guidelines											IRWM Plan Program Preferences						Statewide Priorities							
	Water Supply Reliability	Groundwater Management	Water Conservation	Water Recycling	Water Banking & Conjunctive Use	Imported Water	Surface Storage	Water Transfers	Desalination	Water Quality Protection and Improvement	Non-Point Source Pollution Control	Water and Wastewater Treatment	Flood Management	Storm water Capture and Management	Ecosystem Restoration	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Wetlands Enhancement and Creation	Land Use Planning	Watershed Planning	The control of saline water intrusion.	Identification and management of wellhead protection areas and recharge areas	Regulation of the migration of contaminated groundwater.	The administration of a well abandonment and well destruction program.	Mitigation of conditions of overdraft.	Replenishment of groundwater extracted by water producers.	Monitoring of groundwater levels and storage.	Facilitating conjunctive use operations.	Identification of well construction policies.	The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling and extraction projects.	The development of relationships with state and federal regulatory agencies.	The review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.	Include integrated projects with multiple benefits.	Support and improve local and regional water supply reliability.	Contribute expeditiously and measurably to the long-term attainment and maintenance of water quality standards.	Eliminate or significantly reduce pollution in impaired waters and sensitive habitat areas, including areas of special biological significance.	Include safe drinking water and water quality projects that serve disadvantaged communities.	Include groundwater management and recharge projects that are located 1) in San Bernardino or Riverside counties; 2) outside of the service area of the Metropolitan Water District of Southern California; or 3) within one mile of established residential and commercial development.	Reduce conflict between water users or resolve water rights	Implementation of TMDLs that are established or under development.	Implementation of Regional Water Quality Control Board Watershed Management initiative Chapters, plans, and policies.	Implementation of the State Water Resource Control Board's Non-point Source Pollution Plan.	Assist in meeting Delta Water Quality Objectives.	Implementation of recommendations of the floodplain management task force, desalination ask force, recycling task force or State species recovery plan	Address environmental justice concerns.	Assist in achieving one or more goals of the CALFED Bay-Delta Program.
WATER SUPPLY MANAGEMENT																																												
Groundwater Recharge/Banking																																												
Amargosa Creek Recharge and Channelization Project (Palmdale)	X	X			X								X	X		X		X	X	X	NA	X			X	X		X		X			X	X					X			X	X		X
Amargosa Water Banking and Storm Water Retention Project (No financial sponsor identified)	X	X			X								X	X		X		X	X	X	NA	X			X	X		X		X			X	X					X			X	X		X
Antelope Valley Water Bank (WDS)	X	X			X	X		X		X			X	X					X	X	NA	X			X	X	X	X		X			X	X					X			X		X		X
Aquifer Storage and Recovery Project: Injection Well Development (LACWWD40)	X	X			X	X															NA	X			X	X		X	X	X			X	X					X					X		X
Aquifer Storage and Recovery Project: Additional Storage Capacity (LACWWD40)	X	X			X	X															NA				X	X		X		X			X	X					X			X		X		X
Deep wells to Recapture Banked Water (RCSD)	X	X			X																NA	X						X	X	X			X	X					X					X		X
Gaskell Road Pipeline (RCSD)	X				X																NA							X		X			X	X					X					X		X
Groundwater Banking (LACWWD40)	X	X			X	X													X	X	NA	X			X	X	X	X		X			X	X					X			X		X		X
Purchasing Spreading Basin Land (RCSD)	X	X			X														X	X	NA							X				X	X					X					X		X
Water Supply Stabilization Project – Westside Project (AVEK, AVSWCA)	X	X			X	X		X		X			X	X					X	X	NA	X			X	X	X	X		X			X	X					X			X		X		X
Water Supply Stabilization Project – Eastside Project (AVEK, AVSWCA)	X	X			X	X		X		X			X	X					X	X	NA	X			X	X	X	X		X			X	X					X			X		X		X
Recycled Water																																												
Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project (Lancaster)	X	X		X	X						X									X	NA	X			X	X		X		X			X	X					X			X	X	X		X
Groundwater Recharge - Recycled Water Project (PWD)	X	X		X	X						X									X	NA	X			X	X		X		X			X	X					X			X	X	X		X
KC & LAC Interconnection Pipeline (RCSD)	X			X																	NA									X			X	X								X	X	X		X
North Los Angeles/Kern County Regional Recycled Water Project (LACWWD40)	X	X		X	X	X					X								X	X	NA	X			X	X		X		X			X	X					X			X	X	X		X
Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H (Lancaster)	X	X		X	X						X										NA	X			X	X		X		X			X	X					X			X	X	X		X
Water Conservation/Water Use Efficiency																																												
ET-Based Controller Program (PWD)	X		X	X										X						X	NA				X								X	X								X		X		X
Implement Evapotranspiration (ET) Controller Program (LACWWD40)	X		X	X																X	NA				X								X	X								X		X		X
Precision Irrigation Control System (Leona Valley Town Council)	X		X	X										X						X	NA				X			X					X	X					X			X	X	X		X
Ultra Low Flush Toilet (ULFT) Change Out Program (LACWWD40)	X		X																		NA				X								X	X								X	X			X
Water Conservation Demonstration Garden (PWD)	X		X																	X	NA				X								X	X								X	X			X
Water Conservation School Education Program (LACWWD40)	X		X																	X	NA				X								X	X								X	X			X
Water Waste Ordinance (LACWWD40)	X		X								X									X	NA				X								X	X								X	X			X
Water Infrastructure Improvements																																												
Avenue K Transmission Main, Phases I-V (LACWWD40)	X						X														NA				X								X	X								X	X			X
Avenue M and 60th Street West Tanks (LACWWD40)	X						X														NA				X								X	X								X	X			X
Littlerock Dam Sediment Removal Project (PWD)	X															X					NA				X								X	X								X	X			X
Place Valves and Turnouts on Reclaimed Water Pipeline (RCSD)	X			X																	NA				X					X			X	X								X	X	X		X
RCSD's Wastewater Pipeline (RCSD)	X			X							X										NA				X					X			X	X								X	X	X		X
WATER QUALITY MANAGEMENT																																												
Recycled Water																																												

Table 6-6 Planned Projects vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

Current Project/Program Types and Activities	Water Supply								Water Quality			Flood Mngt.		Environmental Resource Management				Land Use Mngt.		AB 3030 Guidelines												IRWM Plan Program Preferences						Statewide Priorities							
	Water Supply Reliability	Groundwater Management	Water Conservation	Water Recycling	Water Banking & Conjunctive Use	Imported Water	Surface Storage	Water Transfers	Desalination	Water Quality Protection and Improvement	Non-Point Source Pollution Control	Water and Wastewater Treatment	Flood Management	Storm water Capture and Management	Ecosystem Restoration	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Wetlands Enhancement and Creation	Land Use Planning	Watershed Planning	The control of saline water intrusion.	Identification and management of wellhead protection areas and recharge areas	Regulation of the migration of contaminated groundwater.	The administration of a well abandonment and well destruction program.	Mitigation of conditions of overdraft.	Replenishment of groundwater extracted by water producers.	Monitoring of groundwater levels and storage.	Facilitating conjunctive use operations.	Identification of well construction policies.	The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling and extraction projects.	The development of relationships with state and federal regulatory agencies.	The review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.	Include integrated projects with multiple benefits.	Support and improve local and regional water supply reliability.	Contribute expeditiously and measurably to the long-term attainment and maintenance of water quality standards.	Eliminate or significantly reduce pollution in impaired waters and sensitive habitat areas, including areas of special biological significance.	Include safe drinking water and water quality projects that serve disadvantaged communities.	Include groundwater management and recharge projects that are located 1) in San Bernardino or Riverside counties; 2) outside of the service area of the Metropolitan Water District of Southern California; or 3) within one mile of established residential and commercial development.	Reduce conflict between water users or resolve water rights	Implementation of TMDLs that are established or under development.	Implementation of Regional Water Quality Control Board Watershed Management initiative Chapters, plans, and policies.	Implementation of the State Water Resource Control Board's Non-point Source Pollution Plan.	Assist in meeting Delta Water Quality Objectives.	Implementation of recommendations of the floodplain management task force, desalination ask force, recycling task force or State species recovery plan	Address environmental justice concerns.	Assist in achieving one or more goals of the CALFED Bay-Delta Program.
42nd Street East, Sewer Installation (Palmdale)	X	X								X	X										NA		X							X			X								X	X	X				X
Lancaster WRP Stage V (LACSD)	X			X	X		X										X	X			NA												X	X	X		X							X			X
Lancaster WRP Stage VI (LACSD)	X			X	X		X					X					X	X	X		NA												X	X	X									X			X
Lancaster WRP Proposed Effluent Management Sites (LACSD)	X	X		X								X							X		NA	X	X		X	X	X	X		X			X	X	X							X		X			X
Palmdale Power Project (Palmdale)	X			X								X									NA												X	X								X		X			X
Palmdale WRP Existing Effluent Management Sites (LACSD)	X	X		X								X							X		NA	X	X		X	X	X	X		X			X	X	X							X		X			X
Palmdale WRP Stage V (LACSD)	X	X		X		X						X							X		NA						X						X	X	X									X			X
Palmdale WRP Stage VI (LACSD)	X	X		X		X						X							X		NA												X	X	X									X			X
Palmdale WRP Proposed Effluent Management Sites (LACSD)	X	X		X								X							X		NA	X	X		X	X	X	X		X			X	X	X							X		X			X
Water Infrastructure Improvements																																														
Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (LACWWD40)		X								X		X									NA		X							X			X	X	X	X								X			X
PWD New Treatment Plant (PWD)	X									X											NA				X								X	X	X		X					X		X			X
QHWD Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation Project (QHWD)		X								X		X									NA		X							X			X	X	X	X								X			X
FLOOD MANAGEMENT																																														
Water Infrastructure Improvements																																														
"45th Street East Flood Control Basin (Q-East Basin) (Palmdale)"	X	X	X		X						X		X	X		X					NA	X						X		X			X	X				X					X	X	X		X
Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park (Palmdale)	X		X								X		X	X		X					NA	X						X		X			X	X									X	X	X		X
"Avenue Q and 20th Street East Basin (Q-West Basin) (Palmdale)"	X	X	X		X						X		X	X		X					NA	X						X		X			X	X				X					X	X	X		X
Barrel Springs Detention Basin and Wetlands (Palmdale)	X	X	X		X					X	X		X	X	X	X		X			NA	X			X			X		X			X	X				X			X	X	X	X		X
Hunt Canyon Groundwater Recharge and Flood Control Basin (Palmdale)	X	X	X		X					X	X		X	X		X					NA	X			X	X		X		X			X	X				X			X	X	X	X		X
Quartz Hill Storm Drain (LAFCD)	X		X							X	X		X	X							NA							X					X	X									X	X	X		X
Stormwater Harvesting (Leona Valley Town Council)	X		X	X	X		X	X					X	X							NA				X					X			X	X				X			X		X	X		X
ENVIRONMENTAL MANAGEMENT																																														
Habitat Restoration																																														
Ecosystem & Riparian Habitat Restoration of Amargosa Creek: Avenue J north to Avenue H (Lancaster)										X	X		X	X	X	X		X	X	X	NA											X			X					X		X	X		X
Recycled Water																																														
Tropico Park Pipeline Project (RCSD)	X			X								X				X	X		X		NA												X	X								X		X	X		X
LAND USE MANAGEMENT																																														
Plans and Studies																																														
Antelope-Fremont Watershed Assessment and Plan (Antelope Valley Conservancy)	X		X							X	X		X	X	X	X	X	X	X	X	NA										X	X	X	X	X	X		X			X	X	X		X	X
Recreation																																														
Amargosa Creek Pathways Project (Lancaster)										X	X		X	X	X	X	X		X	X	NA												X								X			X		
SUMMARY	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**NA**	**X**	**X**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**			**X**	**X**	**X**	**X**	**X**	**X**

Legend

WS = Water Supply Management FM = Flood Management EM = Environmental Resources Management

WQ = Water Quality Management LM = Land Use Management

Table 6-7 Alternative "Gap" Projects Vs. IRWM Plan Objectives

Local and Regional Plan Policies	Water Supply Management								Water Quality Management										Flood Management		Environmental Management		Land Use Management					
	Provide reliable water supply to meet the Region's expected demand between now and 2035.	Reduce (73,600 to 263,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.	Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.	Provide adequate reserves (0 to 62,000 AFY) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.	Establish a contingency plan to meet water supply needs of the region during a plausible disruption of SWP water deliveries.	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer by June 2010.	Stabilize groundwater levels at current conditions.	Manage groundwater levels throughout the basin such that a 10 year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.	Provide drinking water that meets customer expectations.	Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetic.	Protect aquifer from contamination.	Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.	Identify contaminated portions of aquifer and prevent migration of contaminants by June 2009.	Map contaminated sites and monitor contaminant movement by December 2008.	Protect natural streams and recharge areas from contamination.	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.	Maximize beneficial use of recycled water.	Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.	Reduce negative impacts of storm water, urban runoff, and nuisance water.	Coordinate a regional flood management plan and policy mechanism by the year 2010.	Preserve open space and natural habitats that protect and enhance water resources and species in the region.	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat to integrate and maximize surface and groundwater management by 2015.	Maintain agricultural land use within the Region.	Preserve 100,000 acres of farmland in rotation through 2035.	Meet growing demand for recreational space.	Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.	Improve integrated land use planning to support water management.	Coordinate a regional land use management plan by the year 2010.
Aggressive conservation	X	X	X	X	X	X																						
Develop further conjunctive use management	X	X	X	X			X	X											X	X	X	X	X	X	X	X	X	
Water Banks Outside of the Antelope Valley	X	X	X	X	X																							
Create regional database for groundwater pumping							X	X			X				X													
Use alternative sources of water	X	X	X	X	X																							
Make further use of recycled water	X	X	X	X													X	X										
Inability to approve further development		X			X																							
Identify contaminated portions of the aquifer											X	X	X	X	X	X												
Map contaminated portions of aquifer by December 2008.											X	X	X	X	X	X												
Establish a well abandonment ordinance											X																	
Develop and implement a regional Groundwater Wellhead Protection Program											X																	
Develop management program for nitrate and TDS											X	X	X	X	X	X												
Expand the water quality monitoring program											X	X	X	X	X	X			X	X								
Coordinate a flood management plan																			X	X							X	
Storm water capture/recovery feasibility study																			X	X								
Increase small-scale flood management projects	X	X	X	X															X		X	X						
Encourage Low Impact Development																	X		X		X						X	
Preserve acres of habitat																					X	X			X	X	X	
Develop a HCP for the Antelope Valley																					X	X			X	X	X	
Promote land conservation projects that enhance flood control, aquifer recharge, and watershed and open space preservation.											X	X			X	X			X		X	X	X	X	X	X	X	
Preserve farmland																							X	X	X		X	
Build public parks and recreational amenities																									X	X	X	
Create a Watershed Management Plan											X	X			X	X			X	X	X		X		X		X	
Create incentives for land owners to protect/restore/preserve open space											X	X			X	X			X		X	X	X	X	X			

Table 6-8 Alternative "Gap" Projects vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, Statewide Priorities, & IRWM Plan Objectives

Current Project/Program Types and Activities	Water Supply									Water Quality			Flood Mngt.		Environmental Resource Management				Land Use Mngt.		AB 3030 Guidelines											IRWM Plan Program Preferences						Statewide Priorities							
	Water Supply Reliability	Groundwater Management	Water Conservation	Water Recycling	Water Banking & Conjunctive Use	Imported Water	Surface Storage	Water Transfers	Desalination	Water Quality Protection and Improvement	Non-Point Source Pollution Control	Water and Wastewater Treatment	Flood Management	Storm water Capture and Management	Ecosystem Restoration	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Wetlands Enhancement and Creation	Land Use Planning	Watershed Planning	The control of saline water intrusion.	Identification and management of wellhead protection areas and recharge areas	Regulation of the migration of contaminated groundwater.	The administration of a well abandonment and well destruction program.	Mitigation of conditions of overdraft.	Replenishment of groundwater extracted by water producers.	Monitoring of groundwater levels and storage.	Facilitating conjunctive use operations.	Identification of well construction policies.	The construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling and extraction projects.	The development of relationships with state and federal regulatory agencies.	The review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.	Include integrated projects with multiple benefits.	Support and improve local and regional water supply reliability.	Contribute expeditiously and measurably to the long-term attainment and maintenance of water quality standards.	Eliminate or significantly reduce pollution in impaired waters and sensitive habitat areas, including areas of special biological significance.	Include safe drinking water and water quality projects that serve disadvantaged communities.	Include groundwater management and recharge projects that are located 1) in San Bernardino or Riverside counties; 2) outside of the service area of the Metropolitan Water District of Southern California; or 3) within one mile of established residential and commercial development.	Reduce conflict between water users or resolve water rights	Implementation of TMDLs that are established or under development.	Implementation of Regional Water Quality Control Board Watershed Management initiative Chapters, plans, and policies.	Implementation of the State Water Resource Control Board's Non-point Source Pollution Plan.	Assist in meeting Delta Water Quality Objectives.	Implementation of recommendations of the floodplain management task force, desalination ask force, recycling task force or State species recovery plan	Address environmental justice concerns.	Assist in achieving one or more goals of the CALFED Bay-Delta Program.
Aggressive conservation	X		X	X			X					X							X						X					X			X	X								X		X		X	X
Develop further conjunctive use management	X	X			X		X	X					X	X				X	X	X		X			X	X	X	X		X			X	X					X			X		X			X
Participated in water banks outside of the Antelope Valley	X	X			X	X	X	X																		X		X		X	X		X	X					X			X		X			X
Create regional database for groundwater pumping	X	X					X																X				X						X	X													X
Use alternative sources of water		X			X	X	X	X	X																X	X		X		X	X		X	X					X			X			X		X
Make further use of recycled water	X		X	X						X		X	X	X											X	X		X		X			X	X	X							X			X		X
Inability to approve further development	X										X								X																												
Identify contaminated portions of the aquifer	X	X								X	X											X										X	X	X	X	X						X		X			X
Map contaminated portions of aquifer by December 2008	X	X								X	X											X										X	X	X	X	X						X		X			X
Establish a well abandonment ordinance	X	X								X	X												X	X				X				X	X	X	X	X						X		X			X
Develop and implement a regional Groundwater Wellhead Protection Program	X	X								X	X								X	X		X	X	X				X				X	X	X	X	X						X		X			X
Develop management program for nitrate and TDS	X	X								X	X	X							X	X		X	X									X	X	X	X	X						X		X			X
Expand the water quality monitoring program	X	X				X	X			X	X	X							X	X							X						X	X	X	X						X		X			X
Coordinate a flood management plan	X												X	X					X	X								X		X			X	X					X			X		X	X		X
Storm water capture/recovery feasibility study	X												X	X					X	X								X		X			X	X					X			X		X	X		X
Increase small-scale flood management projects	X												X	X					X	X								X		X			X	X					X			X		X	X		X
Encourage Low Impact Development	X												X	X					X	X												X	X	X								X		X	X		X
Preserve acres of habitat															X	X	X	X	X	X													X												X		
Develop a HCP for the Antelope Valley															X	X	X	X	X	X													X												X		
Promote land conservation projects that enhance flood control, aquifer recharge, and watershed and open space preservation.	X	X											X	X	X	X	X	X	X	X	X							X		X		X	X									X					
Preserve farmland																			X	X												X	X														
Build parks and recreational amenities																	X	X														X	X											X		
Create a Watershed Management Plan	X														X	X	X	X		X												X	X	X	X							X		X			X
Create incentives for land owners to protect/restore/preserve open space	X		X	X									X	X		X	X		X	X													X	X								X		X			X

associated planning targets by 2035. The initial benefits for those projects far enough along in the planning stages to estimate benefit have been quantified showing that the projects will not provide the level of benefits needed to fully accomplish the Antelope Valley Region's quantified planning targets, particularly relative to the water supply, environmental resource, and land use management WMSAs. This provides the basis for discussion on how stakeholders may begin to contribute progress towards quantifiable targets. Table 6-9 provides a summary of the quantified benefits, for those projects that identified numerical benefits, for each WMSA, and assumes that all the projects proposed for this IRWM Plan were implemented. For example, Table 6-9 provides the projects that included quantifiable water supply benefit information, even if the numbers are very preliminary estimates. Note that some projects are likely to contribute a benefit to supply in one water year scenario more than another. For example, groundwater banking is a water management strategy that provides a dry/multi-dry year benefit, not an average year benefit because of the way that the banks are typically operated. An average water year, surplus water would be injected into the banks, and therefore this injected water would not go towards meeting demand for an average year, thus is not a "benefit" for an average year. During a dry water year, however, water would be extracted from the bank to help meet dry year demand and would then be a "benefit" for a dry year.

Therefore, Table 6-9 groups the projects and their expected benefits into the three water year scenarios; average, dry, and multi-dry.

Table 6-9 Projects that Provide Quantifiable Water Supply Benefits

Projects Organized by Water Year Scenario	Estimated Benefit
Average Year	
PWD's ET-Based Controller Program This project involves the installation of ET-based irrigation controllers for landscaped areas. PWD estimates that greater than 1,000 AFY could be saved through use of these controllers.	> 1,000 AFY** ** Given that these projects overlap one another, their quantified benefits have been combined. However, these estimates are based on conceptual project descriptions and are therefore subject to change as the projects are more clearly defined.
LACWWD 40's ET Controller Program This project involves the installation of ET-based irrigation controllers for landscaped areas. LACWWD 40 anticipates that this project be jointly administered with the City of Palmdale, City of Lancaster, PWD, AVEK, the Building Industry Association, AVWCC, and homeowners associations.	
Leona Valley Town Council's Precision Irrigation Control System This project is a proposed irrigation control system using electronic sensor probes at the root level. Preliminary estimates show a potential savings of more than 150 AFY.	> 150 AFY
LACWWD 40's Ultra Low Flush Toilet (ULFT) Change Out Program This project would distribute ULFT's to customers through one-day Saturday toilet distributions. Estimated savings are between 1 to 100 AFY.	1 to 100 AFY
Leona Valley Town Council's Stormwater Harvesting This project involves the collection and treatment of stormwater for use as irrigation supply. The project estimates that once fully implemented, a savings of 25 AFY could be realized.	25 AFY
PWD's Littlerock Dam Sediment Removal Project This project involves removing accumulated sediment from the Littlerock Reservoir which would increase its storage capacity. PWD estimates that greater than 1,000 AFY could be supplied through this capacity increase.	> 1,000 AFY
Lancaster's Groundwater Recharge Using Recycled Water Pilot Project This Pilot project would recharge 2,500 AFY of blended recycled water and imported/stormwater. Ultimately the project could recharge as much as 50,000 AFY of blend water, with blend water consisting of 40,000 AFY of imported SWP water and 10,000 AFY of recycled water from Lancaster WRP. The baseline project would extract 48,000 AFY of recharged water, on average, via a new well field and deliver the water to wholesaler/retailer distribution system(s) and private agricultural users.	2,500 AFY and 100 acres open space; ultimately 48,000 AFY and 1,000 acres open space

Table 6-9 Projects that Provide Quantifiable Water Supply Benefits (continued)

Projects Organized by Water Year Scenario	Estimated Benefit
PWD's Groundwater Recharge Using Recycled Water This project involves groundwater recharge using recycled water from the Palmdale WRP. This project is anticipated to be similar to the Lancaster groundwater recharge project described above and have similar blending and extraction numbers (e.g., a blend of 10,000 AFY of recycled water and 40,000 AFY of SWP water). In order to have 40,000 AFY of SWP water to blend, this project would most likely end up being an AVSWCA project (or at least a joint venture type project with AVEK and/or LCID).	48,000 AFY *** This project is still in the conceptual phase, however it is anticipated to be similar to the Lancaster project described above. Therefore, the same average annual extraction is assumed.
Palmdale's Amargosa Creek Recharge and Channelization Project This project includes expanding the size and capacity of the spreading grounds for natural recharge; developing and preserving an ephemeral stream habitat; and channelization of Amargosa Creek and providing a grade separation of 20th Street West over Amargosa Creek.	5,000 to 10,000 AFY; 15 acres of open space and 20 acres of flood protection.
Dry Year and Multi-Dry Year	
Western Development & Storage's Antelope Valley Water Bank The Antelope Valley Water Bank is being designed to provide 500,000 AF of storage in the Neenach Subbasin of the Antelope Valley Region and the ability to recharge and recover 100,000 AFY. This project would also create approximately 1,700 acres of agricultural land.	40,400 - 100,000 AFY** ** Although these projects share the same source water (SWP water) and thus their benefits are limited to how much SWP is available to the Antelope Valley Region for recharge, they can be differentiated by the potential extraction capacities. Therefore, a range of the individual project benefits has been provided.
LACWWD 40's Groundwater Banking Project This project would establish a groundwater bank to include 63,500 AF extraction capacity during dry years and 170,000 AF storage capacity.	
AVEK's Water Supply Stabilization Project – Eastside and Westside Projects These projects establish groundwater banks in the Antelope Valley Region used to recharge imported SWP water.	
LACWWD 40's Injection Well Development Project This project involves the construction of 10 new Aquifer Storage and Recharge/Recovery (ASR) well sites. The additional wells would be available for water injection during wet years and for water extraction during dry years.	12,000 AFY

There are additional water supply capacity improvement projects that by themselves do not contribute to adding new supplies to the Antelope Valley Region, but allow for the additional use of existing supplies. These projects include but are not limited to: infrastructure improvements at AVEK's treatment plants, RCSD's Gaskell Road Pipeline project, and RCSD's valves and turnouts projects just to name a few. Refer to Section 5 or to Tables 6-1 and 6-2 for a listing of all the current and proposed projects.

Table 6-10 provides a summary of the projects that provide quantifiable benefits other than water supply.

Because quantified planning targets were not established for the flood management WMSA, that WMSA is not included in Table 6-11 below.

Table 6-12 provides a summary of how the stakeholder-identified projects contribute towards meeting the other evaluation criteria: Proposition 50 IRWM Strategies, AB 3030 Guidelines, IRWM Guideline Program Preferences, and Statewide Priorities. Proposed projects contributed to all but one Proposition 50 IRWM Strategy, desalination. Due to the Antelope Valley Region's distance from the ocean, and the economic cost of constructing a desalination plant and pipeline to the ocean, desalination is not an attractive strategy for the Antelope Valley Region at this time. However, should the Antelope Valley Region consider a future transfer or exchange which has desalinated water as a component, the IRWM Plan's contribution to meeting this objective could be re-evaluated. All of the AB 3030 Guidelines were cumulatively contributed to by the projects proposed in this IRWM Plan. Due to the Antelope Valley Region's distance from the ocean, and the widely-held assumption that it is a closed basin, saltwater intrusion was assumed to not be applicable to the Antelope Valley Region. All of the IRWM Guideline Program Preferences were cumulatively contributed to by the projects proposed

Table 6-10 Projects that Provide Other Quantifiable Benefits

Projects	Estimated Benefit
Antelope Valley Conservancy's Antelope-Fremont Watershed Assessment and Plan This project would integrate with this IRWM Plan and consensus-based Antelope Valley Region Regional Conservation Roundtable, and create habitat management plans for proposed conservation lands.	2,000 acres open space/habitat, conservation lands
Palmdale's Barrel Springs Detention Basin and Wetlands This project would provide flood control, wetland enhancement, and habitat protection for the City of Palmdale.	40 acres of wetland/habitat
PWD's Avenue Q and 20th Street East Basin This project would provide for a possible groundwater recharge area and provide for natural habitat preservation.	160 acres of habitat; 1,600 AFY of stormwater capture
PWD's Hunt Canyon Groundwater Recharge and Flood Control Basin This project is intended to alleviate flooding concerns in the Antelope Valley Region through detention of excess stormwater runoff during severe storms.	300 acres of habitat; 3,000 AFY of stormwater capture
Los Angeles County Public Work's Quartz Hill Storm Drain This project would alleviate flooding and improve water quality in unincorporated areas of Los Angeles County.	1,200 acres of flood protection

Table 6-11 Summary of Quantified Benefits

WMSA Benefit Type	Range	
Water Supply	1 AFY – 48,000 AFY (Avg. Year)	12,000 AFY – 100,000 AFY (Dry Year)
Water Quality	3,200 – 64,780 AFY recycled water demand	
Environmental Management	5,800 acres flood protection/stormwater capture	
Land Use Management	2,500 acres habitat/open space	

Table 6-12 Summary of Projects vs. Proposition 50 Strategies, AB 3030, IRWM Program Preferences, and Statewide Priorities

Other Evaluation Criteria	No. of Objectives Contributed to	No. of Projects
IRWM Proposition 50 Strategies	0	0
	1-5	39
	> 5	21
AB 3030 Guidelines	0	8
	1-5	40
	> 5	12
IRWM Program Preferences	0	1
	1-3	53
	> 3	6
Statewide Priorities	0	0
	1-4	55
	> 4	5

in this IRWM Plan. Only one of the Statewide Priorities was not contributed to by the projects in this IRWM Plan: "implementation of TMDLs that are established or under development," because there are no TMDLs currently established for waters within the Antelope Valley Region.

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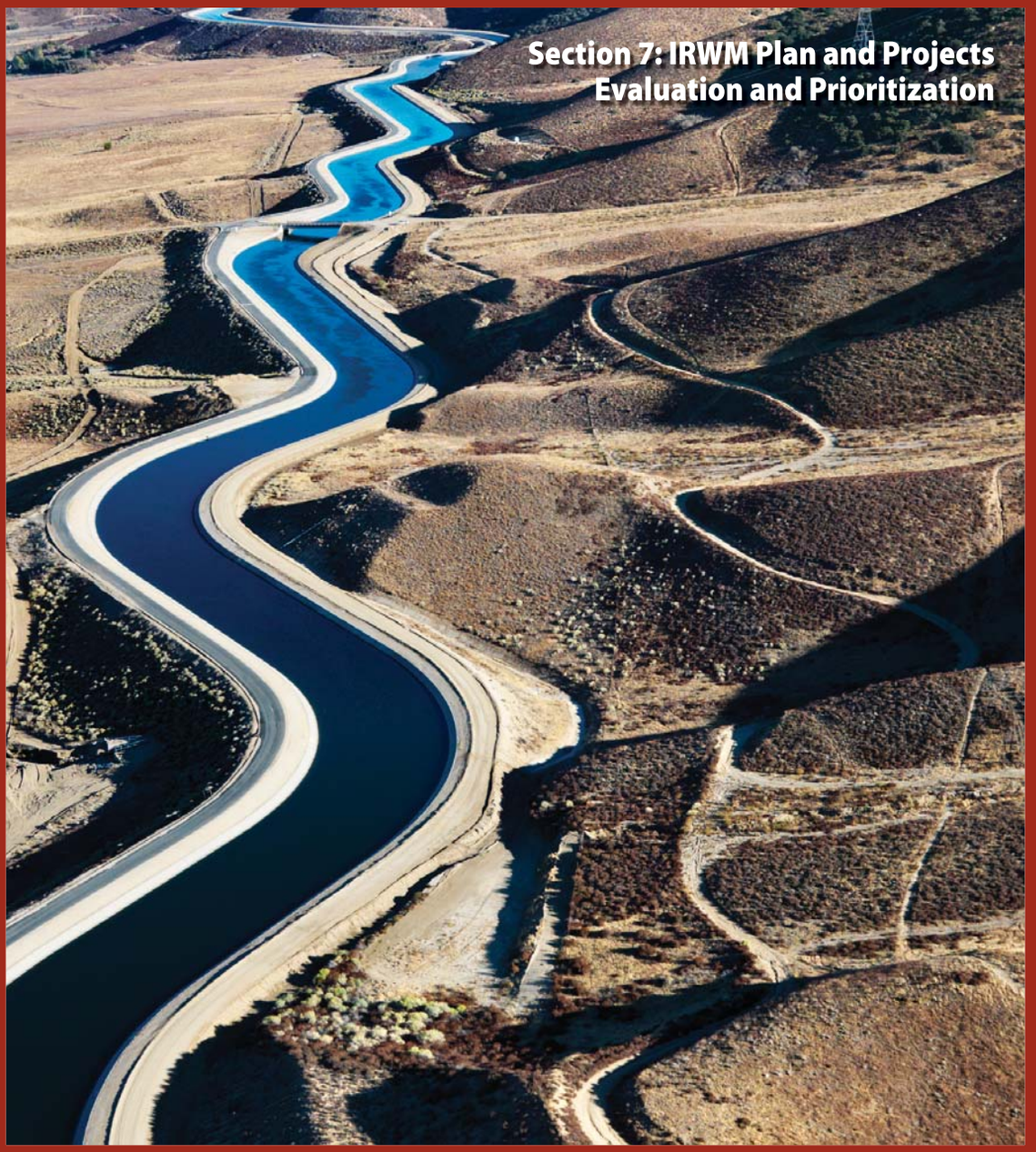
Section 7: IRWM Plan and Projects Evaluation and Prioritization



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With many residents relying on the California Aqueduct to supply their water, it is a lifeline to the Antelope Valley.

Section 7: IRWM Plan and Projects Evaluation and Prioritization

7.1 INTRODUCTION

This section presents a general discussion of the advantages of planning regionally for water resource management and evaluates the benefits of the Antelope Valley Integrated Regional Water Management (IRWM) Plan, including benefits to local and disadvantaged communities within the Antelope Valley Region, and positive impacts that this effort may have on other natural and community resources. Section 7 also describes the evaluation criteria and process that Stakeholders used to rank and prioritize IRWM projects, and presents those projects that Stakeholders have designated as high priority. High priority projects are those that the Stakeholders want to see implemented within the next two years; their implementation is discussed further in Section 8. Lastly, the benefit and costs of these high priority projects are provided in this section.

7.2 IRWM PLAN IMPACTS AND BENEFITS ASSESSMENT

The discussion below discusses the advantages of preparing a regional plan as opposed to individual local efforts and includes an evaluation of the potential benefits and impacts of Plan implementation within the Antelope Valley Region and in adjacent areas. A description of how this IRWM Plan responds to environmental justice concerns and its potential impacts on disadvantaged communities (DACs) is provided, as well as a preliminary evaluation of the impacts and benefits to other resources, such as air quality and transportation.

7.2.1 Advantages of Preparing a Regional Plan

There are many advantages to preparing a regional plan as opposed to implementing local efforts. Regional planning provides a means to maintain, protect, and restore natural resources within the Antelope Valley Region while also enhancing the quality of life for residents in the Antelope Valley Region. The Antelope Valley IRWM Plan provides a means to support environmental protection, quality of life issues, and economic development using the watershed boundary as the planning framework. This IRWM Plan allows for stakeholders in the community to join together in creating a vision for water resources in the Antelope Valley Region.

In creating the opportunity for collaboration, this IRWM Plan process facilitates the establishment of partnerships between local and state governments, community organizations and any other groups with the common goal of protecting water resources within the Antelope Valley Region. It is through the IRWM Plan process that community efforts can be coordinated to create a regionally focused plan to more efficiently reach the identified objectives and goals. Moreover, preparation of a regional plan allows for the communities to address water supply, water quality, flood management, and environmental and land use issues within the physical boundaries of the watershed rather than political boundaries.

The environmental benefits of preparing this IRWM Plan are clear: enhanced water supply reliability, improvements in water quality, protecting natural habitats and open space areas for their water resource function, controlling flooding and maintaining community cultural and land uses. The community benefits are, however, even more important in the Antelope Valley Region. This is exemplified by the coordination and collaboration of the Regional Water Management Group (RWMG), which was formed for the purposes of carrying out this IRWM Plan. The fact that the RWMG, and all the stakeholders who participated in the planning of this IRWM Plan, have come together to develop an action plan to address their concerns over water resources in the Antelope Valley Region, is a historical feat given the Antelope Valley Region's history.

The RWMG made significant progress by establishing a collaborative forum in the Antelope Valley Region to conduct water management planning, regional objective and planning target design, assembly and prioritization of a comprehensive list of potential implementation projects, and oversight of the planning and implementation grant application process. Establishment of the RWMG has already resulted in substantial benefits by bringing together the numerous disparate water interests within the Antelope Valley Region into a single, unified group with a common purpose and direction.

The implementation of projects and management actions contained in this IRWM Plan designed to improve local resources (whether they be water supply, open space, recreational land, etc.) will be more successful as a result of this high level of cooperation among the agencies that must work together to implement them. This level of achievement and the benefits could not be realized from implementation of just a local agency's projects alone.

7.2.1.1 Potential Adverse Impacts

The IRWM Plan Guidelines require an evaluation of potential negative or adverse impacts within the Antelope Valley Region and in adjacent areas from implementation of the IRWM Plan projects. Each project implemented as part of this IRWM Plan will require evaluation of its impacts pursuant to the California Environmental Quality Act (CEQA). Section 7.2.4 provides a preliminary impact analysis for the resources that could be impacted by the IRWM Plan. Generally, any impacts that would be considered adverse would likely be short-term construction related impacts such as air quality emissions and increases in noise levels from grading activities. It is assumed that any approving entity would comply with CEQA regulations and respond with appropriate mitigation measures to the extent that any significant environmental impacts would result.

7.2.2 Interregional Benefits and Impacts

As detailed in Sections 1 and 2, the drainage basin was chosen as the boundary for this IRWM Plan, not the boundary of the groundwater basin. This decision was made to be consistent with several scientific studies of the

Antelope Valley Region that have used this larger drainage basin boundary so that similar data sets could be utilized, and the boundary also included key agencies dealing with similar water management issues such as increasing populations, limited infrastructure, and increasing pumping costs with shared water resources.

Because the Antelope Valley Region is bound by the San Gabriel Mountains to the south and southwest, and the Tehachapi Mountains to the northwest, coordination with agencies and organizations outside of these ranges, in Los Angeles County and Ventura County, for example, would provide little benefit. However, there exists the potential for interregional benefits and impacts from coordination with agencies and organizations in San Bernardino County which lies to the east, and with the other South Lahontan funding area groups that are beginning their own process of developing an IRWM Plan.

Other IRWM Plan groups in the Antelope Valley Region include Mojave (who already completed their plan), Mono County, Owens Valley, Lake Tahoe, and Alpine County. Implementation of this IRWM Plan includes a provision to identify opportunities as they arise to find synergies with these other regional IRWM Plans so that interregional benefits can be realized.

7.2.3 Benefits to Disadvantaged Communities

A DAC is defined as having an annual median household income that is less than 80 percent of the statewide annual median household income, which is $37,994 using Census 2000 data. The analysis of census tract data (refer to Section 1) determined that approximately 20 percent of the population in the Antelope Valley Region reside in DACs, having a median household income of less than $37,994. These DAC communities include Mojave, portions of the Cities of California City, Palmdale and Lancaster, and some County unincorporated areas.

Projects that have so far been included in this IRWM Plan are not located specifically within these communities but will benefit Palmdale, Lancaster, and County unincorporated area residents directly. Additionally, the RWMG is currently engaged in outreach to develop and include projects within and adjacent to these communities. The RWMG is accepting projects on an ongoing basis and will offer technical assistance to DAC communities when available. All project ideas and concepts can be submitted for consideration to this IRWM Plan, and will undergo the same process for evaluation as the current proposed projects.

The objectives of the IRWM Plan are to provide a reliable water supply to meet demands in the Antelope Valley Region, to meet water quality standards and protect existing supplies from contamination, to manage flood waters and provide adequate flood control, and to protect and preserve open space, habitat, recreational uses, and agricultural lands within the entire Antelope Valley Region. Outreach effort findings suggest that these objectives successfully capture the general desires of most residents in the Antelope Valley Region, and that local projects generally capture the specific expression of these desires.

Meeting these objectives benefits the Antelope Valley Region as a whole, not just in the vicinity of the individual project. DACs in the Antelope Valley Region will benefit from implementation of this IRWM Plan and are expected to play a greater role in developing, proposing, and sponsoring/cosponsoring projects in the near future due to the targeted outreach efforts in these communities.

7.2.4 Resource Specific Impacts

The following discussion provides an evaluation of the impacts and/or benefits to other resources, such as air quality and transportation. These resources are evaluated below for implementation of this IRWM Plan as a whole. Each project will be required to undergo adequate CEQA review prior to project-specific implementation. The CEQA review will provide an evaluation of impacts to these other resources in much greater detail than discussed below.

Aesthetics. The IRWM Plan includes objectives that preserve habitat and open space which would maintain the beneficial visual aspects of these land uses. Projects that include construction activities would likely occur in areas that are already disturbed, or would include mitigation

Through the use of energy saving devices like solar panels, proposed projects attempt to safeguard against both water and energy concerns in the Antelope Valley.

measures that would return disturbed areas to their pre-construction conditions.

Agricultural Resources. One of the objectives of the IRWM Plan is to preserve existing agricultural land and increase the amount of agricultural land used to facilitate conjunctive use operations. Therefore, impacts to agriculture from Plan implementation are likely to be beneficial.

Air Quality. Short-term air quality impacts could result from construction activities from some of the proposed projects. However, through the CEQA process most of these activities would be minimized through mitigation efforts, and no long-term air quality impacts would be expected.

Biological Resources. Short-term biological impacts could result from construction activities from some of the proposed projects. However, through the CEQA process most of these activities would be minimized through mitigation efforts and no long-term biological impacts would be expected. Additionally, the IRWM Plan includes habitat preservation as one of its objectives. Thus, if implemented, impacts to biological resources could be beneficial.

Cultural Resources. Impacts to cultural resources could result from construction activities from some of the proposed projects. However, through the CEQA process most of these activities would be minimized through mitigation efforts and no long-term cultural impacts would be expected.

Geology and Soils. All projects would be required to undergo geological feasibility studies which would specify the appropriate engineering standards the contractor would have to comply with during construction. Compliance with these standards would mitigate project site geological and soil impacts.

Hazards and Hazardous Materials. Hazards and hazardous materials impacts could result from construction activities from some of the proposed projects should a spill occur. However, through the CEQA process most of these activities would be minimized through mitigation efforts and best management practices and no long-term hazards impacts would be expected.

Hydrology and Water Quality. Overall impacts to hydrology and water quality would be beneficial because the majority of the projects in this IRWM Plan would improve water supply reliability and water quality.

A number of projects proposed in this IRWM Plan are water banking programs; some indicate the source of water to be banked, others focus on creation of the bank itself, and not the source of water. For example, AVEK's Eastside and Westside Water Supply Stabilization Projects assume the source of water will be SWP. Alternatively, the Western Development and Storage Banking Program will operate by extending invitations to agencies and other entities to import water into the bank; without specifying the source of the imported water. Concern for meeting water quality regulations for groundwater recharge for the variety of source waters was discussed in Section 3.2.5.1.

Land Use and Planning. The projects proposed in this IRWM Plan were evaluated as to their consistency with local and regional General Plans (see Table 8-2). Therefore, no significant land use changes or inconsistencies with policies are anticipated.

Noise. Noise impacts could result from construction activities from some of the proposed projects. However, through the CEQA process most of these activities would be minimized through mitigation efforts and no long-term noise impacts would be expected.

Population and Housing. No adverse impacts to population and housing would occur. Plan implementation would help to meet the water demands of the existing and current population.

Public Services. Public services would not be adversely impacted by implementation of this IRWM Plan. The increased reliability of local water supplies could benefit fire protection efforts in the Antelope Valley Region.

Recreation. One of the objectives of the IRWM Plan is to meet the growing demand for recreational space. Therefore, impacts to recreation from Plan implementation are likely to be beneficial.

Transportation and Circulation. Transportation and circulation could be temporarily impacted during construction of some of the proposed projects that are located near roadways and main arteries. However, through the CEQA process most of these activities would be minimized through mitigation efforts and no long-term transportation and circulation impacts would be expected.

Utilities and Service Systems. Many of the projects proposed in this IRWM Plan are included to enhance water and wastewater treatment, enhance reliability of water supplies through infrastructure upgrades, and increase stormwater management and flood control operations. These types of projects would benefit the utilities and service systems in the Antelope Valley Region.

7.2.4.1 Impacts to Energy

The Antelope Valley Region has a variety of efforts planned or underway to both reduce water consumption with the corresponding reduction in energy use and to develop local energy supply. These efforts include water conservation, recycled water use, hydropower, and utilization of renewable resources, such as wastewater treatment plant digester gas recovery and solar power. As described in the IRWM Plan, the Antelope Valley Water Conservation Coalition is proposing the Comprehensive Water Conservation/ Water Use Efficiency Program and the Cities of Palmdale and Lancaster are both proposing recycled water projects. The water use efficiency effort, in particular, has a direct impact to reducing the energy used to pump water over the Tehachapis. Recycled waters derive similar benefit by reducing the quantity of potable water that needs to be pumped through the State Water Project system.

The projects included in the AV IRWM Plan also contribute to the production of local energy. The proposed Palmdale Power Project in the City of Palmdale, is a hybrid of natural gas-fired combined cycle generating equipment integrated with solar thermal generating equipment, and will have a net electrical output of 563 megawatts (MW). Critical process cooling water needs for the Plant will be met by the use of recycled water, as described in Section 3, thereby saving valuable potable water. Construction is planned to begin in 2008 and commercial operation planned in late 2010. The Palmdale Power Project is also designed to use solar photovoltaic technology to generate a portion of the project's output and thereby support the State of California's goal of increasing the percentage of renewable energy supplies.

Other examples of renewable energy in the region are the LACSD 14 and LACSD 20 projects. In 2003, the LACSD 14 entered into an agreement with Ingersoll-Rand (IR) to demonstrate their 250 kilowatt (kW) microturbine fueled by digester gas. At full power the microturbine will produce 250 kW of electricity and sufficient hot water to heat the water reclamation plant (WRP) digesters. The completed project will provide economical electricity and hot water to supply the plant's energy needs with a combined electrical and thermal efficiency of up to 51 percent. In the same time period as LACSD 14, LACSD 20 entered into an agreement with Quinn Power Systems to demonstrate a Fuel Cell Energy 250 kW fuel cell on digester gas. This program is the first digester gas application of the 250 kW unit. At full power the fuel cell will produce 250 kW of electricity and sufficient hot water to heat the WRP digesters. The completed project will provide economical electricity and hot water to supply the plant's energy needs with a combined electrical and thermal efficiency of up to 73 percent. Environmental benefits of these facilities include a reduction of greenhouse emissions, air emissions that are less than the gas flares, and the reduction of air emissions associated with less consumption of utility central generating plants. By generating power where it is needed there is also a reduced need for utility transmission and distribution facilities.

Through implementation of these projects and the AV IRWM Plan, there is the potential for an overall benefit to energy resources within the Antelope Valley Region.

7.3 IRWM PROJECTS EVALUATION AND RANKING

The following discussion focuses on the potential benefits associated with the individual projects proposed as part of the plan, as well as how effectively they will work towards plan objectives and the feasibility of their future implementation. The intent of the project evaluation and prioritization process is to identify those projects and management actions the stakeholders would like to pursue first to begin addressing the Antelope Valley Region's issues and needs and to meeting the identified AV IRWM Plan objectives.

As discussed in Section 5 and shown in Tables 6-1 and 6-5, there are a number of current strategies being used to address the Antelope Valley Region's water management issues. These include the development of plans and studies, investigations into groundwater recharge and groundwater banking programs, and others. Many of these current efforts provide the basis for the stakeholder-identified projects. For example, the City of Lancaster's Groundwater Recharge Feasibility Study provided the technical analysis for the development of Lancaster's Groundwater Recharge Using Recycled Water Pilot Project.

Plans and actions currently underway are assumed to continue for the purposes of this IRWM Plan. It is the projects that were submitted by the stakeholders during the Call for Projects that illustrate the breadth of the activities that would be needed for the Antelope Valley Region to meet its water management objectives. However, even if all of the projects proposed in this IRWM Plan were implemented in the Antelope Valley Region (discussed in Section 5 and shown in Table 6-2 and 6-6), there are still gaps that would need to be filled by alternative projects in order to meet the IRWM Plan objectives. Management actions suggested to fill these gaps were discussed in Section 6, and are also considered in the evaluation and prioritization exercise provided in this Section.

Therefore, the evaluation and ranking of the projects is focused mainly on those projects and management actions submitted by the stakeholders and the 'alternative gap' projects discussed in Section 6 that help fill the gaps between strategies. Through numerical ranking and qualitative assessment, each project was given a low, medium, or high priority ranking. Projects were evaluated and ranked according to the criteria listed below, and as shown in Table 7-1. Each evaluation criteria was assigned points, as described in more detail below. Initial scores provided an early indication of the potential final ranking of each project. Table 7-1 also allowed for stakeholder comments, which provided an additional method to evaluate the Projects.

CEQA Completed, or Not Required. Activities funded under Proposition 50 must be in compliance with the CEQA. Projects that have completed CEQA analyses or do not require CEQA review were given a point.

Cost Estimates Prepared (with some detail). As discussed in Section 5, the stakeholders were given the opportunity to directly submit their projects and project concepts for consideration through a "Call for Projects." The cost information provided herein represents the outcome of the initial step in a process of bringing individual projects into the collaborative process implied by this IRWM Plan. It should also be noted that stakeholders were encouraged to submit project concepts and thus the incompleteness of some cost information may be appropriate given that request. While many of the projects lack detailed supporting information, especially with regard to cost estimates, the Call for Projects process identified information that is readily available, needs to be identified, and provides a basis to move forward. Based on that process, a point was given to those projects that were farther along in their estimation of their project costs.

Table 7-1 also identifies the cost estimates if provided, and a description of the associated benefit if quantified. This allowed the Stakeholders to assess the projects cost/benefit ratio, even if just on a very preliminary level. Additionally, if the anticipated funding match source was known, that information was also identified in Table 7-1.

Schedule Prepared. Preference is given to those projects that demonstrate a 'readiness to proceed'. A point was given to those projects that had a schedule for implementation that was consistent with its project description and cost estimate.

The three evaluation criteria above: (1) CEQA, (2) Cost Estimation (including cost/benefit detail if available), and (3) Schedule, collectively gave the Stakeholders an indication of the readiness to proceed for a particular project.

Have Broad Support among AV IRWM Plan Stakeholders. It is ultimately up to the Antelope Valley Region Stakeholders to determine which water management projects and actions they wish to implement to address their issues and needs, and only those projects that are supported by the group are likely to move forward. Therefore, those projects that have broad support amongst the IRWM Plan stakeholders were given a point.

Integrates Easily with Other Projects. A key criterion for prioritization is the ability of a project to integrate with other projects and maximize linkages between projects. Those projects that could be integrated easily with other projects were given a point.

Number of IRWM Plan Objectives and Planning Targets Addressed. The IRWM Plan objectives and planning targets, identified in Section 4, were used to evaluate stakeholder-identified projects in Section 6. Priority was assumed to weigh more heavily on projects that meet more than one IRWM Plan objective. Therefore, for each project, the number of objectives that a project contributed to was tallied as its score for this criterion.

Six or More AB 3030 Elements Addressed. The Assembly Bill (AB) 3030 elements for a Groundwater Management Plan, identified in Section 3, were used to evaluate stakeholder-identified projects in Section 6. Those projects that contributed to six or more AB 3030 elements were given a point.

Six or More Water Management Strategies Addressed. The IRWM Plan water management strategies, identified and correlated with the California Water Plan strategies in Section 5, have been used to evaluate stakeholder-identified projects in Section 6. Those projects that contributed to six or more water management strategies were given a point.

Regional Priorities

Number of Regional Priorities Addressed. Regional priorities are intended to guide development of the IRWM Plan. Using the systemic approach of 'facilitated broad agreement' during one of the Stakeholder meetings, the following Regional priorities were developed. These priorities are inherently integrative to the objectives and planning targets identified in Section 4 that address the Antelope Valley Region's issues and needs. Based on discussions with the RWMG and the greater Stakeholder group,

Table 7-1 Project Evaluat ion Matrix

Planned Project/Program Types and Activities	Readiness to Proceed						Broad Support	Integration		No. of IRWM Plan Objectives & Targets Addressed	Six or more AB 3030 Elements Addressed	Six or More Water Mngt Strategies Addressed	No. of Regional Priorities Addressed	Four or more IRWM Plan Preferences Addressed	Five or more Statewide Priorities Addressed	Consistency w/ General Plans	Serves a DAC	Total Criteria Score	Stakeholder Comments/Discussion	Stakeholder's Priority (Low, Medium, High)
	CEQA Completed or Not Required	Cost Estimates Prepared (with some detail)	Cost/Benefit Detail: Cost Estimate	Cost/Benefit Detail: "Benefit Estimate (if quantifiable)"	Cost/Benefit Detail: Anticipated Funding Match Source	Schedule Prepared		Integrates Easily	Integration Detail											
Antelope Valley Water Bank (WDS)	1	1	$170M	100,000 AFY; 1,700 acres of agriculture	Antelope Valley Water Bank Banking Partners	1	1	1	Integrates with other groundwater banking projects in the region.	16	1	1	9	0	0	1	1	34	Source of water to be banked currently undetermined. The project is strategically located near imported water supply wheeling infrastructure (1 mile from AVEK West Feeder and 8 miles from East Branch of the SWP California Aqueduct) providing an excellent means to store and regulate supplies. The land will remain in agricultural production (carrots, onions, wheat, barley) when not being used for surface recharge (approximately 90% of the time) and provide associated habitat.	High
Water Supply Stabilization Project – Eastside Project (AVEK, AVSWCA)	0	0	$200M	It is likely that this project will provide a benefit similar to that of the westside project; therefore in range of 40,000 to 43,000 AFY.	Not specified	0	1	1	Integrates with existing (or proposed) treated water facilities, recycled water recharge, or stormwater collection and reuse.	17	1	1	9	0	0	1	1	32	Establishment of a regional groundwater bank by local entities would ensure that the benefits from implementation, including economic benefits, would remain within the Antelope Valley, thereby benefiting the community.	Medium
Water Supply Stabilization Project – Westside Project (AVEK, AVSWCA)	0	0	$230M	40,400 to 42,600 AFY	Not specified	0	1	1	Integrates with existing (or proposed) treated water facilities, recycled water recharge, or stormwater collection and reuse.	17	1	1	9	0	0	1	1	32	Land currently in escrow. The AVSWCA to issue an RFP for engineering services related to this project. Establishment of a regional groundwater bank by local entities would ensure that the benefits from implementation, including economic benefits, would remain within the Antelope Valley, thereby benefiting the community.	High
Antelope-Fremont Watershed Assessment and Plan (Antelope Valley Conservancy)	1	1	$45K	2,000 acres open space/ habitat, conservation lands	Other grant funding and donations	1	1	0	Integrates existing research, plans, and projects, identifying opportunities and barriers, coordinating them into a consensus-based regional plan, and proposing approaches to identified gaps. The resultant plan will integrate with the Antelope Valley IRWM Plan and the consensus-based AV Regional Conservation Roundtable, and create habitat management plans for proposed conservation lands.	13	0	1	9	1	1	1	1	31	This project proposal would fund the 606 Studio to work with our regional stakeholders to coordinate a regional land use plan with emphasis on the preservation and restoration of sensitive natural systems of the Antelope-Fremont Watershed.	High, combine with the high prioritized regional land use management plan.
Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project (Lancaster)	0	1	$6M	2,500 AFY; 100 acres of open space	To be determined as part of the Pilot Project Fatal Flaw Analysis (refer to Project Template form in Appendix E)	1	1	1	Integrates the resources and capabilities of local municipalities, water purveyors and service providers to the benefit of the entire region and dove-tail into current groundwater banking plans, recycled water utilization plans and storm water management endeavors.	12	0	1	9	0	0	1	0	27	Feasibility and technical studies complete. Integrates with the regional recycled water project and LACSD projects.	High
Groundwater Banking (LACWWD40)	0	0	> $100M	It is likely that this project overlaps the other regional water banking programs in the initial concept phase. Therefore, their individually estimated quantified benefits cannot be cumulatively totaled to provide an accurate estimate of future supply.	Not specified	0	1	1	Integrates with the WDS water bank, or a water banking program outside the Region (ex. Semitropic).	11	1	1	9	0	0	1	1	26	This project has great potential to be integrated with recreational, open space, and flood management opportunities.	Removed as a separate project/ linked to other banking projects
Amargosa Water Banking and Storm Water Retention Project (No current sponsor)	0	0	$100K - $1M		Not specified	0	1	1	Integrates with several other types of projects including, but not limited to, other water banking programs, future recycled water recharge programs, water conservation programs, flood control programs, watershed management, and habitat/open space/recreation programs. Potential for integration with the City of Palmdale's Amargosa project.	12	0	1	9	0	0	1	0	25	Provides multiple benefits including stormwater capture, flood control, and open space areas.	Medium
Groundwater Recharge - Recycled Water Project (PWD)	0	0	> $10M	This project is still in the conceptual phase, however it is anticipated to be similar to the Lancaster project described above. Therefore, the same average annual extraction, 48,000 AFY, is assumed.	Not specified	0	1	1	Integrates with LACSD's Palmdale WRP projects. Could also integrate with recharge projects on the east side using SWP water.	12	0	1	9	0	0	1	0	25	The District hired Wildermuth Environmental to perform a reconnaissance-level study on doing groundwater recharge with recycled water from the Palmdale WRP.	Medium
Palmdale WRP Stage V (LACSD)	1	1	$95M	increase availability of recycled water to 16,800 AFY from Palmdale WRP when users identified.	Bonds, state revolving fund loans, and even-tual ratepayer fee increases	1	1	1	Integrates with other projects with a recycled water demand by providing tertiary treated recycled water.	11	0	1	6	0	0	1	1	25	Includes design and construction of secondary/tertiary treatment facilities. Augments water supply by providing recycled water in lieu of potable for landscape irrigation, dust control, construction, and industrial process water.	High

Table 7-1 Project Evaluat ion Matrix (continued)

Planned Project/Program Types and Activities	Readiness to Proceed						Broad Support	Integration		No. of IRWM Plan Objectives & Targets Addressed	Six or more AB 3030 Elements Addressed	Six or More Water Mngt Strategies Addressed	No. of Regional Priorities Addressed	Four or more IRWM Plan Preferences Addressed	Five or more Statewide Priorities Addressed	Consistency w/ General Plans	Serves a DAC	Total Criteria Score	Stakeholder Comments/Discussion	Stakeholder's Priority (Low, Medium, High)
	CEQA Completed or Not Required	Cost Estimates Prepared (with some detail)	Cost/Benefit Detail: Cost Estimate	Cost/Benefit Detail: "Benefit Estimate (if quantifiable)"	Cost/Benefit Detail: Anticipated Funding Match Source	Schedule Prepared		Integrates Easily	Integration Detail											
Palmdale WRP Stage VI (LACSD)	1	1	~$62.4M (remaining cost starting 01/08)	increase availability of recycled water to 22,400 AFY from Palmdale WRP when users identified.	Bonds, state revolving fund loans, and even-tual ratepayer fee increases	1	1	1	The project augments water supply by providing recycled water in lieu of potable for landscape irrigation, dust control, construction, and industrial process water.	11	0	1	6	0	0	1	1	25	Includes design and construction of agricultural recycled water force main and treatment plant expansion.	Medium
Amargosa Creek Recharge and Channelization Project (Palmdale)	0	0	$13.5M	5,000 - 10,000 AFY; 15 acres open space/habitat, 20 acres flood protection	$3M from Prop 50, $3.5M City of Palmdale, $2M State Water Contractors, $5M LACWWD40	0	1	1	Integrates with the construction of the 20th Street West bridge over the Amargosa Creek, the channelization of Amargosa Creek between 25th Street West and 20th Street West, and the natural habitat preservation, and with existing upstream and downstream Amargosa Creek improvements.	10	0	1	9	0	0	1	0	23	Provides multiple benefits including flood control and open space areas. The AVSWCA intends to issue an RFP for engineering services related to this project.	High/slightly modified project description to integrate with more project. Refer to project template in Appendix E.
Palmdale WRP Existing Effluent Management Sites (LACSD)	1	1	$5.2M	improved water quality and effluent management.	Bonds, state revolving fund loans, and even-tual ratepayer fee increases	1	1	1	Integrates with water banking, groundwater recharge, habitat preservation and recreational space projects by supplying tertiary-treated recycled water.	9	1	0	6	0	0	1	1	23	Includes monitoring, irrigation equipment and misc capital costs associated with existing effluent management sites. Augments water supply by providing recycled water in lieu of potable for landscape irrigation, dust control, construction, and industrial process water.	High
Aquifer Storage and Recovery Project: Injection Well Development (LACWWD40)	1	1	$10M	12,000 AFY	75% from LACWWD40	1	1	1	Integrates with the well development project that increases our groundwater extraction capacity during the peak session.	6	1	0	8	0	0	1	1	22	Project includes 5 replacement wells, 6 wells currently in-design, and 4-5 conceptual wells north of Lancaster.	High
Lancaster WRP Stage V (LACSD)	1	1	$75M	increase availability of recycled water to 23,500 AFY from Lancaster WRP when users identified.	Bonds, state revolving fund loans, and even-tual ratepayer fee increases	1	1	1	Integrates with water banking, groundwater recharge, habitat preservation and recreational space projects by supplying tertiary-treated recycled water.	8	0	1	6	0	0	1	1	22	Increases effluent storage capacity to 21 MGD. Augments water supply by providing recycled water in lieu of potable for landscape irrigation, dust control, construction, and industrial process water.	High
Lancaster WRP Stage VI (LACSD)	1	1	~$51M (remaining cost starting 01/08)	increase availability of recycled water to 29,100 AFY from Lancaster WRP when users identified.	Bonds, state revolving fund loans, and even-tual ratepayer fee increases	1	1	1	Integrates with water banking, groundwater recharge, habitat preservation and recreational space projects by supplying tertiary-treated recycled water.	8	0	1	6	0	0	1	1	22	Increases effluent storage capacity from 21 MGD to 26 MGD. Augments water supply by providing recycled water in lieu of potable for landscape irrigation, dust control, construction, and industrial process water.	Medium
Amargosa Creek Pathways Project (Lancaster)	1	1	$10M	1-100 AFY	Not specified	1	1	1	Integrates flood control, stormwater management, open space management and recreational/land use management with environmental synergy and conserva-tion. A foot-bridge would connect existing trailheads and allow for pedestrian movement to and from the AV Fairgrounds.	10	0	1	4	0	0	1	1	22	Proactive environmental management, design based on habitat enhancement, ecosystem protection and wetlands creation that utilizes storm and municipal nuisance water, a natural effect of resulting riparian habitat on flood control & storm surge dissipation, as well as water quality via natural attenuation & incidental charge to ground-water aquifer.	High
North Los Angeles/ Kern County Regional Recycled Water System (LACWWD40)	0	0	> $10M	Quantifiable benefits include the increased use of approximately 64,780 AFY of recycled water by 2025.	Not specified	1	1	1	Integrates with other planned recycled water projects such as the City of Lancaster's groundwater recharge with recycled water project, and will provide the infrastructure and recycled water for the City of Palmdale's Power Plant.	7	0	1	9	0	0	1	1	22	Provides the backbone system for recycled water throughout the Antelope Valley. CEQA has been initiated.	Broken down into Phases 1, 2, 3, 4. High priority given to Regional Recycled Water Project Phase 2. Medium priority given to Phases 3, and 4.
Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (LACWWD40)	1	1	$1.5M	0 AFY; prevents loss of groundwater pumping and existing supply	Not specified	1	1	1		5	0	0	7	1	0	1	1	20	5 wells successfully remediated. This project would remediate 3-5 additional wells.	High

Table 7-1 Project Evaluat ion Matrix (continued)

Planned Project/Program Types and Activities	Readiness to Proceed						Broad Support	Integration		No. of IRWM Plan Objectives & Targets Addressed	Six or more AB 3030 Elements Addressed	Six or More Water Mngt Strategies Addressed	No. of Regional Priorities Addressed	Four or more IRWM Plan Preferences Addressed	Five or more Statewide Priorities Addressed	Consistency w/ General Plans	Serves a DAC	Total Criteria Score	Stakeholder Comments/Discussion	Stakeholder's Priority (Low, Medium, High)
			Cost/Benefit Detail																	
	CEQA Completed or Not Required	Cost Estimates Prepared (with some detail)	Cost Estimate	"Benefit Estimate (if quantifiable)"	Anticipated Funding Match Source	Schedule Prepared		Integrates Easily	Integration Detail											
QHWD Partial Well Abandonment of Groundwater Wells for Arsenic (QHWD)	1	1	$48K	0 AFY; prevents loss of groundwater pumping and existing supply	Not specified	1	1	1	LACWWD40 is currently investigating using this method to remedy higher arsenic levels in five additional well sites. QHWD plans to put this project out to bid during the same time and complete the proposed work concurrently.	5	0	0	7	1	0	1	1	20	This has proven to be a cost-effective non-treatment method for dealing with higher levels of arsenic located in one level of strata. The project will be beneficial to several lower income regions due to the location of the well.	High, combine with the high prioritized LACWWD40 arsenic project. Refer to project template in Appendix E.
Ecosystem & Riparian Habitat Restoration of Amargosa Creek: Avenue J north to Avenue H (Lancaster)	1	1	$10M	100-1,000 AFY	Not specified	1	1	1	Integrates with other projects sited within or adjacent the Amargosa Creek to provide better land use and environmentally proactivity by establishing a riparian corridor that combines ecosystem restoration, habitat protection, acoustic and visual buffers, and wetlands creation and enhancement.	8	0	1	4	0	0	1	1	20	Restoration projects such as this are holistic and enhance the environment, providing physical buffers and off-sets to impacts on the overall ecosystem of ephemeral and riparian habitat associated with Amargosa Creek.	High
Palmdale WRP Proposed Effluent Management Sites (LACSD)	1	1	~$9.7M (remaining cost starting 01/08)		Bonds, state revolving fund loans, and even-tual ratepayer fee increases	1	1	1	Integrates with water banking, groundwater recharge, habitat preservation and recreational space projects by supplying tertiary-treated recycled water.	5	1	0	6	0	0	1	1	19	Includes groundwater monitoring, well abandonment, land acquisition, planning, permitting, site development, etc. for agricultural effluent sites. Augments water supply by providing recycled water in lieu of potable for landscape irrigation, dust control, construction, and industrial process water.	Medium
Lancaster WRP Proposed Effluent Management Sites (LACSD)	1	1	~$9.7M (remaining cost starting 01/08)		Bonds, state revolving fund loans, and even-tual ratepayer fee increases	1	1	1	Integrates with water banking, groundwater recharge, habitat preservation and recreational space projects by supplying tertiary-treated recycled water.	5	1	0	6	0	0	1	1	19	Includes land acquisition, irrigation equipment, farm management plan, site development, etc. for proposed effluent management sites. Augments water supply by providing recycled water in lieu of potable for landscape irrigation, dust control, construction, and industrial process water.	Medium
Stormwater Harvesting (Leona Valley Town Council)	0	0	$100K - $1M	150 AFY	Not specified	0	1	1	Integrates with Leona Valley "Precision Sensor" project in regard to furthering water conservation, as well as assistance in achieving goals of any regional conservation plan.	10	0	1	5	0	0	1	0	19	Would collect and treat stormwater for irrigation, helping to maintain agricultural operations in Leona Valley. Leona Valley	Low
Barrel Springs Detention Basin and Wetlands (Palmdale)	0	0	> $10M	40 acres open space/habitat	Not specified	0	1	1		6	0	1	7	0	1	1	0	18	Provides multiple benefits: flood control, wetland enhancement, and habitat protection.	Medium
Hunt Canyon Groundwater Recharge and Flood Control Basin (Palmdale)	0	0	> $10M	300 acres open space/ habitat	Not specified	0	1	1		6	0	1	7	0	1	1	0	18	Project would alleviate flooding and have the potential to provide a recharge area for raw aqueduct water.	Medium
45th Street East Flood Control Basin (Q-East Basin) (Palmdale)	0	0	$20M - $25M	210 acres open space/habitat	Not specified	0	1	1	Integrates with the construction of the Avenue Q and 20th Street East detention basin for flood control, provide possible groundwater recharge, and the natural habitat preservation.	6	0	1	7	0	0	1	0	17		Low
Avenue Q and 20th Street East Basin (Q-West Basin) (Palmdale)	0	0	$10M - $15M	160 acres open space/ habitat	Not specified	0	1	1	Integrates with the construction of the 45th Street East and Avenue P-8 detention basin for flood control, provide possible groundwater recharge, and the natural habitat preservation.	6	0	1	7	0	0	1	0	17		Low
Deep wells to Recapture Banked Water (RCSD)	0	0	$1M - $10M		Local + Gov't grants, loans	0	1	1	Will provide a way of capturing banked water when neededonce regional banking programs in place.	6	0	0	8	0	0	1	0	17		High/component high priority AVEK Westside project. Refer to AVEK Westside project template in Appendix E.

Table 7-1 Project Evaluat ion Matrix (continued)

Planned Project/Program Types and Activities	Readiness to Proceed						Broad Support	Integration		No. of IRWM Plan Objectives & Targets Addressed	Six or more AB 3030 Elements Addressed	Six or More Water Mngt Strategies Addressed	No. of Regional Priorities Addressed	Four or more IRWM Plan Preferences Addressed	Five or more Statewide Priorities Addressed	Consistency w/ General Plans	Serves a DAC	Total Criteria Score	Stakeholder Comments/Discussion	Stakeholder's Priority (Low, Medium, High)
	CEQA Completed or Not Required	Cost Estimates Prepared (with some detail)	Cost/Benefit Detail			Schedule Prepared		Integrates Easily	Integration Detail											
			Cost Estimate	"Benefit Estimate (if quantifiable)"	Anticipated Funding Match Source															
Precision Irrigation Control System (Leona Valley Town Council)	1	0	$100K - $1M		Not specified	0	1	1	Integrates with other conservation efforts proposed for the Region.	8	0	0	5	0	0	1	0	17	Would support agricultural operations in Leona Valley. Would demonstrate effectiveness of 'smart' irrigation control in the Valley.	High/to be included high priority coordinated conservation program. Refer to Appendix E for Coordinated Conservation Program project template.
PWD New Treatment Plant (PWD)	1	1	$50M	10 MGD treatment	Not specified	1	1	1		6	0	0	4	1	0	1	0	17	Would treat SWP and Littlerock Creek water.	Medium
Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H (Lancaster)	0	0	$100K - $1M		Not specified	0	1	1	Integrates by conjunctive use of Regional Backbone to recharge the over drafted regional groundwater aquifer. This project envisions utilizing tertiary treated recycled water from LWRP, integrating with LACSD14 by providing a flexible and reliable means to dispose of recycled water.	5	0	0	9	0	0	1	0	17	Depends on the regional recycled water backbone project. Would also integrate with LACSD projects by using tertiary treated water and with the proposed recharge projects.	Medium
Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park (Palmdale)	0	1	>$10M		Not specified	0	1	1		6	0	1	5	0	0	1	0	16	The project is a multipurpose flood control basin with the ability to provide wildlife habitat, conservation, and storm water capture.	Low
Aquifer Storage and Recovery Project: Additional Storage Capacity (LACWWD40)	1	1	$500,000		Not specified	1	1	1	Integrates well with the LACWWD40 ASR Project: Injection Well Development.	1	0	0	8	0	0	1	1	16	Would help to improve efficiency of AVEK supply.	Medium
Implement Evapotranspiration (ET) Controller Program (LACWWD40)	1	1	$100K - $1M		Not specified	1	1	1	Integrates with other conservation efforts proposed for the Region.	4	0	0	5	0	0	1	1	16	Could be used as a model for a future mandated program for new development. Cost and schedule well defined, was included in a previous Proposition 50 Chapter 7 grant application.	High/to be included high priority coordinated conservation program. Refer to Appendix E for Coordinated Conservation Program project template.
ET-Based Controller Program (PWD)	1	1	$135,000	240 AFY	Not specified	1	1	1	Integrates with landscape ordinances enacted by the cities and county. This project can assist water purveyors in the Antelope Valley in meeting Best Management Practices for water use efficiency, and will reduce runoff from overwatering of landscaped areas.	4	0	0	5	0	0	1	0	15	Could be integrated with LACWWDs ET-Controller project.	High/to be included high priority coordinated conservation program. Refer to Appendix E for Coordinated Conservation Program project template.
Purchasing Spreading Basin Land (RCSD)	1	0	$1M - $10M		Local + Gov't grants, loans	0	1	1	Will provide land to spread water for percolation and water banking for other entities.	3	0	0	8	0	0	1	0	15	Supports regional water banking efforts.	High/component high priority AVEK Westside project. Refer to AVEK Westside project template in Appendix E.

Table 7-1 Project Evaluat ion Matrix (continued)

Planned Project/Program Types and Activities	Readiness to Proceed						Broad Support	Integration		No. of IRWM Plan Objectives & Targets Addressed	Six or more AB 3030 Elements Addressed	Six or More Water Mngt Strategies Addressed	No. of Regional Priorities Addressed	Four or more IRWM Plan Preferences Addressed	Five or more Statewide Priorities Addressed	Consistency w/ General Plans	Serves a DAC	Total Criteria Score	Stakeholder Comments/Discussion	Stakeholder's Priority (Low, Medium, High)
	CEQA Completed or Not Required	Cost Estimates Prepared (with some detail)	Cost/Benefit Detail: Cost Estimate	Cost/Benefit Detail: "Benefit Estimate (if quantifiable)"	Cost/Benefit Detail: Anticipated Funding Match Source	Schedule Prepared		Integrates Easily	Integration Detail											
Tropico Park Pipeline Project (RCSD)	0	0	$1M - $10M		Local + Gov't grants, loans	0	1	1	Will provide a way of using tertiary water to develop and water a regional park north to Tropico Hill	5	0	1	6	0	0	1	0	15	Provides a way of using tertiary treated water to develop a regional recreational park. Integrates with the recycled water projects.	Medium
Water Conservation Demonstration Garden (PWD)	1	1	$9M	~86,000 AF over 20 years	Not specified	1	1	1	Integrates with other conservation efforts proposed for the Region.	4	0	0	5	0	0	1	0	15	Addresses water quality problems.	High/to be included high priority coordinated conservation program. Refer to Appendix E for Coordinated Conservation Program project template.
Water Conservation School Education Program (LACWWD40)	1	1	$1M		Not specified	1	1	1	Integrates with other conservation efforts proposed for the Region.	3	0	0	5	0	0	1	1	15	County recently issued a new contract for this project, to be awarded soon.	High/to be included high priority coordinated conservation program. Refer to Appendix E for Coordinated Conservation Program project template.
42nd Street East, Sewer Installation (Palmdale)	0	0	$100K - $1M		Not specified	0	1	1		6	0	0	4	1	0	1	0	14	Would reduce groundwater pollution by eliminating septic tanks.	Low
Ultra Low Flush Toilet (ULFT) Change Out Program (LACWWD40)	1	1	$100K - $1M		Not specified	1	1	1	Integrates with other conservation efforts proposed for the Region.	2	0	0	5	0	0	1	1	14	Cost and schedule well defined, was included in a previous Proposition 50 Chapter 7 grant application.	High/to be included high priority coordinated conservation program. Refer to Appendix E for Coordinated Conservation Program project template.
Water Waste Ordinance (LACWWD40)	1	0	Unknown		Not specified	0	1	1	Integrates with local city ordinances	4	0	0	5	0	0	1	1	14	Could integrate with local city ordinances and policies.	High/to be included high priority coordinated conservation program. Refer to Appendix E for Coordinated Conservation Program project template.
Littlerock Dam Sediment Removal Project (PWD)	0	1	$4M		Not specified	1	1	1		3	0	0	5	0	0	1	0	13	CEQA almost complete, provides protection for the Arroyo Toad.	High
Place Valves and Turnouts on Reclaimed Water Pipeline (RCSD)	1	1	$900,000		Local + Gov't grants, loans	0	1	1	Will provide valving and controls to direct water to various pipelines for use by RCSD, AVEK, LA County, etc.	3	0	0	5	0	0	1	0	13	Facilitates water delivery to new facilities and will connect with Tropico Park Pipeline project.	Low
Avenue K Transmission Main, Phases I-IV (LACWWD40)	1	1	> $10M		Not specified	1	1	1		1	0	0	4	0	0	1	1	12	Provides multiple benefits, in-design.	High/linked to AVEK Westside project

Table 7-1 Project Evaluat ion Matrix (continued)

Planned Project/Program Types and Activities	Readiness to Proceed						Broad Support	Integration		No. of IRWM Plan Objectives & Targets Addressed	Six or more AB 3030 Elements Addressed	Six or More Water Mngt Strategies Addressed	No. of Regional Priorities Addressed	Four or more IRWM Plan Preferences Addressed	Five or more Statewide Priorities Addressed	Consistency w/ General Plans	Serves a DAC	Total Criteria Score	Stakeholder Comments/Discussion	Stakeholder's Priority (Low, Medium, High)
	CEQA Completed or Not Required	Cost Estimates Prepared (with some detail)	Cost/Benefit Detail			Schedule Prepared		Integrates Easily	Integration Detail											
			Cost Estimate	"Benefit Estimate (if quantifiable)"	Anticipated Funding Match Source															
Gaskell Road Pipeline (RCSD)	0	0	$8.5M		Local + Gov't grants, loans	0	1	1	Integrates with proposed banking projects.	4	0	0	5	0	0	1	0	12	In close proximity to proposed banking projects. Will provide way of capturing banked water when needed.	High/component high priority AVEK Westside project. Refer to AVEK Westside project template in Appendix E.
RCSD's Wastewater Pipeline (RCSD)	0	1	$13M		Local + Gov't grants, loans	0	1	1	Integrates with the recycled water backbone project and LACSD upgrade projects.	3	0	0	5	0	0	1	0	12		High
Avenue M and 60th Street West Tanks (LACWWD40)	0	1	> $10M	Would provide 12 MG storage	Not specified	0	1	1		2	0	0	4	0	0	1	1	11	Would provide the necessary system pressure if water from AVEK was diminished or not available.	Low
Palmdale Power Project (Palmdale)	0	1	$1M - $10M	3,200 AFY of recycled water demand	Not specified	1	1	1	Integrates with the regional recycled water project. The Project will be a customer and end user of reclaimed water, linked to the regional recycled water backbone system.	2	0	0	4	0	0	1	0	11	Creates a demand for recycled water.	High/component of high priority Antelope Valley Recycled Water Project Phase 2. Refer to project template in Appendix E.
Quartz Hill Storm Drain (LAFCD)	0	1	$6.9M	Flood protection of 95 acres, and 1,108 acres private property	Not specified	0	1	1	The project would alleviate local flooding and have the potential to provide water conservation and improved water quality.	2	0	1	4	0	0	1	0	11	New alignments being designed and may require land acquisition.	Medium
KC & LAC Interconnection Pipeline (RCSD)	0	0	$100K - $1M		Local + Gov't grants, loans	0	1	1	Integrates with the regional recycled water project.	2	0	0	5	0	0	1	0	10	Would allow for recycled water to be used in Kern County.	Medium
Alternative 'Gap' Projects																				
Develop further conjunctive use management	0	0	Not estimated		NA**	0	1	1		15	1	1	9	0	0	1	1	30	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Create a Land use Management Plan	1	0	Not estimated		NA**	0	1	1		13	0	1	8	0	0	1	1	27	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	High
Create a Watershed Management Plan	1	0	Not estimated		NA**	0	1	1		10	0	1	9	0	0	1	1	25	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Promote land conservation projects that enhance flood control, aquifer recharge, and watershed and open space preservation.	0	NA	Not estimated		NA**	0	1	1		12	0	1	9	0	0	1	0	25	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Expand the water quality monitoring program	1	0	Not estimated		NA**	0	1	1		8	0	1	8	1	0	1	1	23	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Create incentives for land owners to protect, restore, preserve open space	1	0	Not estimated		NA**	0	1	1		10	NA	1	6	0	0	1	0	21	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Develop management program for nitrate and TDS	1	0	Not estimated		NA**	0	1	1		6	0	1	8	1	0	1	1	21	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	

Table 7-1 Project Evaluat ion Matrix (continued)

Planned Project/Program Types and Activities	Readiness to Proceed						Broad Support	Integration		No. of IRWM Plan Objectives & Targets Addressed	Six or more AB 3030 Elements Addressed	Six or More Water Mngt Strategies Addressed	No. of Regional Priorities Addressed	Four or more IRWM Plan Preferences Addressed	Five or more Statewide Priorities Addressed	Consistency w/ General Plans	Serves a DAC	Total Criteria Score	Stakeholder Comments/Discussion	Stakeholder's Priority (Low, Medium, High)
	CEQA Completed or Not Required	Cost Estimates Prepared (with some detail)	Cost/Benefit Detail: Cost Estimate	Cost/Benefit Detail: "Benefit Estimate (if quantifiable)"	Cost/Benefit Detail: Anticipated Funding Match Source	Schedule Prepared		Integrates Easily	Integration Detail											
Identify contami-nated portions of the aquifer	1	0	Not estimated		NA**	0	1	1		6	0	0	8	1	0	1	1	20	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Map contaminated portions of aquifer by December 2008.	1	0	Not estimated		NA**	0	1	1		6	0	0	8	1	0	1	1	20	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Make further use of recycled water	1	1	Refer to Section 6		NA**	0	1	1		6	0	1	6	0	0	1	0	18	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Aggressive conservation	1	1	Refer to Section 6		NA**	0	0	1		6	0	0	6	0	0	1	1	17	High expected cost, and not likely to be implemented unless in drought conditions.	
Use alternative sources of water	0	1	Refer to Section 6		NA**	0	1	1		5	0	1	7	0	0	1	0	17	Alternative sources of water vary considerably with regard to cost and reliability.	
Develop and imple-ment a regional Groundwater Wellhead Protection Program	1	0	Not estimated		NA**	0	1	1		1	0	1	8	1	0	1	1	16	Integrates with Amargosa Creek projects and Lancaster's groundwater recharge project.	
Water banks outside of the Antelope Valley	0	0	Refer to Section 6		NA**	0	1	0		5	0	0	9	0	0	1	0	16	Could be politically charged. Issues have been raised regarding keeping water from the Antelope Valley within the Region.	
Increase small-scale flood management projects	0	NA	Not estimated		NA**	0	1	1		7	0	0	5	0	0	1	1	16	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Establish a well abandonment ordinance	1	0	Not estimated		NA**	0	1	1		1	0	0	8	1	0	1	1	15	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Create regional database for ground-water pumping	1	0	Not estimated		NA**	0	1	1		4	0	0	7	0	0	1	0	15	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Preserve acres of farmland in rotation.	1	0	Not estimated		NA**	0	1	1		4	0	0	5	0	0	1	1	14	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Preserve acres of habitat.	1	0	Not estimated		NA**	0	1	1		5	0	1	4	0	0	1	0	14	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Encourage Low Impact Development	0	NA	Not estimated		NA**	0	1	1		4	0	0	6	0	0	1	1	14	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Coordinate a flood management plan	1	0	Not estimated		NA**	0	1	1		3	0	0	5	0	0	1	1	13	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	High
Develop a HCP for the Antelope Valley	0	0	Not estimated		NA**	0	1	1		5	0	1	4	0	0	1	0	13	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Build public parks and recreational amenities	0	0	Not estimated		NA**	0	1	1		3	0	0	5	0	0	1	1	12	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Storm water capture/ recovery feasibility study	1	0	Not estimated		NA**	0	1	1		1	0	0	5	0	0	1	1	11	At this point in the IRWM Plan development, considered a recommended strategy to pursue.	
Inability to approve further development	1	0	Refer to Section 6		NA**	0	0	0		2	0	0	6	0	0	0	0	9	High expected cost, politically charged issue.	

Table 7-1A Regional Priorities Matrix

"Planned Project/Program Types and Activities"	Short-Term Regional Priorities						Long-Term Regional Priorities								
	Complete AV IRWM Plan by January 1, 2008	Identify Gap Projects	Maximize Funding For Project Implementation	Utilize Committee for Continued Development/ AV IRWM Plan Implementation	Develop Programs/ Policies to Increase Groundwater Recharge/ Manage Use	Encourage Cooperation in Developing Regional Groundwater Banking	Maintain Committee for Continued AV IRWM Plan Implementation/ Stakeholder Input	Optimize Use of Recycled Water, Conjunctive Management, Conservation, Stormwater	Provide Adequate Water/ Wastewater Services to Meet Projected Growth	Protect Groundwater Supplies	Provide More Efficient Storage for Imported Water Supply	Preserve Open Space, Ag Lands, Conserve Functional Habitats & Protect Species	Continue to Meet Applicable Water Quality Standards	Expand Recycled Water Distribution Systems to New Users	Expand Voluntary Water Conservation Programs for Res/CII/ Ag Users
WATER SUPPLY MANAGEMENT															
Groundwater Recharge/Banking															
Amargosa Creek Recharge and Channelization Project (Palmdale)				X	X	X	X	X	X	X	X	X			
Amargosa Water Banking and Storm Water Retention Project (No financial sponsor identified)				X	X	X	X	X	X	X	X	X			
Antelope Valley Water Bank (WDS)				X	X	X	X	X	X	X	X	X			
Aquifer Storage and Recovery Project: Injection Well Development (LACWWD40)				X	X	X	X	X	X	X	X				
Aquifer Storage and Recovery Project: Additional Storage Capacity (LACWWD40)				X	X	X	X	X	X	X	X				
Deep wells to Recapture Banked Water (RCSD)				X	X	X	X	X	X	X	X				
Gaskell Road Pipeline (RCSD)				X			X	X	X					X	
Groundwater Banking (LACWWD40)				X	X	X	X	X	X	X	X	X			
Purchasing Spreading Basin Land (RCSD)				X	X	X	X	X	X	X	X	X			
Water Supply Stabilization Project – Westside Project (AVEK, AVSWCA)				X	X	X	X	X	X	X	X	X			
Water Supply Stabilization Project – Eastside Project (AVEK, AVSWCA)				X	X	X	X	X	X	X	X	X			
Recycled Water															
Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project (Lancaster)				X	X	X	X	X	X	X	X			X	
Groundwater Recharge - Recycled Water Project (PWD)				X	X	X	X	X	X	X	X			X	
KC & LAC Interconnection Pipeline (RCSD)				X			X	X	X					X	
North Los Angeles/Kern County Regional Recycled Water System (LACWWD40)				X	X	X	X	X	X	X	X			X	
Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H (Lancaster)				X	X	X	X	X	X	X	X			X	
Water Conservation/Water Use Efficiency															
ET-Based Controller Program (PWD)				X			X	X	X						X
Implement Evapotranspiration (ET) Controller Program (LACWWD40)				X			X	X	X						X
Precision Irrigation Control System (Leona Valley Town Council)				X			X	X	X						X
Ultra Low Flush Toilet (ULFT) Change Out Program (LACWWD40)				X			X	X	X						X
Water Conservation Demonstration Garden (PWD)				X			X	X	X						X
Water Conservation School Education Program (LACWWD40)				X			X	X	X						X
Water Waste Ordinance (LACWWD40)				X			X	X	X						
Water Infrastructure Improvements															
Avenue K Transmission Main, Phases I-V (LACWWD40)				X			X	X	X						
Avenue M and 60th Street West Tanks (LACWWD40)				X			X	X	X		X				
Littlerock Dam Sediment Removal Project (PWD)				X			X	X	X		X				
Place Valves and Turnouts on Reclaimed Water Pipeline (RCSD)				X			X	X	X					X	
RCSD's Wastewater Pipeline (RCSD)				X			X	X	X					X	
WATER QUALITY MANAGEMENT															
Recycled Water															
42nd Street East, Sewer Installation (Palmdale)				X			X		X				X		
Lancaster WRP Stage V (LACSD)				X			X	X	X				X	X	
Lancaster WRP Stage VI (LACSD)				X			X	X	X				X	X	
Lancaster WRP Proposed Effluent Management Sites (LACSD)				X			X	X	X				X	X	
Palmdale Power Project (Palmdale)				X			X	X						X	
Palmdale WRP Existing Effluent Management Sites (LACSD)				X			X	X	X				X	X	
Palmdale WRP Stage V (LACSD)				X			X	X	X				X	X	
Palmdale WRP Stage VI (LACSD)				X			X	X	X				X	X	
Palmdale WRP Proposed Effluent Management Sites (LACSD)				X			X	X	X				X	X	
Water Infrastructure Improvements															
Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (LACWWD40)				X	X		X	X	X	X			X		

Table 7-1A Regional Priorities Matrix (continued)

"Planned Project/Program Types and Activities"	Short-Term Regional Priorities						Long-Term Regional Priorities								
	Complete AV IRWM Plan by January 1, 2008	Identify Gap Projects	Maximize Funding For Project Implementation	Utilize Committee for Continued Development/ AV IRWM Plan Implementation	Develop Programs/ Policies to Increase Groundwater Recharge/ Manage Use	Encourage Cooperation in Developing Regional Groundwater Banking	Maintain Committee for Continued AV IRWM Plan Implementation/ Stakeholder Input	Optimize Use of Recycled Water, Conjunctive Management, Conservation, Stormwater	Provide Adequate Water/ Wastewater Services to Meet Projected Growth	Protect Groundwater Supplies	Provide More Efficient Storage for Imported Water Supply	Preserve Open Space, Ag Lands, Conserve Functional Habitats & Protect Species	Continue to Meet Applicable Water Quality Standards	Expand Recycled Water Distribution Systems to New Users	Expand Voluntary Water Conservation Programs for Res/ CII/ Ag Users
PWD New Treatment Plant (PWD)				X			X		X				X		
QHWD Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (QHWD)				X	X		X	X	X	X			X		
FLOOD MANAGEMENT															
Water Infrastructure Improvements															
45th Street East Flood Control Basin (Q-East Basin) (Palmdale)				X	X		X	X	X	X		X			
Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park (Palmdale)				X			X	X	X			X			
Avenue Q and 20th Street East Basin (Q-West Basin) (Palmdale)				X	X		X	X	X	X		X			
Barrel Springs Detention Basin and Wetlands (Palmdale)				X	X		X	X	X	X		X			
Hunt Canyon Groundwater Recharge and Flood Control Basin (Palmdale)				X	X		X	X	X	X	X				
Quartz Hill Storm Drain (LAFCD)				X			X	X	X						
Stormwater Harvesting (Leona Valley Town Council)				X			X	X	X			X			
ENVIRONMENTAL MANAGEMENT															
Habitat Restoration															
Ecosystem & Riparian Habitat Restoration of Amargosa Creek: Avenue J north to Avenue H (Lancaster)							X	X	X			X			
Recycled Water															
Tropico Park Pipeline Project (RCSD)				X			X	X	X			X		X	
LAND USE MANAGEMENT															
Plans and Studies															
Antelope -Fremont Watershed Assessment and Plan (Antelope Valley Conservancy)				X	X	X	X	X				X	X	X	X
Recreation															
Amargosa Creek Pathways Project (Lancaster)							X	X	X			X			
ALTERNATIVE "GAP" PROJECTS															
Aggressive conservation		X		X			X	X	X						X
Develop further conjunctive use management		X		X	X	X	X	X	X	X	X				
Water banks outside of the Antelope Valley		X		X	X	X	X	X	X	X	X				
Create regional database for groundwater pumping		X		X	X		X	X	X	X					
Use alternative sources of water		X		X	X		X	X	X	X					
Make further use of recycled water		X		X			X	X	X					X	
Inability to approve further development		X					X	X	X	X		X			
Identify contaminated portions of the aquifer		X		X	X		X	X	X	X			X		
Map contaminated portions of aquifer by December 2008		X		X	X		X	X	X	X			X		
Establish a well abandonment ordinance		X		X	X		X	X	X	X			X		
Develop and implement a regional Groundwater Wellhead Protection Program		X		X	X		X	X	X	X			X		
Develop management program for nitrate and TDS		X		X	X		X	X	X	X			X		
Expand the water quality monitoring program		X		X	X		X	X	X	X			X		
Coordinate a flood management plan		X		X			X	X	X						
Storm water capture/recovery feasibility study		X		X			X	X	X						
Increase small-scale flood management projects		X		X			X	X	X						
Encourage Low Impact Development		X		X			X	X	X			X			
Preserve acres of habitat		X		X			X					X			
Develop a HCP for the Antelope Valley		X		X			X					X			
Promote land conservation projects that enhance flood control, aquifer recharge, and watershed and open space preservation.		X		X	X	X	X	X		X	X	X			
Preserve farmland		X		X			X	X				X			
Build public parks and recreational amenities		X		X			X	X				X			
Create a Watershed Management Plan		X		X	X	X	X	X		X	X	X			
Create incentives for land owners to protect/restore/preserve open space		X		X			X	X				X			X

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the following short-term (e.g., 3 to 5 years) and long-term (20 years) priorities have been identified for the Antelope Valley Region. For each project, the number of regional priorities that a project contributed to was tallied as its score for this criterion (refer to Table 7-1A).

Short-term Implementation Priorities (3-5-years)

- Complete the Antelope Valley IRWM Plan by January 1, 2008;
- Identify projects that will meet the gap between existing projects and the Regional planning targets;
- Maximize funding opportunities for project implementation from local, state, and federal funding sources;
- Utilize a committee structure for continued development and implementation of the IRWM Plan;
- Develop programs and policies to increase groundwater recharge or better manage groundwater use; and
- Encourage cooperation in the short-term to develop regional groundwater banking programs.

Long-term Implementation Priorities (20 years)

- Maintain a committee structure to oversee plan implementation and continued stakeholder input;
- Optimize use of recycled water, conjunctive management, conservation, and stormwater to enhance water supply reliability;
- Provide adequate water and wastewater services to meet projected growth
- Protect groundwater supplies;
- Provide more efficient storage for imported water supply to increase its reliability;
- Preserve open space, agricultural land uses, conserve functional habitats, and protect special-status species;
- Continue to meet applicable water quality standards;
- Expand distribution systems to provide recycled water to new users; and
- Expand voluntary water conservation programs for residential, commercial, industrial and agricultural uses.

Four or More IRWM Plan Preferences Addressed. The IRWM Plan preferences were identified and used to evaluate stakeholder-identified projects in Section 6. Those projects that contributed to four or more IRWM Plan preferences were given a point.

Five or More Statewide Priorities Addressed. The statewide priorities were used to evaluate stakeholder-identified projects in Section 6. Those projects that contributed to five or more statewide priorities were given a point.

Consistency with General Plans. The local and regional general plan policies related to water supply, water quality, flood management, environmental resource management, and land use management are identified in Section 8 (Table 8-2) and used to evaluate stakeholder-identified projects. Those projects that demonstrated consistency with these general plan policies were given a point.

Serves a Disadvantaged Community. A DAC was assumed to benefit from a particular project if the project increased the reliability of water supply for the Antelope Valley Region as a whole, enhanced water quality in the Antelope Valley Region, or if the DAC was located within the service area of a proposed project. In this manner, a project was given a point if it was determined to benefit a DAC.

Table 7-1 provides a preliminary evaluation and ranking of the stakeholder-identified proposed projects via a tally of the total number of criteria met by each project. The projects were then evaluated for how well they can be integrated with each other. Additionally, the projects were reviewed for geographic coverage while using a mix of plan objectives and water management strategies to provide multiple benefits, as shown in the "Additional Comments" column in Table 7-1.

Table 7-1 was presented to the RWMG/Stakeholder group for further evaluation and prioritization. Additionally, the Stakeholders were given the opportunity to present support for their projects, to discuss the merits of the projects with the group, and to discuss how their projects could potentially be combined to create more regional, comprehensive, and logistically beneficial and efficient projects. Additionally, at this particular Stakeholder meeting, a number of Stakeholders presented modified versions of their projects to the group that they felt better integrated with the goals and objectives of the Antelope Valley Region as well as other projects.

The Stakeholders were then broken up into groups and asked to give a preliminary "priority" ranking to each project based on the information in Table 7-1 and the discussions presented at the meeting. The group was asked to assign priority under the assumption that any particular project would be implemented with or without grant funding. Priority was given as follows:

- A 'high' priority was assigned to projects the group would take action on within the next two (2) years.
- A 'medium' priority was assigned to projects the group would take action on within the next five (5) years.
- A 'low' priority was assigned to projects the group would take action on within the next 5 to 10 years.

A facilitated discussion led the Stakeholders to identify their high, medium, and low projects, as shown below in Table 7-2. Appendix F provides a more detailed breakdown of the high priority project schedules.

Based on the stakeholders determinations of the ranking process above, the suite of projects and alternatives given 'high' priority, were selected for implementation and discussed below in Section 7.4.

Table 7-2 Prioritized Project List

Priority	Project	Responsible Entity	Project Status	Project Schedule
Water Supply Groundwater Recharge/Banking Infrastructure Projects				
High	Antelope Valley Water Bank	WDS	Design	2001 to 2008
	Aquifer Storage and Recovery Project - Injection Well Development	LACWWD 40	Planning	2007 to 2010
	Upper Amargosa Creek Recharge, Flood Control & Riparian Habitat Restoration Project	Palmdale, AVEK	Planning	2006 to 2010
	Water Supply Stabilization Project – Westside	AVEK/AVSWCA/ LACWWD 40	CEQA/ Permitting	2007 to 2009
Medium	Aquifer Storage and Recovery Project: Additional Storage Capacity	LACWWD 40	Planning	2010 to 2013
	Lower Amargosa Creek Recharge & Flood Control Project	J.Goit/Palmdale	Planning	2010 to 2013
	Water Supply Stabilization Project – Eastside Project	AVEK	Planning	2010 to 2013
Water Infrastructure Projects				
High	Avenue K Transmission Main, Phases I-IV	LACWWD 40	Planning	2008 to 2010
	Littlerock Dam Sediment Removal Project	PWD	Planning/ Design	2004 to 2009
	Waste Water Pipeline	RCSD	Planning	2008 to 2010
Low	Avenue M and 60th Street West Tanks	LACWWD 40	Conceptual	2013 to 2018
	Place Valves and Turnouts on Reclaimed Water Pipeline	RCSD	Conceptual	2013 to 2018
Recycled Water Projects				
High	Antelope Valley Recycled Water Project Phase 2	LACWWD 40/ Palmdale/LACSD	Planning	2007 to 2009
	Groundwater Recharge Using Recycled Water Project	Lancaster	Pilot Study	2006 to 2009
Medium	Groundwater Recharge – Recycled Water Project	PWD	Planning	2010 to 2013
	KC & LAC Interconnection Pipeline	RCSD	Planning	2010 to 2013
	Regional Recycled Water Project Phase 3	LACWWD 40/ Palmdale/LACSD	Planning	2010 to 2013
	Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H	Lancaster	Planning	2010 to 2013
Low	Regional Recycled Water Project Phase 4	LACWWD 40/ Palmdale/LACSD	Planning	2013 to 1018
Water Conservation/Water Use Efficiency				
High	Comprehensive Water Conservation/Efficient Water Use Program. This program would include the following: PWD's & LACWWD 40's "ET-Based Controller Program", Leona Valley's "Precision Irrigation Control System"; PWD's "Water Conservation Demonstration Garden"; LACWWD 40's "Water Conservation School Education Program", "Ultra Low Flush Toilet (ULFT) Change Out Program", and "Waste Water Ordinance." Additionally, this Program is envisioned to include a landscape/nuisance water ordinance.	AVWCC/ LACWWD/PWD	Planning	2007 to 2010

Table 7-2 Prioritized Project List (continued)

Priority	Project	Responsible Entity	Project Status	Project Schedule
Water Quality Projects				
High	Lancaster WRP Stage V	LACSD	Design	2007 to 2010
	Palmdale WRP Existing Effluent Management Sites	LACSD	Design	2007 to 2010
	Palmdale WRP Stage V	LACSD	Design	2007 to 2010
	Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation	LACWWD/ QHWD	Design	2007 to 2010
Medium	Lancaster WRP Stage VI	LACSD	Planning	2010 to 2013
	Lancaster WRP Proposed Effluent Management Sites	LACSD	Planning	2010 to 1013
	Palmdale WRP Stage VI	LACSD	Planning	2010 to 2013
	Palmdale WRP Proposed Effluent Management Sites	LACSD	Planning	2010 to 2013
	PWD New Treatment Plant	PWD	Planning	2010 to 2013
Low	42nd Street East, Sewer Installation	Palmdale	Conceptual	2013 to 2018
Flood Management Projects				
High	Development of Coordinated Antelope Valley Flood Control Plan	Cities of Lancaster, Palmdale, LADPW, Kern County	Planning	2007 to 2009
Medium	Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park	Palmdale	Planning	2010 to 2013
	Barrel Springs Detention Basin and Wetlands	Palmdale	Planning	2010 to 2013
	Hunt Canyon Groundwater Recharge and Flood Control Basin	Palmdale	Planning	2010 to 2013
	Quartz Hill Storm Drain	LADPW	Planning	2010 to 2013
Low	45th Street East Flood Control Basin (Q-East Basin)	Palmdale	Conceptual	2013 to 2018
	Avenue Q and 20th Street East Basin (Q-West Basin)	Palmdale	Conceptual	2013 to 2018
	Storm water Harvesting	Leona Valley Town Council	Conceptual	2013 to 2018
Environmental Resource Management Projects				
High	Ecosystem & Riparian Habitat Restoration of Amargosa Creek; Avenue J to Ave H	Lancaster	Planning	2007 to 2008
Medium	Tropico Park Pipeline Project	RCSD	Planning	2010 to 2013
Land Use Management Projects				
High	Amargosa Creek Pathways Project	Lancaster	Planning	2007 to 2008
	Development of a Coordinated Land Use Management Plan. This project includes the Antelope Valley Conservancy's Antelope-Fremont Watershed Assessment and Plan.	Cities of Lancaster, Palmdale, LADPW, Kern County/ Antelope Valley Conservancy	Planning	2007 to 2009

Notes:
AVEK = Antelope Valley-East Kern Water Agency
AVSWCA = Antelope Valley State Water Contractors Association
AVWCC = Antelope Valley Water Conservation Coalition
LACSD = Los Angeles County Sanitation Districts
LACWWD 40 = Los Angeles County Waterworks District 40
LADPW = Los Angeles County Department of Public Works
PWD = Palmdale Water District
RCSD = Rosamond Community Services District

It is important to note that this AV IRWM Plan is meant to be a living document. As the AV IRWM Plan is updated, the opportunity exists to re-evaluate the projects included in this IRWM Plan as their project scopes are refined, and a

continual assessment of whether this IRWM Plan is meeting the issues and needs of the Antelope Valley Region will be conducted. Additionally, this IRWM Plan provides a mechanism for identifying new projects designed in accordance with the regional objectives, priorities, and management strategies. Therefore, a continual review of the prioritization is anticipated, and is described in more detail in Section 8, Implementation Framework. Table 7-2 is also included as Appendix E. In this way, the Appendix can be more easily evaluated and adjusted rather than having to make changes to the entire IRWM Plan if changes are necessitated more frequently than the scheduled updates as described in Section 8.6.

7.4 CURRENT HIGH PRIORITY PROJECTS

The following provides descriptions of the high priority projects from Table 7-2. During the process of evaluating and prioritizing the projects, the Stakeholders found that a number of their individually submitted projects could be integrated to form enhanced projects that could reach more beneficiaries, integrate geographically to extend to further reaches of the Antelope Valley Region, and take advantage of synergies not previously noticed. The process enabled the stakeholders to look more carefully at their projects and at what phases they may want to implement in the near term, potentially ranking that a higher priority than a later phase in the project. For example, the Regional Recycled Water Project, which is the regional recycled water backbone system project, includes a number of implementation phases. Phase 2, which includes the connection to the Palmdale Power Plant, was given a high priority. Later phases of the project, Phases 3 and 4, were given medium and low priorities, respectively. For a full description of each of the high priority projects, refer to their project templates, which are provided in Appendix F.

7.4.1 High Priority Projects Benefit/Cost Assessment

The IRWM Plan Guidelines require that an IRWM Plan demonstrate its economic and technical feasibility on a programmatic level (technical feasibility is discussed in Section 8). It is appropriate that both quantifiable and non-quantifiable benefits provided by projects be considered in relation to their costs. The potential benefit of each proposed project was initially identified in Section 5, and cumulatively considered in Section 6. It is likely, however, in this initial stage of Plan development, that a lack of detailed data regarding all benefits, especially costs, could preclude a rigorous quantitative comparison of all projects. Therefore, only those projects that have demonstrated priority status resultant from the analysis provided in Table 7-1 and with concurrence from the Stakeholders are assessed for their benefit to cost relationships. This analysis is presented in Table 7-3.

Upper Amargosa Creek Recharge, Flood Control and Riparian Habitat Restoration Project (WS-1)	
Project Sponsor:	City of Palmdale and Antelope Valley-East Kern Water Agency (AVEK)
Joint Agencies:	Antelope Valley State Water Contractors Association (AVSWCA), Los Angeles County Waterworks District No. 40 (LACWWD 40)
Project Description:	This project consists of the project previously entitled "Amargosa Creek Recharge and Channelization" with some modifications and additions included during the prioritization process. The project proposes the release of untreated aqueduct water into the Upper Amargosa Creek in order to recharge the most depressed and damage portion of the Antelope Valley Region's groundwater basin. Per the Stetson Report, the Amargosa ranks as one of the top locations in the Antelope Valley Region for groundwater recharge. Project goals include increasing the Antelope Valley Region's water supply and the amount of open space and protected natural habitat, and providing improved flood prevention within the Amargosa Creek watershed. Proposed project improvements include: expanding the size and capacity of the spreading ground of the natural recharge area; developing and preserving an ephemeral stream habitat; channelization of Amargosa Creek (soft bottom) and providing a grade separation of 20th Street West over Amargosa Creek.
Project Integration:	Possible integration with Water Supply Stabilization Project- Westside Project (WS-2).
Project Benefits:	5,000 – 10,000 AFY, 15 acres open space; 20 acres flood protection
Total Cost:	$13.5 Million

Water Supply Stabilization Project- Westside Project (WS-2)	
Project Sponsor:	AVEK
Joint Agencies:	AVSWCA, Rosamond Community Services District (RCSD), LACWWD 40
Project Description:	WS-2 is an imported water stabilization program that utilizes SWP water delivered to the Antelope Valley Region's westside for groundwater recharge and supplemental supply required for the Antelope Valley Region during summer peaking demand and anticipated dry years. This project increases imported water supply reliability in the Antelope Valley Region by developing storage and allowing for recharge. It includes the design and construction of additional facilities necessary for the delivery of untreated water for direct recharge (percolation basins) or indirect (in-lieu) recharge, and for wells and a pipeline for treated water conveyance. The project is considered an immediate water banking and groundwater recharge opportunity. It also incorporates the use of large acreage of farm land for spreading of water and rotating farm crops to increase percolation. Components of the Westside Project include but are not limited to: drilling and equipment of 6 deep wells between Avenue A and Rosamond Boulevard, 70th to 140th Street West (RCSD's "Deep Wells to Recapture Banked Water Project"); placing a new 36-inch pipeline on Gaskell Road, from 60th Street to 140th Street to transport water from well fields (RCSD's "Gaskell Road Pipeline Project"); and purchasing water spreading basins land in West Kern County from Avenue A to Rosamond B (RCSD" "Purchasing Spreading Basin Land Project").
Project Integration:	Possible integration with Upper Amargosa Creek Recharge Flood Control and Riparian Habitat Restoration Project (WS-1).
Project Benefits:	40,400 to 42,600 AFY
Total Cost:	$230 Million
Aquifer Storage and Recovery Project: Injection Well Development (WS-3)	
Project Sponsor:	LACWWD 40
Joint Agencies:	AVEK
Project Description:	The ASR Injection Well Development project involves the construction of ten new well sites in a groundwater depression area of the Antelope Valley Region to improve water supply reliability. Using wells to access this depressed area of the Antelope Valley groundwater basin will allow for the storage of up to 3,300 AFY of excess imported water supplies during wet years and the extraction of up to 12,000 AFY during dry years. The District is already operating 11 wells in this capacity to store and recover available imported water.
Project Integration:	Integration with other water storage projects proposed in this IRWM Plan (WS 1 and WS-2)
Project Benefits:	Extraction of 12,000 AFY; injection of 3,300 AFY
Total Cost:	$10.0 Million
Antelope Valley Water Bank (WS-4)	
Project Sponsor:	Western Development and Storage (WDS)
Joint Agencies:	WDS is offering storage to willing participants in this program.
Project Description:	The Antelope Valley Water Bank (AVWB) is estimated to provide 500,000 acre-feet (AF) of storage in the Neenach Subbasin of the Antelope Valley Basin and will have the ability to recharge and recover 100,000 AFY. Water recovery will take place through the use of 30 to 50 wells, many already existing, and will utilize water pumped into the AVEK West Feeder or the California Aqueduct. This additional storage capacity could be used to regulate supplies on a seasonal and year-to-year basis by storing water when it is plentiful for later use when needed. In addition to improving supply reliability, this project will assist in stabilizing groundwater levels, protecting the aquifer from contamination, and reducing nuisance water. Project land will remain in agricultural production when not being used for surface recharge and provide associated habitat. Potential participants in this banking program include water agencies or local mutuals that have access to state water.
Project Integration:	Potential integration with WS-2. In addition, water supplies stored in the AVWB could be delivered to all parts of the AVEK, Palmdale Water District (PWD), and Littlerock Creek Irrigation District (LCID) service territories in the Antelope Valley Region via immediately adjacent conveyances.
Project Benefits:	100,000 AFY; 1,700 acres of agriculture; 500,000 AF of storage
Total Cost:	$170 Million

Antelope Valley Recycled Water Project Phase 2 (RW-1)	
Project Sponsor:	City of Palmdale
Joint Agencies:	Los Angeles County Sanitation District (LACSD), Palmdale Water District (PWD), City of Lancaster, LACWWD 40
Project Description:	The Antelope Valley Recycled Water Project Phase 2 is one phase of the North Los Angeles/Kern County Regional Recycled Water Project combined with some modifications to benefit the entire Antelope Valley Region. The North Los Angeles/Kern County Regional Recycled Water Project outlines the foundation of a regional recycled water system in the Antelope Valley Region. It would distribute recycled water throughout the service area and provide a backbone system that could accommodate minimum and maximum demands and allow significant deliveries of recycled water to recharge areas. The recommended placement of the system components is based on an analysis of the service area demands, topography, and desired operating pressures. The proposed RW-1 project provides the addition of a recycled water connection between LACSD14 and LACSD20 Water Reclamation Plants (WRPs); provides recycled water to the existing eastside farmlands and provides the potential to bring recycled water to Littlerock Creek for recharge. RW-1 will also provide approximately 3,400 AFY of recycled water to a future power generating facility whose design is underway. Storage facilities and or "surge basins" could be designed as future park or habitat restoration areas.
Project Integration:	Possible integration with Palmdale WRP Proposed Effluent Management Sites (WQ-2) and PWD's Groundwater Recharge-Recycled Water Pilot Project (RW 2).
Project Benefits:	8,400 AFY of recycled water; potential recharge and habitat restoration
Total Cost:	$10.9 Million
Groundwater Recharge Using Recycled Water Pilot Project (RW-2)	
Project Sponsor:	City of Lancaster
Joint Agencies:	LACSD, PWD, LACWWD 40
Project Description:	The Pilot Program was identified as the first and critical step forwards implementing a $200M, 50,000 AFY Lancaster Area GWR-RW project in the Groundwater Recharge Feasibility Study (RMC, 2007). The proposed program would build upon the regional recycled water project (RW-1) and LACSD projects. The proposed pilot project would assess the maximization of available recycled water for beneficial use by utilizing this valuable source to recharge the local groundwater basin, increasing the Antelope Valley Region's overall water resources and thus working to provide a reliable water supply. The pilot program would recharge a blend of stormwater and recycled water from the Lancaster Water Reclamation Plant. A supplemental blend supply (local groundwater, raw imported water or treated imported water) would likely be needed. Under the current proposal, recharge would occur at the City-proposed 100-acre stormwater basin at 60th Street West and Avenue F in Lancaster, CA. Up to 2,500 AF of water would be recharged annually, including 500 AF of recycled water. The recharged water would be pumped to serve either non-potable uses or municipal and industrial uses, after an initial monitoring phase is complete.
Project Integration:	Integration with WS-2, RW-1, WQ-1, WQ-2, WQ-3.
Project Benefits:	2,500 AFY; 100 acres open space Ultimately 48,000 AFY and 1,000 acres open space.
Total Cost:	$6.0 Million

Comprehensive Water Conservation/Water Use Efficiency Program (WC-1)	
Project Sponsor:	Antelope Valley Water Conservation Coalition (AVWCC), LACWWD, PWD
Joint Agencies:	AVWCC includes the Cities of Lancaster and Palmdale, local mutual water districts, AVEK, Antelope Valley College, Building Industry Association (BIA), and local developers.
Project Description:	The Comprehensive Water Conservation/Water Use Efficiency Program would include a number of water conservation and water use efficiency projects previously discussed in Section 5 including: PWD's & LACWWD 40's "ET-Based Controller Program", Leona Valley's "Precision Irrigation Control System"; PWD's "Water Conservation Demonstration Garden"; LACWWD 40's "Water Conservation School Education Program", "Ultra Low Flush Toilet (ULFT) Change Out Program", and "Waste Water Ordinance." Additionally, WC-1 would include a landscape/nuisance water ordinance.
Project Integration:	Project integrates with all the water supply projects in reducing the expected mismatch of supply and demand in 2035.
Project Benefits:	3,500 AFY by 2010 and ultimately 28,000 to 42,000 AFY
Total Cost:	$900,000
Avenue K Transmission Main, Phases I-IV (WI-1)	
Project Sponsor:	LACWWD 40
Joint Agencies:	None
Project Description:	The Avenue K Transmission Main, Phases I-IV project consists of four phases for a total of approximately 32,000 linear feet of 30-inch and 36-inch diameter steel transmission main. The proposed transmission main will have interconnections to the existing distribution system and will increase the capacity of the water system to meet the existing domestic and fire protection requirements.
Project Integration:	Possibility to connect to WS-2
Project Benefits:	Firms up existing supply
Total Cost:	$10.0 Million
Littlerock Dam Sediment Removal Project (WI-2)	
Project Sponsor:	PWD
Joint Agencies:	None
Project Description	The Littlerock Dam Sediment Removal Project will remove up to 540,000 cubic yards of sediment that has accumulated from runoff in Littlerock Reservoir, and up to 40,000 cubic yards on an annual basis after the initial sediment is removed. The project may include a grade control structure that will protect the identified habitat of the arroyo toad. The project is expected to increase capacity and reliability of surface water storage in Littlerock Reservoir, and could eventually feed into other regional water banking projects such as AVEK's eastside project. CEQA for the project is almost complete.
Project Integration:	Project integrates with the other water supply projects in reducing the expected mismatch between supply and demand in 2035.
Project Benefits:	1,000 AFY
Total Cost:	$5.5 Million
RCSD's Waste Water Pipeline (WI-3)	
Project Sponsor:	RCSD
Joint Agencies:	None
Project Description:	This project would include placing a 36-inch wastewater pipeline from LACSD to RCSD's wastewater treatment plant. The total distance would be approximately 15 miles. This project would provide for a possible expansion of RCSD's recycled water services beyond the 0.5 mgd expansion in order to provide more recycled water in a quicker period of time.
Project Integration:	Integration with RW-1, WQ-1, WQ-2, and WQ-3, by connecting to their systems.
Project Benefits:	Adds additionally potential users of recycled water.
Total Cost:	$13.0 Million

Lancaster Water Reclamation Plant Stage V Plant Expansion, Phase 1 (WQ-1)	
Project Sponsor:	LACSD
Joint Agencies:	None
Project Description:	The Lancaster WRP Stage V project, Phase 1, involves construction and design of a new pump station, storage reservoirs, and other ancillary facilities needed to increase effluent storage capacity to 18 mgd. The project also includes land acquisition needed for site development. The proposed upgrades will help to maximize the beneficial use of recycled water to agricultural and other end users. CEQA for this project has been completed. By providing an increase in recycled water availability to the Region, this project eases demand for potable water and improves recharge opportunities for the Region.
Project Integration:	Integrates with RW-1, RW-2, WQ-2, WQ-3
Project Benefits:	23,500 AFY of increased recycled water availability; benefit limited to identified users within delivery system.
Total Cost:	$74.8 Million
Palmdale WRP Existing Effluent Management Sites (WQ-2)	
Project Sponsor:	LACSD
Joint Agencies:	None
Project Description:	The proposed upgrades to the Palmdale WRP existing effluent management sites will improve overall water quality by extracting water in the Antelope Valley Region that is high in nitrates and maximizing its beneficial reuse by applying it to agricultural lands and redirecting it to other end users. This project includes monitoring, purchase and installation of irrigation equipment, and completion of other capital projects associated with the existing effluent management sites. CEQA for this project has been completed.
Project Integration:	Integrates with RW-1, RW-2, WQ-1, WQ-3
Project Benefits:	Improved groundwater water quality and effluent management.
Total Cost:	$5.2 Million
Palmdale Water Reclamation Plant Stage V Plant Expansion (WQ-3)	
Project Sponsor:	LACSD
Joint Agencies:	None
Project Description:	This plant expansion will upgrade the Palmdale WRP from oxidation ponds to tertiary treatment of 15 mgd of total plant flow. Proposed structural additions will also provide the capacity to deliver treated effluent to agricultural reuse sites and to store effluent during times of low demand, helping to maximize the beneficial use of recycled water. The project augments water supply by providing recycled water in lieu of potable water for landscape irrigation, dust control, construction, and industrial process water. This phase of the upgrade project includes the following series of activities: construction of an effluent pump station, force main, agricultural recycled water pump station, and an agricultural recycled water storage tank and reservoir; development of the new reservoir site and installation of monitoring wells; and design and construction of secondary/tertiary treatment facilities. By providing an increase in recycled water availability to the Region, this project eases demand for potable water and improves recharge opportunities for the Region.
Project Integration:	Integrates with RW-1, RW-2, WQ-1, WQ-2
Project Benefits:	16,800 AFY of increased recycled water availability; benefit limited to identified users within delivery system.
Total Cost:	$94.6 Million

Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation (WQ-4)	
Project Sponsor:	LACWWD 40 and Quartz Hill Water District (QHWD)
Joint Agencies:	None
Project Description:	WQ-4 includes a combination of LACWWD 40's and QHWD's "Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation" projects. WQ-4 proposes arsenic mitigation of six groundwater wells. The proposed method involves using grout with extremely small pour space to seal off localized regions of the well that contain higher levels of arsenic, resulting in an isolation of arsenic located in specific levels of strata and an overall decrease in contamination. This project will benefit several lower income areas that are served by these wells.
Project Integration:	Integrates with other water quality projects in protecting the Basin.
Project Benefits:	Preventing loss of groundwater pumping and supply.
Total Cost:	$1.5 Million
Ecosystem and Riparian Habitat Restoration of Amargosa Creek; Ave J to Ave H (EM-1)	
Project Sponsor:	City of Lancaster
Joint Agencies:	None
Project Description:	The Ecosystem and Riparian Habitat Restoration of Amargosa Creek; Ave J north to Ave H establishes riparian habitat along the eastern edge of the Amargosa Creek in elongated segments and sections resulting in a "Riparian Curtain" approximately extending from Ave J north to Ave H. This restoration project is holistic in that it serves to enhance the environment and improve water quality, and helps to offset impacts on the overall ecosystem of ephemeral and riparian habitat associated with Amargosa Creek. By establishing a riparian corridor, this project provides habitat connectivity and protection; creates acoustic and aesthetic buffers; improves the existing network of wetlands; and works towards overall ecosystem restoration. This project requires site reconnaissance, coordination with California Department of Fish and Game (CDFG), various bio-assessments and planting plans prior to implementation and creation.
Project Integration:	Integrates with WS-1 and LM-1
Project Benefits:	100 – 1,000 AFY
Total Cost:	$10.0 Million
Coordinated Flood Management Plan (FM-1)	
Project Sponsor:	Cities of Lancaster, Palmdale, LADPW, Kern County
Joint Agencies:	Edwards AFB would be an interested participant
Project Description:	The proposed project is the coordination of a flood management plan for the Antelope Valley Region by 2010. The Plan could include regional strategies to: improve and update flood management mapping and technology; coordinate mitigation efforts that address the level of risk associated with different areas and flood events; and direct the location, pattern and design of development in order to reduce flood damage, maximize groundwater recharge and meet other planning objectives throughout the Antelope Valley Region. A regional flood management plan could also include a regional communication and contingency plan, prepared so that regional and local authorities have the means to respond collaboratively to different flood events.
Project Integration:	Integrates with WS-1, EM-1, and LM-1
Project Benefits:	Improved flood management and protection for the Antelope Valley Region.
Total Cost:	To be provided once all project description components are more clearly defined.

Amargosa Creek Pathways Project (LM-1)	
Project Sponsor:	City of Lancaster
Joint Agencies:	None
Project Description:	The Amargosa Creek Pathways Project, proposed by the City of Lancaster, includes development of a top of bank trail or paseo along eastern side of Lake Lancaster, and construction of a foot-bridge structure crossing the lake and connecting under Hwy 14 to link to the existing trailhead at the Antelope Valley Region Fairgrounds. The project integrates stormwater/flood control with natural riparian habitat enhancement and preservation, open/recreational space and land use management. The goal is to construct a pathway in harmony with established riparian habitat, within a flood control management basin which captures stormwater and nuisance water runoff that, in turn, sustains riparian habitat. This project will additionally increase the amount of protected natural habitat and provide improved flood control within the Amargosa Creek watershed.
Project Integration:	Integrates with WS-1 and EM-1
Project Benefits:	1 – 100 AFY
Total Cost:	$1.3 Million
Coordinated Land Use Management Plan (LM-2)	
Project Sponsor:	Cities of Lancaster, Palmdale, LADPW, Kern County
Joint Agencies:	Antelope Valley Conservancy
Project Description:	The proposed project is the coordination of a land use management plan for the Antelope Valley Region. A regional land use plan that directs the Antelope Valley Region's growth towards existing urban centers will help protect agricultural lands, natural habitat and recreational open space, and will encourage the efficient use of water and economic resources dedicated to water utilities infrastructure improvements and expansions. It is likely that this effort will be combined with the "Antelope-Fremont Watershed Assessment and Plan" project described in Section 5. The watershed assessment project would fund the 606 Studio to work with regional stakeholders to coordinate a regional land use plan with emphasis on the preservation and restoration of sensitive natural systems of the Antelope Valley Region.
Project Integration:	Integrates with WS-1, WS-2, WS-4, RW-1, RW-2, WC-1, WQ-1, WQ-2, WQ-3, EM-1, and LM-1.
Project Benefits:	2,000 acres of habitat/conservation lands
Total Cost:	$45,000 to fund the development of the Antelope-Fremont Watershed Assessment and Plan portion of the Plan. Total cost of the Plan to be provided.

7.4.1.1 Integration of High Priority Projects

The combined implementation of these projects would provide multiple benefits to the Antelope Valley Region spanning a number of water management actions. All of the projects proposed for implementation are targeted at reducing the mismatch between supply and demand projected for the Region by 2035. The projects would facilitate the use of recycled water throughout the Region as well as improve water quality in the groundwater through interdependent recycled water projects, thereby providing a new water supply to the Region. Additionally, the suite of projects would reduce regional water demand by as much as 10 percent by 2035 through a regional water conservation program.

These priority projects work as an integrated package. Many of their components are dependant on each other, requiring continual coordination between agencies and Stakeholders. Implementation of these projects are discussion further in Section 8.

Table 7-3 Benefit/Cost for High Priority Projects

Project Code	Project	Quantified Water Supply Benefit	Other Benefits	Costs (in millions)
LM-1	Amargosa Creek Pathways Project	1 – 100 AFY		$1.3
RW-1	Antelope Valley Recycled Water Project Phase 2	8,400 AFY	Potential recharge and habitat restoration	$10.9
WS-4	Antelope Valley Water Bank	100,000 AFY	1,700 acres of agriculture	$170.0
WS-3	Aquifer Storage and Recovery Project: Injection Well Development	12,000 AFY		$10.0
WI-1	Avenue K Transmission Main, Phases I-IV	NA	Firms up supplies	$10.0
WC-1	Comprehensive Water Conservation/Water Use Efficiency Program	3,500 AFY	Ultimate benefit of 28,000 AFY to 42,000 AFY	$0.90
FM-1	Coordinated Flood Management Plan	NA	Would improve overall flood management and protection for the Antelope Valley Region	TBD
LM-2	Coordinated Land Use Management Plan	NA	2,000 acres open space	TBD
EM-1	Ecosystem & Riparian Habitat Restoration of Amargosa Creek; Ave J to Ave H	100 – 1,000 AFY		$10.0
RW-2	Groundwater Recharge Using Recycled Water (GWR-RW) Project	2,500 AFY	100 acres open space	$6.0
WQ-1	Lancaster WRP Stage V	See RW-1	48,000 AFY potential benefits when users identified	$74.8
WI-2	Littlerock Dam Sediment Removal Project	1,000 AFY		$5.5
WQ-2	Palmdale WRP Existing Effluent Management Sites	See RW-1	48,000 AFY potential benefits when users identified	$5.2
WQ-3	Palmdale WRP Stage V	See RW-1	48,000 AFY potential benefits when users identified	$94.6
WQ-4	Partial Well Abandonment of Groundwater Wells for Arsenic Mitigation	NA	Prevents loss of groundwater pumping and existing supply	$1.5
WI-3	RCSD's Waste Water Pipeline	NA	Provides potential future recycled water users	$13.0
WS-1	Upper Amargosa Creek Recharge, Flood Control & Riparian Habitat Restoration Project	5,000 – 10,000 AFY	15 acres open space; 20 acres flood protection	$13.5
WS-2	Water Supply Stabilization Project – Westside Project	40,400 to 42,600 AFY		$230.0

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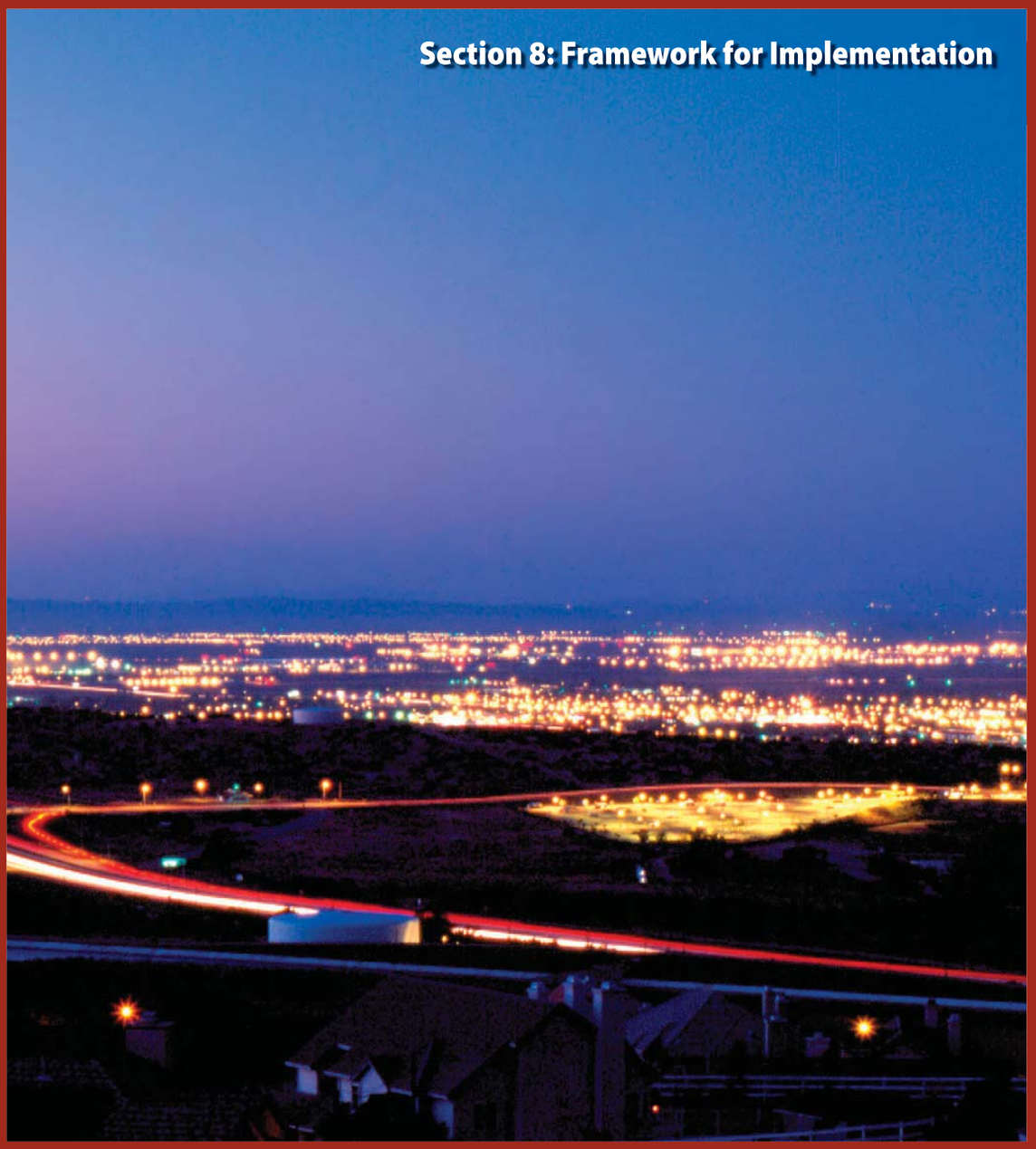
Section 8: Framework for Implementation



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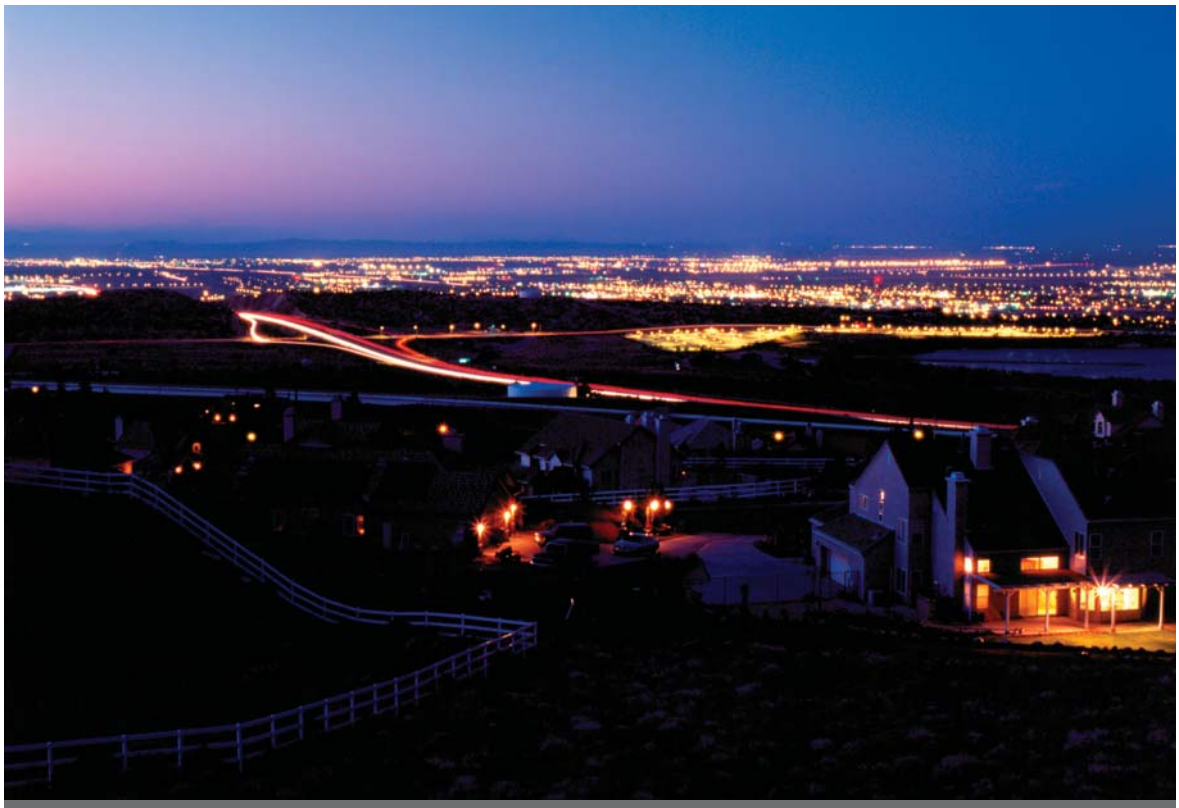

Just as a city can operate more effectively through an organized structure, communities can work together to create a framework to benefit all residents of a region. Photo courtesy of the City of Palmdale.

Section 8: Framework for Implementation

This section develops a comprehensive implementation framework for the Integrated Regional Water Management (IRWM) Plan. The objective of this section is to develop a capital improvement program and financial plan for both construction and operation and maintenance (O&M) of the projects and management actions selected as 'high priority' within this IRWM Plan, as well as to identify a means for updating and maintaining the AV IRWM Plan throughout the planning horizon.

8.1 FRAMEWORK INTRODUCTION

This subsection discusses the agencies and stakeholders that develop plans or participate in the development of plans in the Antelope Valley Region, and identifies the different scales at which planning occurs. How local agencies and stakeholders choose to link regional water issues and challenges with the IRWM Plan priorities, strategies, and objectives noted in Section 4, combine water management strategies, or determine which specific activities should occur for any specific water management strategy may vary based on the scale of planning. It is within this framework that the agencies and stakeholders expect to move toward the shared water management objectives, following a course of greater integration and coordination of water projects and programs in the Antelope Valley Region.

8.1.1 Existing Plans and Programs

A substantial number of federal, state and local/regional agencies and jurisdictions are responsible for, or participate in, the development and implementation of plans and programs that satisfy the water management strategies developed earlier in this report. Table 8-1 identifies those agencies and jurisdictions associated with each established water management strategy in order to demonstrate the coordination required to plan and implement these programs. This table suggests that substantial effort will be required to assure cross-agency coordination and integration for the development of regional plans and projects for individual water management strategies or that incorporate multiple water management strategies.

Table 8-1 Agencies and Jurisdictions Involved with Planning in Antelope Valley Region

Water Management Strategy	Federal	State	Local/Regional
Water Supply Reliability		Department of Water Resources (DWR); State Water Resources Control Board (SWRCB)	Water Agencies; Lahontan Regional Water Quality Control Board (RWQCB)
Groundwater Management and Conjunctive Use		Department of Public Health (DPH); DWR; SWRCB	Cities of Palmdale and Lancaster; Los Angeles and Kern Counties; Antelope Valley State Water Contractors Association (AVSWCA); Lahontan RWQCB
Water Conservation	Bureau of Reclamation (BOR)	DWR; SWRCB	Cities of Palmdale and Lancaster; Water Agencies; Kern County
Water Recycling	Environmental Protection Agency (EPA)	DWR; DPH; SWRCB	Cities of Palmdale and Lancaster; Los Angeles County Sanitation Districts (LACSD) 14 and 20; Kern County; Lahontan RWQCB
Imported Water	BOR	DWR; SWRCB	Antelope Valley-East Kern Water Agency (AVEK); Palmdale Water District; and Littlerock Creek Irrigation District
Surface Storage	BOR; Army Corps of Engineers (ACOE)	DWR; SWRCB	Some cities; Los Angeles County Flood Control District (LAFCD); Kern County; Lahontan RWQCB
Water Transfers	BOR	DWR; SWRCB	Some Water Agencies; Lahontan RWQCB
Desalination	BOR	DWR	Not Applicable for Antelope Valley Region
Water Quality Protection & Improvement	EPA	DPH; DWR; SWRCB	Cities of Palmdale and Lancaster; Water Agencies; Los Angeles and Kern Counties, LACSD; Lahontan RWQCB
Non-point Source Pollution Control	EPA	DWR; SWRCB	Cities of Palmdale and Lancaster; Water Agencies; Los Angeles and Kern Counties; Lahontan RWQCB; Environmental and Watershed Groups
Water & Wastewater Treatment	EPA	DWR; SWRCB	Cities of Palmdale and Lancaster; LACSD 14 and 20; Kern County; Water Agencies; Lahontan RWQCB
Flood Management	BOR; ACOE	DWR; SWRCB	Cities of Palmdale and Lancaster; LAFCD; Kern County; Lahontan RWQCB
Stormwater Capture and Management	BOR; ACOE	DWR; SWRCB	Cities of Palmdale and Lancaster; LAFCD; Kern County; Lahontan RWQCB
Ecosystem Restoration	Fish and Wildlife Service (FWS); Forest Service; National Park Service (NPS); Natural Resources Conservation Service (NRCS); Bureau of Land Management (BLM)	California Department of Fish and Game (Fish and Game); State Parks	Cities of Palmdale and Lancaster; Los Angeles and Kern Counties; Environmental and Watershed Groups

Table 8-1 Agencies and Jurisdictions Involved with Planning in Antelope Valley Region (continued)

Water Management Strategy	Federal	State	Local/Regional
Environmental and Habitat Protection and Improvement	ACOE; FWS; Forest Service; NPS; NRCS; BLM	Fish and Game; State Parks	Cities of Palmdale and Lancaster; Los Angeles and Kern Counties; Environmental and Watershed Groups
Recreation and Public Access	NPS	State Parks	Cities of Palmdale and Lancaster; Los Angeles and Kern Counties
Wetlands Enhancement and Creation	ACOE; FWS; Forest Service; NPS; NRCS	Fish and Game; State Parks	Cities of Palmdale and Lancaster; Los Angeles and Kern Counties
Land Use Planning	Forest Service; NPS	State Parks	Cities of Palmdale and Lancaster; Los Angeles and Kern Counties
Watershed Planning	ACOE; NPS		Cities of Palmdale and Lancaster; Los Angeles and Kern Counties; Environmental and Watershed Groups

8.1.2 Relationship to Local Planning

The AV IRWM Plan establishes broad objectives and planning targets for the entire Antelope Valley Region. The Antelope Valley Regional Water Management Group (RWMG) created for the development and implementation of the AV IRWM Plan cannot feasibly assume responsibility for meeting all of the objectives and planning targets. Thus, projects and management actions implemented by the AV IRWM Plan stakeholders will likely remain the primary means by which the IRWM Plan's objectives are contributed As acknowledged in a number of the stakeholder meetings, many of the local agencies increasingly acknowledge the value of collaboration in the planning, design, implementation, funding, monitoring and maintenance of integrated projects. Implementation of the AV IRWM Plan supports the development of integrated projects, provides a comprehensive framework that can support planning by individual agencies and jurisdictions, and encourages integrated planning for those issues that could benefit from a regional approach.

Numerous plans and studies related to water resources and land use management in the Antelope Valley Region have contributed to the development of the IRWM Plan. Thus, the AV IRWM Plan has been developed from and is consistent with local planning efforts in the Antelope Valley Region, as discussed below.

- **General Plans:** Plans of the counties and cities that comprise the Antelope Valley Region reflect local planning needs and issues. General Plans express the goals, actions and policies in a number of resource areas, including land use and water management. The Los Angeles County General Plan which covers a large majority of the Antelope Valley Region, in connection with the Antelope Valley Areawide General Plan and the Kern County General Plan specifically calls for a number of policies directly related to IRWM Plan objectives and planning targets such as increased water quality and reliability; water conservation; watershed management, wastewater recovery and reuse; avoidance and mitigation of pollution threats to drainages and groundwater reserves; open space preservation; and establishment of adequate public access and recreational opportunities. General Plans for the Cities of Palmdale and Lancaster offer similar themes of ensuring reliable water supply; maintaining open space and recreational opportunities; and protecting human health and safety and the environment through better floodplain management and ecosystem restoration. Table 8-2 lists applicable goals, policies and programs from each General Plan and compares them to the IRWM Plan objectives and planning targets, the IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, and Statewide Priorities.
- **Lahontan Regional Water Quality Control Board Basin Plan:** The AV IRWM Plan includes key strategies achieving water quality goals for the Antelope Valley Region identified in the Basin Plan developed by the Lahontan RWQCB. The control of Non-point Source Pollution throughout the Antelope Valley Region and restoration of water quality in local water bodies are particular aspects of the Basin Plan that are directly addressed by the IRWM Plan. A number of planning targets are identified to achieve this, such as preventing unacceptable degradation of the aquifer according to the Basin Plan throughout the planning period, identification of contaminated portions of the aquifer and prevention of migration, and mapping and monitoring contaminant movement. In addition, the AV IRWM Plan calls for coordination of a regional flood management

plan and policy mechanism to reduce negative impacts of storm water, urban runoff and nuisance water. Projects designed to reduce, capture, and treat urban and stormwater runoff directly address the water quality objectives in the Basin Plan.

> *"What's important about this effort is that it provides a single forum for all the water resource stakeholders to work together on overlapping planning efforts."*
>
> – Richard Caulkins,
> Los Angeles County Sanitation District

- **Involvement of Land Use Decision Makers:** Land use decisions have the potential to affect the water management strategies utilized in the AV IRWM Plan, as land use can affect population growth, water demand, and surface water quality. The implementation of stormwater capture projects may require acquisition of land which could displace existing uses and may warrant consideration of modifications to land use policies and practices. In addition, the passage and implementation of water conservation or floodplain management ordinances can further address IRWM Plan objectives. In developed areas, the land use decision makers are primarily the cities and the counties. In open space areas, the Forest Service, National Park Service, and California State Parks have regulatory responsibility for the conservation and preservation of those spaces. Additionally, many 'open spaces' in the Antelope Valley Region are undeveloped rural lands under Los Angeles County jurisdiction. All of these agencies and jurisdictions have been involved in the AV IRWM Plan as part of the stakeholder process, or are active members of the Antelope Valley RWMG (e.g., cities and counties).

- **Dynamics between IRWM Plan and Local Planning:** The stakeholder process allows for interactive feedback to occur between local planning and regional IRWM Plan planning. Local planning is conducted by cities, counties, and local agencies and districts. Most of the cities in the Antelope Valley Region have participated either directly, or through the participation of a regional representative. Through the stakeholder workshops, the cities, counties and municipal agencies have advocated for their respective local planning needs and issues, which have been incorporated into the IRWM Plan. Subsequently, the outcomes from the AV IRWM Plan process have been disseminated by the representatives back to their local decision makers, allowing the IRWM Plan priorities, objectives and planning targets to be considered in local planning efforts where appropriate. For example, the Los Angeles County General Plan is currently being updated, and as feasible, the AV IRWM Plan can be used to inform that process in areas related to water resource management.

8.1.3 Relationship of Other Planning Documents to IRWM Plan Objectives

Other water resource management planning documents are also being used to help guide the AV IRWM Plan process. Many of these planning documents are sources of specific projects and programs that can be incorporated directly into the AV IRWM Plan's implementation plan. A general discussion follows of how these planning documents support IRWM Plan objectives related generally to optimizing local resources; complying with water quality standards; protecting and improving groundwater and drinking water quality; increasing watershed-friendly recreational space; protecting, restoring and enhancing natural processes and habitats; and maintaining and enhancing flood protection and infrastructure related to water resources and water quality. Such planning documents include, but are not limited to, Urban Water Management Plans (UWMP), local and regional General Plans, City Master Plans, conservation efforts, and Los Angeles County Flood Control District plans.

Provide reliable water supply to meet the Antelope Valley Region's expected demand between now and 2035.
The quantity of supply necessary to meet future population growth and land use development through 2035 (as forecast in the Antelope Valley Region's General Plans) is documented in the UWMPs of the Antelope Valley Region. The AV IRWM Plan includes a number of projects described in these UWMPs, including several water conservation

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities

| Local and Regional Plan Policies | Water Supply | | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | | | | | | | | | | IRWM Plan Program Preferences | | | | | | | | | | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | | | | | | IRWM Plan Program Preferences | | | | | | | | Statewide Priorities | | | | | | | | Water Supply Management Objectives | | | | | | | | Water Quality Management Objectives | | | | | | | | | | | Flood Mgmt. Objectives | | Env. Mgmt. Obj. | | Land Use Management Objectives | | | | | |
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Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | | | | | | | IRWM Plan Program Preferences | | | | | | | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | | | | | | | IRWM Plan Program Preferences | | | | | | | | | Statewide Priorities | | | | | | | | | Water Supply Management Objectives | | | | | | | | | Water Quality Management Objectives | | | | | | | | | | | Flood Mgmt. Objectives | | Env. Mgmt. Obj. | | Land Use Management Objectives | | | | | | |
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Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | Water Quality | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

| Local and Regional Plan Policies | Water Supply | | | | | | | | | Water Quality | | | | Flood Mgmt. | | Environmental Resource Management | | | | Land Use Mgmt. | | AB 3030 Guidelines | | | | | | | | |

Table 8-2 Local & Regional Plan Policies vs. IRWM Plan Strategies, AB 3030, IRWM Plan Guidelines, & Statewide Priorities (continued)

Local and Regional Plan Policies	Water Supply										Water Quality			Flood Mgmt.		Environmental Resource Management					Land Use Mgmt.	
	Water Supply Reliability	Groundwater Management	Water Conservation	Water Recycling	Water Banking & Conjunctive Use	Imported Water	Surface Storage	Water Transfers	Desalination		Water Quality Protection and Improvement	Non-Point Source Pollution Control	Water and Wastewater Treatment	Flood Management	Storm water Capture and Management	Ecosystem Restoration	Environmental and Habitat Protection and Improvement	Recreation and Public Access	Wetlands Enhancement and Creation		Land Use Planning	Watershed Planning
Provide trail linkages through active park sites to connect nearby equestrian and multi-use trails, and bikeways.																		X			X	
On those park sites with steep slopes or other development constraints, leave natural areas for passive recreation pursuits.																		X			X	
Environmental Resources Element																						
Identify significant farmlands pursuant to the State of California Important Farmlands Inventory and provide for their preservation as an interim use within the Planning Area.																					X	
Encourage the preservation of agricultural lands in non-urban areas and as an interim use where urban development is not anticipated for several years.																					X	
Preserve agricultural uses as a means of retaining aquifer recharge both naturally and through treated water sources.	X	X			X																X	
WEST MOJAVE PLAN (2006)																						
Environmental Resource Management Policies																						
Biological Goals																						
Protect sufficient habitat to ensure long-term tortoise population viability.																X	X				X	
Establish a minimum of three, preferably four, Desert Wildlife Management Areas that would be managed for the long-term survival and recovery of the desert tortoise, and which would also benefit other special-status plant and animal species.																X	X				X	
Establish an upward or stationary trend in the tortoise population of the West Mojave Recovery Unit for at least 25 years.																X	X				X	
Ensure genetic connectivity among desert tortoise populations, both within the West Mojave Recovery Unit, and between this and other recovery units.																X	X				X	
Delineate and maintain movement corridors between DWMAs, and with the Eastern Mojave Recovery Unit, the Eastern Colorado Recovery Unit, and the Northern Colorado Recovery Unit.																X	X				X	
Ensure a minimum width of two miles for movement corridors, and include provisions for major highway crossings.																X	X				X	
Reduce tortoise mortality resulting from interspecific (i.e., raven predation) and intraspecific (i.e., disease) conflicts that likely result from human-induced changes in the ecosystem processes.																X	X				X	
Maintain the hydrological processes that support the dense populations within the Rosamond Lake Basin.		X									X	X									X	
Conserve all suitable riparian nesting habitat.																X	X				X	
Maintain groundwater levels in Mojave River that support the riparian habitat.		X														X	X				X	

| Local and Regional Plan Policies | AB 3030 Guidelines | | | | | | | | | | | | | | | | | | |

programs (education, evapotranspiration (ET)-based irrigation controllers, faucet aerators, xeriscaping, etc.). Recycled water and conservation master plans have also been developed by local government agencies and water agencies (or are identified to be developed as part of this IRWM Plan); the AV IRWM Plan will similarly implement a number of projects identified in those plans.

Establish a contingency plan to meet water supply needs of the Antelope Valley Region during a plausible disruption of SWP water deliveries. Water supply needs, including a complete description of a purveyor's water supply portfolio and, forecasts for single- and multi-year droughts, are discussed in the UWMPs of the Antelope Valley Region. The reliability section within each UWMP requires purveyors to identify those actions needed to meet any such supply deficiencies. The AV IRWM Plan includes a number of projects described in these UWMPs, including various Best Management Practices (BMPs) (e.g., water conservation programs). Additionally, Water and Wastewater Master Plans developed for portions of the Antelope Valley Region identified necessary infrastructure improvements and additional storage requirements necessary to increase the reliability of the water supply available to the Antelope Valley Region. The AV IRWM Plan includes a number of projects described in the Master Plans.

Stabilize groundwater levels at current conditions. There is the need, however, to develop a groundwater management plan for the Antelope Valley Region in order to provide a better understanding of the Antelope Valley Groundwater Basin and to recommend various strategies that result in a reliable water supply for all basin users and help meet increasing water demands. Therefore, the AV IRWM Plan meets the requirements for an AB 3030 Plan and establishes a groundwater management plan for the whole basin. The AV IRWM Plan also identifies projects that are intended to protect and enhance groundwater supply through conjunctive use operations and monitoring.

Provide drinking water that meets customer expectations. UWMPs for all water purveyors in the Antelope Valley Region document actions to address improving and/or maintaining high quality drinking water that meets the customers' expectations. Planning documents that address drinking water quality include the Antelope Valley Region's water treatment plant facilities plans and the Lahontan RWQCB Basin Plan, which includes water quality objectives for groundwater used for domestic supply. In addition, the DPH regulates drinking water quality standards and determines the levels at which potential toxins can be present in drinking water. Projects within the AV IRWM Plan designed to meet these documented objectives include expansion or upgrade of water treatment and water reclamation plants, as well as groundwater management programs for removal of contaminants.

Protect aquifer from contamination. The Lahontan RWQCB Basin Plan discusses and identifies a variety of water quality objectives for groundwater and surface waters within the Antelope Valley Region, to preserve and enhance overall water quality, and to protect regional waters from contamination and degradation. The AV IRWM Plan proposes several programs and projects aimed at improving, enhancing and protecting the aquifer from contaminants, including regional wellhead management planning and monitoring and mapping known or suspected plumes.

Protect natural streams and recharge areas from contamination. The Lahontan RWQCB Basin Plan designates beneficial uses for surface and groundwater resources and watersheds in the Antelope Valley Region, and includes objectives that must be attained or maintained to protect these uses and avoid contamination or degradation. A number of the local and regional General Planning documents also contain policies and programs aimed at improving the quality and use of surface waters and recharge areas. Thus, the plans and programs of those local and regional agencies and entities that are required to implement the specific projects and programs discussed above, will also implement this objective.

Maximize beneficial use of recycled water. Plans for improving and expanding infrastructure to accommodate and increase the beneficial use of recycled water in the Antelope Valley Region are contained in the capital improvement and strategic facilities plans of the wholesale and retail water agencies. The AV IRWM Plan identifies a variety of recycled water infrastructure expansion projects intended to increase beneficial use of recycled water in the Antelope Valley Region, and reduce overall potable demand.

Reduce negative impacts of storm water, urban runoff, and nuisance water. There are a number of local planning documents related to improving the quality of runoff and reducing adverse impacts of nuisance water on area streams and waterbodies that have informed IRWM Plan efforts, such as the Lahontan RWQCB Basin Plan. TMDL implementation plans are developed to meet EPA Clean Water Act requirements at a local level, and identify responsible agencies. The development of projects and programs to reduce, capture, infiltrate, and/or treat storm water runoff is the responsibility of National Pollutant Discharge Elimination System (NPDES) permit holders (and co-permittees) and/or Waste Discharge Requirements (WDR), which include the counties, cities, and point source dischargers.

Projects and programs to reduce the presence of pollutants will be identified in TMDL-specific implementation plans prepared by the relevant jurisdictions for the affected water bodies if required, and the plans and programs developed by individual permittees.

Preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region. The objective to preserve open space and natural habitats is contained in a number of local watershed management plans. Individual projects and programs to achieve this goal will be the responsibility of local jurisdictions in those areas in which restoration or preservation activities occur, including those responsible for management of parks and open space (State Parks, counties and cities), resource management agencies (FWS, Forest Service, BLM, and Fish and Game), land use agencies (counties and cities), the local wastewater treatment entity (to the extent that wastewater discharge affects streams subject to restoration), and NPDES permit holders (where storm water discharge affects water quality in streams subject to restoration). Thus, the plans, work programs and capital improvement programs of those agencies and entities will include the specific projects and programs that implement this objective.

Maintain agricultural land use within the Antelope Valley Region. Responsibility for protecting, preserving and maintaining agricultural land use within the Antelope Valley Region rests with the various governing agencies with discretionary oversight for land use development, including the counties and cities, and the NRCS. A variety of tax incentive programs (e.g., the Williamson Act and Los Angeles County Agricultural Opportunity Areas [AOA]) within these jurisdictions have been developed to support ongoing operations, in light of encroaching non-agricultural development. In addition, many of these agencies have right-to-farm policies and ordinances intended to reduce potential conflict from introduction of new commercial or residential development adjacent to farmlands or on prime agricultural land.

Meet growing demand for recreational space. Responsibility for the expansion or creation of new recreational space, including parkland and passive open spaces remains with the numerous jurisdictions within the Antelope Valley Region, including the park and recreation departments of the counties and cities, the Open Space District of Los Angeles County, the California Parks Department, and the NPS. The City of Palmdale and the City of Lancaster, for example, provide a standard of 5 acres of parkland per 1,000 residents, whereas Kern County identifies a standard of 2.5 acres per 1,000 residents. Los Angeles County's standards are 4 acres per 1,000 residents of local parkland, and 6 acres per 1,000 residents of regional parkland. In addition, various private entities, such as land conservancies, trusts, and park support groups have developed or identified opportunities to promote and create additional parkland, open spaces and recreational space. Many of these agencies and groups have existing plans and policies, and most local watershed plans identify opportunities to expand recreation areas.

Improve integrated land use planning to support water management. Most land use planning policies within the local and regional plans, as discussed throughout this IRWM Plan, including those found specifically within the Antelope Valley Region's General Plans, identify a need or objective for improving integrated planning efforts across jurisdictional boundaries, as well as regional water management policies. One of the suggested management planning targets for the AV IRWM Plan calls for coordinating and developing a regional land use management plan by the year 2010, which directly implements the objectives and goals of the Antelope Valley Region's land use planning documents.

8.1.3.1 Implementation of Local Plans

Implementation of the AV IRWM Plan will address many of the policies and goals found in the planning documents of the Antelope Valley Region. By doing so, it also plays a crucial role of placing these plans into a regional context, while preserving the outcomes of the individual planning efforts. Most of the implementation projects come directly from local planning documents. Altogether, the projects included in the AV IRWM Plan directly implement elements of a number of local plans and studies, including UWMPs, Water Recycling Master Plans, Water Conservation Master Plans, and Master Facilities Plans. The AV IRWM Plan also includes projects that meet the water quality objectives of the Lahontan RWQCB Basin Plan, and the water supply reliability, water quality, open space and recreation, and flood management goals, policies, and programs of the Antelope Valley Region's General Plans as discussed above.

8.2 INSTITUTIONAL STRUCTURE

8.2.1 Organizational Structures for Regional Collaboration

Several agencies with considerably different authorities and responsibilities share jurisdiction over aspects of the multi-faceted water management challenges faced by residents

of the Antelope Valley. The complexity of many of these water management challenges make them difficult for any single agency to solve on their own. Water managers within the Antelope Valley Region recognized the potential value in joining resources to define and address these challenges collectively. In order to do this, the multiple agencies need some organized structure to work together effectively. As a result, eleven public agencies formed the Antelope Valley Regional Water Management Group (RWMG) to develop the AV IRWM Plan. The RWMG formed when the eleven agencies signed a Memorandum of Understanding (MOU). The MOU defined their mutual agreement to contribute funds to help develop this IRWM Plan, provide and share information, review and comment on drafts of this IRWM Plan, adopt the final Plan, and assist in future grant applications for the priority projects selected in this IRWM Plan. A copy of the signed MOU can be found in Appendix A. Under this current organizational structure, the RWMG is the decision-making body responsible for formal decisions regarding the scope and content of this IRWM Plan.

> *"This process is really breaking down the barriers that have existed amongst the organizations the the Valley related to water – water resources, water supply, water demand, water banking, recycled water – all the issues we're trying to address in this process."*
>
> – Curtis Paxton,
> Antelope Valley State Water Contractors Association

Another type of organizational structure often used to allow multiple agencies to work collaboratively is a Joint Powers Authority (JPA). A JPA is formed when it is to the advantage of two or more public entities (e.g., local governments, or utility or transport districts) with common powers to consolidate their forces to acquire or construct a joint-use facility. Their bonding authority and taxing ability is the same as their powers as separate units. A JPA is distinct from the member authorities, and they have separate operating boards of directors, and these boards can be given any of the powers inherent in all of the participating agencies. In setting up a JPA, the constituent authorities must establish which of their powers the new authority will be allowed to exercise. A term and the membership and standing orders of the board of the authority must also be laid down. The joint authority can employ staff and establish policies independently of the constituent authorities.

A prominent JPA in the Antelope Valley Region is the Antelope Valley State Water Contractors Association (AVSWCA), formed in May 1999 by the three local SWP contractors of the Antelope Valley. The AVSWCA's Statement of Principals and Objectives are outlined in Section 1.2.1 of this IRWM Plan.

8.2.2 Governance Structure

Governance structure means "decision-making" structure or management structure. As described above, the AV IRWM Plan was developed using a governance structure established through an MOU that prescribed the roles and responsibilities for the RWMG. The RWMG has operated over the past year using a systematic approach called "facilitated broad agreement." As part of this approach, the RWMG was the governing body and invited stakeholder involvement beyond the MOU signatories through frequently scheduled stakeholder meetings. These meetings were conducted according to the following steps for collaboration:

- Adopt specific and measurable goals for the process
- Create a safe space for interaction
- Establish a clear course of action
- Demonstrate tangible progress
- Iterate until the group is satisfied

These meetings were led by a professional facilitator with no direct association or stake in the outcome of any actions considered within the Plan. Material for the Plan discussed in each meeting has been developed by a consultant team in cooperation with RWMG members and other stakeholders and made available for review and comment by the stakeholders. This governance structure and approach has worked well to create the Plan.

While the structure and approach has been successful to create the plan, the RWMG discussed whether the MOU and facilitated broad agreement approach would work well to implement and update the Plan after it is adopted. Several potential options were discussed including selection of one willing existing agency within the RWMG, (the City of Palmdale for example), that would serve on behalf of the entire stakeholder group, or creation of a new legal entity, such as a new JPA to lead the collaboration with the stakeholder group and help implement the AV IRWM Plan.

The stakeholders decided that they would like to continue using the current approach of facilitated broad agreement to implement and update the AV IRWM Plan. However, several of the RWMG Members expressed a desire to form a more formal governance structure to implement the Plan over the next several years.

8.2.2.1 Governance Subcommittee

A Governance Subcommittee was formed to explore options and prepare a recommendation for the IRWM Plan Stakeholder Group about how to establish an effective governance structure to implement the IRWM Plan. The Subcommittee was comprised of a wide representation of the Stakeholder group, inviting all entities within the Valley whose interests should be represented by the Subcommittee participate.

The Governance Subcommittee identified and prioritized objectives for the new Governance Structure, as well as recommended roles for the new structure. These are both provided below.

8.2.3 Objectives for New Governance Structure

During the meeting on August 29, 2007 the Governance Subcommittee identified and prioritized the following draft objectives to accomplish within next 2 to 3 years:

8.2.4 Recommended Roles for New Governance Structure

During the meeting on August 29, 2007 the Governance Subcommittee identified recommended roles for a new governance structure to serve within first 2 to 3 years:

- Provide focused leadership for implementing and updating IRWM Plan
- Serve as contracting agency for state or federal grant funds related to implementation of IRWM Plan
- Track and report performance related to IRWM Plan goals
- Focus efforts to identify potential sources of outside funding and assist local entities to compete for those funds
- Provide leadership to focus cooperative efforts for broad regional planning and implementation efforts such as:
  - » regional water recycling
  - » regional water quality preservation
  - » regional water conservation programs
  - » regional data and information management
  - » regional groundwater banking program

Draft Objective	Priority Vote (5 is highest Priority)
Provide leadership to implement IRWM Plan and conduct regular open stakeholder meetings and provide quarterly updates	5.0
Assume authoritative liaison with DWR and contract	4.7
Complete 3 high priority projects	4.7
Establish enforceable water conservation policies	4.7
Provide assistance to local agencies to implement projects that provide regional benefit (technical, financial, advisory, legal, grant writing, oversight assistance)	4.7
Serve as non-political watermaster	4.7
Accomplish water recycling program at some level	4.5
Bank X acre-feet of water for regional benefit	4.5
Seek additional funding opportunities	4.5
Identify promising sites for groundwater recharge	4.0
Gather and manage performance information for IRWM Plan (gather information to protect water quality)	3.0
Want to determine what to govern	0.1

The Subcommittee also identified the following factors that must be provided within a new governance structure to accomplish successfully the draft goals and serve the recommended roles:

- People dedicated to provide leadership
  - » Initiate actions
  - » Collaborate with others
  - » Call public/stakeholder meetings, set agendas, and lead meetings
  - » Prepare documents for quarterly updates
  - » Identify, select, and apply for appropriate funding opportunities
- Capability to gather, compile and manage data and information
- Ability to execute and manage contracts
- Ability to receive and process financial transactions and meet acceptable accounting standards
- Expertise
- Operating funds
- Point of contact
- Process facilitation

The stakeholders understand that creating a new, more formal governance structure that will maintain the positive momentum the group has demonstrated during the past year until the year 2035 will likely require a few years. Therefore, the stakeholders agreed to establish a short-term (2 to 3 years) governance structure first, with the intention of formalizing and transitioning into a longer-term governance structure as needed. The governance structure outlined below is proposed to begin starting in November 2007.

See Table 8-3 for the Plan Adoption Schedule.

8.2.4.1 Regional Water Management Group

As described above, the RWMG was formed via MOU to contribute funds to help develop this IRWM Plan, provide and share information, review and comment on drafts of this IRWM Plan, adopt the final Plan, and assist in future grant applications for the priority projects selected in this IRWM Plan. The Governance Subcommittee recommended that the RWMG continue, and that the MOU be revised to include the implementation roles and responsibilities identified by the Subcommittee and stakeholders for governance of the IRWM Plan. In addition to these roles, it is proposed that the RWMG would fund the governance functions through contributions of cash or in-kind services, and therefore have budgetary and contracting authority over the governance structure. The RWMG will continue to engage stakeholders through regular public meetings to promote collaborative implementation and tracking of progress. The RWMG agreed to establish a working group called the Leadership Team to initiate actions to implement the IRWM Plan and to interface with the broader stakeholder group. Refer to Figure 8-1 for a schematic of this proposed model. The group has agreed to evaluate the effectiveness of this governance structure annually, and to explore replacing the RWMG with a more formal structure such as a JPA if needed.

8.2.4.2 Leadership Team

The expanded MOU will create a Leadership Team to provide focused initiative and effort to accomplish the two year objectives for the governance structure and to serve the recommended roles identified above. The Leadership Team will be responsible for tasks such as:

- Collaborating and coordinating with stakeholders;
- Call public/stakeholder meetings, set agendas, and lead meetings;
- Prepare documents for quarterly updates;
- Initiate actions with the Stakeholder group to identify, select, and apply for appropriate funding opportunities;

Table 8-3 AV IRWM Plan Adoption Schedule

Date	Adoption Item
July 2, 2007	Release Public Draft IRWM Plan
July 10, & July 18, 2007	Public Workshops held on Public Draft IRWM Plan
August 1, 2007	Public Comments Due on Public Draft IRWM Plan
August - September 2007	Stakeholder meetings to refine the Draft IRWM Plan
October 17, 2007	Release final Admin Draft IRWM Plan
October 31, 2007	Comments Due on final Admin Draft IRWM Plan
November - December 2007	Public Hearings & Adoption by RWMG Governing Bodies

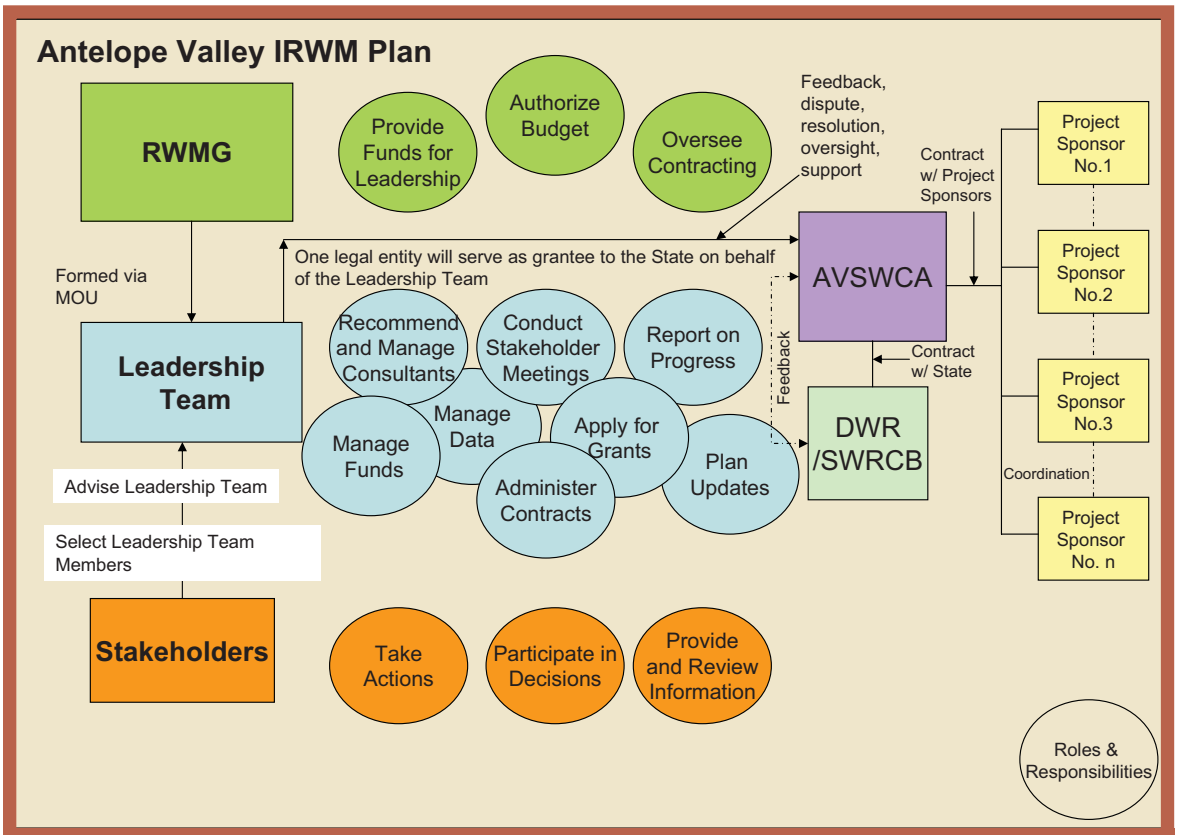

Figure 8-1 Recommended Roles for New Governance Structure

- Recommend to the Stakeholder group hire, and manage consultants as needed;
- Gather, compile and manage data and information as described in the RWMP and additional reporting as required;
- Execute and manage contracts as approved by the RWMG and Stakeholder group;
- Oversee, receive and process financial transactions and meet acceptable accounting standards;
- Identify and provide needed expertise when appropriate;
- Manage operating funds;
- Serve as central point of contact for the RWMG;
- Provide facilitation for implementation process;
- Initiate discussion to form recommendation for long-term governance; and
- Provide representation of regional issues to governing bodies.

The Leadership Team will include 7 members selected by the Stakeholder Group representing categories of water-related interested with the Antelope Valley:

- Agricultural water users
- Conservation, Environmental, and Water Quality
- Municipalities
- Industry and Commerce
- Land Owners/Public/Rural Town Councils
- Mutual water companies
- Urban water suppliers

In addition to these roles, it is proposed that the responsibilities of the Leadership Team serve as an oversight body during grant administration, should the Antelope Valley Region successfully receive grant funds to help implement the Plan. In this capacity, the Leadership Team would work with local project sponsors (described below) to solicit feedback on the grant administration process and provide dispute resolution if needed. The Leadership Team would help ensure effective communication between the contracting entity (described below) and the project sponsors. Additionally, the Leadership Team would sustain an open dialogue with the State regarding progress on the AV IRWM Plan implementation and continue to provide feedback on project progress.

8.2.4.3 Larger Stakeholder Group

The larger stakeholder group, or planning group, is a group of all participants within the IRWM Plan process including agencies that comprise the RWMG as well as an extensive mix of other cities and regulatory, environmental, industrial, agricultural, and land-use planning agencies that represent all areas of the Antelope Valley Region. The stakeholder group has met at a least once per month to allow for discussion of issues facing the Antelope Valley Region and to develop the AV IRWM Plan. Through the facilitated broad agreement approach, decisions on behalf of the group were made by this larger stakeholder group. The Stakeholder Group has agreed to continue to meet at least once per quarter (4 times per year) to review progress with Plan implementation and to consider updates to the Plan (such as newly proposed projects or management actions that address the Regional Plan objectives).

8.2.4.4 Regional/State Interface Contracting Entity

Governing the development, implementation, and updating of the AV IRWM Plan is different than administration or governance of potential grant funding for implementation projects. The Proposition 50 Guidelines require identification of a single contracting agency, or eligible grant recipient, should a contract be awarded and funding be received from DWR. Grant administration includes the ability to receive and administer funds to the awarded sponsored projects, to prepare the necessary progress reports and invoicing reports, to make investigations, and to execute, and file such documents and agreements with DWR as required.

The AVSWCA has taken the initiative to propose to its board to serve on behalf of the Leadership Team (and RWMG) as the legal entity to submit the Antelope Valley Region's application for Proposition 50 funds and to administer grant funds with the DWR. Some of the assumed responsibilities for this entity includes (but is not limited to): filing the grant application with the State; providing additional information if requested; having sufficient cash flow to buffer any delays in administering the grant; having sufficient staff to prepare and comply with all reporting requirements of the grant; and having generally acceptable accounting practices. All of these requirements are laid out in the grant agreement between the State and the contracting agency once the grant award is made.

Additionally, the AVSWCA would then contract with the implementing agencies or local project sponsors (in a manner consistent with the contract terms between AVSWCA and the State) as described below. This contractual arrangement will require some clarification of the existing operating guidelines of AVSWCA to specify its roles and responsibilities and terms of service for committee members and a process for the administration of the grant funds, as well as clarification of the contracting terms with the project sponsors. In this manner, liability passed on from the State to the AVSWCA, would also be transferred through to the individual local project sponsors.

8.2.4.5 Local Project Sponsors

Local project sponsors are those IRWM Plan stakeholder agencies or entities having projects that are included as part of the AV IRWM Plan, and whose projects have been decided by the larger stakeholder group that they should be included in the Proposition 50 grant application. Local project sponsors are assumed to implement their projects with or without the receipt of grant funding. As mentioned above, the local sponsors would enter into a contract with the contracting entity, or 'grantee' with the State when grant funds are awarded to support implementation of their sponsored project, and would therefore be bound to the conditions of that contract.

8.3 IMPLEMENTATION OF HIGH PRIORITY PROJECTS

8.3.1 Lead Agency

The lead agencies are those agencies that have the principal responsibility for carrying out or approving the high priority projects proposed in the IRWM Plan. The lead agency is also generally responsible for determining the appropriate environmental document under the California Environmental Quality Act (CEQA), as well as for its preparation. Entities responsible for project implementation are identified in Section 7.3 in Table 7-2. The lead agencies for each of the high priority projects are also identified in their high priority project template forms, which can be found in Appendix F.

8.3.2 Implementation Schedules

High priority projects have been defined as those that the stakeholders want to have implemented, or want to take action on, within the next two years. Specific timelines for some of the high priority projects were identified in Section 7.3 in Table 7-2. Their detailed implementation schedules are also identified in their high priority project template forms, which can be found in Appendix F. Also included in

Appendix F is a summary table which provides the high priority project schedules broken down even further into phases (i.e., planning, demonstration, design, and construction) as well as cost information.

> *"This collaborative effort will improve the competitiveness of the County of Los Angeles for future State and Federal grant funds to enhance regional water supplies, protect the environment, and provide for flood management."*
>
> Michael Antonovich,
> Los Angeles County Supervisor, Fifth District

8.3.3 Financial Needs of Selected High Priority Projects

The financial needs of the selected high priority projects will cover both the construction costs and the cost of operation and maintenance (O&M) throughout the IRWM Plan planning horizon. Refer to Section 7 for an estimate of the total cost of each of the high priority projects. Refer to the project template forms in Appendix F for information on the detailed cost breakdown for construction costs, O&M costs, administration costs, and other relevant costs associated with each of the projects. The anticipated funding match for each high priority project is also indicated on these forms. Also included in Appendix F is a summary table which provides the high priority project schedule and cost information.

Future funding will be needed to implement all the projects proposed in this IRWM Plan. The Cities of Palmdale and Lancaster, PWD, and others have already spent or committed large funding amounts on recycled water infrastructure, desert landscaping, modified ordinances and recycled water pilot projects. While many of the cities and agencies have funding mechanisms (impact fees, conservation fees, rate increases, etc.,) in place to fund their projects, there is still more need than there are financial resources available.

8.3.4 Beneficiaries and Funding/Financing Options

The potential beneficiaries of the IRWM Plan implementation are the stakeholders represented by the RWMG and include: all water users; residents; retail water purveyors; local jurisdiction/land use planning agencies; local, State, and Federal regulatory agencies; the environment; the building industry; the agricultural/farm industry; wastewater agencies; mutual water companies; the media; and others within the Antelope Valley Region jurisdiction.

Initial funding for the IRWM Plan effort was provided by the RWMG through a MOU. The funding/financing partners for the selected high priority projects are identified in the project template forms found in Appendix F. There are opportunities for grant funding that are available to the stakeholders in the Antelope Valley Region and that are well suited to many of their projects. Additional funds for O&M of the implemented projects will be included in future funding requests and provided by local agencies through matching funds. The source of these funds may include: water and wastewater general funds, capital improvement funds, general funds from local Cities, County departments, private organizations, member dues, etc. Local taxpayers may also fund these projects through rate increases, bond measures, and tax increases. Table 8-4 provides a summary of the funding opportunities that are available, broken into local, state, and federal funding sources. Table 8-5 shows which of these potential funding opportunities may potentially be well suited to the stakeholder identified projects in the IRWM Plan.

8.3.4.1 Financial Packaging Strategy

As described in Section 8.3.4, there are many funding programs outside of the Antelope Valley Region that could provide financial opportunities for Stakeholder identified projects. As these funding opportunities become available, the list of prioritized projects in the AV IRWM Plan would be integrated to fit the future funding criteria. In this manner, a process would be established for integrating packages of projects for future funding programs. Included in the discussion was the list of high priority projects, the total project cost, the local cost share, the quantified project benefits, and the number of IRWM Plan objectives the projects contributed to. For example, the current opportunity is Proposition 50, Chapter 8, Round 2 Grant funding. Utilizing this process of strategic packaging, the Stakeholders collectively discussed which of the priority projects could be benefited the most by being funded through Proposition 50 Round 2 funds, and those that could be packaged for

Table 8-4 Possible Funding Opportunities

Funding Category	Program	Brief Description	Key Points	Eligibility	Submit Grant Application	Contact
LOCAL						
Local funding opportunities include bonds and property taxes for capital, parcel taxes, existing capital improvement budgets, local sales taxes, utility fees, gasoline taxes, and water sales.						
STATE						
PROPOSITION 50						
Conservation/Water Use Efficiency (WUE)	Prop 50-Chapter 7(g) Department of Water Resources (DWR) WUE Grant Program	Program primarily funds projects not locally cost effective, and that provide water savings, or in-stream flows that are beneficial to the Bay-Delta or the rest of the state. Consideration also for water quality and energy efficiency.	Two step on-line process application process: first step is concept proposal and second step is detailed on-line submittal.	Cities, counties, districts, tribes, non-profits; also utilities and mutual water companies for Section A, also universities, colleges, state and federal for section B.	DWR will post its 2007 WUE Proposal Solicitation Package Draft Recommendations of grant-funded projects on website in June 2007. http://www.grantsloans.water.ca.gov/grants/efficiency.cfm	Baryohay Davidoff, DWR (916) 651-9666
Water Quality	Prop 50-Chapter 4 Department of Health Services (DHS) Safe Drinking Water Grants	Chapter 4a1: Small Community Water System Facilities: upgrade monitoring, treatment, or distribution infrastructure of small community water systems; must be in noncompliance with a safe drinking water standard	Project Funding: $5,000-$2 million	Small Community Water Systems: < 1,000 connections or 3,300 people 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and State Revolving Fund [SRF]) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Quality	Prop 50-Chapter 4 DHS Safe Drinking Water Grants	Chapter 4a2: Demonstration Projects & Studies for Contaminant Treatment: Development and demonstration of new treatment and related facilities for water contaminant removal and treatment	Project Funding: $50,000-$2 million	Public water systems under DHS 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Quality	Prop 50-Chapter 4 DHS Safe Drinking Water Grants	Community Water System Monitoring Facilities: Water quality monitoring facilities and equipment; must be in non-compliance with a safe drinking water standard	Project Funding: $5,000-$2 million	Public water systems under DHS 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Quality	Prop 50-Chapter 4 DHS Safe Drinking Water Grants	Drinking Water Source Protection: For planning, preliminary engineering, detailed design, construction, education, land acquisition, conservation easements, equipment purchase, and implementing the elements of a Source Water Protection program	Project Funding: $50,000-$2 million	Public water systems under DHS 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Quality	Prop 50-Chapter 4 DHS Safe Drinking Water Grants	Disinfection By-Product Treatment Facilities: To meet DBP safe drinking water standards, must be in non-compliance with the EPA Stage 1 DBP Rule MCLs or treatment technique	Project Funding: $50,000-$2 million	Public water systems under DHS 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Quality	Prop 50-Chapter 4 DHS Safe Drinking Water Grants	Southern California Projects to Reduce Demand on the Colorado River: Assist in meeting drinking water standards and in meeting the state's commitment to reduce Colorado River water use to 4.4 MAF per year	Project Funding: $50,000-$20 million Max grant for a regional project: $20 million per application up to a max of $60 million	Public water systems under DHS 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Quality	Prop 50-Chapter 6(b) DHS Safe Drinking Water Grants	Demonstration Projects and Studies for Contaminant Removal: Treatment or removal technology for the following contaminants: Petroleum products, such as MTBE and BTEX, N-Nitrosodimethylamine (NDMA), Perchlorate, Radionuclides, such as radon, uranium, and radium, Pesticides and herbicides, Heavy metals, such as arsenic, mercury, and chromium, Pharmaceuticals and endocrine disrupters	Project Funding: $50,000-$5 million No more than 30% of the funds can address a single contaminant Must address existing problems in CA	Public water systems under DHS 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Quality	Prop 50-Chapter 6c Safe Drinking Water Grants	Ultraviolet (UV) and Ozone Disinfection	Project Funding: $50,000-$5 million; must address an Maximum Contaminant Level (MCL) compliance violation, surface water treatment microbial requirements, or other mandatory disinfection that can only be met by UV/ or ozone; the water system must demonstrate that it can operate and maintain the treatment facilities; ozone treatment projects shall be designed and operated to minimize residual disinfection byproduct formation from the ozone treatment	Public water systems under DHS 25% to disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600
Water Security	Prop 50-Chapter 3 Water Security Program	DHS Water security grants for protection of state, local, and regional drinking water systems http://www.dhs.ca.gov/ps/ddwem/Prop50/2006PPLs/default.htm	Grants cannot be used for the routine responsibilities or projects previously required by a DHS compliance order, permit or regulation. Grants can be used for: warning systems, fencing, protective structures; contamination treatment facilities, emergency interconnections; communications systems, and other projects; Response Plan, Emergency Notification Plan; $10 million maximum grant per project; $50,000 minimum; 1 to 1 local resource match to grant award (except small and DAC)	State, local, and regional drinking water systems under DHS regulation; 25% reserved for disadvantaged communities	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Mark Bartson (707) 576-2734; state level (916) 449-5600

Table 8-4 Possible Funding Opportunities (continued)

Funding Category	Program	Brief Description	Key Points	Eligibility	Submit Grant Application	Contact
Water Management	Prop 50-Chapter 8 Integrated Regional Water Management Program, Round 2	Implementation grants for: water supply reliability, water conservation, water use efficiency; stormwater capture, storage, treatment and management; removal of invasive non-native specie, creation and restoration of wetlands, open space and watershed lands; NPS reduction; groundwater recharge/management; desalination; water banking, exchange, reclamation; improvement of water quality; flood control programs; stormwater capture/ percolation; improve wildlife habitat; watershed management; and demonstration projects to develop new drinking water treatment/ distribution.	Approximately $64 M available for SoCal region; Max award is $25 M (any award from Round 1 to be considered against this cap). 10% funding match requested. On-stream or off-stream surface water storage facilities are not eligible.	Public Agencies, Non-profits, and Members of a Regional Water Management Group	PSP released: June 2007 Step 1: August 1, 2007 Step 2: January 2008. http://www.grantsloans.water.ca.gov/grants/integregio.cfm	Norman Shopay, DWR (916) 651-9218 or Scott Couch, State Water Board (916) 341-5658
PROPOSITION 84 (BY CHAPTER)						
Multiple Topics	Prop 84 Water supply/ flood protection, etc.	In general, this bond law would provide funding for flood control, Integrated Regional projects, water quality, etc.	$5.388 Billion major grants for local entities through IRWMPs. $210 M earmarked for Los Angeles sub-region	IRWMP is a primary tool of Prop 84	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 2 Safe Drinking Water	DHS	Emergency/Urgent water supply protection	$10 M budget; max grant $250,000	Interregional	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	DHS (916) 449-5600
Chapter 2 Safe Drinking Water	DHS	Small Community & Disadvantaged Communities (DAC)	$180 M budget, max grant $5 million	Interregional	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	DHS (916) 449-5600
Chapter 2 Safe Drinking Water	DHS	State Share of Safe Drinking Water SRF Projects	$50 M budget	Interregional	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	DHS (916) 449-5600
Chapter 2 Safe Drinking Water	SWRCB	State Share State Water Pollution Control Revolving Fund	$80 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 2 Safe Drinking Water	DHS	loans and grants to Prevent GW Pollution to drinking water	$60 M budget	Interregional	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	DHS (916) 449-5600
Chapter 2 Safe Drinking Water	DWR	IRWMP - see Prop 50 Chapter 8 description above	$215 M budget	4-Los Angeles/Ventura	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 2 Safe Drinking Water	DWR	IRWMP - see Prop 50 Chapter 8 description above	$100 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 2 Safe Drinking Water	SWRCB	Reduce agriculture runoff pollution into surface waters	$15 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 3 Flood Control	DWR	Floodplain mapping	$30 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 3 Flood Control	DWR	Flood Control Projects	$275 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 3 Flood Control	DWR	Flood Corridor Project (Water Code 79037)	$36 M budget; max $5 M	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 3 Flood Control	DWR	State Share Flood Control Project	$180 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 4 Planning	DWR	Plan and Feasibility studies/ climate chg evaluate impacts on flood and water systems, integration of flood and water systems, modeling, reservoir operations	$65 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov

Table 8-4 Possible Funding Opportunities (continued)

Funding Category	Program	Brief Description	Key Points	Eligibility	Submit Grant Application	Contact
Chapter 5 Protection	DWR	State Water Project (SWP) obligations for wildlife, recreation per water code Section 11912	$54 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 5 Protection	Secretary Resources	California River Parkways Act Projects	$72 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 5 Protection	DWR	Urban streams restoration program	$18 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 5 Protection	California Conservation Corps	California Conservation Corps incl $25M for fuel reduction and stream/ river restoration and $20M for acquisition and dev of local conserv corps and local res. Cons activities	$45 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 5 Protection	SWRCB	Matching Grants to prevent stormwater contamination	$90 M budget	Interregional	Final Guidelines November 2007; TBD	Ms. Erin Ragazzi, Division of Financial Assistance Project Development Section 1A (916) 341-5733
Chapter 6 Forest and Wildlife Conservation	Wildlife Conservation Board? SWRCB? CDF??DFG	Forest and wildlife conservation projects	$180 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 6 Forest and Wildlife Conservation	SWRCB	Protect/recover Threatened/Endangered species, natural corridors, old growth/riparian and wetlands, implement CA Comprehensive Wildlife Strategy	$135 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 6 Forest and Wildlife Conservation	University of California	up to $25m of $135m for Natural Reserve System for training		Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 6 Forest and Wildlife Conservation	Wildlife Conservation Board? SWRCB? CDF??DFG	Natural Community Conservation Plans	$90 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 6 Forest and Wildlife Conservation	SWRCB	Protect ranches, farms, oak woodlands	$45 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 8 Parks and Nature Education	Department of Parks and Recreation	Improve Public Access by Develop, acquire, interpret, restore & rehabilitate State Park system & resources	$400 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 8 Parks and Nature Education	Department of Parks and Recreation	Grants for nature education and facilities	$100 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 9 Sustainable	TBD by Legislation	Urban greening that reduce energy, conserve water, improve air/water quality, incl not less than $20M for urban forestry projects	$90 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 9 Sustainable	Department of Parks and Recreation	Competitive grants for local and regional parks	$400 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
Chapter 9 Sustainable	TBD by Legislation	Plan grants and incentives for regional and local land use plans designed to promote water conservation, reduce auto use/fuel consumption, encourage greater infill/compact dev, protect natural res/ag lands, revitalize urban/comm centers	$90 M budget	Interregional	Final Guidelines November 2007; TBD	Judy Colvin (916) 651-9665 jcolvin@water.ca.gov
PROPOSITION 82						
Water Supply	DWR	New Local Water Supply: water supply development projects and feasibility studies (loan)	Construction of dams, reservoirs, water storage tanks, well field development projects, recycled water distribution facilities; $5 million per eligible project; $500.000 per eligible feasibility study	Local Public Agency	Continuous filing	David Rolph (916) 651-9635

Table 8-4 Possible Funding Opportunities (continued)

Funding Category	Program	Brief Description	Key Points	Eligibility	Submit Grant Application	Contact
PROPOSITION 1E						
Flood management	Prop 1E Disaster Preparedness and Flood Prevention Bond Act of 2006 (Overview)	The Strategic Growth Plan levees proposals would authorize a $4 billion general obligation bond on the November 2006 ballot to pay for levee repairs and improvements, upgrade flood protection for urban areas, improve emergency response capabilities, and provide grants for stormwater flood management projects.	For state-federal project levees and the Delta ($3B) Flood Control Subventions ($500M) Flood protection corridors, bypasses, and alluvial floodplains ($290M) Stormwater Flood Management Grants ($300M)		Available and Upcoming/TBD	
Flood management	Prop 1E Disaster Preparedness and Flood Prevention Bond Act of 2006	Evaluation, repair, rehab, reconstruction, replacement of levees, weirs, bypasses and facilities of the State Plan of Flood Control	$3 billion; $200 M except for Folsom Dam		Criteria to be posted on flood SAFE website upon approval of the Bond Expenditure Plan	George Qualley (916) 574-0384
Flood management	Prop 1E Disaster Preparedness and Flood Prevention Bond Act of 2006	Payment of state share of non-federal costs for projects not in the State Plan for Flood Control	$500 M		Available and Upcoming/TBD	Dena Uding (916) 574-2745
Flood management	Prop 1E Disaster Preparedness and Flood Prevention Bond Act of 2006	Protection, creation, and enhancement of flood protection corridors and bypasses	$290 M		Floodway Corridor program: rules released September 2007; application package released January 2008; submittal deadline April 2008	Earl Nelson (916) 574-1244
Flood management	Prop 1E Disaster Preparedness and Flood Prevention Bond Act of 2006	Grants for stormwater flood management projects w- nonstate cost share of not less than 50%; not part of State Plan for Flood control, multiple benefits, comply with Basin Plans, consistent with IRWMP	$300 M		Available and Upcoming/TBD	TBD
PROPOSITION 13						
Water Conservation	DWR	Agricultural Water Conservation: voluntary, cost effective projects or programs to improve agricultural water use efficiency, and feasibility studies for such projects	Canal or ditch piping or lining projects; tail-water recovery projects; and replacement of leaking distribution system components; $5 million per eligible project	Local public agencies and incorporated mutual water companies	Continuous filing; application being updated http://www.grantsloans.water.ca.gov/loans/conservation.cfm	Baryohay Davidoff (916) 651-9666
OTHER						
Water Quality	Department of Health Services	Drinking Water State Revolving Fund: Provide low interest loans and/or grants to assist public water systems in achieving and maintaining compliance with the Safe Drinking Water Act (SDWA)	Project must be needed to comply with SDWA and project must be on program's priority list; system must meet technical, managerial, and financial requirements; all applications are for loans; financial review determines if grant funds apply; $100,000 per planning study; $20 million per project and $30 million per entity per cap grant; disadvantaged communities can receive a zero interest loan and disadvantage public and mutual systems may receive partial grant funding	Must be a public water system	The universal preapplication (Prop 50, 84, and SRF) will be available for access from this website on June 1, 2007 http://www.dhs.ca.gov/ps/ddwem/funding/default.htm	Steve Woods (916) 449-5624
Water Supply	State Department of Housing and Community Development	Community Development Block Grant (CDBG) program: Project must principally benefit low income persons/households; for example: create jobs for low income persons, provide housing units for low income households, and provide clean water to residents of community with over half of its residents being low income	Pay for project feasibility study, final plans and specs, site acquisition and construction, and grant administration costs; pay for one time assessment fees for low income families; pay for installation of private laterals and hook up fees for low income families; Each allocation sets funding award limits in their annual NOFA (typically $500,000)	cities or counties that are not under HUD's CDBG entitlement program; jurisdictions can pay for their own system or give the funds to private or public water providers	Notices of Funding Availability released each year http://www.hud.gov/offices/cpd/communitydevelopment/programs/	Patrick Talbot (916) 552-9361
Conservation	Department of Parks and Recreation	Land and Water Conservation Fund-For acquisition or development projects. Acquisition projects shall be for outdoor recreation, development projects shall include the construction of new and/or renovation of existing facilities for outdoor recreation. http://www.parks.ca.gov/default.asp?page_id=21360	50% reimbursement, match can be money, services, or real property		2008 TBD	TBD
Environment	Resources Agency	Environmental Enhancement and Mitigation Program-Resource Lands: Projects for the acquisition, restoration, or enhancement of watersheds, wildlife habitat, wetlands, forests, or other natural areas. Roadside Recreational: projects for the acquisition and/or development of roadside recreational opportunities	no match required	Local, state, federal government and non-profit	FY 2007-2008 TBD http://resources.ca.gov/eem/	TBD

Table 8-4 Possible Funding Opportunities (continued)

Funding Category	Program	Brief Description	Key Points	Eligibility	Submit Grant Application	Contact
Habitat	Department of Parks and Recreation	Habitat Conservation Fund: The program provides funds to local governments under the California Wildlife Protection Act of 1990. http://www.parks.ca.gov/default.asp?page_id=21361		Counties and districts are eligible to apply. Eligible districts are defined in Subdivision (b) of Section 5902 of the Public Resources Code.	Applications must be postmarked or delivered to the California Department of Parks and Recreation, no later than October 1, 2007	TBD
Land Acquisition	Wildlife Conservation Board (WCB): various funding sources	Land Acquisition Program: Acquires real property or rights in real property on behalf of DFG and also grant funds to acquire real property or rights in real property (contact South Coast Region Headquarters) 4949 Viewridge Avenue, San Diego, CA 92123 (858) 467-4201 http://www.wcb.ca.gov/Pages/land_acquisition_program.htm	Project Funding: continuous; depends on available sources.	governmental entities or nonprofit organizations	The WCB accepts applications for funding on a continuous basis depending on available funding sources.	TBD
Restoration	WCB: Restoration	California Riparian Habitat Conservation Program: Projects that develop coordinated conservation efforts aimed at protecting and restoring the state's riparian ecosystems, including trees and other vegetation and the physical features normally found on the stream banks and flood plains associated with healthy streams. Habitat Enhancement and Restoration Program: eligible enhancement and restoration projects must provide for the long-term maintenance of the restored and/or enhanced habitat.	Project funding: continuous; depends upon available sources Contract Regional Fish and Game Headquarters for information.	Non-profit conservation organizations and federal, state, or local government agencies. Program allows cooperative project agreements with agencies of state, local agencies or non-profit organizations.	The WCB accepts applications for funding on a continuous basis depending on available funding sources.	TBD
Wastewater/Watershed	Environmental Protection Agency (EPA)-SWRCB	Clean Water State Revolving Fund (SRF) Program: Projects for publicly-owned wastewater treatment facilities. Funds may be used to better the quality of watersheds and protect groundwater resources through planning, design, and construction; to build or rehabilitate sewer collection systems and urban wet weather flow control activities, including stormwater and sanitary and combined sewer control measures. The program also funds a publicly or privately-owned nonpoint source and estuary management projects, such as controlled runoff from ag. land, conservation tillage, soil erosion, development of stream bank buffer zones, and wetlands protection and restoration. Estuary management projects may include restoration of wildlife habitat and sewage pump-out facilities.	Program also offers significant funding for nonpoint source pollution control and estuary protection, assistance to a variety of borrowers and partnerships with other funding sources. Matching funds are not required. http://www.swrcb.ca.gov/funding/srf.html	Borrowers range from municipalities, communities of all sizes, farmers, homeowners, small businesses, and nonprofit organizations. CWSRF's partner with banks, nonprofits, local governments, and other federal and state agencies	Continuous application process, currently accepting applications. $200-$300 Million Annually available The final 2007/2008 SRF Project Priority List is scheduled for adoption by the State Water Board consideration at the July 17, 2007 Board Meeting	TBD
Water Quality	EPA-SWRCB	State Revolving Fund Loan Nonpoint Source Protection Program: Address water quality problems associated with discharges from nonpoint source dischargers and for estuary enhancement. http://www.swrcb.ca.gov/funding/srf.html	Planning study to determine cost effective alternative, CEQA compliance, dedicate source repayment and compliance with certain Federal requirements.	Point source dischargers, municipalities and nonpoint source dischargers, public and private entities	Continuous application process, currently accepting applications. $200-$300 Million Annually available The final 2007/2008 SRF Project Priority List is scheduled for adoption by the State Water Board consideration at the July 17, 2007 Board Meeting	TBD
Water Supply	California Infrastructure and Economic Development Bank (i-bank)	Infrastructure State Revolving Fund (ISRF) Program: Provides financing for construction and/or repair of publicly owned water supply and treatment systems including these components: drainage, supply, flood control, treatment and distribution	Eligible uses include: to acquire land, construct, and/or repair water collection and treatment systems, including equipment; $10 million maximum per project; annual jurisdiction funding caps; Interest rate is 67% of Thompson's Municipal Market Index for A rated security; up to 30 year terms; continuous filing	Applicant must be a local municipal entity; project must meet tax-exempt financing criteria	Continuously accepting applications.	Diane Cummings (916) 324-4805
FEDERAL						
Water and Waste Disposal	United States Department of Agriculture (USDA) Rural Development	Water and Waste Disposal program that provides for additional security for commercial lenders that finance community water systems	Funds may be used for costs associated with planning, design, and construction of new or existing systems; eligible projects include storage, distribution, source development; no funding limits, but average project size is $3-5 million	Banks and other commercial lenders are eligible applicants; cities towns public bodies and census designated places with populations less than 10,000	Continuous filing; need update for FY 2007-2008	Dave Hartwell USDA State Office (530) 792-5817
Desalination	United States Bureau of Reclamation (USBR)	Desalination and Water Purification Research and Development Program: purpose of program is to address a broad range of desalting and water purification needs in order to increase the supply of usable water available to the US. With a focus on the desalination of water as one solution for increased water demands, this program supports attempts to develop cost effective methods of producing usable water from salty and brackish water. http://www.usbr.gov/pmts/water/research/DWPR/index.html	Matching funds are required. Applicants must generally provide a minimum 75% of project costs in non-Federal cash or in-kind resources. Approximately 25% of applications received are awarded funds in a typical year.	Individuals, Institutions of higher education, commercial or industrial organizations, private entities (including State and local governments), Indian Tribal governments, and the US-Mexico bi-national research foundations and inter-university research programs established by the two countries.	Update pending; check website	TBD

Table 8-4 Possible Funding Opportunities (continued)

Funding Category	Program	Brief Description	Key Points	Eligibility	Submit Grant Application	Contact
Environment	EPA	Source Reduction Assistance: The purpose of this program is to provide an overall benefit to the environment by preventing the generation of pollutants at the source. This program seeks projects that support source reduction, pollution prevention, and/or source conservation practices. Source reduction activities include: modifying equipment or technology; modifying processes or procedures; reformulating or redesigning products; substituting raw materials; and generating improvements in housekeeping, maintenance, training, or inventory control. Pollution prevention activities reduce or eliminate the creation of pollutants by: using raw materials, energy, water or other resources more efficiently; protecting natural resources by conservation; and resource conservation practice activities; prevent pollution, promote the re-use of materials and/or conserve energy and materials.		Units of state, local, and tribal government; independent school district governments; private or public colleges and universities; nonprofits; and community-based grassroots organizations.	Proposal submission deadline June 18, 2007 http://www.epa.gov/p2/pubs/grants/srap07.htm	TBD
Restoration	US Fish and Wildlife Service (USFWS)	Wildlife Restoration Grants (SWG): Development and implementation of programs that benefit wildlife and their habitat, including species that are not hunted or fished. Both planning and implementation of programs are permitted.	25% Match required.	All state fish and wildlife agencies may submit grant proposals.	Continuous filing http://www.fws.gov/grants/state.html	TBD
Restoration	NFWF	Five-Star Restoration Program: Purpose of the program is to support community-based wetland, riparian, and coastal habitat restoration projects. Applicants must demonstrate that measurable ecological, educational, social, and/or economic benefits are expected to result from the completion of the project. Preferences will be given to the projects that: 1) Are part of a larger watershed or community stewardship effort; 2) Include specific provisions for long term management and protection; and 3) Demonstrate the value of innovative, collaborative approaches to restoring the nation's waters.	There are no matching requirements; however, applicants are strongly encouraged to show funding support from other sources. Matching funds include cash and/or in-kind goods and services and can be from both federal and non-federal sources. Five Star Restoration Grant applications can be downloaded from the NFWF website at http://www.nfwf.org/programs/5star-rfp.cfm	State and local agencies, private landowners, and other interested parties.	Proposals for Five Star Restoration Grants are due in early March each year. Grant applicants are notified in late May early June each year.	TBD
Restoration	US Fish and Wildlife Service (USFWS)	Partners for Fish and Wildlife Program: Restoration projects may include, but are not limited to, the following: 1) Restoring wetland hydrology by plugging drainage ditches, breaking the drainage systems, installing water control structures, dike construction, and re-establishing old connections with waterways; 2) planting native trees and shrubs in formally forested wetlands and other habitats; 3) planting native grasslands and other vegetation; 4) installing fencing and off-stream livestock watering facilities to allow for restoration of stream and riparian areas; 5) removal of exotic plants and animals that compete with native fish and wildlife and alter their natural habitats; 6) prescribed burning as a method of removing exotic species and to restore natural disturbance regimes necessary for some species survival; 7) reconstruction of in-stream aquatic habitat through bio-engineering techniques, and 8) re-establishing fish passage for migratory fish and removing barriers to movement.	There is no formal application process. Applicants will work with Fish and Wildlife Service biologists for their region to develop a plan for their proposed project. 50% match of the project's cost. Matching fund can be in cash or in-kind resources from non-Service sources. The entire program cannot pay for more than 50% of the combined costs of all projects.	Tribes, schools, local governments, businesses, and organizations. Any privately-owned land is potentially eligible for restoration under this program.	http://www.fws.gov/grants/state.html	TBD
Water Conservation	USBR	Challenge Grant Program: Through the Challenge Grant Program, Reclamation provides 50/50 cost share funding to irrigation and water districts and states for projects focused on water conservation, efficiency, and water marketing. Projects are selected through a competitive process, based on their ability to meet the goals identified in Water 2025: Preventing Crises and Conflict in the West. The focus is on projects that can be completed within 24 months that will help to prevent crises over water.	Funding for Water 2025 Challenge Grant projects is awarded on a competitive basis through a merit-based review process performed by a Technical Proposal Evaluation Committee (TPEC), comprised of experts in various disciplines from across Reclamation. Priority is given to projects that will be completed within 24 months from the date of the award, and that will decrease the likelihood of conflict over water. Projects are prioritized and selected based on the application by the TPEC on the following criteria: 1) The extent to which the project involves water marketing; 2) The amount of water conserved as a percent of average annual supply; 3) Likelihood that the estimated project benefits will be attained; 4) Demonstration of the applicant's financial ability to complete the project; 5) the costs are reasonable for the work proposed; 6) Evidence of collaboration and stakeholder involvement in the project; 7) the proposed work is located in a "hot spot" (hot spots are geographic problem areas identified on Potential Water Supply Crises by 2025 illustration http://www.doi.gov/water2025/supply.html), and 8) ?	Grants valued at only $1.3 M were awarded in 2006 versus awards valued at $9.9 M the previous year. Budget amount pending.	The FY 2008 budget request for Water 2025 is $11 million http://www.doi.gov/water2025/grant.html	TBD

Table 8-4 Possible Funding Opportunities (continued)

Funding Category	Program	Brief Description	Key Points	Eligibility	Submit Grant Application	Contact
Watershed	EPA	EPA Wetlands Program Development Grants: Projects that promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution http://www.epa.gov/owow/wetlands/grantguidelines/	Three priority areas identified by the EPA: Developing a comprehensive monitoring and assessment program; improving the effectiveness of compensatory mitigation; and refining the protection of vulnerable wetlands and aquatic resources. Typically $25,000 to $250,000, but no set amount. 25% match required. Not currently soliciting RFPs	States, tribes, local governments, interstate associations, intertribal consortia, and national non-profit, non-governmental organizations are eligible to apply.	2008 schedule TBD http://www.epa.gov/owow/wetlands/grantguidelines/	TBD
Watershed Conservation	National Park Service	Rivers, Trails, and Conservation Assistance Program: Purpose is to conserve rivers, preserve open space, and develop trails and greenways. The program provides staff assistance to help build partnerships to achieve community set goals, assess resources, develop concept plans, engage in public participation, and identify potential sources of funding. This program provides technical assistance only in the planning phases of conservation activities. No funding will be awarded to successful applicants. The following is a partial list of river project areas accepted by the agency: Community waterfronts; Economics; Floodplain planning; Hydro (re) licensing; Watersheds; Water trails; and wild and scenic water areas.	Projects will be evaluated on how they meet the following criteria: 1) A clear anticipated outcome leading to on the ground success; 2) commitment, cooperation, and cost-sharing by interested public agencies and nonprofit organizations; 3) Opportunity for significant public involvement; 4) Protection of significant natural and/or cultural resources and enhancement of outdoor recreational opportunities; and 5) Consistency with the National Park Service mission and RTCA goals.	Nonprofits, community groups, tribes, or tribal governments; and state or local government agencies.	Applications are due August 1st for assistance during the next fiscal year. http://www.nps.gov/rtca/	TBD
Wetlands	Natural Resources Conservation Service	Watershed Protection and Flood Prevention: Purpose of the program is to support activities that promote soil conservation and the preservation of the watersheds of rivers and streams throughout the US. This program seeks to preserve and improve land and water resources by preventing erosion, floodwater, and sediment damages. Program supports work of improvement associated with: 1) Flood prevention including structural and land treatment measures, 2) conservation, development, utilization, and disposal of water, or 3) conservation and proper utilization of land. Successful applicants under this program receive support for watershed surveys and planning, as well as watershed protection and flood prevention operations. Funding for watershed surveys and planning is intended to assist in the development of watershed plans to identify solutions that use conservation practices, including nonstructural measures, to solve problems.	Matching funds are not required: applicants must generally provide matching ranging from 0%-50% in cash or in-kind resources depending on such factors as project type and the kinds of structural measures a project proposes.	States, local governments, and other political subdivisions; soil or water conservation districts; flood prevention or control districts and tribes. Potential applicants must be able to obtain all appropriate land and water rights and permits to successfully implement proposed projects.	Update pending http://www.nrcs.usda.gov/programs/watershed/index.html	TBD
Wetlands	US FWS	North American Wetlands Conservation Act (NACWA): projects must provide long-term protection of wetlands and wetlands dependent fish and wildlife.	Partners must minimally match the grant request at a 1 to 1 ratio.	Organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the US, Canada, and Mexico.	Continuous filing http://www.fws.gov/grants/state.html	TBD
Wildlife Conservation	NFWF	The National Fish and Wildlife Foundation operates a conservation grants program that awards matching grants, on a competitive basis, to eligible grant recipients, including federal, tribal, state, and local governments, educational institutions, and non-profit conservation organizations. Project proposals are received on a year-round revolving basis with two decision cycles per year. Grants typically range from $25,000-$250,000, based upon need. http://nfwf.org/guidelines.cfm	Matching grants are awarded to projects that: 1) Address priority actions promoting fish and wildlife conservation and the habitats on which they depend; 2) Work proactively to involve other conservation and community interests; 3) Leverage available funding; and 4) Evaluate project outcomes.	The Foundation is mandated by Congress to ensure that each federal dollar awarded is leveraged with a non-federal dollar or equivalent goods and services. The foundation refers to these funds as matching funds. As a policy, the Foundation seeks to achieve at least a 2:1 ratio return on its project portfolio - $2 raised in matching funds to every federal dollar awarded.	Project Pre-Proposal Received by April 1, and Sept. 1; Project Full Proposal Due June 1 and Nov 1 http://www.nfwf.org/AM/Template.cfm?Section=Browse_All_Programs	TBD

Table 8-5 IRWM Planning Projects vs. Funding Opportunities

Project Sponsor	Project Name	State Programs																								Federal Programs								
		Prop 50 - (Ch 3) Water Security Program	Prop 50 - (Ch 4) Drinking Water Source Protection	Prop 50 - (Ch 6) Safe Drinking Water Grants	Prop 50 - (Ch 7) DWR WUE Grant Program	Prop 50 - (Ch 8) IRWMP, Round 2	Prop 84 - (Ch 2) Safe Drinking Water, Water Quality, and Other Projects	Prop 84 - (Ch 3) Flood Control Projects	Prop 84 - (Ch 4) Statewide Water Planning	Prop 84 - (Ch 5) Protection of Rivers, Lakes, Streams	Prop 84 - (Ch 6) Forest and Wildlife Conservation	Prop 84 - (Ch 8) Parks and Nature Education Facilities	Prop 84 - (Ch 9) Sustainable Communities & Climate Change	Prop 82 - Water Supply Development Projects	Prop 1E - Flood Management	Prop 13 - Ag Water Conservation	Other - DHS - Drinking Water SRF grant/loans for public water systems	Other - Community Development Block Grant Program	Other - Dept. of Parks and Rec. Land and Water Conservation Fund Program	Other - Environmental Enhancement and Mitigation Program (Wetlands, habitat)	Other - Dept. of Parks and Rec. Habitat Conservation Fund	Other - Wildlife Conservation Board: Land Acquisition	Other - Wildlife Conservation Board: Restoration	Other - EPA-SWRCB Clean Water State Revolving Fund (SRF) Program	Other - CA Infrastructure & Economic Development Bank Infrastructure SRF Program	USDA Rural Development: Water and Waste Disposal Program	USBR Desalination & Water Purification Research Program	EPA Source Reduction Assistance Program	USFWS Wildlife Restoration Grants	NFWF Programs	USBR Challenge Grant Program	EPA Wetlands Program Development Grants	NPS Rivers, Trails, and Conservation Assistance Program	NRCS Watershed Protection and Flood Prevention
Antelope Valley Conservancy	Antelope-Fremont Watershed Assessment and Plan				X					X	X		X						X	X	X	X		X					X	X			X	X
AVEK	Water Supply Stabilization Project – Westside Project					X								X																				
AVEK	Water Supply Stabilization Project – Eastside Project													X																				
Antelope Valley Water Conservation Coalition	Comprehensive Water Conservation/Efficient Water Use Program				X	X			X				X			X				X											X			
Cities of Lancaster, Palmdale, LAFCD, Kern County	Develop Coordinated Antelope Valley Flood Control Plan							X	X						X				X															X
Antelope Valley Conservancy, Cities of Lancaster, Palmdale, LA County	Development of a Coordinated Land Use Management Plan								X		X								X	X		X								X			X	X
City of Lancaster	Groundwater Recharge Using Recycled Water (GWR-RW) Pilot Project					X		X						X	X																			
City of Lancaster	Tertiary Treated Water Conveyance & Incidental Groundwater Recharge of Amargosa Creek Avenue M to Avenue H													X																				
City of Lancaster	Amargosa Creek Pathways Project				X	X		X					X		X									X					X	X			X	
City of Lancaster	Ecosystem & Riparian Habitat Restoration of Amargosa Creek: Avenue J north to Avenue H				X	X				X	X		X						X	X	X			X					X	X			X	
City of Palmdale	Barrel Springs Detention Basin and Wetlands				X			X		X					X								X		X									X
City of Palmdale	Anaverde Detention Basin, Dam & Spillway at Pelona Vista Park							X							X										X									X
City of Palmdale	Hunt Canyon Groundwater Recharge and Flood Control Basin							X							X										X									X
City of Palmdale	Avenue Q and 20th Street East Basin (Q-West Basin)							X							X										X									X
City of Palmdale	45th Street East Flood Control Basin (Q-East Basin)							X							X										X									X
City of Palmdale	42nd Street East, Sewer Installation		X				X																	X	X									X
City of Palmdale	Upper Amargosa Creek Recharge, Flood Control, & Riparian Habitat Restoration Project					X		X							X				X						X									X
City of Palmdale	Palmdale Power Project					X																												
LACSD	Lancaster WRP Stage V					X																		X	X									
LACSD	Lancaster WRP Stage VI																							X	X									
LACSD	Lancaster WRP Proposed Effluent Management Sites																							X	X									
LACSD	Palmdale WRP Existing Effluent Management Sites					X																		X	X									
LACSD	Palmdale WRP Stage V					X																		X	X									
LACSD	Palmdale WRP Stage VI																							X	X									
LACSD	Palmdale WRP Proposed Effluent Management Sites																							X	X									
LACWWD40	Aquifer Storage and Recovery Project: Injection Well Development					X								X											X									
LACWWD40	Aquifer Storage and Recovery Project: Additional Storage Capacity													X											X									

Table 8-5 IRWM Planning Projects vs. Funding Opportunities

Project Sponsor	Project Name	State Programs																								Federal Programs								
		Prop 50 - (Ch 3) Water Security Program	Prop 50 - (Ch 4) Drinking Water Source Protection	Prop 50 - (Ch 6) Safe Drinking Water Grants	Prop 50 - (Ch 7) DWR WUE Grant Program	Prop 50 - (Ch 8) IRWMP, Round 2	Prop 84 - (Ch 2) Safe Drinking Water, Water Quality, and Other Projects	Prop 84 - (Ch 3) Flood Control Projects	Prop 84 - (Ch 4) Statewide Water Planning	Prop 84 - (Ch 5) Protection of Rivers, Lakes, Streams	Prop 84 - (Ch 6) Forest and Wildlife Conservation	Prop 84 - (Ch 8) Parks and Nature Education Facilities	Prop 84 - (Ch 9) Sustainable Communities & Climate Change	Prop 82 - Water Supply Development Projects	Prop 1E - Flood Management	Prop 13 - Ag Water Conservation	Other - DHS - Drinking Water SRF grant/loans for public water systems	Other - Community Development Block Grant Program	Other - Dept. of Parks and Rec. Land and Water Conservation Fund Program	Other - Environmental Enhancement and Mitigation Program (Wetlands, habitat)	Other - Dept. of Parks and Rec. Habitat Conservation Fund	Other - Wildlife Conservation Board: Land Acquisition	Other - Wildlife Conservation Board: Restoration	Other - EPA-SWRCB Clean Water State Revolving Fund (SRF) Program	Other - CA Infrastructure & Economic Development Bank Infrastructure SRF Program	USDA Rural Development: Water and Waste Disposal Program	USBR Desalination & Water Purification Research Program	EPA Source Reduction Assistance Program	USFWS Wildlife Restoration Grants	NFWF Programs	USBR Challenge Grant Program	EPA Wetlands Program Development Grants	NPS Rivers, Trails, and Conservation Assistance Program	NRCS Watershed Protection and Flood Prevention
LACWWD40	Groundwater Banking													X												X								
LACWWD40	Implement Evapotranspiration (ET) Controller Program				X	X							X			X																X		
LACWWD40	Water Waste Ordinance				X	X							X																			X		
LACWWD40	Water Conservation School Education Program				X	X						X																				X		
LACWWD40	Ultra Low Flush Toilet (ULFT) Change Out Program				X	X							X																			X		
LACWWD40	Avenue M and 60th Street West Tanks													X											X									
LACWWD40	Avenue K Transmission Main, Phases I-IV					X								X											X									
LACWWD40	Partial Well Abandonement of Groundwater Wells for Arsenic Mitigation	X	X	X		X	X										X																	
LACWWD40	North Los Angeles/Kern County Regional Recycled Water System (All Phases)					X								X																				
LADPW	Quartz Hill Storm Drain							X							X									X	X									
Leona Valley Town Council	Precision Irrigation Control System				X	X							X			X																X		
Leona Valley Town Council	Stormwater Harvesting				X	X		X					X		X	X																X		
No Current Sponsor/J. Goit	Amargosa Water Banking & Stormwater Retention Project							X																										
PWD	Littlerock Dam Sediment Removal					X																												
PWD	Water Conservation Demonstration Garden				X	X						X	X			X																X		
PWD	Groundwater Recharge - Recycled Water Project													X																				
PWD	New PWD Treatment Plant						X										X								X									
PWD	ET-Based Controller Program				X	X							X			X																X		
QHWD	Partial Well Abandonement of Groundwater Wells for Arsenic Mitigation	X	X	X		X	X										X								X									
RCSD	KC & LAC Interconnection Pipeline						X							X											X									
RCSD	Place Valves and Turnouts on Reclamaimed Water Pipeline													X											X									
RCSD	Purchasing Spreading Basin Land					X																			X									
RCSD	Deep wells to Recapture Banked Water					X								X											X									
RCSD	Gaskell Road Pipeline					X								X											X									
RCSD	Tropico Park Pipeline Project													X											X									
RCSD	RCSD's Wastewater Pipeline					X								X											X									
Western Development & Storage, LLC	Antelope Valley Water Bank					X								X																				

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future funding opportunities such as for Proposition 84 or Proposition 1E.

The initial resulting priority package for Proposition 50 Round 2 as determined by the Stakeholders is shown below in Table 8-6. Local match percentages are preliminary estimates and will not be finalized until the grant application has been submitted. For project details on project cost, and local match sources, refer to the high priority project templates provided in Appendix F.

One benefit of using this approach is to more accurately compare this IRWM Plan's performance with regards to meeting its planning targets as shown in Table 8-7. When

Table 8-6 Package Selected for Proposition 50, Round 2 Grant Application

	Project Name	Total Cost (Millions $s)(a)	Prop 50 Funding(a)	Local Match(a)	% Match(a)	WS benefits (AFY)
RW-1	Antelope Valley Recycled Water Project Phase 2	$10.90	$3.00	$7.90	72%	8,400
WS-1	Upper Amargosa Creek Recharge, Flood Control & Riparian Habitat Restoration Project	$13.50	$3.00	$10.50	78%	10,000
WC-1	Comprehensive Water Conservation/Water Use Efficiency Program	$0.90	$0.63	$0.27	30%	3,500
WI-2	Littlerock Dam Sediment Removal	$5.50	$1.10	$4.4	80%	1,000
WQ-1	Lancaster Stage V	$74.80	$7.50	$67.30	90%	NA
WQ-3	Palmdale Stage V	$94.60	$7.50	$87.10	92%	NA
RW-2	Groundwater Recharge Using Recycled Water Pilot Project	$6.00	$2.00	$4.00	67%	2,500
	Grant Administration Costs		$0.5			
	Total Package	**$206.20**	**$25.23(b)**	**$181.47**	**88%**	**25,400(c)**

Notes:

(a) Total project cost, funding request amounts, and local match estimates are preliminary amounts that the Stakeholders have identified in order to come up with a suite of packages best suited for the current funding opportunity at this time. These estimates will continue to be refined until the Proposition 50, Step 2 application Proposal Solicitation Package is prepared.

(b) The maximum amount that can be requested is $25 million.

(c) This total package benefit has been revised from the original estimate of 72,200 AFY in the Draft AV IRWM Plan submitted for Public Review and referenced in some of the letters of support contained in Appendix H.

Table 8-7 Comparison of Cumulative Project Benefits to Selected Planning Targets

WMSA Benefit Type	Planning Target	Quantified Benefit	% of Target
Water Supply (AFY)			
Reduce mismatch of supply and demand in average years	73,600 to 236,800 AFY	25,400 AFY	11%
Supplement average supply to meet dry year demand	50,600 to 57,400 AFY	0 AFY	0%
Supplement average supply to meet multi-dry demand	0 to 62,000 AFY	0 AFY	0%
Water Quality			
Increase in recycled water use by 2015 (33%)	13,200 AFY	10,900 AFY	83%
Increase in recycled water use by 2025 (66%)	36,300 AFY	10,900 AFY	30%
Increase in recycled water use by 2035 (100%)	65,000 AFY	10,900 AFY	17%
Environmental Management			
Open Space & Habitat (acres) by 2015	2,000	115	6%
Land Use Management			
Farmland in rotation (acres)	100,000	TBD	TBD
Public parks and recreational amenities (acres)	5,000	TBD	TBD

new projects are implemented their benefits can be added to the table and the percentages recalculated. Measuring IRWM Plan performance is discussed further in Section 8.5.3 below.

8.4 DATA MANAGEMENT

This section discusses the importance of collecting, managing, disseminating and utilizing data to create a sustainable integrated plan. A comprehensive data management approach will help to quickly identify data gaps, detect and avoid duplication, support statewide data needs, and integrate with other regional and statewide programs.

A wide variety of information is necessary to effectively manage water. The kinds of data needed include information regarding water quality, quantity, population demographics, climate and rainfall patterns, treatment plant effluent, habitat locations and needs, water costs, and more. Data is vitally important to agencies trying to maximize operating efficiency and design projects with limited budgets. The types of data available, current relevance and trends, and knowledgeable people that can interpret the data are all important. Equally important is the opportunity for Federal and State agencies to view local data for their own monitoring needs and to better understand local conditions.

The collection, management, dissemination and utilization of data (e.g., information gathered from studies, sampling events, or projects) are an essential element to creating a sustainable integrated plan. Information needs to be available to regional leaders, stakeholders, and the public to facilitate effective planning and decision-making. A comprehensive data management approach will help to quickly identify data gaps, detect and avoid duplicate data collection efforts, support statewide data needs, and integrate with other regional and statewide programs.

Information needs to be available to regional leaders, stakeholders, and the public to facilitate effective planning and decision-making. A comprehensive data management approach will help to quickly identify data gaps, detect and avoid duplicate data collection efforts, support statewide data needs, and integrate with other regional and statewide programs.

As part of this IRWM Plan, the data management strategies described below will be applied to coordinate data collection between implementation projects, leverage existing data available from ongoing statewide and regional programs, and provide timely data to stakeholders and the public, and consolidate information to be used in other state programs. These strategies are explained in more detail below.

8.4.1 Management and Data Reporting

Dissemination of data to stakeholders, agencies, and the general public is integrated into the AV IRWM Plan process to ensure overall success. A requirement of the Proposition 50 Guidelines is the routine reporting on project performance. The routine collection of this data naturally lends itself to the routine collection and reporting that is required as part of the AV IRWM Plan process. The stakeholders have suggested, as one potential option which would have to be agreed to by the RWMG, that the AVSWCA, as the potential grant contracting entity, compile the reporting of this IRWM Plan and work individually with the project proponents to receive updates on individual project progress. It was suggested that a standardized reporting format be created which the AVSWCA could use to compile this data, which could then be uploaded to the project website described in more detail below. Data collected or produced as part of the AV IRWM Plan will then be presented and disseminated during quarterly meetings as discussed in Section 8.6.1.

A public website has been created to store data and information about the AV IRWM Plan process so that the public can find information about public meeting dates, agendas, and notes. The website provides information on the AV IRWM Plan process and posts annual reports and relevant documents that can downloaded. Data collected during the AV IRWM Plan process will be available on the website as well. The website will also provide links to other existing monitoring programs to promote data between these programs and the AV IRWM Plan. This will provide a means to identify data gaps (e.g., information needed to provide a more complete assessment of the status of a specific issue or program) and to ensure that monitoring efforts are not duplicated between programs.

The AV IRWM Plan website, www.avwaterplan.org, provides a mechanism for stakeholders to upload project information regarding water supply, water quality, and other benefits of the project, which will be collected in a database to manage, store, and disseminate information to the public. A data collection template will be available on the website in the future so that data collected during the AV IRWM Plan can be stored and managed in a consistent format. This template will be compatible with those used in the statewide Groundwater Ambient Monitoring and Assessment (GAMA) and the Surface Water Ambient Monitoring Program (SWAMP) programs to assist in the sharing and integration of data with these programs.

8.4.2 Statewide Data Needs

This subsection identifies statewide data needs including information required to evaluate the effectiveness of projects that produce non-traditional data.

Data sets and reports will be reviewed for their applicability to the Antelope Valley Region and statewide data needs. This knowledge will provide information necessary to identify data gaps, and data gaps represent information crucial to a greater understanding of the Antelope Valley Region and help develop context for future projects (as discussed in Section 8.5.2 below). The IRWM Plan can identify multi-objective projects that integrate appropriate management strategies to meet the statewide water supply, water quality, and beneficial use needs.

The AV IRWM Plan process will also collect non-traditional data (i.e., summarizing the effectiveness of water conservation programs throughout the Antelope Valley Region) in a comprehensive way that can be a powerful contribution to statewide water management efforts. Comprehensive data collection and measurement of these efforts will provide leadership and guidance to growing metropolitan areas throughout California.

8.4.3 Existing Monitoring Efforts

This subsection will provide the existing surface and groundwater level and quality monitoring efforts in the Antelope Valley Region and will identify opportunities for additional monitoring and/or for partnership.

Overall the AV IRWM process has identified a need for better coordination of groundwater level and quality monitoring efforts in the Region. As discussed in more detail below, there is some coordination of groundwater monitoring efforts in the Region, and there is local historical data (accumulated and consolidated by C. Seal through the assistance of the Antelope Valley College) that has been collected which can be made available for coordination with these efforts. However there are still portions of the basin which are not well mapped, or where there are data gaps. One of the planning targets for the Plan calls for additional mapping and monitoring of the groundwater basin, which will help to address these identified problems, as well as the plan performance measures once they are better refined.

8.4.3.1 Surface Water

Surface water for the Region comes from the state aqueduct and Littlerock Reservoir. According to PWD, of the two surface water sources, normally the State water is more prevalent (dependant on the amount of snow pack in the northern sierras and rainfall in northern California in any given year), whereas, water from Littlerock Reservoir is less prevalent (dependent on the amount of snow pack and rainfall in the local mountains in any given year). Both of these waters are transferred either from the aqueduct or Littlerock dam into Palmdale Lake to provide local storage. This surface water is then filtered and disinfected to make it safe for potable uses. See Section 8.4.3.2 below for the discussion of drinking water quality monitoring.

8.4.3.2 Drinking Water

Drinking water quality is monitored through the following means:

- **Safe Drinking Water Act (SDWA) compliance monitoring and reporting:** All public water systems are required to produce water that complies with the SDWA. To this end, specific monitoring information is required and conducted routinely. Results of the monitoring are reported to the California DPH. In addition, monitoring information is required to be published in the annual Consumer Confidence Report (also required by the SDWA).
- **Unregulated Contaminant Monitoring Rule Results:** The 1996 SDWA Amendments mandate that EPA publish a list of unregulated contaminants that may pose a potential public health risk in drinking water. This list is called the Contaminant Candidate List (CCL). The initial 1998 accounting listed 60 contaminants. USEPA uses this list to prioritize research and data collection efforts for future rulemaking purposes. The 1996 SDWA amendments incorporated a tiered monitoring approach. The rule required all large public water systems and a nationally representative sample of small public water systems serving less than 10,000 people to monitor the contaminants. The information from the monitoring program for the Antelope Valley Region will be compiled and submitted to the State as well as be available on the website.

8.4.3.3 Groundwater

AVEK and the USGS have coordinated groundwater monitoring efforts in the Antelope Valley Region for several years. Groundwater monitoring is also required in areas on and surrounding the Edwards Air Force Base (AFB) as well as regional landfills.

8.4.4 Integration of Data into Existing State Programs

Data collected as part of this IRWM Plan can be used to support existing state programs such as the SWAMP, GAMA, and California Environmental Resources Evaluation System (CERES).

- **Surface Water Ambient Monitoring Program (SWAMP):** All the surface water data collected as part of the IRWM Plan will be consistent with SWAMP database comparability guidelines. Data will be collected in a database that is compatible with the SWAMP database and will be exported annually to the state database using the required data submission formats. Where appropriate IRWM Plan sampling activities will be performed according to SWAMP quality assurance requirements.
- **Groundwater Ambient Monitoring and Assessment (GAMA):** Groundwater data collection efforts as part of the IRWM Plan will be coordinated with the needs of the GAMA program so that the data can be shared and integrated into the GAMA database. Field sampling efforts will be coordinated with the GAMA program to eliminate duplicative data collection efforts and fill data gaps. Data will be consistent with GAMA database specifications so that it can be easily submitted, integrated and shared.
- California Environmental Resources Evaluation System (CERES): All data and reports will be sent to CERES so that information will be available and useful to a wide variety of users.

8.5 TECHNICAL ANALYSIS AND PLAN PERFORMANCE

8.5.1 Technical Analysis

This subsection describes how the projects identified for implementation in the AV IRWM Plan are supported through technical studies, including the commission and recommendations from a Technical Advisory Committee (TAC) (discussed in Section 3 and in more detail in Section 8.5.1.1 below), to help document the Antelope Valley Region's water supply picture and the ability of the projects to meet their intended objectives.

The projects identified for implementation in the AV IRWM Plan are supported through technical studies and reports that document their ability to meet the intended objectives. The technical support for these projects and related project concepts on a programmatic level is summarized by IRWM Plan objective below.

Provide reliable water supply to meet the Antelope Valley Region's expected demand between now and 2035. Projects selected to meet this objective could include water conservation, desalination, recycled water projects, and groundwater recharge projects. Water conservation projects typically involve educational programs, ultra low flush toilet change out programs and the use of proven technology, such as irrigation controllers. The technical feasibility of desalting projects has been well established and efficiency is increasing due to improvements in membrane technology. However, economic feasibility of desalting projects would need further consideration. Recycled water projects utilize treatment processes for producing water that meets Title 22 standards. Groundwater recharge projects would require technical feasibility and hydrogeological studies.

Establish a contingency plan to meet water supply needs of the Antelope Valley Region during a plausible disruption of SWP water deliveries. Projects selected to meet this objective are similar to the projects of the previous objective and include water conservation, desalination, recycled water projects, and groundwater recharge projects. The same technical support described above would apply.

Stabilize groundwater levels at current conditions. The objective will be implemented though management of groundwater, groundwater banking and aquifer storage and recovery projects utilizing State Water Project (SWP) and/or recycled water, and likely under the direction of the adjudication. Conceptual level studies have been conducted to determine the feasibility of using recycled water for groundwater recharge.

Provide drinking water that meets customer expectations. Protecting and improving drinking water quality involves using treatment unit processes that have been well documented including disinfection processes such as ultraviolet light and ozone injection; and contaminant removal processes including granular activated charcoal, ion exchange, and reverse osmosis.

Protect aquifer from contamination. Groundwater protection involves pumping management and monitoring injection water quality. Groundwater models have been developed for the Antelope Valley Region and the USGS has conducted studies related to injection, storage and recovery in Lancaster. As stated above, conceptual level studies have been conducted to determine the feasibility of using recycled water for groundwater recharge.

Protect natural streams and recharge areas from contamination. Projects that will meet this objective include stream restoration and wetlands restoration, as

well as projects that are developed from integrated land use management planning documents. Stream restoration projects are supported through a number of studies that document proven hydromodification techniques.

Maximize beneficial use of recycled water. This objective will be met through several recycled water projects including using reclaimed water for injection, storage, and recovery. Recycled water projects utilize treatment processes for producing water that meets Title 22 standards. Groundwater recharge projects would require technical feasibility and hydrogeological studies.

Reduce negative impacts of storm water, urban runoff, and nuisance water. This objective will be implemented by a series of runoff reduction, capture and infiltration projects, as well as non-structural programs. A key element for success of the program is optimal project site selection to ensure high levels of capture and pollutant reduction.

Preserve open space and natural habitats that protect and enhance water resources and species in the Antelope Valley Region. The Antelope Valley Conservancy, local General Planning documents and local agencies have developed a number of documents that identify potential opportunities for preserving existing open space and creating additional open space and recreation. Projects identified under this objective include ecosystem and riparian habitat restoration.

Maintain agricultural land use within the Antelope Valley Region. Projects that will assist in the maintenance of agricultural land use within the Antelope Valley Region include the utilization of recycled water for irrigation purposes as well as the implementation of water conservation practices including the use of precision irrigation control systems.

Meet growing demand for recreational space. The Antelope Valley Conservancy, local General Planning documents and local agencies have developed a number of documents that identify potential opportunities for preserving existing open space and creating additional open space and recreation. These documents also contain information that assists in determining planning criteria such as appropriate density as well as how to allow access while minimizing the negative impacts of human activity on the natural environment.

Improve integrated land use planning to support water management. The local General Planning documents have identified a number of water management resource strategies that integrate with land use planning efforts. Coordination of projects proposed in this IRWM Plan with those planning documents will help to achieve this objective. Further, the Antelope Valley Conservancy is actively working to enhance watershed based management planning with the Antelope Valley which integrates with the need to coordinate a regional land use management plan.

8.5.1.1 Technical Advisory Committee (TAC)

As discussed in Section 3, a TAC was formed to discuss the water budget elements for the Antelope Valley Region, including water supply and water demand issues. The TAC consisted of 13 representatives from 11 agencies including local land use owners, the County Farm Bureaus, and water/wastewater management agencies. These representatives were nominated by the stakeholder groups; nominations were open to all participants. The TAC summarized and reviewed approximately 12 documents regarding the water budget elements. In a day long workshop on March 28, 2007, the TAC discussed the key assumptions and data used in those documents to address each of the water budget elements and reached board agreement for how to proceed with Section 3 of this IRWM Plan. The TAC focused on sources of agricultural acreage data, crop water use requirements, estimates of natural recharge, and estimates of return flow for agricultural, urban, and wastewater users. The primary TAC recommendations included the following (refer to Section 3 for discussion of all assumptions):

Urban Water Demands:

- Remove assumption about baseline conservation; allows for use of conservation as a management action
- Evaluate household-based population projections and compare to per capita projections
- Assume groundwater extractions by smaller mutuals are 5 percent of municipal and industrial (M&I) pumping until additional data is received

Agricultural Water Demand:

- Compare sources of Agricultural acreage data from:
  - » Agricultural Commissioner
  - » Farm Advisor Inspection Reports
  - » AVEK Satellite Imagery
- Present and use County Farm Advisor's Crop Water Requirements
- Assume Agricultural demand remain at 2005 levels for projections

Groundwater:

- Add discussion of change in groundwater levels
- Add groundwater contour maps

Natural Recharge:

- Assume recharge occurring in alluvial fans
- Assume deep percolation on valley floor is 0 AFY
- Discuss previous estimates of recharge
- Assume a **range** of natural recharge approximately 30,300 to 81,400 AFY for projections

Agricultural Return Flows:

- Assume irrigation efficiency of 75 percent, thus:
  - » Return flow = 33 percent of required water
  - » Return flow = 25 percent of applied water
- Remove 10-year time delay for agricultural return flows to reach groundwater table

Wastewater Return Flow:

- Assume return flow rate is 10 percent of applied water

Urban Return Flow:

- Assume irrigation efficiency is same as for agriculture (75 percent) thus:
  - » Return flow = 25 percent of applied water
- Assume outdoor water use is 70 percent of total urban use
- Verify indoor/outdoor ratio

8.5.2 Data Gaps

This subsection discusses the data sets and reports used for preparation of this IRWM Plan and discussion of data gaps that were identified. Numerous data sets and reports were reviewed for their applicability to the Antelope Valley Region and statewide data needs. This knowledge provided the information necessary to identify the data gaps. Data gaps represent information crucial to a greater understanding of the Antelope Valley Region and help develop context for future projects and management actions.

Data gaps that have already been identified during the preparation of the AV IRWM Plan and discussed in Section 3, Issues and Needs, include the ability to quantify:

- Actual agricultural pumping
- Agricultural acreage by crop-type
- Outdoor verses Indoor water use
- Groundwater Return Flows
- Water Demand by Water Sector for the Antelope Valley Region
- Subsurface Flow
- Consumptive Use Losses in the Basin
- The amount of water available for recovery from surface water runoff, particularly from Amargosa Creek
- The amount of water available for recovery through stormwater capture
- Natural groundwater recharge
- Groundwater recharge loss due to septic removal
- Safe yield of the basin
- Historical and current groundwater pumping records

It is recommended that additional monitoring and studies be conducted to fill in these data gaps.

8.5.3 IRWM Plan Performance

8.5.3.1 Performance Measures

This subsection develops measures that will be used to evaluate strategy performance, monitoring systems that will be used to gather performance data, and mechanisms to adapt strategy implementation and operations based on performance data collected.

Generally, the success of the AV IRWM Plan will depend on how well the individual plan objectives are accomplished. Achievement of all of these objectives will, in large part, determine the success of local integrated regional water management planning processes. Additionally, the success may be attributed to the AV IRWM Plan when individual projects meet their goals and objectives and help to cumulatively and positively address individual plan objectives.

This IRWM Plan is a dynamic document, part of an ongoing local effort to achieve integration of local water management. The process, through stakeholder participation and plan revisions, will continue for many years and will be an effective mechanism for addressing the water management issues facing the Antelope Valley Region. As a consequence, on an ongoing basis, plan objectives, regional priorities, and statewide priorities will be reviewed for relevance and modified as needed to ensure the overall IRWM Plan reflects changing needs and continues to be effective. Additionally, the projects identified for future implementation will be reviewed and evaluated periodically to ensure that current plan objectives will be met and that the proposed projects offer the greatest benefit possible. Periodically, a new set of projects will be developed to address plan objectives and State and regional priorities.

Performance measures for each of the planning targets discussed in Section 4 are addressed below. These

measures are based on the AV IRWM Plan objectives, and were developed to allow progress of the overall IRWM Plan to be measured. This section describes the monitoring methods and programs that will be used to collect data and the mechanisms by which this data will drive future improvements to projects and the AV IRWM Plan.

It is recognized that more detail is needed for a number of these performance measures in order for them to sufficiently be measured and implemented. Therefore, the Stakeholder group agreed to continue to refine these performance measures as the draft Plan was finalized and until adopted. In order to develop measures that will realistically provide the Stakeholder group with a mechanism to measure its progress out until the year 2035, the group decided to commission a 'Performance Advisory Committee' or PAC. The PAC researched, collaborated, and recommended the following set of performance measures to the larger Stakeholder group.

Reduce (73,600 to 236,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009. Implementation of a project with a quantifiable benefit, either supply enhancement, or demand reduction with a known timeline for implementation or realization of the benefit will allow for measurement of this planning target. For example, on the demand management side, the performance of this planning target could be measured through the number of water conservation devices installed. Each agency participating in a water conservation program would maintain records of water conservation devices provided to customers for installation, primarily ultra low flush toilets (ULFT). The number of water conservation devices provided on an annual basis would be recorded and the estimated water savings per unit determined through use of existing documentation and accepted methodologies, such as CUWCC worksheets, and would be submitted on a monthly or quarterly basis for inclusion in a central data management program as described in Section 8.4. The volume of recycled water produced will be monitored by the treatment plants and Wastewater Operations Reports maintained by the governing agency. This target will also be met by additional potable water produced and stored. Annual precipitation data for groundwater and surface water conditions, total volumes of recycled water produced, potable water produced, and potable or recycled water stored will be recorded on a monthly or quarterly basis by the individual agencies managing the projects and included in the central data management program, as described in Section 8.4.

Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009. The performance of this planning target can be measured through monitoring the amount of water in reserve each year, and recording the volumes of groundwater banked and withdrawn quarterly, with the cumulative total amount of water banked also recorded quarterly. As water is put into storage for purposes of reserve, the total mismatch and reduction in demand for meeting this single-dry year target volume would be recorded and included in the central data management program. .

Provide adequate reserves (0 to 62,000 AF/4-year period) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009. The performance of this planning target would similarly be measured through monitoring the amount of water in reserve each year, and recording the volumes of groundwater banked and withdrawn quarterly, with the cumulative total amount of water banked also recorded quarterly. As water is put into storage for purposes of reserve, the total mismatch and reduction in demand for meeting multi-dry year conditions would be recorded and included in the central data management program..

Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by June 2010. The ability to provide a diversity of water supply sources to meet peak demands over the summer without receiving SWP water can be measured by first determining how much water is needed during that time period and then comparing that number to how much water is available as an emergency or demand-reduction source. The total volume of water required during the 6-month peak summer period would be measured through monitoring SWP deliveries from AVEK, LCID, and PWD in 2010 average conditions. Once the demand is determined, the current reserve supply can be quantified by measuring the total water supply available as emergency supply sources, such as banked water reserves, emergency transfer contracts, short-term paid non-use contracts, the maximum demand reduction that can be achieved through an aggressive water conservation program, and the overall storage capacity within recharge and extraction facilities. Annual total volumes would be recorded and included in a central data management program, and the demand compared against the supply reserves to show whether there is sufficient supply (or potential to reduce demand) to meet the loss of SWP supply.

Manage groundwater levels throughout the basin such that a 10-year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010. The ability to stabilize long-term groundwater levels in the region by showing groundwater

recharge and extractions are in balance can be measured through monitoring groundwater levels through a GAMA Program well monitoring program, and recording volumes of groundwater pumped and banked. Groundwater levels should be monitored, at a minimum, on a quarterly basis to account for seasonal variations. In order to sufficiently measure the performance of this planning target, a number of details about measuring needs to be identified including, but not limited to, the number of groundwater monitoring wells, which wells to be monitored, which subbasins to be monitored, who will collect the data, and how it will be coordinated. The data acquired through these monitoring efforts will be included in the central data management program.

Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetics throughout the planning period. To measure the performance of this planning target, water quality will be tested in accordance with EPA and Consumer Confidence Reporting (CCR) Protocols, and the data compared to adopted water quality standards, such as California Drinking Water Standards established by the California Department of Public Heath (DPH). If the measurements indicate that compliance is not being achieved, additional water quality monitoring of taste and odor causing compounds, such as geosmin and algaes could be undertaken. To monitor overall customer satisfaction and perceived taste and aesthetics, consumer input would be solicited at community fairs and in semi-annual mail-in surveys. The data acquired through these monitoring efforts will be recorded by the local water districts and agencies responsible for providing drinking water and included in the central data management program.

Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period. To preserve the acceptable quality of groundwater, with close attention paid to potential contaminants such as arsenic, nitrate, salinity and other problem pollutants, monitoring of groundwater quality would be undertaken, using GAMA Program methodology, as feasible. The quality of groundwater in recharge zones will also be monitored to ensure that the non-impacting activities that helpmeet Basin Plan requirements are sited appropriately. The difference between the baseline groundwater quality measured and the Basin Plan goals will be an indicator of plan performance. In order to sufficiently measure the performance of this planning target, a number of details about measuring need to be identified including, but not limited to: identification of sampling sites, establishing groundwater monitoring wells, the number of wells to be monitored, the frequency of monitoring, who will collect the data, and how it will be handled. The data acquired through the groundwater monitoring, as well as monitoring of areas where impacting activities are located near recharge zones, will be included in the central data management program.

Map contaminated and degraded sites and monitor contaminant movement, by December 2008. Achievement of this planning target would be establishment of a process for identifying, mapping and monitoring contaminated sites. To measure program performance, general groundwater quality monitoring of the Region would be conducted to identify locations of contaminated sites, in order to set up a monitoring program in the problem area to document the change in contaminant plume over time and rate of migration. Sites can be identified by reviewing historical land use to search for potential high risk uses including industrial, agricultural or military, as well as through databases listing known pollutant leaks, spills or contamination issues. Additional details needed for measuring performance including identification of water quality constituents of concern, the number of groundwater monitoring wells needed per site, the frequency of monitoring, who will map and collect the data, and how it will be recorded in the central data management program.

Identify contaminated portions of aquifer and prevent migration of contaminants, by June 2009. To prevent migration of existing contaminants to currently uncontaminated portions of the aquifer, as with the previous planning target, groundwater quality monitoring will be used to collect data to determine the potential sources of contaminants and the drivers influencing migration, such as seasonal variation. The data would then be input into a database for continual monitoring and modeling, if required, to help evaluate management alternatives to prevent further migration. To measure the performance of this planning target, a number of details to be further defined include the identification of a groundwater modeling expert, determination of the number of groundwater monitoring wells needed, and identifying who will collect and incorporate the data into the central data management program.

Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period. To preserve the ecosystem health of current stream systems and groundwater recharge areas, the sources of flow that could carry contaminants would be measured through surface water monitoring efforts. Potential contamination sources and mechanisms, and areas that need protection and additional monitoring would be identified using standard methods and procedures for water quality testing, such as GAMA Program methodologies, as feasible. Additional information to be developed in support of this planning target include

establishing groundwater monitoring wells, determining the number of wells to be monitored and how frequently, as well as identification of who would collect and disseminate the data for the central data management program.

Increase infrastructure and establish policies to use 33 percent of recycled water to help meet expected demand by 2015, 66 percent by 2025, and 100 percent by 2035. To increase the use of recycled water, and thereby reduce the demand on imported water or groundwater resources, the annual volume of recycled water produced, and the annual volume of recycled water banked or delivered would be measured using flow meters. The recycled water infrastructure is already planned for expansion, as shown by the LACWWD 40 Regional Recycled Water Backbone System and the LACSD's tertiary treatment facility upgrades. Additional urban and agricultural recycled water users should also be identified through ongoing planning efforts. The data acquired through these monitoring efforts would then be included in the central data management program.

Coordinate a regional flood management plan and policy mechanism by the year 2010. Development of a Regional Flood Management Plan and policy mechanism would require identification of data gaps related to flood management, preparation of detailed flood use maps for the Region, identification of policies to protect aquifer, natural streams and recharge areas from contamination in the area, and identification of flood management opportunities. The progress of this planning target would be measured by monitoring the progress of development of the plan, on a section by section basis. The signing of an MOU (or other suitable governance structure) and the commitment of funds for the regional flood plan would also be indicators of program performance. Progress development of the plan would be included in the central data management program to ensure close coordination of efforts.

Contribute to the preservation of an additional 2,000 acres of open space and natural habitat, to integrate and maximize surface water and groundwater management by 2015. This planning target will be measured by recording the existing acres of open space and natural habitat and comparing those totals to the newly developed acres of open space and natural habitats created, restored or enhanced annually. The change between baseline acreage and new, measured open space and natural habitat created or preserved through community-based projects would be reported and included in the central data management program. A stakeholder process would further help to identify projects, create awareness for, or provide financial contributions towards the development of open space, and this information could be compiled and mapped for future project concepts or integration with other IRWM Plan projects.

Preserve 100,000 acres of farmland in rotation through 2035. To measure the economic health of the Agricultural community in the Region, and the land remaining in agricultural use, the existing acreage of agricultural land in rotation will be compared to the future, measured agricultural land in rotation. Landowners working would work with local water agencies in coordinated water banking rotation projects, and the resulting number of acres of farmland and the number of water resource projects that integrate agricultural land with irrigation practices would be indicators of progress. This data would be included in the central data management program.

Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035. Providing low impact recreational opportunities for residents and visitors into the future will require the measurement of existing acreage of recreational space to compare against future acreage. A stakeholder process would contribute to the identification of community-based projects that could be developed to increase recreational space, and coordination with General Plan updates and policy directives would further build consensus. The annual acreages would then be included in the central data management program.

Coordinate a regional land use management plan by the year 2010. Development of a Regional Land Use Management Plan would require identification of data gaps, preparation of detailed land use maps for the Region, identification of policies to protect and enhance land uses in the area, and identification of land use management opportunities. The progress of this planning target would be measured by monitoring the progress of development of the plan, on a section by section basis. The signing of an MOU (or other suitable governance structure) and the commitment of funds for the regional plan would also be indicators of performance. Quarterly progress reports on the development of the plan would be included in the central data management program to ensure close coordination of efforts.

Table 8-8 summarizes the project monitoring and program performance measures.

The following table identifies a list of questions and action items that the AV IRWM Plan Leadership Team are tasked with responding to in order to determine the parameters of the planning targets and performance metrics to be used in project implementation. The table also documents the types of ongoing decisions and tasks needed by the

Leadership Team throughout Plan implementation to address a systematic approach to tracking, measuring and reporting on the Plan's performance over time.

8.6 FUTURE AV IRWM PLAN ACTIVITIES

8.6.1 Process for Developing Future Projects

The development of the AV IRWM Plan provided an opportunity for the Stakeholders to identify, evaluate and prioritize their projects and management actions. Those that were given a 'high' priority are those that they collectively decided to pursue within the next two years. The 'medium' and 'low' projects are those projects that the group still feels are important to implement in order to help meet the objectives and goals for the Antelope Valley Region, however their implementation is not as timely as the 'high' priority projects. Therefore, the 'medium' and 'low' priority projects will need to be revisited by the Stakeholder group at a later date for further evaluation to determine when it is most appropriate for their implementation and action. Additionally, as these projects, whether 'high', 'medium', or 'low,' are implemented in the Antelope Valley Region, the Stakeholders may see their issues and needs begin to shift, warranting the call for new types of projects. For example, should the adjudication place a restraint on the amount of groundwater that can be extracted from the groundwater basin by the year 2015, the group will need to look more closely at those projects that do not rely on groundwater to meet their needs. Or if a new contaminant is discovered in the Antelope Valley Region, they will have to adapt and identify projects and management actions to address those needs as they arise. Therefore, the process for developing future projects must be flexible, and allow for changing conditions. Any potential future project or management action will be assessed on how well it can be integrated within the Antelope Valley Region and within the existing projects to provide multiple benefits.

As projects are developed and/or refined in the future, the continued or new involvement of some state and/or federal agencies as identified in Table 8-1 may be warranted.

8.6.1.1 Responsiveness of Decision-Making to Regional Changes

As the IRWM Plan is updated and developed through the planning horizon, there will be a process to revisit the evaluation, assessment, and ranking process outlined herein to identify changes that should be made to the criteria and prioritization in response to new regional conditions and project implementation status. If changes are deemed appropriate, then the priority project list (as shown in Table 7-2 and in Appendix E) will be re-assessed and re-prioritized using the modified criteria and/or other evaluation criteria determined by the Stakeholder group.

8.6.1.2 Assessing Responses to Project Implementation

As projects are implemented in the Region as part of this Plan, project performance will be assessed and outcomes will be monitored, and the results from this monitoring will be used to guide future project implementation. Specific mechanisms for monitoring project performance are presented in Table 8-8.

8.6.1.3 Altering Project Sequencing Based on Project Implementation Responses

The results from monitoring project performance will be used to guide future project implementation and sequencing. If project monitoring reveals that a project is progressing as planned and regional changes do not necessitate revisiting project implementation, then changes to project sequencing are not anticipated. However, if project monitoring reveals that a project is not producing the anticipated result, the governance structure will dictate the responsible party to work with the project proponent to identify and implement corrective actions.

8.6.2 Future AV IRWM Plan Updates

The AV IRWM Plan is a dynamic planning document. The AV IRWM Plan at a minimum will be updated every two years as further study and planning is conducted, projects continue to be developed and objectives and priorities are adjusted. There will be an ongoing process for keeping the proposed project list up-to-date, through regular quarterly updates with additional meetings and revision as needed before major grant applications, as conditions change, funding is identified, projects are implemented and objectives revised.

As stated in Section 8.4.1, the AV IRWM Plan website, www.avwaterplan.org, provides a mechanism for stakeholders to upload project information, including submittal of new project ideas and concepts. Appendix E contains the prioritized list of projects in the AV IRWM Plan. Appendix G contains the electronic list of projects in this IRWM Plan.

Table 8-8 Project Monitoring and Program Performance Measures

Water Resource Strategy	Planning Target	Desired Outcome	Output Indicators (measures to effectively track output)	Outcome Indicator (measures to evaluate change that is a direct result of the work)	Measurement Tools and Methods				Measurement to be Reported and Overall Reporting Guidelines	Decisions Needed/ Unknowns
					What needs to be measured:	How it should be measured:	Measurement/ Reporting Frequency	Who should measure		
Water Supply	Reduce (73,600 to 236,800 AFY) mismatch[1] of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.	Supply and demand balance in average years (no mismatch) over the planning horizon	Update estimated supply and demand each year (for that year and future years) using similar approach to that used in the IRWM Plan including any updated information such as new population estimates, per capita use, etc.	Create an "accounting table" that starts with the estimated mismatch from the IRWM Plan (and then subsequent updates) and report expected changes to the mismatch that would result from management actions (e.g., a groundwater banking project, a low flow toilet rebate program, etc.). This would allow quarterly reporting of expected adjustments to the mismatch based on project actions being implemented. In addition to accounting for the expected changes to the mismatch, require projects that are estimating increases in supply, or reductions in demand to track tangible metrics that demonstrate the progress they are making over time.	Precipitation measurement to determine if it an average, dry, single dry year Also measure ETo from CIMIS weather stations in Victorville and Palmdale.	Rain gauges in mountains and Stream/Run-off gauges for groundwater conditions and recharge estimates (still need to determine how many, where to place these, who will operate, and how to report the data.) Littlerock precipitation data for surface water conditions Northern California conditions for imported water conditions	Daily/Annually	TBD	Measurement to be reported: Total reduction in mismatch Reporting: Report quarterly with updates to regional board and compare against objectives	Do we measure additional supply as new water sources or any water in addition to what was projected for that year? Reduction in mismatch = total new supply plus reduction in demand? How compare numbers to mismatch? Use annual projected mismatch for each given year or as percent of 236,800? OR compare actual supply and demand difference to projected mismatch for given year?
					Imported water delivered to AVEK, PWD, LCID, how much they deliver, and how much water is banked	Annual Water Production Reports	Monthly/Quarterly	AVSWCA		
					Inflows to and Deliveries from Littlerock Reservoir (including water levels in reservoir, delivered water, spill over, and amount evaporated)	PWD	Monthly/Quarterly	PWD		
					Amount of recycled water produced, delivered (by water use category), and banked (including quantity, timing, and location)	Wastewater Operations Reports flow meters at injection sites	Monthly/Quarterly	LACSD		
					Amount of local groundwater produced, delivered by purveyors to customers, and extracted by minimal and agricultural water users (broken down by water use category)	Annual Water Production Reports/ Billing Records	Monthly/Quarterly	TBD		
					Amount of irrigation return flows from M&I users, recycled water users, and agricultural users	LACSD Waste Discharge Permit. Method to be determined but could include: • Using indoor/outdoor water ratio and evaporation estimates to determine how much applied water consumed and how much percolates. • Using infrared spectoral analysis to measure ETo • Using RCSD estimates of water delivered and water inflows to wastewater plant	Monthly/Quarterly	TBD		
					Population Projections	Census tract (updated with release of new census tract data or other new population data available for Region.)	Annually	TBD		
					M&I Demand	Recalculate the regional average per capita demand. Then use this number and the projected population estimates to calculate total demand.	Annually	TBD		
					Agricultural Demand	Continue obtaining annual agricultural acreage by crop type from LA and Kern County Agricultural Commissioners and calculate demand using the crop use requirements in the Plan. Update crop estimates with release of new data (Use actual demand measurements when available.)	Annually	TBD		
					Proposed/Actual amount of new water supply	All Projects: Estimated in 5-year intervals from project information • Amount of water produced from project (operation records) • Amount delivered from project (billing records) For projects with banking/ recharge element: monitored daily, reported monthly • Overall Project injection, storage, and pumpback capacity • Actual amount injected • Actual amount pumped from bank • Total amount in storage • Need to account for percent remaining in storage to improve groundwater levels For Water Deals/Transfers: • Amount agreed/allotted (water right) • Actual amount transferred.	Monthly/Quarterly	Project Proponent		

1 The "mismatch" between supply and demand in the IRWM Plan is based on estimated supply and demand values and cannot be measured directly. Some aspects of supply can be measured directly such as the amount of water received from the State Water Project. Other aspects of supply are more difficult to measure directly such as the volume of water provided from precipitation and the volume pumped from groundwater. Demand cannot be measured directly, because demand is a behavior that is influenced by the desired use, available supply and price of supply.

Table 8-8 Project Monitoring and Program Performance Measures (continued)

Water Resource Strategy	Planning Target	Desired Outcome	Output Indicators (measures to effectively track output)	Outcome Indicator (measures to evaluate change that is a direct result of the work)	Measurement Tools and Methods				Measurement to be Reported and Overall Reporting Guidelines	Decisions Needed/ Unknowns
					What needs to be measured:	How it should be measured:	Measurement/ Reporting Frequency	Who should measure		
Water Supply (continued)					Planned and actual reduction in demand	Proposed/Actual number of units installed/lines replaced/ rebates planned (est. water savings per unit from existing documentation such as CUWCC worksheets and methods for estimating water savings for various BMPs) Also need to consider impacts of demand reduction on wastewater inflows and recycled water availability. Should try to reduce outdoor use as much as possible.	Monthly/Quarterly	Project Proponent		
Water Supply	Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009.	Establish a mechanism to dedicate supply in groundwater for dry year use. Start banking water in average year conditions to meet the expected quantity by 2009 and beyond.	Amount of water in reserve each year.	Amount of water banked and withdrawn quarterly and a cumulative total in bank quarterly.	Amount of water banked	Water put in storage for purpose of reserve	Quarterly	TBD	Measurement to be reported: Total mismatch and reduction in demand Reporting: Report every two years with update of the Plan and compare against objectives	
Water Supply	Provide adequate reserves (0 to 62,000 AF/4-year period) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009.	Establish a mechanism to dedicate supply in groundwater for dry year use. Start banking water in average year conditions to meet the expected quantity by 2009 and beyond.	Amount of water in reserve each year.	Amount of water banked and withdrawn quarterly and a cumulative total in bank quarterly.	Amount of water banked	Water put in storage for purpose of reserve	Quarterly	TBD	Measurement to be reported: Total mismatch and reduction in demand Reporting: Report every two years with update of the Plan and compare against objectives	
Water Supply	Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by June 2010.	Provide a diversity of water supply sources to meet peak demands over the summer	Determine quantity of water needed to reasonably meet demands in region for 6 months without receiving SWP water over the summer (assuming 2010 conditions) Estimated SWP demand during 6-month summer period Estimate of maximum savings from emergency conservation program Estimate of recycled water demand Estimate of banked water amount	Percent change in SWP water deliveries over the 6-month period Percent change in groundwater extractions from using banked water Quantification of additional water transported to Region (i.e. banked water from outside region, transfers from south of Delta Water Supplies during emergency conditions from trade agreements) Quantification of reduction in demand from emergency conservation measures	Amount of SWP received in a 6-month summer period	Use expected deliveries from AVEK, LCID, and PWD during 6-month summer period in 2010 average conditions.	Annually	TBD	Measurement to be reported: The difference between how much water is needed, compared to how much water is available during the 6-month summer period. Reporting: Report every two years with update of the Plan and compare against objectives Need to show have sufficient reserves (or potential to reduce demand) to meet the loss of SWP supply.	What the total volume of water required is? Is this for an average year, single-year, multi-dry year?
					Total water supply available over 6-month summer period without above	Account for available emergency supply sources, such as banked water reserves, emergency transfer contracts, short-term paid non-use contracts, etc.	Annually	TBD		
					Maximum reduction in demand that can be reasonable achieved	Using Contingency/Water Conservation Plans and Emergency Response Plan assuming highest level of water shortage Compare economic tradeoffs of aggressive short-term rationing to the cost of securing other supplies	Annually	TBD		
					Overall Storage Capacity within existing or proposed recharge and extraction facilities.	Master Plans/Infrastructure Reports	Annually	TBD		

Table 8-8 Project Monitoring and Program Performance Measures (continued)

Water Resource Strategy	Planning Target	Desired Outcome	Output Indicators (measures to effectively track output)	Outcome Indicator (measures to evaluate change that is a direct result of the work)	Measurement Tools and Methods				Measurement to be Reported and Overall Reporting Guidelines	Decisions Needed/ Unknowns
					What needs to be measured:	How it should be measured:	Measurement/ Reporting Frequency	Who should measure		
Water Quality	Manage groundwater levels throughout the basin such that a 10-year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.	Stabilize long-term groundwater levels in region, meaning ground-water recharge and extractions are in balance.	Observed groundwater levels in a monitoring network that provides representative view of entire groundwater basin Coordination with Regional Boards for continued compliance with new or changes to existing discharge permits, regulations, etc.	Annual change in groundwater level (+ / -) from previous year averaged over past 10 years	Groundwater levels May need additional study/testing/ modeling for this. GIS based groundwater level map updating on a regular basis can use to update/ monitor GW level. Will need to coordinate with Water Master. Still need to determine how many wells, which subbasins, and how to report (i.e. as a whole or by subbasin)	Well monitoring (GAMA Program methodology will be followed, when applicable); can use Claud's data for baseline, existing wells (take note of how many wells are in a subbasin)	Quarterly	TBD	Measurement to be reported: Observed ground-water level improvements; calculate 10-year average Reporting: Report every year with update of the Plan and compare against objectives	Need yearly average. Can we report over the entire basin, or do we need to report for each subunit? Need to determine if going to fill in existing depressions before set baseline levels [for the time being take measure-ments on the subunit basis]
	Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetics throughout the planning period.	Meet Federal and State water quality standards and achieve high levels of customer satisfaction	Monitoring to ensure compliance Coordination with Regional Boards for continued compliance with new or changes to existing discharge permits, regulations, etc.	Compliance with Consumer Confidence Reporting (CCR) and EPA's unregulated contaminant monitoring rule reporting Customer Satisfaction	Standard lab methods for water quality testing, EPA Protocols, CCR Reporting Protocols	See EPA and CCR Protocols	See EPA and CCR Protocols	See EPA and CCR Protocols	Measurement to be reported: Comparison of measured water quality data to water quality stan-dards. For taste & aesthetics, overall consumer satisfac-tion with water quality. Reporting: Taste & aesthetics collect annual data, report with updates, could also add to CCR Reporting.	If problem then can do some: Basic monitoring effort of taste and odor causing compounds like: geosmin (produced by microbes like blue-green algae and gives a "dirty/earthy" taste to water), MIB, algaes.
					Taste & aesthetic	Solicit consumer input at a community fair	Monthly/Annually	Local water district		
					Overall customer satisfaction	Include a bi-annual mail-in survey in the monthly water bill	Semi-annually	Local water district		
Water Quality	Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the plan-ning period.	Preserve accept-able quality of groundwater paying special attention to potential contaminants such as arsenic, nitrate, salinity and other problem pollutants	Monitoring of ground-water quality Coordination with Regional Boards for continued compliance with new or changes to existing discharge permits, regulations, etc. Monitor areas where impacting activities are located near recharge zones.	Difference between background or baseline groundwater quality and goals for arsenic, nitrate, salinity and other problem pollutants Promote non-impacting activi-ties in recharge zones (not allow impacting activity in recharge zones)	Bacteria, Coliform, Radioactivity, Taste and Odor, Ammonia, Biostimulatory, Substances, Chemical Constituents, Chlorine, Total Residual, Color, Dissolved Oxygen, Floating Materials, Oil and Grease, Non-degradation of Aquatic Communities, Populations Pesticides, pH, as required by Basin Plan and additionally measure pollutants of concern such as arsenic, nitrate, TDS How many well sites, how often, where? Surface waters that should be measures are Lake Palmdale and Littlerock Reservoir	Standard methods and procedures for water quality testing; GAMA Program methodology will be followed, when applicable. The Basin Plan requires that all drinking water requirements (MCL and Secondary MCL) are to be met	Monthly or more frequently, can refer to Title 22 for additional monitoring requirements Report quarterly	TBD	Measurement to be reported: water quality limits Reporting: Report every year with update of the Plan and compare against objectives	Locations of sampling site? Frequency of sampling? How many wells? Where to locate the wells? How often to test? Existing USGS wells?

Table 8-8 Project Monitoring and Program Performance Measures (continued)

Water Resource Strategy	Planning Target	Desired Outcome	Output Indicators (measures to effectively track output)	Outcome Indicator (measures to evaluate change that is a direct result of the work)	Measurement Tools and Methods				Measurement to be Reported and Overall Reporting Guidelines	Decisions Needed/ Unknowns
					What needs to be measured:	How it should be measured:	Measurement/ Reporting Frequency	Who should measure		
Water Quality	Map contaminated and degraded sites and monitor contaminant movement, by December 2008.	Set up a process for identifying, mapping and monitoring contaminated sites	Locations, constituents, and constituent concentrations Coordination with Regional Boards for continued compliance with new or changes to existing discharge permits, regulations, etc. Records database search for pollutant leaks, spills, contamination, etc. Enhance monitoring system to detect identified potential pollutants (i.e. modify sampling plan to include identified potential pollutants or indicators of those pollutants, perform vertically discrete sampling, etc).	Change in contaminant plume over time and rate of migration of contaminant	Water quality of Region to identify contaminated sites. Do a general sweep, then monitor more often in problem areas. Steps for a general groundwater quality monitoring methodology: 1. select area for monitoring 2. identify pollution sources, causes, and methods of disposal 3. identify potential pollutants 4. define groundwater usage 5. define hydrogeologic situation 6. describe existing groundwater quality 7. evaluate infiltration potential of waste at the land surface 8. evaluate mobility of pollutants from the land surface 9. evaluate attenuation of pollutions in the saturated zone 10. prioritize sources and causes 11. evaluate existing monitoring programs 12. identify alternative monitoring approaches 13. select and implement the monitoring program 14. review and interpret monitoring results 15. summarize and transmit monitoring information	Database with location of the well, contaminants and detection levels, continually monitor that, monitoring of a few wells near it. Up stream and downstream well. May require additional monitoring wells.	Quarterly for common contaminants, if no contamination found for 5-10 years, then go to annually for that well. Keep in mind the Cost $$	Need to identify a person to do the mapping. Need to identify person to maintain database itself	Measurement to be reported: Record of contaminated sites Reporting: Report every year with update of the Plan and compare against objectives	Water quality constituents? How often are we going to monitor? Where to monitor?
Water Quality	Identify contaminated portions of aquifer and prevent migration of contaminants, by June 2009.	Provide information for groundwater management that will prevent migration of existing contaminants to currently uncontaminated portions of the aquifer	Locations, constituents, and constituent concentrations Potential sources of contaminants Potential drivers influencing migration (e.g., nearby cone of depression) Coordination with Regional Boards for continued compliance with new or changes to existing discharge permits, regulations, etc. Install monitoring wells (need several years of data to know if the contamination is due to seasonal variation or not)	Change in contaminant plume over time and rate of migration of contaminant Locate production wells geographically and with respect to depth in order to manipulate groundwater movement	Water quality of Region to identify contaminated sites. Do a general sweep, then monitor more often in problem areas. Migration of the contaminant	Database with location of the well, contaminants and detection levels, continually monitor that, monitoring of a few wells near it. Up stream and downstream well. May require additional monitoring wells. Modeling	Quarterly	TBD	Measurement to be reported: water quality data, contour level data, TBD Reporting: Report every year with update of the Plan and compare against objectives	Need groundwater modeling expert to help evaluate management alternatives to prevent migration Determining best methods for preventing migration; might be different based on contaminant; might be different based on location May require modeling of rate of change of contaminant when identified

Table 8-8 Project Monitoring and Program Performance Measures (continued)

Water Resource Strategy	Planning Target	Desired Outcome	Output Indicators (measures to effectively track output)	Outcome Indicator (measures to evaluate change that is a direct result of the work)	Measurement Tools and Methods				Measurement to be Reported and Overall Reporting Guidelines	Decisions Needed/ Unknowns
					What needs to be measured:	How it should be measured:	Measurement/ Reporting Frequency	Who should measure		
Water Quality	Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.	Preserve ecosystem health of current stream systems Preserve opportunity to use existing and promising future groundwater recharge areas	Identify potential contamination sources and mechanisms Identify areas that need to be protected and monitored. Coordination with Regional Boards for continued compliance with new or changes to existing discharge permits, regulations, etc.	Sources of flow that could carry contaminants Contaminants in flows entering areas desired to protect	Bacteria, Coliform, Radioactivity, Taste and Odor, Ammonia, Biostimulatory, Substances, Chemical Constituents, Chlorine, Total Residualm Color, Dissolved Oxygen, Floating Materials, Oil and Grease, Non-degradation of Aquatic Communities, Populations Pesticides, pH, as required by Basin Plan and additionally measure pollutants of concern such as arsenic, nitrate, and ?? (TDS?) How many well sites, how often, where? Surface waters that should be measures are Lake Palmdale and Littlerock Reservoir	Standard methods and procedures for water quality testing; GAMA Program methodology will be followed, when applicable. The Basin Plan requires that all drinking water requirements (MCL and Secondary MCL) are to be met.	Monthly or more frequently, can refer to Title 22 for additional monitoring requirements Report quarterly	TBD	Measurement to be reported: water quality limits Reporting: Report every year with update of the Plan and compare against objectives	Locations of surface water samples during storm events? Locations of gw sampling site? Frequency of sampling? How many wells? Existing USGS wells?
Water Quality	Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.	Increased use of recycled water, which would decrease demand on other resources, such as imported water or groundwater.	New users for 40,000 AFY in 2015, 55,000 AFY in 2025, and 65,000 AFY of recycled water under contract by 2035.	Volume of recycled water created: 40,000 AFY in 2015, 55,000 AFY in 2025, and 65,000 AFY in 2035 of recycled water will be used in the urban or agricultural setting where it is not currently used.	Amount of recycled water delivered and banked.	Deliveries would be measured using flow meters. Monitoring will be consistent with the permit requirements for the use sites.	Monthly/Quarterly	LACSD	Measurement to be reported: Total volume of recycled water banked or delivered compared to 33%, 66%, 100% Reporting: Report every year with update of the Plan and compare against objectives	Users, if not already identified.
Flood Management	Coordinate a regional flood management plan and policy mechanism by the year 2010.	Identification of data gaps, preparation of detailed flood use maps for the Antelope Valley Region, identification of policies to protect aquifer, natural streams and recharge areas from contamination in the Valley, and identification of flood management opportunities.	Identification of entities that would be involved in coordination of the regional flood management plan; the establishment of a regional flood management committee; and the identification of the funding mechanism for creating and implementing a plan.	Signing of an MOU (or other suitable governance structure) and commitment of funds for the regional flood plan.	Monitoring progress of development of the Plan and policy mechanism	TBD Plan development, by Section	Quarterly	TBD	Measurement to be reported: Measuring progress of a flood management plan development. Reporting: Report every year with update of the Plan and compare against objectives	Need to define the Region for the flood management plan; same boundary as the IRWM Plan? When it's going to start? Who's responsible? Adopting it?
Environmental Resource Management	Contribute to the preservation of an additional 2,000 acres of open space and natural habitat, to integrate and maximize surface water and groundwater management by 2015.	Help contribute through identification of, awareness for, financial contribution towards, or similar for creating, restoring, or preserving near-term open space and natural habitat in the Antelope Valley.	Stakeholder-coordinated meetings with implementation partners to develop community projects. Increase in restoration plantings or mitigation planting sites.	Community consensus and agreement on project list/alternative, as developed through meetings and coordination Work with individual landowners to revegetate the areas Number of acres preserved & treated for open space and natural habitat; measurement of the health of open space and natural habitat	To measure 'preservation': existing acres of open space and natural habitat to measure additional open space and natural habitat acreage Fugitive dust management (measured and mapped); tons of soil per acre (particulate matter ([pm]10, pm2.5) Acreage of new plantings	Land use maps; satellite imagery; AV conservancy database; General Plan GIS data? Measure fugitive dust according to Air Quality Management District (AQMD) standards	Annually Soil data measured daily/reported annually	TBD AVRCD	Measurement to be reported: Comparison between existing (2005) acreage of open space and natural habitat and measured open space and natural habitat. Reporting: Report every year with update of the Plan and compare against objectives	Identify priority open space areas that can contribute to successful integrated management of surface and groundwater.

Table 8-8 Project Monitoring and Program Performance Measures (continued)

Water Resource Strategy	Planning Target	Desired Outcome	Output Indicators (measures to effectively track output)	Outcome Indicator (measures to evaluate change that is a direct result of the work)	Measurement Tools and Methods				Measurement to be Reported and Overall Reporting Guidelines	Decisions Needed/ Unknowns
					What needs to be measured:	How it should be measured:	Measurement/ Reporting Frequency	Who should measure		
Land Use Management	Preserve 100,000 acres of farmland in rotation through 2035.	The Agricultural community in the Antelope Valley stays economically healthy and land use remains in agriculture.	Landowners working with local water agencies in coordinated water banking rotation projects.	Number of water-resource integrated projects The number of acres of farmland in active rotation	Existing (2005) acreage in rotation (at least 24,000 acres of active farm land need to determine total in rotation) and current land use by type (active farming, fallowing, recharge, etc.) Fugitive dust management (measured and mapped); tons of soil per acre (particulate matter ([pm]10, pm2.5) {**Note: fugitive dust affects the health of agricultural land and thus was asked to be included by the AVRCD for routine measurement}	Land use maps; satellite imagery; survey of landowners; General Plan GIS data, County commissioner reports Measure fugitive dust according to Air Quality Management District (AQMD) standards	Quarterly/Annually Soil data measured daily/reported annually	TBD (USDA, LA Farm Bureau, Kern County Farm Bureau, LA County Agricultural Commissioner, Kern County Agricultural Commissioner, AVRCD)	Measurement to be reported: Comparison between existing (2005) acreage of agricultural land in rotation and measured agricultural land in rotation. Reporting: Report every year with update of the Plan and compare against objectives	How costly to measure? Note that if objective is meet, the agricultural demand in the Plan may go up, and likewise the mismatch between supply and demand may go up.
Land Use Management	Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.	Provide low impact recreational opportunities for residents and visitors into the future.	Stakeholder-coordinated meetings with implementation partners to develop community projects	Community consensus and agreement on project list/alternatives, as developed through meetings and coordination	Existing acreage of recreational space and future acreage	Land use maps; satellite imagery; General Plan GIS data?	Quarterly/Annually	TBD	Measurement to be reported: Comparison between existing acreage of recreational land and measured recreational land. Reporting: Report every year with update of the Plan and compare against objectives	
Land Use Management	Coordinate a regional land use management plan by the year 2010.	Identify data gaps, prepare detailed land use maps for the Antelope Valley Region, identify policies to protect land uses in the Valley, identify land use management opportunities	Identification of entities that would be involved in coordination of the regional land management plan; the establishment of a regional land management committee; and the identification of the funding mechanism for the plan.	Signing of an MOU and commitment of funds for the regional land plan. A broadly supported regional land use management plan.	Monitoring progress of development of the Plan and policy mechanism	Plan development, by Section	Quarterly	TBD	Measurement to be reported: Measuring progress of a land use management plan development. Reporting: Report every year with update of the Plan and compare against objectives	Need to define the Region for the land use plan; same boundary as the IRWM Plan? When it's going to start? Who's responsible? Adopting it?

Table 8-9 Antelope Valley IRWM Plan Performance Measures Action Item Task List

Planning Targets	What Needs Measuring	Action Items	Responsible Party
WATER SUPPLY MANAGEMENT			
Reduce (73,600 to 236,800 AFY) mismatch of expected supply and demand in average years by providing new water supply and reducing demand, starting 2009.	In General	Decisions Needed/Unknowns: Do we measure additional supply as new water sources or any water in addition to what was projected for that year?	
		Decisions Needed/Unknowns: • Reduction in mismatch = total new supply plus reduction in demand?	
		Decisions Needed/Unknowns: • How to compare numbers to mismatch? Use annual projected mismatch for each given year or as percent of 236,800? OR compare actual supply and demand difference to projected mismatch for given year?	
	Precipitation measurement to determine if it an average, dry, or single dry year	How it should be measured: • Rain gauges in mountains and Stream/Run-off gauges for groundwater conditions and recharge estimates. • Determine how many, where to place these, who will operate, and how to report the data.	
		Who should measure: • Identify.	
	Amount of local groundwater produced, delivered by purveyors to customers, and extracted by minimal and agricultural water users (broken down by water use category)	Who should measure: • Identify.	
	Amount of irrigation return flows from M&I users, recycled water users, and agricultural users	How it should be measured: • Determine method; it could include: » Using indoor/outdoor water ratio and evaporation estimates to determine how much applied water consumed and how much percolates. » Using infrared spectoral analysis to measure ETo. » Using RCSD estimates of water delivered and water inflows to wastewater plant.	
	Population Projections	Who should measure: • Identify.	
	M&I Demand	Who should measure: • Identify.	
	Agricultural Demand	Who should measure: • Identify.	
Provide adequate reserves (50,600 to 57,400 AFY) to supplement average condition supply to meet demands during single-dry year conditions, starting 2009 .	Amount of water banked	Who should measure: • Identify.	
Provide adequate reserves (0 to 62,000 AF/ 4 year period) to supplement average condition supply to meet demands during multi-dry year conditions, starting 2009 .	Amount of water banked	Who should measure: • Identify.	

Table 8-9 Antelope Valley IRWM Plan Performance Measures Action Item Task List (continued)

Planning Targets	What Needs Measuring	Action Items	Responsible Party
Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by June 2010.	Amount of SWP received in a 6-month summer period	Who should measure: • Identify.	
		Decisions Needed/Unknowns: • What is the total volume of water required?	
		Decisions Needed/Unknowns: • Is this for an average year, single-year, multi-dry year?	
	Total water supply available over 6-month summer period without above SWP	Who should measure: • Identify.	
	Maximum reduction in demand that can be reasonable achieved	Who should measure: • Identify.	
	Overall Storage Capacity within existing or proposed recharge and extraction facilities.	Who should measure: • Identify.	
Manage groundwater levels throughout the basin such that a 10-year moving average of change in observed groundwater levels is greater than or equal to 0, starting January 2010.	Groundwater levels	What needs to be measured: • Additional study/testing/modeling needed? GIS based groundwater level map updating on a regular basis can use to update/monitor GW level. Need to coordinate with Water Master.	
		What needs to be measured: • Determine how many wells, which sub-basins, and how to report (i.e., as a whole or by subbasin).	
		How it should be measured: • Well monitoring (GAMA Program methodology will be followed, when applicable); Use Claud's data for baseline, existing wells (take note of how many wells are in a subbasin)?	
		Who should measure: • Identify.	
		Decisions Needed/Unknowns: • Need yearly average.	
		Decisions Needed/Unknowns: • Can we report over the entire basin, or do we need to report for each subunit? [For the time being take measurements on the subunit basis?]	
		Decisions Needed/Unknowns: • Determine if going to fill in existing depressions before set baseline levels.	
WATER QUALITY MANAGEMENT			
Continue to meet Federal and State water quality standards as well as customer standards for taste and aesthetics throughout the planning period.	Standard lab methods for water quality testing, EPA Protocols, CCR Reporting Protocols	Decisions Needed/Unknowns: • If problem then can do: Basic monitoring effort of taste and odor causing compounds, such as geosmin (produced by microbes like blue-green algae and gives a "dirty/earthy" taste to water), MIB, and/or algae.	

Table 8-9 Antelope Valley IRWM Plan Performance Measures Action Item Task List (continued)

Planning Targets	What Needs Measuring	Action Items	Responsible Party
Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.	Bacteria, coliform Chemical Constituents Radioactivity Taste and Odor as required by Basin Plan and additionally measure pollutants of concern such as arsenic, nitrate, and TDS	Measurement/Reporting Frequency: • Identify. Check Title 22 for monitoring requirements.	
		Who should measure: • Identify.	
		Decisions Needed/Unknowns: • Locations of sampling site?	
		Decisions Needed/ Unknowns: • Frequency of sampling?	
		Decisions Needed/ Unknowns: • How many wells? Where to locate the wells? How often to test?	
		Decisions Needed/ Unknowns: • Existing USGS wells?	
Map contaminated sites and monitor contaminant movement, by December 2008.	Water quality of Region to identify contaminated sites. Do a general sweep, then monitor more often in problem areas.	Who should measure: • Identify a person to do the mapping.	
		Who should measure: • Identify person to maintain database itself.	
		Measurement to be reported: • Identify.	
		Decisions Needed/Unknowns: • Water quality constituents? How often are we going to monitor?	
		Decisions Needed/Unknowns: • Where to monitor?	
Identify contaminated portions of aquifer and prevent migration of contaminants, by June 2009.	Water quality of Region to identify contaminated sites. Do a general sweep, then monitor more often in problem areas. Migration of the contaminant	Measurement/Reporting Frequency: • Is Quarterly measurement OK?	
		Who should measure: • Identify.	
		Measurement to be reported: • Identify.	
		Decisions Needed/Unknowns: • Need groundwater modeling expert to help evaluate management alternatives to prevent migration? • Need to determine best method for preventing migration; might be different based on contaminant; might be different based on location	

Table 8-9 Antelope Valley IRWM Plan Performance Measures Action Item Task List (continued)

Planning Targets	What Needs Measuring	Action Items	Responsible Party
Prevent unacceptable degradation of natural streams and recharge areas according to the Basin Plan throughout the planning period.	Bacteria, Coliform, Radioactivity Taste and Odor, Ammonia, Biostimulatory, Substances, Chemical Constituents, Chlorine, Total Residual Color, Dissolved Oxygen, Floating Materials, Oil and Grease, Non-degradation of Aquatic Communities, Populations Pesticides, pH, as required by Basin Plan and additionally measure pollutants of concern such as arsenic, nitrate, and TDS.	What needs to be measured: • Identify what additional pollutants of concern, if any, require measurement (e.g., TDS).	
		What needs to be measured: • How many well sites, how often, where?	
		Measurement/Reporting Frequency: • Identify. Check Title 22 for monitoring requirements.	
		Who should measure: • Identify.	
		Measurement to be reported: • Identify.	
		Decisions Needed/Unknowns: • Locations of surface water samples during storm events?	
		Decisions Needed/Unknowns: • Locations of GW sampling site?	
		Decisions Needed/Unknowns: • Frequency of sampling?	
		Decisions Needed/Unknowns: • How many wells?	
		Decisions Needed/Unknowns: • Existing USGS wells?	
Increase infrastructure and establish policies to use 33% of recycled water to help meet expected demand by 2015, 66% by 2025, and 100% by 2035.	Amount of recycled water delivered and banked.	Decisions Needed/Unknowns: • Users, if not already identified.	
FLOOD MANAGEMENT			
Coordinate a regional flood management plan and policy mechanism by the year 2010.	Monitoring progress of development of the Plan and policy mechanism.	How it should be measured: • Identify Plan development, by Section.	
		Who should measure: • Identify.	
		Decisions Needed/Unknowns: • Need to define the Region for the flood management plan; same boundary as the IRWM Plan?	
		Decisions Needed/Unknowns: • When it's going to start? Who's responsible? Who's adopting it?	
ENVIRONMENTAL RESOURCE MANAGEMENT			
Contribute to the preservation of an additional 2,000 acres of open space and natural habitat, to integrate and maximize surface water and groundwater management by 2015.	To measure 'preservation': Existing acres of open space and natural habitat to measure additional open space and natural habitat acreage.	How it should be measured: • Identify if additional data needed beyond: land use maps; satellite imagery; AV conservancy database; General Plan GIS data.	
		Who should measure: • Identify.	
		Decisions Needed/Unknowns: • Identify priority open space areas that can contribute to successful integrated management of surface and groundwater.	

Table 8-9 Antelope Valley IRWM Plan Performance Measures Action Item Task List (continued)

Planning Targets	What Needs Measuring	Action Items	Responsible Party
LAND USE PLANNING/MANAGEMENT			
Preserve 100,000 acres of farmland in rotation through 2035.	Existing (2005) acreage in rotation (at least 24,000 acres of active farm land. Still need to determine total in rotation) and current land use by type (active farming, fallowing, recharge, etc.)	What needs to be measured: • Acreage of farm land in rotation	
		Who should measure: • Identify.	
		Decisions Needed/Unknowns: • How to measure and how much it will cost? Note that if objective is met, the agricultural demand in the Plan may go up, and likewise the mismatch between supply and demand may go up.	
Contribute to local and regional General Planning documents to provide 5,000 acres of recreational space by 2035.	Existing acreage of recreational space and future acreage.	How it should be measured: • Identify if additional data needed beyond land use maps; satellite imagery; General Plan GIS data.	
		Who should measure: • Identify.	
Coordinate a regional land use management plan by the year 2010.	Monitoring progress of development of the Plan and policy mechanism.	Who should measure: • Identify.	
		Decisions Needed/Unknowns: • Need to define the Region for the land use plan; same boundary as the IRWM Plan?	
		Decisions Needed/Unknowns: • When it's going to start? Who's responsible? Who would adopt it?	

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Section 9: References

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Section 9: References

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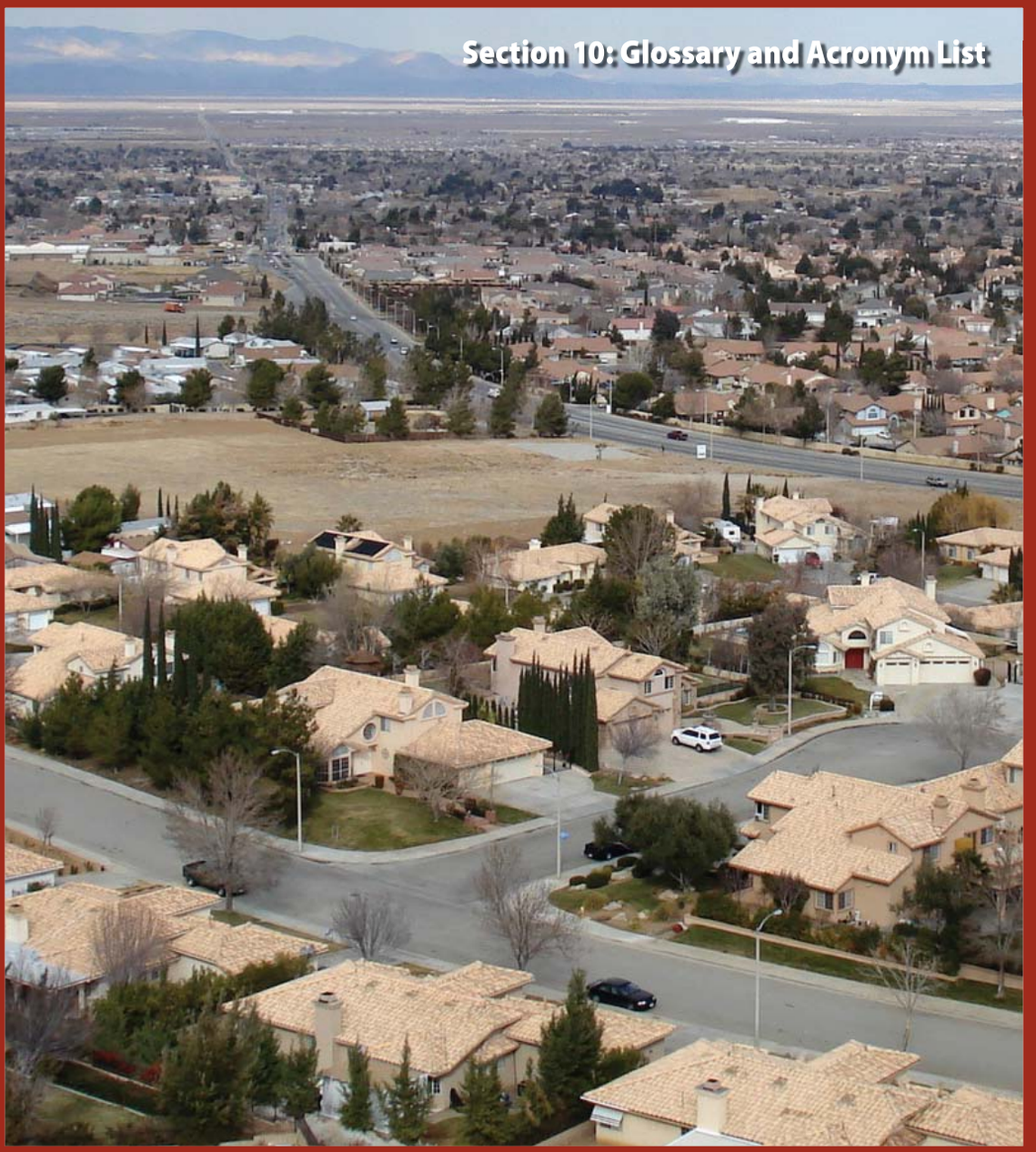
Section 10: Glossary and Acronym List



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Section 10: Glossary & Acronyms

10.1 GLOSSARY

A

Acre-Foot: The quantity of water required to cover one acre to a depth of one foot; equal to 43,560 cubic feet, or approximately 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.

Adopted IRWM Plan: The version of the IRWM Plan that is adopted by the governing bodies of at least three or more member agencies to the Regional Water Management Group (RWMG), two of which have statutory authority over water supply, as evidenced by resolutions.

Agronomic Rate: The rate of nutrient application to fulfill a plant's nitrogen requirements while minimizing the amount of nutrients that passes to groundwater.

Alluvium: Sediment deposited by flowing water, such as in a riverbed, flood plain or delta.

Alluvial Aquifer: Earth, sand, gravel or other rock or mineral materials laid down by flowing water, capable of yielding water to a well.

Antelope Valley Region: The Antelope Valley Region, as defined for the purposes of this IRWM Plan, follows the Antelope Valley's key hydrologic features, bounded by the San Gabriel Mountains to the south and southwest, and the Tehachapi Mountains to the northwest, forming a well-defined triangular point at the Valley's western edge. The Region covers portions of northern Los Angeles and southeastern Kern Counties, and encompasses the majority of the AVEK service area.

Applied Water Demand: The quantity of water that would be delivered for urban or agricultural applications if no conservation measures were in place.

Aquifer: An underground layer of rock, sediment or soil, or a geological formation/unit that is filled or saturated with water in sufficient quantity to supply pumping wells.

Arid: 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.

Article 21 Water: Refers to the SWP contract provision defining this supply as water that may be made available by DWR when excess flows are available in the Delta. 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.

Artificial Recharge: The addition of water to a groundwater reservoir by human activity, such as irrigation or induced infiltration from streams, wells, or recharge/spreading basins. See also GROUNDWATER RECHARGE, RECHARGE BASIN.

B

Bedrock Aquifer: A consolidated rock deposit or geological formation of sufficient hardness and lack of interconnected pore spaces, but which may contain a sufficient amount of joints or fractures capable of yielding minimal water to a well.

Beneficial Uses: Include fish, wildlife habitat, and education, scientific and recreational activities which are dependent upon adequate water flow thorough rivers, streams and wetlands. The Regional Water Quality Control Board's Basin 4A Plan categorizes beneficial uses per water quality standards.

Best Management Practice (BMP): An urban water conservation (water use efficiency) measure that the California Urban Water Conservation Coalition agrees to implement among member agencies. The BMP's are intended to reduce long-term urban water demand.

Brackish Water: Water containing dissolved minerals in amounts that exceed normally acceptable standards for municipal, domestic, and irrigation uses. Considerably less saline than sea water.

C

Closed Basin: A topographic water basin with no outlet to the ocean

Confined Aquifer: A water-bearing subsurface stratum that is bounded above and below by formations of impermeable, or relatively impermeable, soil or rock.

Conjunctive Use: The operation of a groundwater basin in coordination with a surface water storage and conveyance system. The purpose is to recharge the basin during years of above average water supply to provide storage that can be withdrawn during drier years when surface water supplies are below normal.

Conservation: Urban water conservation or water use efficiency includes reductions realized from voluntary, more efficient, water use practices promoted through public education and from state-mandated requirements to install water-conserving fixtures in newly constructed and renovated buildings. Agricultural water conservation or agricultural water use efficiency, means reducing the amount of water applied in irrigation through measures that increase irrigation efficiency. See NET WATER CONSERVATION.

Critical Dry Period: A series of water-deficient years, usually an historical period, in which a full reservoir storage system at the beginning is drawn down (without any spill) to minimum storage at the end.

Critical Dry Year: A dry year in which the full commitments for a dependable water supply cannot be met and deficiencies are imposed on water deliveries.

Cubic Feet Per Second (CFS): A unit of measurement describing the flow of water. A cubic foot is the amount of water needed to fill a cube that is one foot on all sides, about 7.5 gallons.

D

Decision 1641: An action by the State Water Resources Control Board (SWRCB) to establish water quality objectives for water users in the Delta. The Bay/Delta Water Quality Control Plan was developed as a means to attain these water quality objectives.

Desalting/Desalination: A process that converts sea water or brackish water to fresh water or an otherwise more usable condition through removal of dissolved solids.

Disadvantaged Community: A community with an annual median household income that is less than 80 percent of the statewide annual median household income (CWC § 79505.5 (a)).

Distribution Uniformity (DU): The ratio of the average low-quarter depth of irrigation water infiltrated to the average depth of irrigation water infiltrated, for the entire farm field, expressed as a percent.

Drainage Basin: The area of land from which water drains into a river; as, for example, the Sacramento River Basin, in which all land area drains into the Sacramento River. Also called, "WATERSHED."

Dry-Weather Runoff: Urban runoff that enters the drainage system due to human activities such as car washing and lawn irrigation. Dry-weather runoff can also result from illicit connections to the stormwater or sewer systems.

E

Efficient Water Management Practice (EWMP): An agricultural water conservation measure that water suppliers could implement. EWMPs are organized into three categories: 1) Irrigation Management Services; 2) Physical and Structural Improvements; and 3) Institutional Adjustments.

Effluent: Waste water or other liquid, partially or completely treated or in its natural state, flowing from a treatment plant.

Empirical Yield: See SAFE YIELD (GROUNDWATER)

Ephemeral: An ephemeral water body is one that exists for only a short period of time following precipitation or snowmelt. This is not the same as an intermittent or seasonal water body which exists for a longer period of time.

Evapotranspiration (ET or ETO): The quantity of water transpired (given off), retained in plant tissues, and evaporated from plant tissues and surrounding soil surfaces. Quantitatively, it is expressed in terms of depth of water per unit area during a specified period of time.

F

Final IRWM Plan: The version of the IRWM Plan that is deemed ready for adoption by 50 percent or more of the representatives from the RWMG member agencies.

Firm Yield: The maximum annual supply of a given water development that is expected to be available on demand, with the understanding that lower yields will occur in accordance with a predetermined schedule or probability.

Forebay: A groundwater basin immediately upstream or upgradient from a larger basin or group of hydrologically connected basins. Also, a reservoir or pond situated at the intake of a pumping plant or power plant to stabilize water levels.

G

Groundwater: Water that occurs beneath the land surface and completely fills all pore spaces of the alluvium or rock formation in which it is located.

Groundwater Basin: A groundwater reservoir, together with all the overlying land surface and underlying aquifers that contribute water to the reservoir.

Groundwater Mining: The withdrawal of water from an aquifer greatly in excess of replenishment; if continued, the underground supply will eventually be exhausted or the water table will drop below economically feasible pumping lifts.

Groundwater Overdraft: The condition of a groundwater basin in which the amount of water withdrawn by pumping exceeds the amount of water that replenishes the basin over a period of years.

Groundwater Recharge: Increases in groundwater quantities or levels by natural conditions or by human activity. See also ARTIFICIAL RECHARGE.

Groundwater Storage Capacity: The space contained in a given volume of deposits. Under optimum use conditions, the usable groundwater storage capacity is the volume of water that can, within specified economic limitations, be alternately extracted and replaced in the reservoir. (Directly related to SAFE YIELD).

Groundwater Table: The upper surface of the zone of saturation (all pores of subsoil filled with water), except where the surface is formed by an impermeable body.

H

Hydraulic Conductivity: A property of vascular plants, soil or rock, that describes the ease with which water can move

through pore spaces or fractures. It depends on the permeability of the material and on the degree of saturation.

I

Instream Use: Use of water that does not require diversion from its natural watercourse. For example, the use of water for navigation, recreation, fish and wildlife, esthetics, and scenic enjoyment.

Irrigation Efficiency: The efficiency of water application. Computed by dividing evapotranspiration of applied water by applied water and converting the result to a percentage. Efficiency can be computed at three levels: farm, district, or basin.

Irrigation Return Flow: Applied water that is not transpired, evaporated, or deep percolated into a groundwater basin, but that returns to a surface water supply.

L

Lacustrine: In geology, the sedimentary environment of a lake.

Land Subsidence: Land subsidence is the lowering of the land-surface elevation from changes that take place underground. Overdrafting of aquifers is the major cause of subsidence in the southwestern United States.

Leaching: The flushing of salts from the soil by the downward percolation of applied water.

M

Maximum Contaminant Level (MCL): The maximum level of a drinking water contaminant allowed under the federal Safe Water Drinking Act. MCLs set under National Primary Drinking Water Regulations are legally enforceable standards that apply to public water systems.

M&I: Municipal and Industrial (water use); generally urban uses for human activities.

Milligrams Per Liter (mg/L): The mass (milligrams) of any substance dissolved in a standard volume (liter) of water. One liter of pure water has a mass of 1000 grams. For dilute solutions where water is the solvent medium, the numerical value of mg/l is very close to the mass ratio expressed in parts per million (ppm).

Mineralization (of Groundwater): The addition of inorganic substances, usually dissolved from surface or aquifer material, to groundwater.

N

Naturally Occurring Contaminants (in Groundwater): A deleterious substance present in groundwater which is of natural origin, i.e., not caused by human activity.

Natural Habitat: See OPEN SPACE.

Net Water Conservation: The difference between the amount of applied water conserved and the amount by which this conservation reduces usable return flows.

Net Water Demand: The applied water demand less water saved through conservation efforts (= net applied water = actual water used).

Non-Point Source Pollution: A diffuse discharge of pollutants throughout the natural environment. See POINT SOURCE.

O

Open Space: Open space can mean natural open space, passive and active recreation which may or may not be compatible with natural habitats or natural open space preservation. As an example, open space can mean soccer fields, playgrounds, etc and should not be considered as natural habitat. See also NATURAL HABITAT.

Overdraft: Withdrawal of groundwater in excess of a basin's perennial yield. See also PROLONGED OVERDRAFT.

P

Parts Per Million (ppm): A ratio of two substances, usually by mass, expressing the number of units of the designated substance present in one million parts of the mixture. For water solutions, parts per million is almost identical to the milligrams per liter.

Per-Capita Water Use: The amount of water used by or introduced into the system of an urban water supplier divided by the total residential population; normally expressed in gallons per-capita-per-day (GCPD).

Perched Groundwater: Groundwater supported by a zone of material of low permeability located above an underlying main body of groundwater with which it is not hydrostatically connected.

Percolation: The downward movement of water through the soil or alluvium to the groundwater table.

Perennial Yield: Perennial yield is an estimate of the long-term average annual amount of water that can be withdrawn without inducing a long-term progressive drop in water level. The term "safe yield" is sometimes used in place of perennial yield, although the concepts behind the terms are not identical: the older concept of "safe yield" generally implies a fixed quantity equivalent to a basin's average annual natural recharge, while the "perennial yield" of a basin or system can vary over time with different operational factors and management goals.

Permeability: The capability of soil or other geologic formation to transmit water.

Playa: A dry lakebed, also known as an alkali flat. Playas consist of fine-grained sediments infused with alkali salts and are devoid of vegetation.

Playa Deposit: A thick salt deposit that forms over time through the accumulation of layers of dissolved minerals from rocks. Dissolved salts that form a playa deposit are laid by rainfall that rapidly evaporates once reaching the earth's surface.

Point Source: Any discernable, confined and discrete conveyance site from which waste or polluted water is discharged into a water body, the source of which can be identified. See also NON-POINT SOURCE.

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.

Potable Water: Water suitable for human consumption without undesirable health consequences. Drinkable. Meets Department of Health Services drinking water requirements.

Prolonged Overdraft: Net extractions in excess of a basin's perennial yield, averaged over a period of ten or more years.

Proposition 50: The "Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002", as set forth in Division 26.5 of the California Water Code (commencing with § 79500).

Q

Quaternary Geology: Younger of the two geologic periods of the Cenozoic era of geologic time lasting from 2 million years ago to the present. Comprising all geologic time from the end of the Tertiary period to today.

R

Reach Repayment Capacity: SWP contractors, via their water supply contracts with DWR, are allocated specified shares of "reach repayment" capacity in various reaches of the SWP system. This share of capacity pertains to SWP supplies only, and provides each contractor with delivery priority for its SWP supplies. Reach repayment capacity is often less than the actual constructed physical capacity of SWP facilities.

Recharge Basin: A surface facility, often a large pond, used to increase the infiltration of water into a groundwater basin.

Recycled Water: Urban wastewater that becomes suitable for a specific beneficial use as a result of treatment.

Regional Priorities: The short-term and long-term issues and/or objectives that are determined to be most important on the Region's needs.

Regional Water Management Group: A group that, at a minimum, includes three or more local public agencies, at least two of which have statutory authority over water management, which may include but is not limited to water supply, water quality, flood control, or storm water management. The Antelope Valley Regional Water Management Group includes Antelope Valley-East Kern Water Agency, Palmdale Water District, Quartz Hill Water District, Littlerock Creek Irrigation District, City of Palmdale, City of Lancaster, Los Angeles County Sanitation District Nos. 14 & 20,

Rosamond Community Services District, and Los Angeles County Waterworks District No. 40, Antelope Valley.

Reverse Osmosis: Method of removing salts from water by forcing water through a membrane.

Return Flow: The portion of withdrawn water that is not consumed by evapotranspiration and returns instead to its source or to another body of water.

Reuse: The additional use of once-used water.

Riparian: Of, or on the banks of, a stream or other of water.

Riparian Vegetation: Vegetation growing on the banks of a stream or other body of water.

Runoff: The surface flow of water from an area; the total volume of surface flow during a specified time.

S

Safe Yield (Groundwater): The maximum quantity of water that can be withdrawn from a groundwater basin over a long period of time without developing a condition of overdraft. Sometimes referred to as sustained yield.

Sag Pond: An enclosed depression formed where active or recent fault movement results in impounded drainage.

Salinity: Generally, the concentration of mineral salts dissolved in water. Salinity may be measured by weight (total dissolved solids), electrical conductivity, or osmotic pressure. Where seawater is the major source of salt, salinity is often used to refer to the concentration of chlorides in the water. See also TDS.

Serious Overdraft: Prolonged overdraft that results, or would result, within ten years, in measurable, unmitigated adverse environmental or economic impacts, either long-term or permanent. Such impacts include but are not limited to seawater intrusion, other substantial quality degradation, land surface subsidence, substantial effects on riparian or other environmentally sensitive habitats, or unreasonable interference with the beneficial use of a basin's resources.

Seawater Intrusion: Occurs when extractions exceed freshwater replenishment of groundwater basins and causes seawater to travel laterally inland into fresh water aquifers.

Secondary Treatment: In sewage treatment, the biological process of reducing suspended, colloidal, and dissolved organic matter in effluent from primary treatment systems. Secondary treatment is usually carried out through the use of trickling filters or by an activated sludge process.

Sheet Flow: Shallow-depth, low velocity water flow.

Silt: A sedimentary material composed of very fine particles intermediate in size between sand and clay.

Siltation: The deposition or accumulation of silt.

Spreading Basin: See RECHARGE BASIN.

Spreading Grounds: See RECHARGE BASIN.

Stakeholder: An individual, group, coalition, agency or others who are involved in, affected by, or have an interest in the implementation of a specific program or project.

Solute: A substance dissolved in another substance, usually the component of a solution present in the lesser amount.

Subsidence: See LAND SUBSIDENCE.

T

Table A Amount: A reference to the amount of water listed in "Table A" of the contract between the State Water Project (SWP) and the contracting agencies and represents the maximum amount of water an agency may request each year.

Tertiary Geology: Geologic time period between roughly 65 million and 2 million years ago.

Tertiary Treatment: In sewage, the additional treatment of effluent beyond that of secondary treatment to obtain a very high quality of effluent.

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 (mg/l) or in parts per million (ppm). See also Salinity.

Turbidity: A measure of cloudiness and suspended sediments in water. Water high in turbidity appears murky and contains sediments in suspension. Turbid water may also result in higher concentrations of contaminants and pathogens, that bond to the particles in the water.

Turnback Pools: A means in which SWP contractors with excess Table A Amount water in a given hydrologic year may sell that excess to other contractors. This is included in a provision in the SWP water supply contracts. The program is administered by DWR.

W

Wash: A wash, also called an arroyo, is a usually dry creek bed or gulch that temporarily fills with water after a heavy rain, or seasonally.

Water Management Stategies: Specified categories of approaches to meet regional objectives. According to the IRWM Grant Program Guidelines, the water management strategies include, but are not limited to, ecosystem restoration, environmental and habitat protection and improvement, water supply reliability, flood management, groundwater management, recreation and public access, storm water capture and management, water conservation, water quality protection and improvement, water recycling, wetlands enhancement and creation, conjunctive use, desalination, Imported water, land use planning, non-point source pollution control, surface storage, watershed planning, water and wastewater treatment, and water transfers.

Water Management Stratey Alternative: A set of projects, project concepts, actions, and/or studies that when implemented together would fill the gaps, minimize the overlaps, maximize benefits for multiple water management strategies, and ultimately achieve the regional planning objectives.

Water Management Strategy Area: A group of similar or related water management strategies to make the Antelope Valley IRWM Plan development more efficient and manageable (data collection, management, and dissemination).

Water Management Strategy Integration: A process to design water management strategy alternatives to maximize regional benefits by identifying potential synergies, linkages, and gaps between water management strategies and evaluating geographical distribution of project benefits.

Water Management Strategy Objective: A goal for the Region to achieve in order to meet the needs for a water management strategy. A quantifiable objective can be used to allow future measurement of progress towards accomplishment of the objectives (e.g., conserve 10,000 AFY of drinking water by 2030).

Water Quality: A term used to describe the chemical, physical, and biologic characteristics of water with respect to its suitability for a particular use.

Water Quality Contamination: For the purposes of the IRWM Plan, any increase in water constituent levels over the State or Federal standards is considered contamination.

Water Quality Degradation: Any increase in water constituent levels over naturally occurring levels is considered degradation.

Water Reclamation: The treatment of water of impaired quality, including brackish water and seawater, to produce a water of suitable quality for the intended use.

Water Right: A legally protected right, granted by law, to take possession of water occurring in a water supply and to divert the water and put it to beneficial uses.

Watershed: The area or region drained by a reservoir, river, stream, etc.; drainage basin.

Water Table: The surface of underground, gravity-controlled water.

10.2 ACRONYMS

AB: Assembly Bill

AF: acre-foot

AFB: Air Force Base

AFY: acre-feet per year

AQMD: Air Quality Management District

ASR: Aquifer Storage and Recharge/Recovery

AV: Antelope Valley

AVEK: Antelope Valley-East Kern Water Agency

AVSWCA: Antelope Valley State Water Contractors Association

AVWCC: Antelope Valley Water Conservation Coalition

BIA: Building Industry Association

BLM: Bureau of Land Management

BMP: Best Management Practice

CAS: Conventional Activated Sludge

CCD: Census County Division

CCR: California Code of Regulations

CDFG: California Department of Fish and Game

CDFA: California Department of Food and Agriculture

CEQA: California Environmental Quality Act

cfs: cubic feet per second

CIMIS: California Irrigation Management Information System

CIP: Capital Improvements Plan

CLWA: Castaic Lake Water Agency

CMWD: Calleguas Municipal Water District

CUWCC: California Urban Water Conservation Council

CVP: Central Valley Project

CWA: Clean Water Act

DAC: Disadvantaged Communities

DPH: Department of Public Health

DMM: Demand management measure

DU: Distribution Uniformity

DWMA: Desert Wildlife Management Area

DWR: Department of Water Resources

EIR: Environmental Impact Report

ESA: Federal Endangered Species Act

ETc: Evapotranspiration (for a particular crop)

ETo: Evapotranspiration (general or reference)

EWMP: Efficient Water Management Practice

FEIR: Final Environmental Impact Report

FWSMPU: Final Water System Master Plan Update

gal: gallon

GIS : Geographic Information System

gpcd: gallons per-capita-per-day

gpd: gallons per day

gpm: gallons per minute

GWR-RW: Groundwater Recharge Using Recycled Water

GWR: Groundwater recharge

HCP: Habitat Conservation Plan

° F: degree Fahrenheit

IRWM Plan: Integrated Regional Water Management Plan

IUWMP: Integrated Urban Water Management Plan

IWRP: Integrated Water Resources Plan

JPA: Joint Powers Authority

LACSD: Los Angeles County Sanitation District

LACWWD 40: Los Angeles County Waterworks District No. 40

LADPW: Los Angeles Department of Public Works

LADWP: Los Angeles Department of Water and Power

LAFCO: Local Area Formation Commission

Lancaster: Lancaster, City of

LAWA: Los Angeles World Airports

LCID: Littlerock Creek Irrigation District

LWRP: Lancaster Water Reclamation Plant

M&I: municipal & industrial

MBR: Membrane bioreactor

MCL: Maximum Contaminant Level

MG: million gallon

mgd: million gallons per day

mg/L: milligrams per liter

MHI: median household income

MOA: Memorandum of Agreement

MOU: Memorandum of Understanding

MW: megawatt

MWD: Municipal Water District

NLFC: Newhall Land and Farming Company

NPDES: National Pollutant Discharge Elimination System

O&M: operations and maintenance

OEHHA: Office of Environmental Health Hazard Assessment

NRCS: Natural Resource Conservation Service

PHG: Public Health Goal

ppb: parts per billion

ppm: parts per million

PAC: Performance Advisory Committee

Palmdale: Palmdale, City of

PID: Palmdale Irrigation District

PM: Particulate Matter

PWD: Palmdale Water District

PWRP: Palmdale Water Reclamation Plant

QHWD: Quartz Hill Water District

RCSD: Rosamond Community Services District

RO: reverse osmosis

ROC: reactive organic compound

RRBWSD: Rosedale-Rio Bravo Water Storage District

RWMG: Regional Water Management Group

RWQCB: Regional Water Quality Control Board

RWQCB-LR: Regional Water Quality Control Board – Lahontan Region

SB: Senate Bill

SCAG: Southern California Association of Governments

SEA: Significant Ecological Area

Semitropic: Semitropic Water Storage District

SMART: Specific Measurable Attainable Relevant Time-based

SWP: State Water Project

SWRCB: State Water Resources Control Board

TAC: Technical Advisory Committee

TDS: Total Dissolved Solids

THM: Trihalomethanes

TTHM: Total Trihalomethanes

TMDL: Total Maximum Daily Load

TOC: total organic carbon

TTP: Tertiary Treatment Plant

UCCE: University of California Cooperative Extension

ug/L (or µg/L): micrograms per liter

ULFT: Ultra Low Flush Toilet

uS/cm (or µg/cm): microsiemens per centimeter

U.S.: United States

USACE: U.S. Army Corps of Engineers

USBR: U.S. Bureau of Reclamation

USFWS: U.S. Fish and Wildlife Service

USGS: U.S. Geological Survey

UWMP: Urban Water Management Plan

WDR: Waste Discharge Requirements

WMS: Water Management Strategy

WMSA: Water Management Strategy Area

WRP: Water Reclamation Plant

WSMP: Water System Master Plan

WSMS: Water Supply Management Strategy

WTP: Water Treatment Plant

WWTP: Wastewater Treatment Plant

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2007

Antelope Valley Integrated Regional Water Management Plan