

Attachment 10 consists of the following information for the application:

- 1. Strategic Business Plan**
- 2. Climate Change Vulnerability Assessment**
- 3. Contact Person for Climate Change**
- 4. Risk of Climate Change in its Capital Reserves and Investments**

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Strategic Business Plan

The primary threats from climate change to the Coachella Valley are reduction in groundwater quality and quantity, and reduced availability of imported water supplies. Coachella Valley Water District (CVWD) has a *2015 Strategic Plan (Appendix 10-1)* whose main goal is to deliver high quality drinking water that meets stringent government standards.¹ CVWD's strategic goals are: employee/workforce development, financial stability, water supply sustainability, exceptional customer service, water quality and environmental leadership, and infrastructure investment and management.

Several significant, external issues influenced the development of CVWD's strategic goals. California's historic drought resulted in state-mandated conservation goals and water-use restrictions, which included goals and restrictions on the Coachella Valley Regional Water Management Group (CVWRMG) member agencies. Therefore, to abide by the state mandate and recognize the importance of conserving water, the *2010 Coachella Valley Water Management Plan (CVWMP)* and the *2013 Mission Creek – Garnet Hill Water Management Plan (MC-GH WMP)* were developed to analyze groundwater conditions and develop management programs in key groundwater subbasins of the Coachella Valley Groundwater Basin. The CVWMP and MC-GH WMP each detailed several strategies and projects to eliminate overdraft and continue groundwater replenishment. CVWD also recognizes the vulnerability of imported water supplied from the Colorado River and the State Water Project (SWP), and established plans to protect and optimally use their imported supplies. Continuous repair and replacement of parts of the Coachella Canal irrigation system and stormwater protection for the Coachella Valley are other key goals for CVWD. Following passage of the Sustainable Groundwater Management Act (SGMA), CVWD and the other water purveyors in the Coachella Valley – including Desert Water Agency (DWA), Mission Springs Water District (MSWD), Coachella Water Authority (CWA), and Indio Water Authority (IWA) – each submitted application materials to become a Groundwater Sustainability Agency (GSA) for different portions of the groundwater subbasins. In January 2017, CVWD submitted two sets of information to the California Department of Water Resources (DWR) to serve as Alternative Plans: 1) the 2010 CVWMP, the 2016 SGMA Alternative Groundwater Sustainability Plan Bridge Document for the Indio Subbasin, and other supporting documents, and 2) the 2013 MC-GH WMP, the 2016 SGMA Alternative Groundwater Sustainability Plan Bridge Document for the Mission Creek Subbasin, and other supporting documents. Both Alternative Plans – which address all of the water reliability issues described above – were approved by DWR on July 17, 2019.

Based on these external issues, the Strategic Plan identified projects that would align with CVWD's goals.

Climate Change Vulnerability Assessment

The Climate Change Handbook for Regional Water Planning (DWR 2011) is intended to help local agencies, cities, and counties include climate change as part of their water resources planning. As part of the suggested process, the Climate Change Handbook recommends regions identify strategies that can be used to help them to adapt to climate change as well as mitigate greenhouse gas (GHG) emissions. The *2009 California Climate Adaptation Strategy Handbook* (CNRA 2009) defines climate change adaptation as adjustments to the natural or human systems due to actual or expected climate changes in an effort to minimize harm or take advantage of beneficial opportunities, while climate change mitigation aims at directly reducing the GHG emissions that cause climate change through energy efficiency, emissions reduction, and/or carbon sequestration.

The CVWRMG completed a climate change vulnerability assessment as part of its *2018 Coachella Valley IRWM/SWR Plan Update*. This update used DWR's Climate Change Handbook and CNRA's Climate Adaptation Strategy Handbook, along with additional climate change related documents, to identify water management strategies that address climate change vulnerability issues and mitigate GHG emissions. Prioritization was given to strategies that could provide answers to the following questions:

- Is the strategy a “no regret” strategy?
- Does the strategy help to adapt to the vulnerability issues identified and evaluated in *Section 3.2.3 Vulnerability Analysis of the 2018 Coachella Valley IRWM/SWR Plan Update*?
- Does the strategy help the Region mitigate GHGs?

In *Chapter 3 Issues and Needs* of the *2018 Coachella Valley IRWM/SWR Plan Update (Appendix 10-2)*, the Coachella Valley Region created models to project climate change impacts to water supplies and infrastructure. Generally, climate change is expected to increase temperatures, with little to no change in average rainfall, and increase in water demand due to higher irrigation needs caused by increased temperatures.

¹ Coachella Valley Water District. 2015. *Strategic Plan*.



Imported water from the Colorado River Aqueduct (for SWP exchange water) and Coachella Canal (for Colorado River water) may be impacted by decreased flows in the Colorado River since it has been projected that there will be up to 20% decrease in the River's flow (Hoerling, et al. 2009). Climate changes may also slightly increase the frequency of wildfires. Increases in wildfires have the potential to increase sedimentation and turbidity of surface waters and increase flash flooding (Lenihan, et al. 2008). By knowing these projected climate change impacts, vulnerabilities can be prioritized and implemented using best management practices. The vulnerability issues found in **Table 10-1** are considered to be unique aspects of the Coachella Valley Region.

Table 10-1: Prioritized Climate Change Vulnerability Issues

Priority Level	Category and Vulnerability Issue
High	<ul style="list-style-type: none"> Water Demand: Crop water demand would increase Water Supply: Decrease in imported supply Flooding: Increases in inland flooding
Medium	<ul style="list-style-type: none"> Water Demand: Lack of groundwater storage to buffer drought Water Demand: Limited ability to conserve further Water Demand: Limited ability to meet summer demand Water Supply: Invasive species can reduce the supply available
Low	<ul style="list-style-type: none"> Water Demand: Industrial demand would increase Water Supply: Decrease in local surface supply Water Supply: Decrease in groundwater supply Water Quality: Increased erosion and sedimentation due to wildfires Ecosystem and Habitat: Increased impacts to water dependent species Ecosystem and Habitat: Decrease in available unnecessary habitat

Source: CVRWMP, 2018, *Coachella Valley IRWM/SWR Plan Update*.

In the climate change vulnerability assessment, the highest ranked vulnerabilities were considered to be increased crop water demand, decreased water supply, and increased inland flooding. With the expected increase in temperatures, there will be an increase in crop irrigation demands, which could in turn increase supply costs. Given the Region's limited local water supplies, a decrease in imported supply could have a significant impact on the Region. Even though Colorado River water supplies are relatively secure, it is expected that the average reliability of the Colorado River's discharge will be impacted by variations in precipitation and snowpack. Additionally, the Sierra Nevada will likely be impacted by greater precipitation and the Sacramento-San Joaquin River Delta will likely be impacted by sea level rise, which together will affect the reliability of SWP allocations. Lastly, it is predicted that there will be an increase in inland flooding due to more extreme storms, which will put the Region's critical water infrastructure found in the 200-year flood plain at risk.

As stated above, some of these climate change vulnerability issues can already be addressed by climate strategies that have a "no regret" implementation. The Projects discussed in this application will help reduce water demand and protect groundwater quality throughout different areas of the Region, both of which help to improve water supply reliability. By addressing climate change concerns through these Projects, there is a better chance to mitigate climate change impacts in the future.

The climate strategies, listed in **Table 10-2**, were created to help the Coachella Valley Region respond to and reduce potential climate change vulnerabilities. Several of these strategies address reducing energy consumption, even when not explicitly stated. The Region has also been implementing water use efficiency strategies, which has significantly reduced the overall gallons per capita per day throughout the Region. The amount of imported water needed reduces when urban water demands are reduced, which in turn, reduces energy consumption and GHGs.



Table 10-2 Climate Change Management Strategies

	Implemented in Region?	No regret strategy?	Help to adapt to climate change vulnerabilities?	Help to mitigate GHGs?
Reduce Water Demand				
Agricultural Water Use Efficiency	Yes	Yes	Yes	Yes
Urban Water Use Efficiency	Yes	Yes	Yes	Yes
Water Meter Installation ¹	Yes	Yes	Yes	Yes
Improve Operational Efficiency and Transfers				
Conveyance – Delta	Yes	Yes	Yes	Yes
Conveyance – Regional/Local	Yes	Yes	Yes	Yes
System Reoperation	Yes	Yes	Yes	Yes
Water Transfers	Yes	Yes	Yes	
Conduct emissions inventories ¹	Yes	Yes		Yes
Increase use of renewable energy sources ¹	Yes			Yes
Localized (or decentralized) water/wastewater treatment ¹	No			Yes
Shift water use to off-peak hours ¹	No	Yes	Yes	
Optimize sewer systems ¹	Yes		Yes	
Increase Water Supply				
Conjunctive Management and Groundwater Storage (including Stormwater Retention Basin)	Yes	Yes	Yes	
Desalination	Yes		Yes	
Precipitation Enhancement	Yes		Yes	Yes
Recycled Municipal Water	Yes	Yes	Yes	Yes
Surface Storage – CALFED	Yes		Yes	Yes
Surface Storage – Regional/Local	Yes		Yes	Yes
Improve Water Quality				
Drinking Water Treatment and Distribution	Yes	Yes	Yes	
Groundwater Remediation/Aquifer Remediation	Yes	Yes	Yes	
Matching Quality to Use	Yes	Yes	Yes	Yes
Pollution Prevention	Yes	Yes	Yes	Yes
Salt and Salinity Management	Yes	Yes	Yes	Yes
Urban Runoff Management ²	Yes	Yes	Yes	Yes
Improve Flood Management				
Flood Management ²	Yes	Yes	Yes	
Integrated Flood Management ²	No	Yes	Yes	
Protective Infrastructure ¹	Yes		Yes	
Sediment Management ¹	No		Yes	
Practice Resources Stewardship				
Agricultural Lands Stewardship	Yes	Yes	Yes	Yes



	Implemented in Region?	No regret strategy?	Help to adapt to climate change vulnerabilities?	Help to mitigate GHGs?
Ecosystem Restoration	Yes	Yes	Yes	Yes
Forest Management	Yes	Yes	Yes	Yes
Recharge Area Protection	Yes	Yes	Yes	Yes
Watershed Management	Yes	Yes	Yes	Yes
People & Water				
Economic Incentives (Loans, Grants and Water Pricing)	Yes	Yes	Yes	Yes
Outreach and Engagement	Yes	Yes	Yes	
Water and Culture	Yes	Yes		
Water-Dependent Recreation	Yes	Yes		
Other Strategies				
Crop idling, dewvaporation, fog collection, irrigated land retirement, rainfed agriculture, and waterbag transport	No	No	No	No

¹ Indicates an additional strategy (not an RMS identified in the *2013 California Water Plan Update*) that was considered as a potential additional strategy that could be implemented to address climate change.

² Stormwater retention is included in the Urban Runoff Management, Flood Management and Integrated Flood Management plans.

These strategies were designed to complement each other when implemented so that participating water purveyors can help fully achieve the strategies' goals. The different strategies focus on reducing water demand, improving operational efficiency and transfers, increasing water supply, improving water quality, improving flood management, practicing resource stewardship, reconnecting people with water, and other strategies. Reducing water demand for the Region will be implemented through improving agricultural water use efficiency through irrigation technology, monitoring, and education and improving urban water use efficiency, installing water efficient landscapes, and education.

The strategies were created to address climate change vulnerability issues and mitigating GHG emissions. Some of these strategies are "no regret" strategies, which means that if implemented, these strategies would provide benefits today regardless of potential climate change impacts and would reduce the Region's vulnerability to potential future climate change impacts. The "no regret" strategies are desirable for immediate implementation. Additional strategies that were determined to not be appropriate for the Region are discussed in *Section 8.2 Resource Management Strategies* in the *2018 Coachella Valley IRWM/SWR Plan Update*. The set of strategies found in **Table 10-2** will best help the Region in responding to and reducing potential climate change vulnerabilities given current knowledge.

Contact Person for Climate Change

CVWD serves as the regional lead agency on climate change in the Coachella Valley:

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Risk of Climate Change in its Capital Reserves and Investments

CVWD has considered risk of climate change in its capital reserves and investments, which can be seen through the types of projects being implemented throughout the Region. One of the largest climate risks faced by the Coachella Valley is reduction in imported recharge water. Multiple projects in this application directly address this climate risk issue by minimizing Coachella



Valley's use of potable water for non-drinking uses, reducing groundwater pumping for inefficient landscapes, and consolidating small water systems to improve access to safe drinking water and eliminate degraded wells from the basin. Coachella Valley is considering the risk of climate change by investing funds into projects that help mitigate the effect of future climate change impacts. As stated in the first two sections of *Attachment 10*, climate change vulnerabilities have been identified with actions that can be taken to implement mitigation measures. Support has been given to projects that help alleviate stress on water supply sources, improve water accessibility, decrease water demand, and improve water quality for the different communities within the Region. With recognition from stakeholders, disadvantaged and tribal communities will have their water-related concerns addressed and supported through different projects presented in this application. The Region's capital reserves and investments will support projects that help to adapt to and mitigate climate change impacts. The following paragraphs describe how the projects in this application address climate change:

- The **CV Water Counts Regional Conservation Program** directly addresses multiple high and medium priority vulnerabilities related to "Water Supply: Decrease in imported supply" and "Water Demand: Limited ability to meet summer demand" by reducing urban demands for additional recharge water. Urban water use efficiency is a "no regret" strategy that helps to both adapt to climate change and mitigate GHG emissions (see Table 10-2). *CV Water Counts* works to educate and incentivize residents to create more water-efficient landscapes and use less potable drinking water for non-drinking uses. *CV Water Counts* will target several of the urban water efficiency implementation goals by providing incentives for the reduction of irrigation of turf in the Region and by showing residents via demonstration gardens that water efficient landscaping can be an aesthetic replacement for turf. Urban water use efficiency is a "no regret" strategy that will help the Coachella Valley to reduce pumping and better manage its groundwater basins, which will be increasingly stressed in response to climate changes.
- The **Non-Potable Water System – Hovley Lane East** project directly addresses multiple high and medium priority vulnerabilities related to "Water Demand: Crop water demand would increase" and "Water Demand: Limited ability to meet summer demand" by replacing irrigation demands with non-potable water supplies. Recycled municipal wastewater is a "no regret" strategy that helps to both adapt to climate change and mitigate GHG emissions (see Table 10-2). The *Non-Potable Water System* reduces the cost of replacing golf course irrigation via groundwater wells with recycled water. Currently, golf course owners have no incentive to switch to recycled water, as use of their groundwater wells is cheaper. However, it is difficult for the groundwater sustainability agencies to manage extraction from private users, such as golf courses. Grant funding of CVWD's recycled water system is essential to allowing recycled water to be competitive for these users. Switching large irrigators to the recycled water system will reduce the amount of groundwater pumping and associated need for additional recharge water, all while using a locally-available recycled wastewater supply that is currently underutilized. Recycled water is a "no regret" strategy that will help the Coachella Valley to better manage its groundwater basins and ensure sustainable use of existing resources.
- The **East Coachella Valley Water Supply Project – Avenue 66 Phase 2B** will consolidate a small water system, the Manuela Garcia Mobile Home Park, into CVWD's domestic water system. The **Castro Mobile Home Park (MHP) Water Consolidation Project** will consolidate a small water system, the Castro MHP, into CWA's domestic water system. *Avenue 66 Phase 2B* and *Castro MHP* both directly address medium priority vulnerabilities related to "Water Demand: Limited ability to meet summer demand" by improving access to safe drinking water and abandoning inefficient small system wells that depend on recharge water. Local conveyance is a "no regret" strategy that helps to both adapt to climate change and mitigate GHG emissions (see Table 10-2). By consolidating small water systems into larger water systems, it provides local residents with clean, safe, affordable and reliable drinking water that they typically would not be able to obtain. As more and more smaller systems get consolidated into the Region's municipal water systems, water loss and groundwater contamination associated with poorly maintained wells will be reduced. These projects allow the Region's water purveyors to better regulate water usage in their areas by reducing the number of extraction points throughout the basins. The consolidation of these smaller water systems will help CVWD better manage the basin's water supply.
- The **Groundwater Quality Protection Project Sub Area M2-1** and the **East Coachella Valley Septic to Sewer Conversion Project-Monroe Street** will consolidate septic systems into larger regional sewer systems. *Sub Area M2-1* and *Monroe Street* both directly address multiple high and medium priority vulnerabilities related to "Water Supply: Decrease in imported supply" and "Water Demand: Limited ability to meet summer demand" by replacing septic systems with regional sewer infrastructure, thereby protecting the Region's drinking water supply from contaminants. Optimizing sewer systems is a climate change strategy that helps to adapt to climate change (see Table 10-2). Many of these small septic systems are failing and contaminating the surrounding land and precious groundwater resources below. By protecting local groundwater supplies, it reduced the need for costly supplemental and imported water supplies that are



change impacts. An additional benefit to consolidating sewage is there's an opportunity for the sewage agencies to tertiary treat the wastewater to recycled water. As climate change risks water availability for the area, it is important to begin creating new opportunities that can stabilize and secure water.

3 Issues and Needs

*This chapter outlines the major water-related issues and need of the Coachella Valley Integrated Regional Water Management (IRWM) Region, and demonstrates that it based on sound technical information, analyses, and methods as directed in the **Technical Analysis Standard**.*

3.1 Coachella Valley Issues and Needs

To clearly establish the Coachella Valley IRWM/Stormwater Resource (SWR) Plan Objectives (see *Chapter 6 Objectives*), the following section outlines the issues, needs, and conflicts related to water management in the Coachella Valley. The information provided on this chapter is based on the information about the Coachella Valley IRWM Region's (Region) water resources, which are available in *Chapter 2 Region Description*.

The issues and needs included in the following sections are listed below.

1. Water Demand
2. Water Supply
 - Groundwater
 - Imported Water
 - Surface Water
 - Water Conservation
3. Recycled Water
4. Stormwater
5. Water Quality
 - Groundwater
 - Imported Water
 - Surface Water
 - Wastewater/Recycled Water
 - Stormwater
6. Flood Management
7. Natural Resources
8. Disadvantaged Communities
9. Tribal Nations

It is important to recognize that climate change has the potential to impact these issues and needs in different ways. Climate change is extensively discussed in Section 3.2 and in *Chapter 6 Objectives* in this IRWM/SWR Plan.

3.1.1 Water Demand

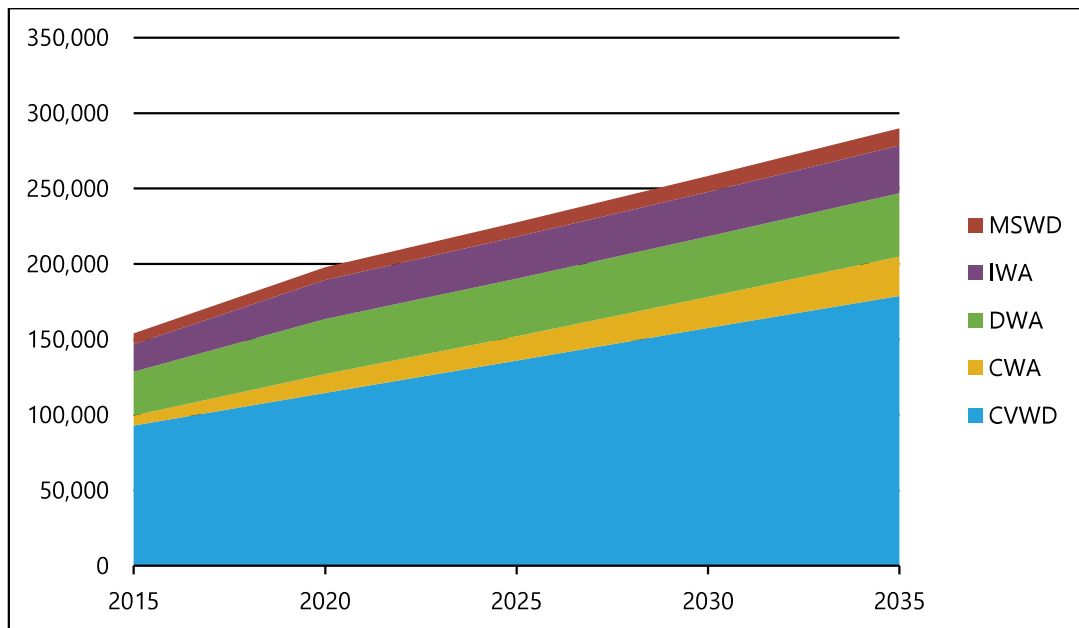
The total potable water (water that meets drinking water standards) demand for Coachella Valley Regional Water Management Group (CVRWMG) agencies is projected to increase by approximately 50% from 197,911 acre-feet per year (AFY) in 2020 to 289,890 AFY in 2035. A breakdown of urban water demand by agency as reported in the agencies' 2010 Urban Water Management Plans (UWMPs) is shown in **Figure 3-1** (see also *Chapter 2 Region Description, Table 2-13: Total CVRWMG Agency Projected Demands*).

Water agencies recently prepared 2015 updates to their UWMPs, which took the recent recession, associated changes in local development patterns, and water conservation mandates into account. Because of the economic recession since 2007, the rate of growth has moderated in the near term. However, overall growth in Coachella Valley is expected to increase through 2045, as the effect of the

recession on growth is expected to attenuate over the long-term planning horizon. Future changes in land uses, including future conversions of agricultural or vacant lands to urban land uses, development on Tribal lands (particularly in eastern Coachella Valley), and annexation of lands by cities or expansion of their spheres of influences affect the amount of growth (CVWD 2012; CVWD 2016a; CVWD et al. 2013).

As described in *Section 2.4.2 Water Demand* and shown in **Figure 3-1**, water demands are projected to nearly double from 2015 to 2035. This increase in demand is largely driven by projected population growth in the Coachella Valley. **Figure 3-2** provides a projection of water demand for different uses for the Coachella Valley from the 2010 Coachella Valley Water Management Plan (WMP) and Mission Creek-Garnet Hill WMP. Due to projected residential growth in the Coachella Valley (discussed in *Chapter 2 Region Description*), urban demands are expected to increase at a faster rate than agricultural demands.

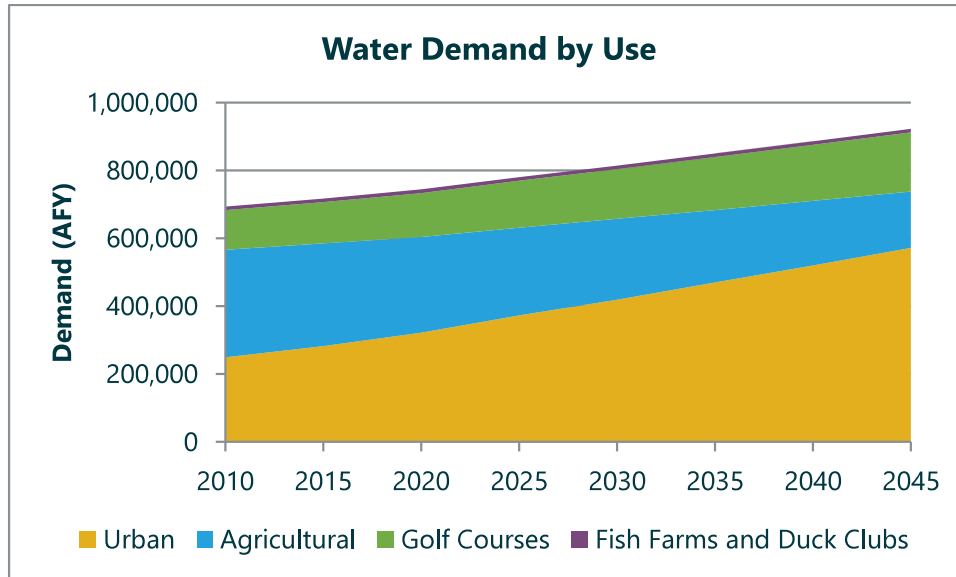
Figure 3-1: Total Projected CVRWMG Agency Potable Water Demand with Conservation¹



1. Projections are for a normal water year and include water losses.

Sources: CVWD 2016a; DWA 2016; MSWD 2016; CWA 2016; IWA 2016

Figure 3-2: Total Water Demand Projections for Coachella Valley IRWM Region



Source: CVWD 2012; CVWD et al. 2013

Note: Duck Clubs are private clubs for duck hunters. Fish farms and duck clubs are defined as recreational non-potable water uses in the CVWD UWMP (CVWD 2016a).

Increasing Water Demands

Population growth and changes in land use correspond to an increase in water demand and pressure on the existing water supply sources, including the groundwater basins (CVWD 2012; CVWD 2016a; CVWD et al. 2013; IWA 2016; MSWD 2016; DWA 2016; CWA 2016). As shown in **Table 2-11**, the total water demand projected in the plan area for the year 2040 is 886,293 AFY (CVWD 2012; CVWD et al. 2013; CVWD 2016a; IWA 2016; DWA 2016; CWA 2016; MSWD 2016).

Water supply sources in the Coachella Valley include groundwater, imported water, surface water, and recycled water; although groundwater is the Region's primary water resource (CVWD 2012; CVWD 2016a; CVWD et al. 2013; IWA 2016; MSWD 2016; DWA 2016; CWA 2016). Due to the role of groundwater as the Region's primary water supply source, increased water demand would have the greatest impact on groundwater supply. Increased demand could lead to groundwater overdraft if those demands are not met with available local water supply sources such as recycled water.

3.1.2 Water Supply

Coachella Valley water supplies are primarily obtained from: imported water supplied through the Coachella Canal and the Colorado River Aqueduct, as well as groundwater pumped from the Coachella Valley Groundwater Basin. However, concerns over Coachella Valley's future water supplies has increased due to a combination of drought, reductions in imported water deliveries, over pumping of groundwater, and seasonal variation in surface water. These concerns are discussed further below.



Groundwater

The Coachella Valley Groundwater Basin encompasses much of the Coachella Valley floor. Geologic faults and structures divide the basin into five subbasins: Whitewater River (Indio), Garnet Hill, Mission Creek, Desert Hot Springs, and West Salton Sea. The Whitewater River Subbasin, the largest of the five subbasins, has a storage capacity of approximately 30 million acre-feet (CVWD 2012). The Mission Creek Subbasin has an estimated total storage capacity on the order of 2.6 million acre-feet. The Garnet Hill Subbasin has an estimated total storage capacity on the order of 1.0 million acre-feet (CVWD et al. 2013).

A confining layer, or aquitard, extends from near La Quinta to the Salton Sea, and conceptually divides the area into four main hydrogeologic units: the semi-perched aquifer, the upper aquifer, the aquitard, and the lower aquifer (refer to **Figure 3-5** below). Capping the upper aquifer at the surface are tight clays and silts with minor amounts of sands, within which semi-perched groundwater occurs (CVWD 2012). The semi-perched aquifer is extensive and generally retards the deep percolation of surface runoff and applied irrigation water. The 100 to 200 foot-thick aquitard, located below the upper aquifer, restricts groundwater flow between the upper and lower aquifers (IWA 2008).

Groundwater Overdraft

Groundwater supply consists of a combination of natural inflow and returns from groundwater and imported water use. Despite the large amount of artificial groundwater recharge, the local groundwater basin has periodically been in overdraft throughout recent decades. The loss in groundwater storage in 2009 was lower than historical loss due to increased delivery of the Region's State Water Project (SWP) allocations that are provided via exchange with the Metropolitan Water District of Southern California (MWD) at Whitewater River Groundwater Replenishment Facility (GRF) and increased Canal water recharge at the Thomas E. Levy GRF in the eastern Coachella Valley beginning in 2009. For example, the 2013 Coachella Valley Water District (CVWD) Engineer's Report on Water Supply and Replenishment Assessments for Mission Creek, East Whitewater River, and West Whitewater River all noted that groundwater monitoring wells showed water level increases, indicating reductions in overdraft conditions, and reduced rates of overdraft.

As reported in the 2010 Coachella Valley WMP, for the Whitewater River and Garnet Hill groundwater basins, the long-term average of natural inflow is about 57,000 AFY and varies from about 8,000 AFY in very dry years to over 200,000 AFY in extremely wet years. From 2000 to 2009, natural inflows were below normal averaging about 40,000 AFY. Returns from use vary with water demands. From 2000 to 2009, returns from use are estimated to average about 240,000 AFY. During this same period, about 51,000 AFY of imported water was recharged in the basin. Total inflows are estimated to be about 331,000 AFY (CVWD 2012). Outflows from the basin consist of pumping, flows to the agricultural drainage system, evapotranspiration by native vegetation and subsurface outflow to the Salton Sea. For the 2000-2009 period, groundwater pumping averaged about 389,000 AFY. Drain flows are estimated to be about 48,000 AFY, while evapotranspiration and subsurface outflow averaged about 4,000 AFY. Total basin outflows for this period averaged 441,000 AFY (CVWD 2012). This equals basin pumping in excess of total recharge by 110,000 AFY.

Regional water levels, including those in the Mission Creek and Garnet Hill Subbasins, have been declining since the early 1950s due to scarce annual precipitation and groundwater extractions. Groundwater level data indicate that since 1952, water levels have declined at a rate of 0.5 to 1.5 feet per year (CVWD et al. 2013). Continued overdraft without additional recharge would have significant consequences for the Coachella Valley, including:



- Land subsidence and associated permanent loss of groundwater storage capacity in some areas, along with resultant potential for ground fissures and damage to buildings, sidewalks, streets, wells, and buried pipelines;
- Increased costs to pump water and deepen wells; and
- Water quality degradation, which includes increased salinity from Salton Sea intrusion and perched water intrusion.

Any reductions in other water supplies (e.g., imported water allocations) resulting from droughts, climate change, or litigation could further erode groundwater supply availability, as there is insufficient water supply to meet projected demands without additional water supply sources.

To eliminate long-term overdraft conditions, groundwater must be managed carefully in combination with other water management strategies. Groundwater pumping needs to be brought into balance through other means including conservation, acquisition of additional water supplies, conjunctive use programs to maximize supply reliability, source substitution programs (e.g., recycled water or desalinated water), and groundwater recharge programs. Failure to achieve this balance could lead to continued water level declines, water quality degradation, land subsidence (which can result in loss of groundwater storage and impacts on infrastructure), and increased pumping costs (CVWD 2012; CVWD 2016a; IWA 2008; CVWD et al. 2013; IWA 2016; MSWD 2016; DWA 2016; CWA 2016). While reversal of overdraft would eliminate the above risks, increasing water levels could also result in other types of risks, including shallow groundwater, liquefaction, and artesian flow. The challenge in groundwater management is to achieve an appropriate balance between the resulting higher groundwater levels and the risks and benefits associated with those levels (CVWD 2012).

Agricultural Drainage

Within the eastern Coachella Valley, agricultural tile drains were installed to drain shallow groundwater. Most of the drains empty into the Coachella Valley Stormwater Channel (CVSC), while a few smaller open channel drains convey flows directly to the Salton Sea. Agricultural drain flows are needed to export salt from the Region and to maintain habitat in the CVSC, agricultural drains, and the Salton Sea. Water levels in the underlying groundwater aquifers and the quantity of applied irrigation water determine the amount of flow in the agricultural drains. Additionally, groundwater use has the potential to impact agricultural drain flows as declining groundwater levels may result in negative pressure, meaning that groundwater would flow down into the basin rather than up into the agricultural drain system. Any change in the amount of agricultural drain flows can have consequences to biological resources in the CVSC and Salton Sea (CVWD 2012).

Land Subsidence

Groundwater withdrawal is the most likely cause of land subsidence in the Coachella Valley. Subsidence can lead to visible cracks, fissures, or surface depressions, damage to structures (e.g., canals, utilities, roads, and buildings), damage and loss in effectiveness of the subsurface agricultural drainage system, disruption of surface drainage and irrigation systems, and loss of vertical elevation. Groundwater pumping has caused groundwater levels to decrease more than 60 feet in portions of the eastern Coachella Valley from La Quinta to the Salton Sea, and raised significant concern about water quality degradation and land subsidence in this area. Recently, however, reduced pumping in the eastern Coachella Valley along with recharge at the Thomas E. Levy Facility has resulted in a return to artesian flow in the vicinity of Mecca. Groundwater



monitoring results indicated that a pumping hole created by an aquaculture facility has recovered since the facility reduced pumping from about 8,000 AFY to 2,000 AFY.

Groundwater levels in the western Coachella Valley have also decreased substantially, except in the areas near the Whitewater Spreading Facility where artificial recharge has successfully raised water levels. **Figure 3-3** shows areas within the Region where land subsidence studies have been conducted by the U.S. Geological Survey. These studies have inferred land subsidence in the areas marked in pink.

In 1996, the United States Geological Survey (USGS), in cooperation with CVWD, established a geodetic network of monuments to monitor vertical changes in land surface in the eastern Coachella Valley. Results of the monitoring program, published in a 2007 report, identified at least four areas in the Coachella Valley that had experienced land surface elevation changes, indicating that land subsidence occurred in three of the areas (Palm Desert, Indian Wells and La Quinta) and both subsidence and uplift apparently occurred in one of the areas (Indio-Coachella) between 2003 and 2005. These areas of subsidence coincide with or are near areas where groundwater pumping generally caused groundwater levels to decline. Other local areas in the Coachella Valley also may have deformed, but the size of these areas and the amount of deformation generally are small compared with the Palm Desert, Indian Wells and La Quinta areas. Eight of the fourteen measurement sites for which subsidence rates could be compared show subsidence rates increased by as much as a factor of 10 between 2000 and 2005, compared with subsidence rates prior to 2000 (CVWD 2012; USGS 2007; IWA 2008).

Ultimately, subsidence could limit the quantity of pumping in the Coachella Valley; however, as indicated in the previous section, increased groundwater levels indicate reductions in overdraft conditions, and are likely to reduce future land subsidence.



Figure 3-3: Land Subsidence Study Areas



Semi-Perched Aquifer

If the amount of overdraft reduction is greater than the reduction in return flows, increased water levels could occur in the semi-perched aquifer. High groundwater levels in shallow perched or semi-perched aquifers can lead to waterlogging of soils which can lead to septic system failures, structural flooding (seepage into subterranean parking, etc.), utilities damage (flooded vaults, sewer infiltration, etc.) and saturated root zones resulting in adverse effects on agricultural production and landscaping. Currently, extensive agricultural irrigation in the eastern Coachella Valley contributes a significant amount of return flow to the semi-perched aquifer maintaining the shallow groundwater levels. Continued use of the drainage system is expected to be necessary to maintain water levels and to export salt resulting from irrigation (CVWD 2012).

Liquefaction

As overdraft conditions improve in the eastern Coachella Valley and groundwater levels rise, the potential for liquefaction increases, as well as the need for adequate drainage and proper foundation design for structures within identified liquefaction zones (CVRWMG Planning Group Meeting – May 19, 2010). Liquefaction is a physical process by which sediments below the water table temporarily lose strength and behave as a liquid rather than a solid. In the liquefied condition, soil may deform enough to cause damage to buildings and other structures. Seismic shaking is the most common cause of liquefaction. As indicated in the Coachella Valley WMP, liquefaction occurs in well-sorted (similar sized) sands and silts in areas with high groundwater levels. Liquefaction has been most abundant in areas where groundwater occurs within 30 feet of the ground surface and liquefaction hazards have been noted for the area from Indio southeast to the Salton Sea. The California Department of Water Resources (DWR) indicated a liquefaction hazard exists for the majority of the eastern Coachella Valley floor because of perched groundwater and presence of appropriate soils, although there is no surface indication of any liquefaction occurring in the past (CVWD 2012).

Artesian Conditions

As overdraft conditions are reduced, groundwater levels in the deep aquifers are expected to return to conditions similar to those of 1970s and 1980s, when wells exhibited positive pressure that led to artesian conditions. While flowing artesian conditions can reduce the amount of pumping energy required to extract groundwater, such conditions can also lead to loss of water from improperly controlled wells, property damage if water is not routed to drainage channels, vector control issues, and leakage from the deeper aquifers into the shallow aquifers through wells that are perforated in both zones (which can potentially lead to water quality degradation). Recent observations indicate that artesian conditions have returned to portions of the eastern Coachella Valley due to changed pumping patterns, including a significant pumping reduction by aquaculture operations south of Mecca, and increased recharge from operation of the Thomas E. Levy GRF and other recharge facilities (CVWD 2012; CVWD 2013a).

Garnet Hill Underflow

The Garnet Hill Subbasin is upgradient of Whitewater River Subbasin and groundwater underflow typically flows from the Garnet Hill Subbasin to the Whitewater River Subbasin. However, high groundwater levels in the Whitewater River Subbasin following large recharge events may limit flow from Garnet Hill Subbasin to the Whitewater River Subbasin or even cause underflow to the Garnet Hill Subbasin. Presently, there is limited groundwater level monitoring data available for the Garnet Hill Subbasin and additional monitoring is needed (CVWD et al. 2013).



Conjunctive Use

With the increased variability and uncertainty of imported water deliveries, conjunctive use could provide groundwater storage opportunities for other water agencies in the State of California. Issues related to this option include the need for recharge facilities to have sufficient capacity to allow capture of surplus water deliveries during future wet periods, the availability of water above and beyond existing customers' demands to recharge, and additional pumping capacity. Under the Advanced Delivery and SWP Exchange Agreements, the mechanism for returning stored water to entities outside the basin is through a reduction in deliveries of the Region's SWP allotments. If stored water is to be returned through reductions in Canal water deliveries, then deliveries for recharge would need to be reduced during the payback period. If recharge reductions are insufficient, then reductions in direct deliveries would need to be offset through increased groundwater pumping (CVWD 2012).

Source Substitution

Source substitution, where an alternate water source is used in the place of pumped groundwater, is important potential water, money, and energy conservation measure associated with groundwater. Alternate sources of water in the Coachella Valley include recycled water, Colorado River water, desalinated agricultural drain water, and SWP allotments delivered via exchange with MWD. Depending on use, these sources may not be treated to potable standards, but are used for irrigation and other non-potable uses, though in some areas, such as the eastern Coachella Valley, urban groundwater users may be converted to treated Colorado River water. Some issues with potential source substitution projects may include regulatory (e.g., ability to meet water quality standards), user resistance, cost, geological and physical limitations, and infrastructure limitations (CVWD 2012).

Costs

Costs related to groundwater issues expressed in the preceding sections could include: reduced groundwater storage capacity; increased power consumption due to increased pumping lifts; repair and replacement of damaged infrastructure; and additional water treatment requirements due to decreases in water quality. The cost of addressing groundwater issues may disproportionately impact economically disadvantaged communities if such costs result in increased water rates or fees.

Imported Water

The Region relies on SWP allotments delivered via exchange with MWD and Colorado River supply via the Coachella Canal (refer to *Chapter 2 Region Description*). However, concern regarding the reliability of imported water supplies has increased due to: reductions in SWP deliveries (potentially less than the Region's designated allocations); drought in the Colorado River Basin and recent litigation that could potentially affect the 2003 Quantification Settlement Agreement (QSA); and increased costs for importing water. As described below, SWP reliability is of greater concern than Colorado River reliability, which in the absence of extreme shortages, is guaranteed full delivery.

SWP Reliability

CVWD and Desert Water Agency (DWA) do not have a direct delivery connection to the SWP and instead receive their deliveries via an exchange agreement with the MWD where MWD takes CVWD and DWA's SWP allocations and in turn delivers an equal amount of Colorado River Water via the MWD Colorado River Water Aqueduct. Per DWA and CVWD's SWP allocation agreements, they have a combined SWP



allotment (Table A Allotment) of 194,100 AFY. Despite the agencies' contractual allotments, each year, DWR determines the amount of water available for delivery to SWP contractors based on hydrology, reservoir storage, the requirements of water rights licenses and permits, water quality, and environmental requirements for protected species in the Sacramento-San Joaquin Delta (Delta). Thus, SWP supplies fluctuate annually. DWR estimates the current average reliability of the SWP to be 60% of Table A Amounts¹, although the reliability of the SWP water has decreased over time. Other factors that could further reduce the SWP reliability include the uncertainty in modeling restrictions associated with biological opinions, risk of levee failure in the Delta, additional pumping restrictions resulting from biological opinions on new species or revisions to existing biological opinions, impacts associated with litigations², and climate change impacts. Current efforts in the Delta (e.g., Bay-Delta Conservation Plan) may improve water supply reliability but not necessarily yield; if the Bay Delta Conservation Plan is implemented, then SWP supply reliability could potentially be expected increase to 77% of Table A (CVWD 2012; CVWD et al. 2013; DWA 2009a).

Colorado River Reliability

Although the Coachella Valley's Colorado River supply faces problems that could impact long-term reliability, interim guidelines for Lower Basin shortages and coordinated operations for Lake Powell and Lake Mead were adopted in 2007 that will provide Colorado River recipients a higher degree of reliability. Some potential threats to reliability include the prolonged Colorado River Basin drought, Colorado River shortage sharing agreement, endangered species and habitat protection, the litigation challenging the validity of the QSA³, and climate change. However, under the interim guidelines it is expected that California would only experience shortages if the total shortage in the Lower Basin exceeds 1.7 million AF. Due to California's Colorado River priority system, all delivery shortages would be borne by MWD, which has a lower priority than CVWD. Consequently, no reduction in CVWD's Colorado River supplies is projected at this time (CVWD 2012). Although recent litigation posed a threat to the stability of the 2003 QSA, a June 4, 2013 ruling by the Superior Court of California upheld the QSA, securing the water deliveries outlined in that document. Thus, current Colorado River allocations to the water agencies for beneficial consumptive use and transfers and exchanges of conserved water to and between water agencies and other parties under the QSA for the 75-year period starting in 2003 are preserved.

¹ SWP water contractors submit annual requests to the DWR for water allocations and DWR makes an initial SWP Table A allocation for planning purposes, typically in December of each year. Throughout the year, as additional information regarding water availability becomes available to DWR, its allocation/delivery estimates are updated.

² In October 2005, the state issued the Delta Smelt Action Plan (DSAP) outlining a 14-point program to identify and understand causes of recent delta smelt population decline and describe actions that should be taken to protect the species. In November 2006, a lawsuit was filed by the California Sportfishing Protection Alliance (CSPA) and other environmental organizations to specifically stop the pumping in the South Delta in an attempt to prevent further decline of the smelt population. In March 2007, a judge ordered DWR to shut down pumping in the South Delta until necessary permits were obtained. In a landmark decision in August 2007, a Federal Judge ordered State and Federal water project managers to reduce the amount of water pumped from the Delta to protect the threatened delta smelt from extinction. The order, which was finalized by the U.S. District Court in December 2007, reduced pumping by 30% from the end of December until June (IWA, 2008).

³ In 2003, CVWD, IID and MWD successfully completed negotiation of the QSA, which quantifies the Colorado River water allocations of California's agricultural water contractors for the next 75 years and provides for the transfer of water between agencies. Under the QSA, CVWD has a base allotment of 330,000 AFY. In accordance with the QSA, CVWD has entered into water transfer agreements with MWD and IID that increase CVWD supplies by an additional 129,000 AFY by 2026 and remain at that level for the 75 year term of the QSA (CVWD 2011).



Recharge Basin Operation

The timing and the amount of Colorado River water available for recharge is impacted by MWD's water delivery schedule. The amount of available water may be lower than what is required because of water supply reliability and the distribution of imported water recharge between the Whitewater and the Mission Creek Subbasins (CVWD et al. 2013).

With respect to recharge pond operations and maintenance, some water is lost due to evaporation at the artificial recharge sites. Conducting regular maintenance of spreading basins for silt removal will maintain or increase existing infiltration rates and minimize evaporation loss (CVWD et al. 2013).

Surface Water

Surface water from Whitewater River, Snow Creek, Falls Creek and Chino Creek, and smaller creeks and washes is used as water supply for western Coachella Valley urban and golf course customers. In 2009, surface water supplied less than 1% of the total water supply to the Coachella Valley.

Surface Water Reliability

Because surface water supplies are affected by variations in annual precipitation, the annual supply is highly variable. Surface water runoff either percolates in streambeds or is captured in mountain-front debris basins where it recharges the groundwater basin. Since 1993, an average of approximately 60,000 AFY of surface water recharged the Whitewater River Subbasin (CVWD 2012). All surface water that is not captured and used for domestic water supply is accounted for and put to beneficial use by recharging the groundwater aquifer.

Surface water features that contribute to recharge in the Mission Creek Subbasin include Mission Creek, Dry Morongo Wash, and Big Morongo Canyon. Surface water features that contribute to recharge in the Garnet Hill Subbasin includes the Whitewater River. A portion of the imported water released from the Colorado River Aqueduct into the Whitewater River also percolates into the Garnet Hill Subbasin. Recharge in the Garnet Hill Subbasin from the Whitewater River is approximately 7,000 AFY (CVWD et al. 2013). Long Canyon Creek and the Little Morongo Creek provide recharge in the Desert Hot Springs Subbasin, as well as to the Mission Creek Subbasin during times of substantial rainfall. Total recharge varies from approximately 4,900 AFY to 11,800 to 14,300 AFY to both the Mission Creek and Desert Hot Springs Subbasins (CVWD et al. 2013).

Water Conservation

All five water purveyors within the Coachella Valley recognize that water is a limited resource and that water conservation and use efficiency should be actively pursued. Each agency implements a variety of irrigation and/or domestic water conservation measures, including model landscape ordinances, water-efficient irrigation controls, water efficient plumbing, water-wise landscaping programs, conservation outreach and education, conservation pricing of water rates, and water audits (CVWD 2016a; DWA 2016; MSWD 2016; CWA 2016; IWA 2016). **Figure 3-4** provides a screenshot from the CVRWGM's regional water conservation program website www.cvwatercounts.com.

Figure 3-4: CVRWMG Regional Water Conservation Program



Conservation

Conservation efforts are critical to reduce water demand over the long-term, and to reduce the pressure on the groundwater supply. Current water conservation efforts by various agencies have focused on urban use, agricultural irrigation, and golf course irrigation. For example, Coachella Valley cities have adopted the Coachella Valley Landscape Ordinance (2009), conducted water audits, instituted rebate program, implemented tiered pricing, and conducted public information and education programs. Many cities and agencies are signatory to the Memorandum of Understanding (MOU) Regarding Urban Water Conservation in California and are therefore members of the California Urban Water Conservation Council (CUWCC). Members of the CUWCC must comply with all Best Management Practice (BMP) targets outlined in the MOU that have been determined appropriate for the conditions within its service area. Water conservation best management practices (also referred to as demand management measures or DMMs) that are set forth by the CUWCC and implemented by the CVRWMG agencies are provided below in **Table 3-1**. Increased conservation may be required to meet the conditions of Senate Bill SB 7X7, which stipulates urban water purveyors to reduce water use by 20% by the year 2020. However, because of the existing low outdoor use, additional conservation may be limited, but may be extended to water users in the region that are not covered by SB 7x7 (e.g., for private producers) (CVWD 2012; CVWD et al. 2013; MSWD 2016; IWA 2016; DWA 2016; CWA 2016). Water conservation increases the reliability of supplies to the Coachella Valley and is being further pursued through the *Regional Water Conservation Program* funded through IRWM grants (refer to *Chapter 11 Framework for Implementation* for more information).

Table 3-1: Best Management Practices Implemented by CVRWMG Agencies

Best Management Practices		Implementing CVRWMG Agency:				
California Urban Water Conservation Council BMPs		CVWD	CWA	DWA	IWA	MSWD
1	Water Survey Program for Single-Family and Multi-Family Residential Customers	X	X	X	X	
2	Residential Plumbing Retrofit Program		X	X	X	X
3	System Water Audits, Leak Detection and Repair Program	X	X	X	X	X
4	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections Program	X	X	X	X	X
5	Large Landscape Conservation Programs and Incentives Program	X	X	X		X
6	High-Efficiency Washing Machine Rebate Program					
7	Public Information Program	X	X	X	X	X
8	School Education Program	X ¹	X	X	X	X
9	Conservation Programs for Commercial, Industrial, and Institutional Accounts Program	X	X	X		
10	Wholesale Agency Programs	N/A	N/A	N/A	N/A	N/A
11	Conservation Pricing Program	X	X		X	X
12	Water Conservation Coordinator Program	X	X	X	X	X
13	Water Waste Prohibition Program	X		X	X	X
14	Residential Ultra-Low-Flush Toilet Replacement Rebate Program	X	X	X		
Other (non-CUWCC) Conservation BMPs Implemented in the Region:						
Main line/equipment replacements to stop leaks		X	X	X	X	X
Have field employees watch for water waste and report water waste issues to customers		X	X	X	X	X
High bill investigations (sending letters to water customers whose water bills or water use spikes)		X	X	X	X	X
Installation of new meters to detect continual flow that is indicative of leaks		X	X	X	X	X
Monitor water levels within the reservoirs through a telemetry system and turn off wells when reservoir levels reach specific levels to prevent over-pumping and possibly overflowing the reservoirs		X	X	X	X	X



Best Management Practices	Implementing CVRWMG Agency:				
California Urban Water Conservation Council BMPs	CVWD	CWA	DWA	IWA	MSWD
Daily visits to every operating facility to ensure that the system is operating correctly and to inspect the facilities for things such as leaking pipes	X	X	X	X	X
Groundwater replenishment activities	X		X		
Planning efforts that address water conservation such as Urban Water Management Planning, Integrated Regional Water Management Planning, and General Planning	X	X	X	X	X

1. CVWD's School Education Program serves CVWD, CWA, and IWA service areas

Local Economy

Water conservation measures must consider the potential effect on industries that rely on water for irrigation (tourism, golf, agriculture). Water conservation efforts are in place consistent with State law, while not causing significant impacts to water users. While water conservation regulations do not prohibit development of water-dependent enterprises, regulations are in place in various cities in the Coachella Valley to help reduce the water use of such businesses. For example, golf courses are limited in the amount of turf they may install to help reduce their water demands (CVWD 2012).

3.1.3 Recycled Water

Recycled water is needed to meet anticipated future demands and offset existing use of groundwater for non-potable uses, as well as provide for supply redundancy. However, during the summer months, recycled water supplies are not sufficient to meet all current demands; users are required to use their private wells or other water sources to supplement the recycled water supply. A map of existing recycled water facilities is provided in **Figure 2-5** (see *Chapter 2 Region Description*).

Local Supply Development

One of the goals of the State's Recycled Water Policy (2009) includes the increase of recycled water by at least 1 million AFY over the 2002 levels by 2020. Because recycled water is such a valuable resource, it is considered within the Coachella Valley as an additional, local water supply to help eliminate current and future overdraft of the groundwater basins (by helping to meet anticipated future demands and offsetting existing use of groundwater for non-potable uses) and provide for supply redundancy (CVWD 2012; CVWD et al. 2011; CVWD 2016a; DWA 2016; IWA 2016; MSWD 2016; CWA, 2016). Not all agencies in the Coachella Valley currently operate a recycled water system. Where recycled water has not been used, recycled water systems are currently being evaluated (MSWD 2016; IWA 2016; CWA 2016a). The feasibility of a recycled water system is driven by the proximity of suitable users to the recycled water supply source (CVWD et al. 2013). Thus, the challenge is to cost-effectively link recycled water supply to customers; one possibility may be through interagency partnerships (CVRWMG Planning Group meeting - May 19, 2010). Recycled water has been historically used for landscape irrigation at golf courses and other urban landscaped areas in parts of the Coachella Valley. The amount of wastewater available for recycling in the future primarily depends on growth in the Coachella Valley and water quality regulations. According to the Coachella Valley WMP, within the Whitewater River Subbasin, recycled water could



meet as much as 12,000 AFY of non-potable demand in the Coachella Valley by 2045, based on order of magnitude estimates of water demands and wastewater flows (CVWD 2012). Mission Springs Water District (MSWD) is currently in design for a new wastewater treatment plant, the West Valley Water Reclamation Facility, with an initial treatment capacity of 1.5 mgd, within the area of the Mission Creek and Garnet Subbasins. While surface spreading of effluent is currently proposed, MSWD anticipated adding tertiary treatment in a subsequent phase. The projected recycled water use in 2040 is 6,400 AFY (MSWD 2016). As growth in the eastern Coachella Valley continues, there is potential for use of up to 53,000 AFY of recycled water by 2045, though this recycled water use may impact habitat along the CVSC and the Salton Sea by reducing flows (CVWD 2012).

Seasonal Variability

Wastewater flows in the Region peak during winter during high-tourism months. Recycled water demands, however, peak during summer, when the precipitation is low, and heat is high. Agencies are currently using percolation ponds for seasonal groundwater storage; percolation is expected to be reduced as recycled water customer bases develop in the future (CVWD 2012; CVWD et al. 2013).

In the western Coachella Valley, demand for non-potable water typically exceeds the available supply, especially in the summer months. Irrigators using recycled water currently must supplement that supply with local groundwater to meet peak summer demands (CVWD 2012; DWA 2016). In an effort to stabilize the supply and demand, DWA recently built an influent tank reservoir to store water in periods of high supply. Augmentation using other sources of supply would be necessary in the future to address the imbalance of demand and supply.

Costs

Because little reuse of wastewater is occurring in the eastern Coachella Valley, essentially all wastewater produced from the three eastern Coachella Valley wastewater treatment plants is discharged into the CVSC. However, as growth occurs in the eastern Coachella Valley, more wastewater will be generated and require treatment (CVWD 2012). The water agencies face challenges associated with cost-effectively linking recycled water supply to customers (i.e., strategic location of treatment facilities), possibly through inter-agency partnerships in the future.

3.1.4 Stormwater

Riverside County Flood Control and Water Conservation District (RCFCWCD) and CVWD are the Region's flood control districts. They operate and maintain a series of regional flood control facilities throughout the Coachella Valley that ultimately drain to the Salton Sea during major and significant storm events (refer to *Chapter 2 Region Description*). Local cities and the County of Riverside manage localized urban drainage systems that drain to these facilities.

The backbone of this system is the Region's 49-mile Whitewater River Stormwater Channel/Coachella Valley Stormwater Channel (WRSC/CVSC). West of Washington Street, the channel is referred to as the WRSC; east of Washington Street, the channel is referred to as the CVSC. The WRSC follows the natural Whitewater River, and flows in the WRSC are ephemeral, while the CVSC is the channelized portion of the Whitewater River, and generally contains flow year-round east of Dillon Road from agricultural drains, permitted discharges, and stormwater runoff from occasional storm flows.



Local cities and the County convey runoff from major storm events to the WRSC/CVSC. The stormwater channel is designed for the Standard Project Flood of 82,000 cubic feet per second (City of Coachella 2012). Three wastewater treatment plants (Valley Sanitation District (VSD), City of Coachella, and CVWD's WRP-4) also discharge effluent to the CVSC. Flows are then conveyed by the WRSC/CVSC to the Salton Sea.

Stormwater Capture

Stormwater capture has been identified as a potential method to augment local water supplies in the Coachella Valley. Stormwater retention systems located in strategic areas of suitable geology could capture runoff from surrounding mountains within the Whitewater River and Mission Creek Subbasins (CVWD 2012; CVWD et al. 2013; CVWD 2016a). The 2013 Municipal Separate Storm Sewer System (MS4) permit requires builders of new developments to include stormwater capture and recharge infrastructure (Regional Board 2013). Water agencies will need to coordinate with the local cities and the County of Riverside to maximize use of stormwater capture and recharge infrastructure related to development, because management of development requirements is not under the purview of the water agencies (CVWD et al. 2013). While the 2013 MS4 permit requirement solidifies this strategy for runoff management, stormwater capture and beneficial use is a long-standing strategy in the Coachella Valley, where MS4 permittees have required stormwater onsite retention (detention and infiltration) through municipal ordinances years before the 2013 MS4 permit.

3.1.5 Water Quality

This section addresses key issues concerning Coachella Valley's water quality.

Water Supply

Groundwater

Groundwater supply from the Coachella Valley Groundwater Basin is generally of high quality. Disinfection is not required but is generally provided as a precautionary measure before distribution of water for potable uses. For a summary of recent groundwater quality concentrations, see **Table 2-19** in *Chapter 2 Region Description*. Current and emerging groundwater quality issues in the Coachella Valley include salinity, arsenic, nitrate, fluoride, ammonium, perchlorate, chromium-6, and uranium.

Although groundwater quality is generally considered high in the Region, groundwater quality is a concern in isolated areas of the Region. In the eastern Coachella Valley, groundwater overdraft has reduced groundwater flow into the agricultural drains, which has changed groundwater pressure conditions (refer to *Section 3.1.2 Water Supply* for more information). This change in pressure, if it results in negative pressure that directs water down into the groundwater basin, may result in water that is high in total dissolved solids (TDS or salts) migrating from the semi-perched zone downward to the Upper aquifer. **Figure 3-5** illustrates the structure of the local groundwater aquifer, including the semi-perched zone. Under these conditions, water in the Upper aquifer, which is generally of lower quality, may also migrate to the Lower aquifer, particularly along the margins of the basin, where the aquitard separating the two zones is thin or absent. The net result of such pressure changes would potentially be a decline in the water quality of the Lower aquifer in the eastern Coachella Valley (CVWD 2002).



In the eastern Coachella Valley, there is also concern about elevated levels of natural constituents in the groundwater. Naturally occurring substances such as uranium, arsenic, and fluoride have been detected, and are likely due to natural geologic conditions. As described in *Chapter 2 Region Description, Section 2.5.1 Groundwater Quality*, representatives of Disadvantaged Community (DAC) and tribal organizations report that groundwater supplies for some mobile home park communities within the eastern Coachella Valley have arsenic concentrations that exceed the regulatory standard maximum contaminant level (MCL) of 10 parts per million (ppm). Nitrates are a concern throughout the Coachella Valley with respect to septic systems but are also of concern in the eastern Coachella Valley due to the prevalence of septic systems in that area (refer to the section below regarding Wastewater/Recycled Water).

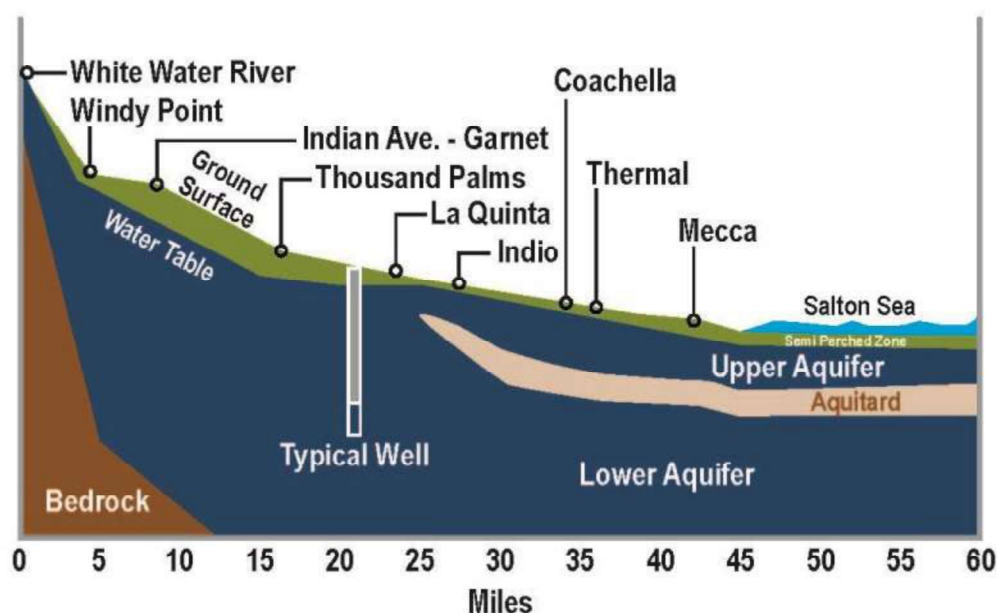
Additionally, a naturally-occurring high groundwater table within the semi-perched zone has the potential to saturate the root zone of crops and stifle growth or eliminate crop production. Therefore, a drainage system was developed for much of the eastern Coachella Valley to reclaim the area for farming. CVWD operates and maintains a collector system of 166 miles of pipe, along with 21 miles of open ditches, to serve as a drainage network for nearly 38,000 acres of irrigated lands. All agricultural drains empty into the CVSC, except those at the southern end of the Coachella Valley which flow directly to the Salton Sea. CVWD plans to begin desalting agriculture drainage to a quality equivalent to Canal water and delivering it for irrigation use by 2023 (CVWD 2005).

The CVRWMG has also addressed potential concerns regarding the organic compounds ethylene dibromide (EDB), trichloroethylene (TCE), dibromochloropropane (DBCP), and perchloroethylene (perc or PCE) in Coachella Valley groundwater. Current information demonstrates that EDB and TCE have not been detected in Coachella Valley groundwater, as both have been either banned or replaced. However, groundwater testing demonstrates that DBCP and PCE have been detected in isolated areas.

DBCP has been detected in some groundwater wells located within the Whitewater River Subbasin, and specifically in wells located in the communities of Palm Desert, Indian Wells, Bermuda Dunes, and La Quinta. DBCP was banned in California in the 1980's but was previously used as a soil fumigant that was primarily applied on grapes in the Coachella Valley to control nematodes. Despite its presence, evidence demonstrates that detected levels of DBCP range from 0.01 to 0.02 micrograms per liter ($\mu\text{g/L}$), which is below the drinking water MCL of 0.2 $\mu\text{g/L}$. CVWD monitors DBCP occurrences in the Coachella Valley and installs wells outside areas of concern or at greater depths to avoid this constituent.

Although PCE is a solvent widely used for dry cleaning and metal degreasing, detection of this substance in the Coachella Valley has been limited to isolated incidents. For example, a former dry-cleaning business has been identified as the source of a PCE plume in south Palm Springs and is currently subject to a cleanup order. PCE has also been detected in some wells in an area adjacent to the border of Rancho Mirage and Palm Desert within the Whitewater River Subbasin, although the source of PCE in this area has not been identified. When detected, PCE levels in these wells range from 0.5 $\mu\text{g/L}$ to 1.5 $\mu\text{g/L}$, which is well below the drinking water MCL for PCE of 5.0 $\mu\text{g/L}$. CVWD monitors PCE occurrence in domestic wells and installs new wells outside areas of concern or at greater depths to avoid this constituent.

Figure 3-5: Coachella Valley Groundwater Basin Perched Zone



Source: (CVWD 2002)

Salinity

Some areas in the Coachella Valley such as Oasis and Salton City, as well as areas near fault lines, have naturally-occurring high salinity groundwater (CVWD 2012). TDS concentrations in groundwater may increase from artificial recharge of imported water (see Imported Water, below), from septic system waste disposal, saline underflows from the Desert Hot Springs Subbasin, and percolation of treated wastewater (CVWD et al. 2013). TDS concentrations in the groundwater basin need to be managed properly to ensure long-term suitability of groundwater quality in the basin. Potential options to manage TDS concentrations may have high costs; however, in accordance with the Recycled Water Policy, the agencies developed a Salt and Nutrient Management Plan in June 2015 and are currently in the process of addressing comments from the Regional Water Quality Control Board regarding this SNMP. Although TDS concentrations in the groundwater have increased over the past decades, concentrations of TDS remain below the MCL, and vary greatly across the Coachella Valley.

If desalination of groundwater, imported water supplies, or agricultural drain water from the CVSC is implemented, brine discharge and management will be a major issue in the Coachella Valley in the future. Considerations include high costs for handling and disposing brine, large land areas for evaporation ponds, and regulatory issues associated with disposal (CVWD 2012; CVWD et al. 2013).

Arsenic

Arsenic concentrations as high as 162 µg/L (compared to the MCL of 10 µg/L) have been observed in some eastern Coachella Valley municipal water supply wells, and as a result, groundwater treatment facilities have been built and operated to reduce arsenic levels in potable water supplies. In Coachella and the



unincorporated eastern Coachella Valley communities of Mecca, Oasis, and Thermal, 19 wells at mobile home parks have recently tested positive for high levels of arsenic ranging from 12 to 91 $\mu\text{g/L}$. These parks are served by private wells and are located some distance from CVWD's potable water system. About half of the parks have installed treatment filters to reduce the arsenic levels (CVWD 2012; CVWD 2016a). Arsenic at levels of less than 1 to 28 $\mu\text{g/L}$ has been detected in several groundwater wells in the Mission Creek Subbasin. Arsenic concentrations for samples collected since 1981 have remained below the MCL and samples collected for MSWD wells in 2008 do not indicate any presence of arsenic. There is limited water quality data available to assess arsenic concentrations in the Garnet Hill Subbasin. (CVWD et al. 2013). Because arsenic degrades water quality, treatment is needed before groundwater distribution if they are above MCL (CVWD 2012).

Nutrients

Higher concentrations of nitrate above the MCL of 45 mg/L have been detected in some of the shallower portions of the Coachella Valley groundwater basin (CVWD 2012; CVWD 2016a). Nitrate concentrations are below the MCL for all recorded samples in the Mission Creek Subbasin (CVWD et al. 2013). Sources of nitrate include nitrogen-based fertilizers used for agriculture, golf courses and landscaping; septic tank discharges; wastewater disposal through percolation; natural sources like mesquite hummocks; and alluvial fan formations. Nitrates are generally found in the unsaturated and shallow aquifer zones above 300 to 400 feet and have not been observed in the deeper aquifer zones below 500 feet. Activities in the basin that could cause nitrate to leach into higher quality groundwater include recharge, pumping, and overdraft reduction. As nitrates readily migrate in groundwater, specific steps, such as locating recharge activities away from areas with high nitrate concentration, treating pumped groundwater, and blending with low-nitrate supplies, may be taken (CVWD 2012; CVWD 2016a; CVWD et al. 2013; RWQCB 2004).

Fluoride

Fluoride concentrations for public wells in the Mission Creek and Garnet Hills Subbasins are below the MCL for domestic water (2 mg/L). Fluoride exceeding the MCL has been observed in one private well. While State law requires water agencies to install fluoride treatment at water supply sources contingent upon the availability of funds, there is no fluoride treatment at drinking water wells in the Mission Creek or Garnet Hill Subbasins (CVWD et al. 2013).

Chromium-6

In July 2014, the California Department of Public Health (CDPH) Division of Drinking Water (now part of the State Water Resources Control Board (SWRCB)) established the nation's first MCL for chromium-6, with a standard of 10 $\mu\text{g/L}$. However, in May 2017, the Superior Court of Sacramento County issued a judgement invalidating the MCL for chromium-6 because economic feasibility of complying with the MCL wasn't considered. Upon adoption in 2014, approximately 50% of the Region's municipal wells became non-compliant. The cost for the Region to comply with any future chromium-6 MCL containing new chromium-6 levels above the 10 $\mu\text{g/L}$ MCL is of significant concern. The SWRCB has been directed to conduct further studies to determine a more economically feasible standard and is expected to adopt a new MCL in the coming years. The CVRWG agencies are continuing to study chromium-6 reduction technologies in anticipation of a future MCL.

Uranium

The source of uranium in the Coachella Valley has not been confirmed but is likely naturally derived from the basin's geologic formations, such as those found in the Mission Creek Subbasin (CVWD 2012; CVWD



2016a; CVWD et al. 2013). Though contamination along the Colorado River was thought to be a possible source, due to large uranium deposits upstream from the Coachella Valley, subsequent monitoring indicates that trace uranium levels observed in the groundwater are naturally occurring (CVWD 2012; CVWD 2016a). Uranium is detected in several groundwater wells in the Mission Creek Subbasin although none of the wells sampled in 2008 exceeded the four-quarter average MCL of 20 picocuries per liter pCi/L. One well was taken out of service because it exceeded primary MCL for uranium. Another well has well-head treatment for uranium. There is limited water quality data available to assess uranium concentrations in the Garnet Hill Subbasin (CVWD et al. 2013).

Future Recharge Issues

Long-term recharge with SWP allocations that are delivered via exchange with MWD, although not currently an option in the Region, could generate additional groundwater quality issues, because SWP Exchange water contains more total organic carbon and bromide than Colorado River water (both of which are precursors for creating disinfection byproducts).

Perched Water Intrusion

Groundwater quality may be degraded as a result of increased Salton Sea water and perched water intrusion. Sufficiently high groundwater levels lead to freshwater flow from the Coachella Valley to the Salton Sea. However, groundwater levels near the Salton Sea are low, posing a risk of flow reversal, where Salton Sea water, which is high in salinity and of generally poor quality, may flow into the semi-perched aquifer. From the perched aquifer, this poor-quality water may flow downward into the Upper and Lower aquifers, degrading their quality (CVWD 2012).

Imported Water

Although water supplies (described in *Chapter 2 Region Description*) come from the Colorado River, their water qualities vary slightly. The Coachella Canal diversion is further downstream than the Colorado River Aqueduct diversion (see **Figure 2-4: Statewide Imported Water Systems**); this results in higher concentrations of TDS and other constituents of concern, including the potential for invasive species such as Quagga mussels. TDS concentrations have averaged in MWD's Colorado River Aqueduct water 636 ppm since 1973 and in the Coachella Canal water (Avenue 52) 790 ppm since 1949 (CVWD 2012). TDS concentrations and other constituents are listed in **Table 2-19** in *Chapter 2 Region Description*.

Therefore, issues regarding imported water supply in Coachella Valley are: salinity of Colorado River water, hardness, and minerals, and potential presence of Quagga mussels.

Salinity

As discussed in the preceding water quality sections, Colorado River water has elevated TDS concentration compared to the natural TDS concentration of the groundwater, however those levels are still below the MCL for TDS. Based on historical and projected variations in Colorado River water quality, the TDS range for Colorado River water recharged at the Whitewater River Recharge Facility is 530 to 750 mg/L, averaging 636 mg/L since 1973. The TDS range for the Colorado River water delivered via the Coachella Canal⁴ is 625 mg/L to 975 mg/L, averaging 790 mg/L over the past 60 years (CVWD 2011; MSWD 2011). Artificial recharge with Colorado River water may increase TDS concentrations in the groundwater basin;

⁴ The Coachella Canal transports Colorado River water from the All American Canal near the Mexico-U.S. border. The primary use of Coachella Canal water is for agricultural irrigation, although it is used to irrigate golf course and other landscape irrigation, recharge groundwater in the eastern Coachella Valley.



however, the potential for this to occur must be considered in conjunction with salt exportation and the fact that groundwater overdraft may increase TDS levels due to shifting pressure conditions, particularly in the eastern Coachella Valley (CVWD 2012).

Uranium and Perchlorate

Two constituents that have been detected in Colorado River water quality are uranium and ammonium perchlorate. Uranium concentrations below the MCL have been detected in the Colorado River water. Because of this constituent's presence, CVWD and other Valley agencies (MSWD, DWA, City of Indio, City of Coachella) will continue to monitor for radioactive materials in the Colorado River water used for recharge (CVWD 2012). Perchlorate found in Colorado River water imported to the Coachella Valley originated from the Kerr-McGee plant in Nevada on Las Vegas Wash upstream of Lake Mead. Colorado River water used in the past for irrigation and recharge in the eastern Coachella Valley led to perchlorate contamination of the groundwater. Because the source of perchlorate contamination in Colorado River water has been undergoing treatment since 1999, perchlorate is not expected to be a concern; however, continued monitoring of this constituent in both the Colorado River water and groundwater will continue (CVWD 2012; CVWD 2016a; CVWD et al. 2013; MSWD 2016).

Quagga

The non-native mollusk, *Dreissena bugensis*, also known as Quagga mussel, has been found in the Colorado River system. A Quagga mussel invasion could significantly affect the Coachella Valley's water quality, aquatic ecosystems, and water delivery systems. They have not yet been found in Coachella Canal. Quagga mussels can cause substantial economic damage associated with infestation of pipes, pumps or other components of water supply systems as well as environmental impacts removing food and nutrients from the water column and potentially collapsing the food web. Water quality may be affected by putrefactive decay of mussel flesh and methane gas production, and increased corrosion of pipelines from bacterial growth associated with the mussels (CVWD 2016a). CVWD has been proactively working to prevent the infestation and spread of Quagga mussels in the Coachella Canal and the irrigation system (CVWD 2016a).

Turbidity

Water turbidity and temperature vary greatly throughout the year in the Coachella Canal. The Canal water is typically clear in the winter when flow is low and murky in the summer as the water velocity increases enough to scour the silt from the bottom of the Canal. The principal chemical constituents concern in the Canal are TDS as described above, perchlorate (further described below), and selenium. Canal water is not suitable for domestic use without treatment (CWA 2016).

Local Surface Water

The surface water supplies currently used by DWA and those that may be diverted by the Agua Caliente Band of Cahuilla Indians are of high quality, with the concentration of TDS and nitrates both well within the MCLs.

Filtration

DWA's surface water supply complies with state and federal drinking water standards without any treatment, except disinfection where needed. One of the diversions for DWA was taken out of service in 2000 due to turbidity spikes in the source water, and it cannot be restored to potable service without filtration. DWA is currently exempted from filtration requirements due to DWA's control of the watershed,



the surface water's low turbidity, and DWA's continued monitoring of the supply⁵. In the event that filtration is required, DWA will determine whether to construct filtration facilities or use surface water supplies for groundwater recharge (DWA 2016).

Wastewater/Recycled Water

Wastewater may also impact local water quality through the leeching of septic effluent into the groundwater basin, as well as the addition of salts to the basin through irrigation with recycled water.

Wastewater

Some Coachella Valley residents utilize septic systems for wastewater treatment. Failing septic systems or a high density of septic systems have the potential to contaminate the local groundwater basin, a source of drinking water for the area.

Effluents from failing septic tanks have a high risk of polluting ground and surface water with nutrients, and human-borne pathogens. Nitrate, a water-soluble nutrient and major constituent of septic tank effluent, is a widespread ground water contaminant due largely to releases from septic tanks. Heavy pumping of water supply wells may draw down nitrate-polluted water in the unsaturated zone from septic tank discharges and contaminate ground water.

Septic Failure

As described above, if the amount of overdraft reduction is greater than the reduction in return flows, increased water levels could occur in the semi-perched aquifer. High groundwater levels in shallow perched or semi-perched aquifers can lead to waterlogging of soils which can lead to septic system failures. Septic flows are sources of nitrate and salt load to the groundwater basin, which could result in groundwater quality degradation (CVWD 2012; CVWD et al. 2013). MSWD, DWA, and CVWD are currently implementing programs to convert users from septic systems to sewer systems which would reduce the addition of nitrate to the groundwater basin (CVWD et al. 2013). The cost of addressing septic failures may disproportionately impact economically disadvantaged communities if such costs result in increased water rates or fees for low-income populations.

Recharge

Widespread use and density of septic tanks in some areas raises possible concerns about using artificial recharge to address overdraft. Changes in groundwater levels could result in septic effluent percolating from underground tanks. However, recharge in the area may reduce the nitrate levels. This issue is being studied (CVRWMP Planning Group meeting - May 19, 2010).

Recycled Water

The two potential sources of recycled water in the Coachella Valley are desalinated agricultural drainage water and treated municipal wastewater effluent. At present, golf courses and parks utilize treated municipal effluent for irrigation. Although recycled water tends to contain elevated nitrogen concentrations, studies

⁵ Existing surface water treatment regulations are codified in Chapter 17 of Title 22 of the California Code of Regulations (CCR), Sections 64650 through 64666. Said regulations state that "Each supplier using an approved surface water source shall provide multibarrier treatment necessary to reliably protect users from the adverse health effects of microbiological contaminants ...". "Multibarrier treatment" is defined as "a series of water treatment processes that provide for both removal and inactivation of waterborne pathogens" (CCR 2016).



at the University of California, Riverside have indicated that little nitrate moves past the root zone in well managed golf courses (RWQCB 2006).

The key concerns regarding the quality of recycled water for the IRWM Region are: potential percolation of recycled water with elevated nitrogen concentrations; timing of peak flows; regulatory conflicts associated with recycled water use; and high costs and large energy requirements.

Matching Quality to Use

Local sources need to be considered, including recycling and stormwater harvesting, in providing water supply to non-potable users. Large irrigators (agriculture and golf courses) may be supplied recycled water from municipal effluent, desalinated agricultural drainage water, or untreated Canal water.

Salinity and Nutrients

Currently, recycled water in the western Coachella Valley is either reused or percolated for disposal (percolated water enters the groundwater basin). Wastewater contains nutrients, and where water is recycled for irrigation uses, much of the nutrients are taken up by the plants and turf, thus reducing the need for fertilizer and contribution of nutrients into the groundwater basin. The State Water Resources Control Board (SWRCB) Recycled Water Use Policy requires every region in the state to develop a salt/nutrient management plan by 2014. The salt/nutrient management plans are intended for management of all sources contributing salt/nutrients, including recycled water, on a basin-wide or watershed-wide basis to ensure that water quality objectives are achieved (CVWD 2012; CVWD et al. 2013).

In addition to salts and nutrients, another water quality issue related to recycled water is emerging contaminants. The SWRCB Recycled Water Policy acknowledges the incomplete and evolving knowledge of emerging contaminants and provides for research and development of analytical methods to determine their potential for environmental and public health impacts. The impact this regulation would have on water management planning efforts in the Coachella Valley is not known at this time (CVWD 2012).

Regulatory Conflicts

Regulatory conflicts regarding recycled water use have arisen between the SWRCB and California Department of Public Health (CDPH). While the SWRCB promotes and encourages the use of recycled water and has statewide goals for increasing recycled water, CDPH permitting of recycled water systems can potentially restrict the use of this water source. These regulatory conflicts can make implementation of recycled water systems challenging and costly for local agencies.

Costs

Planning and implementing recycled water systems, including treatment plant upgrades to tertiary and distribution system expansions, involves high costs and large energy requirements. While the use of recycled water could represent an efficient water supply, at around \$400 per AF, development of a non-potable distribution system could be costly (CVWD 2012). The CVRWMG Proposition 84 – Round 2 Implementation Grant application (March 2013) included a project that would connect three golf courses to the Mid-Valley Pipeline, which blends recycled water with other non-potable water for distribution.



Stormwater

Contamination of drinking water wells from agricultural and urban stormwater runoff is a concern for improperly constructed wells the Region (CVWD 2012). Improperly constructed wells can increase the potential for contamination from runoff and groundwater (CVWD 2012). Stormwater pollution can pose a serious health risk to people due to pesticides, bacteria, and chemicals being picked up as water drains from streets, parking lots, and lawns and enters the WRSC/CVSC untreated.

Coachella Valley Stormwater Channel

The CVSC is a continuation of the WRSC and runs from Washington Street to the Salton Sea. The CVSC is listed on the 303(d) List of Water Quality Impaired Segments for DDT, Dieldrin, PCBs, E. Coli and toxaphene. The source of the contamination is unknown. With the exception of pathogens which apply to a 17 mile stretch area of the CVSC, the remaining constituents apply to a 2 mile stretch of the CVSC. Total Maximum Daily Loads (TMDLs) are being developed for all of these parameters (SWRCB 2010).

Salton Sea

Salton Sea is listed on the 303(d) List of Water Quality Impaired Segments for arsenic, chlorpyrifos, DDT, Enterococcus, nutrients, salinity, and selenium. The sources of nutrients are agricultural return flows and major industrial point source. The sources of salinity are out-of-state source, agricultural return flows, and unspecified point source. TMDLs are being developed for all of these parameters (SWRCB 2010).

3.1.6 Flood Management

CVWD and RCFCWCD's regional flood control systems consist of a series of debris basins, levees, and stormwater channels that convey floodwaters from the mountains and alluvial fans surrounding the Coachella Valley to the 49-mile WRSC/CVSC. Cities in the Coachella Valley (including the City of Indio/Indio Water Authority (IWA) and the City of Coachella/Coachella Water Authority (CWA)) provide local drainage control within their jurisdictions through a system of storm drains, retention basins, and dry wells; some of the flows from the local facilities contribute to flows within the stormwater channel. Implementation of BMPs, along with low annual rainfall and low urban density, have substantially reduced runoff from urban areas into the stormwater channel such that such flows are rare except in cases of major storm events (wet weather conditions). During dry weather conditions, local contributions from local facilities are rare due to implementation of BMPs.

The WRSC/CVSC and its tributary channels along with the implementation of stormwater BMPs protect the Coachella Valley cities from Palm Springs to Coachella from flooding. Areas that are not protected by regional flood control infrastructure and are located within identified flood hazard areas may be subject to alluvial-fan flash flooding from the surrounding mountain ranges (refer to **Figure 3-6**). In addition to areas located within identified (mapped) flood hazard areas, there are several areas of the Region that are not covered by flood hazard mapping.

Flood issues within the Region may be related to land use planning issues, because development is restricted within known flood hazard areas and therefore potentially impedes development. Stakeholders have expressed concerns that without additional flood control facilities, the need for affordable housing may drive allowances for housing to be built in flood-prone regions. **Figure 3-6** shows the areas recognized as at-risk for flooding by Federal and State flood mapping agencies.



Alluvial and Riverine Flooding

Much of the Coachella Valley is subject to alluvial and riverine flooding but has not been mapped by the Federal Emergency Management Agency (FEMA). Several at-risk areas lack flood control facilities and are vulnerable to such flooding. Those areas include:

- Areas adjacent to Mission Creek in the Desert Hot Springs area
- Sky Valley and Indio Hills
- Thousand Palms
- Portions of Indio north of Interstate 10
- The Oasis community extending from Avenue 66 to Avenue 86
- Areas adjacent to the CVSC south of Avenue 52
- Highway 111 between Palm Springs and Cathedral City
- Roadways that cross the Whitewater River

As mentioned in *Chapter 2 Region Description*, CVWD has undertaken a stormwater planning effort for North Cathedral City and Thousand Palms and has commissioned a series of studies in support of this effort. These studies have examined the existing conditions, identified geography and some man-made features as contributors to flood risks, and developed flood control alternatives. As with other flood control in the Region, these alternatives consist of levees, culverts, and channels designed to convey stormwater away from development and into the existing stormwater control channels, such as the WRSC/CVSC. The studies conducted for the Stormwater Master Plan effort also noted the importance of integrated, coordinated flood control planning, and the expensive nature of flood control projects (CVWD 2013d). In addition, the CVRWMG has updated this IRWM/SWR Plan to serve as a Stormwater Resource Plan (SWRP) functional equivalent.



Figure 3-6: Federal and State Mapped Flood Zones



3.1.7 Natural Resources

Key issues concerning the Region's water-related natural resources are addressed in this section.

Habitat Conservation

The Region may support populations of sensitive species such as migratory birds and endangered desert pupfish listed by California and the federal government. At the north end of the Salton Sea, the CVSC provides important sheltering, nesting, and feeding resources for migratory and resident waterfowl.

A Multiple Species Habitat Conservation Plan (MSHCP) was prepared for the entire Coachella Valley and surrounding mountains to address state and federal Endangered Species Act issues in the IRWM/SWR Plan Area. Conservation approaches, involving acquisition, biological monitoring, and adaptive management actions, have been identified in the MSHCP to achieve conservation of natural communities. Key water-related natural resource issues for the Coachella Valley include the need for permanent water availability for native flora and fauna; and preserving, restoring, and managing its water-related natural resources.

Water Availability

Changes in the water table or flows to the Salton Sea could affect water availability and success of conserving habitat for specific species covered by the MSHCP. Specifically, the MSHCP calls for establishing and providing a permanent water source for the following:

- Permanent habitat for the California black rail and Yuma clapper rail in the CVSC and Delta Conservation Area.
- Riparian habitat for covered riparian bird species in the CVSC and Delta Conservation Area.
- Desert pupfish habitat.
- Established mesquite on CVWD land in the East Indio Hills Conservation Area, if needed.

In addition, the MSHCP specifies the requirement to develop and implement a monitoring and adaptive management program for desert pupfish in the agricultural drains and flood control channels, and to restore and enhance habitat for the Coachella Valley round-tailed squirrel and mesquite on CVWD land in the East Indio Hills Conservation Area (CVAG 2007).

Salton Sea

Although the Salton Sea is not within the Region, local stakeholders acknowledge that permitted waste discharges and agricultural drains ultimately flow to the Salton Sea and can impact its wetlands resources.

The Salton Sea is the largest lake in California and has served as a recreational attraction, avian refuge and is a great source of biodiversity. The northern end of the Salton Sea has been described as a freshwater marsh that provides nesting areas, shelters, and feeding resources for migratory waterfowl, including federally listed endangered species. However, the Salton Sea has no natural outlet other than evaporation. Salinity has been steadily increasing due to the lack of discharge; water evaporation thus leaves behind high concentrations of salt.

To ensure continued restoration and protection of wildlife dependent on the Salton Sea ecosystem, three pieces of legislation (Senate Bill 277, Senate Bill 317, and Senate Bill 654) were signed by Governor



Schwarzenegger in September 2003, committing the state to a restoration path for the Salton Sea, establishing a Restoration Advisory Committee, and providing limited relief from California's Fully Protected Species Act. By October 2003, the QSA had been signed by local, state and federal agencies.

Wetlands

Coachella Valley drains southward to the Salton Sea, with flows containing treated wastewater effluent, rising groundwater and subsurface drain flows, and storm flows following major storm events. Where the CVSC and agricultural drains empty into the Salton Sea, there are mixed open water and freshwater cattail-reed marshes, and cottonwood-willow riparian stands that are supported by freshwater flows from the channels. The Torres-Martinez Tribe of Desert Cahuilla Indians (TMDCI) has developed an 85-acre wetland system on the shore of the Salton Sea west of the CVSC outflow. The wetland supports migratory and resident birds and other sensitive species that depend on increasingly scarce wetland habitat. DWR and California Department of Fish and Wildlife (CDFW) predict that declining inflows in future years will result in ecosystem collapse of the Salton Sea due to increasing salinity and other water quality issues. Certain species, including the pileworm, a primary component of the Salton Sea food web, and tilapia, the primary forage species for fish-eating birds, may be eliminated if salinity levels further increase. Loss of fish populations and invertebrates could in turn reduce bird populations (CVWD 2012). Thus, preservation of the water sources and the quality of their water is critical to the survival and propagation of numerous wildlife species.

Groundwater Outflow

In addition to biological impacts, changes in the flows to the Sea and hence the freshwater-saltwater boundary could affect water quality of the Coachella Valley Groundwater Basin. Freshwater flows from the Coachella Valley aquifers towards the Salton Sea if groundwater levels are sufficiently high. Currently, groundwater levels adjacent to the Sea are below the level of the Sea, which may induce the movement of the denser saline Sea water into the fresher groundwater aquifers, and cause intrusion into the semi-perched aquifer if groundwater levels drop. This intruded water could eventually migrate vertically downward into the underlying upper and lower aquifers causing groundwater quality degradation. As groundwater levels in the basin declined, the rate of groundwater outflow to the Salton Sea has decreased (CVWD 2012).

3.1.8 Disadvantaged Communities

As described in *Chapter 4 Disadvantaged Communities*, stakeholders in the Region stated that previous maps of DACs did not fully capture the economic reality of the region. To address these stakeholder concerns, the DAC Outreach Program conducted extensive outreach to improve understanding of which areas in the Region qualify as DACs. These efforts and the resulting DAC maps are provided in *Chapter 4 Disadvantaged Communities*.

Based on meetings with DAC stakeholders and representatives, issues of concern for both eastern and western Coachella Valley residents related to DAC water supplies focus around the affordability and accessibility of a safe drinking water supply that is in compliance with state and federal requirements in order to meet the needs of both eastern and western Coachella Valley residents (see *Chapter 4 Disadvantaged Communities*). Education programs may be needed to inform residents of the safety or hazards of their groundwater supplies and other potential water supply and quality issues. Stakeholders have also noted that there may be conflicts between landowners and residents of DACs in instances when economic interests of landowners' conflict with the interests of onsite DAC residents; this issue specifically



pertains to the IRWM Program when such issues involve provision of adequate water and wastewater services.

Water and Sewer Infrastructure

DACs acknowledged there is a lack of basic water and wastewater infrastructure (onsite wastewater facilities are undersized or inadequate in low percolation areas) in DAC communities in the eastern Coachella Valley. Septic systems in the western Coachella Valley (including DACs) may be too densely located or otherwise improperly designed or failing, posing a contamination threat to the Desert Hot Springs Subbasin that is used for potable water supplies. Inadequate wastewater infrastructure is a public health hazard that can expose residents to untreated sewage. Untreated sewage may also leak into local ground or surface waters or spill near residential areas. DACs described a number of issues that indicate a problem with their wastewater infrastructure. For more detailed information on the water and wastewater infrastructure needs, refer to *Chapter 4 Disadvantaged Communities*.

Affordability

Affordability of water and wastewater is a key issue for DACs. As described in *Chapter 2 Region Description, Section 2.5.1 Groundwater Quality*, arsenic levels exceed MCL drinking water standards in localized areas in the eastern Coachella Valley. This issue is complicated by other issues such as affordable housing; for instance, there are many unpermitted mobile home parks in the eastern Coachella Valley that do not receive the required water system monitoring and provide housing to residents that cannot afford necessary treatment and testing procedures on their own. The CVRWMG has been working with local non-profits to address issues associated with water treatment. As described in detail in *Chapter 4 Disadvantaged Communities*, the CVRWMG developed an onsite water treatment program aimed at providing reverse osmosis systems to eastern Coachella Valley residents to treat for constituents such as arsenic in drinking water. The eastern Coachella Valley communities are located within the service area of CVWD; that agency's long-term water supply planning will address the desire for these communities to potentially connect to CVWD's drinking water and wastewater systems.

Nutrients in Hot Water

Poor groundwater quality in the hot water aquifer has the potential to have adverse economic impacts on the hot water resources in the western Coachella Valley's Desert Edge and Desert Hot Springs communities. Comprised of senior residents on fixed incomes, many of these small DACs desire to convert local septic systems to municipal sewer in order to ensure that water quality of the hot water resources is maintained. The County of Riverside and the CVRWMG are also involved in these issues. To date, two of the nine projects submitted for IRWM grant funding have been targeted towards providing sewer infrastructure to the Desert Hot Springs community.

Rural Access to Water

Available water supplies with adequate quality is limited in many rural communities, as wells above the perched aquifer, hot water basin wells, and agricultural wells are not suitable for drinking, and hauled water may be scarce or entirely inaccessible due to location of the communities. Many DACs are not within urban areas and as such municipal services hookup is difficult. An example of this is concentrated communities of farm workers in rural areas. Water quality issues are of particular concern in the eastern Coachella Valley, where many small mobile home parks are dependent on small private wells. These wells are not monitored and may be at risk of high levels of arsenic or potentially other pollutants, which have been found in



localized areas of the groundwater basin. Rural water treatment systems (point of source or other new technologies) and system maintenance training are needed in these rural/remote areas as discussed in *Chapter 4 Disadvantaged Communities*.

Flooding and Stormwater

Flooding and stormwater management improvements are needed to address flooding hazards in DAC areas, particularly in unincorporated communities that are not protected by regional flood control infrastructure. The expensive nature of flood control and stormwater management projects may impede their implementation in DACs. Further, onsite flooding has been noted as a concern in many DACs, particularly in the eastern Coachella Valley, whose soils are not conducive to rapid percolation. The resulting standing water also presents a public health hazard by creating conditions that foster disease vectors such as mosquitos.

3.1.9 Tribal Nations

Based on meetings with tribal communities, issues of concern include water and wastewater infrastructure, groundwater water quality, groundwater quantity, tribal water rights, and habitat protection/restoration, recycled water. Issues faced by tribal nations, namely the lack of adequate water and wastewater infrastructure and the high costs associated with improving it. There is a lack of basic water and wastewater infrastructure on some tribal lands in the eastern Coachella Valley. For instance, private sewer facilities are undersized or inadequate in low percolation areas.

The tribes share the Coachella Valley Groundwater Basin, using groundwater wells where municipal water is not available. Like other Coachella Valley users, the tribes are also concerned about regional water issues such as groundwater supply and quality (refer to *Chapter 5 Tribal Water Resources* for more information). Groundwater quality in some areas is unsuitable for certain uses. Testing at mobile home parks on tribal lands has found arsenic concentrations of 60-70 ppm compared to the 10 ppm MCL. Due to water quality issues, some tribes rely on bottled water for drinking water supply. The tribes have also expressed concern about increasing TDS concentrations due to recharge activities.

Resource management for sustainability is important to tribes. For example, in the WRSC on the Twenty-Nine Palms Reservation, flood control channel operations and maintenance activities could potentially impact native plant species or habitats that are culturally important to the tribes. There are also culturally-significant water resources on tribal lands. Tribes wish for these resources to be recognized in the IRWM/SWR Plan.

Tribal water rights are not included as an issue in the following sections, because this issue is not one that can be addressed through IRWM planning due to the lack of regulatory authority associated with the IRWM/SWR Plan (refer to *Chapter 5 Tribal Water Resources* for more information). However, the CVRWMG acknowledges tribal water issues that have been expressed by stakeholders and will continue to work through the IRWM process to improve and strengthen relationships with local tribes.

Water and Sewer Infrastructure

Tribal communities acknowledged there is a lack of basic water and wastewater infrastructure (private sewer facilities are undersized or inadequate in low percolation areas) on some tribal lands in the eastern Coachella Valley, and the issue of costs for these services is a concern for certain tribes.



Water Quality

Water quality is also a major concern, including salinity levels, elevated arsenic concentrations, and septic leaching issues and their impacts on the Coachella Valley's groundwater basins.

Water Quantity

Water quantity is a concern, especially as it relates to long-term groundwater overdraft.

Resource Management

Resource management is important to the tribes; for example, the TMTDCI is concerned about both the volume and quality of water flowing to the Salton Sea and their effects on the Salton Sea ecosystem restoration (CVRWMG Tribe meeting - May 20, 2010).

Expansion of Recycled Water

Further expansion of recycled water systems has provided water supplies to tribal development authorities for use on golf courses and other non-potable uses. In 2009, DWA executed a Reclaimed Water Service Agreement with the Agua Caliente Development Authority for Indian Canyons Golf Course (DWA 2009b).

3.1.10 Summary of Water Management Issues

As with other regions throughout the State, the Region is facing a variety of water-related issues that can be addressed through the IRWM/SWR planning process. Issues identified in this chapter range from the need to secure additional imported water supplies to the quantity and quality of local groundwater to lack of regional flood control.

Table 3-2 below provides a preliminary evaluation and summary of the top 12 categories of key water management issues in the Coachella Valley.



Table 3-2: Summary of Significant Water Management Issues in Coachella Valley

#	Category	Key Issues
1	Reliability of Water Supply	Regional population projections include continued growth, equating to water demand increases. Municipal demands are expected to increase at a faster rate than agricultural demands primarily due to population growth. Seasonal demands may not coincide with supply availability, so water supply reliability needs to coordinate supply availability with demand.
2	Groundwater Levels	<p>Basin pumping exceeds total recharge. Pumping needs to be brought into balance through increased recharge, source substitution, and conservation. Failure to achieve this balance could lead to continued water level declines, water quality degradation, and land subsidence, which can result in loss of groundwater storage and impacts on infrastructure. If overdraft is reduced, and return flows are not reduced, areas over the shallow and semi-perched aquifers could experience soil waterlogging, with impacts to septic systems, utilities, agriculture, and other vegetation. Agricultural drain use will need to continue to maintain groundwater levels.</p> <p>Reliability of water supplies will affect the Region's ability to offset groundwater pumping with recharge efforts.</p>
3	Imported Water Supply	<p>SWP supplies are less reliable due to Statewide drought conditions and environmental constraints (which have led to reduced pumping) in the Delta.</p> <p>Colorado River supplies are vulnerable due to the prolonged Colorado River Basin drought.</p>
4	Local Supply Opportunities	<p>Local sources need to be considered, including recycling and stormwater harvesting. Large irrigators (agriculture and golf courses) may be supplied recycled water from municipal effluent, desalinated agricultural drainage water, or untreated Canal water.</p> <p>Challenges associated with cost-effectively linking recycled water supply to customers (i.e., strategic location of treatment facilities) must be met, possibly through inter-agency partnerships. Other challenges may include regulatory obstacles (ability to meet water quality standards), user resistance, physical limitations, and infrastructure limitations.</p>



Table 3-2: Summary of Significant Water Management Issues in Coachella Valley

#	Category	Key Issues
5	Groundwater Quality	<p>The salinity of Colorado River water is higher than the salinity of SWP Exchange water, recycled water, and some groundwater. Therefore, the use of Colorado River water for recharge and irrigation may result in the addition of salt to the basin if salts are not exported. In eastern Coachella Valley, agricultural drains help export salts from the basin through artesian flows.</p> <p>SWP Exchange water contains more total organic carbon and bromide than Colorado River water (both of which are precursors for creating disinfection byproducts). Long term recharge with SWP Exchange supplies could increase the concentration of these constituents. Although the Coachella Valley Groundwater Basin has had historically high water quality, regional groundwater quality is potentially at risk for increased salinity and nitrates. Individual domestic septic tanks and leach fields, fertilizer application, and wastewater percolation ponds are likely sources of natural organic contaminants.</p> <p>Several small private water systems in mobile home parks in eastern Coachella Valley have data that shows groundwater quality exceeds the MCLs for arsenic. Many private water systems supplying water to small mobile home parks in the eastern Coachella Valley do not test or report on drinking water quality; therefore, data on MCL exceedances are likely undercounted. Dependable arsenic removal systems and water quality testing are needed.</p> <p>The 10 µg/L MCL for chromium-6 that was issued in 2014 has since been invalidated. However, the SWRCB has been directed to conduct further studies to determine a more economically feasible standard and is expected to adopt a new MCL in the coming years. A new, lower MCL has the potential to be of substantial concern for the Region. The CVRWMP agencies are continuing to study chromium-6 reduction technologies in anticipation of a future MCL.</p> <p>Groundwater quality may also be impacted by failing septic systems, which may be too expensive for DACs to address, particularly in the eastern Coachella Valley.</p>
6	Surface Water Quality	<p>The last 17 miles of the CVSC, which conveys flows to the Salton Sea, is listed on the 303(d) List of Water Quality Impaired Segments for DDT, dieldrin, PCBs, pathogens, and toxaphene. The Salton Sea is listed on the 303(d) List for arsenic, chlorpyrifos, DDT, Enterococcus, nutrients, salinity, and selenium.</p>
7	Local Environment	<p>A permanent water source for permanent riparian habitat is needed for the California black rail, Yuma clapper rail, and riparian bird species in the CVSC and Delta Conservation Area. Changes in flow to the Sea may impact this habitat as a result of changes caused by falling groundwater levels that reduces flows entering the agricultural drain system, among others.</p> <p>Quagga mussels have been found in Colorado River, but not yet in the Coachella Valley and its water systems. Monitoring and preventative measures will continue, to prevent the impacts of Quagga mussel spread to the region.</p>

Table 3-2: Summary of Significant Water Management Issues in Coachella Valley

#	Category	Key Issues
8	Flood Risks	Several areas lack flood control facilities and are vulnerable to devastating alluvial and riverine flooding. From Avenue 52 to Salton Sea, the CVSC lacks bank stabilization and is in a levee condition meaning that the estimated surface elevation of Standard Project Flood is higher than the elevation of adjacent properties. Coordination between land use planning and flood prevention planning could address some of the flood issues the Region faces.
9	Conjunctive Use	Potential increases in conjunctive use, to the degree that recharge and source substitution are increased more than net outflow, could lead to a solution to overdraft-related problems facing the basin. Key issues that must be addressed include completion of the SWP aqueduct extension and amount of this additional recharge water, its cost, its reliability, and its quality.
10	Water-Related Needs of Native Americans	There is a lack of basic water and wastewater infrastructure on some tribal lands in the eastern Coachella Valley. For instance, private sewer facilities are undersized or inadequate in low percolation areas. Tribes expressed the importance of sustainable resource management to protect the natural environment that is of cultural importance. Tribes expressed concerns over groundwater quality (salinity, arsenic, septic leaching), groundwater overdraft, resource management, and expansion of recycled water.
11	Water-Related Needs of Disadvantaged Communities	Many DACs are not within urban areas, making water supply difficult. One example is farm workers in rural areas. Rural water treatment systems (point of source or other new technologies) and training are needed in these rural/remote areas. The need for septic to sewer conversion or connection to municipal water systems is great, but DACs worry that jurisdictional issues or high costs may delay or prohibit project construction. Further, DACs have noted that conflicts between landowners and residents may arise with regard to provision of water and wastewater services if such provision requires additional expenditures on behalf of landowners.
12	Affordability of Water	Cost related to continued overdraft could include: reduced groundwater storage capacity; increased power consumption due to increased pumping lifts; repair and replacement of damaged infrastructure; and additional water treatment requirements due to decreases in water quality. Changing regulatory requirements and legal challenges could also potentially impact the affordability of water in the region. Planning and implementing a recycled water system, including treatment plant upgrades to tertiary and distribution system expansions, involves high costs and large energy requirements.

3.2 Climate Change Issues and Needs

DWR requires IRWM Plans to include an analysis of the effects of climate change on a Region and their water resources. The Region underwent a climate change analysis to consider the potential impacts and effects that have been projected, determine which of these impacts have the potential to affect the Region, identify vulnerabilities of regional water resources due to the potential projected impacts, and prioritize these vulnerabilities to more effectively manage for potential projected climate change effects.

3.2.1 Projected Impacts and Effects of Climate Change

Estimating the impacts of climate change at a regional level is challenging due to the coarse spatial scale of models that project climate change impacts of temperature and rainfall, and the long-time scale evaluated in many models (to the year 2100). Recently, state and regional entities have been working to downscale climate models to allow for climate change planning at a level that can be useful for planning efforts. These downscaled models provide outputs for the year 2050, and while this is still a longer timescale than is used in IRWM planning, it can still be useful for assessing climate change.

To incorporate climate change into water resources management, downscaled temperature and precipitation projections were inputted into other models, such as hydrologic models, to project impacts to water supply, water demand, snow pack, sea level rise, and wildfires. The results of these models have been summarized in a variety of studies and planning documents at the state, regional, and local levels. A number of these documents were reviewed to determine which best represented the impacts for the Region. These documents include:

- Preparing California for a Changing Climate (PPIC 2008)
- Reconciling Projections of Colorado River Streamflow, Southwest Hydrology (Hoerling et al. 2009)
- Response of Vegetation Distribution, Ecosystem Productivity, and Fire to Climate Change Scenarios for California (Lenihan, et al. 2008)
- *Climate change Adaptation Policy Guide* (CA Emergency Management Agency and CA Natural Resources Agency 2012)
- Climate Action Plans (Palm Springs, Rancho Mirage, Palm Desert, Coachella, Desert Hot Springs, La Quinta)

Climate change impacts and effects are based on very different climate change assumptions and analysis approaches. **Table 3-3** summarizes the impacts and effects of climate change on the Region by 2050 (unless otherwise indicated), which are typically based on an average of various climate change analyses. Generally, climate change is expected to increase temperature in the region. Rainfall projections vary, though there is little to no projected change in annual average rainfall. Water demand may be expected to increase due to higher irrigation needs caused by increased temperatures.

Imported water supply from the Colorado River Aqueduct may be impacted by expected decreased flows in the Colorado River from climate change. Up to a 20% decrease in Colorado River flow has been projected. (Hoerling, et al. 2009)

Climate changes may also slightly increase the frequency of wildfires. Increases in wildfires have the potential to increase sedimentation and turbidity of surface waters and increase flash flooding. (Lenihan, et al. 2008) Although lands that have been subject to stochastic events such as wildfire can be potentially be

susceptible to invasion by non-native vegetation, such as non-native grass and/or tamarisk, native species often re-sprout vigorously following a fire. If lands were previously dominated by native vegetation, these native species typically re-establish first and can outcompete non-native species that may be introduced afterwards. Where non-native species establish, there can be changes to the soil hydrology and chemistry.

Knowing the projected climate change impacts and effects in the Region, it is possible to determine which water resources in the Region are most vulnerable to climate change. The next sections identify and prioritize the vulnerabilities to help determine how to best apply management practices.

Table 3-3: Impacts and Effects of Climate Change on Region by 2050¹

Impact	Effect
Temperature	Winter: Projected increases of 5°F to 9°F Summer: Projected increases of 6°F to 10°F
Rainfall	Little to no change in annual average rainfall
Supply	Colorado River flow decreases of 5% to 20%
Demand	Increases expected with higher temperatures, but not quantified
Wildfires	Same or slightly increased likelihood of wildfire

1. Information presented in this table is from the list of references provided on the preceding page

3.2.2 Identification of Climate Change Vulnerabilities

Understanding the potential impacts and effects that climate change is projected to have on the Region allows for an informed vulnerability assessment of the Region's water resources. A climate change vulnerability assessment helps assess water resource sensitivity to climate change, prioritize climate change vulnerabilities, and ultimately guides decisions as to which strategies and projects would most effectively adapt to and mitigate climate change. Key indicators of potential vulnerability include (DWR 2011):

- Currently observable climate change impacts (climate sensitivity)
- Presence of particularly climate sensitive features, such as specific habitats and flood control infrastructure (internal exposure)
- Resiliency of a region's resources (adaptive capacity)
- An analysis of the Region's vulnerabilities to climate change was developed and presented at the December 13, 2012 Planning Partners meeting by asking a series of questions suggested by DWR in its 2011 *Climate Change Handbook for Regional Water Planning*. **Table 3-4** summarizes the analysis, which includes:
 - Vulnerability Question: Taken from Box 4-1 of DWR's *Climate Change Handbook*
 - Answer: Determined according to the Region's current conditions and stakeholder feedback
 - Justification: Why Y (yes) or N (no) was selected
 - Vulnerability Issue: What is the climate change vulnerability issue that is identified by asking the question?



Following this analysis, the vulnerability issues were prioritized and vetted by the Region. The relative prioritization (low, medium, and high) are also indicated in **Table 3-4**.



Table 3-4: Climate Change Vulnerability Indicator Questions

Vulnerability	Y/N	Justification	Vulnerability Issue	Tier
Water Demand				
Are there major industries that require cooling/process water in your planning region?	Y	Vegetable packing plants require process water, but the Region as a whole is accustomed to large temperature shifts already.	Industrial demand would increase	Low
Are crops grown in your region climate-sensitive? Would shifts in daily heat patterns, such as how long heat lingers before night-time cooling, be prohibitive for some crops?	Y	Some fruits and vegetables grown in the area may be affected by changes in heat patterns.	Crop demand would increase	High
Is groundwater storage able to buffer drought?	Y	Groundwater storage provides an excellent buffer to drought events.	Lack of groundwater storage to buffer drought	Med
Is there additional ability to conserve further?	Y	Water conservation measures are in place throughout the Region.	Limited ability to conserve further	Med
Does water use vary by more than 50% seasonally in parts of your region?	Y	Agricultural, residential and golf course irrigation demand increases substantially in the summer.	Limited ability to meet summer demand	Med
Are some instream flow requirements in your region either currently insufficient to support aquatic life, or occasionally unmet?	N	Surface waters are ephemeral	Habitat demand would be impacted	N/A



Issues and Needs

December 2018

Vulnerability	Y/N	Justification	Vulnerability Issue	Tier
Water Supply				
Does a portion of the water supply in your region come from snowmelt?	Y	Portion of supply from snowmelt in San Geronio and Santa Rosa mountains is low.	Decrease in local surface supply	Low
Does part of your region rely on water diverted from the Delta, imported from the Colorado River, or imported from other climate-sensitive systems outside your region?	Y	Region is dependent on Colorado River water.	Decrease in imported supply	High
Would your region have difficulty in storing carryover supply surpluses from year to year?	N	Groundwater basins have excess storage capacity, and facilities are in place to recharge.	Decrease in seasonal reliability	N/A
Does part of your region rely on aquifers with the potential to be affected with salt intrusion? Has salt intrusion been a problem in the past?	Y	Salt intrusion could potentially come from the Salton Sea and the eastern Coachella Valley perched aquifer.	Decrease in groundwater supply	Low
Has your region faced a drought in the past during which it failed to meet local water demands?	N	Did the Region implement drought management measures??	Sensitivity due to higher drought potential	N/A
Does your region have invasive species management issues at your facilities, along conveyance structures, or in habitat areas?	Y	Quagga mussels in Colorado River Aqueduct	Invasive can reduce supply available	Med
Water Quality				
Are increased wildfires a threat in your region? If so, does your region include reservoirs with fire-susceptible vegetation nearby which could pose a water quality concern from increased erosion?	Y	Climate change projections show little to no increase in wildfire in the Region, though fires in the surrounding mountains could increase flood damage and sedimentation.	Increased erosion and sedimentation	Low



Vulnerability	Y/N	Justification	Vulnerability Issue	Tier
Does part of your region rely on surface water bodies with current or recurrent water quality issues related to eutrophication, such as low dissolved oxygen or algal blooms? Are there other water quality constituents potentially exacerbated by climate change?	Y	Region relies on local surface waters for supply, but use of local surface water is low.	Poor water quality in surface waters	Low
Are seasonal low flows decreasing for some water bodies in your region? If so, are the reduced low flows limiting the water bodies' assimilative capacity?	N	Rivers in the area are dry except during storm events.	Increased constituent concentrations	N/A
Are there beneficial uses designated for some water bodies in your region that cannot always be met due to water quality issues?	N	Whitewater River has a recreational designation, but has never been closed to the public due to water quality issues.	Decrease in supply and/or recreational opportunity	N/A
Does part of your region currently observe water quality shifts during rain events that impact treatment facility operation?	N	No direct treatment of surface water	Increase in treatment needs and costs	N/A
Sea Level Rise				
Has coastal erosion already been observed in your region?	N	Not applicable	Not applicable	N/A
Are there coastal structures, such as levees or breakwaters, in your region?	N	Not applicable	Not applicable	N/A
Is there significant coastal infrastructure, such as residences, recreation, water and wastewater treatment, tourism, and transportation) at less than six feet above mean sea level in your region?	N	Not applicable	Not applicable	N/A
Is there land subsidence in the coastal areas of your region?	N	Not applicable	Not applicable	N/A
Are there climate-sensitive low-lying coastal habitats in your region?	N	Not applicable	Not applicable	N/A



Vulnerability	Y/N	Justification	Vulnerability Issue	Tier
Are there areas in your region that currently flood during extreme high tides or storm surges?	N	Not applicable	Not applicable	N/A
Do tidal gauges along the coastal parts of your region show an increase over the past several decades?	N	Not applicable	Not applicable	N/A
Flooding				
Does critical infrastructure in your region lie within the 200-year floodplain?	Y	Pump stations and pipelines, treatment plants could be impacted. Facilities currently in place are designed for SPF (250-year storm/flood), so increased flooding could be manageable.	Increases in inland flooding	High
Does aging critical flood protection infrastructure exist in your region?	Y	eastern Coachella Valley lacks adequate flood control		
Have flood control facilities (such as impoundment structures) been insufficient in the past?	Y	eastern Coachella Valley lacks adequate flood control		
Are wildfires a concern in parts of your region?	N	Not applicable	Increases in flash flooding	N/A
Does part of your region lie within the Sacramento-San Joaquin Drainage District?	N	Not applicable	Not applicable	N/A



Issues and Needs
December 2018

Vulnerability	Y/N	Justification	Vulnerability Issue	Tier
Ecosystem and Habitat				
Does your region include inland or coastal aquatic habitats vulnerable to erosion and sedimentation issues?	Y	Considered low threat, because watershed erosion and sediment management are not key issues due to the engineered and maintained nature of waterways; however, pup fish exist in open agricultural drains.	Increased impacts to water dependent species	Low
Does your region include estuarine habitats which rely on seasonal freshwater flow patterns?	N	Not on coast.		
Do climate-sensitive fauna or flora populations live in your region?	Y	Desert pupfish living in agricultural drains and flood control channels		
Do estuaries, coastal dunes, wetlands, marshes, or exposed beaches exist in your region? If so, are coastal storms possible/frequent in your region?	N	Not applicable	Decrease in habitat protection against coastal storms	N/A
Do endangered or threatened species exist in your region? Are changes in species distribution already being observed in parts of your region?	Y	Wetlands near the Salton Sea are a part of the Coachella Valley MSHCP	Decrease in available necessary habitat	Low
Does the region rely on aquatic or water-dependent habitats for recreation or other economic activities?	N	Not applicable		
Are there areas of fragmented estuarine, aquatic, or wetland wildlife habitat within your region? Are there movement corridors for species to naturally migrate? Are there infrastructure projects planned that might preclude species movement?	Y	Wetlands near the Salton Sea are a part of the Coachella Valley MSHCP		



Issues and Needs
December 2018

Vulnerability	Y/N	Justification	Vulnerability Issue	Tier
Does your region include one or more of the habitats described in the Endangered Species Coalition's Top 10 habitats vulnerable to climate change?	Y	The "Southwest Deserts" identified on the top 10 list includes the Sonoran Desert.		
Are there rivers in your region with quantified environmental flow requirements or known water quality/quantity stressors to aquatic life?	N	Not applicable	Decrease in environmental flows	N/A
Hydropower				
Is hydropower a source of electricity in your region?	Y	Hydropower is used in the Region as a source of electricity from the Imperial Irrigation District	Reduction in hydropower generation potential	Low
Are energy needs in your region expected to increase in the future? If so, are there future plans for hydropower generation facilities or conditions for hydropower generation in your region?	Y	Hydropower use is currently low and there are no concrete future plans to expand its use		Low



3.2.3 Vulnerability Analysis

Once the Region's climate change issues were identified, it was examined the adaptability of its water resources to climate change by prioritizing the vulnerability issues. In prioritizing the vulnerability issues, the Region identified those water resources that are of highest concern because of the significance of the impact of climate change, and from there identify the level of adaptation that will be needed.

Vulnerability Prioritization

The identified vulnerabilities were prioritized by considering the unique aspects of the Region. Prioritized vulnerabilities were vetted at the December 13, 2012 Planning Partners meeting and are shown in **Table 3--5**. Those vulnerability issues determined to be high priority are discussed further below.

Table 3-5: Prioritized Climate Change Vulnerability Issues

Priority Level	Category and Vulnerability Issue
High	<ul style="list-style-type: none"> Water Demand: Crop water demand would increase Water Supply: Decrease in imported supply Flooding: Increases in inland flooding
Medium	<ul style="list-style-type: none"> Water Demand: Lack of groundwater storage to buffer drought Water Demand: Limited ability to conserve further Water Demand: Limited ability to meet summer demand Water Supply: Invasive species can reduce the supply available
Low	<ul style="list-style-type: none"> Water Demand: Industrial demand would increase Water Supply: Decrease in local surface supply Water Supply: Decrease in groundwater supply Water Quality: Increased erosion and sedimentation due to wildfires Ecosystem and Habitat: Increased impacts to water dependent species Decrease in available necessary habitat

Water Demand: Crop Water Demand Would Increase

Crop water demands are expected to increase with the increased temperatures caused by climate change. Given that agriculture is an important industry in the Region, an increase in crop irrigation demands caused by higher temperatures could impact the Region's economy through increased supply costs.

Water Supply: Decrease in Imported Supply

The water supply vulnerability issue of "decrease in imported supply" was identified by the Region as a high priority issue due to its dependency on imported water from the State Water Project and from the Colorado River. Given the Region's limited local water supplies, a decrease in imported supply with climate change could have a significant impact on the Region and is an issue that needs to be addressed.



According to water rights secured by a series of interstate compacts and federal legislation known as the *Law of the River*, Colorado River water supplies for the Coachella Valley are considered relatively secure even considering climate change vulnerabilities. However, according to the published State Water Project Delivery Reliability Reports, it is projected that the average reliability of SWP Table A deliveries (refer to *Chapter 2 Region Description* for more information) will be 60% of the Table A allotted value through 2029 after taking into consideration the potential effects of climate change (CVWD 2012). SWP deliveries are likely to be impacted by variations in streamflow and runoff due to increased precipitation variation and decreases in snowpack due to increased temperature. Additionally, the Sacramento-San Joaquin River Delta, an important source of water for the SWP, will likely be impacted by sea level rise. Due to climate change and other factors, the 2010 Coachella Valley WMP assumes a long-term future average reliability of SWP supplies to be 50% of the Region's Table A allocations.

Flooding: Increases in Inland Flooding

Inland flooding was listed as a high priority for the Region, given that some of the Region's critical water infrastructure exists in the 200-year flood plain, and that the eastern Coachella Valley has experienced flooding in the past. More extreme storms due to climate change could cause an increase in inland flooding in the future.

3.3 Technical Analysis

*This section addresses with **Technical Analysis Standard** by documenting that the IRWM/SWR Plan is based on sound technical information, analyses, and methods.*

This section identifies the scientific and technical analysis used in development of the Coachella Valley IRWM/SWR Plan. Published documents such as regional plans, studies, and technical reports were reviewed, experts were consulted, and meetings with various interest groups were held to understand the short term and long-range needs of the Coachella Valley.

The documents referenced in *Chapter 2 Region Description*, *Chapter 3 Issues and Needs*, and *Chapter 12 References* of the Coachella Valley IRWM/SWR Plan were reviewed by the CVRWMG and the consulting team for the 2014 IRWM Plan Update (RMC and IPM, Inc). As a partnership of the five Coachella Valley water purveyors and one wastewater agency, the CVRWMG includes a wide variety of water professionals with different water-related backgrounds. The variety of backgrounds of the CVRWMG members and the consulting team allowed the information to be evaluated, analyzed, and interpreted from many different perspectives.

To better understand the water management needs of the Coachella Valley, the CVRWMG also held meetings with various interest groups, which are described in further detail in *Chapter 7 Stakeholder Involvement*:

- Coachella Valley Planning Partners are a group formed at the request of the CVRWMG consisting of representatives from public and non-profit entities that have an interest in water resources of the Region. The Planning Partners support the CVRWMG by reviewing and contributing to draft issues identification, goals and objectives, project prioritization criteria, long-term governance, implementation framework, and other IRWM/SWR Plan deliverables.
- Disadvantaged Community representatives within the Coachella Valley; DAC representatives were also invited to become Planning Partners. These meetings allowed the CVRWMG to understand



the critical water supply/water quality issues and needs of the DACs; and to identify potential solutions.

- The Coachella Valley's tribal governments, Bureau of Indian Affairs, and other tribal coordinating agencies were contacted to better understand their critical water resources issues and needs. The CVRWMG learned more about the major water-related concerns facing the tribes such that the long-term implementation of the IRWM/SWR Plan was responsive to those needs.
- Other Coachella Valley stakeholders were also identified. These meetings consisted of individual community members concerned with water resources, and representatives from various community groups that are concerned about water resources. The CVRWMG gathered input from the stakeholders about the community priorities and water related concerns.

The information gathered from the pertinent literature, water resource experts, and various interest groups was compiled and analyzed by the CVRWMG and the consulting team to determine the water management needs of the Coachella Valley. This work focused on identifying the key water resource goals and objectives of the IRWM/SWR Plan area (see *Chapter 6 Objectives*). The CVRWMG and its consulting team then used the information to prepare the Coachella Valley IRWM/SWR Plan.

3.3.1 Technical Information

The IRWM/SWR Plan goals were determined through review of pertinent literature, and consultation of various experts and interest groups. The CVRWMG undertook an extensive review of regional plans, studies, and technical reports to identify water management issues facing the Coachella Valley. Each section of the above *Section 3.1 Coachella Valley Issues and Needs* contains a summary of issues statement and pertinent literature used to derive the issues statement. This summary provides a snapshot of the studies, models, and other technical methodologies used to analyze the technical information and data sets. **Appendix VI-B** contains more detailed information regarding the technical analyses included in the plans and studies used to inform the development of the 2018 IRWM/SWR Plan. This appendix is consistent with Table 6 – Possible Studies/Data Sets provided in the *2016 IRWM Program Guidelines* by DWR.

Information was obtained from a broad range of sources, including: CVWD, CWA, DWA, MSWD, IWA, Coachella Valley Association of Governments (CVAG), DWR, Rural Community Assistance Corporation (RCAC), Poder Popular, RCFCWCD, County of Riverside, Colorado River Regional Water Quality Control Board (RWQCB), and the Desert Recreation District. Plans and reports included: water management plans, water quality reports, engineer's reports, habitat conservation plans, general plans, groundwater replenishment reports, master plans, feasibility studies, system assessments, stormwater management plans, and trails studies. *Chapter 12 References* provides a comprehensive list of the resources used to develop this IRWM/SWR Plan. Use of these technical resources is appropriate for development of the IRWM/SWR Plan, because it represents historic, current, and projected conditions for all service providers within the Coachella Valley.



Coachella Valley Water District

Strategic Plan

Adopted 2015



FlowingForward

Our vision

Coachella Valley Water District's top priority is delivering high quality drinking water that meets stringent government standards.





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Message from the General Manager



In June 2015, the Coachella Valley Water District's Board of Directors adopted its second five-year Strategic Plan. Strategic planning is a disciplined effort to produce fundamental decisions and actions that shape and guide an organization, what it does and why. It is a plan for today and for the future.

The 2015-16 Strategic Plan presented here builds upon the important process started last year that helped define the District's priorities. This year's plan identifies 29 Strategic Initiatives, which are the projects that will help us achieve the plan's overall goals.

Development of the Strategic Plan was a collaborative internal process that included a core group of 48 employees representing every department within the District and two rotating Board members who met for three separate workshops. Originally, 42 initiatives were proposed and evaluated based on importance and whether they were measurable, realistic and provided a high return on investment. These were then prioritized into the final 29 Strategic Initiatives outlined in this document.

The focus of this document is on the current year, but it also looks to the future. Strategic planning implies that some organizational decisions and actions are more important than others are, and that much of the strategy lies in making the tough decisions about what is most important to achieving organizational success.

The final product will shape future decisions and help us meet the water-related needs of the community for generations to come.

Sincerely,

A handwritten signature in black ink, appearing to read "Jim Barrett".

Jim Barrett,
General Manager

Our Mission

To meet the water-related needs of the people through dedicated employees, providing high quality water at a reasonable cost.



Coachella Valley Water District at a glance

Coachella Valley Water District (CVWD, District) is a special district established in 1918 by the state legislature and governed by a five-member Board of Directors elected to four-year terms by District voters.

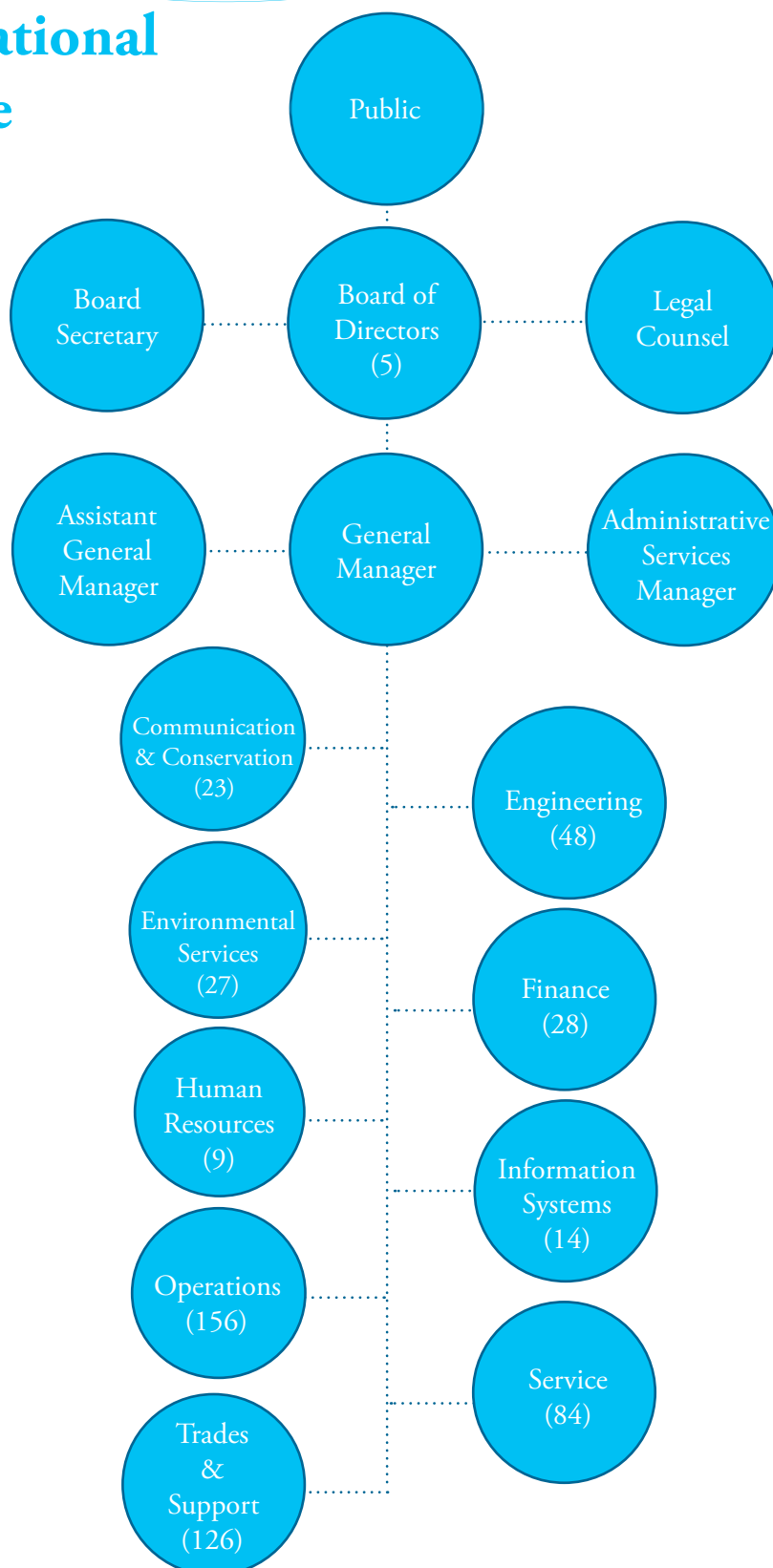
Today, CVWD has grown into a multi-faceted agency with approximately 500 employees helping to provide a variety of water-related utility services to more than 350,000 people in the Coachella Valley.

The primary fields of service are:

- 1 Domestic/drinking water treatment and distribution to approximately 109,000 homes and businesses. All of the drinking water supplied by Coachella Valley Water District comes from the groundwater basin.
- 2 Irrigation water importation and distribution. The 122-mile Coachella Canal provides Colorado River water to local farmers and golf courses in the eastern Coachella Valley.
- 3 Wastewater collection and treatment. The District owns and operates five wastewater reclamation plants that receive a combined average of 17.5 million gallons of wastewater per day.
- 4 Recycled water distribution. Treated wastewater is distributed to golf courses and other customers for landscape irrigation.
- 5 Groundwater management. CVWD replenishes the groundwater supply at three different facilities in the Coachella Valley. At two of the locations, the effort is collaborative with Desert Water Agency.
- 6 Regional stormwater/flood protection. The District protects nearly 600 square miles from flooding through a system that includes 16 stormwater protection channels.

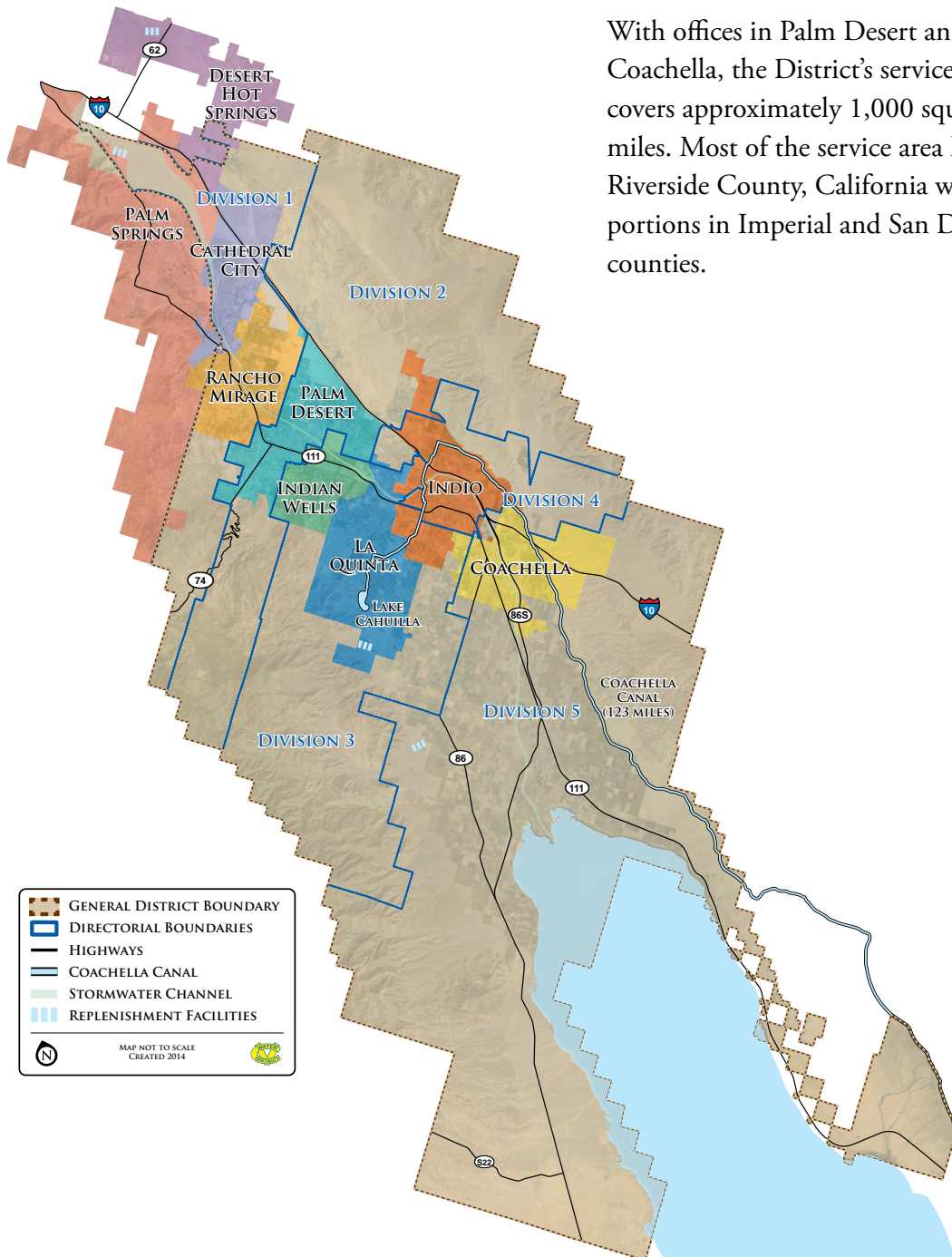


Organizational Structure



Boundary Map

With offices in Palm Desert and Coachella, the District's service area covers approximately 1,000 square miles. Most of the service area lies in Riverside County, California with small portions in Imperial and San Diego counties.



Community profile

The Coachella Valley (Valley) extends approximately 45 miles in Riverside County, southeast from the San Bernardino Mountains to the Salton Sea. The Valley is approximately 15 miles wide along most of its length and surrounded by scenic, rugged mountains. The elevations on the valley floor range from 1,600 feet at the north end of the valley, to 250 feet below sea level at the south end of the valley.

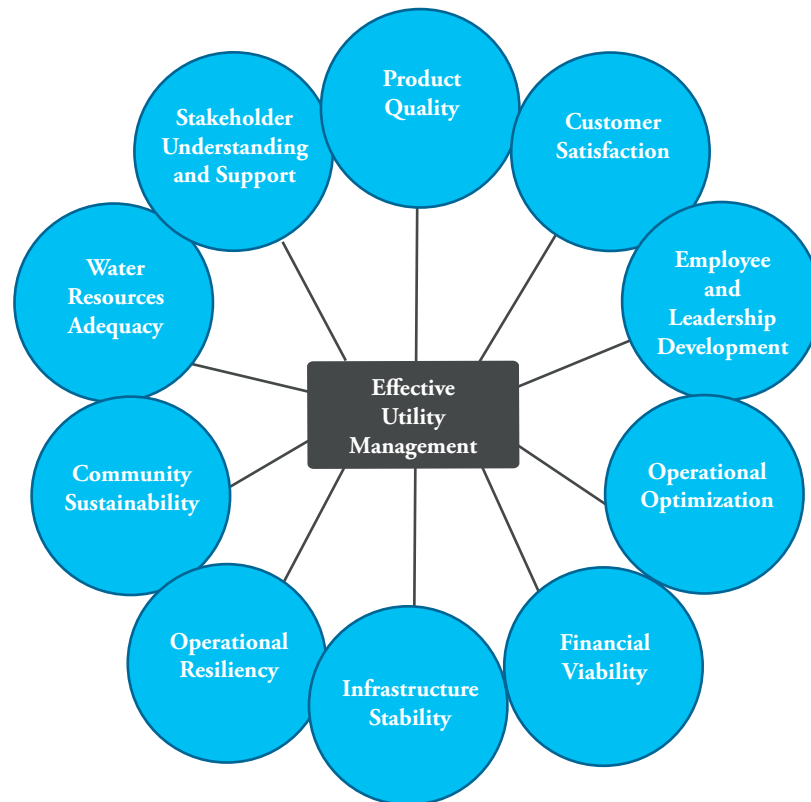
The Valley's year-round population is approximately 350,000, but this figure almost doubles during the months of November through May with the influx of "snowbirds" escaping the cold winters of Canada, the Pacific Northwest, and the Northeastern United States.



What is a Strategic Plan?

The Strategic Plan is a tool that defines what is critical to the District's success and the initiatives necessary to guide the District toward its achievement of goals. Strategic planning is a disciplined effort to produce fundamental decisions and actions that shape and guide an organization, what it does and why.

The strategic goals were developed within the framework of Effective Utility Management (EUM), which was developed by the major water and wastewater organizations in the United States. Effective utility management helps water and wastewater utilities select priorities for improvement, based on the unique needs of their communities. The framework addresses operations, infrastructure, customer satisfaction, community welfare, natural resource stewardship, and financial performance.



The 10 attributes of an effectively managed water utility, as developed by leading industry associations.

External Issues

There are several significant issues currently facing the District that influenced the development of the Strategic Goals. The District paired these issues with the EUM attributes (in parenthesis) as a reference point for determining priorities. Among the key external issues are:

- 1 California is experiencing a historic drought that has resulted in state-mandated conservation goals and water-use restriction. Because we live in a desert, we're essentially always in a drought and require effective groundwater management planning to ensure future water supplies. The Coachella Valley Water Management Plan details several strategies and projects to eliminate overdraft of the aquifer, including increased conservation, utilization of recycled and imported water for golf and farm irrigation and continued groundwater replenishment. (Water Resources Adequacy and Community Sustainability)
- 2 Through the foresight of our predecessors in the Valley, CVWD is only one of two California water agencies that hold rights to both the Colorado River and the State Water Project. However, the recent droughts within California and on the Colorado River basin is a stark reminder how vulnerable our imported water supplies are to the forces of nature, and that these supplies need to be protected and optimally used. (Water Resources Adequacy)
- 3 The California Department of Public Health in 2013 announced a new Maximum Contaminant Level (MCL) for chromium-6 at 10 parts per billion. Complying with the new MCL will have wide-ranging impacts on District operations and infrastructure. A comprehensive study was completed to determine the most cost-effective approach. Design of new treatment facilities is underway with construction expected to start in summer 2016. (Product Quality and Water Resources Adequacy)
- 4 Although the bulk of the domestic water system is relatively new, ongoing repairs and replacement projects are required. The canal irrigation system is 65 years old, with many of the 485 miles of irrigation laterals in need of repair or replacement. The District is the main agency that provides stormwater protection for the Coachella Valley and several areas remain unprotected. (Infrastructure Stability)
- 5 In 2013, the Agua Caliente Band of Cahuilla Indians filed suit against Desert Water Agency (DWA) and the District. The suit claims senior reserved groundwater rights and seeks to permanently stop DWA and the District from (1) withdrawing groundwater from the aquifer in the western Coachella Valley, and (2) replenishing the aquifer without treating the water first. (Water Resources Adequacy)



CVWD's Strategic Goals

The District considered all external issues and internal challenges before identifying and committing to the broad goals below, which are designed to move the District forward in executing its mission. The strategic goals the District has selected to focus on cover six thematic areas:

- | | |
|----------------------------------|--|
| 1 Employee/Workforce Development | 4 Exceptional Customer Service |
| 2 Financial Stability | 5 Water Quality and Environmental Leadership |
| 3 Water Supply Sustainability | 6 Infrastructure Investment and Management |

Budgeting

Although the District continues to enjoy a healthy financial condition in 2015-16 (total annual budget of \$329.7 million, divided into \$221.8 million for operating budget and \$108.4 million for capital projects), budgetary constraints were still considered during the Strategic Plan development.

The Strategic Planning process was very successful, generating 42 distinct projects. Realizing the timing and budgetary constraints for fiscal year 2015-16, a total of 29 projects were identified as ones rising to the top of the priority list, and are presented in the following pages. The other 13 projects have been retained, and will be revisited in the future after the completion of the second year of this process.



Action Plan

Strategic Goal 1: Employee Workforce Development

Objective: Maintain competitive salaries and benefits

:: Action Plan ::

Initiative 1: Perform Salary and Benefits Survey and update all job descriptions.

Status: Partially completed; carried over to next fiscal year.

Initiative 2: Increase outreach to local colleges and high schools about job opportunities.

Status: Completed and ongoing.

Objective: Succession planning and knowledge management

:: Action Plan ::

Initiative 1: Develop succession planning strategy.

Status: Partially completed; carried over to next fiscal year.

Initiative 2: Create an Internal Education/Training Program for District and departmental levels.

Status: Completed.

Initiative 3: Restore internal suggestion box so employees of every level can make recommendations to improve processes and procedures.

Status: Completed and ongoing.

Strategic Goal 2: Financial Stability

Objective: Follow industry-recognized rate making practice

:: Action Plan ::

Initiative 1: Complete Cost of Service Study for irrigation rates and replenishment assessment charges (RAC).

Status: Carried over to next fiscal year.

Initiative 2: Complete Cost of Service Study for domestic water and sanitation.

Status: Carried over to next fiscal year.

Objective: Maintain organizational fiscal health

:: Action Plan ::

Initiative 1: Pre-fund Other Post-Employment Benefits (OPEB) and CalPERS.

Status: Partially completed; carried over to next fiscal year.

Initiative 2: Obtain Bond Rating.

Status: Partially completed; carried over to next fiscal year.

Action Plan

Strategic Goal 2: Financial Stability (Continued)

Objective: Ensure integrity and transparency of financial process

:: Action Plan ::

Initiative 1: Develop financial policies to protect the District's long-term financial health.

Status: Carried over to next fiscal year.

Initiative 2: Develop internal control policies to ensure reasonable safeguards of the District's assets.

Status: Carried over to next fiscal year.

Strategic Goal 3: Water Supply Sustainability

Objective: Enact more aggressive conservation

:: Action Plan ::

Initiative 1: Plan and implement a golf course turf rebate program that includes a tiered rate analysis and establishes water budgets to assist golf courses in reducing water use.

Status: Completed and ongoing.

Objective: Expand non-potable water program

:: Action Plan ::

Initiative 1: Continue current golf course conversion to non-potable use and implement the Board-approved plan.

Status: Completed and ongoing.

Initiative 2: Produce a Non-potable Water Master Plan to identify golf courses to be connected to nonpotable system in the future.

Status: Carried over to next fiscal year.

Objective: Update and comply with Water Master Plan

:: Action Plan ::

Initiative 1: Develop imported water-use strategy to identify groundwater source substitution projects.

Status: Partially completed; carried over to next fiscal year.

Objective: Protect water supply and optimize usage

:: Action Plan ::

Initiative 1: Complete water supply implementation strategies study to consider alternative source of domestic water.

Status: Completed.

Action Plan

Strategic Goal 4: Exceptional Customer Service

Objective: Optimize customer experience

:: Action Plan ::

Initiative 1: Redesign www.cvwd.org website for improved customer navigation.

Status: Completed.

Initiative 2: Install call recording software for customer service training purposes.

Status: Completed.

Initiative 3: Install co-browsing software to allow customer service representatives to better assist customers having difficulty with the website.

Status: Completed.

Objective: Improve internal communications

:: Action Plan ::

Initiative 1: Hold interdepartmental meetings with employees, directors, and general manager to share important information.

Status: Completed and ongoing.

Objective: Obtain customer feedback and input

:: Action Plan ::

Initiative 1: Engage customers through customer satisfaction surveys to explore opportunities for enhanced service and programs.

Status: Completed and ongoing.

Strategic Goal 5: Water Quality & Environmental Leadership

Objective: Comply with water quality regulations

:: Action Plan ::

Initiative 1: Develop and implement an agricultural discharge compliance plan to ensure compliance with state requirements.

Status: Completed

Initiative 2: Obtain revised water quality permit provisions for Waste Water Reclamation Plant 10.

Status: Carried over to next fiscal year.

Objective: Perform effective environmental resource management

:: Action Plan ::

Initiative 1: Complete and Submit Salt and Nutrient Management Plan to the State, as required for all groundwater basins under The State Water Resources Control Board's Recycled Water Policy.

Status: Completed.

Action Plan

Strategic Goal 5: Water Quality & Environmental Leadership (Continued)

Objective: Perform effective environmental resource management (cont'd)

Initiative 2: Complete and implement a comprehensive Operations and Maintenance Manual to protect biological resources on CVWD conservation lands.

Status: Completed.

Objective: Optimize energy usage

:: Action Plan ::

Initiative 1: Complete an Alternative Energy Feasibility Study and rank alternative energy projects that can reduce energy costs and add to overall community sustainability.

Status: Carried over to next fiscal year.

Strategic Goal 6: Infrastructure Investment and Management

Objective: Develop Asset Management, Capital Improvement Program and Preventive Maintenance programs

:: Action Plan ::

Initiative 1: Implement an Asset Management Program.

Status: Partially completed; carried over to next fiscal year.

Initiative 2: Develop Asset Management Policy and recommend computerized maintenance management system software.

Status: Partially completed; carried over to next fiscal year.

Initiative 3: Implement Preventative Maintenance Management Program

Status: Completed.

Initiative 4: Develop hydraulic model for irrigation distribution system.

Status: Carried over to next fiscal year.

Objective: Irrigation infrastructure repair and replacement

:: Action Plan ::

Initiative 1: Perform comprehensive irrigation and drainage inspection of key portions of the District's Canal irrigation system.

Status: Completed.

Objective: Protect other physical assets

:: Action Plan ::

Initiative 1: Conduct a corrosion protection system evaluation and implement recommendations to help maintain District infrastructure.

Status: Carried over to next fiscal year.

Employee Workforce Development

Objective: Maintain Competitive Salaries & Benefits

:: Action Plan ::

Initiative 1: Develop compensation program to evaluate District's overall salary and benefits package.

Outcome: Create a plan to reward employees for exceptional performance and an evaluation process to provide measurable performance expectations while maintaining fiscal responsibility.

Estimated Cost: No additional funding required.

EUMs: Employee and leadership development

Initiative 2: Develop employee reward-recognition program.

Outcome: Implement programs to improve morale and promote employee initiative and empowerment.

Estimated Cost: No additional funding required.

EUMs: Employee and leadership development

Objective: Succession planning & knowledge management

:: Action Plan ::

Initiative 1: Develop and implement a career path and leadership development program.

Outcome: Create clear career paths and leadership development to help employees become better prepared for possible career advancement and increase the number of qualified internal candidates for future positions.

Estimated Cost: No additional funding required.

EUMs: Employee and leadership development, operational resiliency

Initiative 2: Develop and implement an intranet collaboration portal.

Outcome: Develop an electronic tool that will improve internal communication between departments and employees.

Estimated Cost: No additional funding required.

EUMs: Employee and leadership development

Financial Stability

Objective: Follow industry-recognized rate making practices

:: Action Plan ::

Initiative 1: Conduct a Cost of Service Study for non-potable, developer fees, canal capacity, drought RAC's.

Outcome: Standardize non-potable water fees; include canal capacity fees and canal drought contingency plan.

Estimated Cost: \$143,000

EUMs: Financial viability

Objective: Maintain organizational fiscal health

:: Action Plan ::

Initiative 1: Complete bond rating and financial policies.

Outcome: Obtain AA Bond Rating to secure best interest rates for the District.

Estimated Cost: \$72,000

EUMs: Financial viability, operational resiliency

Initiative 2: Establish financial policies.

Outcome: Provide framework for financial and budgeting decisions; provide assurances to bondholders.

Estimated Cost: No additional funding required.

EUMs: Financial viability, operational optimization

Objective: Ensure integrity and transparency of financial process

:: Action Plan ::

Initiative 1: Increase stakeholder outreach (internal and external) regarding RAC, domestic, chromium-6, sanitation, etc.

Outcome: Conduct stakeholder education and receive valuable stakeholder input before developing and approving rate increases.

Estimated Cost: No additional funding required.

EUMs: Stakeholder understanding and support

Water Supply Sustainability

Objective: Enact more aggressive conservation

:: Action Plan ::

Initiative 1: Expand District's Golf Water Conservation Program.

Outcome: Explore funding opportunities to implement golf course rebate program for projects such as turf removal, lake liner replacement, and nozzle replacement.

Estimated Cost: No additional funding required.

EUMs: Water resources adequacy

Initiative 2: Create a new Agriculture Water Conservation program.

Outcome: Form an agricultural water advisory group to provide valuable input on development of a program to assist agricultural water users in reducing water use.

Estimated Cost: No additional funding required.

EUMs: Water resources adequacy, operational resiliency

Initiative 3: Expand Domestic Water Conservation Program (includes complying with Governor's mandate).

Outcome: Develop process for improved staff oversight and tracking related to water-use mandates and water waste reports.

Estimated Cost: No additional funding required.

EUMs: Water resources adequacy, community sustainability

Objective: Expand non-potable water program

:: Action Plan ::

Initiative 1: File State Wastewater Change Petition to utilize waste Water Reclamation Plant No. 4 effluent for non-potable uses.

Outcome: Obtain State approval to change waste Water Reclamation Plant No. 4 waste water discharge to help increase recycled water use and groundwater conservation.

Estimated Cost: \$10,000

EUMs: Water resources adequacy, community sustainability

Water Supply Sustainability (cont'd)

Objective: Update and comply with Water Management Plan

:: Action Plan ::

Initiative 1: Develop drought contingency plan for Colorado River water.

Outcome: Develop a Board-approved plan to address availability and drought conditions that will help guide future water management decisions.

Estimated Cost: \$10,000

EUMs: Water resources adequacy, community sustainability, operational resiliency

Initiative 2: Perform agency coordination and planning to comply with Sustainable Groundwater Management Act (SGMA).

Outcome: Plan and coordinate CVWD's timely compliance with SGMA, including submittal of an alternative groundwater sustainability plan to the State by January 1, 2017.

Estimated Cost: No additional funding required.

EUMs: Water resources adequacy, community sustainability, operational resiliency



Exceptional Customer Service

Objective: Optimize Customer Experience

:: Action Plan ::

Initiative 1: Create mass notification system to be able to inform customers in a timely manner.

Outcome: Implement software and processes for notifying customers of major events (boil water alerts, drought updates, conservation tips, rate adjustments).

Estimated Cost: \$20,000

EUMs: Customer satisfaction

Initiative 2: Develop citizen's reporting application.

Outcome: Provide platform for citizens and stakeholders to notify District of infrastructure problems and water waste utilizing an app.

Estimated Cost: \$10,000

EUMs: Customer satisfaction

Objective: Improve Internal Communications

:: Action Plan ::

Initiative 1: Develop fact sheets for staff about important topics.

Outcome: Improve internal communications and awareness of the issues facing the District and its customers through fact sheets distributed to employees as needed.

Estimated Cost: No additional funding required.

EUMs: Employee and leadership development, customer satisfaction

Initiative 2: Implement interdepartment tailgate meetings.

Outcome: Improve internal communications and awareness of the issues facing the District and its customers through presentations and meetings.

Estimated Cost: No additional funding required.

EUMs: Employee and leadership development, customer satisfaction

Objective: Obtain Customer Feedback & Input

:: Action Plan ::

Initiative 1: Develop targeted customer experience surveys.

Outcome: Develop and conduct customer satisfaction surveys to help CVWD identify policies and procedures in need of improvement.

Estimated Cost: \$50,000

EUMs: Customer satisfaction

Water Quality & Environmental Leadership

Objective: Comply with Water Quality Regulations

:: Action Plan ::

Initiative 1: Obtain State approval for Chromium-6 Water Treatment Compliance Plan.

Outcome: Satisfy State drinking water requirements.

Estimated Cost: No additional funding required.

EUMs: Product quality, operational resiliency

Initiative 2: Complete right-of-way acquisition and CEQA-plus document for pipeline to connect Salton City domestic water system to Cove domestic water system.

Outcome: Bring new water source to ID11, improve water quality and quantity.

Estimated Cost: No additional funding required.

EUMs: Stakeholder understanding and support, community sustainability, water resources adequacy, product quality

Objective: Perform Effective Environmental Resource Management

:: Action Plan ::

Initiative 1: Submit Garfield Street Constructed Habitat Project Concept Plan.

Outcome: Satisfy phase 1 of CVWD's Coachella Valley Multiple Species Habitat Conservation Plan obligation through providing natural habitat for mitigation.

Estimated Cost: \$670,000

EUMs: Water resources adequacy, community sustainability

Initiative 2: Complete Water Reclamation Plant No. 7 Tamarisk Removal Project.

Outcome: Satisfy CVWD Coachella Valley Multiple Species Habitat Conservation Plan obligation; restores natural habitat; conserves groundwater.

Estimated Cost: \$100,000

Additional FY 16 Funds: \$100,000

EUMs: Water resources adequacy, community sustainability

Water Quality & Environmental Leadership (cont'd)

Objective: Optimize Energy Use

:: Action Plan ::

Initiative 1: Complete Alternative Energy Feasibility Study.

Outcome: Identify highest ranked feasible alternative energy projects; provide a path to reduce carbon emissions and energy costs.

Estimated Cost: \$50,000

EUMs: Community sustainability, operational optimization



Infrastructure Investment and Management

Objective: Develop an Asset Management/Capital Improvement Program/
Preventive Maintenance Management program

:: Action Plan ::

Initiative 1: Complete asset inventory and condition assessment, and create a Preventive Maintenance Management Program.

Outcome: Development of plan will guide CVWD's asset inventory, accounting, maintenance, management and replacement (recommend Computerized Maintenance Management System software).

Estimated Cost: \$950,000 total; \$500,000 next fiscal year

EUMs: Infrastructure stability, Operational optimization

Objective: Irrigation Infrastructure Repair and Replacement

:: Action Plan ::

Initiative 1: Finish development of hydraulic model for irrigation system.

Outcome: Develop and implement irrigation distribution system hydraulic model for use as a tool to evaluate and design improvements to the irrigation distribution system.

Estimated Cost: \$250,000

EUMs: Infrastructure stability, operational optimization

Initiative 2: Inspect irrigation and drainage system and begin prioritizing results.

Outcome: Perform comprehensive evaluation to provide valuable input for the asset management master plan pilot program.

Estimated Cost: \$200,000

EUMs: Operational resiliency, infrastructure stability

Infrastructure Investment and Management (cont'd)

Objective: Irrigation Infrastructure Repair and Replacement (cont'd)

Initiative 3: Hire a Capital Improvement Project funding strategies and grant writer.

Outcome: Hire an on-call consultant to improve CVWD grant/low interest loan funding opportunities.

Estimated Cost: \$100,000

EUMs: Infrastructure stability, financial viability

Initiative 4: Reduce resource agency obstacles to execute Capital Improvement Projects.

Outcome: Establish legislator and resource agency contacts and develop path to remove obstacles to timely project completion.

Estimated Cost: No additional funding required.

EUMs: Operational resiliency, operational optimization







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