

# Table of Contents

Executive Summary ..... ES-1

Section 1 Introduction ..... 1-1

    1.1 Background ..... 1-3

    1.2 Stakeholder Participation..... 1-6

        1.2.1 Regional Water Management Group..... 1-6

        1.2.2 Stakeholder Group..... 1-12

        1.2.3 Activities ..... 1-15

        1.2.4 Community Outreach ..... 1-16

    1.3 Plan Updates ..... 1-22

        1.3.1 Region Goals and Planning Objectives ..... 1-22

        1.3.2 Process for the 2013 Updates..... 1-24

        1.3.3 Potential Obstacles to Plan Implementation ..... 1-25

        1.3.4 Groundwater Management Plan..... 1-26

        1.3.5 Integrated Flood Management Planning..... 1-27

        1.3.6 Climate Change ..... 1-29

        1.3.7 Salt and Nutrient Management Plan ..... 1-29

Section 2 Region Description..... 2-1

    2.1 Region Overview ..... 2-1

    2.2 Location ..... 2-2

    2.3 Climate Statistics..... 2-4

    2.4 Hydrologic Features ..... 2-11

        2.4.1 Surface Water ..... 2-15

        2.4.2 Groundwater..... 2-21

    2.5 Land Use ..... 2-27

    2.6 Flood Control..... 2-31

    2.7 Wastewater and Recycled Water ..... 2-32

    2.8 Social and Cultural Values..... 2-32

        2.8.1 Agriculture..... 2-32

        2.8.2 U.S. Military ..... 2-32

        2.8.3 Housing Development..... 2-33

        2.8.4 Alternative Energy..... 2-33

        2.8.5 Visioning Document..... 2-34

2.9 Economic Conditions and Trends ..... 2-35

2.10 Population..... 2-36

    2.10.1 Demographics..... 2-36

    2.10.2 Regional Growth Projections ..... 2-39

2.11 Climate Change ..... 2-41

    2.11.1 Effects and Impacts of Climate Change on the Region..... 2-42

    2.11.2 Climate Change Reporting and Registry Coordination..... 2-42

Section 3 Issues and Needs..... 3-1

    3.1 Water Supply Management Assessment ..... 3-1

        3.1.1 Water Entering ..... 3-2

        3.1.2 Direct Deliveries..... 3-6

        3.1.3 Water Demands..... 3-8

        3.1.4 Recycle/Reuse..... 3-16

        3.1.5 Surface Storage ..... 3-20

        3.1.6 Groundwater Storage..... 3-21

        3.1.7 Water Leaving ..... 3-24

        3.1.8 Water Budget Comparisons ..... 3-30

        3.1.9 Regional Water Supply Issues and Needs..... 3-34

        3.1.10 AB 3030 Water Supply Considerations..... 3-40

    3.2 Water Quality ..... 3-41

        3.2.1 Local Groundwater Quality..... 3-41

        3.2.2 Imported Water Quality..... 3-42

        3.2.3 Wastewater and Recycled Water Quality ..... 3-44

        3.2.4 Local Surface Water and Stormwater Runoff Quality..... 3-44

        3.2.5 Regional Water Quality Issues and Needs..... 3-44

        3.2.6 AB 3030 Water Quality Considerations ..... 3-45

    3.3 Flood Management ..... 3-46

        3.3.1 Regional Flood Management Issues and Needs ..... 3-47

    3.4 Environmental Resources..... 3-50

        3.4.1 Regional Environmental Resource Issues and Needs..... 3-53

    3.5 Land Use..... 3-55

        3.5.1 Regional Land Use Issues and Needs..... 3-55

        3.5.2 AB 3030 Land Use Considerations ..... 3-59

    3.6 Climate Change..... 3-59

3.6.1 Identification of Vulnerabilities.....3-59

3.6.2 Prioritization of Vulnerabilities.....3-60

3.7 DAC Issues and Needs .....3-61

Section 4 Objectives.....4-1

4.1 Objectives Development.....4-1

4.2 Water Supply Management Objectives and Planning Targets.....4-4

4.3 Water Quality Management Objectives and Targets .....4-6

4.4 Flood Management Objectives and Targets .....4-9

4.5 Environmental Resource Management Objectives and Targets.....4-10

4.6 Land Use Planning/Management Objectives and Targets .....4-12

4.7 Climate Change Mitigation Objectives and Targets.....4-15

Section 5 Resource Management Strategies.....5-1

5.1 Consideration of Strategies .....5-1

5.2 Strategies for Water Supply Management .....5-7

5.3 Strategies for Water Quality Management .....5-10

5.4 Strategies for Integrated Flood Management.....5-12

5.5 Strategies for Environmental Resource Management .....5-13

5.6 Strategies for Land Use Planning/Management.....5-14

5.7 Strategies for Climate Change Mitigation.....5-16

5.8 Impacts and Benefits of Implementing Strategies.....5-17

Section 6 Project Integration and Objectives Assessment .....6-1

6.1 Water Supply Management.....6-2

6.2 Water Quality Management .....6-13

6.3 Flood Management .....6-19

6.4 Environmental Resource Management.....6-21

6.5 Land Use Planning/Management .....6-22

6.6 Climate Change Mitigation .....6-24

Section 7 Project Evaluation and Prioritization

7.1 IRWM Project Submittal Process .....7-1

7.2 IRWM Project Review for Inclusion in the Plan.....7-6

7.3 Produces for Communicating the Project List of Selected Projects.....7-9

7.4 IRWM Project Prioritization .....7-9

7.4.1 Project Prioritization Criteria.....7-9

7.4.2 Prioritized Projects .....7-11

Section 8 Implementation.....8-1

- 8.1 Framework Introduction .....8-1
  - 8.1.1 Existing Plans and Programs .....8-1
- 8.2 Governance Structure.....8-2
  - 8.2.1 Public Involvement Process .....8-4
  - 8.2.2 Effective Decision Making.....8-5
  - 8.2.3 Balanced Access and Opportunity for Participation .....8-5
  - 8.2.4 Communication .....8-7
  - 8.2.5 Long-term Implementation of the IRWM Plan .....8-7
  - 8.2.6 Coordination with Neighboring IRWM Efforts, State Agencies, and  
Federal Agencies .....8-7
  - 8.2.7 Changes and Updates to the IRWM Plan .....8-8
  - 8.2.8 Future Governance Structure .....8-8
- 8.3 Funding and Financing of the IRWM Plan.....8-8
  - 8.3.1 Funding/Financing Options .....8-9
  - 8.3.2 Funding/Financing Plan .....8-10
- 8.4 Data Management .....8-12
  - 8.4.1 Management and Data Reporting .....8-13
  - 8.4.2 Regional Data Needs.....8-14
  - 8.4.3 Existing Monitoring Efforts .....8-14
  - 8.4.4 Integration of Data into Existing State Programs.....8-15
- 8.5 Technical Information.....8-16
- 8.6 IRWM Plan Performance.....8-20
  - 8.6.1 Performance Measures.....8-20
  - 8.6.2 Project Specific Monitoring Plans .....8-33
- 8.7 Adaptive Management .....8-35

Section 9 References .....9-1

Section 10 Glossary & Acronyms .....10-1

- 10.1 Glossary of Terms.....10-1
- 10.2 Acronym List.....10-2

## List of Appendices

Appendix A – RWMG Memorandum of Understanding

Appendix B – Sample Stakeholder Sign-In Sheet

Appendix C – Community Outreach Materials

Appendix D – DAC Maps and Technical Memoranda

Appendix E – Public Comment Matrix

Appendix F – Integrated Flood Management Summary Document

Appendix G – Salt and Nutrient Management Plan

Appendix H – Climate Change Vulnerability Question Worksheet

Appendix I – List of Adjudication Documents

Appendix J – Project Submittal Form

Appendix K – Project List

Appendix L – IRWM Grant Program Guidelines, App. H – Plan Review Process, Cross-Reference Table

# List of Tables

Table 1-1 Participating Entities..... 1-12

Table 1-2 DAC Outreach Meetings..... 1-17

Table 1-3 Groundwater Management Plan Checklist According to  
 Required Components ..... 1-28

Table 2-1 Climate in the Antelope Valley Region .....2-5

Table 2-2 Demographics Summary for the Antelope Valley Region .....2-37

Table 2-3 Population Projections .....2-39

Table 2-4 Projected Climate Change Effects on the Region .....2-42

Table 3-1 Summary of Historical Wholesale (Imported) Supply (AFY)  
 in the Antelope Valley Region.....3-6

Table 3-2 Summary of Projected Wholesale (Imported) Supply (AFY)  
 in the Antelope Valley Region.....3-7

Table 3-3 Water Demand Projections (AF) for the Antelope Valley Region.....3-8

Table 3-4 Per Capita Urban Water Use in the Antelope Valley Region .....3-11

Table 3-5 Historical Agricultural Water Use in the Antelope Valley Region .....3-12

Table 3-6 Crop Coefficient (Kc) Estimates .....3-13

Table 3-7 Crop Evapotranspiration (ETc) Estimates for the Antelope Valley Region..... 3-14

Table 3-8 Crop Water Requirements for the Antelope valley Region ..... 3-15

Table 3-9 Comparison of the Historical Crop Acreages..... 3-15

Table 3-10 Agricultural Water Use in the Antelope Valley Region.....3-16

Table 3-11 Potential Availability of Recycled water (AFY) to  
 the Antelope Valley Region.....3-17

Table 3-12 Summary of Current and Projected Recycled Water (AFY)  
 to the Antelope Valley Region ..... 3-20

Table 3-13 Historical Surface Deliveries from Littlerock Reservoir (AFY) ..... 3-21

Table 3-14 Water Budget Comparison for an Average Water Year.....3-31

Table 3-15 Water Budget Comparison for a Single-Dry Water Year .....3-32

Table 3-16 Water Budget Comparison for a Multi-Dry Water Year .....3-33

Table 3-17 Land Subsidence Concerns for the Antelope Valley Region .....3-39

Table 3-18 Comparison of SWP Water Quality Criteria (2013) to SWP Actual Data ..... 3-43

Table 3-19 Prioritized Regional Vulnerability Issues..... 3-60

Table 4-1 Antelope Valley Region Objectives and Planning Targets .....4-3

Table 5-1 2009 California Water Plan Resource Management Strategies.....5-2

Table 5-2 Strategies that Support the Antelope Valley Region’s Objectives.....5-5

Table 5-3 Impacts and Benefits of Strategies that Reduce Water Demand.....5-18

Table 5-4 Impacts and Benefits of Strategies that Improve  
Operational Efficiency and Transfers..... 5-19

Table 5-5 Impacts and Benefits of Strategies that Increase Water Supply..... 5-20

Table 5-6 Impacts and Benefits of Strategies that Improve Water Quality..... 5-22

Table 5-7 Impacts and Benefits of Strategies that Improve Flood Management..... 5-24

Table 5-8 Impacts and Benefits of Strategies that Practice Resources Stewardship ..... 5-24

Table 6-1 Projects with Water Supply Benefits .....6-3

Table 6-2 Projects with Water Supply Benefits .....6-4

Table 6-3 Projects with Water Quality Management Benefits..... 6-15

Table 6-4 Projects with Flood Management Benefits..... 6-20

Table 6-5 Projects with Environmental Resource Management Benefits ..... 6-22

Table 6-6 Projects with Land Use Planning/Management Benefits..... 6-23

Table 6-7 Projects with Climate Change Mitigation Benefits ..... 6-25

Table 7-1 Project Review Factors for Acceptance into the IRWM Plan .....7-8

Table 7-2 Prioritization Method and Scoring ..... 7-10

Table 7-3 Prioritized Implementation Projects Accepted into  
the Antelope Valley IRWM Plan ..... 7-12

Table 7-4 Conceptual Projects Accepted into the Antelope Valley IRWM Plan..... 7-13

Table 8-1 IRWM Plan Relationship to Local Planning Documents .....8-3

Table 8-2 IRWM Plan Financing Plan.....8-11

Table 8-3 Technical Information..... 8-17

Table 8-4 Project Monitoring and Program Performance Measures..... 8-25

Table 8-5 Implementation Project Potential Monitoring Activity..... 8-33

# List of Figures

Figure 1-1 Antelope Valley IRWM Region..... 1-5

Figure 1-2 Antelope Valley IRWM Disadvantaged Communities as  
 Defined by Census Blocks and Population Densities ..... 1-21

Figure 1-3 Antelope Valley Integrated Regional Water Management Planning Process..... 1-26

Figure 1-4 Incorporation of Climate Change into the Antelope Valley IRWM Plan ..... 1-29

Figure 2-1 Neighboring IRWM Regions ..... 2-3

Figure 2-2 DWR IRWM Funding Regions ..... 2-4

Figure 2-3 Antelope Valley Service Districts..... 2-7

Figure 2-4 Antelope Valley City Boundaries and Special Districts ..... 2-8

Figure 2-5 Annual Precipitation..... 2-9

Figure 2-6 Average Maximum and Minimum Temperature  
 in the Antelope Valley Region..... 2-9

Figure 2-7 Average Rainfall and Monthly Evapotranspiration (ET<sub>o</sub>)  
 in the Antelope Valley Region..... 2-10

Figure 2-8 Map of Annual Precipitation for the Antelope Valley Region ..... 2-11

Figure 2-9 Antelope Valley Hydrologic Features ..... 2-13

Figure 2-10 Antelope Valley Watersheds..... 2-14

Figure 2-11 Cross Sectional View of the Clay Layer Between the Upper  
 and Lower Aquifers in the Antelope Valley Region ..... 2-16

Figure 2-12 Antelope Valley Soils Map..... 2-19

Figure 2-13 Antelope Valley Groundwater Sub-Basin Boundary Map..... 2-23

Figure 2-14 Current Land Use Designations for the Antelope Valley Region..... 2-29

Figure 2-15 Solar and Wind Generation Facilities in the Antelope Valley Region ..... 2-34

Figure 2-16 Income Levels for the Antelope Valley Region..... 2-36

Figure 2-17 Population Projections..... 2-40

Figure 2-18 Antelope Valley Region Population..... 2-40

Figure 3-1 Water Budget Schematic..... 3-2

Figure 3-2 Major Infrastructure ..... 3-4

Figure 3-3 Regional Average Year Water Demand..... 3-9

Figure 3-4 Regional Dry Year Water Demand ..... 3-10

Figure 3-5 Proposed Recycled Water Infrastructure ..... 3-18

Figure 3-6 1915 Groundwater Level Contour Map of the Antelope Valley Region..... 3-25



Figure 3-7 1961 Groundwater Level Contour Map of the Antelope Valley Region..... 3-26

Figure 3-8 1979 Groundwater Level Contour Map of the Antelope Valley Region..... 3-27

Figure 3-9 1988 Groundwater Level Contour Map of the Antelope Valley Region..... 3-28

Figure 3-10 2006 Groundwater Level Contour Map of the Antelope Valley Region..... 3-29

Figure 3-11 Water Supply Summary for an Average Water Year ..... 3-31

Figure 3-12 Water Supply Summary for Single-Dry Water Year..... 3-32

Figure 3-13 Water Supply Summary for a Multi-Dry Water Year ..... 3-33

Figure 3-14 Subsidence Levels in the Antelope Valley Region..... 3-37

Figure 3-15 Areas of Potential Land Subsidence in the Antelope Valley Region..... 3-38

Figure 7-1 IRWM Project Review Process..... 7-7

Figure 8-1 Antelope Valley IRWM Governance Structure ..... 8-4

Figure 8-2 Advisory Team Interest Representation ..... 8-5

Figure 8-3 Antelope Valley IRWM Financing Needs ..... 8-9