Table 8-3: Technical Information

Technical Information	Analysis Method	Results/Derived Information	Use in IRWM Plan	Reference or Source
Population Projections	Extracted 2010 populations using 2010 census block group data Extracted projected population information for Palmdale and Lancaster	2010 population estimates Projected population increases between 2010 and 2035	Used to describe regional characteristics, estimate future demand	US Census Bureau, 2010. 2010 US Census statistics. Southern California Association of Governments, 2008. Adopted 2008 RTP Growth Forecast, by City.
DAC identification	Extracted income information by census block group and place	Median household income	Used to identify DACs within the Region	US Census Bureau, 2011. 2006-2010 American Community Survey 5-year Estimates. RMC, 2013. Task 2.1.2 DAC Water Supply, Quality, and Flooding Data. Antelope Valley IRWMP 2007 Update.
Water Supply Projections	Reviewed 2010 urban water management plans	Water supply by source projected between 2010 and 2035 by water district	Used to project water supply availability for the Region, and identify water supply needs and issues	AVEK, 2011. 2010 Urban Water Management Plan. LCID, 2011. Annual CDPH Drinking Water Program Report. LACWD 40 and QHWD, 2011. 2010 Urban Water Management Plan. PWD, 2011. 2010 Urban Water Management Plan. RCSD, 2011. 2010 Urban Water Management Plan.

Technical Information	Analysis Method	Results/Derived Information	Use in IRWM Plan	Reference or Source
Urban Water Demand Projections	Review of 2010 urban water management plans	Projected total demand and per capita demand	Used with population projections to project demand for the Region	AVEK, 2011. 2010 Urban Water Management Plan. LCID, 2011. Annual CDPH Drinking Water Program Report. LACWD 40 and QHWD, 2011. 2010 Urban Water Management Plan. PWD, 2011. 2010 Urban Water Management Plan. RCSD, 2011. 2010 Urban Water Management Plan.
Agricultural Water Demand Projections	Review of existing records of agricultural land use Estimation of crop evapotranspiration using Palmdale area ETo station Calculation of crop water requirements using ETo, crop types, crop area, historical rainfall	Estimated crop water requirements for the Antelope Valley	Used to describe current water demands, and estimate future supply needs	Hansen, B.R., et al. 2004. "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., et al. "Reference Evapotranspiration (ETo) for California," UC Bull. 1922. CIMIS, 2012. Evapotranspiration Estimates. Palmdale Station 197 from Jan. to Dec. 2012. Los Angeles County Agricultural Commissioner, 2011. 2010 Crop Reports.
Total Sustainable Yield	Review of Antelope Valley groundwater basin adjudication documents Discussion with stakeholders	Estimated range of the total sustainable yield of the Antelope Valley Groundwater Basin	Used to estimate groundwater supply availability	Appendix I documents

Technical Information	Analysis Method	Results/Derived Information	Use in IRWM Plan	Reference or Source
Groundwater Quality	Extraction of groundwater quality data by well for select constituents	Wells that exceed drinking water limits for select constituents within the Antelope Valley	Used to describe current groundwater quality, and determine drinking water quality issues and needs	SWRCB, 2013. GeoTracker GAMA. Groundwater Ambient Monitoring & Assessment Program. LACWD 40, 2013. Salt and Nutrient Management Plan for the Antelope Valley.
Regional Flood Needs	Review of existing records of localized flooding Review of FEMA flood zones	Locations of localized flooding Locations of 100 year flood zone	Used to determine flood infrastructure or management needs	RMC, 2013. Task 2.3.2 Flood Protection Needs. Antelope Valley IRWMP 2007 Update.
DAC water resources needs	Review of existing records supply availability, groundwater quality, and flooding records for DAC areas in Antelope Valley	Identified water supply, water quality and flood related needs in the DAC areas of Antelope Valley	Used to determine DAC related issues and needs.	RMC, 2013. Task 2.1.2 DAC Water Supply, Quality, and Flooding Data. Antelope Valley IRWMP 2007 Update.
SWP reliability	Review of DWR's State Water Project Reliability Report	Projected state water project deliveries under various hydrologic scenarios	Used to project imported water supplies under average year, singly dry year, multiple dry year scenarios.	DWR, 2011. State Water Project Reliability Report

8.6 IRWM Plan Performance

This subsection develops measures that will be used to evaluate Plan and project performance, monitoring systems that will be used to gather performance data, and mechanisms to adapt strategy implementation and operations based on performance data collected.

8.6.1 Performance Measures

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 Regional 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. On an ongoing basis, plan objectives 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 agrees to continue to refine these performance measures. The A-Team, in conjunction with a potential committee made up of stakeholder group members, will be taking primary responsibility for organizing the tracking and evaluation of IRWM Plan performance, though tracking of individual output indicators may be completed by different entities.

Water Supply Management Targets

Maintain adequate supply and demand in average years. 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, such as ultra-low flush toilets (ULFT), high-efficiency clothes washers (HECW), rotary sprinkler nozzles (RSN), and weather-based irrigation controllers (WBIC). 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. Recycled water served to customers will be measured

and reported in water purveyor annual reports and in UWMPs every five years. This target will also be met by additional potable water produced and stored. Potable water served to customers will also be measured and reported in these ways. 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 (61,200 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 along with the volumes of groundwater banked and withdrawn quarterly. The cumulative total amount of water banked may also be recorded quarterly. As water is put into storage, 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 (164,800 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 by 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, the total mismatch and reduction in demand for meeting multi-dry year conditions would be recorded and included in the central data management program..

Adapt to additional 7-10% reduction in imported deliveries by 2050, and additional 21-25% reduction in imported water deliveries by 2100. The performance of this planning target would be monitoring in the same way as the target above to reduce mismatch of expected supply and demand in dry and multi-dry years by providing new water supply and reducing demand, starting 2009.

Demonstrate ability to meet regional water demands over an average year without receiving SWP water for 6 months over the summer, by 2017. 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 refining the estimate of how much imported water is used during that time period and then comparing that number to how much water is available as an emergency supply 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 under current 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 of recharge and extraction facilities. Annual total volumes would be recorded and included in a central data management program and the demand may be compared against the supply reserves to show whether there is sufficient supply (or potential to reduce demand) to accommodate 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 need to be determined: 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.

It is assumed that a watermaster or other Court-appointed entity would be responsible for monitoring groundwater levels when the adjudication process has been completed.

Water Quality Management Targets

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 CDPH. If the measurements indicate that compliance is not being achieved, additional water quality monitoring of taste and odor causing compounds, such as geosmin (a compound found in soils that is responsible for the earthy, musty odor and taste in water) and algae 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 appropriate. The quality of groundwater in recharge zones will also be monitored to ensure that the non-impacting activities that help meet Basin Plan requirements are sited appropriately. These monitoring efforts would align with SNMP monitoring efforts. 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 2017. 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 and to support the establishment of a monitoring program in the problem area to document the change in contaminant plume over time and rate of migration. These monitoring efforts would align with SNMP monitoring efforts. 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 include determination 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 2017. To prevent migration of existing contaminants to currently uncontaminated portions of the aquifer, 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. These monitoring efforts would align with SNMP monitoring efforts. The data would 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 identification of 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 appropriate. 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 identifying 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 Los Angeles/Kern County Regional Recycled Water Project 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.

Flood Management Targets

Coordinate a regional flood management plan and policy mechanism by the year 2017 and incorporate adaptive management strategies for climate change. 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 aquifers, 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 management plan would also be indicators of program performance. Progress would be included in the central data management program to ensure close coordination of efforts.

Environmental Resource Management Targets

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 2017. 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.

Land Use Planning/Management Targets

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 2017 and incorporate adaptive management for climate change. 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.

Climate Change Mitigation Target

Implement "no regret" mitigation strategies, when possible, that decrease GHG's or are GHG neutral. To measure GHG reductions in the Region, the existing GHG emissions created through water resources management will be compared to the future GHG emissions created. Water purveyors would estimate the GHG emissions reductions created through the implementation of mitigation strategies, or the reduction of embedded energy used to imported water and associated GHG emissions. This data would be included in the central data management program.

Table 8-4 summarizes the project monitoring and program performance measures.

Table 8-4: Project Monitoring and Program Performance Measures

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
Maintain adequate supply and demand in average years.							
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 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 is an average, single dry or multiple dry year ETo from CIMIS weather stations in Palmdale and Victorville.	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	Western Regional Climate Center, EAFB	Measurement to be reported: Total reduction in mismatch Reporting: Report quarterly with updates to regional board and compare against objectives
			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 reuse sites	Monthly/ Quarterly	LACSD	
			Population Projections	Census statistics SCAG population projections	Annually	Counties and cities	
			M&I Demand	Recalculate the regional average per capita demand, Then use this number and the projected population estimates to calculate total demand.	Annually	Water purveyors	
			Agricultural Demand	Obtain 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	Los Angeles County Farm Bureau, Kern County Farm Bureau	

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
			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 • Percent remaining in storage to improve groundwater levels For Water Deals/Transfers: • Amount agreed/allotted (water right) • Actual amount transferred.	Monthly/ Quarterly	Project Proponents	
			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 Proponents	
Provide adequate reserves (61,200 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	Water bank operators	Measurement to be reported: Total mismatch and reduction in demand Reporting: Report every five years minimum

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
Provide adequate reserves (164,800 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	Water bank operators	Measurement to be reported: Total mismatch and reduction in demand Reporting: Report every five years with update of the Plan and compare against objectives
Adapt to additional 7-10% reduction in imported deliveries by 2050, and additional 21-25% reduction in imported water deliveries by 2100.							
Increased local supply development.	Amount of local water supply development each year.	Amount of groundwater, local surface water and recycled water used each year.	Local water supply accessibility.	Use deliveries of groundwater, local surface water, and recycled water from annual reports. Estimation of local supplies made accessible by implemented projects.	Annually	AVSWCA in conjunction with water purveyors	Measurement to be reported: Total increase in local water supply delivery and development. Reporting: Report every five years with update of the Plan and compare against objectives.
Demonstrate ability to meet regional water demands without receiving SWP water for 6 months over the summer, by 2017.							
Provide a diversity of water supply sources to meet peak demands over the summer	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 (updated from estimate provided in Section 4.2)	Use deliveries from AVEK, LCID, and PWD during 6-month summer periods.	Annually	AVEK, LCID, PWD	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 five 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.
			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	Water bank operators	
			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	Local water purveyors	
			Overall storage capacity within existing or proposed recharge and extraction facilities.	Master Plans/Infrastructure Reports	Annually	Water bank operators, agencies implementing local groundwater recharge	

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
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 groundwater recharge and extractions are in balance.	Observed groundwater levels in a monitoring network that provides representative view of entire groundwater basin Coordination with the Lahontan RWQCB 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	Well monitoring (GAMA Program methodology will be followed, when applicable)	Quarterly	RWQCB	Measurement to be reported: Observed groundwater level improvements; calculate 10-year average Reporting: Report with update of the Plan and compare against objectives
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 standards. For taste & aesthetics, overall consumer satisfaction with water quality. Reporting: Taste & aesthetics collect annual data, report with updates, could also add to CCR Reporting.
			Taste & aesthetic	Solicit consumer input at a community fair	Monthly/Annually	Local water districts	
			Overall customer satisfaction	Include a bi-annual mail-in survey in the monthly water bill	Semi-annually	Local water districts	
Prevent unacceptable degradation of aquifer according to the Basin Plan throughout the planning period.							
Preserve acceptable quality of groundwater paying special attention to potential contaminants such as arsenic, nitrate, salinity and other problem pollutants	Monitoring of groundwater 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 activities 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, Pesticides, pH, as required by Basin Plan and additionally measure pollutants of concern such as arsenic, nitrate, TDS	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	RWQCB	Measurement to be reported: water quality limits Reporting: Report with update of the Plan and compare against objectives

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
Map contaminated and degraded sites and monitor contaminant movement, by 2017.							
Set up a process for identifying, mapping and monitoring contaminated sites. *Note: Groundwater quality monitoring is being completed as part of ongoing SNMP efforts.*	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.	Database with location of the well, contaminants and detection levels, continually monitor that, monitoring of a few wells near it. Upstream 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.	Groundwater pumpers in conjunction with RWQCB	Measurement to be reported: Record of contaminated sites Reporting: Report every year with update of the Plan and compare against objectives
Identify contaminated portions of aquifer and prevent migration of contaminants, by 2017.							
Provide information for groundwater management that will prevent migration of existing contaminants to currently uncontaminated portions of the aquifer *Note: Groundwater quality monitoring is being completed as part of ongoing SNMP efforts.*	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, monitoring of nearby wells.	Quarterly	Groundwater pumpers in conjunction with RWQCB	Measurement to be reported: water quality data, contour level data, TBD Reporting: Report with update of the Plan and compare against objectives

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
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 *Note: Groundwater quality monitoring is being completed as part of ongoing SNMP efforts.*	Identification of potential contamination sources and mechanisms Identification of 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 Residual Color, Dissolved Oxygen, Floating Materials, Oil and Grease, Non-degradation of Aquatic Communities, Pesticides, pH, as required by Basin Plan and additionally measure pollutants of concern such as arsenic, nitrate, and TDS	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	RWQCB, purveyors	Measurement to be reported: water quality limits Reporting: Report with update of the Plan and compare against objectives
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 7,700 AFY in 2015, 18,000 AFY in 2025, and 31,000 AFY of recycled water under contract by 2035. These numbers do not include recycled water used currently for environmental maintenance.	Volume of recycled water available: 23,000 AFY in 2015, 27,000 AFY in 2025, and 31,000 AFY in 2035 that will be used in the M&I, GWR, 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 with update of the Plan and compare against objectives
Coordinate a regional flood management plan and policy mechanism by the year 2017 and incorporate adaptive management strategies for climate change.							
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 management plan.	Monitoring progress of development of the Plan and policy mechanism	Monitoring of localized flooding incidents Monitoring of new flood control projects Development of an integrated flood management plan	Quarterly	Counties and Cities	Measurement to be reported: Measuring progress of a flood management plan development. Reporting: Report with update of the Plan and compare against objectives

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
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 2017.							
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 re-vegetate 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 pm10, 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	Counties, 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 with update of the Plan and compare against objectives
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 acreage 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 pm10, pm2.5)	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	Los Angeles County Farm Bureau, Kern County Farm Bureau	Measurement to be reported: Comparison between existing (2005) acreage of agricultural land in rotation and measured agricultural land in rotation. Reporting: Report with update of the Plan and compare against objectives
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	Counties and cities	Measurement to be reported: Comparison between existing acreage of recreational land and measured recreational land. Reporting: Report with update of the Plan and compare against objectives
Coordinate a regional land use management plan by the year 2017 and incorporate adaptive management strategies for climate change							
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 use management plan. A broadly supported regional land use management plan.	Monitoring progress of development of the plan and policy mechanism	Plan development	Quarterly	Counties and cities	Measurement to be reported: Measuring progress of land use management plan development. Reporting: Report with update of the Plan and compare against objectives

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
			What needs to be measured:	*How it should be measured:*	*Measurement/ Reporting Frequency*	*Who should measure*	
Implement "no regret" mitigation strategies, when possible, that decrease GHGs or are GHG neutral							
Decrease or neutralize GHG emissions from water resources management activities.	**Records of GHG emissions from water and wastewater treatment and distribution.** **Records of imported water use versus local water supply use.**	**Reported decrease in estimated GHG emissions from water/wastewater distribution systems.** **Decrease in imported water usage.**	**Monitoring of GHG emissions from local activities and import of water.**	**Existing reporting through annual reports, UWMPs, and Air Resources Board reporting.**	**Annually**	**AVSWCA and purveyors**	**Measurement to be reported: Reduction in GHG emissions** **Reporting: Report with update of the Plan and compare against objectives**

8.6.2 Project Specific Monitoring Plans

Project-specific monitoring plans will be developed for projects as they are implemented. They will be required to track each project's progress in meeting the Region's objectives and targets as well as in meeting the individual project's expected benefits. Table 8-5 describes the types of information that may be monitored for the implementation projects described in Section 7.

Table 8-5: Implementation Project Potential Monitoring Activity

Sponsor	Project Name	Potential Monitoring Activity
City of Palmdale	Upper Amargosa Creek Flood Control, Recharge, and Habitat Restoration Project	• Volume of water recharged • Volume of imported water used before and after project implementation • Water quality in Amargosa Creek upstream and downstream of project • Acres of habitat and open space created • Acres of improved flood protection
Palmdale Water District	Littlerock Creek Groundwater Recharge and Recovery Project	• Volume of water recharged • Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Water quality in Littlerock Creek upstream and downstream of project • Acres of habitat and open space created • Acres of improved flood protection
Palmdale Water District	Littlerock Dam Sediment Removal	• Volume of water recharged • Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Water quality in Littlerock Creek upstream and downstream of project • Acres of habitat and open space created • Acres of improved flood protection
Antelope Valley Resource Conservation District	Antelope Valley Regional Conservation Project	• Volume of stormwater recharged • Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Acres of recreation and open space created • Energy created through solar panel use • Number of trees planted
AVEK	Water Supply Stabilization Project – Westside Project (WSSP-2)	• Volume of water recharged • Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Acres of open space created • Acres of improved flood protection
AVEK	Water Supply Stabilization Project (WSSP) – Westside Expansion	• Volume of water recharged • Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Acres of open space created • Acres of improved flood protection

Sponsor	Project Name	Potential Monitoring Activity
AVEK	Eastside Banking & Blending Project	• Volume of water recharged • Acre-feet of imported water used before and after project implementation, and associated energy use reduction • THM levels in drinking water before and after project
AVEK	AVEK Strategic Plan	• Not applicable – planning document
Palmdale Recycled Water Authority	Palmdale Recycled Water Authority – Phase 2 Distribution System	• Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Volume of new recycled water use
AVEK	South Antelope Valley Intertie Project	• Acre-feet of imported water used before and after project implementation, and associated energy use reduction • THM levels in drinking water before and after project
City of Lancaster	Antelope Valley Recycled Water Master Plan	• Not applicable – planning document
Boron CSD	BCSD Arsenic Management Feasibility Study and Well Design	• Arsenic concentrations in target well and drinking water • Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Volume of new groundwater pumping available
City of Lancaster	Division Street and Avenue H-8 Recycled Water Tank	• Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Volume of new recycled water use
City of Lancaster	Lancaster National Soccer Center Recycled Water Conversion	• Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Volume of new recycled water use
City of Lancaster	Pierre Bain Park Recycled Water Conversion	• Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Volume of new recycled water use
City of Lancaster	Whit Carter Park Recycled Water Conversion	• Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Volume of new recycled water use
Rosamond CSD	RCSD Arsenic Consolidation Project	• Decrease in arsenic concentrations in drinking water • Reduction in drinking water conveyance system energy use
Antelope Valley Water Storage	Antelope Valley Water Bank	• Acre-feet of water stored
City of Palmdale	Palmdale Power Plant Project	• Acre-feet of imported water used before and after project implementation, and associated energy use reduction • Volume of new recycled water use

Projects proponents will be expected to monitor at the locations and frequency required by regulatory agencies and permitting. As described under Section 8.4.1, 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, 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.

8.7 Adaptive Management

The Antelope Valley Region will use an adaptive management process in its analysis of Plan and project performance and will utilize a methodology to update the Plan and modify projects. The Region will perform reviews of Plan performance at the frequency described in the above monitoring plan in addition to IRWM Plan updates that will occur every five years.

At the Plan level, the Region will review its progress in meeting the planning targets to determine whether they are being met. If the Region's planning targets are not being met, then a review of the original targets, verification of submitted project data, a request for additional data, and/or consideration of a broader mix of strategies and or projects may be warranted. The Region will perform a more in depth examination of its targets and objectives during its five-year Plan updates that will incorporate new studies and data relevant to the Region, and the Region will re-evaluate its issues and needs (i.e., the Region's prioritized vulnerabilities to climate change).

At the project level, project proponents will be responsible for tracking project performance and adjusting project operations for maximum benefit. Those projects that are funded through IRWM program grants will be expected to report on project performance to the Region.

If both project and plan level responses do not lead to satisfactory results, then a change in the Region's governance structure may be considered. This could involve identifying and inviting additional stakeholders whose participation would improve success. Changes to the stakeholder process could be explored to bring new ideas. Finally, a change in decision making process could be considered.