IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

GEI Consultants

FINAL

Imperial Integrated Regional Water Management Plan

Volume 1: IRWM Plan

October 2012

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

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Imperial

Integrated Regional Water Management Plan

Volume 1

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App K	**Imperial IRWMP Project Ranking and Evaluation Criteria**
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List of Acronyms

Acronyms

AAC	All-American Canal
AC	Acre(s)
ACEC	Area of Critical Environmental Concern
AF	Acre-Feet
AFY	Acre-Feet per Year
ARRA	American Recovery and Reinvestment Act
AVM	acoustic velocity meter
BECC	Border Environment Cooperation Commission
BMP	Best Management Practices
CalTAP	California Technical Assistance Providers
CAP	Central Arizona Project
CASGEM	California Statewide Groundwater Elevation Monitoring
CCD	Census County Division
CDCA	California Desert Conservation Area
CDCR	California Department of Corrections and Rehabilitation
CDFG	California Department of Fish and Game
CDOF	California Department of Finance
CDP	Census Designated Places
CDPH	California Department of Public Health
CDWR	California Department of Water Resources
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Plan
CNPS	California Native Plant Society
CPP	Community Partnering Program
CRWA	California Rural Water Association
CRWDA	Colorado River Water Delivery Agreement
CU	Consumptive Use
CUP	County Use Permits
CVWD	Coachella Valley Water District
CWC	California Water Code
CWP	California Water Plan
DAC	Disadvantaged Community
DRECP	Desert Renewable Energy Conservation Plan
DRIP	Desalination Research and Innovation Partnership
DWQIP	Drain Water Quality Improvement Program

DWSRF	Drinking Water State Revolving Fund
EDP	IID 2009 Regulations for Equitable Distribution Plan
EERE	Energy Efficiency and Renewable Energy
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPAct	Energy Policy Act
ESA	Endangered Species Act of 1973
ET	Evapotranspiration
FAP	Financial Assistance Program
FEMA	Federal Emergency Management Agency
FMP	Flood Management Plan
FPGP	Facilities Planning Grant Program
GMA	Groundwater Management Area
GMP	Groundwater Management Plan
GPD	Gallons Per Day
HCP	Habitat Conservation Plan
HUD	Housing and Urban Development
IBWC	International Boundary and Water Commission
ICS	Intentionally Created Surplus
IFM	Integrated Flood Management
IID	Imperial Irrigation District
IOPP	Inadvertent Overrun Payback Policy
IRWMP	Integrated Regional Water Management Plan
ISG	Interim Surplus Guidelines
IVTC	Imperial Valley Transportation Commission
IWSP	Interim Water Supply Policy for Non-Agricultural Projects
KAF	Thousand Acre-Feet
KGRAs	Known Geothermal Resource Areas
LAFCO	Local Agency Formation Committee
MAF	Million Acre-Feet
MCI	Municipal, Commercial, and Industrial
MGD	Million Gallons per Day
MHI	Median Household Income
MOU	Memorandum of Understanding

MSL	Mean Sea Level
MWD	Metropolitan Water District of Southern California
NAF	Naval Air Facility El Centro
NCCP	Natural Community Conservation Plan
NECO	Northern and Eastern Colorado Desert Coordinated Management Plan
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFWF	National Fish and Wildlife Foundation
NOP	Notice of Preparation
NPDES	National Pollution Discharge Elimination System
nr	No Record, site not yet operational
PEIS	Programmatic Environmental Impact Settlement
PPR	Present Perfected Rights
PSP	Proposal Solicitation Package
PUD	Public Utility District
PVC	Polyvinyl Chloride
QSA	Quantification Settlement Agreement
RAMP	Recreation Area Management Plan
RAP	Region Acceptance Process
RCAC	Rural Community Assistance Corporation
REAT	Renewable Energy Action Team
RMS	Resource Management Strategy
RO	Reverse Osmosis
ROD	Record of Decision
RWDF	Reclaimed Water Development Fund
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCADA	Supervisory Control and Automated Data Acquisition
SCP	System Conservation Plan
SCWG	Small Community Wastewater Grant
SDAC	Severely Disadvantaged Community
SDCWA	San Diego County Water Authority
SDI	Supply/Demand Imbalance
SEZ	Solar Energy Zone
SFMP	Statewide Flood Management Planning
SLR	San Luis Rey Settlement Parties
SR	State Route
SRF	State Revolving Loan Funds

SWFM	Stormwater Flood Management
SWP	State Water Project
SWRCB	California State Water Resources Control Board
SWS	Small Water System
t	Trace, flow volume greater than 0 AF and less than 500 AF
TDS	Total Dissolved Solids
THMs	Trihalomethanes
TMDL	Total Maximum Daily Load
TP	TruePoint Solutions, software used for IID delivery data
UCD	University of California Davis
USBLM	U.S. Bureau of Land Management
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USDOE	U.S. Department of Energy
USDOI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
VOC	Volatile Organic Carbon
Water Forum	Imperial Water Forum
WCC	Water Control Center
WERF	Water Environmental Research Foundation
WIS	Water Information System
WRFP	Water Recycling Funding Program
WRG	Water Recycling Grants
WRLP	Water Recycling Loan Program
WSA	Senate Bill 610 Water Supply Assessment
WSM	Westside Main Canal
WWD	Water and Waste Disposal
WWTP	Wastewater Treatment Plant

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Executive Summary

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Executive Summary

Challenges presented by new water demands and land use changes are intensified by the annual cap on Imperial Region's Colorado River water supply and the uncertainty associated with varying annual demands and competing uses within the Imperial Region. The Imperial Integrated Regional Water Management Plan (IRWMP) is the result of stakeholders, who represent a wide array of interests, working together to formulate and support implementation of long-term water management solutions. Regional planning does not replace or supersede local water supply or land use planning, nor usurp any water district, city, or county authorities. At its best, regional planning incorporates local planning elements, prioritizes regional needs, focuses resources, and utilizes the range of authorities within the region to improve overall water resources management.

A resolution supporting preparation of an IRWMP; accepting and endorsing the IRWMP mission, goals and objectives, and the Imperial IRWMP Water Forum and RWMG Charter; and designating a representative to the Water Forum was prepared for stakeholders to take to their respective agencies and organizations for adoption.[1] The resolution has been adopted by the agencies listed below; adopted resolutions are in Appendix A of the Imperial IRWMP.

- Imperial County
- Imperial Irrigation District
- City of Brawley
- City of Calexico
- City of El Centro
- City of Holtville
- City of Imperial
- City of Westmorland
- Calexico New River Committee

[1] Resolution to Support Goals. Imperial Water Forum. September 9, 2010. <http://imperialirwmp.org/Resolution%20G&OParticipationAdoption_FNL.pdf>

The Imperial IRWMP, once adopted by responsible agencies, will provide guidance for future water management and land use plans for their jurisdictions. Local water supply and land use planning efforts remain the responsibility of the local agencies, and their future update will in turn influence IRWMP updates.

ES.1 WHAT IS AN IRWMP?

An IRWMP is a comprehensive planning document prepared on a region-wide scale that plans for and enables implementation of stakeholders' priority water resources projects and programs. An IRWMP relies upon specific and focused local and sub-regional planning efforts for its foundation. Unlike traditional water resources planning documents, an IRWMP does not focus on just one – or even just a few – facets of water resources planning. Rather, an IRWMP investigates a broad spectrum of water resources objectives including water supply, water quality, environmental restoration, and flood management based on stakeholder involvement, environmental justice concerns, and far-reaching community, statewide and federal interests. A key difference in IRWMPs (as compared to typical planning documents) is that IRWMPs are governed by local agencies that integrate multiple localized water management strategies to solve priority challenges.

ES.2 PURPOSE OF THE IMPERIAL IRWMP

There are specific technical IRWMP requirements which this plan meets and exceeds. Further, the Imperial Region Integrated Regional Water Management Plan (Imperial IRWMP) represents the collective vision and wisdom of region stakeholders and will provide an important addition to Southern California's water resources planning toolkit.

As such, the purpose of the Imperial IRWMP is to define a portfolio of cost-effective water supply management strategies that support economic development and provide a reliable water supply for new municipal, commercial, and industrial (MCI) demands without negatively impacting existing MCI and agricultural water users, or existing agreements and contracts. To meet the Imperial Region's water management goals (see Section ES.5), the IRWMP is to guide action on resource management strategies and projects to be implemented by participating agencies and stakeholder groups.

The IRWMP is also a resource the Imperial Region can use to define its long-term needs and priorities for water infrastructure, and match these needs to available state and federal funding. In the near-term, the purpose of the IRWMP is to ensure that the Imperial Region qualifies for funding available from the State of California by meeting IRWMP standards established by the State Legislature and managed by the California Department of Water Resources (CDWR).

Imperial Irrigation District (IID) holds the rights to and is responsible for delivering untreated Colorado River water to users in its water service area (Imperial Valley). Imperial County (County) is responsible for land use planning in the unincorporated areas of Imperial County and for groundwater management. Broad policy concepts were developed by IID and County staff and then presented to the IID/County Water Planning Group.[2] In April 2010, overarching direction on IRWMP development was provided by the Water Planning Group, as follows:

- Annual apportionment to water users: The IID Board should make a yearly determination of forecasted water use – among all categories of users – and apportion supplies in a manner that is consistent with IID's Equitable Distribution Plan.[3]
- Joint land-use conversion policy: Imperial County, as the land-use planning entity, and IID, as the purveyor of water to the region, should agree to the establishment of designated corridors that would facilitate the conversion of agricultural lands to the development of renewable energy production.[4]
- Joint groundwater study: Imperial County and IID should conduct a joint feasibility study to ascertain the availability and accessibility of groundwater resources throughout the region.
- Fallowing for in-valley water use: IID will consider rotational fallowing of IID-owned land and/or private land to generate or reallocate water for MCI purposes.
- Water storage and banking: IID will pursue storage projects it has identified within its service area and banking opportunities in the Coachella Valley IRWM Region. While projects to augment the Colorado River water supply are generally more expensive to build and operate than policy options, IID recognizes that storage is vital to the long-term management of its water supply and provides the most durable and defensible means of addressing fluctuations in usage from year to year.

Commitment to a regional planning model: In concert, Imperial County and IID will develop a regional water plan that actively solicits and relies on stakeholder advice and consent to balance the needs of diverse interests. Plan development will be guided by the goals of multiple use and sustained yield.

ES.3 IMPERIAL WATER FORUM

The Imperial Water Forum (Water Forum) was convened in June 2010 by IID and the County. The IID Board of Directors and the County Board of Supervisors recognized that all stakeholders in the region, whether representing public or private agencies, have unique perspectives and that all of the individual interests need to be recognized if the Imperial IRWMP is to be successful. The Water Forum adopted the following mission statement:

[2] The Water Planning Group is composed of two members of IID Board of Directors and two members of Imperial County Board of Supervisors.
[3] IID website: 2009 Regulations for Equitable Distribution Plan..<http://www.iid.com/index.aspx?page=141>
[4] In 2012, the County adopted a conditional use permit procedure for such land use conversion; and IID adopted a temporary land conversion fallowing policy. These are presented in Chapter 12.

The mission of Imperial Water Forum is to preserve and enhance the economic and environmental health and well-being for the Imperial Region through the regional stewardship and comprehensive management of water resources in a practical, cost effective, and responsible manner.[5]

The intent of the Water Forum is to provide the mechanism for Imperial Region stakeholders to communicate, collaborate, and cooperate when addressing water issues and developing regional solutions. The Water Forum, which consists of members and interested parties, provided oversight and management structure for institutional, public, and stakeholder group involvement and multi-stakeholder participation. All meetings were noticed and open to the public. Water Forum members and participants are listed in Table ES-1.

Table ES-1. Water Forum Members

- Imperial Irrigation District
- County of Imperial
- Imperial County Farm Bureau
- Imperial Valley Vegetable Growers Association
- IID Water Conservation Advisory Board
- City of Brawley
- City of Calexico
- City of El Centro
- City of Holtville
- City of Imperial
- City of Westmorland
- Heber Public Utility District
- Niland Sanitary District
- Geothermal Energy Stakeholder Group
- Comité Cívico Del Valle Inc in Brawley
- Institute for Socioeconomic Justice
- Brawley Chamber of Commerce
- El Centro Chamber of Commerce & Visitors Bureau
- Imperial Valley Economic Development Corporation
- New River Improvement Project
- Sierra Club, CA- NV Regional Conservation Committee
- USFWS Sonny Bono Salton Sea National Wildlife Refuge

Participating entities recognize that regional integration can enhance their ability to manage individual agency operations and the available regional water supply; and that, to a large degree, the success of the Imperial IRWMP depends on participation of agencies that have jurisdictional authority to implement the IRWMP; however, participation by agricultural, renewable energy, business and civic stakeholders was also important.

In addition, agencies are assured that participation in an integrated regional water management program and adoption of the IRWMP will not in any way diminish their control of their own future or compromise their autonomy. Regional integration in no way seeks to weaken an agency's decision-making power or authority. Rather, the IRWMP process is designed to enhance the collective power of local entities, support economic development and environmental well being, increase the ability to obtain state and federal funding, and protect the Region's Colorado River water supply.

The IRWMP is intended to support and complement water management and land use plans that are based on the statutory authorities of IID, the County, and Imperial Region Cities (Cities). By involving stakeholders and agencies with diverse interests and authorities, the IRWM planning process has opened the doors for partnerships, funding, operational connectivity, increased awareness of related planning efforts, and regional project opportunities.

The Water Forum united local expertise and information and, thereby, facilitated communication concerning complex and controversial topics. The Water Forum recognizes that implementation of the Imperial IRWMP cannot succeed without continuous review and updates to meet unanticipated

[5] Imperial IRWMP website: Imperial IRWMP Mission, Goals and Objectives. June 2011. <http://imperialirwmp.org/20100824%20WF%20GoalsObjectives_rev_16June2011.pdf>

challenges. Therefore, the Water Forum plans to continue to function as a mechanism for identifying common problems; finding solutions and resolving conflicts; and promoting consultation and collaboration among groups with differing missions, agendas, and interests.

ES.4 Imperial Region Overview

The Imperial Region is located in the southeast corner of Imperial County – bordered to the east by the crest of the Chocolate Mountains (which lie west of the Colorado River), to the west by San Diego County, to the north by the Coachella Valley IRWM boundary, the Salton Sea and Riverside County, and to the south by the U.S./Mexico international border. Figure ES-1 shows the location of the Imperial Region, the region boundary, major IID water delivery infrastructure, and other geographical features.

The basis for selection of the region boundary is described in Chapter 2. The area, having annual average rainfall of less than three inches a year, relies almost exclusively on imported Colorado River water. Groundwater development has occurred to a very limited degree in areas outside of the IID water service area. Coachella Valley is to the north and Mexicali Valley (Baja California, Mexico) to the south, while Imperial Valley is central to the Imperial Region; and all three lie within the Salton Sea watershed. The region, which abuts the Coachella Valley IRWM and Anza Borrego IRWM regions, is nestled among surrounding mountain ranges, and lies entirely within the state's Colorado River Hydrologic Region. The major population centers are located along California State Route (SR) 86 and SR 111 in the Imperial Valley.

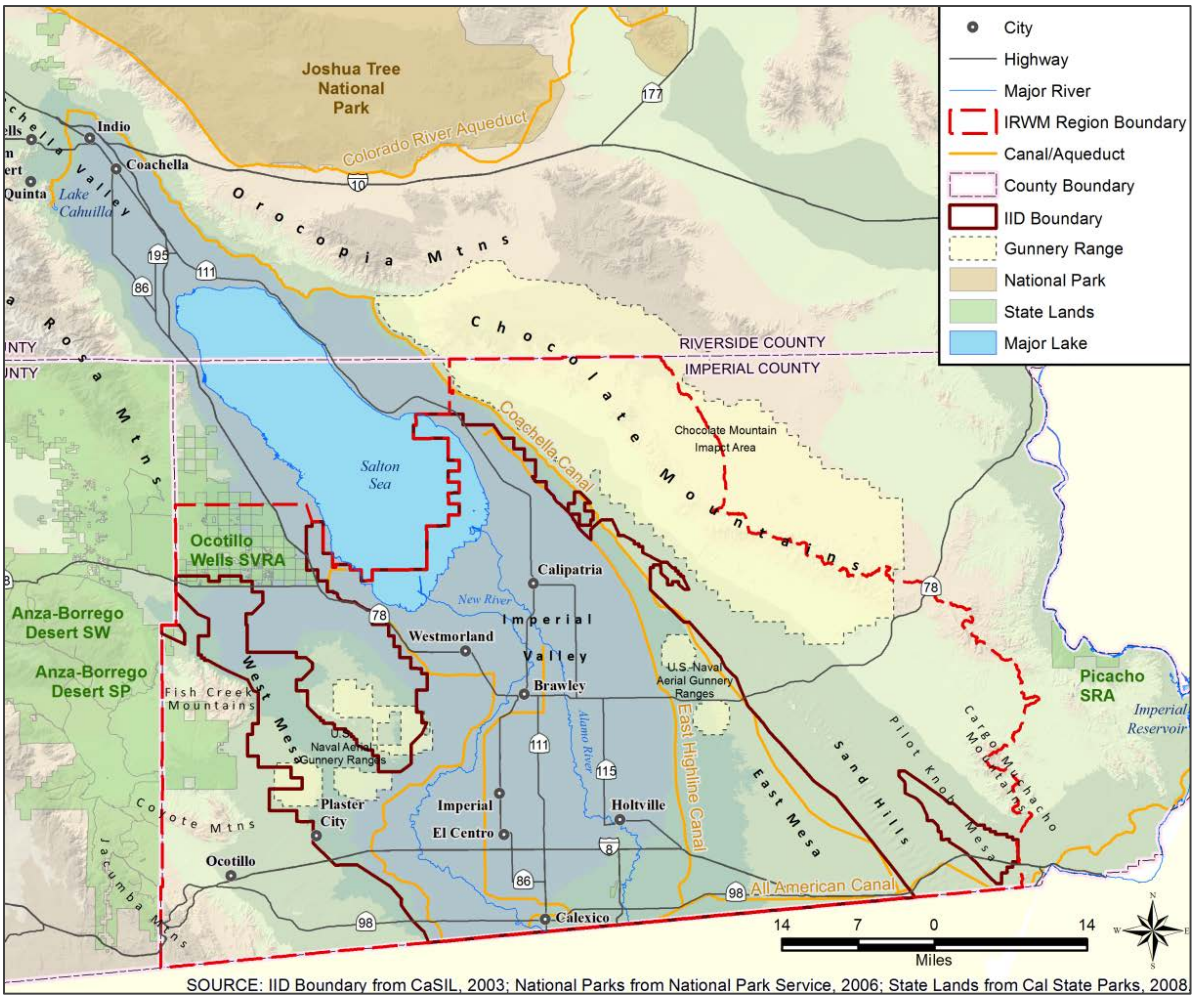
ES.5 Imperial IRWMP Goals and Objectives

The Water Forum with the participation of region stakeholders and agency representatives adopted water resources management goals and objectives, prioritized as follows:

Water Supply: Diversify the regional water supply portfolio to ensure a long-term, verifiable, reliable, and sustainable supply to meet current and future agricultural, municipal, commercial, industrial, and environmental demands.

Objectives

1. Meet 100% of future demands without adverse impact to existing users that are not mitigated.
2. Implement projects or programs that will provide a firm, verifiable, and sustainable supply of 50 to 100 thousand acre-feet per year (KAFY) for municipal, commercial or industrial demands by 2025.
3. Ensure equitable and appropriate cost sharing among water users who would receive benefits from any proposed water management project.
4. Protect surface water rights.



SOURCE: IID Boundary from CaSIL, 2003; National Parks from National Park Service, 2006; State Lands from Cal State Parks, 2008

Figure ES-1. Imperial Region Locations

a. Optimize and sustain use of Colorado River entitlements through development of groundwater banking and storage projects.

b. Implement water conservation measures that demonstrate reasonable beneficial use of the available supplies and are consistent with established industry standards[6], and state and federal requirements.

5. Integrate resources management strategies that diversify the regional water supply portfolio through projects such as desalination of brackish groundwater or drain water, reclaimed waste water, and stormwater reuse; or through coordinated land use and water management policies.

6. Promote economic development that is consistent with existing agreements on use and management of the Colorado River water supply and is consistent with County and Cities general plans and other local ordinances and regulations.

7. Protect correlative groundwater rights and currently designated sole source aquifers from further overdraft, and optimize the use of other groundwater where feasible.

[6] Water conservation measures include Efficient Water Management Practices recognized by the Agricultural Water Conservation Council; and Demand Management Measures and Best Management Practices as defined by the California Urban Water Conservation Council; or those related actions defined by federal or state law.

Water Quality Goal: Protect water quality for beneficial uses consistent with regional community interests and the Colorado River Regional Water Quality Control Board (RWQCB) Basin Plan through cooperation with stakeholders and local and state agencies.

Objectives

1. Maintain or improve the quality of incoming Colorado River water.
2. Support disadvantaged and other communities in meeting wastewater disposal and permit requirements.
    a. Define local and regional opportunities, evaluate economies of scale and where cost effective, develop capital facilities for wastewater reuse/reclamation.
    b. Match water quality to appropriate uses and supply treated wastewater to extend use of Colorado River supplies.
3. Support disadvantaged and other communities in meeting drinking water standards.
    a. Define local and regional opportunities, evaluate economies of scale and where cost effective, develop capital facilities.
4. Comply with Total Maximum Daily Loads (TMDLs) established by the Colorado River Regional Water Quality Control Board (Region 7) for the Imperial Region, and implement established Best Management Practices or other measures to minimize water quality impacts from stormwater.
5. Preserve and, where and when technology allows, improve quality of groundwater resources in Imperial Region.

Environmental Protection and Enhancement Goal: Protect and enhance aquatic ecosystems and wildlife habitat consistent with municipal, commercial, industrial, and agricultural land uses.

Objectives

1. Recognize and mitigate impacts to IID drains, small natural floodways, and the New or Alamo rivers that could result from reduced flows as a result of development or reclaimed water use
2. Investigate and develop regional mitigation banking program to provide cost-effective environmental mitigation for proposed projects that reduce IID drain flow or have other adverse impacts.
3. Identify opportunities for open spaces, trails, parks and other recreational projects in the Imperial Region that can be incorporated with water supply, water quality or flood protection projects, consistent with public use and property rights.

Flood Protection and Stormwater Management Goal: Protect life and property from flooding and develop regional and local flood protection and stormwater management strategies.

Objectives

1. Assess regional flood control and local storm water management needs through a collaborative effort to develop policies and cost effective physical solutions.
    a. Address vector control and safety concerns related to overflow ponds.
    b. Encourage local agencies to maintain and enforce FEMA floodway and flood plain maps and regulations adopted by Imperial County in 1984 so Imperial Region communities are eligible for federal flood insurance.
2. Document and define technical and policy approaches for flood and storm water management that can be integrated with other water management actions to meet multiple objectives and provide multiple benefits.
3. Evaluate and define local and regional projects that prevent or minimize flooding and damage to public and private facilities and property.

And a fifth, non-prioritized goal that supports the four prioritized goals:

Develop Regional Policies Goal: Develop regional policies, in accordance with and respecting the individual agencies' jurisdiction and authorities, by engaging the water and land use agencies and other interested parties in a cooperative, regional approach.

Objectives

1. Streamline permitting process and integrate land use and water supply planning requirements where appropriate.
2. Define cost-effective projects and equitable cost sharing agreements with those entities that would receive benefits from proposed water management projects of all types.
3. Develop consistent policy across all water and land use agencies: Imperial County, Cities, IID, federal lands.

ES.6 Key Regional Water Resources Challenges

The Imperial Region is faced with significant water resources challenges, most of which relate to the availability of imported water from the Colorado River. California's share of the Colorado River is fixed at 4.4 million acre-feet (MAF) per year plus 50 percent of any declared surplus. The seniority of the IID water right is confirmed in the Quantification Settlement Agreement and Related Agreements (QSA/Transfer Agreements) and is effectively capped at 3.1 MAF per year.[7] Further, by 2026 and for the term of the QSA (2037 or 2047), the QSA/Transfer Agreements require that IID take actions to reduce net annual consumptive use of Colorado River water by 408,000 acre-feet, with the conserved water

[7] Consumptive use volume at Imperial Dam, reported in USBR Lower Colorado Region Decree Accounting Reports. <http://www.usbr.gov/lc/region/g4000/wtracct.html>

transferred out of the Imperial Region. The result is to reduce IID net consumptive use to just over 2.6 MAF per year. [7] System and on-farm efficiency conservation measures have been formulated to enable IID to meet the reduction along with a schedule for their implementation. These measures are designed to maintain historic levels of agricultural productivity and MCI water supplies. The 2.6 MAF per year supply is considered to be stable and reliable due to IID's senior water rights. However, when forecasted renewable energy and other MCI demands are added to the future demand, this amount is no longer expected to be sufficient.

Agricultural demand can vary significantly from year to year due mainly to fluctuations in markets and to some extent rainfall, further complicating IID's operational flexibility. In some years IID's total annual consumptive use may exceed its Colorado River entitlement, resulting in inadvertent overruns (annual use that exceeds the capped amount), which IID must pay back in subsequent years from extraordinary conservation practices.[8] Forecasted increases in MCI demand are expected to exacerbate this condition.

Figure ES-2 illustrates IID's maximum 3.1 MAF per year threshold. Any time annual consumptive use exceeds the threshold, an inadvertent overrun is charged to IID. In the case of underruns (annual consumptive use is less than capped amount) shown prior to 2012 in Figure ES-2, IID could have taken the underrun had storage been available to IID. Beyond 2011, the underrun potential decreases and overrun potential increases each year that water demand for renewable energy rises and MCI growth occurs on non-irrigated agriculture lands.

To reduce the likelihood of an overrun in any given year, the IID Board approved the 2009 Regulations for Equitable Distribution Plan (EDP) that define how IID will apportion water to its customers should demand be anticipated to exceed available supply.[9] When this is projected to occur, the IID Board may declare a supply/demand imbalance. For agricultural water users, implementation of the EDP will cap their annual water apportionments and call into effect measures that require additional planning and water management actions, with resulting higher costs.

[8] Per terms of the USBR Inadvertent Overrun and Payback Policy
[9] EDP, IID 2009. <http://www.iid.com/index.aspx?page=144>

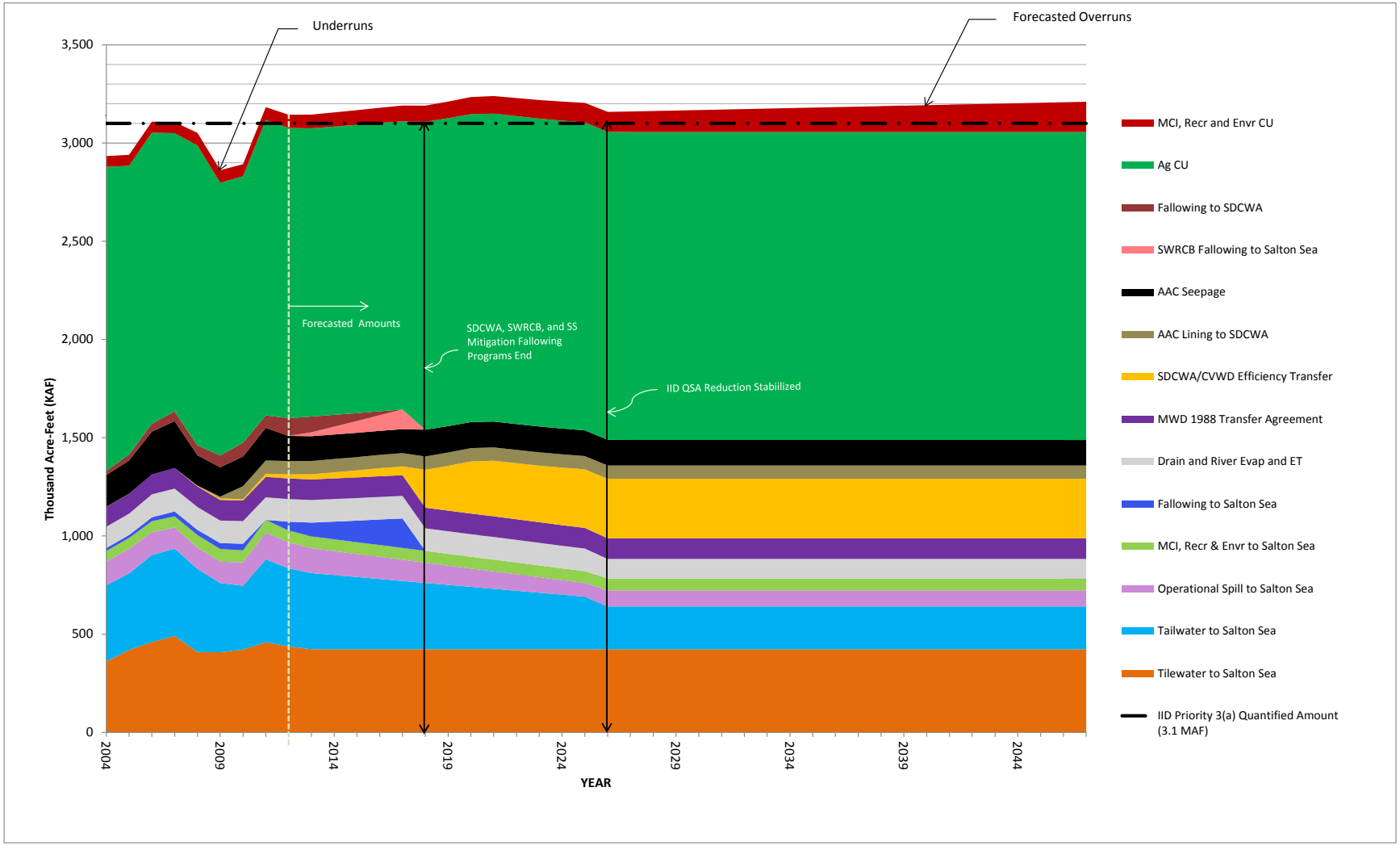


Figure ES-2. Existing and Future Water Demands

Figure Notes:

1. MCI, Recreational, and Environmental CU – Untreated water delivered to retail suppliers for treatment for potable domestic, commercial and urban use and irrigation of urban and recreation areas; untreated water for other recreational uses and for environmental use for QSA/Transfer Agreements mitigation.
2. Agricultural CU – Irrigation water consumed to meet crop evapotranspiration requirements.
3. Fallowing to SDCWA – See 18 below, *SDCWA, SWRCB, and SS Mitigation Fallowing Programs End.*
4. SWRCB Fallowing to Salton Sea – See 18 below, *SDCWA, SWRCB, and SS Mitigation Fallowing Programs End.*
5. AAC Seepage – Amount seeping from All American Canal due to flow for IID flow in the canal.
6. AAC Lining to SDCWA – Water conserved from lining a portion of the All American Canal for delivery to SDCWA.
7. SDCWA/CVWD Efficiency Transfer –Water from IID system and on-farm efficiency conservation for delivery to SDCWA and to CVWD, respectively.
8. MWD 1988 Transfer Agreement – Water conserved from IID system efficiency conservation for delivery to MWD (projects completed Sept 1998).
9. Drain and River Evap and ET – Water that evaporates from IID's open channel system and rivers or that is used by plant life along the conveyance pathways.
10. Fallowing to Salton Sea – See 18 below*, SDCWA, SWRCB, and SS Mitigation Fallowing Programs End.*
11. MCI, Recr & Envr to Salton Sea – Return flow from non-agricultural uses to the Salton Sea (e.g., treated wastewater and non-ag irrigation/environmental runoff).
12. Operational Spill to Salton Sea – IID discharge from main canals and laterals which flows via drainage system to rivers to Salton Sea; or via drainage system to Salton Sea.
13. Tilewater to Salton Sea – Agricultural irrigation (leaching) water captured by tile drains underlying irrigated farmed land that is discharged to IID drainage system to rivers to Salton Sea; or via drainage system to Salton Sea.
14. Tailwater to Salton Sea – Agricultural irrigation surface runoff from the ends (tails) of fields that discharges to IID drainage system to rivers to Salton; or via drainage system to Salton Sea.
15. IID Priority 3(a) Quantified Amount (3.1 MAF) – Annual (calendar year) cap on IID consumptive use, under terms of QSA/Transfer Agreements, volume at Imperial Dam.
16. Underruns/ Overruns – IID Net Consumptive Use, volume at Imperial Dam (USBR Decree Accounting Report)[10] in a calendar year is less than (underrun) or exceeds (overrun) the IID Priority 3(a) Quantified Amount of 3.1 MAF. IID Net Consumptive Use equals Colorado River water diverted to IID less IID return flow credit, accounted as volume to IID water service area plus transfers out of region (including AAC Lining to SDCWA) plus AAC seepage accounted to IID plus other water (e.g., Intentionally Created Surplus, Inadvertent Overrun Payback, Lower Colorado River Water Supply Project well field pumpage).
17. Forecasted Amounts – Quantified amounts (2012-2047) closely tied to CRWDA Appendix B; others, such as MCI, Recr and Envr CU, based on IRWMP forecasting.[11]
18. SDCWA, SWRCB, and SS Mitigation Fallowing Programs End – Water conserved by fallowing agricultural lands to provide flows to the Salton Sea to meet State Water Resource Control Board (SWRCB) Salton Sea mitigation requirements (2003-2017), and for delivery to SDCWA (2003-2016).
19. IID QSA Reduction Stabilized – Under the QSA/Transfer Agreements, IID agreed to 45 years of water transfers to urban areas outside of the Imperial Region; for years 2026-2047, that amount remains constant; for 2012-2047, volumes shown for Imperial Region and transfers are based on quantified amounts tied to CRWDA Appendix B.

[10] USBR website: Lower Colorado River Accounting. <http://www.usbr.gov/lc/region/g4000/wtracct.html>
[11] USBR website: Colorado River Water Delivery Agreement: Federal QSA. 10 Oct 2003. <http://www.usbr.gov/lc/region/g4000/QSA/crwda.pdf>

Urban (domestic, commercial and urban industrial) and environmental uses are not required to cut back as much as agriculture (if at all) during a year that EDP is in effect. The higher degree of reliability and change in timing of deliveries granted to non-agricultural users by IID can reduce the supply available to agricultural water users in any year that EDP is in effect – especially if new developments, with their associated water supply requirements, are approved. Figure ES-3 illustrates the difference in delivery patterns. With MCI development increasing water demand and the higher reliability granted MCI users, agriculture will take the brunt of the EDP cutbacks (dashed lines) during the peak season. *The dashed lines for each curve reflect a 20 percent overall cutback in IID deliveries with a maximum eight percent reduction for MCI demands*[12] *with agriculture taking up the difference to minimize an overrun.*

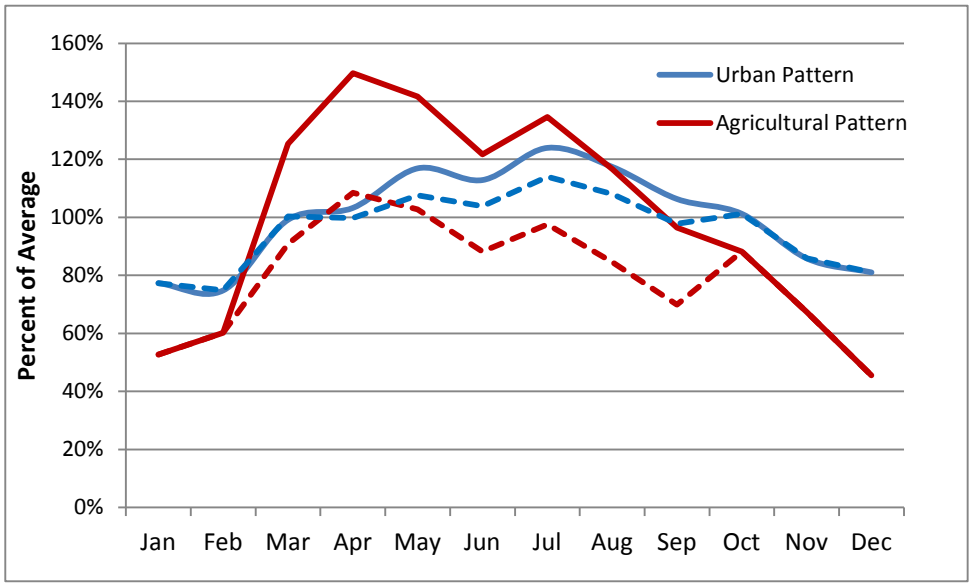


Figure ES-3. Illustrative Example of Monthly Demands and EDP Apportionment for Urban and Agriculture

ES.7 How Imperial IRWMP Meets Statewide Priorities for an IRWMP

A resource management strategy (RMS) is defined by CDWR as a project, program, or policy that helps local agencies manage water and related resources to meet integrated plan objectives. The RMS can be interrelated and linked to other activities in the Imperial Region, such as land use planning and beneficial drainage to the Salton Sea. Table ES-2 lists the CDWR management objectives and associated RMS elements. California Water Plan Update 2009 defines seven objectives and 27 strategies.[13] The table provides a summary of how CDWR strategies were subdivided and adapted to the Imperial Region. It also shows where strategies were regrouped and integrated into Imperial Management Objectives to better reflect Imperial Region circumstances.

[12] The expected maximum MCI reduced apportionment after meeting water conservation reductions per SBX7-7, the Water Conservation Act of 2009.
[13] CDWR website: "CWP Update 2009: Volume 2 - Resource Management Strategies" <http://www.waterplan.water.ca.gov/cwpu2009/index.cfm>

Table ES-2. Resource Management Strategies as Applied and Grouped for the Imperial Region

CDWR Management Objective	CDWR RMS	Imperial RMS	Imperial Management Objective
Reduce Water Demand	Agricultural Water Use Efficiency	Agricultural Water Use Efficiency	Reduce Water Demand (Chapter 8)
	Urban Water Use Efficiency	Urban Water Use Efficiency	
		Renewable Energy Sector Water Use Efficiency	
Improve Operational Efficiency and Transfers	System Reoperation	System Reoperation – Regional, Interregional	(Table 6-3)
	Water Transfers	Transfers – Into and Out of Region	
	Conveyance – Delta (Table 6-3)		Increase Water Supply (Chapter 7)
	Conveyance – Regional/Local	Conveyance – Regional, Interregional (Table 6-3)	
		Conveyance – Local, Planned	
		Conveyance – Municipal Systems Interconnections	
Increase Water Supply	Conjunctive Management and Groundwater Storage	Groundwater Development, Storage, and Conjunctive Management	
	Desalination		
	Recycled Municipal Water		
	Surface Storage – Regional/Local	Surface Storage – Local	
		Surface Storage – Regional (Table 6-3)	
	Surface Storage – CALFED (Table 6-3)		
	Precipitation Enhancement (Table 6-3)		
Improve Water Quality	Matching Water Quality to Use		
	Drinking Water Treatment and Distribution		Improve Water Quality (Chapter 10)
	Pollution Prevention (Table 6-3)		
	Salt and Salinity Management (Table 6-3)		
	Groundwater and Aquifer Remediation (Table 6-3)		
	Urban Runoff Management		Improve Flood Management (Chapter 9)
Improve Flood Management	Flood Risk Management	Regional Flood Control	
Practice Resources Stewardship	Agricultural Lands Stewardship		Practice Resources Stewardship and Other Strategies(Chapter 11)
	Economic Incentives (Loans, Grants and Water Pricing)		
	Ecosystem Restoration		
	Forest Management (Table 6-3)		
	Land Use Planning and Management [1]		
	Recharge Area Protection (Table 6-2)		
	Water-Dependent Recreation (Table 6-2)		
	Watershed Management [2] (Table 6-3)		
Other Strategies	Crop Idling for Water Transfers (Table 6-3)		
	Irrigated Land Retirement	Irrigated Land Retirement for Local Apportionment	
	Dewvaporation or Atmospheric Pressure Desalination		(Table 6-3)
	Fog Collection		
	Rainfed Agriculture		
	Waterbag Transport, Storage Technology		

[1] Land Use Planning and Management: Imperial County Use Permits for Solar Development IID Temporary Land Conversion Fallowing

[2] Crop Idling for Water Transfers: IID Equitable Distribution Plan, Temporary Land Conversion Fallowing Policy, and proposed fallowing for In-lieu MCI Exchange (Table 6-3 & Recycled Water RMS &)

ES.7.1 Imperial IRWMP Priority Project List

The Imperial IRWMP is intended to support and complement existing water management and land use plans. The existing plans are based on the statutory authorities of IID, the County, and the Cities that are involved. By working together as a region, the Imperial IRWMP planning process provides regional project opportunities. Agencies and stakeholders in the Imperial Region participating in this IRWMP have developed a suite of significant projects, programs and policies to meet their water resource objectives. These projects, programs and policies address the sustainability of existing and future surface water supplies and the potential for groundwater development to meet the region's needs for planned growth and for environmental protection and enhancement.

Through stakeholder meetings and smaller meetings among individual agencies, staff, and their consultants, a list of specific implementable projects was developed. Each project was prioritized within the context of this Imperial IRWMP and the CDWR management objectives. The projects that are incorporated in the Imperial IRWMP are described with the sponsor for each project and the tentative completion date shown in Table ES-3.

Table ES-3. Imperial IRWMP 2012 Project List

Rank	Projects and Programs	Project Type	Sponsor	Cost	Status	Years to Project Start	Project Completion	Management Objectives Addressed
1	Keystone Water Reclamation Facility	Reclaim Wastewater	City of Imperial	$65,000,000	Final Design	< 1	2016	Water Supply
2	Keystone Desalination with IID Drainwater/ Alamo River Source (50 KAFY)	Desalination	Imperial Irrigation District	$147,440,000	Planning	3 - 6	2022	Water Supply
3	East Brawley 25 KAFY Desalination with Well Field and Groundwater Recharge	Desalination	Imperial Irrigation District	$101,000,000	Planning	3 - 6	2021	Water Quality
4	Large-Scale Microalgal Cultivation on Recently Exposed Playa Lands for Improving Salton Sea Water Quality and Regional Air Quality	Pilot Project, Algae	Scripps Institution of Oceanography (SIO), University of California San Diego (UCSD)	$5,620,000	Project Planning and Feasibility Study	< 1	2017	Environmental Protection, Regional Policies/Goals, Water Quality
5	City of Brawley Reclaim Water Project	Reclaim Wastewater	City of Brawley	$12,500,000	Preliminary Design	< 1	2015	Water Supply, Environmental Protection, Regional Policies/Goals, Water Quality
6	City of Brawley Water Meter Project	Metering, Conservation	City of Brawley	$4,000,000	Preliminary Design	< 1	2016	Water Supply, Environmental Protection, Regional Policies/Goals
7	City of Brawley Raw Water Storage Project	Storage, Reliability	City of Brawley	$4,000,000	Project Planning and Feasibility	1 - 3	2018	Water Supply
8	Holtville Wastewater Treatment Plant Improvement Project	Wastewater Treatment Plant Upgrade	City of Holtville	$6,149,000	Preliminary Design	< 1	2016	Water Quality
9	Spearheading with Spirulina: An Sustainable Approach to Desert Acquaculture	Pilot Project	Southern Low Desert Resource Conservation & Development Council	$350,000	Ready to Construct	< 1	2014	Regional Policies/ Goals
10	Drainage Improvements in the Township of Seeley; County Project No. 5363	Stormwater	Imperial County Public Works	$1,916,794	Project Planning and Feasibility	1 - 3	2017	Flood Protection and Stormwater Management
11	HPUD WWTP Upgrade to Tertiary Treatment	Reclaim Wastewater	Heber Public Utility District	$12,500,000	Preliminary Design	1 - 3	2017	Water Supply
12	New River Bioremediation and Wildlife Habitat Restoration and Process Evaluation Project	Habitat Restoration, Invasive Species Control, Conservation	San Diego State University Research Foundation	$600,000	Preliminary Design	< 1	2014	Water Quality
13	Holtville Wastewater Collection System Project	Fix Wastewater Outfall Pipeline	City of Holtville	$4,100,000	Final Design	< 1	2014	Water Quality
14	Water distribution storage tanks, 2 each 5MG	Storage, Reliability	City of El Centro	$10,000,000	Preliminary Design	1 - 3	2016	Water Supply, Regional Policies/ Goals, Water Quality
15	Holtville Water Distribution System Project	Water Supply Connector/ Pipeline Reliability	City of Holtville	$3,040,000	Preliminary Design	< 1	2016	Water Quality
16	Holtville Stormwater Conveyance System and Detention Basin Project	City Stormwater Management	City of Holtville	$7,095,000	Project Concept	< 1	2016	Flood Protection and Stormwater Management
17	Interconnection Projects between City of El Centro, City of Imperial and the Heber Utility District	Inter-connection, Reliability	City of El Centro	$1,400,000	Project Concept	3 - 6	2021	Water Supply, Regional Policies/Goals, Water Quality
18	Holtville UV Transmittance Water Treatment System Project	Drinking Water	City of Holtville	$540,000	Project Concept	< 1	2014	Water Quality
19	Holtville Stormwater Master Plan Project	Stormwater plan	City of Holtville	$60,000	Project Concept	< 1	2014	Flood Protection and Stormwater Management
20	Holtville Sewer Master Plan/ Map Update Project	Wastewater Treatment System Upgrade	City of Holtville	$84,000	Project Concept	< 1	2014	Water Quality

ES.8 Imperial IRWMP Implementation

Participation in IRWMP implementation will require local agencies to take ownership in the IRWMP projects and initiate the project funding process through state or federal grant programs such as California's Proposition 84. To be included in the IRWMP list for funding under Proposition 84, the sponsoring agency was required to submit a cost estimate based on best engineering practices. In some cases the estimate is based on an 80 percent or higher level of design. Where there is little project definition, or where the project fits into a much larger program, the cost is reflective of the estimated expense over the next five years. Projects listed in Table ES-3 are ranked based on their score using ranking and evaluation criteria that included project purpose, regional and/or state benefits, level of design, cost estimate, and region-wide support for application towards the Proposition 84 grant. If grant monies are awarded for the identified projects, local monies could either be re-budgeted or expected fee and rate increases could be deferred.

Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Costal Protection Act was passed by California voters in November 2006. Administered by CDWR, Proposition 84 includes funding for the IRWM Grant Program. This bond act provides $5.4 billion for water related purposes and $1 billion for IRWM planning efforts. The IRWMP funding is allocated by region with $36 million for the Colorado River Region and $100 million for inter-regional projects.

Changes to land use and water management plans are the responsibility of the lead agencies participating in the IRWMP, and updates to existing plans may influence IRWMP updates. The County, Cities, and IID remain responsible for activities in their jurisdictional areas consistent with their authorities. The interrelationship of the IRWMP and Imperial Region planning and policy efforts is represented in Figure ES-4, where the IRWMP is built on existing planning efforts and policy guidelines, and then updated over time as local planning and policy updates occur.

Responsibility for complying with CEQA and other environmental laws rests with the lead public agency that proposes implementation of a listed project. Information compiled and analyses conducted for the Imperial IRWMP have resulted in materials that can be incorporated by reference into project level CEQA analysis. The information will support preparation of an initial study, development of the public Notice of Preparation (NOP) that initiates environmental review and public involvement, and in preparing the needed CEQA documents. Individual projects must be certified through Negative Declaration, Mitigated Negative Declaration or a full Environmental Impact Report (EIR). During project planning, collected environmental data was factored into the development and application of the ranking and screening criteria, and CEQA clearance was one of the readiness-to-proceed criteria used by the Water Forum to set project priorities.

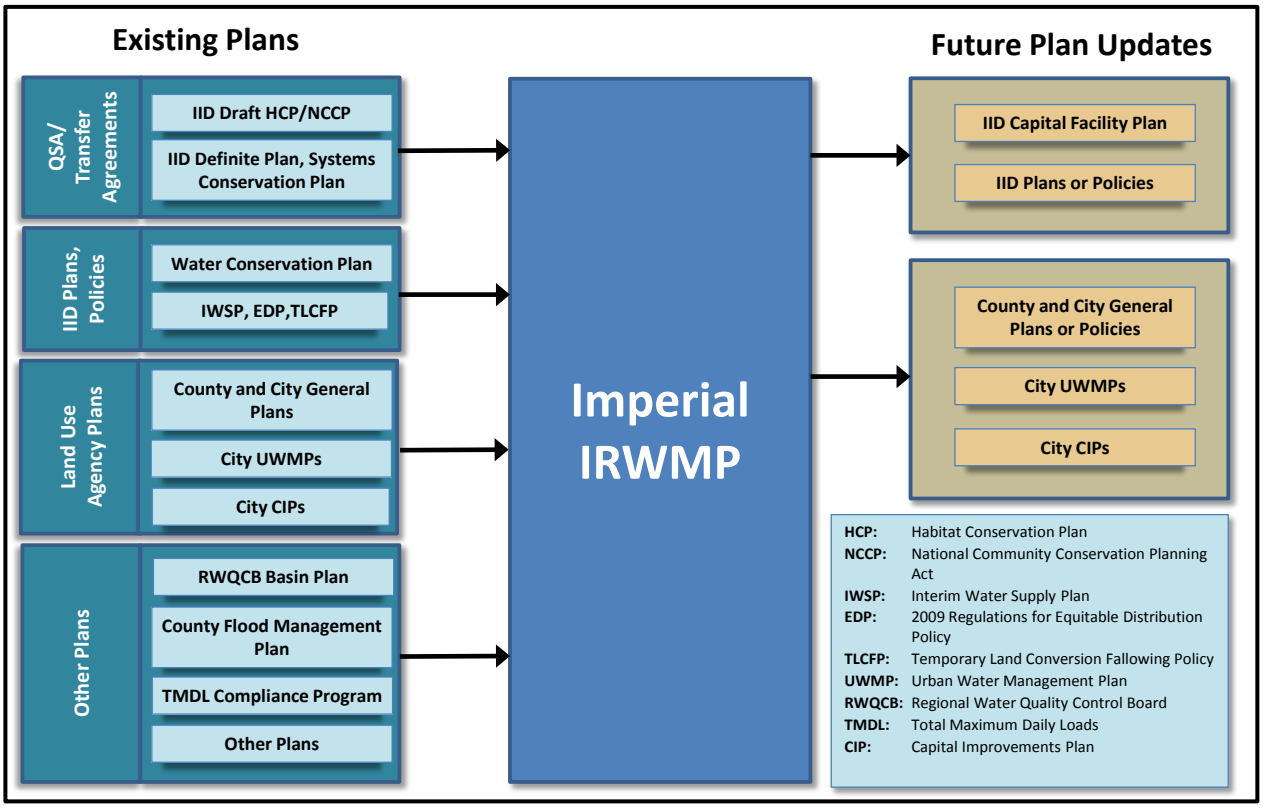


Figure ES-4. Relationship of IRWMP with Outside Planning Elements

ES.8.1 Imperial Project Development

Knowing where a project is in the project development process (Figure ES-5) will help the Water Forum integrate projects over time, and support local stakeholders to set priorities and match projects to potential funding sources. For example, if a project requires a further feasibility study prior to moving into the design phase, this activity may be able to be funded through grant funds intended for this purpose. Alternatively, if a project is "shovel ready," it may be qualified to receive state or federal grant funds for construction and implementation. Shovel-ready projects are those with final design, environmental clearances and permits, and identified sources of financing.

For projects to be included in grant applications and to insure the success of the project, each project development step will have to be clearly outlined – from planning to long term operation and maintenance. Each project will be tracked to provide accurate reporting on the status of the project and monitored level of performance. Data collection, management and reporting are critical aspects of measuring the success of the Imperial IRWMP over its constantly moving planning horizon.

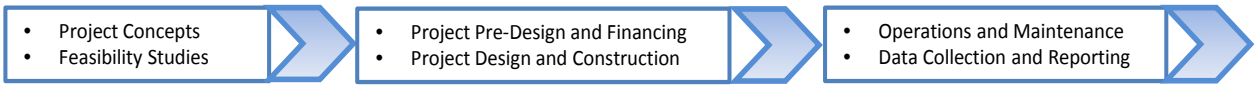


Figure ES-5. Project Development Process

ES.9 IMPLEMENTATION STRUCTURE

Individual agencies or organizations, or combinations thereof, will be responsible for implementing identified projects, programs and policies, and reporting back to the Water Forum on monitoring measurements and performance results. The Water Forum will meet annually, or as-needed, to respond to changes, additions, or removal of IRWMP projects and/or in response to grant application preparations and submittals by the City of Imperial on behalf of Imperial IRWMP project proponents. This implementation structure will guarantee success by providing a coordinated regional, single-point-of-contact responsiveness while maintaining and preserving local business and policy decision making authority in the Imperial Region.

ES.10 IMPERIAL IRWMP ORGANIZATION

This IRWMP describes water resources challenges facing the state and Imperial Region, and a set of available strategies for addressing those challenges with projects, programs and policies that will help the region meet statewide priorities and regional needs. The IRWMP also describes potential impacts and benefits of the projects, programs and policies, and how they will be financed and monitored to ensure the intended objectives are met.

The document is divided into four sections that address specific requirements in the Integrated Regional Water Management Grant Program Guidelines (CDWR and SWRCB, 2004), as follows:

Imperial IRWMP Organization

Chapter 1. Introduction
Part I: PLANNING ENVIRONMENT
Chapter 2. Imperial Region Planning Environment
Chapter 3. Governance, Stakeholder Involvement, and Outreach
Part II: REGION DESCRIPTION
Chapter 4. Region Description and Baseline Conditions
Chapter 5. Supply, Demand, and Water Budget
Part III: RESOURCE MANAGEMENT STRATEGIES
Chapter 6. Review of Resource Management Strategies
Chapter 7. Increase Water Supply
Chapter 8. Reduce Water Demand – Increase Water Use Efficiency
Chapter 9. Improve Flood Management
Chapter 10. Improve Water Quality
Chapter 11. Practice Resources Stewardship and Other Strategies
Part IV: IMPLEMENTATION PLAN
Chapter 12. Review of Project, Program, Policy, and Funding Alternatives
Chapter 13. Implementation Plan
Chapter 14. Measuring Plan Performance and Data Management

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 1

Introduction

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Chapter 1. Introduction

1.1 Purpose of the Imperial IRWMP

The purpose of the Imperial Region Integrated Regional Water Management Plan (Imperial IRWMP) is to define a portfolio of cost-effective water management strategies that support economic development and provide a reliable water supply for new municipal, commercial, and industrial (MCI) demands without impacting historical MCI and agricultural uses of water or impacting existing agreements or contracts. The IRWMP is to guide action on resource management strategies and projects to be implemented by participating agencies and stakeholder groups in order to meet the Region's water management goals and objectives (see Section 1.7).

The IRWMP is also a resource the Imperial Region can use to define its long-term needs and priorities for water infrastructure, and match these needs to available state and federal funding. In the near-term, the purpose of the IRWMP is to ensure that the Imperial Region qualifies for funding available from the State of California by meeting IRWMP standards by the State Legislature and managed by the California Department of Water Resources (CDWR).

1.2 Convening the Imperial Water Forum

Following the April 2010 kick-off meeting, the Imperial Water Forum (Water Forum) was convened in June 2010 by Imperial Irrigation District (IID) and Imperial County (the County). The IID Board of Directors and the County Board of Supervisors recognized that all stakeholders in the region, whether representing public or private agencies, have unique perspectives and that all of the individual interests need to be recognized if the Imperial IRWMP is to be successful. The Water Forum adopted the following mission statement:

> *The mission of Imperial Water Forum is to preserve and enhance the economic and environmental health and well-being for the Imperial Region through the regional stewardship and comprehensive management of water resources in a practical, cost effective, and responsible manner.*[1]

The intent of the Water Forum is to provide the mechanism for different stakeholders to communicate, collaborate, and cooperate when addressing water issues and developing regional solutions. It provided the oversight and management structure for institutional, public, and stakeholder group involvement and multi-stakeholder participation. All meetings were noticed and open to the public. The Water Forum consists of members and interested parties; Water Forum members are listed in Table 1-1.

[1] Imperial IRWM website: Imperial IRWM Mission, Goals and Objectives. June 2011. <http://imperialirwmp.org/20100824%20WF%20GoalsObjectives_rev_16June2011.pdf>

Participating entities recognize that regional integration can enhance their ability to manage individual agency operations and the available regional water supply; and that, to a large degree, the success of the Imperial IRWMP depends on participation of those agencies that have jurisdictional authority to implement the IRWMP; however participation by agricultural, renewable energy, business and civic stakeholders was also important.

Table 1-1. Water Forum Members

- Imperial Irrigation District
- County of Imperial
- Imperial County Farm Bureau
- Imperial Valley Vegetable Growers Association
- IID Water Conservation Advisory Board
- City of Brawley
- City of Calexico
- City of El Centro
- City of Holtville
- City of Imperial
- City of Westmorland
- Heber Public Utility District
- Niland Sanitary District
- Geothermal Energy Stakeholder Group
- Comité Cívico Del Valle Inc in Brawley
- Institute for Socioeconomic Justice
- Brawley Chamber of Commerce
- El Centro Chamber of Commerce & Visitors Bureau
- Imperial Valley Economic Development Corporation
- New River Improvement Project
- Sierra Club, CA- NV Regional Conservation Committee
- USFWS Sonny Bono Salton Sea National Wildlife Refuge

In addition, agencies are assured that participation in an integrated regional water management program and adoption of the IRWMP will not in any way diminish their control of their own future or compromise their autonomy. Regional integration in no way seeks to weaken an agency's decision-making power or authority. Rather, the IRWMP process is designed to enhance the collective power of local entities, support economic development and environmental wellbeing, increase the ability to obtain state and federal funding, and protect the Region's Colorado River water supply.

The IRWMP is intended to support and complement water management and land use plans which are based on the statutory authorities of IID, the County, and Imperial Region Cities (the Cities). By involving stakeholders and agencies with diverse interests and authorities, the IRWM planning process has opened the doors for partnerships, funding, operational connectivity, increased awareness of related planning efforts, and regional project opportunities.

The Water Forum united local expertise and information and thereby facilitated communication concerning complex and controversial topics. The Water Forum recognizes that implementation of the Imperial IRWMP cannot succeed without continuous review and updates to meet unanticipated challenges. Therefore, the Water Forum plans to provide an ongoing mechanism for identifying common problems; finding solutions and resolving conflicts; and coordinating groups with differing missions, agendas, and interests.

1.3 Imperial Region Overview

The Imperial Region is located in the southeast corner of Imperial County – bordered to the east by the crest of the Chocolate Mountains (which lie west of the Colorado River), to the west by San Diego County, to the north by the Coachella Valley IRWM boundary, the Salton Sea and Riverside County, and to the south by the U.S./Mexico international border. Figure 1-1 shows the location of the Imperial Region, the region boundary, major IID water delivery infrastructure, and other geographical features.

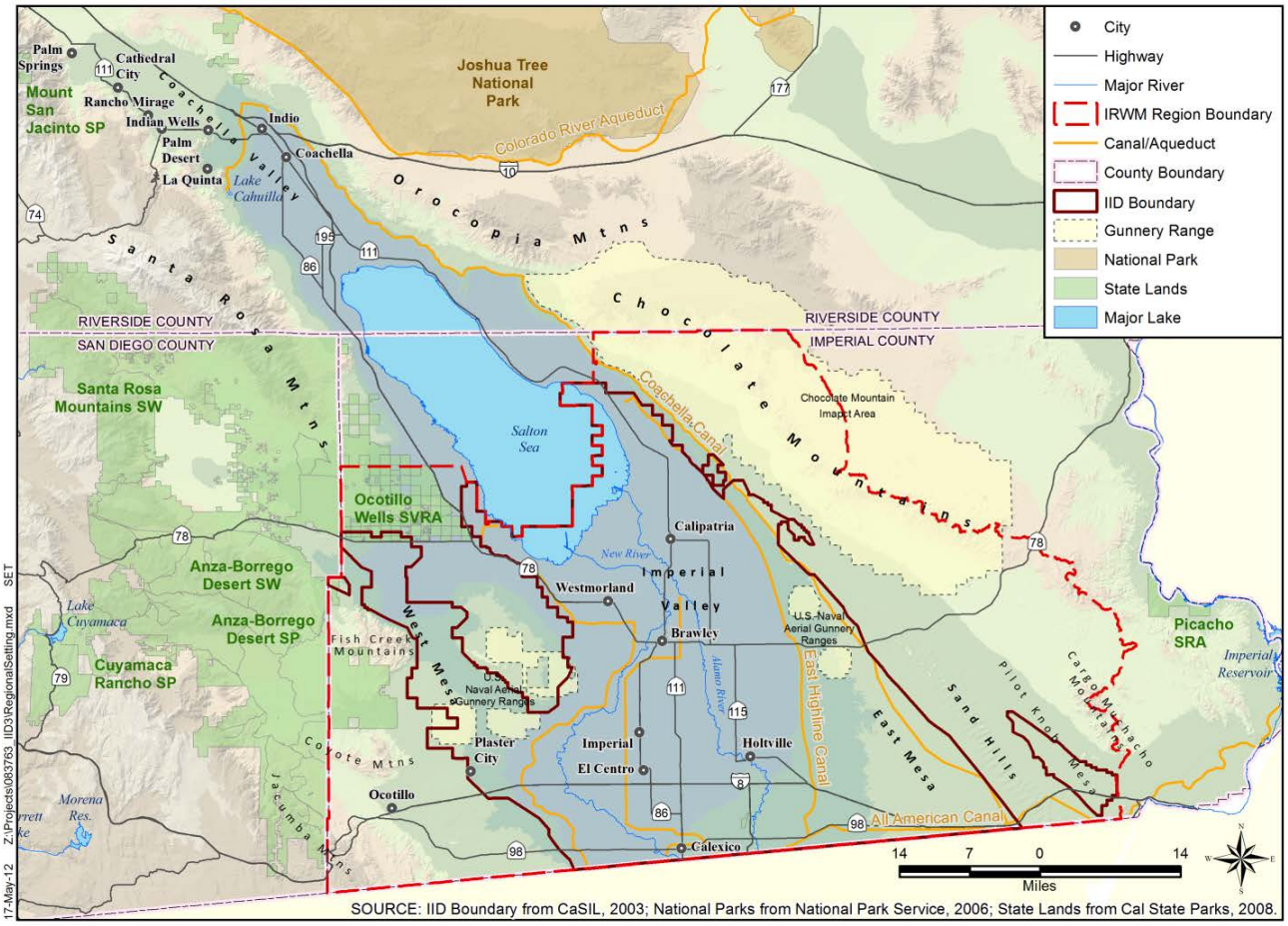

Figure 1-1. Imperial IRWMP Regional Setting

The basis for selection of the region boundary is described in Chapter 2. The area, having annual average rainfall of less than three inches a year, relies almost exclusively on imported Colorado River water. Groundwater development has occurred to a very limited degree in areas outside of the IID water service area. The Coachella Valley is to the north and the Mexicali Valley (Baja California, Mexico) to the south, while the Imperial Valley is central to the Imperial Region, all three of which lie within the Salton Sea watershed. The Region, which abuts the Coachella Valley IRWM and Anza Borrego IRWM regions and is nestled among surrounding mountain ranges, lies entirely within the state's Colorado River Hydrologic Region. The major population centers are located along California State Route (SR) 86 and SR 111 in the Imperial Valley.

1.4 BACKGROUND

1.4.1 Draft IID Integrated Water Resources Management Plan

The 2008 IID Strategic Plan included a strategic objective to develop an integrated water resources plan by the end of 2009.[2] In early 2009, the IID Board began preparing the integrated water resources management plan (draft IID Plan) and directed staff and consultants to "leave no stone unturned" in developing a list of potential projects, demand management measures, and policy alternatives to meet existing and future demands.

The outcome was to be a water supply portfolio of capital projects which, combined with management actions and policies, would identify water supplies to meet planned and anticipated future municipal, commercial and industrial (MCI) water demands without affecting current agricultural and municipal water users. A draft IID Plan described a range of water management options including groundwater blending, groundwater storage, desalination, IID system improvement, and wastewater treatment and recycling. These options provided the building blocks that were used to configure infrastructure facilities (capital projects) and non-structural policy or program solutions (e.g., water conservation programs, policies for allocating water during times of shortage, etc.)

In the process of preparing a draft IID Plan and as a result of discussion with community stakeholders, the IID Board realized that a wider effort such as the CDWR IRWM process could benefit not only IID, but also the other agencies and stakeholders in the Imperial Region. The Board made a mid-course adjustment in February 2009 and directed staff to continue to develop the Draft IID Plan, but also to initiate the process to develop the Imperial IRWMP.

In September 2009, the Board accepted the draft IID Plan which the consulting team used as the basis for developing the Imperial IRWMP. However, substantial effort remained as the Imperial Region includes areas outside of the IID water service area; and because the IRWM process involves the Cities, County and other stakeholders in addition to IID in plan development, and includes CDWR resource management strategies not considered in the Draft IID Plan (e.g., water quality, flood management).

1.4.2 State Water Management and Planning

As directed by the legislature and statute, CDWR prepares and updates the California Water Plan (see Figure 1-2).[3] The California Water Plan defines hydrologic planning regions, provides a statewide water planning framework for integrated regional water management (IRWM), and identifies resource management strategies for groups like the Water Forum to consider when developing their IRWMP.

[2] IID 2008 Strategic Plan Adopted September 23, 2008; Strategic Objective B
[3] California Water Plan Update 2009. CDWR is preparing CWP Update 2013. <http://www.waterplan.water.ca.gov/cwpu2013/index.cfm>

Figure 1-2. California Water Plan Update 2009 Framework for Integrated Water Management and Sustainability

California's IRWM strategy calls for collaborative efforts on the part of regions throughout the state to manage all aspects of water resources by implementing strategies appropriate for their unique needs and goals. The IRWM planning framework is also intended to identify regional project priorities and provide the basis for state investments and for allocating public resources such as bond funds.

IRWM planning is focused not on deriving water resource solutions to serve a single purpose, but on how to manage solutions based on all the ways the water resource is being used, and includes multi-agency collaboration, stakeholder involvement and collaboration, regional approaches to water management, consideration of water management in land use decisions, and project monitoring to evaluate results of practices that are utilized.[4]

CDWR IRWM Guidelines[5] define specific IRWM standards that project proponents and the Imperial IRWMP must meet to qualify for Proposition 84, Proposition 1E, or other state funding.[6] Eligibility for IRWM and Stormwater Flood Management project grants are contingent on:[7]

- IRWMP projects that support local goals and objectives

[4] CDWR. 2012 Guidelines, Pg. 18, IRWM Plan Standards. <http://www.water.ca.gov/irwm/docs/Guidelines/GL_2012_DRAFT.pdf>
[5] IRWM Program. CDWR, 2010. <http://www.water.ca.gov/irwm/index.cfm>
[6] Proposition 84, Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Public Resource Code §75001 et seq.); and Proposition 1E, Disaster Preparedness and Flood Prevention Bond Act of 2006.
[7] Ibid. Pg. 15, Eligibility requirements

- IRWMP content meeting the state standards
- Compliance with Groundwater Management Plan requirements if seeking funding for groundwater projects
- 2010 Urban Water Management Plan[8] accepted by CDWR, if project proponent seeking funding is a municipality required to prepare an UWMP
- Agricultural Water Management Plan or Water Conservation Plan accepted by CDWR, if project proponent seeking funding is an irrigation district required to prepare an AWMP or WCP
- Implementation of best management practices for urban water conservation and metering[9] by urban water service providers seeking funding

1.4.3 Direction from IID Board and Imperial County Supervisors

IID holds the water rights to and is responsible for delivering untreated Colorado River water to users in the IID service area (Imperial Valley). The County is responsible for land use planning in the unincorporated areas of Imperial County and for groundwater management. Broad policy concepts were developed by IID and County staff and then presented to the IID/County Water Planning Group.[10] In April 2010, overarching direction on IRWMP development was provided by the Water Planning Group, as follows:

- Annual apportionment to water users: The IID Board should make a yearly determination of forecasted water use – among all categories of users – and apportion supplies in a manner that is consistent with IID's Regulations for Equitable Distribution Plan.[11]
- Joint land-use conversion policy: Imperial County, as the land-use planning entity, and IID, as the purveyor of water to the region, should agree to the establishment of designated corridors that would facilitate the conversion of agricultural lands to the development of renewable energy production.[12]
- Joint groundwater study: Imperial County and IID should conduct a joint feasibility study to ascertain the availability and accessibility of groundwater resources throughout the region.
- Fallowing for in-valley water use: IID will consider rotational fallowing of IID-owned land and/or private land to generate or reallocate water for MCI purposes.
- Water storage and banking: IID will pursue storage projects it has identified within its service area and banking opportunities in the Coachella Valley IRWM Region. While projects to augment the Colorado River water supply are generally more expensive to build and operate than policy options, IID recognizes that storage is vital to the long-term management of its

[8] CWC §10610 et seq. Required of municipal suppliers serving 3000 connections or more.
[9] AB 1420 (Statutes of 2007, Ch. 628) requirements for best management practices; CWC §529.5 for metering compliance.
[10] The Water Planning Group is composed of two members of IID Board of Directors and two members of Imperial County Board of Supervisors.
[11] IID website: 2009 Regulations for Equitable Distribution Plan. <http://www.iid.com/index.aspx?page=141>
[12] In 2012, the County adopted a conditional use permit procedure for such land use conversion; and IID adopted a temporary land conversion fallowing policy. These are presented in Chapter 12.

water supply and provides the most durable and defensible means of addressing fluctuations in usage from year to year.

- Commitment to a regional planning model: In concert Imperial County and IID will develop a regional water plan that actively solicits and relies on stakeholder advice and consent to balance the needs of diverse interests. Plan development will be guided by the goals of multiple use and sustained yield.

1.5 IMPERIAL IRWMP OBJECTIVES AND CONFLICTS

CDWR IRWM Guidelines require a description of the major water management objectives and conflicts within the region, including clear identification of problems within the region that focus the objectives, implementation strategies, and implementation projects that ultimately provide resolution.[13] The Imperial IRWMP and Water Forum seek to resolve and/or reduce conflicts among water users in the Imperial Region, and to anticipate and avoid future conflicts. Conflicts cannot be resolved without a recognition and clear understanding of the problems that drive them. Conflicts within the Imperial Region have historical, geographic, technical, and institutional components, and center around three main areas: 1) QSA/Transfer Agreements which cap the region's ability to import Colorado River water; 2) forecasted renewable energy and other MCI development; and 3) DAC needs. These changes have resulted in a planning environment that is realizing how to operate under a new paradigm.

A summary of conflicts and objectives identified in the Region Acceptance Process (RAP) was presented to the Water Forum in October 2010 for discussion and to lay the foundation for establishing goals and objectives. The conflicts and issues are summarized in the sections below.

1.5.1 QSA and Related Agreements (QSA/Transfer Agreements)

RAP.1 - With the growth of Las Vegas, the completion of the Central Arizona Project, and creation of the Arizona Water Banking Authority, IID and the other Colorado River contractors became enmeshed in interstate and interregional conflicts surrounding use of the Colorado River. The October 2003 Quantification Settlement Agreement and Related Transfer Agreements (QSA/Transfer Agreements) (Chapter 5) settled many interstate and interregional conflicts among the federal interests (USBR), Lower Basin States (California, Arizona, Nevada), and tribal and California water rights holders (San Luis Ray Tribe, PVID, Yuma Project, IID, CVWD, MWD) over the use of, and rights to, Colorado River water. This prevented litigation that could have resulted in even greater impacts to IID's water supply.

RAP.2 - A host of technical problems and institutional issues facing Southern California and Lower Colorado River geography were resolved by the QSA/Transfer Agreements, and after extensive public hearings the State Water Resources Control Board issued approvals authorizing the

[13] California Water Code (CWC) §10541. (e)(3)) and CDWR Guidelines/Standards

transfer agreements. The QSA/Transfer Agreements have been approved by all appropriate parties, creating a complex legal, political, regulatory, and operational landscape.

RAP.3 - The Secretary of the Interior, acting as Water Master for the Colorado River manages the large federal facilities on the Colorado River, establishes operating policies, and provides final accounting of diversions, return flows, and consumptive use of water diverted from the Colorado River below Lee's Ferry, including components of the QSA/Transfer Agreements. Since adoption of the QSA/Transfer Agreements, two major changes that both benefit and constrain IID are the Inadvertent Overrun and Payback Policy (IOPP) (USBR 2002, 2003) and the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead (USBR 2007a and 2007b).

RAP.4 - The QSA/Transfer Agreements define a new reality and create changed circumstances under which IID must manage the major water source of the Imperial Region. Specifically, resolution of the interregional and interstate conflicts resulted in supply constraints for IID customers that now must be resolved at the local level. QSA/Transfer Agreements and related Colorado River operating policies represent the baseline conditions for the IRWMP.

RAP.5 - California's annual share of the Colorado River is fixed at 4.4 million acre-feet (MAF) per year plus 50% of any declared surplus flow in the river. The seniority of the IID water right is confirmed in the QSA/Transfer Agreements for the term of the QSA, while its consumptive use is effectively capped at 3.1 MAF per year (volume measured at Imperial Dam). In addition, the QSA/Transfer Agreements require that IID, by 2026 and for the term of the QSA (2037 or 2047), take actions to reduce its net annual consumptive use of Colorado River water by 408,000 acre-feet, with the conserved water transferred out of the Imperial Region. The result is to reduce IID's net consumptive use, measured at Imperial Dam, to just over 2.6 MAF per year.[14] System and on-farm efficiency conservation measures have been formulated and there is a schedule for their implementation. These measures are designed to maintain historic levels of agricultural productivity and MCI use, and this amount is anticipated to meet demand in most years. This supply is stable and reliable due to IID's senior water rights. However, when forecasted renewable energy and other MCI demand is incorporated into the future demand, this amount is no longer expected to be sufficient.

RAP.6 - IID/MWD 1988 Agreement projects produce a verified amount of conserved water each year for transfer to MWD. Under the terms of the Second Amendment to the Approval Agreement, dated June 18, 2007, 105,000 acre-feet (AF) per year (under most conditions) are to be made available by IID for transfer to MWD. The system and on-farm efficiency conservation measures were designed to ensure that historic levels of agricultural productivity and MCI use would be maintained.

[14] USBR LCR home page. "Colorado River Water Delivery Agreement." Exhibit B. 10 Oct 2003. <http://www.usbr.gov/lc/region/g4000/QSA/crwda.pdf>

RAP.7 - The SWRCB, as part of its approval of the IID/SDCWA transfer, stipulated that from 2003 through 2017, IID must provide mitigation water to the Salton Sea to compensate for reduction in discharge accountable to the SDCWA transfer. To meet this obligation, IID instituted a voluntary Fallowing Program.

RAP.8 - As of 2017, IID's entire transfer requirement to SDCWA and CVWD (195,000 acre-feet in 2017, ramping up to 303,000 acre-feet per year by 2026) is to be achieved through IID system and voluntary on-farm efficiency conservation measures. The IID/SDCWA and IID/CVWD transfer agreements bring monies to IID based on the amount of water transferred ($/AF); therefore, IID and participating growers must find monies to fund capital improvements and programs needed to achieve the required conservation and to address the environmental impacts of these programs.

RAP.9 - As with the IID/MWD program, measures implemented for the IID/SDCWA and IID/CVWD transfer programs are expected to ensure historical levels of agricultural and MCI consumptive use. What will be impacted is inflow to IID drains, the New and Alamo rivers, and the Salton Sea as operational spill and tailwater runoff are reduced to meet transfer requirements; IID's net consumptive use of Colorado River water, volume at Imperial Dam, will be reduced by the amount of the transfers.

RAP.10 - The IID Efficiency Conservation Definite Plan (Definite Plan; IID 2007) provides a road map of projects, costs, and investments that can be implemented as voluntary on-farm and IID system efficiency conservation measures. In short, the Definite Plan outlines how IID and Imperial Valley growers can decrease their discharge to the Salton Sea to meet transfer obligations according to schedules in the QSA/Transfer Agreements, while ensuring the long-term viability of the Imperial Region's agricultural economic base and MCI activity.

1.5.2 Inadvertent Overrun Payback, and Underrun Opportunity

RAP.11 - Even with full implementation of efficiency conservation measures, agricultural water demand can vary significantly from year to year due mainly to market fluctuations and to some extent the amount of rainfall, further complicating IID's operations. In some years IID's total consumptive use may exceed its Colorado River entitlement, resulting in inadvertent overruns (annual use that exceeds the capped amount), which IID must pay back in subsequent years from extraordinary conservation practices according to the terms of the USBR Inadvertent Overrun and Payback Policy.[15] Forecasted increases in Renewable energy and MCI demand are expected to exacerbate this situation.

[15] USBR: Inadvertent Overrun and Payback Policy, April 21, 2006. <http://www.usbr.gov/lc/region/g4000/4200Rpts/DecreeRpt/2006/agreements/IOPP.pdf>

RAP.12 - To reduce the likelihood of an overrun in any given year, the IID board has approved the 2009 Regulations for the Equitable Distribution Plan (EDP, IID 2009) that define how IID will apportion water to its customers when demand is anticipated to be greater than the available supply. When this is projected to occur, a Supply Demand Imbalance may be declared by the Board of Directors. For agricultural water users, implementation of the EDP will cap their annual water apportionments and call into effect other measures that require additional planning and water management actions, with resulting higher costs.

RAP.13 - In other years IID may experience an underrun, where annual consumptive use is less than IID's entitlement. During underrun years, California agencies with water right priorities junior to IID's can divert and beneficially use the water that IID is not able to use. IID is seeking to develop opportunities to divert and store this water to increase water supply reliability in the Imperial Region. Potential storage may be available in the East Mesa groundwater basin, which is under the jurisdiction of Imperial County. The needed agreements regarding such a project could benefit from cooperation and development through the IRWMP process.

1.5.3 Non-Agricultural Users

RAP.14 - Municipal, commercial, industrial, and environmental uses are not required to cut back as much (if any) during a year when the EDP is in effect. The higher degree of reliability granted to non-agricultural users in the IID water service area can limit and/or reduce the supply available to agricultural water users in any year that the EDP is in effect – especially if new developments, with their associated water demands, are approved. Figure 1-3 illustrates the difference in delivery patterns. With MCI development increasing water demand and the higher reliability granted MCI users, agriculture will take the brunt of EDP cutbacks (dashed lines) during the peak season. *The dashed lines for each curve reflect a 20 percent overall cutback in IID deliveries with a maximum eight percent reduction for MCI demands*[16] *with agriculture taking up the difference to minimize an overrun.*

[16] The expected maximum MCI reduced apportionment after meeting water conservation reductions per SBX7-7, the Water Conservation Act of 2009.

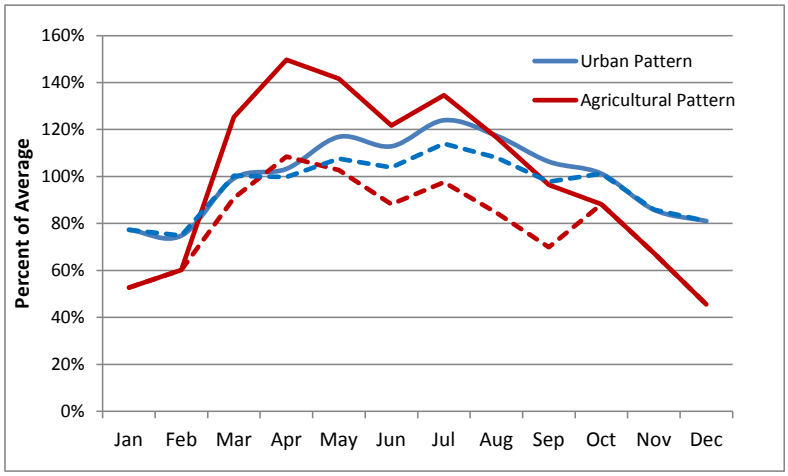

Figure 1-3. Illustrative Example of Monthly Demands and EDP Apportionment for Urban and Agriculture

RAP.15 - Two areas of conflict arise out of the potential for an annual overrun, both resulting from the reliability of supply provided to the MCI and environmental uses, which are not as affected in times of a determination when the EDP is in effect. One conflict is that MCI water users pay a higher price associated with the increased reliability, whether or not use of the EDP is declared. That this is associated with benefits of increased reliability is not widely recognized. The other conflict is that MCI and, to a degree, environmental uses will reduce the supply for agricultural uses in years when the EDP is in effect. Development of new non-agricultural uses will exacerbate this situation.

1.5.4 Forecasted Renewable Energy and Other MCI Development

RAP.16 - Municipal, commercial, and industrial developments anticipated for the Imperial Region may impact agricultural consumptive use unless new water projects are constructed.

RAP.17 - As noted above, the annual cap on IID's supply has created competition and conflicts at the local level among agricultural, MCI and environmental uses within the Imperial Region. The Cities and County have realized that their economic development is constrained by the cap on IID's Colorado River water supply and by the lack of new reliable water supplies needed to avoid impacting existing agricultural water availability. Agricultural users are concerned that new development projects may negatively impact their supply. To address the challenges, either "new" water is needed to support growth or water would have to be allocated from existing agricultural uses.

1.5.5 The Imperial Planning Environment, a New Paradigm

RAP.18 - The new reality and changed circumstances affect the planning environment in which Imperial Region stakeholders are making land use and water management decisions, resulting in existing and potential conflicts within the Imperial Region between current users and future uses and/or

among the types of water users (agricultural, MCI, and environmental). The conflicts are manifested in lawsuits among local interests and in unresolved requests for water supply for new uses.

RAP.19 - Water management and land use planning are interdependent. IID, as the water right holder and wholesaler of the Colorado River supply, is working to develop a consensus with the other stakeholders in the Imperial Region regarding water availability realities, possibilities for "new" supply, and how best to set water supply policies that will affect land use decisions; and the County and Cities need to be able to make defensible findings related to reliable water supply availability needed to meet the water demands of new development.

RAP.20 - The water supply and demand management problems and conflicts described herein must be resolved within the Imperial Region at the local level by community stakeholders. A host of other issues related to DAC needs, including water treatment, source water protection, drainage, recycling, and groundwater management may best be addressed at the local level.

The Imperial Region seeks to use the IRWMP planning framework to address and resolve conflicts through a facilitated process to reduce competition and polarization in the community, to build consensus, to provide an alternative to litigation, and to find a way forward in which the water demands for agriculture, economic development, and environmental uses can be met in a more harmonious manner. As such, the Imperial IRWMP sets forth a wide range of resource management strategies that can be used to develop project alternatives that meet local goals and objectives (see Section 1.7).

1.6 Issues Identified by the Water Forum and Stakeholders

As part of the outreach activity, a stakeholder assessment was conducted to introduce the IRWMP to potential participants, seek their input, and identify stakeholder issues and expectations. The consulting team also conducted outreach to Disadvantaged Communities (DACs) to document their issues (see Appendix Q where both documents are compiled). The list presented below is a summary and compilation of the issues identified in the stakeholder interviews, initial water Forum meetings and interviews with the DACs:

1.6.1 Regional Water Supply

- Inability to store Colorado River Water – need groundwater or surface water storage to make full use of available supply
- Aging IID conveyance infrastructure and lack of funds for maintenance of facilities
- Need for a reliable water supply for geothermal and renewable energy projects and to support other economic development
- Continued competition for IID's water supply
- Potential threats from other regions seeking to acquire additional Colorado River water

1.6.2 Wastewater Treatment and Related Infrastructure

- Aging collection pipelines, infiltration of groundwater into the collection systems
- Compliance with water quality standards and waste discharge requirements
- Inability to fund plant upgrades to meet standards and increasing regulatory requirements
- Recycling and reclaiming wastewater is not affordable for rate payers

1.6.3 Drinking Water Treatment

- Aging and decaying distribution infrastructure
- Increasing costs to maintain, upgrade, and expand drinking water treatment plants
- Meeting seven-day water supply storage standard
- Catastrophic supply interruptions
- Safe drinking water compliance in rural areas

1.6.4 Flood Control and Stormwater Management

- Inadequate regional and sub-regional stormwater facilities; IID drains not designed for urban runoff and conveyance
- No regional flood control district, no benefit assessment zones to provide a revenue source, and no regional master plan for drainage
- Requirements for on-site stormwater retention limit MCI development potential

1.6.5 Other

- Need to define who benefits and who pays for projects, and to equitably distribute cost
- Disadvantaged communities' limited technical, management, and fiscal resources constrain the ability to participate in the IRWMP process and state or federal grant programs
- Reluctance to increase rates and fees
- Changing and evolving regulatory requirements
- Increased, and sometimes unrealistic, expectations on how much water can be conserved through efficiency practices
- Disconnect between land use planning and water supply

1.7 Goals and Objectives

Setting IRWMP goals and objectives is the foundation of the planning process. The goals and objectives establish the intent of the IRWMP and indicate to the public which regional conflicts and water management issues the IRWMP is designed to address.

1.7.1 Setting the Mission, Goals and Objectives

In October 2010, the Water Forum established a Policy Work Group to draft a mission statement and goals and objectives. The work group considered technical studies, stakeholder assessment results, and issues and conflicts identified by DAC stakeholders. Members worked to make the objectives measureable, so they could be used to track progress during IRWMP implementation. Specific metrics were included where possible in the objective statements.

The identified issues, conflicts, and challenges provided the Water Forum with a basis for establishing and prioritizing the IRWMP goals and objectives. The Water Forum prioritized the IRWMP goals in March 2011. The goal priorities are:

1. Water Supply
2. Water Quality
3. Flood Protection and Stormwater Management
4. Environmental Protection and Enhancement

A fifth goal, Develop Regional Policies, is conceived as an overarching goal that serves to tie together the other goals. The Imperial IRWMP Mission, Goals and Objectives were adopted by the Water Forum on September 9, 2010. The Water Forum made a minor change in the Goals and Objectives in June 2011 to clarify some objectives and eliminate redundant language.[17]

In August 2010, a Charter Work Group was established. Members developed the Imperial IRWMP Water Forum and Regional Water Management Group Charter which defines the governance and decision making processes followed during development of the IRWMP (see Chapter 3) and that will be followed for the IRWMP Implementation Plan (see Chapter 13).

A resolution supporting preparation of an IRWMP; accepting and endorsing the IRWMP mission, goals and objectives, and the Imperial IRWMP Water Forum and RWMG Charter; and designating a representative to the Water Forum was prepared for stakeholders to take to their respective agencies and organizations for adoption.[18] The resolution has been adopted by the agencies listed in Table 1-2; adopted resolutions are in Appendix A.

At its September 2010 meeting, the Water Forum adopted a resolution announcing the intent to prepare the IRWMP through an open, participatory and collaborative process. The resolution supported preparation and submittal of the Proposition 84 Planning Grant by IID on behalf of the Imperial Water Forum. The Notice of Intent to adopt this resolution was placed in the *Imperial Valley Press*.

[17] Imperial IRWMP Mission, Goals & Objectives. Imperial Water Forum. June 2010, revised June 2011. <http://imperialirwmp.org/20100824%20WF%20GoalsObjectives_rev_16June2011.pdf>
[18] Resolution to Support Goals. Imperial Water Forum. September 9, 2010. <http://imperialirwmp.org/Resolution%20G&OParticipationAdoption_FNL.pdf>

On September 14, 2010, the IID Board of Directors adopted a resolution authorizing the IID, serving in its capacity as the project coordinator, to submit an application for Proposition 84 Planning Grant funding.[19]

Table 1-2. Agencies with Resolutions Adopting Imperial IRWMP Goals and Objectives, and Charter

Imperial County
Imperial Irrigation District
City of Brawley
City of Calexico
City of El Centro
City of Holtville
City of Imperial
City of Westmorland
Calexico New River Committee

1.7.2 Imperial IRWMP Goals and Objectives

The Water Forum with the participation of region stakeholders and agency representatives, adopted water resources management goals and objectives, prioritized as follows:

Water Supply Goal: Diversify the regional water supply portfolio to ensure a long-term, verifiable, reliable, and sustainable supply to meet current and future agricultural, municipal, commercial, industrial, and environmental demands.

Objectives

1. Meet 100% of future demands without adverse impact to existing users that are not mitigated.
2. Implement projects or programs that will provide a firm, verifiable, and sustainable supply of 50 to 100 thousand acre-feet per year (KAFY) for municipal, commercial or industrial demands by 2025.
3. Ensure equitable and appropriate cost sharing among water users who would receive benefits from any proposed water management project.
4. Protect surface water rights.

[19] IID Board Resolution No. 24-2010. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=2380>

   a. Optimize and sustain use of Colorado River entitlements through development of groundwater banking and storage projects.
   b. Implement water conservation measures that demonstrate reasonable beneficial use of the available supplies and are consistent with established industry standards,[20] and state and federal requirements.

5. Integrate resources management strategies that diversify the regional water supply portfolio through projects such as desalination of brackish groundwater or drain water, reclaimed waste water, and stormwater reuse; or through coordinated land use and water management policies.
6. Promote economic development that is consistent with existing agreements on use and management of the Colorado River water supply and is consistent with County and Cities general plans and other local ordinances and regulations.
7. Protect correlative groundwater rights and currently designated sole source aquifers from further overdraft, and optimize the use of other groundwater where feasible.

Water Quality Goal: Protect water quality for beneficial uses consistent with regional community interests and the Colorado River Regional Water Quality Control Board (RWQCB) Basin Plan through cooperation with stakeholders and local and state agencies.

Objectives

1. Maintain or improve the quality of incoming Colorado River water.
2. Support disadvantaged and other communities in meeting wastewater disposal and permit requirements.
   a. Define local and regional opportunities, evaluate economies of scale and where cost effective, develop capital facilities for wastewater reuse/reclamation.
   b. Match water quality to appropriate uses and supply treated wastewater to extend use of Colorado River supplies.
3. Support disadvantaged and other communities in meeting drinking water standards.
   a. Define local and regional opportunities, evaluate economies of scale and where cost effective, develop capital facilities.
4. Comply with Total Maximum Daily Loads (TMDLs) established by the Colorado River Regional Water Quality Control Board (Region 7) for the Imperial Region, and implement established Best Management Practices or other measures to minimize water quality impacts from stormwater.
5. Preserve and, where and when technology allows, improve quality of groundwater resources in Imperial Region.

[20] Water conservation measures include Efficient Water Management Practices recognized by the Agricultural Water Conservation Council; and Demand Management Measures and Best Management Practices as defined by the California Urban Water Conservation Council; or those related actions defined by federal or state law.

Environmental Protection and Enhancement Goal: Protect and enhance aquatic ecosystems and wildlife habitat consistent with municipal, commercial, industrial, and agricultural land uses.

Objectives

1. Recognize and mitigate impacts to IID drains, small natural floodways, and the New or Alamo rivers that could result from reduced flows as a result of development or reclaimed water use
2. Investigate and develop regional mitigation banking program to provide cost-effective environmental mitigation for proposed projects that reduce IID drain flow or have other adverse impacts.
3. Identify opportunities for open spaces, trails, parks and other recreational projects in the Imperial Region that can be incorporated with water supply, water quality or flood protection projects, consistent with public use and property rights.

Flood Protection and Stormwater Management Goal: Protect life and property from flooding and develop regional and local flood protection and stormwater management strategies.

Objectives

1. Assess regional flood control and local storm water management needs through a collaborative effort to develop policies and cost effective physical solutions.
    a. Address vector control and safety concerns related to overflow ponds.
    b. Encourage local agencies to maintain and enforce FEMA floodway and flood plain maps and regulations adopted by Imperial County in 1984 so Imperial Region communities are eligible for federal flood insurance.
2. Document and define technical and policy approaches for flood and storm water management that can be integrated with other water management actions to meet multiple objectives and provide multiple benefits.
3. Evaluate and define local and regional projects that prevent or minimize flooding and damage to public and private facilities and property.

And a fifth, non-prioritized goal that supports the four prioritized goals:

Regional Policies Goals: Develop regional policies, in accordance with and respecting the individual agencies' jurisdiction and authorities, by engaging the water and land use agencies and other interested parties in a cooperative, regional approach.

Objectives

1. Streamline permitting process and integrate land use and water supply planning requirements where appropriate.
2. Define cost-effective projects and equitable cost sharing agreements with those entities that would receive benefits from proposed water management projects of all types.
3. Develop consistent policy across all water and land use agencies: Imperial County, Cities, IID, federal lands.

1.8 Contents and Organization

The Imperial IRMWP is presented in 14 chapters grouped into four major parts:

Imperial IRWMP Organization

Chapter 1. Introduction
Part I: PLANNING ENVIRONMENT
Chapter 2. Imperial Region Planning Environment
Chapter 3. Governance, Stakeholder Involvement, and Outreach
Part II: REGION DESCRIPTION
Chapter 4. Region Description and Baseline Conditions
Chapter 5. Supply, Demand, and Water Budget
Part III: RESOURCE MANAGEMENT STRATEGIES
Chapter 6. Review of Resource Management Strategies
Chapter 7. Increase Water Supply
Chapter 8 Reduce Water Demand – Increase Water Use Efficiency
Chapter 9. Improve Flood Management
Chapter 10. Improve Water Quality
Chapter 11. Practice Resources Stewardship and Other Strategies
Part IV: IMPLEMENTATION PLAN
Chapter 12. Review of Project, Program, Policy, and Funding Alternatives
Chapter 13. Implementation Plan
Chapter 14. Measuring Plan Performance and Data Management

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 2

Imperial Region Planning Environment

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Chapter 2. Imperial Region Planning Environment

2.1 Basis for Imperial Region Boundary

The Imperial Region boundaries were selected for the following reasons:

- Imperial Water Forum members have experience working together to address complex issues, so they will be well equipped to develop an IRWMP.
- Urban and rural development of the Imperial Valley tie together IID, the County, and the Cities that are working together to better integrate land use and water supply plans and the planning process.
- Primary conflicts within the region related to new water demands and future land use changes are intensified by issues surrounding the cap on Colorado River supplies, the approach to apportioning water supplies, and competing uses within the Imperial Valley.
- The Imperial Region presents opportunities for recycled and reclaimed water use because of the geographic proximity of its users.
- The Imperial Region has opportunities to help the state meet its renewable energy goals by developing geothermal and solar generating facilities.

In developing the proposed IRWMP boundary, a number of meetings and conference calls were held between IID and the County to evaluate both physical and institutional features. The proposed Imperial Region boundary encompasses the service areas of multiple local agencies and maximizes opportunities to integrate water management objectives related to natural and man-made water systems, including water supply reliability, water quality, land use planning, environmental stewardship and flood management. The Region is within Imperial County, which serves to expedite integration of land use and water planning. The boundaries were established to be inclusive of a larger area where practical. In the Imperial Region there are no overlapping areas or areas not covered (voids).

The area selected for the Imperial Region lies completely within CDWR's Colorado River Hydrologic Region. It is also entirely within the State Water Resources Control Board Region 7, Colorado River Basin Region.

Figure 1-1 presents the County boundaries, location of developed areas, water district boundaries, IID delivery system, and federal lands. IID is responsible for delivery of untreated Colorado River water.

The Urban Area designation on the County's Land Use Plan includes areas surrounding the six incorporated cities: Imperial, Brawley, El Centro, Westmorland, Holtville, and Calexico. These Cities and the County have authority over land use, authority to adopt General Plans and zoning to guide land use, prepare Urban Water Management Plans to guide use of their available water supplies where required to do so, and to act as lead agency pursuant to the California Environmental Quality Act (CEQA). The

Imperial Region includes six unincorporated communities: Calipatria and Niland to the north; Heber, Seeley, and the El Centro Naval Air Facility in the center; and Ocotillo/Nomirage in the West Mesa area.

The Imperial IRWM boundary is shown on Figure 1-1 and Figure 1-2. To the south, the boundary is the international border with Mexico. To the west, the boundary follows the Imperial County line from Mexico to the point where it meets with the Coachella Valley Water District (CVWD) boundary; thence, it follows the southern CVWD boundary east to the point where it abuts the northern IID boundary. The Imperial Region boundary then continues to follow the IID boundary east below the Salton Sea to where the IID boundary again abuts the CVWD boundary. It then follows the CVWD boundary north to a point where a line was extended north to the Imperial County line, whence it was extended east along the county line until it reaches the eastern boundary of the East Salton Sea Basin. The eastern boundaries of the East Salton Sea Basin, Amos Valley Basin, and Ogilby Valley Basin watersheds form the remainder of the Imperial Region boundary to the east, following the Ogilby Valley Basin watershed divide south to where it meets the Yuma Valley Basin. The Yuma Valley Basin boundary is then followed down to the Mexican Border. Much of the land within the Imperial Region is under federal control, and these lands are managed under existing plans prepared pursuant to federal laws.

Figure 1-2 presents the key hydrologic features showing the watershed boundaries, groundwater basin boundaries, and IID facilities used to manage Colorado River supplies.

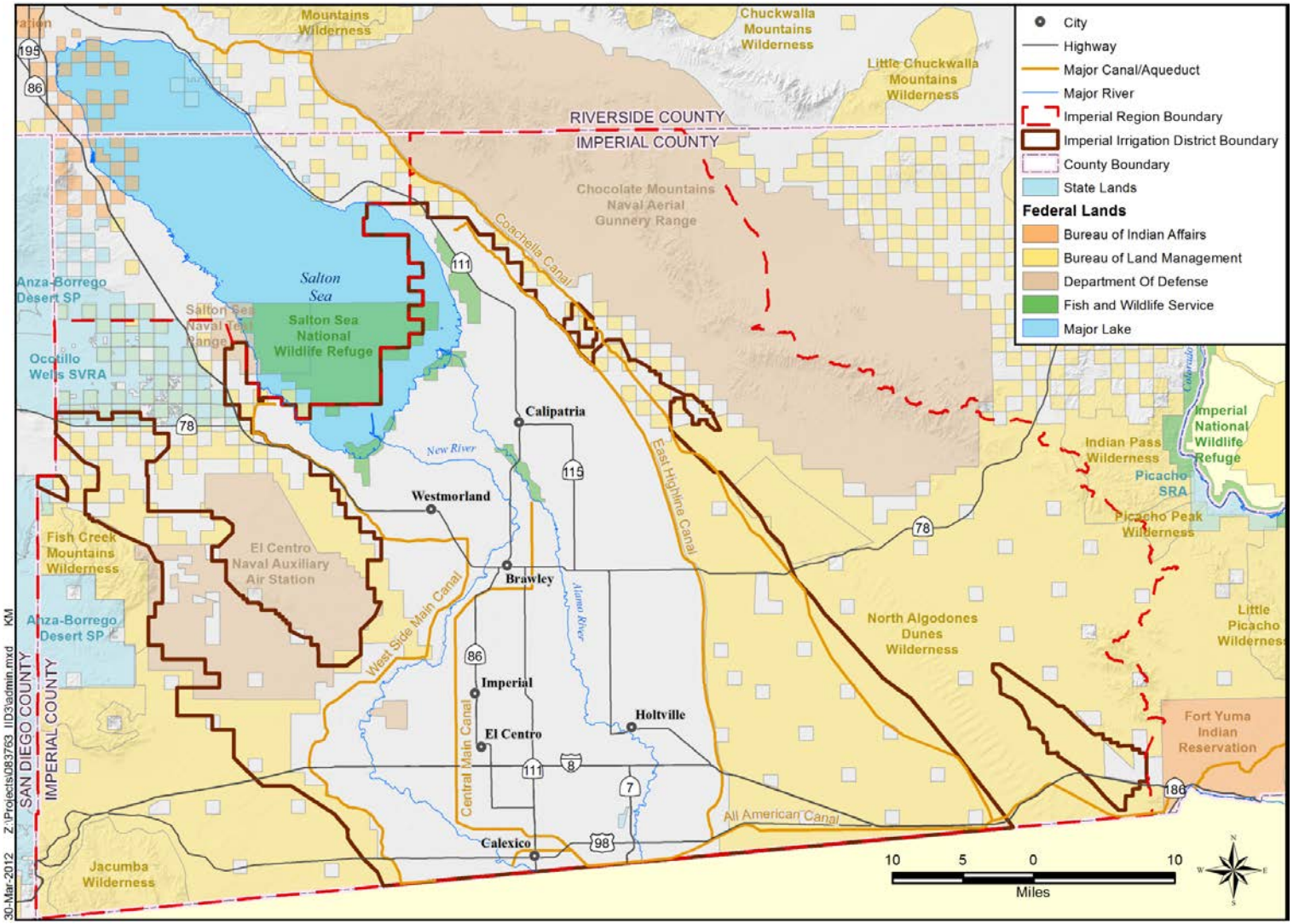

Figure 1-1. Imperial Region and other Jurisdictional Administrative Boundaries

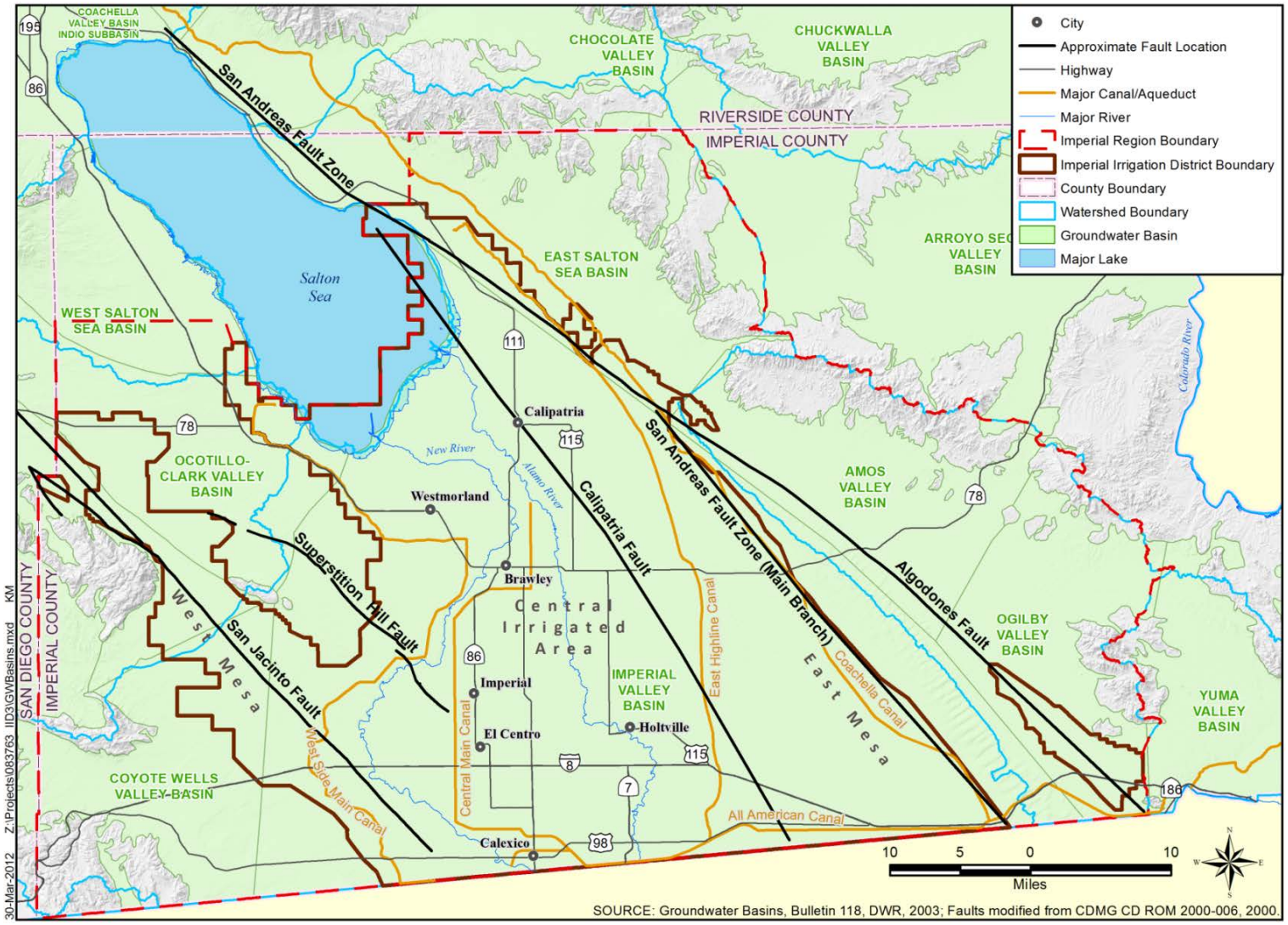

Figure 1-2. Hydrologic Regions

2.2 Planning Horizon

The IRWMP has a 40-year planning horizon from 2010 to 2050. The Quantification Settlement Agreement and Related Agreements (QSA/Transfer Agreements) extend through 2047.

2.3 Planning Process

The IRWMP was developed through a number of sequential steps shown in Figure 1-3. The Water Forum used a multi-step planning process. The first step was to convene the Water Forum and identify the issues and concerns by reviewing existing plans and conducting stakeholder assessments and outreach to the Cities. The outreach to the Cities was important because, with the exception of the City of Imperial, all are characterized as disadvantaged communities (DACs) using the CDWR definition. The issues and conflicts provided the basis for developing goals and measureable objectives.

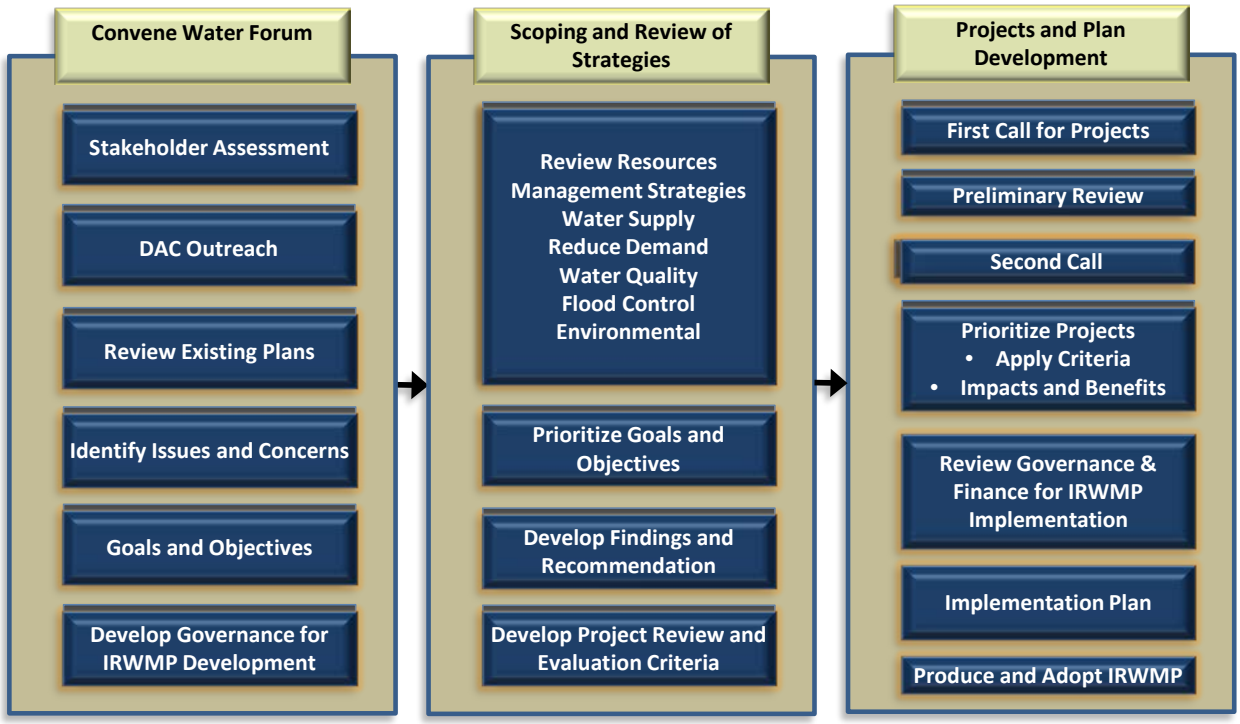

Figure 1-3. Planning Process

Next, the Water Forum reviewed the CDWR resource management strategies in order to:

- Document existing conditions in the Region where the strategies are already applied
- Identify opportunities and constraints
- Evaluate the relationship between strategies
- Consider how the strategies would help the Region mitigate or adapt to climate change, and

- Make findings regarding which strategies should be applied and how they could be adapted to local conditions, and/or integrated to meet the goals and objectives.

Water Forum findings on the resource management strategies helped define the scope of the IRWMP. The Water Forum also decided which strategies were not applicable to the Region because they were not feasible, were impractical, or did not meet the objectives. Review of the resource management strategies helped the Water Forum revisit and prioritize the goals and objectives, and develop the project review and evaluation criteria used to prioritize projects.

The resources management strategies that were carried forward by the Water Forum were integrated and used to formulate project, program, and policy alternatives. The stakeholders worked to formulate their projects or bring projects to the IRWMP that would help to meet the goals and objectives and apply the resource management strategies. The project alternatives were then evaluated and compared using a ranking and evaluation to prioritize the projects for the IRWMP. The prioritized list will be the basis for developing grant applications.

2.4 Integration Approaches

The IRWMP is a long-term proposition requiring integration and adaptive management to respond to changing circumstances. The IRWMP provides the opportunity for stakeholders to work together throughout the planning horizon. However, regional planning does not replace or supersede local water supply or land use planning, nor usurp water district, City, or County authorities. At its best, regional planning incorporates local planning elements[1] and utilizes the range of authorities within the region to improve overall water resources management.

The Imperial IRWMP proposes how to integrate:

- Imported regional surface water (Colorado River) and local water (groundwater) supplies
- Demand management measures
- Existing local plans and policies
- Local agency efforts to meet state regulatory requirements
- Capital projects and timing
- Local, state, and federal funding
- Powers and authorities of the local agencies

Integrating regional and local supplies includes development of capital facilities to extend the Colorado River supply through groundwater storage, wastewater recycling, and/or desalination of drain water or brackish groundwater.

Integrating demand management measures involves conserving water to meet future demands, so that all users and use types (agriculture, renewable energy, MCI, and environmental) are working to cost-

[1] California Water Code (CWC) §10540(b)(1)-(7)

Integrating existing local plans and policies ensures the IRWMP is consistent with, and complements, existing land use and water management plans. The relationship between existing plans and the IRWMP is represented conceptually in Figure 1-4.

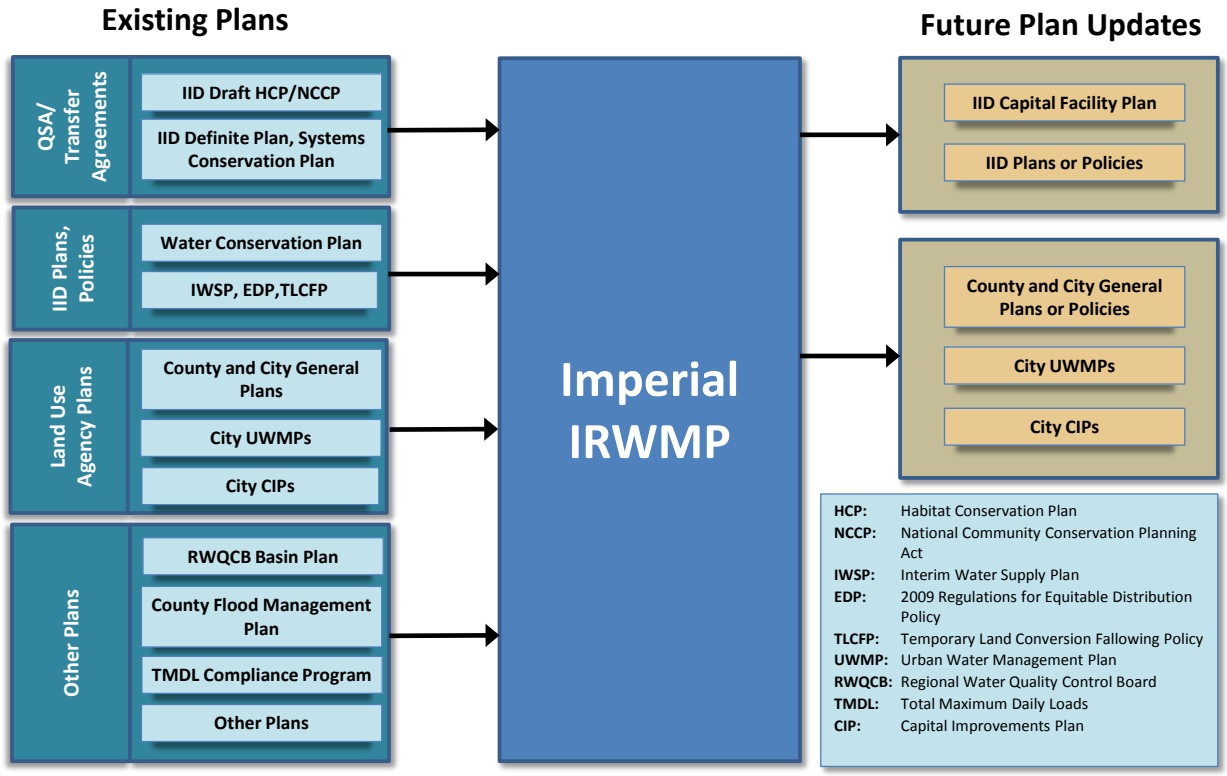

Figure 1-4. Relationship between Existing Plans and the IRWMP

The CDWR Guidelines include two IRWMP standards that seek to improve coordination between land use and water management plans and agencies. The standards require the Imperial IRWMP to define:

- The relation to local water planning
- The relation to local land use planning

The intent and requirements for each standard is to integrate land use and water supply planning where this is appropriate within the region and supports the IRWMP goals and objectives. To meet CDWR standards and meld the relationship between local plans and the IRWMP, the Water Forum:

- Sought to be consistent with other local plans
- Included IID, the County and the Cities, and coordinated with their representatives to develop IRWMP content, identify issues, and shape the goals and objectives
- Used the most current local plans to incorporate relevant and accurate information
- Integrated existing water management tools, strategies, and criteria contained in local plans, where deemed appropriate

The approach was to review existing water management and land use plans, thus laying a foundation to formulate the IRWMP and for upgrading future plans. CDWR resource management strategies being applied in local plans were identified. Land use designations in the general plans were used to forecast future demand and identify potential gaps between demand and supply. The demand forecasts in the IRWMP were provided to the Cities for the use in updating their 2010 Urban Water Management Plans (UWMPs).

The Imperial IRWMP can be used by lead agencies for subsequent updates of water management and land use plans for their jurisdictional area. Future changes to land use or water management plans are the responsibility of the lead agencies participating in the IRWMP, and future updates to land or water plans will influence any IRWMP updates.

Integrating local plans and agency efforts to meet state regulatory requirements helps agencies to economically meet state and federal mandates. For example, urban water suppliers with 3,000 service connections or more are required to prepare Urban Water Management Plans (UWMPs) and update the plans every five years. Urban suppliers could work together to fund a regional UWMP and cost-share efforts to implement state mandated programs. Proposition 84 grant funding for groundwater projects, such as those envisioned in Section 7.1 Groundwater Development, Storage, and Conjunctive Management, is contingent on the County having a Groundwater Management Plan (GMP) that is consistent with state requirements.

Integrating capital projects and their timing serves to make projects more cost-effective and competitive for state and federal funding (e.g., development of multi-participant regional wastewater or drinking water treatment plants). The IRWMP seeks to integrate projects over the planning horizon based on a project's progress in the project development process (Figure 1-5). Categorizing the project development process will help the Water Forum stakeholders integrate projects over time, and help support local stakeholders' set priorities and match projects to potential funding sources.

Figure 1-5. Project Development Process

Program and Policy Integration supports partnering, co-funding, and implementing shared projects. The IRWMP includes instances of this occurring in the Region, such as the County and IID policies for solar development (see Chapter 12).

Integrating local, state, and federal funding serves to reduce local costs, minimize the effects to local rate payers, and qualify the Region for state funding.

Integration of local agency powers and authorities can help expedite project review, streamline land and water management decisions, and establish a unified front when dealing with other regions and governing bodies. This could also include use of joint powers authorities to finance and build projects.

2.5 Relationship to Other Hydrologic Regions and IRWM Regions

The Colorado River Hydrologic Region and the boundaries of the other approved IRWM regions are shown in Figure 1-6. South Lahontan Hydrologic Region is to the north and South Coast Hydrologic Region lies to the west. Within the Colorado River Hydrologic Region are three other IRWM regions, Coachella Valley, Anza Borrego Desert, and Mojave. The relationship among the Hydrologic Regions and the IRWM regions is influenced by the sources of water supply, existing agreements, and agency authorities involved in planning.

2.5.1 Relationship within the Colorado River Hydrologic Region

Coachella Valley IRWM Region. The boundary with Coachella Valley Water District (CVWD) was used in defining the Imperial Region since CVWD along with other water districts, Riverside County, the Cities, and stakeholders is preparing the Coachella Valley IRWMP. The Coachella Valley Region is unique and distinctly different from the Imperial Region. However, the portion of CVWD abutting the Imperial Region is not part of the Coachella Valley Region. The Coachella Valley Region has its own water distribution facilities, Colorado River apportionment, and State Water Project (SWP) allocation. The region is more reliant on groundwater and has overdrafted groundwater in some areas. There is more urban area as compared to the Imperial Region. Within CVWD, the crop mix and delivery system are different from those of IID. Coordinating with the adjacent Coachella Region is particularly important because of the mutual reliance on Colorado River supplies, linkages through the QSA/Transfer Agreements, and the geographic relationship to the Salton Sea which is impacted by the QSA/Transfer Agreements

Anza Borrego Desert IRWM Region. The Anza Borrego Desert Region is located in San Diego County and has its own unique water resource, economic, political, social, and technical issues. The Region is reliant on groundwater, lies outside of the authorized place of use for Colorado River water, and has no Colorado River water rights or entitlements. The area is covered under the San Diego County General Plan, and San Diego County has land use planning authority.

Mojave IRWM Region. The Mojave Region overlaps the Colorado Hydrologic and South Lahontan Hydrologic regions. The region is reliant on imported SWP and local surface water and groundwater resources, and water is managed through conjunctive use. SWP water supplies help to recharge the groundwater basin in the Mojave River Valley and Morongo Basin.

2.5.2 Coordination between Hydrologic Regions

Colorado River Hydrologic Region Coordination. California Water Plan Update 2009 references the QSA/Transfer Agreements as the integrated regional planning effort across hydrologic regions in Southern California. By virtue of the QSA/Transfer Agreements and reliance on Colorado River water, the Imperial Region, which is in the state's Colorado Hydrologic Region, is interrelated with the South Coast Hydrologic Region, which includes the Metropolitan Water District of Southern California (MWD)

and San Diego County Water Authority (SDCWA), two principal partners in the QSA/Transfer Agreements. The QSA/Transfer Agreements benefit California, since they provide the mechanism to stay within its 4.4 million acre-feet (MAF) a year Colorado River water apportionment consistent with the Law of the River. The U.S. Department of the Interior, through the U.S. Bureau of Reclamation (USBR), acts as water master for the Colorado River. Interstate and interregional coordination are through existing management structures including the Colorado River Board of California, the Colorado River Water Users Association, and the USBR.

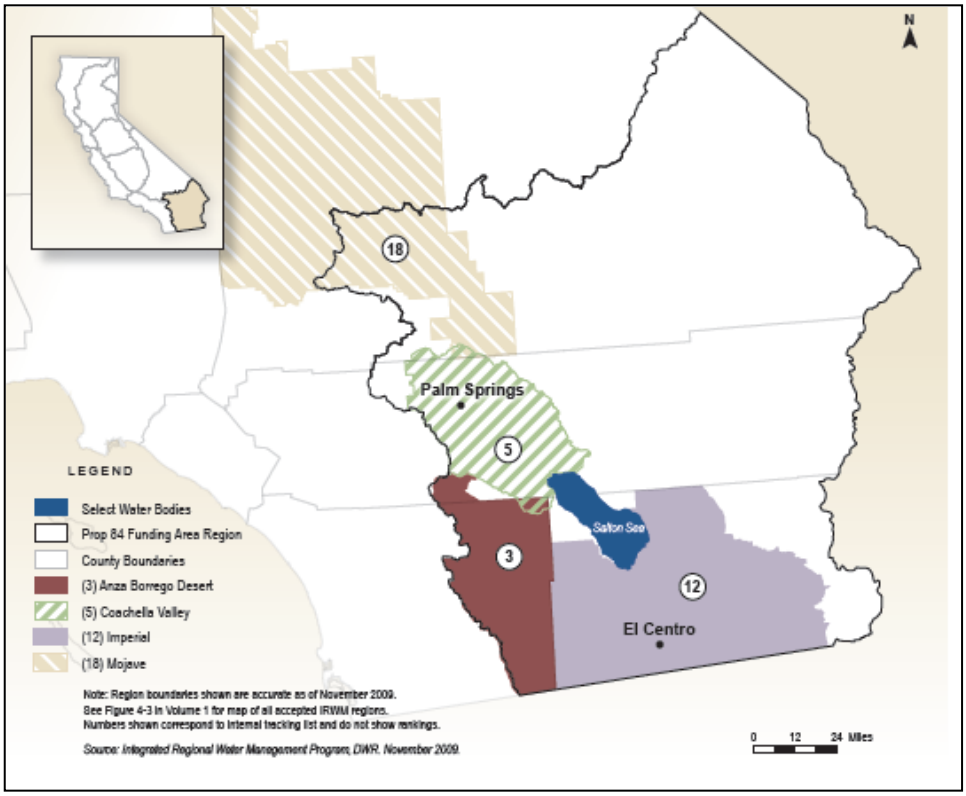

Figure 1-6. Colorado River Hydrologic Region and IRWM Regions

It is anticipated that interregional competition for Colorado River supplies will continue to influence water planning and management in both the South Coast and Colorado River Hydrologic Regions. Water used for agriculture in the Colorado River Hydrologic Region, within both the Imperial and Coachella IRWM planning regions, is identified as a potential source of future supply for expanding urban demands in the South Coast.

Salton Sea Coordination. Interregional cooperation on the Salton Sea Restoration Plan is through the Salton Sea Authority.[2] A restoration plan is beyond the scope of the Imperial IRWMP. The Salton Sea Restoration Plan is a separate and far more extensive planning effort than the Imperial IRWMP, involving a much larger geographic area that includes a large number of stakeholders. The Imperial Region and Water Forum remain committed to the development of a Salton Sea Restoration Plan by the

[2] Salton Sea Authority home page <http://www.saltonsea.ca.gov>

Salton Sea Authority. Where practical and cost effective, the Water Forum and local stakeholders will support developing and testing pilot projects that could be included in the Imperial IRWMP; support the broader restoration planning effort.

2.6 Planning Baseline and Existing Plans

Existing plans and policies define the baseline conditions and define the present-day planning environment. This includes IID's existing water management policies and plans, and the land use plans, policies goals, and objectives of the Cities and County. Plan and policy baselines are discussed in more detail in Chapters 5 and 6 and include:

- Law of the River, which is the body of compacts, state and federal law, court decisions and decrees, contracts and regulatory guidelines that govern Colorado River water rights[3]
- QSA/Transfer Agreements[4]
- IID Water Conservation and Transfer Project Habitat Conservation Plan/National Community Conservation Planning Act, HCP/NCCP <http://www.iid.com/index.aspx?page=235>
- IID Efficiency Conservation Definite Plan (IID, 2007, Definite Plan,<http://www.iid.com/index.aspx?page=203>
- IID System Conservation Plan
- IID 2007 Water Conservation Plan (IID, 2008, <http://www.iid.com/index.aspx?page=186>)
- IID 2009 Regulations for Equitable Distribution Plan (EDP)
- IID Temporary Land Conversion Fallowing Program (TLCFP) <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5646>
- IID Interim Water Supply Policy (IWSP)
- Existing IID policies, standards, and guidelines

Imperial County General Plan, Area Plans, and Community Plans Elements with greatest relevance include:

- Geothermal/Alternative Energy and Transmission Element (2006 update)
- Water Element (2002)
- Imperial County Groundwater Management Ordinance, Title 9 – Land Use Code, Division 22 – Groundwater Management
- General Plans for each of the Cities
- Adopted 2010 Urban Water Management Plans (Cities of Calexico, El Centro, Imperial and Brawley)

[3] The Colorado River is managed and operated under numerous compacts, federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the "Law of the River." <http://www.usbr.gov/lc/region/pao/lawofrvr.html>
[4] See Chapter 5. Also see the QSA Annual Implementation Report covering specific details about water conservation and the transfer project: <http://www.iid.com/index.aspx?page=381>. For QSA-related documents and general information: <http://www.iid.com/index.aspx?page=122>

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 3

Governance, Stakeholder Involvement, and Outreach

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Chapter 3. Governance, Stakeholder Involvement, and Outreach

This chapter provides discussion of:

- The jurisdictional authorities for the agencies comprising the Regional Water Management Group (RWMG).
- The Water Forum and RWMG Charter that defines the IRWM governance during the development of the Imperial IRWMP.
- The organizational structure, decision process and plan adoption process of the IRWM program.
- The approach for stakeholder involvement and public outreach.

Governance and stakeholder involvement during implementation of the IRWMP and related projects are discussed in Chapter 13.

3.1 JURISDICTIONAL AUTHORITIES

California legislation and CDWR standards define a RWMG as a group that includes three or more local agencies, at least two of which have statutory authority over water supply or management, as well as those other persons necessary for the development and implementation of the IRWMP. This section describes agency water management powers and authorities of the Imperial Region that satisfy requirements for a RWMG.

3.1.1 Imperial Irrigation District

Imperial Irrigation District (IID) is an irrigation district organized under the California Irrigation District Law, codified at §§ 20500 et seq. of the California Water Code (CWC). IID has a longstanding right to divert Colorado River water, and holds legal title to all its water and water rights in trust for landowners within the IID service area. IID delivers untreated Colorado River water in its service area for irrigation purposes as well as MCI and environmental uses.[1] By a decisive vote on October, 1911, the people of the Imperial Valley organized the IID, which became effective by a resolution of the Board of Supervisors of Imperial County on October, 1911. IID is governed by a five-member Board of Directors. While elected by a vote of all qualified voters, each member represents a separate geographical division of IID. Directors serve a renewable four-year term. Key functions of IID are:

- Diversion and delivery of untreated Colorado River water through operation and maintenance of an extensive canal system and related facilities
- Construction and maintenance of the agricultural drainage system

[1] CWC §§ 20529 and 22437; Bryant v. Yellen, 447 U.S. 352, 371 (1980), fn. 23

- Generation and distribution of electricity

IID provides raw water distribution and drainage within its service area. IID cannot deliver water outside of its water service area and permitted place of use. The few residents and business in the Imperial Region area that are outside of the IID water service area rely on groundwater. Surface water, under IID's senior rights to Colorado River water and contract with the federal government, is delivered through an extensive canal system. [2, 3] IID delivers only untreated, non-potable surface water for agricultural, domestic, and environmental uses in its 500,000-acre water service area.

IID has constructed a network of over 1450 miles of agricultural drains. Agricultural drainage water and runoff from urban areas is collected in the surface drain system and is conveyed via the New River and Alamo River, to the Salton Sea.

IID Energy provides electric power to more than 145,000 customers in the Imperial Valley and parts of Riverside and San Diego counties. The sixth largest electric utility in California, IID Energy controls more than 1,100 megawatts of power derived from a diverse resource portfolio that includes its own generation, and long- and short-term power purchases. IID is a consumer-owned utility whose mission is to act as a fiscally responsible public agency to provide reliable, efficient and affordably priced water and energy service to the communities it serves. This is accomplished by producing 30 percent of the area's power supply locally using efficient, low-cost hydroelectric facilities, steam generation facilities, and natural gas turbines.

As a water wholesaler and water management agency, IID consults with the County and the Cities when they, making land use decisions and determinations, need to make findings as to the adequacy of existing and future water supplies to commit water to new development. IID provides comments on environmental documents prepared pursuant to the California Environmental Quality Act (CEQA) and on land use and development proposals regarding impacts to IID facilities and current water users.

3.1.2 Imperial County

Imperial County is an agency with statutory authority for water management. The County manages groundwater and has a Groundwater Management Ordinance.[4,5] The County has the power and authority to regulate land use, develop general plans, establish zoning, and review and approve new development proposals in unincorporated areas acting as the CEQA lead agency. Imperial County is also the lead for floodplain management through the Flood Management Plan (FMP; Imperial County, 2007),

[2] SWRCB issued to IID Water Rights Permit No. 7643 in January 1950 to divert up to 10,000 cfs year-round; limiting IID diversion under its federal contract to 3,850,000 acre-feet per annum. IID also holds pre-1914 water rights.
[3] In 1932, IID entered into a contract with the Secretary of the Interior to receive entitlement to 3.85 MAFY of water minus priorities one (PVID) and two (Yuma Project) – as in the 1931 California Seven-Party Agreement. IID's federal entitlement has two components: 1) Present Perfected Right to 2.6 MAFY, and 2) the remaining contract portion, between the PPR and the maximum amount under the 1932 Contract and the Seven Party Agreement – both grounded in state law prior appropriations, as limited by the QSA /Transfer Agreements.
[4] Revised May 11, 2004, and amended August 3, 2004.
[5] Draft IRWMP comment noted that Imperial County has not implemented its groundwater management ordinance since it was adopted.

General Plan, and County ordinance. The FMP documents flood history; identifies known flood problem areas; establishes goals, objectives, policies, and implementation programs to reduce flooding and flood-related hazards; and ensures that natural functions of the floodplains are protected.

3.1.3 Imperial Region Cities

Imperial Region Cities and developed areas include Brawley, El Centro, Imperial, Westmorland, Calipatria, Niland, Seeley, Heber, Calexico, NAF El Centro, and Holtville. The Cities and the County have authority over land use. They adopt General Plans and zoning to guide land use, prepare Urban Water Management Plans (UWMPs) to guide water use and conservation of their available water supplies, and act in such matters as lead agency pursuant to CEQA. The Cities operate drinking water treatment and wastewater treatment plants, or contract for these services. The Cities also have stormwater management responsibilities within their respective city boundaries.

3.2 WATER FORUM AND REGIONAL WATER MANAGEMENT GROUP CHARTER

The Region Acceptance Process document includes a proposed governance structure and decision process for developing an IRWMP. The proposed governance structure, decision making process, and CDWR standards for governance were explained at the April 2010 Imperial IRWMP kick-off meeting. The concepts were further reviewed when the Water Forum was convened in June 2010. In addition, the Charter Work Group was established to develop a formal charter to guide and direct Water Forum operations and deliberations. The Charter Work Group met over the summer of 2010 to draft the Water Forum and Regional Water Management Group Charter (Charter) that was presented to the Water Forum for adoption in September 2010. The adopted Charter is included as Appendix A1. The purpose of the Charter is to guide interactions among stakeholders during development and implementation of the Imperial IRWMP. It defines:

- Program organization
- Program operation
- Administrative oversight and technical support
- Decision-making process
- Development, endorsement, and adoption of the IRWMP
- Values and principles
- Ground rules for meetings

The Water Forum decided that the Charter should be reviewed and adopted by the member agencies and organizations. A draft resolution was prepared for members to present to their organizations for action. The resolution adopts the Charter and the IRWMP Goals and Objectives. Once adopted, the member agency appoints a representative to the Water Forum and states the agency's intention to review the draft IRWMP.

3.3 PROGRAM ORGANIZATIONAL STRUCTURE

The Charter defines the Imperial IRWMP program structure (Figure 3-1), including Regional Water Management Group (RWMG) membership and the functional relationships of the organizational units. The Charter also defines the purpose, roles, and responsibilities of the organizational units. These are summarized below.

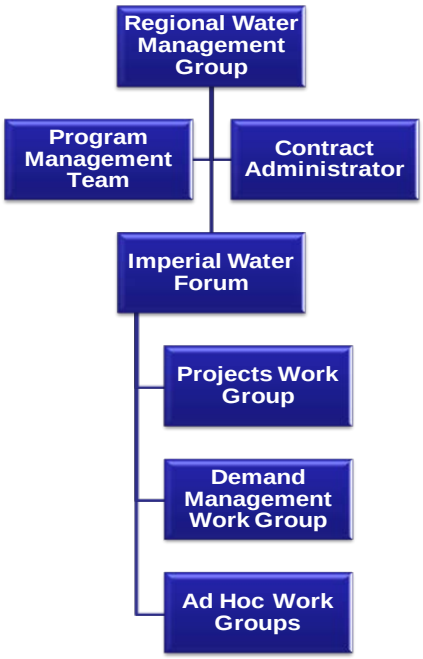

Figure 3-1. Program Organizational Structure

3.3.1 Water Forum

The purpose of the Water Forum is to enable stakeholder involvement, coordination, and input during development of the IRWMP; thereby representing their group's interests, providing for two-way communications, building consensus, and making decisions. Membership is open to all public agencies and organized stakeholder groups. Representatives and alternates are designated by their agency group. Water Forum membership includes broad representation and diversity of perspectives. Members are incorporated into the Water Forum by indicating their support for the IRWMP planning process through a resolution approved by their governing body, and members can participate regardless of ability to contribute financially to IRWMP development. Interested parties (persons) that are not part of an organized stakeholder group can also participate in Water Forum meetings and work groups and provide input when seeking consensus, but are not able to vote.

3.3.2 Regional Water Management Group

The purpose of the RWMG is to engage elected officials and leaders from stakeholder groups, resolve conflicts, build political support, and achieve a unified front for implementing regional water projects. The role and responsibility of the RWMG is to act as the final arbiter of decisions where necessary. .

Membership on the RWMG consists of nine members:

Five (5) elected representatives of the Imperial Region land use and water management agencies, as follows:

- One (1) member from the IID Board of Directors
- One (1) member of the Imperial County Board of Supervisors
- Three (3) elected City Council members of Cities participating in the Water Forum, two of which must be designated as disadvantaged communities

Four (4) additional members are selected as follows:

- IID Water Conservation Advisory Board (WCAB) selects one (1) member to represent agricultural users
- Imperial Valley Economic Development Corporation (IVEDC) selects one (1) person to represent industrial/business users
- Local Agency Formation Commission (LAFCO) coordinates selection of one (1) special district (water-related) member
- Community organizations coordinate the selection of one (1) community-based or environmental justice member
- To take action, RWMG meetings require attendance of seven of nine (7 of 9) RWMG members.

3.3.3 Program Management Team (PMT)

The PMT provides oversight and coordination of the IRWMP process. The PMT includes senior staff of IID and the County, a representative of one of the Cities (City of Imperial), the consulting team program manager, the facilitator, and the IID project manager. The roles and responsibilities of the PMT includes scheduling Water Forum and RWMG meetings, directing tasks, setting milestones and reviewing progress, providing agency staff resources, forming work groups, sponsoring workshops, managing internal and external IRWMP communications, and ensuring that CDWR IRWMP requirements are met.

3.3.4 Work Groups and Workshops

The purpose of work groups is to coordinate technical resources, agency staff, and stakeholders in addressing specific topics or assignments, and to provide draft findings and recommendations to the Water Forum. When the PMT forms a work group, all Water Forum members and interested parties are given an opportunity to participate or invite others to participate. Work groups and their activities include:

- ***Charter Work Group***. Draft of the Water Forum and RWMG Charter.
- ***Policy Work Group***. Address topics, problems, and conflicts, and develop draft goals and objectives.
- ***Projects Work Group***. Review water supply resources management strategies, develop project concepts, provide input to the consulting team, draft findings, draft project review and evaluation criteria, and review project evaluation and ranking results.
- ***Demand Management Work Group***. Review agricultural and MCI demand management strategies; provide input to consulting team; develop draft findings; and develop program and project concepts.

A number of workshops were convened to engage Water Forum members, agency staff, and other persons from the community who had relevant expertise. Some of the workshops served an outreach function to inform stakeholders and other organizations; other workshops were single events designed to obtain data, identify issues and opportunities related to the subject, review draft findings on resource

management strategies, and/or to provide advice to the PMT and Water Forum. Water Forum-sponsored workshops are listed in Table 3-1.

Table 3-1. Imperial IRWMP Workshops

Workshops	Date
City Managers Workshop	06/9/10
Imperial Valley Transportation Commission, Technical Advisory Committee Workshop	07/21/10
County/IID Groundwater Workshop	10/21/10
Energy Stakeholders Best Management Practices Workshop	01/20/11
Urban Water Management Plan UWMP Workshop (See Note)	02/09/11
Project Submittal Workshop - First Call for Projects	02/16/11
Energy Stakeholders Workshop	04/20/11
Improve Flood/Stormwater Management Workshop	05/17/11
Improving Water Quality Workshop	05/17/11
Ecosystems Enhancement & Water-related Recreation	06/15/11
Project Submittal Workshop – Second Call for Projects	07/20/11

Note. The UWMP workshop included CDWR Southern Region water conservation staff to explain state requirements and methods.

3.3.5 Contract Administration

IID retained the consulting team to support the Water Forum and development of the IRWMP. IID provided overall contract administration and program management. This includes issuing task orders to consultants, acting as liaison to the state, reviewing the consultant's work, managing project budget and schedule, and coordinating with agencies and other stakeholders.

IID was the submitting agency for the Proposition 84 Planning Grant and is acting as fiduciary agent during IRWMP development. IID has provided the up-front and local funding to match the state grants, convene the Water Forum, and initiate development of the Imperial IRWMP.[6] On behalf of the Imperial Region, IID submitted the Region Acceptance Process Report (GEI 2009) to CDWR. CDWR subsequently accepted the Imperial Region boundaries, qualifying the region for planning grant funding for the Imperial Region. IID, in support of the Water Forum, prepared and submitted an application for a Proposition 84 IRWMP Planning Grant in October 2010. CDWR provided a notice of award for $1 million in February 2011 and the IID/CDWR contract was approved in November 2011.

3.3.6 New Members

New members can be incorporated into the Water Forum by indicating their support for the IRWMP planning process through a resolution approved by their governing boards or equivalent.

The Water Forum and RWMG can incorporate new members on the RWMG by amending the Charter.

[6] IID funding for developing the Draft IID Plan, convening the Water Forum and initiating the Imperial IRWMP were obtained through permit and impact fees paid by Ormat, Inc.

3.4 Decision Process and Plan Adoption

The Charter identifies the Water Forum's decision- making process. In all cases, the Water Forum seeks to make decisions by consensus. The representative or alternate of the organizations on the Water Forum receive cards to be used in making decisions on IRWMP issues. . In October 2010, the Water Forum clarified the decision-making process. The Water Forum determined that: 1) the RWMG would be convened once the IRWMP was ready to be adopted; 2) the composition of the RWMG would be revisited by the Water Forum prior to convening; 3) the Water Forum decision-making would continue to be through consensus as defined in the Charter, but that a simple majority vote by the stakeholders would be used when consensus could not be obtained; and 4) that cards for each member would be used during the decision-making process.

The Water Forum's decision-making process was used to adopt goals and objectives, the Charter, findings on strategies, project review and ranking criteria, project priorities, and will be used to endorse the IRWMP. This process will be followed in the future to define how to fund and sustain Water Forum and IRWMP activities, implement projects, update the IRWMP, and hire and manage staff or consultants.

The Charter defines the process for finalizing and adopting the IRWMP. The Water Forum will review the Draft IRWMP, initiate a public review process, and receive public and stakeholder comments in writing and at a public meeting. The Final IRWMP and response to comments will be prepared and sent to agencies represented on the Water Forum for adoption and/or endorsement. The IRWMP document will be final when IID and the County, as agencies with water management authority, and one public agency member of the RWMG adopt the IRWMP. Agencies seeking funding for projects in the IRWMP must adopt the IRWMP.

The Charter states that the Imperial IRMWP will not be a legally binding document, but rather a regional compact. The IRWMP is a living document requiring periodic update. Once an agency adopts the IRWMP, it agrees to participate in further collaboration and plan implementation.

3.5 Stakeholder Involvement and Public Outreach

Imperial Region developed the IRWMP through a collaborative, multi-stakeholder process representative of diverse perspectives. Outreach efforts served to identify prospective participants. The previous discussion of governance documents the structure and decision processes that promoted access to, and collaboration with, people or agencies with diverse views. This section provides a description of how stakeholders, including Disadvantaged Communities (DACs), were identified and invited to participate.

3.5.1 RAP Objectives for Stakeholder Involvement

The Region Acceptance Process (RAP) helped establish objectives for stakeholder involvement:

- Promote the Imperial IRWMP as the mechanism for addressing water supply topics.
- Identify and address concerns of IID Directors, County Supervisors, City Councils, water customers, and other stakeholders.
- Demonstrate commitment to engage and inform customers, stakeholders, and the public.
- Create awareness and obtain consensus on solutions, including funding strategies.
- Reduce the potential for conflicts, manage expectations, and develop strategies to respond to identified topics and concerns.
- Seek coordination and advisory roles for state and federal agencies.

3.5.2 Develop and Maintain Stakeholder List

IID, with support from the County, developed a working list of stakeholders in the region to guide the outreach efforts. Additional stakeholders were identified and included during development of the Imperial IRWMP, and the list was maintained by IID as the process progressed. The list includes Interested Parties that are not members of an organized and representative stakeholder group, but wish to participate and track Water Forum activities, receive meeting notifications, and review work products.

3.5.3 Stakeholder Assessment

IID initially contacted stakeholders in writing to introduce the IRWMP and solicit input by participating in a stakeholder assessment interview. The stakeholder assessment was conducted by the Center for Collaborative Policy (CCP 2012) through meetings and conference calls held January through March 2010. By being directly contacted, the identified stakeholders were permitted to voice their interests, expectations, and concerns. The objectives of the assessment included:

- Identify issues of importance to stakeholders and interested parties that should be addressed in an Imperial IRWMP.
- Obtain information to further develop the scope of work for the IRWMP.
- Determine how stakeholders can work together to collaboratively prepare the IRWMP for the Imperial Region.
- Explore ways in which to improve relationships among stakeholders and interested parties in the Imperial region
- Encourage participation in the Imperial IRWMP process

All interviewees were in favor of the development of an IRWMP and in addition, all were in favor of their organizations participating in the development of an IRWMP. This was the only consensus response in the assessment.

3.5.4 Disadvantaged Community Outreach and Needs Assessment

A DACs needs analysis was conducted early in the planning process (GEI 2011a). To identify disadvantaged communities, a contact list was developed for all cities, communities, and special districts located within the Region that provide domestic water service, wastewater collection, and/or stormwater collection service (collectively - water systems). The Capital Improvement Plans, Master Plans, General Plans, and Service Area Plans of each community were sought and reviewed where available, to determine the state of their infrastructure and planning efforts. Information about their systems was compiled into an infrastructure matrix that was mailed in advance to the interview participants to obtain input. The information included in the infrastructure matrix consisted of the following:

- Stormwater
  - Land use policy
  - Design criteria
  - Flooding/system deficiencies
  - Capital improvement plans
- Wastewater
  - Existing and future plant size/treatment capacity, average flows, and level of treatment
  - Capital improvements planned for collection system and/or Waste Water Treatment Plant (WWTP), including plans for water recycling
  - Compliance requirements
- Potable Water
  - Current and future plant size/treatment capacity, average demand, raw and clear water storage capacity
  - Distribution system status/deficiencies, capital improvement plans and schedule for implementation
  - Disaster/emergency/shortage preparedness

A letter was sent to each community representative that included an explanation of the Imperial IRWMP goals and objectives, and the intent of the Water Forum to address DAC needs and interests. Interviews were scheduled and conducted using a standardized questionnaire. In addition to the letter, an email with the agency-specific infrastructure matrix was sent to the engineering, planning, and/or public works contact for each community. The email explained the source of the data in the infrastructure matrix, and requested that the information within the matrix be corroborated or updated to reflect the current condition. The telephone interview was scheduled with each public agency's representatives to give them an opportunity to describe specific needs, list priority projects, and articulate issues or concerns with their water systems that were not addressed in the infrastructure matrix.

In the DAC Needs Analysis Report, information gathered from each interview can be found, including the existing state of each of the systems as well as system notes, system concerns, common themes among communities and a list of priority projects (see Appendix E). The information is also summarized in the next chapter.

3.5.5 Coordination with State and Federal Agencies

The list of interested parties included the local legislative and congressional delegates, USBR, Lower Colorado River Region, U.S. Bureau of Land Management (USBLM) El Centro Office, CDWR, and Colorado River Regional Water Quality Control Board (RWQCB) representatives. The Water Forum sought participation of the state and federal agencies through the local offices. State and federal agencies were involved to the degree that their schedules and resources would allow. By virtue of the amount of federal land in the Region, the USBLM was consulted and participated in an advisory role when able. The USBR Lower Colorado River Region also was engaged with the Water Forum in an advisory capacity. Both agencies had representatives who attended a number of Water Forum meetings. Local agencies and personnel have relationships and established communications with local and regional representatives of the various state and federal agencies.

3.5.6 Public Information - Logo, Website, Brochures

IID provided government affairs staff to coordinate outreach and public relations functions. The consultant team and IID staff developed presentations and briefing materials for use by Water Forum members at regularly scheduled stakeholder business meetings. IID periodically, on behalf of the Water Forum, provided public notice that Water Forum meetings would be held in local newspapers, inviting all members of the public to attend.

3.5.6.1 Imperial IRWMP Logo

An Imperial IRWMP logo was selected by the Water Forum. This logo was intended to create brand recognition for the IRWMP effort.

3.5.6.2 Website

The Water Forum used a variety of media in its public outreach efforts to publicize the IRWM process and encourage participation, including the development of the IRWMP web page <http://www.imperialirwmp.org/>. The website (Figure 3-2) is maintained by IID and used to publish meeting announcements and notes, presentations, briefings, and draft and final technical work products, including the draft and final Imperial IRWMP. Water Forum meetings are recorded (video/audio) and are available to the public via the IRWMP website for those who could not attend. Contact information is posted on the website, stating the public may contact with comments, questions, and concerns. A meeting calendar is also included.

3.5.6.3 Brochures

Two brochures were prepared, one to address frequently asked questions and the other to provide a status report. Stakeholders on the Water Forum are encouraged to use their agencies' newsletters to publicize the Water Forum activity and IRWMP development.

3.5.7 Public Meetings – Kickoff, Water Forum, Work Groups and Workshops

Throughout the IRWMP process, interested members of the public have provided input at regularly scheduled Water Forum and work group meetings. All Water Forum and work group meetings were open to the public.

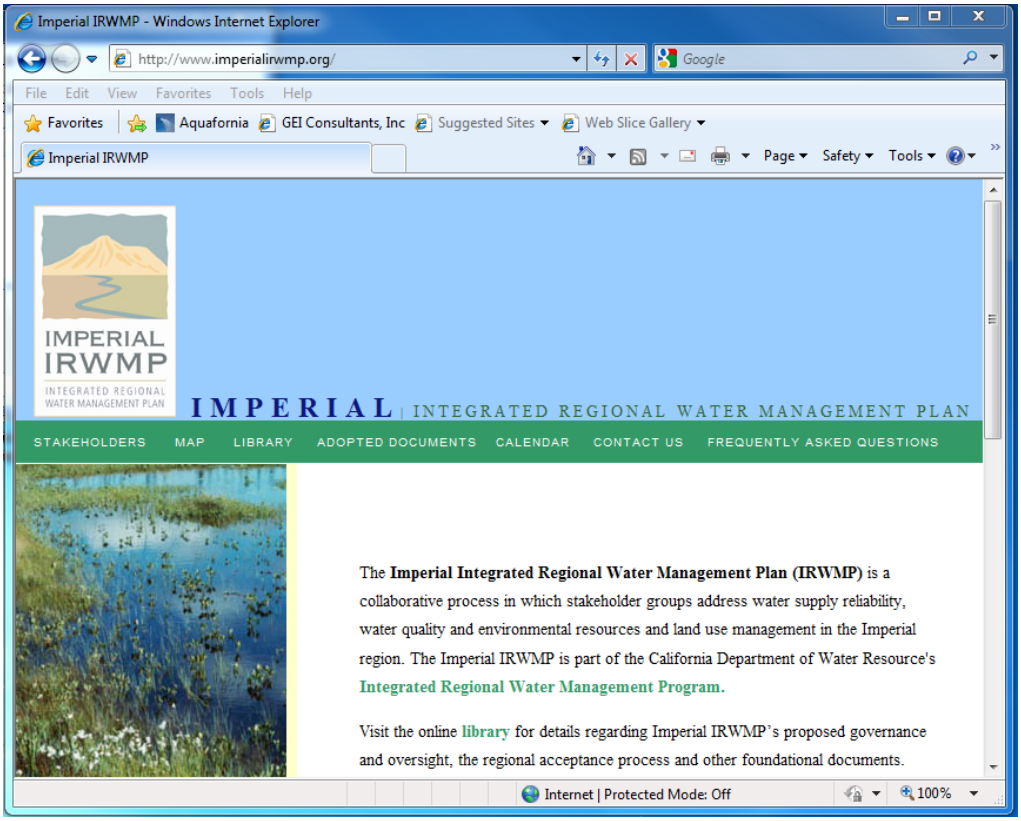

Figure 3-2. Imperial IRWMP Website

3.5.7.1 Imperial IRWMP Kick-off Meeting

A kick-off meeting was held in April 2010 to increase public awareness of the proposed Imperial IRWMP, solicit input from the community, and describe the planning process and anticipated outcome. Invitations to the April 2010 kick-off meeting were prepared to explain the IRWM process and Water Forum. The meeting was publicly noticed and a press release distributed (Appendix A). The kick-off presentation described the Imperial Region and proposed work plan, oversight, and governance. The consulting team, program manager, and facilitator addressed questions and solicited input.

3.5.8 Adoption of Goals, Objectives and Charter by Stakeholder Agencies and Groups

Once the Water Forum adopted the Goals and Objectives and Charter, the representatives took these back to their organization for review and adoption. IID staff coordinated and scheduled the meetings and provided staff when needed. A PowerPoint presentation was prepared for their use to explain the IRWMP Goals and Objectives and Charter. Seven (7) public agencies adopted a resolution that supports the Goals and Objectives and Charter, designates their representative, agrees to review the IRWMP, and considers adoption once the final draft is available (see Table 1-2, and Appendix A).

3.5.9 Public Review Draft IRWMP Meetings, Water Forum Adoption of IRWMP, and Agency Adoption of Final IRWMP

The Public Review Draft of the IRWMP was posted on the IRWMP website for review and comment. The draft was also made available at local libraries and at IID Headquarters for review. On September 16, 2012, the Water Forum held a publicly noticed meeting to receive comments. A notice of intent to adopt was published in the local media. Both the Water Forum and public comments were used to prepare the Final IRWMP. During the review period, Water Forum representatives made presentations at their agencies' public meetings to discuss the draft. The Water Forum then held a meeting to review the responses and endorse the Final Draft IRWMP. This final draft was then sent to the stakeholder groups for final adoption.

3.5.10 Use of Existing Organizations and Communication Channels

For the Water Forum to fairly and comprehensively represent the cities, communities, and agencies of the Imperial Region, public outreach was incorporated through existing programs and communication channels. Members of the Water Forum relayed information to their respective elected bodies and groups for further input. Workshops included coordination with Imperial Valley Transportation Commission (IVTC), City Managers, and the Technical Advisory Committee of public works engineers. IVTC helped coordinate the Urban Water Management Plan workshop. Water Forum members were encouraged to keep their organizations informed about Imperial IRWMP activities.

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 4

Region Description and Baseline Conditions

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Chapter 4. Region Description and Baseline Conditions

This section provides a general description of the baseline conditions for the engineered environment, the economy and community, and the physical and natural environments to provide context for the Imperial IRWMP. The baseline conditions help identify Imperial IRWMP project impacts or benefits and support comparison of potential alternative future conditions. Information regarding city systems is based on outreach interviews that were conducted September through December 2010.

The engineered environment includes constructed facilities used to manage raw water and related resources including the irrigation delivery, and drainage systems; and the MCI stormwater, drinking water, and wastewater treatment systems.

The economy and community baseline conditions include land use and related natural resource management plans, the renewable energy industry, recreation, disadvantaged communities (DACs), and environmental justice considerations.

The physical and natural environment includes natural resources that are considered in a project's design or could constrain project development and implementation. To the degree possible, Imperial IRWMP projects should seek to avoid, minimize, or mitigate potential impacts to sensitive resources.

4.1 Engineered Environment

The facilities and needs of the Cities were contacted through outreach interviews conducted in September through December 2010, through internet research, and from information provided by stakeholders.[1] A DAC Needs Assessment and inventory of facilities was provided to the Water Forum and Projects Work Group for review and comment. The Cities, IID, and other agencies have Capital Improvement Plans, Drainage Master Plans, Urban Water Management Plans (UWMP), or other documents that serve to define investment priorities of stakeholders in the Region.

4.1.1 Wholesale Water Delivery System – Imperial Irrigation District

IID owns and operates the major water supply and drainage infrastructure in the Region and plans regional water supply projects to manage the Colorado River supply and conserve agricultural water.

IID's delivery system begins at Imperial Dam where Colorado River water is diverted into IID's desilting basins at Senator's Wash. After desilting, the water is conveyed by gravity through the 80-mile-long All-American Canal.

[1] Calexico, Imperial, and Westmorland did not respond to interview requests.

The All-American Canal discharges water to several turnouts, including the Coachella Canal and IID's three main canals, the East Highline, Central Main, and Westside Main. East Highline Canal, a 49-mile unlined canal, serves eastern and central portions of the IID water service area. The canal roughly follows the northeastern boundary of the IID water service area and conveys irrigation water to agricultural fields via a series of east-to-west laterals. The Central Main Canal connects to the All-American Canal just east of Calexico and serves most of the central part of the IID water service area. The Westside Main Canal extends from the All-American Canal near the western edge of the IID water service area and serves the western portion of the IID water service area.

IID's water delivery system includes approximately 1,667 miles of canals and laterals that distribute untreated Colorado River water to approximately 5,600 farm delivery gates, to rural service pipes and small parcels, and to all other non-agricultural users within the IID water service area (Table 4-1 and Table 4-2).

Table 4-1. IID Conveyance and Delivery System, 2005 (miles)

System Used	Total Length	Earthen	Concrete Lined	Piped
All-American Canal	**79**	79.720	0.000	0.000
Main Canals	**150**	129.390	20.900	0.000
Lateral Canals	**1,437**	328.880	1,087.986	20.944
Mains & Laterals Total	**1,666**	**537.990**	**1,108.886**	**20.944**
All-American Drains	**50**	37.410	0.000	12.700
Drains	**1,405**	1,298.143	1.180	106.617
Drains Total	**1,455**	**1,335.553**	**1.180**	**119.317**

Source: IID 2007 Water Conservation Plan (IID, 2007)

Table 4-2. IID Customer Accounting and Turnouts

Type	Total Number
Customer Accounts	
Owner-Operated	2,405
Tenant-Operated	3,786
Total	**6,191**
Measured Turnouts	
Delivery Gates	5,586
Small Parcels	792
Pipes	2,259
Total	**5,586**

Source: IID 2007 Water Conservation Plan

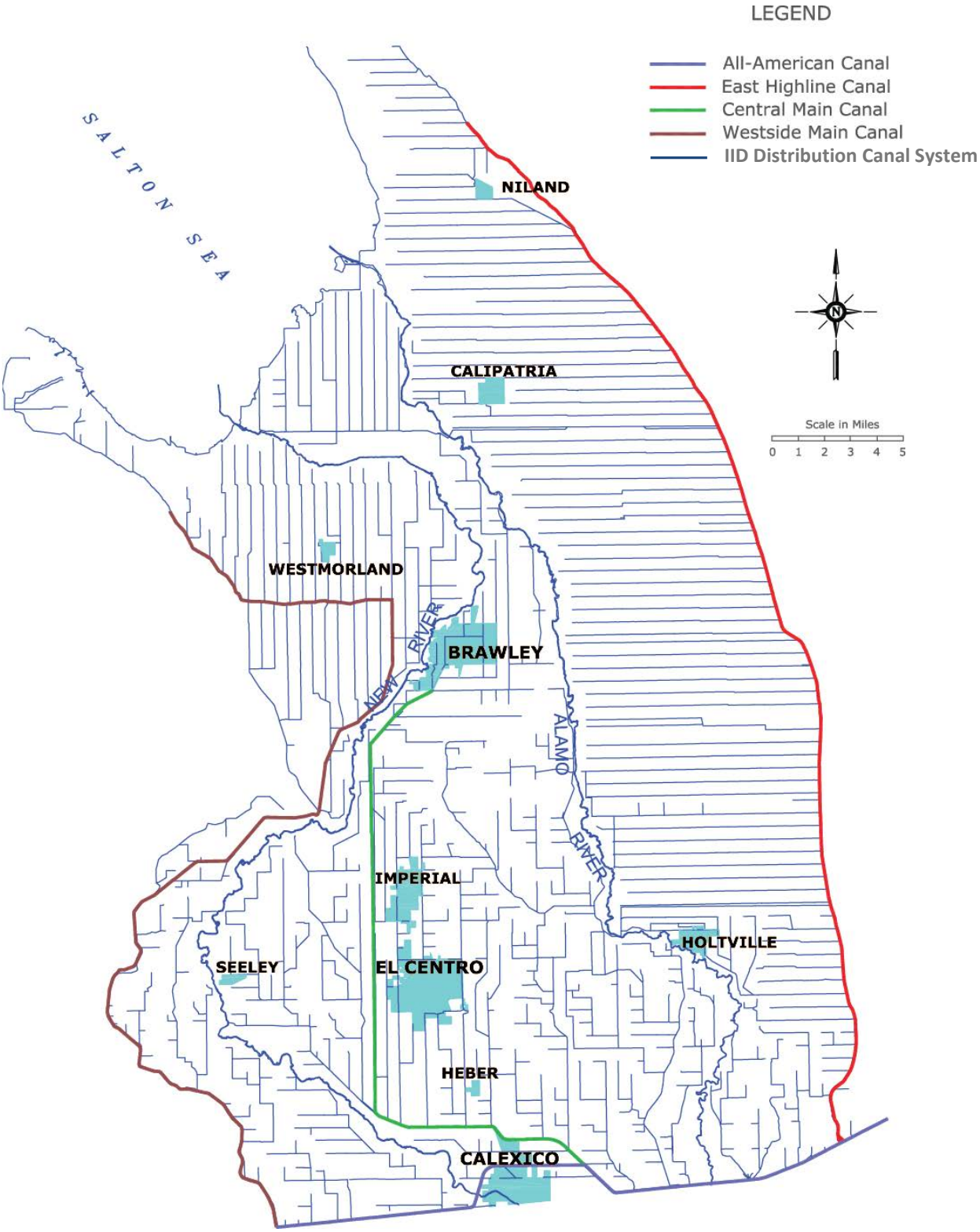

Figure 4-1. IID Main Canals and Lateral System

Source: Imperial Irrigation District 2010 Annual Water Report

IID has built ten reservoirs to improve system operation increase delivery flexibility and reduce operational spill. IID's distribution system includes six regulating reservoirs and four interceptor reservoirs that have a total storage capacity of more than 3,300 acre-feet (Table 4-3). Additional information on the IID operation system can be found through web paths listed in Table 4-4.

Table 4-3. IID Reservoirs

Type	Number	Capacity (AF)
Regulating Reservoirs	6	2,344
Interceptor Reservoirs	4	1,028
Total	**10**	**3,372**

For details re IID reservoirs, visit <http://www.iid.com/Water/Reservoirs>
Source: IID 2007 Water Conservation Plan

Table 4-4. IID Water Transportation System Web Links and Paths

For Water Transportation System
Visit <http://www.iid.com/index.aspx?page=117>

- Irrigation
- Drainage
- Reservoirs
- Water Control Center
- Salton Sea

For Colorado River Facilities
Visit <http://www.iid.com/index.aspx?page=173>

- Imperial Dam
- Senator Wash
- AAC
  - AAC History
  - AAC Lining Project

4.1.1.1 System Operation

System operation information in this section is excerpted from the IID 2009 Water Conservation Plan (IID 2007). Delivery of Colorado River water to users in the IID water service area is driven by user demand subject to constraints of the QSA/Transfer Agreements. Agricultural demand varies throughout the year (Figure 1-3) and from year to year in response to a combination of factors, including changes in climate, local rainfall, crop cycles, crop prices, and government crop programs. IID delivers water year-round, with demand typically highest from April through August, the driest and hottest time of the year in the Imperial Region. Municipal, Commercial, and Industrial (MCI) demand is fairly constant throughout the year.

IID’s main canals are operated through the Water Control Center (WCC), located at IID headquarters. Each Wednesday, IID staff prepares a master water order for the upcoming week (Monday through Sunday) and submits the order to the U.S. Bureau of Reclamation (USBR). The master water order is based on the IID Watermaster’s judgment, water account orders, and weather conditions. Changes to the master water order require four days advance notice to the USBR, which is the travel time for water from Lake Mead to IID’s service area.

Three IID division offices operate the lateral canal distribution system. Divisions receive water orders from growers, consolidate the orders, and submit them to the WCC daily for development of the next day's operating plan. The WCC maintains a master delivery schedule for grower orders. Because total available flow for the upcoming operational day is fixed according to the modified master schedule, demand for water and available supply typically do not match. If demand exceeds supply, orders are carried over to a future operating day, usually no more than one or two days beyond when the water is desired. By shifting water orders forward and backward this way, daily demand for water is matched to the available supply from the Colorado River. Storage levels in main canal regulating reservoirs are also adjusted to help balance supply and demand discrepancies.

IID's main canal system is segmented into six operating reaches defined by the location of its regulating reservoirs. The reservoirs absorb flow mismatches from the main canal reach upstream and allow delivery of scheduled flows into the next reach downstream.

Despite the intent to balance each day's supply with demand, a number of operational factors can cause differences between actual supply and demand within the system. Influential factors include variances between water orders and actual demand due to farmers reducing or shutting off delivery early, changes in canal storage from day to day, operator error in distributing flows, and other factors. Drawing water from or putting water into main canal regulating storage reservoirs accommodates mismatches between actual demand and supply. The extent to which water deliveries are made both reliably and flexibly, while minimizing operational spill, depends primarily on the volume of regulating storage available in the system and the ability to move flow changes smoothly through the canals to the reservoirs.

The operational procedures described above constitute an upstream canal control process where scheduled water deliveries are released into canals and routed from upstream to downstream according to the operations schedule. The objective at flow control locations, such as main canal and lateral headings, is to maintain scheduled deliveries. Between flow control locations, the objective is to use check structures to maintain a targeted water level.

4.1.1.2 IID Water Measurement

IID measures all water delivered to users except for small amounts delivered to service pipes, small parcel connections, and feedlots and dairies. Flow is also measured throughout the delivery system and at key points in the drainage system (Table 4-5). Monitoring and measurement of the systems are critical to account for water deliveries, develop accurate water budgets, verify conservation savings pursuant to the QSA/Transfer Agreements, and track operational performance.

Table 4-5. IID System Measurement Sites (IID)

Type	Process	Number
Automated System		
Sharp-Crested Weir	Logger	5
Sharp-Crested Weir	SCADA	64
Grade Board Weir	SCADA	31
Broad-Crested Weir	SCADA	20
Rated Drop or Weir	SCADA	10
Long-Throated Flume	SCADA	4
Notched Weir	SCADA	1
Orifice Gate	SCADA	1
Automated Drop-Leaf Gate	SCADA	79
Total		***215***
Reported Flow or Level		
Acoustic Meter	SCADA	14
Rated Structure	SCADA	27
Broad-Crested Weir	SCADA	6
Level Only	SCADA	1
ADLG	SCADA	11
Total		***59***
Tailwater Return System		
Grade Board Weir (pond spillage)	SCADA	28
Reported Flow	SCADA	28
Total		***56***
Manual System		
Main Canal or Lateral Heading	Manual	126
Delivery Gate	Manual	5,586
Total		**5,712**
GRAND TOTAL		**6,065**

Source: 2007 IID Water Conservation Plan, Table 21

For IID SCADA sites, a data point is recorded every 15 minutes. In the new ClearSCADA system, a data point is recorded when the water level changes by a defined amount. IID and CVWD contract with the U.S. Geological Survey (USGS) to maintain the official record at seven of IID's automated measurement sites (Table 4-6). Current meter calibration is performed monthly and a data point is recorded every 15 minutes. IID collects backup raw data for these sites, which occasionally are used by the USGS. Data are stored on IID's Water Information System (WIS).

Table 4-6. IID System Measurement Sites (USGS)

Type
AAC Station 60 (paid by USGS)
AAC below Pilot Knob (Station 1117)
Coachella Canal Heading Flume
AAC below Drop 1 (Station 1973)
New River at U.S./Mexico International Border
New River to the Salton Sea
Alamo River to the Salton Sea

Source: IID 2007 Water Conservation Plan, Table 22.

IID maintains four California Irrigation Management Information System (CIMIS) sites (Table 4-7), which are calibrated by CDWR staff. IID downloads CIMIS and enters IID weather station data into the WIS, where additional quality control is performed. IID maintains a weather station at its Imperial Headquarters, Calexico Weather Station, and Niland Weather Station.

Table 4-7. Weather Data Collection of Sites (CIMIS and IID Sites)

Type	Station Number
Calexico Weather Station	IID
Calipatria/Mulberry CIMIS	0041
Imperial Operating Headquarters	IID
Meloland CIMIS	0087
Niland Weather Station	IID
Northend Yard Weather Station	IID
Seeley CIMIS	0068
Westmorland North CIMIS	0181

For CIMIS information and data, visit <http://wwwcimis.water.ca.gov/cimis/welcome>
Source: IID 2007 Water Conservation Plan, Table 24

4.1.2 Agricultural Drainage System – Imperial Irrigation District

IID's agricultural drainage system consists of a network of 1,456 miles of open channel and closed pipe drains, 750 surface and subsurface drainage pumps, thousands of miles of on-farm subsurface (tile) drains growers have installed and operate, and an associated collection of pipelines and tailwater recovery systems. There are three main drainage systems: the Alamo River system, the New River system, and drains that flow directly into the Salton Sea.

Water entering the drainage system can originate from the following sources:

- System seepage (water that has seeped from canals and laterals and is intercepted by IID drains)
- Operational spill (unused water that has traveled through the delivery system to ensure full demand is met and is discharged to IID drains)[2]
- On-farm tailwater runoff (irrigators manage tailwater to fill the root zone at the lower end of the field; additional surface water runoff from the end of an irrigated field when total water applied exceeds the soil infiltration rate)

[2] IID has three lateral interceptor systems and a portion of the Westside Main Canal (serving around 100,000 acres) where such water is collected and delivered to other users.

- On-farm tilewater (water passing the crop root zone to ensure leaching that enters a tile drain)
- Stormwater runoff
- Groundwater (intercepted groundwater that has moved into the drains from the deeper aquifer near the east boundary of the irrigated area) (CH2MHill 2008)

IID's agricultural drainage facilities are not designed nor managed for non-agricultural discharges, flood, or stormwater management purposes.

Agricultural drainage flow is discharged into the Salton Sea. Based on information in the Definite Plan, the average drainage from the Colorado River through IID's service area into the Salton Sea has averaged approximately 1.1 million acre-feet per year (Table 4-8).

Table 4-8. Average Annual Drainage to Salton Sea, Colorado River Water Diverted to IID, and Rainfall Runoff, 1995-2005 (AF)

Component	Average Annual Discharge (Acre-Feet)	Source [1]
Tailwater	432,700	Table 4
Tilewater	417,300	Table 4
IID System Spill	124,000	Table 3
IID System Seepage	86,000	Table 6
Drainage System Evaporation	-22,300	Table 9
MCI Return Flow	34,500	Table 5
TOTAL	**1,072,200**	

[1] Data from *IID Efficiency Conservation Definite Plan*, Appendix 1.a. Delivery System Analyses Overview

Average inflow of Colorado River water to the Imperial Valley during the same period was 2,875,700 acre-feet per year. Implementation of the Definite Plan is projected to reduce flows into the valley by 303,000 acre-feet per year, by means of reducing operational spill and agricultural tailwater runoff.[3] Reduction of drainage flows will increase the salinity in IID drains.

The average 1970 to 2007 flow-weighted salinity of the Colorado River inflow was 746 mg/L, slightly over one ton of salinity per acre-foot.[4] The average salinity of the New River is about 3,300 mg/L and salinity of the Alamo River is about 2,500 mg/L.[5] The Definite Plan balance calculation found that salinity of the agricultural drainage water to the Salton Sea will increase by about 500 mg/L. The average salinity of the New River would increase to about 3,800 mg/L and the average salinity of the Alamo River would increase to about 3,000 mg/L.

As part of the 1988 IID/Metropolitan Water District of Southern California (IID/MWD) water conservation program, growers received incentives to install tailwater return systems. The Definite Plan water conservation efficiency program includes additional tailwater management and operational improvements that will influence the volume and timing of drain flows. These are discussed further in Chapter 7, Increase Water Supply and Chapter 8, Reduce Demand.

[3] Assuming no fallowing and no change in consumptive use
[4] Determined by the U.S. Geological Survey (USGS) from data collected by the USBR and USGS
[5] USGS Records No. USGS 10255550 New River Near Westmorland CA and No. USGS 10254730 Alamo River Near Niland, CA for the period 1963 through 2007.

4.1.3 Stormwater Systems – Cities and Imperial County

The Cities maintain on-site stormwater retention/detention facilities and require new MCI developments to comply with local ordinances and IID requirements to mitigate for any increases in post-development runoff. In unincorporated areas, the County is responsible for management of flood control and stormwater runoff through the County's Flood Management Plan (Imperial County 2007), General Plan policies, and stormwater ordinances. The Cities' stormwater needs were assessed during the DAC outreach and interviews. Not all cities participated or responded. Information obtained from the outreach effort is summarized below.

4.1.3.1 City of Brawley

Portions of the City of Brawley are adjacent to the New River and prone to flooding as a result of stormwater system inadequacies. Approximately 50 percent of the stormwater collection system is combined sewer overflow. The City of Brawley does not have a master drainage plan or mathematical model of their stormwater collection system. Future capital investments for stormwater are identified in the city's Capital Improvement Plan. Implementation of improvements is dependent upon available funds. The City of Brawley is interested in obtaining grants to improve its stormwater system. Priority projects for the stormwater system include:

- Separation of stormwater conveyance and sewer system conveyance
- Development of a Master Drainage Plan

4.1.3.2 City of Calipatria

The City of Calipatria does not have a master drainage plan and relies on IID design criteria for sizing of stormwater management facilities. The storm drain system does not have adequate capacity to provide flood protection. Larger events, such as a 25-year storm, inundate low lying areas. This flooding is not limited to portions of the city closest to the Alamo River, rather flooding is highly variable and dependent upon topography. There is a lack of stormwater infrastructure and funding. The priority project for the stormwater system is:

- Development of a stormwater management and improvement plan

4.1.3.3 City of El Centro

The city captures runoff in retention/detention basins, which discharge to IID drains. This arrangement does not provide adequate capacity for flood protection. The city has completed a draft master drainage plan. Though the draft master drainage plan has not yet been approved and released to the public, indications are that implementing recommendations of the master drainage plan would cost approximately $200 million. Also under development is a computer model of the storm drain system that will assist in identifying problem areas. Typically, improvements to the stormwater system are made when funds are available. The city noted that if there were a regional stormwater management plan and a regional flood control district to administer the plan, this could provide adequate mitigation

of stormwater and postpone the necessity of implementing the city's master drainage plan. Priority activities for the stormwater system include:

- Implementation of the master drainage plan
- Creation of a regional flood control district
- Development of a regional stormwater management system

4.1.3.4 City of Holtville

The City of Holtville has adopted Imperial County standards for stormwater collection. With the exception of existing stormwater detention basins and IID drains, there is no stormwater infrastructure, nor is there a stormwater Capital Improvement Plan or Master Drainage Plan. Stormwater generally drains to the Alamo River. Portions of the city, especially near the Alamo River, are subject to flooding. Standing or stagnant water is a problem in portions of the city due to a lack of drains and conveyance. Also, approximately 60 percent of stormwater runoff from the city flows into an industrial area due to a lack of a proper drainage and conveyance system. Overall, the stormwater system in the city is inadequate. A preliminary engineering report identified the need for a large retention basin to prevent flooding. A more in-depth analysis of the drainage in the city would be beneficial. Potential projects for the stormwater system include:

- Stormwater conveyance system and retention basin improvements
- Development of a Stormwater Master Plan

4.1.3.5 Seeley

There is little to no stormwater infrastructure in place. Several areas directly adjacent to the New River are subject to flooding. A priority project for the stormwater system is:

- Development of facilities for areas directly adjacent to the New River

4.1.3.6 County of Imperial

The County has developed master drainage plans for the town sites of Heber (Nolte 2006) and Niland (Nolte 2007). Priority flood control projects, phased implementation, and costs are well defined in these plans.

The 1,775 gross acres comprising the Gateway of the Americas Community Service Area (CSA), located adjacent to the U.S./Mexico International Border, approximately 6 miles east of the City of Calexico, has little stormwater infrastructure. Parking areas serve as detention basins and are designed to pond to a depth of six inches during storm events. These basins then infiltrate the water into the ground or discharge to Ash Canal or the Alamo River. There is neither a Master Drainage Plan, nor a Capital Improvement Plan; and facility construction is dependent upon development. Currently, the

stormwater management system adequately conveys storm flows and provides adequate flood protection. No stormwater priority projects have been identified.[6]

4.1.4 Drinking Water Systems – Cities and Imperial County

Ten communities in the Imperial Region receive untreated water which they treat and deliver for MCI purposes: Calexico, Holtville, El Centro, Imperial, Brawley, Westmorland, Calipatria, Niland, Seeley, and Heber. IID also delivers water to the El Centro Naval Air Facility. Each community has its own facilities for treating and distributing potable water to its users. Private utility companies also operate in the County, the largest of which is Golden State Water. Areas outside of the IID service area, such as the West Mesa, are reliant on groundwater. Several private water companies provide domestic water in Ocotillo. The DAC outreach effort sought up-to-date information on potable water distribution systems in each community (GEI 2011b). Information provided during the outreach is summarized below.

To comply with USEPA requirements and avoid termination of canal water service, residents in the IID service area who do not receive treated water service must obtain alternative water service for drinking and cooking from a state-approved provider. IID strictly enforces this rule and tracks nearly 4,000 raw water service accounts that are required by the California Department of Public Health (CDPH) to have alternate drinking water service.

4.1.4.1 City of Brawley

The design capacity of the existing Brawley drinking water treatment plant is 15 million gallons per day, with an average daily demand of 8.4 million gallons. Raw water storage and clean water storage are 35 million gallons and 9 million gallons, respectively. Brawley has approximately four days of raw water storage and would like to increase their raw water storage capacity to 52 million gallons (six days). The city does not have a computer model of its distribution system, but bottlenecks and excess pressure zones have been identified. The distribution system consists of cast iron (39 percent), asbestos cement (AC) (41 percent), and of PVC (20 percent) pipe. A number of the city's capital improvement projects involve replacement of cast iron and AC pipe. The current Master Plan is outdated and the city has selected a firm to update the stormwater, wastewater, and potable water elements. Programs identified in the outdated plan have not been implemented due to lack of funds. Priority projects for the potable water system include:

- Expansion of raw water storage capacity and pumping capacity at the water treatment plant
- Main Street water line replacement
- 86th Street water line replacement
- Andrita Place area improvement (cast iron pipeline replacement)

[6] The County is proposing stormwater improvement projects in Seeley – see Section 4.1.3.5

4.1.4.2 Calipatria and Niland

Golden State Water Company operates the water treatment plant and distribution system for Niland, Calipatria, and the Calipatria State Prison. Treatment capacity is 6 million gallons per day, with an average daily demand of approximately 2.5 million gallons. Both the raw water and clear water capacity are currently 9 million gallons (3 to 5 days of storage). Golden State Water Company is evaluating the installation of a supervisory control and automated data acquisition (SCADA) system to better manage the distribution system and to reduce formation of trihalomethanes (THMs). The priority project for the potable water system is:

- Installation of a SCADA system to control water distribution and reduce THM formation

4.1.4.3 City of El Centro

The city constructed a 21 million gallon per day water treatment plant to serve an average daily demand of 7.8 million gallons. The city regards its old 16 million gallon per day water treatment plant as a standby plant to be used in case of an emergency. Raw water storage is approximately 40 million gallons. Clear water storage is currently 10 million gallons. An additional 5 million gallon clear water storage tank was damaged by an earthquake in April 2010. The 5 million gallon tank that was damaged in the April 2010 earthquake has been repaired. The overflow line was lowered which reduced its capacity to 4 million gallons. A replacement tank was never considered since the damage was not total. There are plans to construct two new 5 million gallon tanks within the city. One at the water treatment plant and one at the La Brucherie pump station.

The city has access to a computer model of the distribution system and has not identified any system deficiencies in the delivery system that require immediate action. The city does not have a replacement program for older sections of the distribution system; rather, pipes are replaced as they fail. The city is developing a Capital Improvement Plan. Priority projects for the potable water system include:

- Complete construction of 4 million gallon clear water storage tank
- Provide the local mall with storage for fire flows

4.1.4.4 Heber Public Utility District

The current design capacity of the water treatment plant is 2 million gallons per day, with an average daily demand of 1.1 million gallons. Heber Public Utility District (Heber PUD) has 5.8 million gallons of raw water storage capacity (2.5 to 5 days), and 5.5 million gallons of clear water storage capacity (2.5 to 5 days). Since 2004, all new developments have had a computer model of the distribution system. Heber PUD is developing a Water Distribution Study for the older sections of town. This study was completed in May 2011. The existing distribution system consists of AC, PVC, and HDPE pipe. Heber PUD does not have a program for old pipeline replacement; rather pipes are replaced as they fail.

Peak demand occasionally exceeds the 2 million gallon per day capacity of the water treatment plant. Phase 1 and Phase 2 of a three-phase water treatment plant expansion project have been completed,

and Heber PUD is currently working on Phase 3. Phase 3 was expected to be completed by the end of 2011; however, the project has not been completed at this time due to a shortage of funds. The capacity of the water treatment plant will be 6 million gallons per day once Phase 3 is complete. The total capacity of the water treatment plant can be expanded up to 16 million gallons per day without a major redesign. The Phase 3 expansion will meet Heber PUD demands for at least the next 15 years (2025). Priority projects for the potable water system include:

- Completion of Phase 3 of the water treatment plant expansion
- Complete Water Distribution Study for older sections of town
- Expand raw water storage capacity to 12 million gallons
- Investigate feasibility and benefits of constructing interties between communities that to allow for delivery of potable water in the event of an emergency or water treatment plant shutdown

4.1.4.5 City of Holtville

The design capacity of the existing water treatment plant is 3 million gallons per day, with a peak daily demand of 1.6 million gallons. The city has approximately 11.4 million gallons of raw water storage. The April 2010 earthquake damaged the raw water ponds and a 1.5 million gallon clear water storage tank. The City has begun repairs and lining of three raw water ponds under a USDA grant. Only one pond has been fully repaired; though all three have been lined. A 2.4 million gallon clear water tank was constructed in December 2010. The former 1.5 million gallon tank was damaged by the earthquake and subsequently demolished and removed. FEMA provided a grant for reconstruction of this facility, with construction scheduled to conclude in October 2012. The distribution system is undersized and provides poor fire flow and pressure. Priority projects for the potable water system include:

- Complete repairs to raw water ponds
- Development of a Master Water Plan

4.1.4.6 Seeley County Water District

Design capacity of the existing water treatment plant is 0.75 million gallons per day, with an average daily demand of 0.29 million gallons. Seeley County Water District has 2 million gallons of raw water storage, and 0.9 million gallons of clear water storage. Construction is underway for both raw water and clear water storage. An additional 5 million gallon raw water tank is being constructed, and a total of 1.3 million gallons of clean water storage will be available when planned projects are completed. IID has a computer model of the existing distribution system. No system deficiencies were identified by the model, but many pipes in the distribution system are old and pipe failure is expected. In September 2010, a USDA grant was received for pipeline replacement and implementation began in January 2011. Priority projects for the potable water system include:

- Expansion of clear water storage
- Consideration of permanent emergency connections with El Centro or Naval Air Facility El Centro

4.1.4.7 County of Imperial

The County oversees operations for Gateway of the Americas. The design capacity of the existing water treatment plant is 0.12 million gallons per day, with a maximum daily demand of 0.95 million gallons. There are 1.8 million gallons of raw water storage and 1 million gallons of clear water storage. The system occasionally experiences an exceedance of water quality limits. The water treatment plant is currently undergoing Phase 2 expansion. The priority project for the potable water system is:

- Completion of the Phase 2 expansion of the water treatment plant

4.1.5 Wastewater Systems

The DAC outreach, in late 2010, sought up-to-date information on the wastewater collection systems in each community. Based on the information then available, no community in the Imperial Region is recycling municipal water. Each community that has adopted a 2010 Urban Water Management Plan (Imperial, Brawley, Calexico, and El Centro) found that recycling municipal water was not cost-effective because wholesale water is relatively inexpensive, there is a lack of political acceptance for rate increases, and rate-payers have a limited ability or willingness to pay. Most communities identified the need for state, federal, or private sector funding to upgrade wastewater treatment plants. The Imperial IRWMP is an opportunity to develop regional recycling strategies.

Table 4-9 lists the Imperial Region wastewater treatment plants, including information on owner, location, capacity, and related data. Figure 4-2 shows the locations of the larger existing wastewater treatment plants.

Table 4-9. Wastewater Treatment Plants in the Imperial Region

Wastewater Treatment Plant	Existing Conditions				Future Conditions	
	Plant Capacity (AFY)	**Average Flow** (AFY)	**Treatment Level**	**Discharge to** (Discharge /End of Drainage Path)	**Plant Capacity** ^ (AFY)	**Average Flow** ^ ‽ (AFY)
City of Brawley WWTP	6,608 +/^	3,920 +/^	Secondary	New River +	13,440	5,712
City of Calexico Municipal WWTP	4,816 +/^	3,024 ^	Secondary	New River +	14,000	7,504
Calipatria WWTP, Upgrade by 2025	1,938 +/^	1,120 +/^	Secondary	G Drain/Alamo River +	1,938 *	1,680
El Centro Municipal WWTP	8,960 +/^	4,480 +/^	Secondary ^	Central Main Drain/ Alamo River +	22,400	7,437
El Centro Generating Station	1,165 +	N/A	Secondary	Central Drain 5/Alamo River +	1,165 *	---
Gateway of the Americas WWTP	224 ^	205 ^	Secondary	N/A	1,232	959
Heber Geothermal Company	4,816 +	N/A	N/A	Strout Drain +/ Central Drain /Rice Drain 3/ New River	4,816 *	---
Heber PUD WWTP	907 ^	392 ^	Primary	N/A	6,720	5,041
Holtville Municipal WWTP	952 ^	728 ^	Secondary	Pear Drain/Alamo River ^	2,464	1,151
City of Imperial Water Pollution Control Plant	1,568 +/^	1,073 +/^	Secondary	Dolson Drain/Alamo River +	11,220	4,340
Second Imperial Geothermal Company, Heber	1,680 +	N/A	N/A	Beech Drain / New River +	1,680 *	---
Niland WWTP	560 ^	258 ^	Primary	N/A	560	381
Seeley County WWTP	224 +/^	95 +/^	Secondary	New River +	224	224
Westmorland WWTP	560 ^	291 ^	Secondary	Trifolium Drain 6/ New River +	1,232	1,109
Totals	**34,978**	**15,586**	--	--	**83,092**	--

Notes: Capacities and flows based on information in NPDES permits and Service Area Plans; thus, date of information varies. All discharges eventually flow to Salton Sea. **+** NPDES Permit **^** Service Area Plan
***** Totals - when no information on future expansion was found, future plant capacity was assumed to remain the same
‽ Future average flows from Service Area Plan projections for 2020, except for El Centro Municipal WWTP and Heber PUD WWTP, which are for 2014

Remarks for Table 4-9:

City of Brawley WWTP
- NPDES permit CA0104523 (Effective June 29, 2005 to June 29, 2010).
- City of Brawley Final Service Area Plan, Feb. 2007.

City of Calexico WWTP
- NPDES permit CA7000009 (Effective 2004-2009).
- City of Calexico Service Area Plan, May 31, 2006.

Calipatria WWTP
- NPDES permit CA0105015 (Effective June 29, 2005 to June 29, 2010).
- Final Calipatria Service Area Plan (CL1-04), Nov. 2004.
- California RWQCB Waste Discharge Requirements for City of Calipatria, Calipatria WWTP 2010

El Centro Municipal WWTP
- NPDES permit CA0104426 (Effective 2003-2008).
- City of El Centro Service Area Plan, Nov. 2005.

El Centro Generating Station
- NPDES permit CA0104248 (Effective 2004-2009).

Gateway of the Americas WWTP
- NPEDES permit CA7000015 cited in SAP, unable to locate copy of permit at this time.
- Gateway of the Americas Service Area Plan, Dec. 2005.

Heber Geothermal Company, Heber
- NPDES permit CA0104965 (Effective June 29, 2005 to June 29, 2010).

Heber PUD WWTP
- Heber Public Utility District DRAFT Service Area Plan, June 2004.

Holtville Municipal WWTP
- City of Holtville Final Service Area Plan/Municipal Service Review, Oct. 2006.
- NPDES permit CA 0104361 (Effective to June 21, 2011, unable to locate copy of permit at this time)

City of Imperial Water Pollution Control Plant
- NPDES permit CA0104400 (Effective June 29, 2005 to June 29, 2010).
- City of Imperial Service Area Plan, June 26, 2008.

Second Imperial Geothermal Company, Heber
- NPDES permit CA7000003 (Effective June 29, 2005 to June 29, 2010).

Niland WWTP
- Sanitation District Service Area Plan for Wastewater Facilities, February 2006.

Seeley County WWTP
- NPDES permit CA0105023 (Effective 2002-2007).
- Seeley County Water District Service Area Plan, Final July 10, 2003.

Westmorland WWTP
- NPDES permit CA0105007 (Effective 2001-2006).
- City of Westmorland Service Area Plan, March 3, 2005.

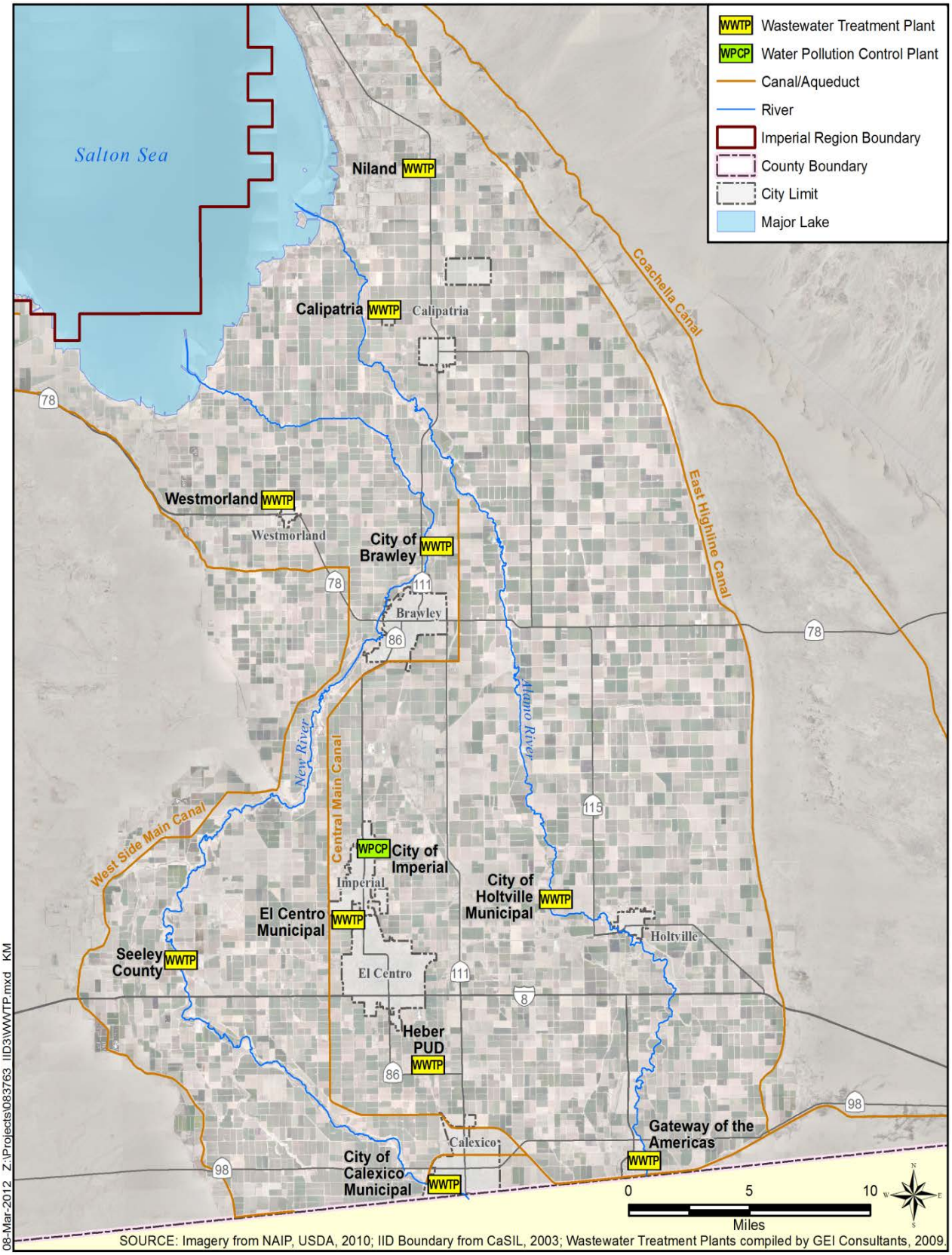

Figure 4-2. Large Wastewater Treatment Facilities

4.1.5.1 City of Brawley

The design capacity of the existing wastewater treatment plant is 5.9 million gallons per day, with an average daily flow of 4.7 million gallons (80 percent of capacity). The wastewater treatment plant is under cease and desist orders for exceedance of their National Pollution Discharge Elimination System (NPDES) discharge requirements. However, upgrades to the secondary treatment system are underway and expected to be completed by 2013. The improvements are expected to bring effluent discharge into compliance with the NPDES permit issued by the Regional Water Quality Control Board (RWQCB). Funding for the upgrades to the wastewater treatment plant was obtained from State Revolving Loan Funds (SRF) in 2010, as well as $10 million from the American Recovery and Reinvestment Act of 2009 (ARRA) grant funds. The City of Brawley wastewater treatment plant may be upgraded to tertiary treatment to provide reclaimed wastewater for cooling to the proposed East Brawley Geothermal Development project north of the city in unincorporated Imperial County.

The city's Capital Improvement Plan has identified a need to expand the capacity of the wastewater treatment plant at a cost of approximately $27 million. The City of Brawley and the City of Imperial have discussed plans to participate in the Keystone wastewater treatment plant project to service planned expansion in parts of Brawley that may be better served from a combined regional facility. No firm agreements have been established. Priority projects for the wastewater system include:

- Expansion of wastewater treatment plant capacity
- Rehabilitation of a wastewater pump station

4.1.5.2 City of Calipatria

Priority projects for the city's wastewater system include:

- Wastewater collection system replacement throughout the city
- Development of a Wastewater Management Plan

4.1.5.3 City of El Centro

The design capacity of the existing wastewater treatment plant is 8 million gallons per day, with an average daily flow of 3.6 million gallons. The wastewater treatment plant has secondary treatment with ultraviolet (UV) disinfection. While not a consistent problem, effluent discharges from the wastewater treatment plant are occasionally out of compliance. Development has occurred adjacent to the wastewater treatment plant, and complaints have been made regarding odor. Due to the poor percolation of local soils, high water table, old infrastructure, and depth of infrastructure, groundwater infiltration has become a problem. A Capital Improvement Plan has been completed, but has not been adopted. The upgrades would be dependent upon development impact fees and reimbursement agreements. The city is in talks with a geothermal energy company regarding upgrading the wastewater treatment plant to tertiary treatment in exchange for access to tertiary treated effluent. In addition to supplying tertiary treated effluent for geothermal power cooling, recycled water could be provided to solar farms, highway dividers, parks, schools, or other public lands.

Priority projects for the wastewater system include:

- Reduce odors detected by developments adjacent to wastewater treatment plant
- Upgrade the wastewater treatment plant to tertiary treatment with financial assistance from an entity needing cooling water or with grants
- Investigate feasibility of using reclaimed water for irrigation of public lands

4.1.5.4 Heber Public Utility District

The design capacity of the existing wastewater treatment plant is 0.65 million gallons per day. When the water treatment plant was originally constructed, it was designed to have a daily capacity of 0.81 million gallons. However, it was discovered that due to deficiencies in the design, the actual daily capacity was only 0.65 million gallons. The average daily flow is 0.5 million gallons. The treatment level is primary. The Heber PUD is planning to expand the capacity to 1.2 million gallons per day of secondary treatment with ultraviolet disinfection, but has had difficulty securing funding. The project cannot be completed in phases. Heber PUD has had preliminary discussions with a geothermal energy company regarding expanding and upgrading the plant to tertiary treatment. In addition to supplying tertiary treated effluent water for cooling, it has been proposed that reclaimed water could be used for park irrigation. Priority projects for the wastewater system include:

- Expand/upgrade wastewater treatment plant to 1.2 million gallons per day and secondary treatment with ultraviolet disinfection
- Upgrade wastewater treatment plant to tertiary treatment with assistance from energy industry sponsor or grants
- Investigate feasibility of using reclaimed water for park irrigation

4.1.5.5 City of Holtville

The design capacity of the existing wastewater treatment plant is 0.85 million gallons per day, with an average daily flow of 0.60 to 0.65 million gallons. The wastewater treatment plant has secondary treatment with sand filters and ultraviolet disinfection. The wastewater treatment plant is currently under a Cease and Desist Orders for exceeding their NPDES permit requirements. The effluent exceeds ammonia, heavy metal, and pesticide concentrations due to infiltration to the collection system. The City has completed a Preliminary Engineering Report. The report includes a probable construction cost of $8 million for rehabilitation of this facility. A grant has been awarded to the City by the Border Environment Cooperation Commission (BECC) to begin the design process to become compliant with their NPDES permit. The City will provide 50 percent matching funds for this design. The City has initiated design of a new sewer system outfall, and has secured a funding commitment of $6.615 million from the USDA. Priority projects for the wastewater system include:

- Upgrades to wastewater treatment plant to comply with NPDES permit
- Wastewater collection system and retention basin improvements

4.1.5.6 Niland Sanitary District and Golden State Water Company

The design capacity of the existing wastewater treatment plant is 0.5 million gallons per day, with an average daily flow of 0.08 million gallons. The level of treatment is primary with chlorination/ fluoridation ponds. The wastewater treatment plant is out of compliance with their NPDES permit for consistently exceeding the allowable copper concentration. California Economic Development Department issued a grant to Niland Sanitary District to help deal with infiltration problems. Liners placed in much of the collection system reduced infiltration substantially. Prior to the pipe lining, average daily flow into the wastewater treatment plant was 0.18 million gallons, nearly a 56 percent reduction in flow. Despite the improvements to the collection system, Niland Sanitary District may dissolve due to lack of operating funds. The area is severely disadvantaged and many residents do not pay taxes that would go to Niland Sanitary District. Priority projects for the wastewater system include:

- Obtain funding for operation, or have another entity take over operations
- If Niland Sanitary District dissolves, connect collection system to Calipatria's wastewater treatment plant
- If Niland Sanitary District does not dissolve, upgrade wastewater treatment plant to secondary treatment to meet NPDES permit requirements
- Replace older sections of pipe and/or line system to prevent infiltration

4.1.5.7 Seeley County Water District

The design capacity of the existing wastewater treatment plant is 0.2 million gallons per day, with an average daily flow of 0.10 million gallons. The level of treatment is secondary with ultraviolet disinfection. The wastewater treatment plant is meeting the NPDES discharge requirements. There is no program for replacement of old sections of the collection system. Pipes are replaced as they break. Seeley County Water District is in preliminary talks with an energy company regarding the wastewater treatment plant upgrades to allow for reclamation and use for cooling purposes. Upgrading the wastewater treatment plant to tertiary treatment has been discussed and 0.15 to 0.2 million gallons per day of treated effluent could be used for construction and operation activities at proposed solar facilities. Priority projects for the wastewater system include:

- Upgrading wastewater treatment plant to tertiary treatment with the assistance of the energy industry in exchange for delivering treated effluent to the facility
- Preventative replacement program for older sections of pipe in the collection system

4.1.5.8 County of Imperial

Gateway of the Americas' wastewater treatment plant's design capacity is 0.2 million gallons per day, with an average daily flow of 0.014 million gallons. Treatment entails filtration and ultraviolet disinfection. The 2005 Gateway of the Americas Service Area Plan identifies planned capital improvements. The wastewater treatment plant is in Expansion Phase 2 of a 5-Phase plan. Future capacity is expected to be 1.5 million gallons, and future treatment is expected to be activated sludge

with ultraviolet disinfection. Phases 3 through 5 are dependent upon municipal growth and funding. Priority projects for the wastewater system include:

- Complete Expansion Phase 2 of the wastewater treatment plant
- Obtain funding and implement Phases 3 through 5

4.2 ECONOMY AND COMMUNITY

4.2.1 Land Use – Agricultural, Urban, Industrial and Federal

The County is the land use authority in unincorporated areas that are not in federal or state ownership. The County General Plan, specific plans, community plans, and related zoning ordinances and regulations govern land use. The incorporated cities in the Imperial Region direct land use within their city boundaries and urban spheres of influence. The Imperial County Local Agency Formation Commission (LAFCO) manages annexations and boundary changes to the Cities and special districts. Federal lands are managed under federal authority and related land and resource management plans.

4.2.1.1 Agricultural

Imperial Region is one of the most productive farming areas in the United States, and the agricultural industry is the largest economic component of the Region's economy, with nearly $2 billion in production in 2011 (Table 4-10). Agricultural land uses predominate in the Imperial Valley, and historically received 97 percent of IID deliveries; more recently, IID delivery to agriculture has fallen to the 95 percent range (Table 4-11). Agricultural land use is limited outside of the IID service area and in these areas the predominant source is groundwater.

Table 4-10. Imperial County Agricultural Production Values, 2006-2010

Year	Production Value
2006	$1,365,368,000
2007	$1,369,147,000
2008	$1,684,522,000
2009	$1,452,970,000
2010	$1,598,534,000
2011	$1,964,087,000

Source: Imperial County Agricultural Crop and Livestock Report, 2007-2011

Table 4-11. IID Water Delivered WIS Record, 2006-2011 (KAF)

Year	Ag Water	Non-Ag Water	Environmental & Recreational Water
2006	2,319	92	7
2007	2,377	93	8
2008	2,411	106	9
2009	2,244	105	7
2010	2,212	104	7
2011	2,529	107	7

Source: IID WIS Water Balance; for more information, see Chapter 5

Table 4-12 presents the IID annual Crop Survey for years 2008 to 2010 (IID 2010). The Inventory of Areas Receiving Water is presented in Table 4-13. Historically, IID has delivered up to 2.8 MAF per year of water primarily for agricultural purposes. Crop water requirements vary greatly with the type of crop, soil type, weather, and requirements to leach salts from the soil to maintain crop productivity.

4.2.1.2 Municipal, Commercial, and Industrial (MCI)

Maps of potential projected future land use obtained from the Cities and County were the bases for forecasting future water demand (see Chapter 5). The intent was for the Imperial IRWMP water demand forecast to be consistent with prevailing land use plans. The land use maps for the Cities and unincorporated areas are presented in the Appendix D, Imperial Region Historical and Future Municipal, Commercial, and Industrial Water Demands (GEI 2011a). MCI water use has historically accounted for approximately 3 percent of IID Region total delivered water. In 2011, MCI uses were 4.5 percent.

Outside of the IID water service area, groundwater is the source for all current and proposed land uses. Imperial Region communities in the West Mesa include Ocotillo, Nomirage, and Yuha Estates. All rely on groundwater from the Ocotillo-Coyote Wells groundwater basin. Future growth in Ocotillo/Nomirage is expected to consist primarily of infill on existing lots or at low density, rather than expansion of community boundaries. In the West Mesa, groundwater is also pumped for industrial use at the U.S. Gypsum Plant at Plaster City. The East Mesa has very limited existing or planned development, but is being considered for groundwater development.

4.2.1.3 Federal Land

Federal lands are extensive within the Imperial Region. A large majority of these lands are in open space and dominated primarily by natural habitat. Imperial IRWMP projects could be located on federal lands, but only a limited area of federal lands could receive water. Federal land designation and biological resource constraints could influence the development of proposed Imperial IRWMP projects. U.S. Bureau of Land Management (USBLM) lands are managed under the amended 1980 California Desert Conservation Area Plan (CDCA Plan) (USBLM 1999) and specific Recreation Area Management Plans (RAMP).

Table 4-12. IID Crop Survey, 2008-2010 (Ac)

GARDEN CROPS	2010	2009	2008	FIELD CROPS	2010	2009	2008
ALOE VERA	75	77	77	ALFALFA, FLAT	82,708	74,971	65,577
ARTICHOKE	19	33	132	ALFALFA, ROW	34,298	32,467	31,967
ARTICHOKE (SEED)	0	0	9	ALFALFA (SEED)	23,269	32,325	30,123
BEANS	59	150	0	ALICIA GRASS	0	65	65
BLACKEYED PEAS	195	126	76	BAMBOO	192	198	198
BROCCOLI	11,072	10,917	11,519	BARLEY	95	184	27
BROCCOLI (SEED)	140	0	0	BERMUDA GRASS	28,132	28,461	29,737
CABBAGE	1,147	953	1,235	BERMUDA GRASS (SEED)	25,968	26,291	27,450
CABBAGE, CHINESE	278	97	85	CORN, FIELD	1,266	1,077	2,200
CARROTS	12,503	14,187	14,962	CORN, SILAGE	17	17	478
CAULIFLOWER	2,455	3,461	2,564	COTTON	437	0	0
CELERY	639	403	316	FLAX	0	106	10
CELERY (SEED)	130	0	36	GRASS, MIXED	338	1,590	335
CILANTRO	558	221	270	KLIEN GRASS	12,415	14,016	14,889
COLLARDS	4	0	0	OATS	1,491	2,386	2,395
CORN, SWEET	8,800	5,978	6,285	RAPESEED	169	113	100
CUCUMBERS	0	0	28	RYE GRASS	2,342	2,490	1,938
EGGPLANT	11	0	2	SAFFLOWER	436	311	132
ENDIVE	0	666	743	SESBANIA	944	814	1,587
FLOWERS	169	149	198	SORGHUM GRAIN	650	1,973	1,310
GARBANZO BEANS	126	0	36	SORGHUM SILAGE	304	265	424
HERBS, MIXED	114	179	30	SOY BEANS	0	75	33
HERBS, MIXED (SEED)	10	0	0	SPIRULINA ALGAE	28	98	98
KALE	54	125	220	SUDAN GRASS	52,807	32,670	66,513
LETTUCE	13,046	15,675	17,051	SUDAN GRASS (SEED)	310	241	1,615
LETTUCE, BUTTER	0	42	0	SUGAR BEETS	25,188	18,022	23,773
LETTUCE, CHINESE	0	214	0	SUGARCANE	594	1,131	1,184
LETTUCE, GREEN	136	454	586	TRITICALE GRAIN	104	105	0
LETTUCE, RED	68	0	0	WHEAT	57,464	108,451	111,050
LETTUCE, MIXED	8,903	7,695	9,430	**TOTAL FIELD CROPS**	**351,966**	**380,913**	**415,208**
LETTUCE, ROMAINE	5,031	5,866	4,231				
MELONS				**PERMANENT CROPS**	**2010**	**2009**	**2008**
CANTALOUPES, FALL	88	33	474	ASPARAGUS	98	92	283
CANTALOUPES, SPRING	6,626	5,631	5,948	CITRUS			
HONEYDEW, SPRING	65	0	363	GRAPEFRUIT	468	1,221	1,239
MIXED, FALL	56	20	0	LEMONS	1,596	3,028	2,863
MIXED, SPRING	675	670	836	LIMES	0	17	25
WATERMELONS	1,171	844	1,231	MIXED	4,468	748	1,211
MUSTARD	600	212	241	ORANGES	198	358	418
MUSTARD (SEED)	4	15	0	TANGERINES	605	1,021	991
OKRA	610	373	360	DATES	846	578	604
ONIONS	8,366	9,813	10,223	DUCK PONDS	10,307	10,309	9,864
ONIONS (SEED)	1,535	1,197	1,172	EUCALYPTUS	9	9	9
PARSLEY	22	0	4	FIGS	150	80	80
PARSNIPS	0	0	25	FISH FARMS	1,161	1,005	908
PEAS	6	12	17	FRUIT, MIXED	4	102	25
PEPPERS, BELL	63	63	103	GRAPES	0	0	4
POTATOES	1,347	1,432	1,938	GUAVA	25	25	0
RADISHES	0	16	51	MANGOS	150	150	150
RAPINI	1,571	1,652	1,789	NURSERY	53	53	65
ROCKETT	0	0	20	ORNAMENTAL TREES	32	15	15
SPINACH	4,010	2,362	2,684	PALMS	214	174	122
SQUASH	70	40	22	PASTURE, PERMANENT	574	521	658
SWEET BASIL	138	75	70	PEACHES	23	84	7
SWISS CHARD	200	179	73	PECANS	0	8	10
THYME	0	0	168	POMEGRANATES	10	160	202
TOMATOES, FALL	0	16	0				
TOMATOES, SPRING	145	44	0	**TOTAL PERMANENT CROPS**	**20,991**	**19,758**	**19,753**
TURNIPS	63	0	0				
VEGETABLES, MIXED	2,406	2,312	2,421				
TOTAL GARDEN CROPS	**95,579**	**94,679**	**100,354**	**TOTAL ACRES OF ALL CROPS**	**468,536**	**495,350**	**535,315**

Table 4-13. IID Inventory of Areas Receiving Water, 2008-2010 (Ac)

ACCOUNT SUMMARY	2010	2009	2008
Number of Farm Accounts	6,101	6,201	6,353
Number of Owner-Operated Farm Accounts	2,412	2,491	2,423
Number of Tenant-Operated Farm Accounts	3,689	3,710	3,930
Average Acreage of Farm Account	78	76	74
SUMMARY OF AREA SERVED	**2010**	**2009**	**2008**
Field Crops Acres	351,966	380,913	415,208
Garden Crops Acres	95,579	94,679	100,354
Permanent Crops Acres	20,991	19,758	19,753
TOTAL ACRES OF CROPS	**468,536**	**495,350**	**535,315**
Total Multiple Cropped Acres	36,898	63,323	105,718
TOTAL NET ACRES IN CROPS	**431,638**	**432,027**	**429,597**
Area Being Reclaimed: Leached	185	131	120
NET AREA IRRIGATED	**431,823**	**432,158**	**429,717**
IID Fallowing Program (Avg. of two mid-year periods)	17,253	15,317	14,476
Area Farmable But Not Farmed During Year (Fallowed land)	25,064	26,428	28,525
TOTAL AREA FARMABLE	**474,140**	**473,903**	**472,718**
Area of Farms In Homes, Feed Lots, Corrals, Crop Processing Facilities, Experimental Farms, and Industrial Areas	16,139	16,723	17,947
Area In Cities, Towns, Airports, Cemeteries, Fairgrounds, Golf Courses, Recreational, Parks, Lakes, and Rural Schools	29,995	29,836	29,833
TOTAL AREA RECEIVING WATER	**520,274**	**520,462**	**520,498**
Area In Drains, Canals, Reservoirs, Rivers, Railroads, and Roads	74,735	74,547	74,511
Area Below -230 Salton Sea Reserve Boundary, and Area Covered By Salton Sea, Less Area Receiving Water	40,150	40,150	40,150
Area in Imperial Unit Not Entitled to Water	63,933	63,933	63,933
Undeveloped Area of Imperial, West Mesa, East Mesa, and Pilot Knob Units	277,629	277,629	277,629
TOTAL ACREAGE INCLUDED - ALL UNITS	**976,721**	**976,721**	**976,721**
Acreage Within District Boundaries Not Included in District Water Right	84,916	84,916	84,916
TOTAL GROSS ACREAGE WITHIN DISTRICT BOUNDARIES	**1,061,637**	**1,061,637**	**1,061,637**

The Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) was to update the CDCA Plan to make it compatible with desert tortoise conservation and recovery. USBLM is the lead agency for NECO; and the proposed plan and Final EIS were released as an amendment to the CDCA Plan in summer 2002; nine years after planning commenced. NECO remains subject to litigation and the CDCA Plan as updated still applies.

USBLM multiple-use classifications are based on the sensitivity of resources and types of uses for each geographic area. Multiple-use classifications and their associated guidelines were established to provide for uses and values in areas that would maximize or enhance those values. The multiple-use classes are:

- Class C (Controlled Use) is for lands either designated as wilderness or for wilderness study areas. These lands are managed to protect their wilderness values.
- Class L (Limited Use) protects sensitive, natural, scenic, ecological, and cultural resource values. Public lands designated as Class L are managed to provide for generally lower-intensity, carefully

controlled multiple use of resources, while ensuring that sensitive values are not significantly diminished.

- Class M (Moderate Use) is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management is also designed to conserve desert resources and to mitigate damage to those resources that permitted uses may cause.
- Class I (Intensive Use) is to provide for concentrated use of lands and resources to meet human needs. Reasonable protection will be provided for sensitive natural and cultural values. Mitigation of impacts on resources and rehabilitation of affected areas will occur insofar as possible.

East Mesa is within the CDCA Plan and a number of Area of Critical Environmental Concerns (ACEC) could constrain Imperial IRWMP project development. These include:

- Lake Cahuilla ACEC protected for its prehistoric resources
- East Mesa ACEC protected for both wildlife habitat and prehistoric resources, located on the southeastern boundary
- North Algodones ACEC and Wilderness Area

Other federal lands are in military use, including:

- Chocolate Mountain Navel Gunnery Area
- Naval Air Facility El Centro

4.2.2 Renewable Energy Resources

California has established its Renewable Portfolio Standard Program that sets goals of increasing the percentage of renewable energy in the state's electricity mix over specific timeframes. The Imperial Region has the potential to help meet the California Renewable Portfolio Standard Program goals because of its unique geothermal resources and large tracts of land in open space, which are ideal for large-scale solar facilities.

The Region’s natural resources along with local, state, and federal policies promoting renewable energy are the, main drivers for renewable energy industry growth in the region. Water use for cooling at solar thermal, geothermal, or conventional energy generation facilities has the potential to increase water demands significantly over the baseline conditions (see Chapter 5). Ensuring that there is adequate water supply for existing and proposed renewable energy facilities is a goal for the Imperial IRWMP.

4.2.2.1 Geothermal and Solar Resources

Geothermal resource areas are generally located along the southern border of the Salton Sea. Thirteen geothermal prospects have been documented in the Imperial Valley: Niland, Salton Sea, Westmorland,

Glamis, East Mesa, Heber, Dunes, Superstition Mountain, North Brawley, East Brawley, Mesquite (aka South Brawley), Mount Signal, and Truckhaven.

Only four of these prospects have existing operating geothermal plants: East Mesa, Heber, North Brawley, and Salton Sea.

Some of the 13 geothermal prospects have been classified as Known Geothermal Resource Areas (KGRAs) in Section 4 of the Federal Geothermal Steam Act. These are areas designated by the United States Geological Survey (USGS) as having potential for beneficial exploitation of the geothermal resource suspected to exist in the area (Aerospace 2010). As shown in Figure 4-3, there are nine KGRAs in the Imperial Valley: Dunes, East Mesa, Glamis, Heber, East Brawley, South Brawley, North Brawley, Westmorland, and Salton Sea. Existing and proposed solar facilities are shown on Figure 4-4.

In addition to providing untreated, wholesale Colorado River water, IID is both a power producer and manager of the transmission grid. The IID prepared a Geothermal Resource Assessment in January 2011 (Aerospace Corporation 2011).

The Imperial County General Plan has a geothermal resources element, which anticipated future water demands for economic development of the Region's geothermal resources and for developing other sustainable power generation operations, primarily solar and wind. The Geothermal/Alternative Energy and Transmission Element (Alternative Energy Element 2006) guides land use decisions and approvals in unincorporated areas. The Imperial County General Plan supports and encourages the full, orderly, and efficient development of Geothermal/Alternative Energy Resources, while at the same time preserving and enhancing possible agricultural, biological, human, and recreational resources. In addition, the County's General Plan seeks to minimize impacts to agricultural lands and biological resources by carefully analyzing the potential impacts on agricultural and biological resources from each project. The County General Plan Alternative Energy Element calls for 180,000 acre-feet per year of water to be provided for renewable energy facilities.

Several planned solar projects are sited on lands zoned as agricultural through use of a conditional use permit. The County considers solar facilities to be consistent with agricultural land use and such use would be considered a temporary land use change. This may result in net reduction in demand and reduced agricultural water deliveries for these lands, thus freeing up water for other uses in the Region.

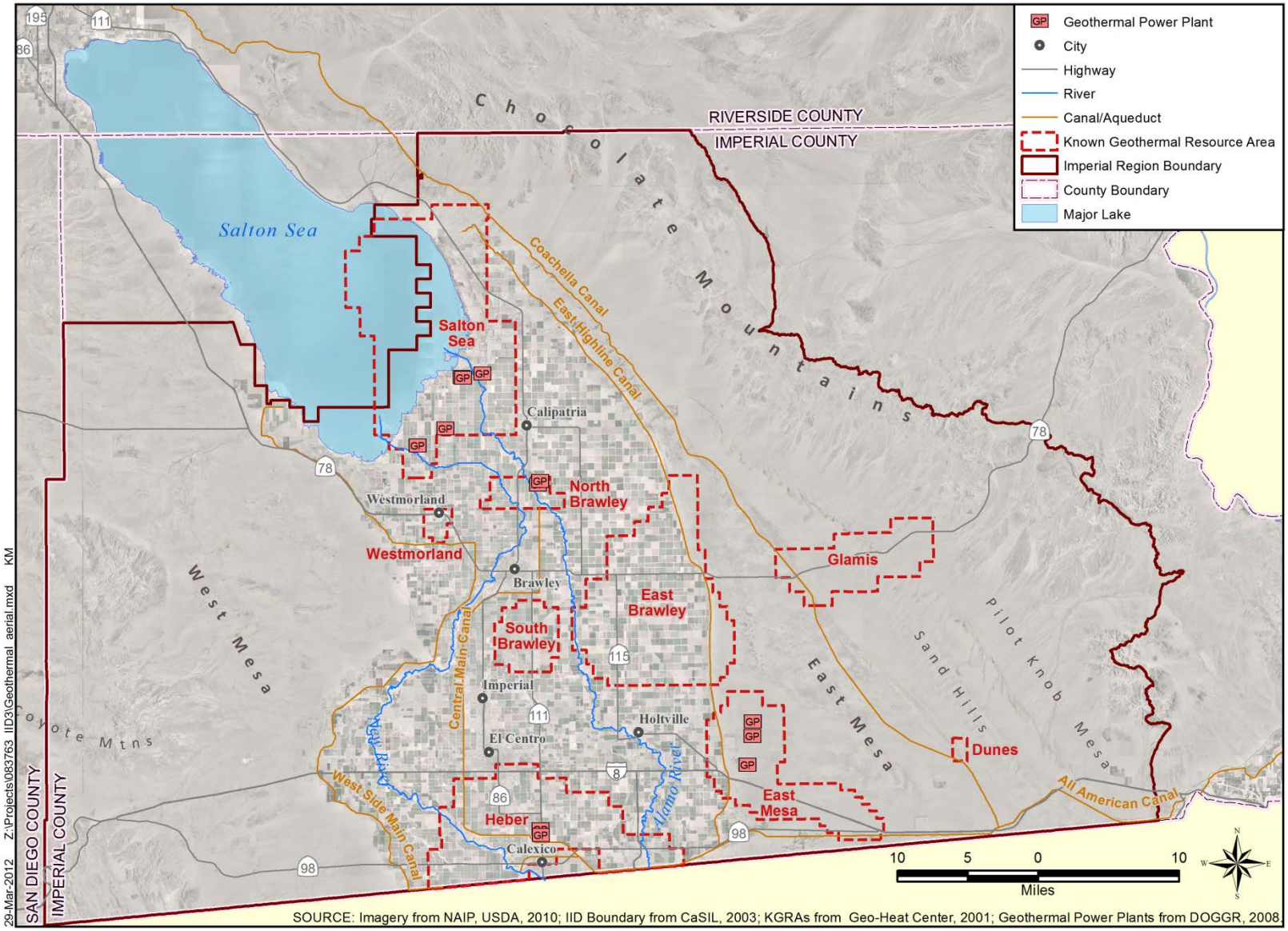

Figure 4-3. Known Geothermal Resources Areas (KGRA)

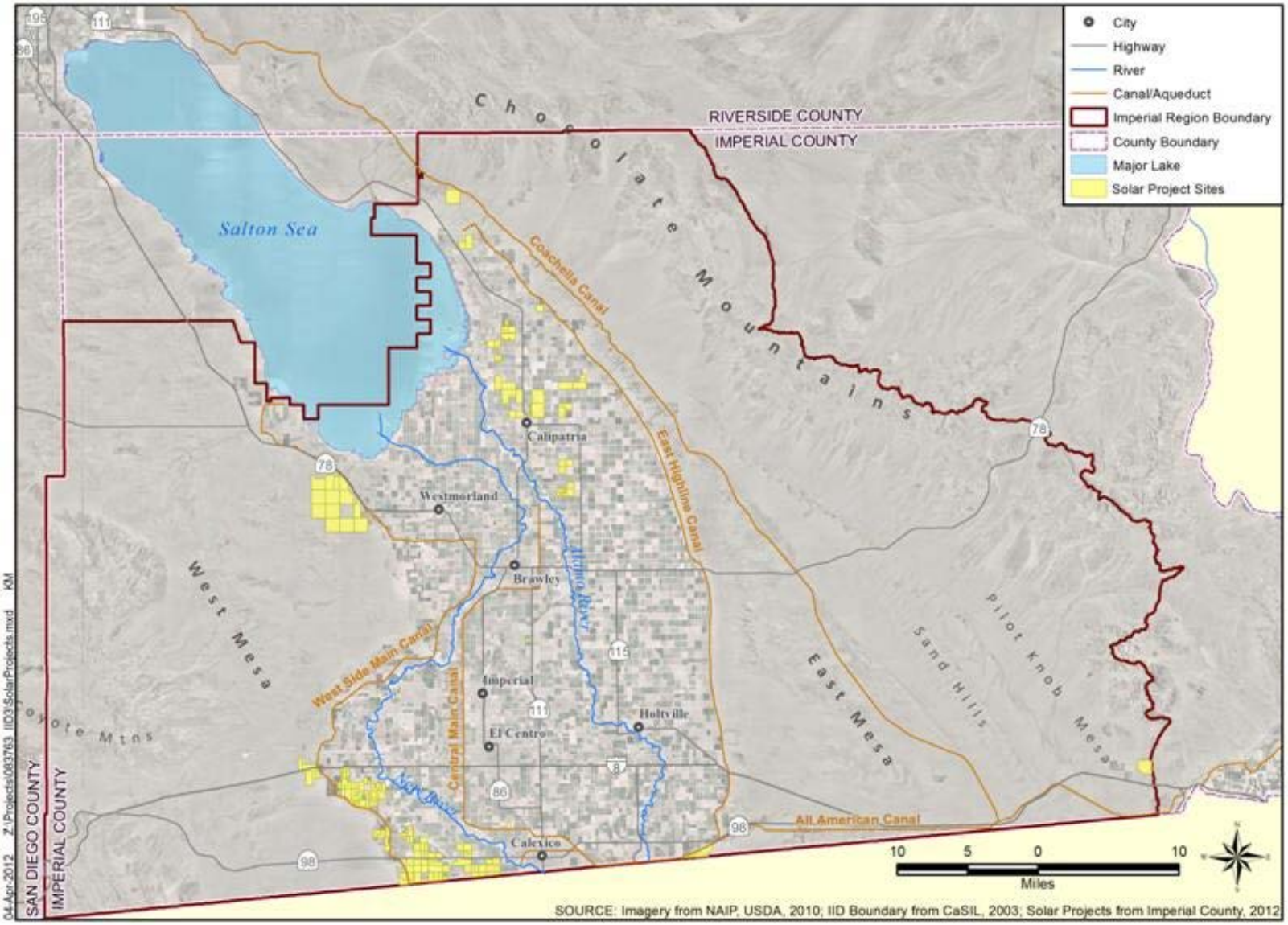

Figure 4-4. Known Solar Resources

4.2.2.2 State Policy

The California Renewable Energy Portfolio Standard sets a renewable energy goal of 20 percent of retail sales by 2010.[7] The 2004 California Energy Report Update further recommended increasing the renewable energy goal to 33 percent by 2020, and the state's 2008 Energy Action Plan included this goal.[8] The 2009 Executive Order S-21-09 directed the California Air Resources Board to enact regulations to achieve the goal of 33 percent renewable by 2020.

Publicly owned utilities set their own renewable energy portfolio goals recognizing the intent of the legislature. All electricity retailers in the state, including publicly owned utilities, investor-owned utilities, electricity service providers, and community choice aggregators, must adopt the California Renewables Portfolio Standard goals. On April 12, 2011, the Governor of California signed into law SBX 1-2 that establishes renewable energy goals for California's utilities, as presented in Table 4-14.

Table 4-14. Renewable Energy Goals for California's Utilities

Compliance Period	Renewable Energy Target
01/01/2011-12/31/2013	Average of 20 percent of retail sales throughout this period
01/01/2014-12/31/2016	Reasonable progress to ensure 25 percent renewable energy by *end* of this period
01/01/2017-12/31/2020	Reasonable progress to ensure 25 percent renewable energy by *end* of this period

Source: IID Board Resolution 12-2011

On May 17, 2011, the IID Board of Directors adopted Resolution 12-2011, resolving that IID will:

1. Meet its renewable energy obligation as established by the State of California.
2. Meet its renewable energy goals from resources located within Imperial Valley and Coachella Valley to the greatest degree feasible.
3. Minimize rate impacts on its retail customers in accordance with SBX 1-2.[9]

4.2.2.3 Federal Plans

Solar and geothermal facilities to be located on federal land are subject to the California Desert Conservation Area Plan, federal geothermal and solar policy and plans, and related programs.

Three (3) geothermal lease locations in the Region have been identified by the USBLM El Centro Field Office (Figure 4-5). Geothermal resources on federal lands are subject to the USBLM Geothermal Resources Leasing Program. The Energy Policy Act of 2005 recognizes the increasing demand for geothermal resources and the desire to facilitate leasing decisions. The Final Programmatic Environmental Impact Settlement for Geothermal Leasing in the Western United States (Geothermal PEIS) (USBLM 2008) has been prepared and covers the lease locations in the East Mesa Area.

[7] Codified in 2006 Senate Bill 107
[8] November 17, 2008, Executive Order S-14-08 and 2011 Senate Bill X 1-2
[9] IID Board Resolution 12-2011 <http://www.iid.com/Modules/ShowDocument.aspx?documentid=4780>

Proposals exist to site solar photovoltaic facilities on federal lands in the Region. The Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy (USDOE), and the USBLM are preparing a Solar Energy Development Programmatic Environmental Impact Statement (Solar PEIS) (USBLM 1999, 2011a, 2011b) to evaluate utility-scale solar energy development on federal lands; to develop and implement agency-specific programs or guidance that would establish environmental policies and mitigation strategies for solar energy projects; and to amend relevant USBLM land use plans to be consistent with the new USBLM Solar Energy Program.

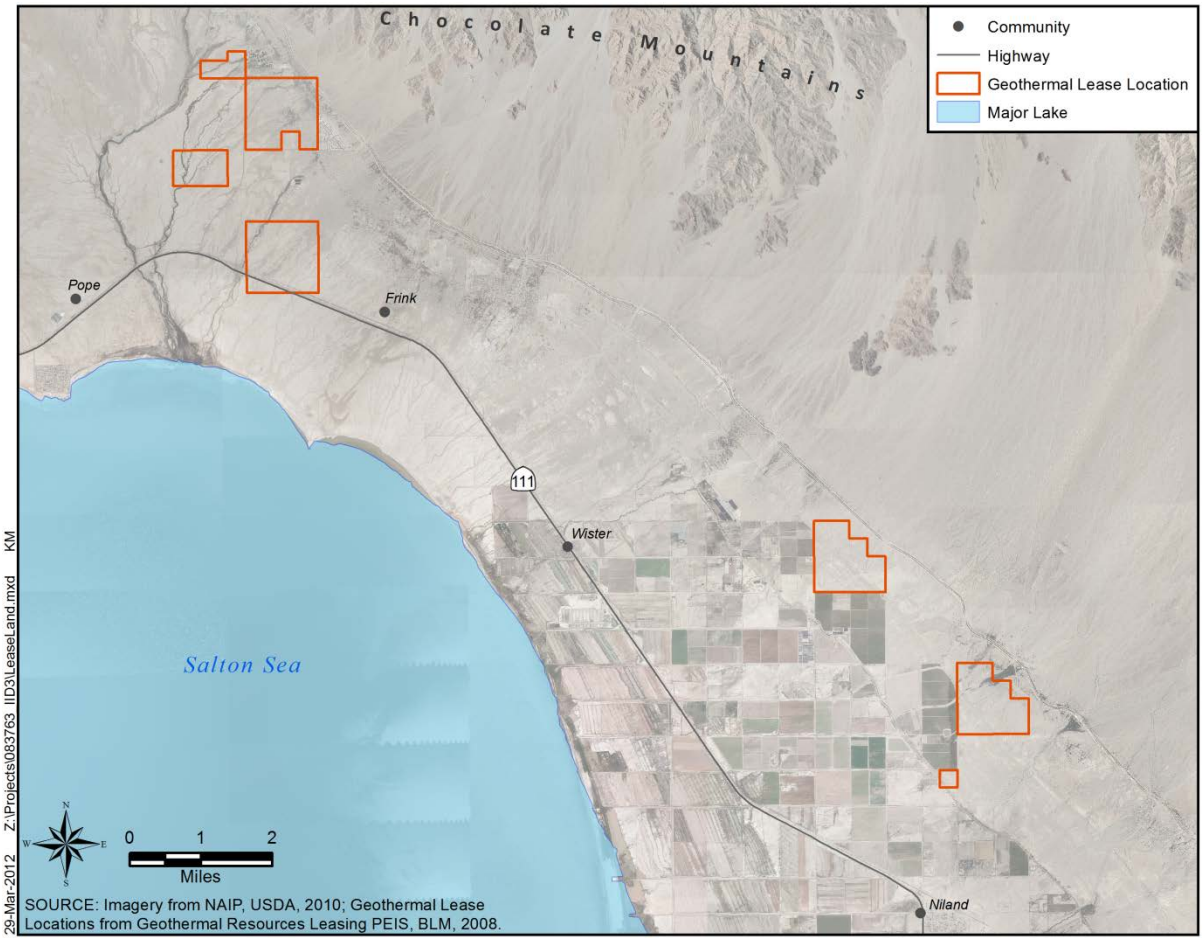

Figure 4-5. Geothermal Lease Locations, USBLM El Centro Field Office

The proposed Imperial East solar energy zone (SEZ) is located in the Imperial Region near the U.S./Mexico International Border on USBLM-administered land within the El Centro Field Office jurisdiction. The proposed SEZ lies in East Mesa, within the CDCA Plan boundary. Figure 4-6 shows the SEZ location and other federal lands potentially available for permitting solar facilities in the Imperial Region. Figure 4-7 shows the SEZ and other sensitive habitat and recreation areas.

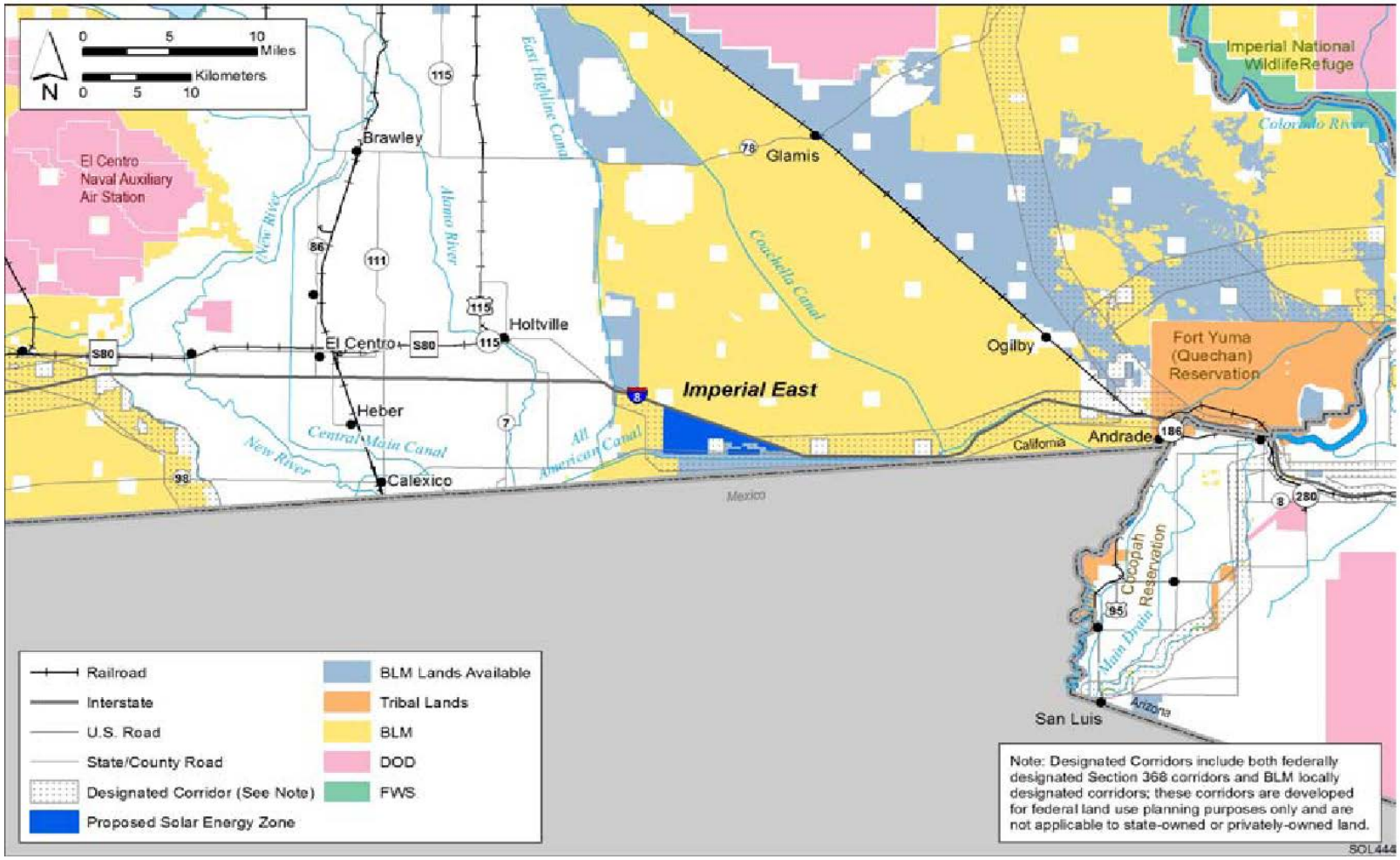

Figure 4-6. Potential Imperial East Solar Energy Zone and Other Federal Lands Potentially Available for Solar Facilities

Source: Figure C.2.1-1 Proposed Imperial East SEZ as Presented in the Draft Solar PEIS <http://solareis.anl.gov/documents/dpeis/index.cfm#vol1>

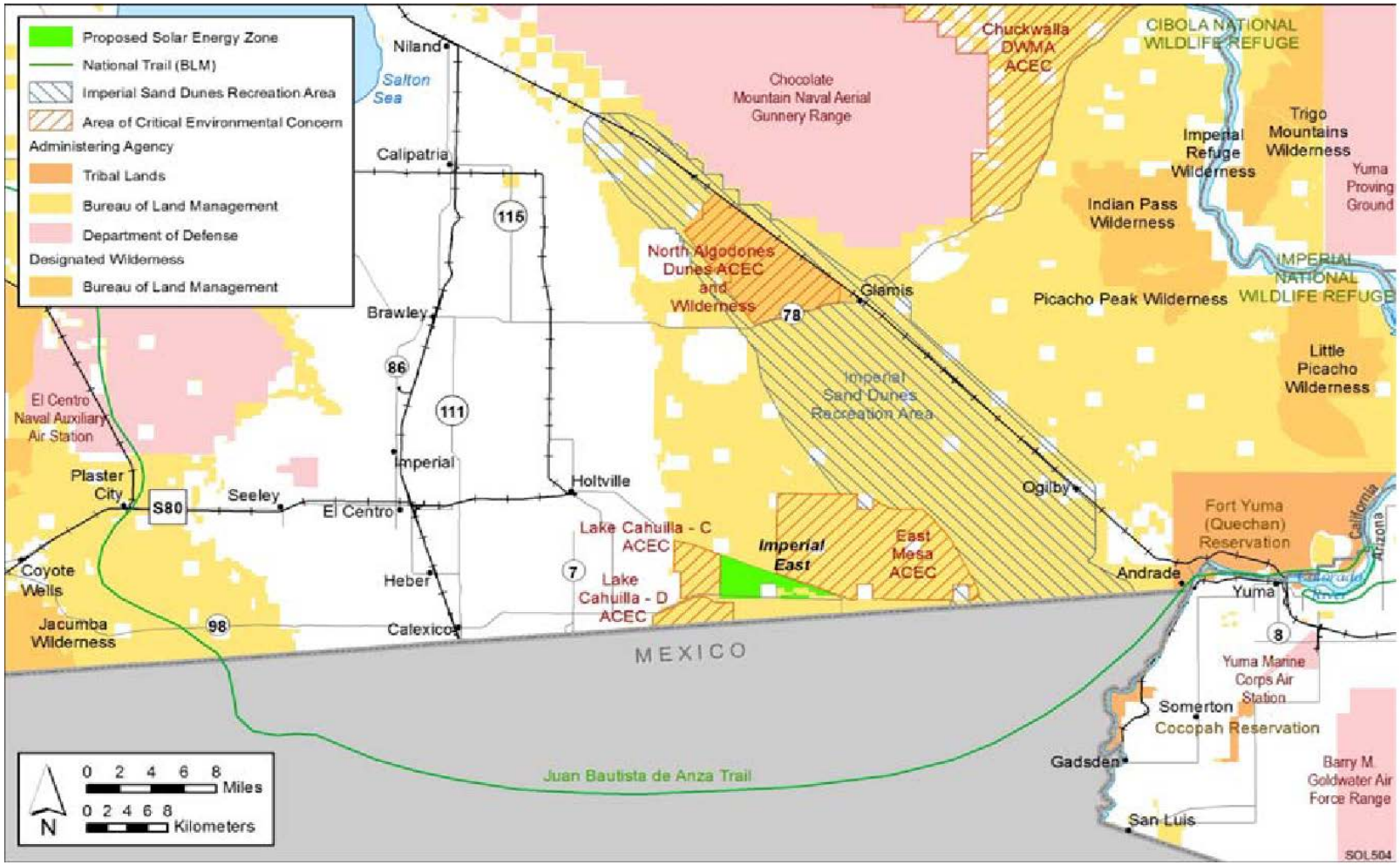

Figure 4-7. Imperial East Proposed Solar Energy Zone

Source: Draft PEIS for Solar Energy Development in Six Southwestern States, Affected Environment and Impact Assessment for Proposed Solar Energy Zones In California. December 2010. <http://solareis.anl.gov/sez/imperial_east/index.cfm>.

4.2.2.4 Joint State and Federal Plans

The Federal and State Renewable Energy Action Team (REAT) convened to develop plans to expedite permitting and project review, and to meet the Renewable Energy Portfolio Standards. The REAT was formed through several memorandums of understanding. Participating agencies include the U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, California Department of Fish and Game, and the California Energy Commission. The purpose is to enable renewable energy projects proposed in the California Desert to address mitigation requirements through the use of a deposit account rather than having to individually undertake mitigation for each project. The REAT account will be managed by the National Fish and Wildlife Foundation (NFWF). The funds necessary to mitigate a project's impacts to wildlife and habitat will be determined project by project. This process will expedite project approval and construction and ensure that a wider range of mitigation measures can be used to address environmental impacts.

The state and federal agencies are to prepare a Desert Renewable Energy Conservation Plan (DRECP). The DRECP is to be a Habitat Conservation Plan (HCP) under the Federal Endangered Species Act (ESA), and a Natural Community Conservation Plan (NCCP) under California's Natural Community Conservation Planning Act. In its simplest form, the DRECP will describe and permit areas for renewable energy generation and transmission facility development and create a network of biological conservation areas providing benefits to covered species found in the Plan Area.

4.2.3 DACs in the Imperial Region

An evaluation of 2010 Census data determined the disadvantaged communities (DAC) within the Region. The state defines a DAC by using the median household income (MHI). A community is disadvantaged if MHI is less than 80 percent of the statewide median household income. A severely disadvantaged community (SDAC) is a community with a median household income less than 60 percent of the statewide median (PRC § 75005). According to the 2010 Census data, the California statewide MHI was $60,883. Thus, county subdivisions, census designated places, and cities with an MHI of $48,706 or less were DACs. Those county subdivisions, census designated places, and cities with an MHI of $36,530 or less were considered SDACs. The MHI in the Imperial Region was $36,202 based on U.S. Census Bureau Estimates for 2010.

The City of Imperial does not meet the definition of a DAC. All other communities have MHIs below the threshold of 80 percent of the statewide MHI ($48,706). Table 4-15 lists all 2010 Census County Subdivisions, Census Designated Places, and the Cities in the Region, the corresponding MHI, and the percent of statewide MHI. Of the 19 locations on the table, 18 meet the definition of a DAC. Of those 18 DACs, 10 meet the definition of a SDAC.

Table 4-15. Imperial Region Median Household Incomes and DAC Status

Census Tract	MHI in 2010	MHI as % of CA	Status
California Average	$60,883	100%	---
County Subdivisions (CCD)			
Brawley CCD	$40,426	66%	DAC
Calexico CCD	$35,124	58%	SDAC
Calipatria-Westmorland CCD	$30,967	51%	SDAC
East Imperial CCD	$22,169	36%	SDAC
El Centro CCD	$42,610	70%	DAC
Holtville CCD	$39,365	65%	DAC
Imperial CCD	$46,698	77%	DAC
West Imperial CCD	$30,502	50%	SDAC
Census Designated Places (CDP)			
Heber CDP	$37,472	62%	DAC
Niland CDP	$13,588	22%	SDAC
Ocotillo CDP	$12,396	20%	SDAC
Seeley CDP	$31,250	51%	SDAC
Cities			
Brawley	$39,676	65%	DAC
Calexico	$34,848	57%	SDAC
Calipatria	$38,586	63%	DAC
El Centro	$38,481	63%	DAC
Holtville	$36,202	59%	SDAC
Imperial	$54,617	90%	---
Westmorland*	$29,152	48%	SDAC

Source: 2010 census <http://factfinder2.census.gov>;
* <http://www.city-data.com/city/Westmorland-California.html>

4.2.4 Recreation

Water-based recreational activities are not allowed in IID reservoirs, irrigation canals, or drains; but, in most reservoirs and all main canals and laterals, the public is allowed to fish with a proper license.

The Salton Sea provides important habitat on the Pacific flyway and is a premier bird watching area. Once it was popular as a recreation and marine sport fishery, but the fishery has declined with increased salinity. Several commercial marinas, residential recreational communities, and public parks are located around the Salton Sea.

Sonny Bono Salton Sea National Wildlife Refuge is managed by the U.S. Fish and Wildlife Service. Management practices include an intensive farming program that involves cooperative farmers. Crops are grown for waterfowl consumption during the winter. The refuge winters up to 30,000 Snow, Ross's, and Canadian geese, plus approximately 60,000 ducks from November through February.

Federal lands in the Imperial Region, such as the Imperial Sand Dunes Recreation Area, attract large numbers of people for off-road vehicle activities. Wiest Lake County Park, located along the Alamo River near Brawley, uses orders water from Moorhead Canal for boating, fishing, and waterfowl hunting.

California Department of Fish and Game owns and operates the Imperial Wildlife Area, consists of three units: Wister (5,423 acres), Hazard (535 acres), and Finney-Ramer (2,047 acres). The units are upland habitat and managed wetlands, primarily to provide waterfowl forage. The wildlife areas provide hunting, fishing, and recreational uses. The Wister Unit is a long, narrow sliver between the desert and the Salton Sea on a gentle slope, where 189 miles of levees and 27 miles of canals form terraces between seasonally flooded ponds and fields. Colorado River water for the ponds is pumped to Wister from the Coachella Canal. The Hazard Unit, which abuts the northern portion of the Sonny Bono Salton Sea National Wildlife Refuge, is south and east of the Wister Unit. The Salton Sea forms the entire western boundary of the Wister and Hazard units in a line that shifts as the Sea level changes. The Finney-Ramer Unit is located south of the Salton Sea near Calipatria and the Alamo River. It was established by USBR as a waterfowl refuge and includes four lakes.

4.2.5 Demographics and Environmental Justice Considerations

In the 2010 Census data, 80 percent of the population in the county identified themselves as Hispanic or Latino. Caucasians of non-Hispanic descent comprised 14 percent of the population. Table 4-16 provides details of race and ethnicity of the population for Imperial County. Imperial County demographic data is presented in Table 4-17.

In 2010, government, agriculture, and retail trade represented 70 percent of total county employment. Government services accounted for over one-third of total employment. Agriculture accounted for one-fourth of jobs. Retail growth has increased due to increased population in the Imperial and Mexicali valleys (Imperial County Department of Social Services).

Imperial County's unemployment rate is among the highest, if not the highest, in California and the nation, reaching over 40 percent in the 1990s and exceeding 30 percent at times in 2009, 2012 and 2011, according to U.S. Bureau of Labor Statistics. Unemployment in the region has been chronically high and well above the state averages (Figure 4-8).

Table 4-16. Population by Race/Ethnicity in Imperial County

	1990	2000	2010	Change from 1990
Total Population	109,303	142,361	174,528	60%
White (a)	73,615	70,290	102,553	39%
Black/African American (a)	2,622	5,624	5,773	120%
American Indian/Alaskan Native (a)	1,859	2,666	3,059	64%
Asian (a)	2,135	2,836	2,843	233%
Pacific Islander* (a)	N/A	119	165	N/A
Other	29,072	55,634	*N/A	N/A
Two or more*	N/A	5,192	7,722	N/A
Hispanic or Latino** (b)	71,935	102,817	140,271	95%

Source: U.S. Census Bureau 1990, 2000, 2010
* Not reported in 1990 census: Asian and Pacific Islanders were one group; more than one race was not an option.
** In combination with other race. Totals may add to more than 100 percent as individuals can report more than one race
(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.

Table 4-17. Imperial County Demographic Data

Demographic Categories	Value
Persons under 18 years, 2010	29.3%
Persons 65 years and over, 2010	10.4%
Language other than English spoken at home, persons age 5+, 2006-2010	73.0%
High school graduates, persons age 25+, 2006-2010	62.3%
Bachelor's degree or higher, persons age 25+, 2006-2010	12.2%
Persons below poverty level, 2006-2010	21.4%
Homeownership rate, 2006-2010	56.6%
Households, 2006-2010	47,304
Persons per household, 2006-2010	3.34

Source: <http://quickfacts.census.gov/qfd/states/06/06025.html>

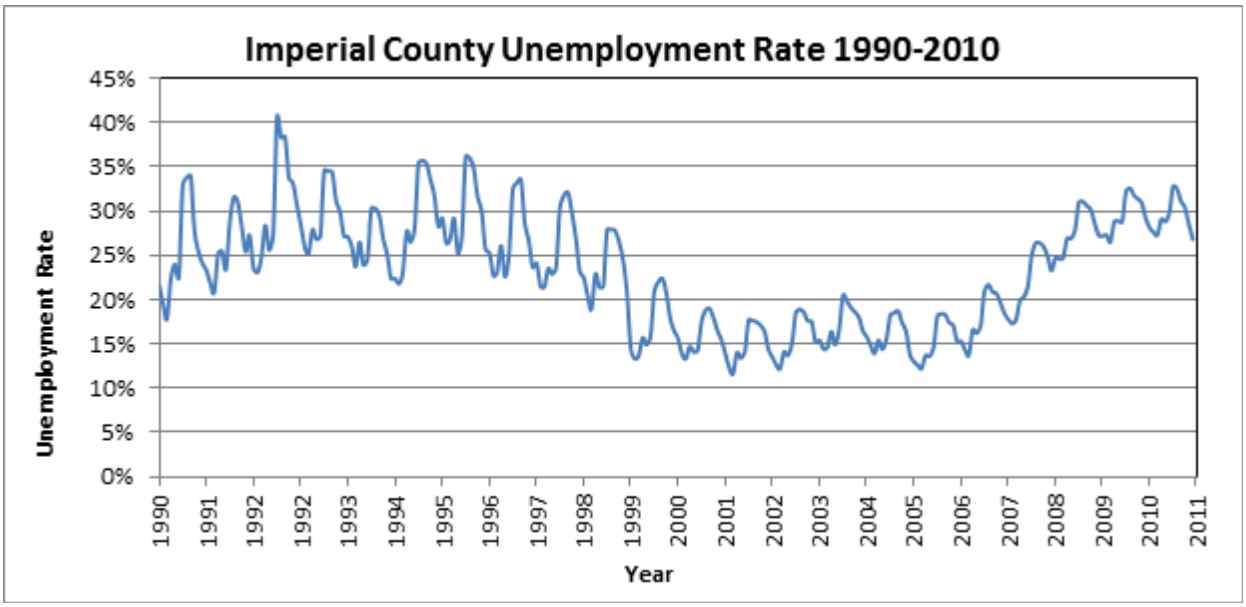

Figure 4-8. Imperial County Unemployment Rate

Source: <http://factfinder2.census.gov>

4.3 Physical and Natural Environment

4.3.1 Climate

Imperial Region is located in the Northern Sonoran Desert, which has a subtropical desert climate. Winter temperatures are mild, but summer temperatures are very hot, with more than 100 days over 100 degrees Fahrenheit (°F) each year (CDWR 2005). Average rainfall is less than three inches per year over the 93-year record; and while rainfall mostly occurs from November through March, summer thunderstorms do occur and can be intense. Clear and sunny conditions typically prevail. The Region receives 85 to 90 percent of possible sunshine each year, the highest value in the United States.

Average annual air temperature is 72 °F, and frost is rare. Climate change and vulnerability to climate change are discussed in Chapter 5. Table 4-18 provides a monthly and annual climate summary.

Table 4-18. Climate Summary – 30-Year Monthly Averages and 30-Year Annual Average, 1977-2006

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Max. Temp (°F)	80	84	91	99	105	112	114	113	110	101	89	78	98.0
Min. Temp (°F)	31	35	40	46	52	58	67	67	60	49	37	32	47.8
Avg. Temp (°F)	57	60	65	72	78	86	92	92	87	76	64	56	73.8
Avg. Rainfall (In.)	.51	.49	.40	.06	.04	.00	.11	.37	.26	.29	.19	.43	3.15

Source: IID Imperial Weather Station Record

4.3.2 Colorado River Hydrologic Region (Region 10)

CDWR divides the state into 10 hydrologic regions (Figure 4-9) corresponding to major drainage basins. Imperial Region is located in the Region 10, Colorado River Hydrologic Region. Despite its dry climate, the Colorado River region has two large surface water bodies – the Colorado River and Salton Sea.

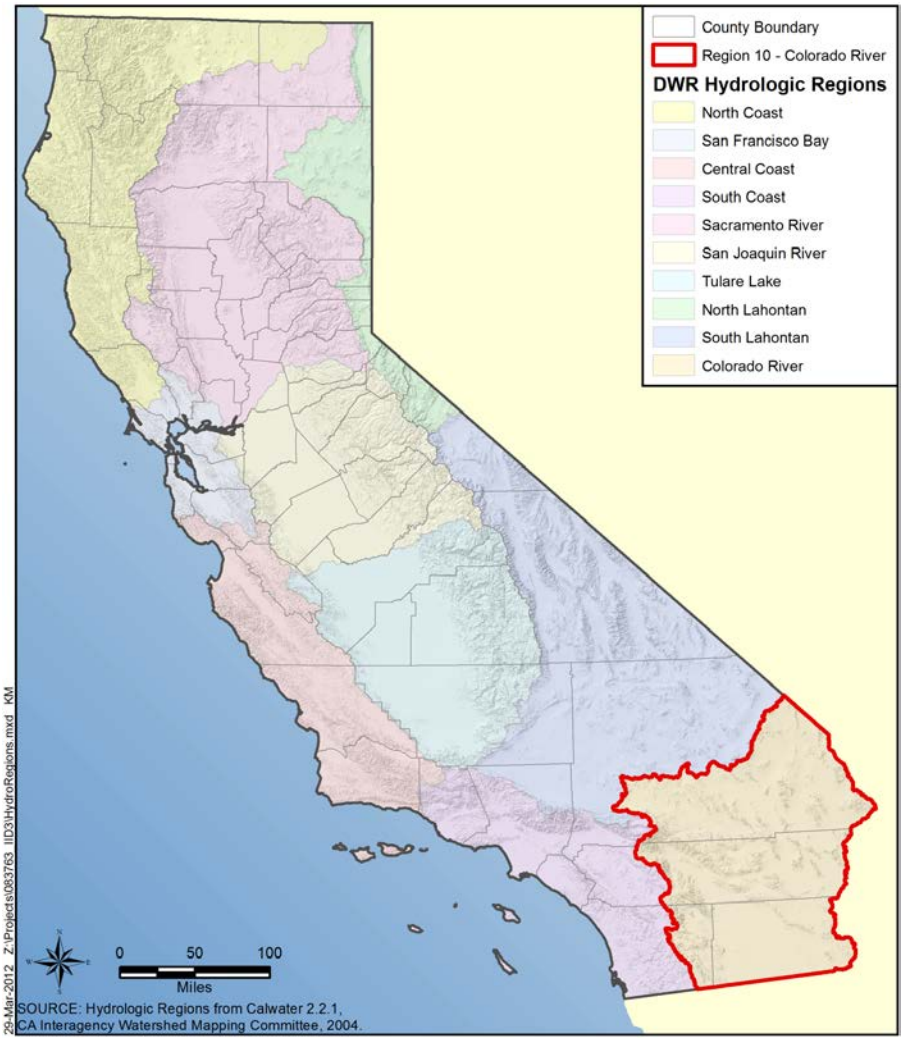

Figure 4-9. California CDWR Hydrologic Regions – Region 10

4.3.3 Geologic and Groundwater Setting

Imperial Valley and Coachella Valley are located in the Colorado Desert geomorphic province. The Colorado Desert is a low-lying barren desert basin, with portions of the area below mean sea level and runoff flowing to the Salton Sea. The province is a depressed block between active branches of alluvium-covered San Andreas Fault with the southern extension of the Mojave Desert to the east. Characterized by the ancient beach lines and silt deposits of extinct Lake Cahuilla (CGS 2002), the Region is bounded to the west by the Jacumba Mountains and on the east by the Chocolate Mountains. Beyond the westerly mountains lies San Diego County, and to the east is the Colorado River watershed and southwestern Arizona. Much of the central portion of the Region is below sea level, reaching nearly 230 feet below mean sea level (MSL) at the Salton Sea.

Imperial Region is situated on and near extensive fault systems, generally trending northwest to southeast. Large nearby faults include the San Andreas, Superstition Hills, and San Jacinto faults (Hart and Bryant 1999). Figure 4-10 shows the three major faults along with the Calipatria and Algodones faults in relation to the Region's groundwater basins (Section 4.3.3.1) and watersheds (Section 4.3.3.2). The faulting influences groundwater movement. More small to moderate earthquakes have occurred in the Region than along any other section of the San Andreas Fault system. Typically, some part of Imperial County is affected by a minor earthquake (less than magnitude 3.5) every few months. Every five years, the Region might experience a moderately damaging event (magnitude of 5.5 or greater). At least once every 50 years, a major earthquake (magnitude of 6.8 or greater) is likely. Microseismicity (magnitude of less than 2.0) occurs almost continuously in the County, often with dozens and sometimes hundreds of events per day (County of Imperial 2006).

Groundwater basins within the Imperial Region, displayed in Figure 4-10, include portions of the Coyote Wells Valley Basin, Borrego Valley Basin, Ocotillo-Clark Valley Basin, West Salton Sea Basin, and Ogilby Valley Basin, and all of the Imperial Valley Basin, East Salton Basin, and East Amos Valley Basin, for a total of approximately 2,800 square miles (CDWR 1975). The major surface water body within the Region is the Salton Sea, and drainage is to the Salton Sea via the New River and Alamo River, a few direct-to-sea drains and various washes. Groundwater-bearing materials are generally younger than older alluvial sediments derived from the erosion of the surrounding mountain ranges.

4.3.3.1 Groundwater Basins

East Mesa. Located in the southeastern portion of the Salton Basin, East Mesa is the area east of the East Highline Canal, and west of the Sand Hills Fault. The Algodones Fault, an easterly splay of the San Andreas Fault system, is mapped as bordering the eastside of the Sand Hills (Loeltz et. al. 1975). The East Mesa is also roughly bordered by the Coachella Canal on the east, and the All-American Canal (AAC) on the south. The East Mesa is an alluvial surface that slopes gently west-southwest, covered with thin veneers of wind-blown sand. The East Mesa aquifer is chiefly unconfined, homogenous, and composed of coarse-grained deposits of gravel, sand, silt, and silty clay that were deposited by the Colorado River.

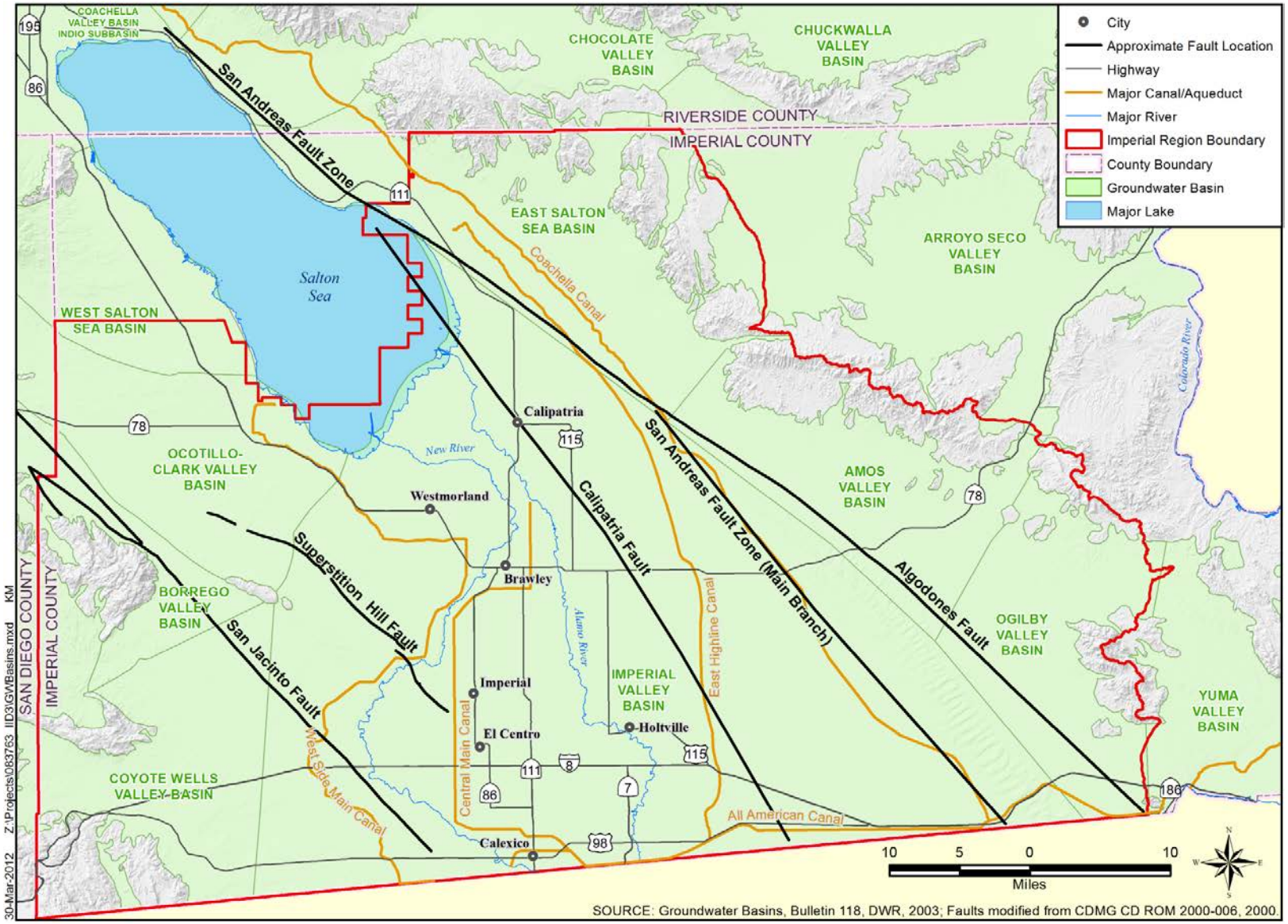

Figure 4-10. Imperial Region Groundwater Basin and Earthquake Faults

Faults in the East Mesa act as partial barriers to the westward flow of groundwater from this area. The Calipatria Fault also crosses a small portion of the East Mesa along the southwest margin and impedes the flow of groundwater out of East Mesa (Crandall 1983).

Imperial Valley. Most studies of groundwater conditions in the Imperial Valley (central irrigated area) focus exclusively on the upper 1,000 feet of water-bearing strata. Groundwater data are limited for the Imperial Valley area because of the poor quality and poor yields in the upper 300 feet. Historically there has been little need to investigate and develop the groundwater in the Imperial Valley area due to the availability and low cost of imported surface water. Studies indicate that groundwater in the Imperial Valley generally occurs in two water-bearing zones: (1) a shallow unconfined aquifer from 0 to 300 feet that is bounded at depth by a low-permeability clay; and (2) an intermediate semi-confined aquifer from 300 to 1,500 feet that is bounded above by the aquitard and at depth by the older marine and non-marine sediments (Tetra Tech 1999; Montgomery Watson 1995). A third, deeper aquifer has been identified by some authors that may be present at depths greater than 1,500 feet, but is likely a poor water supply resource (Durbin and Imhoff 1993).

Hydraulic communication between the upper unconfined and lower semi-confined water-bearing zones is weak, but varies depending on geographic location. Elevations of the base of the deeper aquifer vary from -800 feet MSL in the center of the Salton Trough to -200 feet MSL in the northeast. The upper aquifer averages 250 feet in thickness, and the deeper aquifer averages 550 feet in thickness. The aquitard separating the two water-bearing zones varies in thickness from 0 to 260 feet. This aquitard reportedly pinches out near East Mesa and toward the West Mesa, such that only one somewhat homogenous aquifer is present in the mesas adjoining the Imperial Valley area.

West Mesa. West Mesa is a loosely defined area of gently sloping desert land that lies to the south of the Salton Sea, west of the Westside Main Canal, and east of the Coyote and Jacumba Mountains. The area includes portions of several small groundwater subbasins for which little information is known.

The exception being the Ocotillo/Coyote Wells Subbasin, for which a study by USGS for IC/USGS and two groundwater studies by Bookman Edmonton for U.S. Gypsum (Bookman-Edmonston 1996; Bookman-Edmonston 2004) provide information on both the quality and quantity of available groundwater; the sub basin was designated a sole source aquifer by USEPA in 1996.[10] Underlying geology is critical for both water levels and water quality in the Ocotillo-Coyote Wells basin, with some domestic wells having non-potable water. This part of West Mesa includes the area around the town of Plaster City where the U.S. Gypsum plant operates. The groundwater aquifer in the Ocotillo/Coyote Wells Subbasin is unconfined, with a saturated thickness of approximately 400 feet and an average depth-to-groundwater of approximately 100 feet. The aquifer is generally homogenous and more coarse-grained than the Imperial Valley. The data do not indicate separate water-bearing zones or intervening aquitards of any regional significance. Groundwater and surface water flows east toward discharge areas in the Imperial Valley and Salton Sea.

[10] 61 FR 4772, Sept 10, 1996 <ftp://ftp.co.imperial.ca.us/icpds/eir/usg/final/17revisions-sect3.pdf>

4.3.3.2 Watersheds

Imperial Region lies wholly within the Salton Sea Transboundary Watershed (Figure 4-11). The California Environmental Protection Agency Salton Sea Transboundary Watershed website describes the watershed (footnotes added).[11]

> *The Salton Sea Transboundary Watershed (USGS Hydrologic Unit 18100200) is the Priority Watershed in the Colorado River Basin Region. It encompasses one-third of the region (about 8,360 square miles) and contains five (out of a total of six) of the Region's impaired surface waterbodies. Most of the watershed is in Imperial County. The watershed has been identified as a Category I (impaired) Watershed under the 1998 California Unified Watershed Assessment (UWA). The California UWA was developed and implemented in response to the Clean Water Action Plan released by President William Clinton and Vice-President Albert Gore on February 19, 1998. The UWA was a collaborative process between the State and the United States Environmental Protection Agency (USEPA) and was developed to guide allocation of new federal resources for watershed protection.*

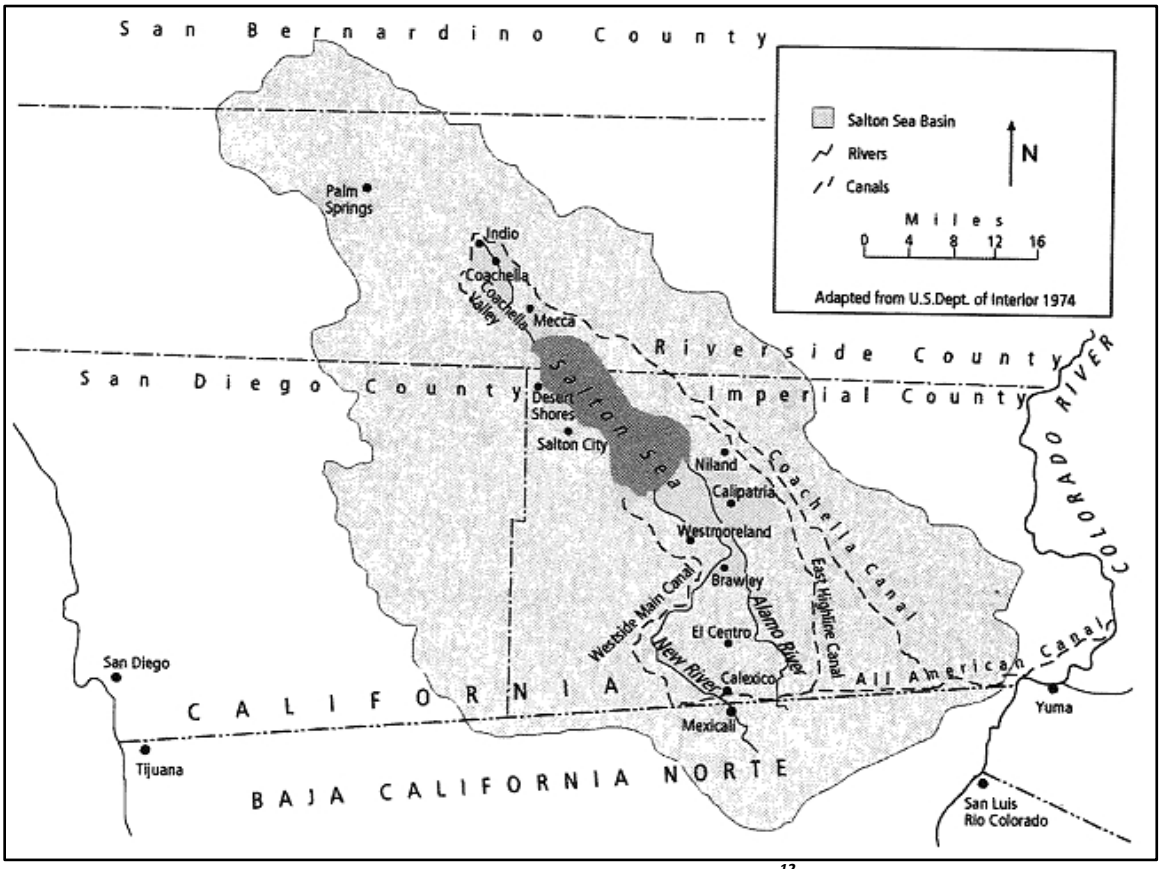

Figure 4-11. Salton Sea Transboundary Watershed [12]

[11] CEPA website: Salton Sea Transboundary Watershed <http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/wmi/priority_watershed.shtml>

[12] RWQCB Colorado River Basin Region Staff Report *Water Quality Issues in the Salton Sea Transboundary Watershed*, Feb 2003. http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/wmi/docs/saltonsea_watershed_staff_report.pdf

The watershed contains five main surface waterbodies: the Salton Sea, the New River, the Alamo River, the Imperial Valley Agricultural Drains, and the Coachella Valley Stormwater Channel.

The Salton Sea is California's largest lake and was famous for its sport fishery and recreational uses. It is about 35 miles long and 9-15 miles wide with approximately 360 square miles of water surface and 105 miles of shoreline. The surface of the sea lies approximately 232 feet below sea level. One of the major functions of the Salton Sea is to serve as a sump for agricultural wastewater for the Imperial and Coachella Valleys. Executive Order of Withdrawal (Public Water Reserve No. 114, California No. 26), signed in 1928, designated lands within the Salton Basin below elevation 220 feet below MSL as storage for wastes and seepage from irrigated lands in the Imperial Valley. Approximately 75% of the freshwater inflow to the Sea is agricultural drain water from Imperial Valley. As the Sea has no outlets, salts concentrate in it and nutrients enhance the formation of eutrophic conditions. Currently, the Sea is 25% saltier than the ocean, with salinity increasing at approximately 1% per year. The Sea supports a National Wildlife Refuge and is a critical stop on the Pacific Flyway for migrating birds, including several state- and federal-listed endangered and threatened species. The Salton Sea National Wildlife Refuge was established in 1930 to preserve wintering habitat for waterfowl and other migratory birds. However, catastrophic die-off of birds and fish between 1992 and 1997 indicate the Sea is in serious trouble, and may be unable to support these beneficial uses in the future.

The New River originates in Mexico. It flows approximately 20 miles through the City of Mexicali, Mexico, crosses the International Boundary, continues through the City of Calexico in the United States, and travels northward about 60 miles until it empties into the Salton Sea. Its flow at the International Boundary is about 108,400 to 145,000 acre-feet per year (AFY).[13] *The New River carries urban runoff, untreated and partially treated municipal wastes, untreated and partially treated industrial wastes, and agricultural runoff from the Mexicali Valley, Mexico across the International Boundary into the United States. In addition, the River carries urban runoff, agricultural runoff, treated industrial wastes, and treated, disinfected and non-disinfected domestic wastes from the Imperial Valley. It also carries approximately 4,350 to 7,970 AFY of treated wastewater from point sources in Imperial Valley. The New River flow at the Salton Sea is about 430,000 AFY.*[14]

The Alamo River channel originates approximately 2 miles south of the International Boundary with Mexico, and runs northward. Across the border it flows for about 50 miles until it empties into the Salton Sea. The Alamo River is dominated by agricultural return flows from Imperial Valley. It also carries approximately 15 to 27 cfs (10,867 to 19,200 AFY) of treated wastewater from point sources in Imperial Valley. Its flow at the International Boundary is 3 to 5 cfs (2100 to 3620 AFY), whereas at its delta with the Salton Sea is about 800 to 1000 cfs (600,000 to 800,000 AFY).[15]

The Ag Drain system comprises over 1,450 miles of surface drains, which discharge into the Alamo and New Rivers and the Salton Sea [2.11]. The Ag Drains primarily carry agricultural

[13] New River flow at the International Boundary was 90,300 AF in 2010 and 82,000 AF in 2011. Source: USGS 10254970 NEW R AT INTERNATIONAL BOUNDARY AT CALEXICO CA

[14] New River flow into the Salton Sea was 415,300 AF in 2010 and 392,600 AF in 2011. Source: USGS 10255550 NEW R NR WESTMORLAND CA

[15] Alamo River flow at the International Boundary was 700 AF in 2010 and 700 AF in 2011. Alamo River at its delta with the Salton Sea was 587,000 AF in 2010 and 612,000 AF in 2011. Source: USGS 10254730 ALAMO R NR NILAND CA

runoff from the Imperial Valley. Agricultural discharges in the Imperial Valley average about 830,000 acre-feet/year. Of this amount, approximately 36 percent is tailwater, 33 percent is seepage, and 30 percent is tilewater. The resulting mix of tailwater, tilewater, and seepage contains pesticides, nutrients, selenium, and silt in amounts that violate water quality standards. [16, 17]

The Statewide Watershed Program, administered through California Department of Conservation (CDOC), has established subbasins, each with a unique identifying number, for the state's watersheds. Shown in 0, the six subbasin watersheds with territory in the Imperial Region are West Salton (183), Anza Borrego (184), Imperial (185), Davies (186), Amos-Ogilby (188), and Salton Sea (190).[18] East Salton (187), Colorado (177) and Yuma (189) are to the north and east of the Imperial Region boundary. Imperial (185) covers nearly the entire Imperial Region.

4.3.3.3 Groundwater Quality

Beneath East Mesa the water quality is moderate to poor and has been locally influenced by seepage from the major conveyance canals (All American and East Highline canals). Higher than recommended concentrations of nitrate and fluoride for drinking water are common and elevated concentrations of sulfate may also be present. Concentrations of boron are typically higher than those recommended for certain agricultural crops. Elevated levels of selenium present in IID drain water are thought to be an imported contaminant from the Colorado River supply.

Total dissolved solids (TDS) concentrations were summarized for three distinct water-bearing zones, shallow (80' to 300'), intermediate (300' to 1,500') and deep (>1,500') aquifers (Durbin and Imhoff 1993) as shown in Figure 4-13 to Figure 4-15. The shallow aquifer contains highly variable water quality, ranging from 800 to over 10,000 milligrams per liter (mg/L) TDS. Relatively consistent water quality is present in the shallow aquifer beneath East Mesa ranging from 800 to 2,200 mg/L TDS. The intermediate aquifer contains water that is uniform averaging 2,200 mg/L, while the deep aquifer contains the poorest quality water.

The Imperial Valley contains a large area of poor quality groundwater that is generally unsuitable for domestic or irrigation use without treatment. The chemical quality of groundwater differs greatly from place to place, and salinity is the primary water quality issue. TDS range from a few hundred to more than 10,000 mg/L.

West Mesa groundwater is derived from recent precipitation that has not yet reached the more saline deposits of the central part of the valley and may contain a TDS concentration which ranges from about a high quality of 300 ppm TDS to non-potable with over 2000 ppm and even up to 6,000 ppm in some wells in the Nomirage area because wells are drilled into old marine or brackish deposits along the northern side of the Jacumba Mts.[19]

[16] Ag discharges were calculated to be 755,500 AF in 2010 and 848,700 AF in 2011. Source: IID WIS Water Balance.
[17] In 2004, IID implemented its Drain Water Quality Improvement Plan, and is meeting RWQCB interim goals.
[18] CDOC DLRP - Watershed Program < http://conservation.ca.gov/dlrp/wp/Pages/Index.aspx >
[19] This information provided by Edie Harmon desertharmon@gmail.com, a resident of West Mesa.

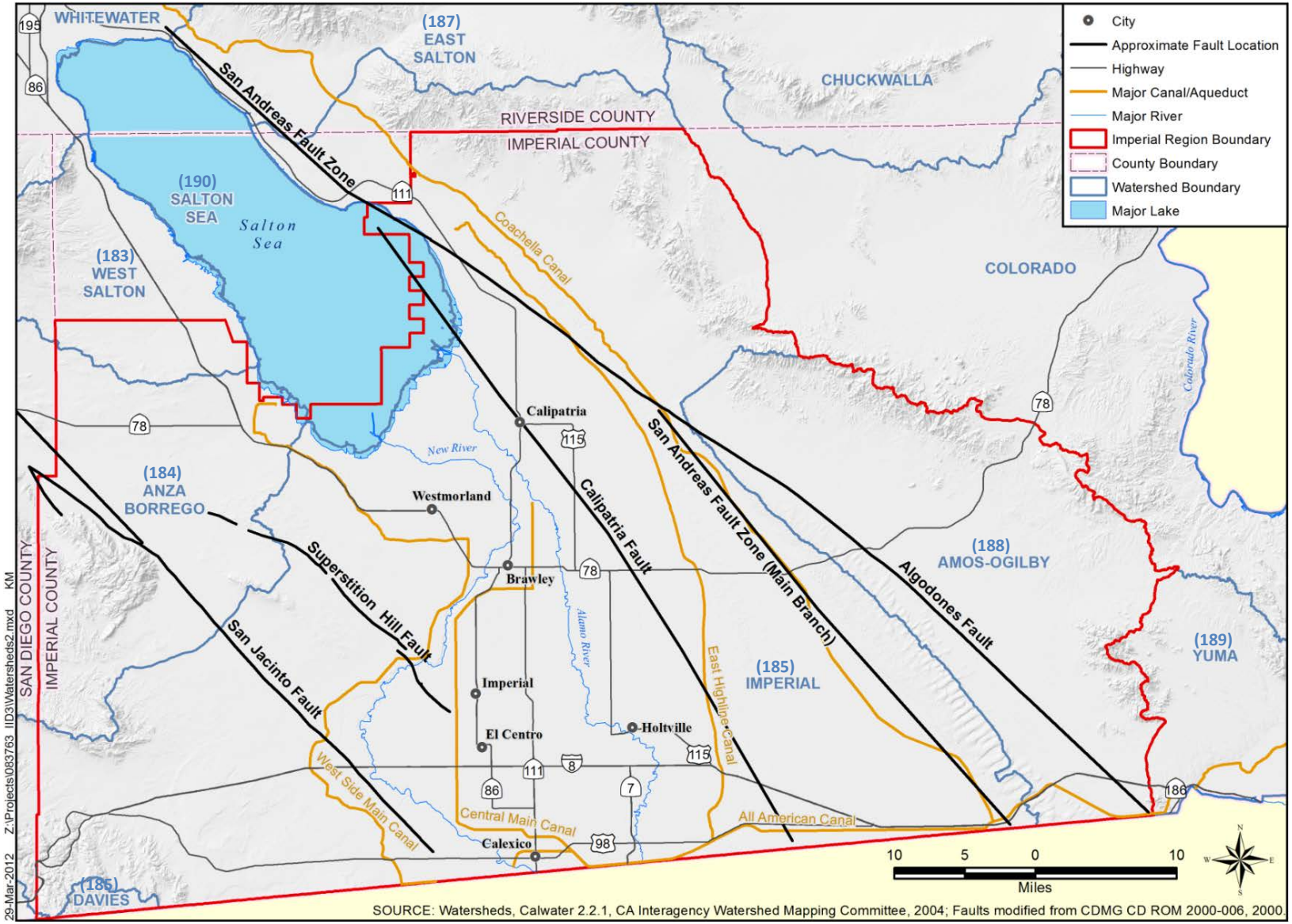

Figure 4-12. Imperial Region Watersheds

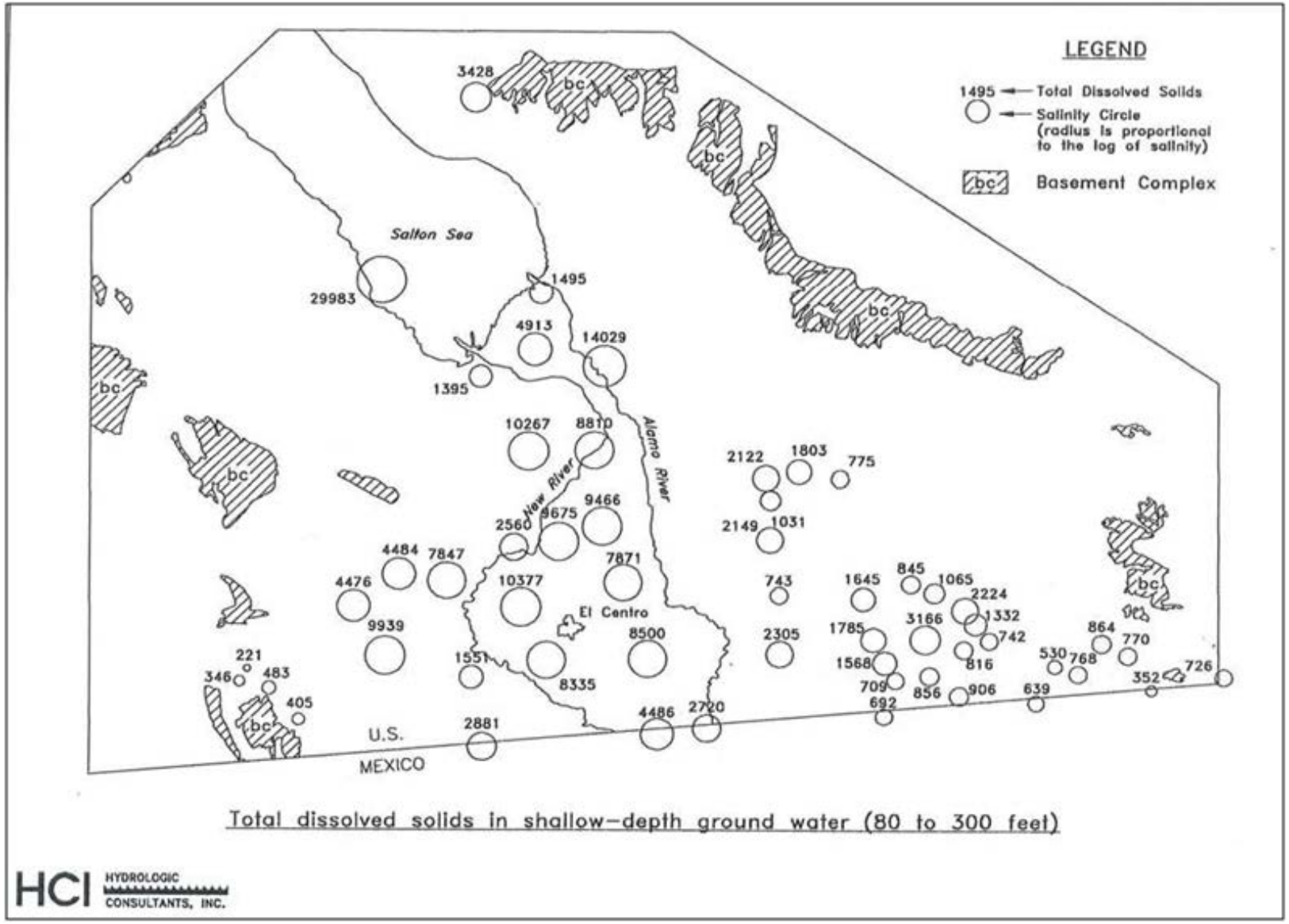

Figure 4-13. TDS Values in Shallow Groundwater Imperial Region

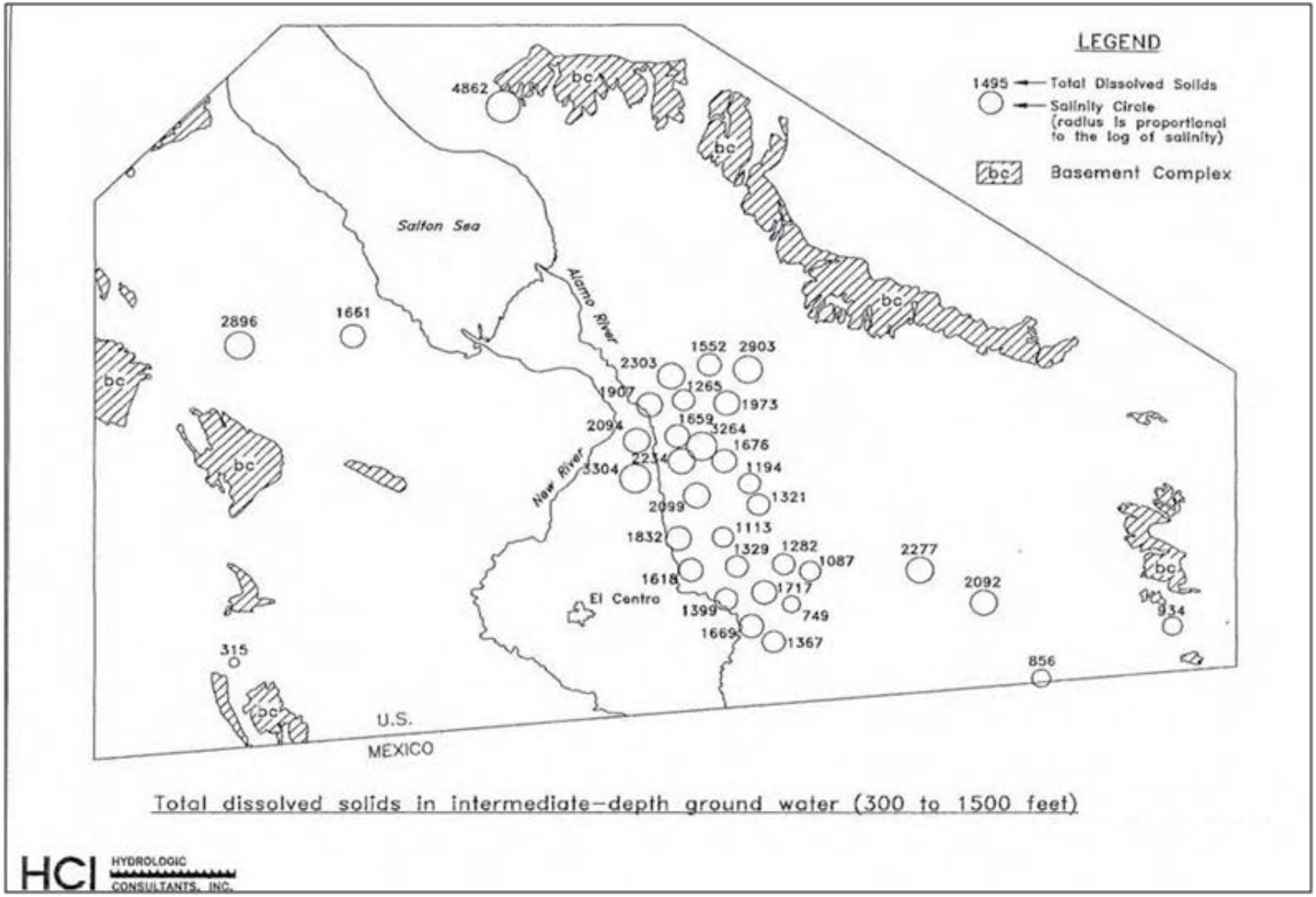

Figure 4-14. TDS Values in Intermediate Depth Groundwater Imperial Region

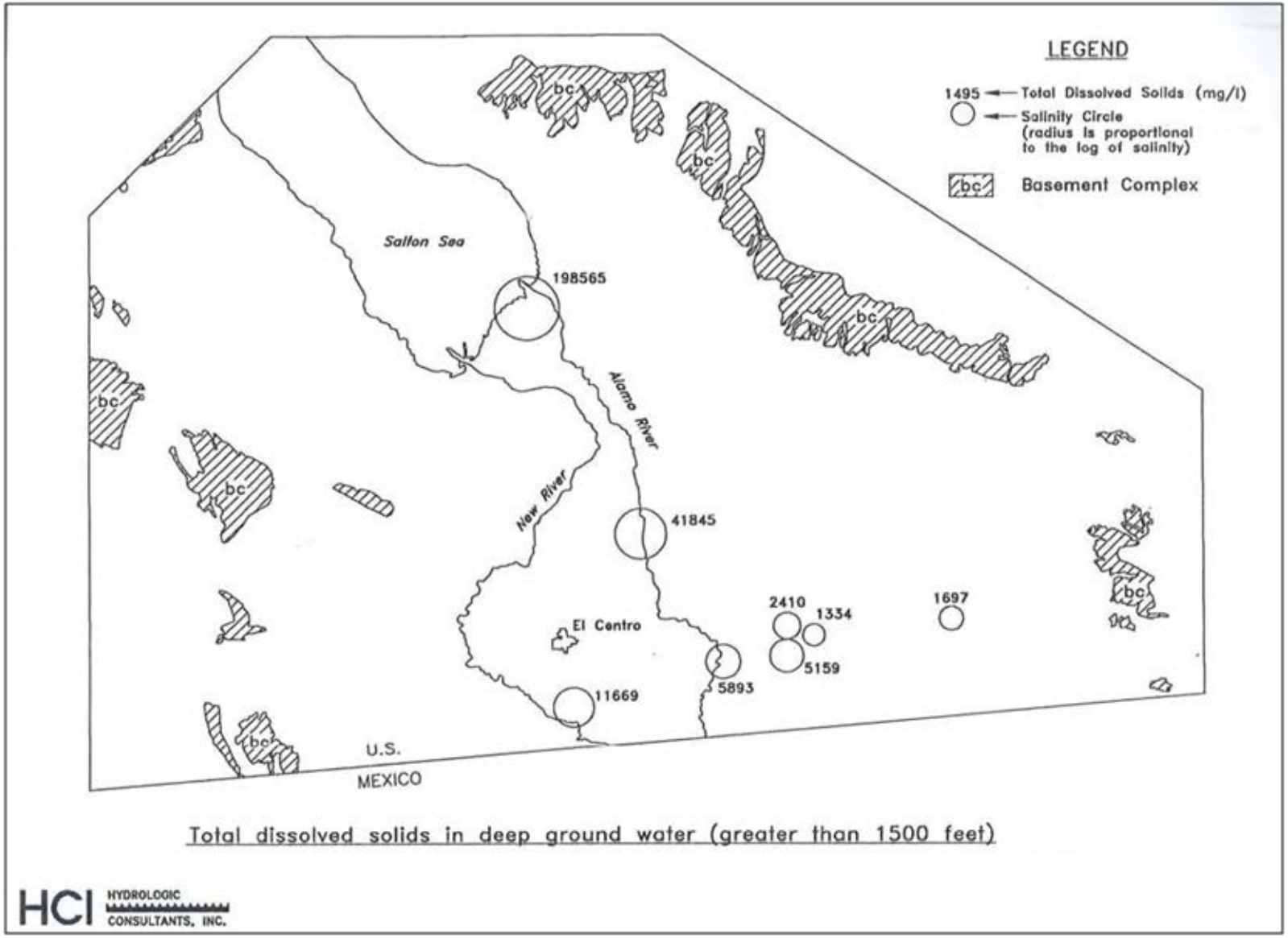

Figure 4-15. TDS Values in Deep Groundwater Imperial Region

4.3.3.4 Aquifer Storage, Recharge and Discharge

Available East Mesa aquifer storage between the unlined East Highline Canal and the unlined portions of the Coachella Canal is estimated to be one million acre-feet (USBR 1988). The storage capacity of the Imperial Valley has been estimated at approximately 14 million acre-feet of water (CDWR 1975). The recharge and storage potential of the West Mesa has not been quantified.

East Mesa recharge to the groundwater aquifer is primarily due to seepage from the All-American, Coachella, and East Highline canals. Due to the arid conditions and small amount of rainfall, virtually no direct precipitation reaches the groundwater aquifer in the East Mesa (Crandall 1983). Groundwater in East Mesa is discharged at ground surface and in the subsurface. Discharge of groundwater onto land surface occurs at areas of shallow groundwater along the AAC where the water may be discharged from interceptor wells. Subsurface outflow in East Mesa occurs toward the Imperial Valley, toward Mexico, and into a portion of the East Highline canal.

In the Imperial Valley, recharge to the groundwater reservoir by subsurface inflow from tributary areas is small compared with recharge from the imported Colorado River water. Total recharge to the groundwater system from precipitation within the valley has been estimated to be somewhat less than 10,000 acre-feet per year (Loeltz et al. 1975). Montgomery Watson (1995) cites a more likely recharge rate of 0.02 inch per year for the Ocotillo area near the West Mesa, which equates to only 800 acre-feet of recharge per year over the 0.5 million-acres of unirrigated land in the Imperial Valley. Major sources of groundwater discharge from Imperial Valley aquifers include groundwater discharge directly into IID drains, the New and Alamo rivers, and the Salton Sea; intercepted shallow groundwater from agricultural fields into the extensive tile drain network; and subsurface discharge into the Salton Sea. Phreatophytes remove groundwater by evapotranspiration in areas where the groundwater table is shallow, especially in and along the rivers and drains, and where artificial wetlands have been created (Tetra Tech 1999). Some limited artesian groundwater conditions exist in the Imperial Valley, primarily east of the Alamo River in a band extending roughly from Holtville in the south to Calipatria in the north.

West Mesa recharge to the aquifer is from two sources: precipitation falling directly on the basin and percolation of seasonal stream runoff from the Coyote and Jacumba Mountains to the west. Sources of discharge in West Mesa include pumpage by U.S. Gypsum, limited residential water use, and subsurface outflow across the Elsinore fault and toward Mexico (Bookman-Edmonston 1996).

4.3.4 Other Geologic Resources

Other geologic resources in the Region include minerals (rock and stone, sand, gravel, clay, and gypsum), metals (gold, silver, nickel, and lead), radioactive elements, and geothermal areas. Imperial Valley sand and gravel are significant economic resources. Most of these materials are derived from shoreline deposits from ancient Lake Cahuilla. Additional sources of lower quality sand and gravel are found in alluvial fan deposits.

4.3.5 Biological Resources

Biological resources in the Imperial Region on non-federal lands in unincorporated areas are managed pursuant to the County General Plan Conservation Element (Imperial County, 2003). On federally owned public lands, extensive biological resources inventories are being prepared as part of DRECP Preliminary Conservation Strategy. DRECP Conservation Strategy (CEC, 2011) describes key components of the baseline biology for much of the Imperial Region, including the ecological processes, biological diversity, natural communities, special status species, habitat connectivity, and anthropogenic issues.

4.3.5.1 Plants and Vegetative Habitats

A broad range of biotic communities have been identified in the Imperial Region, ranging from those dependent upon the ecology of the Colorado River to the saltbush-alkali scrub habitats.

The predominant plant community in the County is cultivated and/or ruderal. The term "ruderal" refers to the type of vegetation that grows in response to human disturbance: along roadsides, at the borders of cultivated fields, and in canal riparian/levee areas. This generally weedy vegetation can intrude rapidly into moist and periodically disturbed areas, and includes opportunistic plants, most of which are not native to the area.

The Region floor consists largely of non-native and agricultural plants. Undeveloped portions of the Region support specialized native plant communities. Where naturally occurring sources of water are available, special and often unique communities thrive. Eleven indigenous plant communities are identified within the Region: desert riparian (cottonwood-willow), fresh emergent wetlands (freshwater marsh), alluvial washes, palm oases, desert scrub (creosotebush), desert succulent shrub, alkali desert scrub (saltbush), sand dune, mixed chaparral, pinyon-juniper, and montane hardwood-conifer.

The waterways of the All-American Canal, the Alamo River, and the New River support riparian and freshwater marsh habitats. Characteristic wetland plant species associated with these habitats include overstory species, understory species, and a variety of weedy species.

The dunes of the Sand Hills Ecological Area in south-eastern part of the Region contain many important plant species that have adapted to the extreme arid conditions.

4.3.5.2 Wildlife

The conditions created by the arid desert climate and irrigation of agricultural lands have resulted in an abundance of wildlife habitats that vary substantially across the Imperial Region. Many species in the Region are localized and dependent on the type of vegetative communities available.

Fish. Introduction of several species of marine fish into the Salton Sea in 1950 resulted in the largest inland fishery in California. The Salton Sea has been home to at least twelve species of fish that have been introduced either directly by the CDFG and USBLM biologists or indirectly through migration from local irrigation canals. Due to the increasing salinity of the Salton Sea, few fish species remain.

The endangered desert pupfish is a native fish found around the fringes of the Salton Sea in some agricultural drains and within the seasonal Salt Creek that feeds into the Salton Sea.

Within the Imperial Region freshwater fish are found in rivers, canals, and some artificial wetland areas. Some introduced species include threadfin shad, mosquito fish, red shiner, California killifish, largemouth bass, and white and channel catfish. Tilapia is found in both fresh and saltwater. Native freshwater fish species include endangered Colorado squawfish, bonytail chub, and humpback sucker.

Amphibians and Reptiles. Some of the amphibian species found in or near freshwater habitats of Imperial County include the Colorado River toad, red-spotted toad, California red-legged frog, leopard frog, bullfrog, and spiny softshell turtle. Desert scrub and rocky outcrops throughout the County provide excellent burrowing, foraging, and boulder habitat for a variety of reptiles.

Birds. Imperial County is located on one of the most important flyway corridors in the western hemisphere for migrant waterfowl, shorebirds, and songbirds. The Salton Sea is a critical component of the Pacific Flyway migratory corridor as it is an essential over-wintering site for thousands of migratory waterfowl. Its wetland areas provide significant habitat for the endangered yuma clapper rail.

Generally, the greatest numbers and diversity of birds are found during the spring and fall months. Approximately 378 species of birds have been identified in Imperial County. The food potential of cultivated areas is the main contributor to the broad range of bird species frequenting the Region.

Mammals. Most indigenous medium and large-sized mammals, such as foxes, coyotes, and badgers have disappeared, but can still be found in relatively undisturbed areas near sources of water. Coyotes are often found around orchards, where they feed on fruit and small mammals. Smaller mammals have adapted better to human activity, especially small rodent species capable of exploiting marginal habitats along canals, agricultural drains, roadsides, and around buildings. Many species of bats are found due to the presence of fruit, fruit flies, and agricultural canals, which provide excellent foraging areas for insects as well as functioning as reliable water sources. Mammalian species are also found in native desert scrub habitats surrounding the Imperial Valley and Salton Sea.

4.3.5.3 Special Status Species and Habitats

Special status species are those identified by federal or state agencies as needing additional management considerations or protection. Federal species are those listed or proposed for listing under the Endangered Species Act. State-sensitive species are those designated sensitive by CDFG. Sensitive species that may occur can be found in a search of the California Natural Diversity Database. The Imperial County General Plan also has identified sensitive species.

Sensitive Plant Species. Sensitive plant species are determined by their rarity, endangerment, and limited distribution. There are three listing authorities for sensitive plants in California: the California Native Plant Society (CNPS), a private organization; CDFG; and the USFWS. Of the 28 sensitive plant species in the Imperial Region, the following three are officially listed as rare, threatened, or endangered

by either USFWS or CDFG: Pierson's milk-vetch, Wiggins' croton, and Algodones Dunes sunflower. Twenty-five plants are considered rare, threatened, or endangered by the CNPS, or are placed on a Watch List by USFWS and/or CNPS.

Sensitive Fish Species. Four native fish species within the Imperial Region are listed as endangered by CDFG. The bonytail chub, desert pupfish, and Colorado squawfish are also listed as endangered by USFWS. The humpback (or razorback) sucker is a Category 1 candidate for the federal endangered species list.

4.3.6 Cultural Resources

Cultural resources are past and present expressions of human culture and history in the physical environment and include prehistoric and historic archaeological sites, structures, natural features, and biota that are considered important to a culture, subculture, or community. Cultural resources also include aspects of the physical environment that are a part of traditional practices and are associated with community values and institutions. Cultural resources in agricultural and other disturbed areas are thought to be minimal. There are likely to be historical resources in some of the developed communities. In the native and federal lands, there may be significant cultural resources that would require site-specific analysis and investigation for siting facilities. Much of the Imperial Region is considered to be within the traditional territory of Cahuilla and Yuman-speaking groups, including the Tipai. Prehistoric sites may exist on the past shorelines of Lake Cahuilla.

4.3.7 Air Resources

Imperial Region falls within the Southeast Desert Intrastate Air Quality Control Region (Title 40). Salton Sea Air Basin was designated for purposes of managing air resources in California.

California Ambient Air Quality Standards address the same six criteria pollutants as does the National Ambient Air Quality Standards (CARB 2010a): sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), particulate matter (PM; PM10 and PM2.5), and lead (Pb). California Ambient Air Quality Standards are more stringent than the federal standard for most of criteria pollutants. In addition, California has set standards for some pollutants that are not addressed by the federal standard, including visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The Imperial County Air Pollution Control District has county-wide jurisdiction and is responsible for ensuring that the ambient air quality standards of the federal Clean Air Act and the California Clean Air Act are achieved and maintained.

Data on annual emissions of criteria pollutants and Volatile Organic Carbons (VOCs) in Imperial County are presented in Table 4-19 for 2002 (USBLM 2010a).

Table 4-19. Emissions of Criteria Pollutants and VOCs in Imperial County, 2002

Pollutant	Emissions (tons/year)
Sulfur Dioxide (SO_2)	499
Nitrogen Oxides (NOx)	14,520
Carbon Monoxide (CO)	70,360
Volatile Organic Carbons (VOCs)	150,725
PM10	19,367
PM2.5	5,542

Includes point, area, on-road and non-road mobile, biogenic, and fire emissions.

Emission data is classified into six source categories: point, area, onroad mobile, nonroad mobile, biogenic, and fires.[20] For the County in 2002, nonroad sources were major contributors to total SO2 and nitrous oxide (NOx) emissions (about 72 percent and 36 percent, respectively). Onroad sources were secondary contributors to NOx emissions (about 33 percent), but with contributions comparable to nonroad sources. Onroad sources were major contributors to CO emissions (about 38 percent). Biogenic sources (i.e., vegetation including trees, plants, crops, and soils) that release naturally occurring emissions accounted for most of the VOC emissions and secondarily contributed to CO emissions. Region sources accounted for about 90 percent of the County's PM10 and 72 percent of PM2.5. Fire sources are minor secondary contributors to SO2 and PM2.5 emissions. In Imperial County, point sources are minor contributors to all criteria pollutants and VOC emissions.

Parts of the Imperial Region are classified as a nonattainment area for inhalable particulate matter with a diameter less than 10 micrometers (PM10), based on state and federal standards. Imperial County has favorable conditions for high ozone (O_3). Table 4-20 shows the County's designation based on state standards (CARB 2010a).

Table 4-20. Imperial County Designation for California Ambient Air Quality Standards

Constituent	Designation			
	Attainment	Nonattainment	Nonattainment-Transitional	Unclassified
Ozone (O_3)		X		
PM 10		X		
PM 2.5				X
Carbon Monoxide (CO)	X			
Nitrogen Oxides (NOx)	X			
Sulfur Dioxide (SO2)	X			
Sulfates	X			
Lead (Pb)	X			
Hydrogen Sulfide H_2S)				X
Visibility Reducing Particles				X

State standard set forth in the California Code of Regulations, Title 17, Section 60200

Large areas of barren lands and unplanted agricultural lands in Imperial County contribute to higher particulate matter concentrations under high winds. Particulate matter concentrations are dominated

[20] Prescribed fires, agricultural fires, and structural fires

by primary windblown dust from paved and unpaved roads, agricultural activities, construction activities, and dust transported from the South Coast region, and densely populated Mexicali, Mexico across the U.S./Mexico International Border.

The Imperial IRWMP and any related project-level analysis will need to consider the impact (if any) that proposed projects would have on the California Air Quality Implementation Plan. Actions that could cause exposure of Salton Sea playa are of concern due to the potential to create dust and impair air quality.

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 5

Supply, Demand and Water Budget

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Chapter 5. Supply, Demand, and Water Budget

5.1 INTRODUCTION

The purpose of this chapter is to create a common understanding of historic[1] and future water supply and demand conditions and to describe the Imperial Region water budget. This chapter:

- Documents the available Colorado River supply and the reliability of the
- Reports historic demand and evaluates forecasted water demand
- Identifies gaps between available supply and forecasted future demand, and impacts that may arise from gaps and/or changing water use patterns
- Describes IID's water budget to explain how the imported Colorado River supply is distributed and used within the Imperial Region

A description of the historic and future water supply is presented first. This is followed by a presentation of the current and forecasted future demands.

The Imperial IRWMP describes how the Colorado River supply can be managed by IID to meet forecasted demands. This chapter provides a regional water supply evaluation that is consistent with the requirements of California and multiple dry water years during the planning horizon from 2010 to 2050 and documents IID's water supply availability to meet forecasted demands.

The chapter includes identification of IID water supply entitlements, water rights, water service contracts, and agreements related to the Colorado River water. This includes the historical consumptive use of water by IID.[2] Future demands were forecasted based on adopted city and county general plans or specific land use plans. The chapter identifies potential challenges in meeting the demand with the available supply.

5.1.1 Intended Use for the IRWMP

Historic demand and available supplies establish the existing condition, including water projects and facilities, water management and land use plans, water use demands, and supply/demand imbalance.

The chapter compares available supply, including planned facilities and other known conditions that could influence the supply, and forecasted future demands to identify any future supply/demand imbalance assuming no other actions are taken. This chapter documents changes in water use as a

[1] The IRWMP Planning Grant Agreement's Scope of Work requires "Quantification of current demands and forecast of future demands…" However, for purposes of the Imperial IRWMP, *current* will be referred to as *historic*.
[2] Throughout this document, net consumptive use is per USBR Colorado River Accounting and Water Use (Decree Accounting) at Imperial Dam – not with any other accounting. Under QSA and USBR Decree Accounting: Net consumptive use is the amount of water less transfers (from 2,978,223 AF in 2003 to a projected 2,613,800 AF in 2026 and thereafter) as measured at Imperial Dam; total annual quantified amount of IID Colorado River water rights is 3,100,000 AF as described in Section 5.2.7.

result of implementation of IID Efficiency Conservation Definite Plan (Definite Plan) and System Conservation Plan (SCP), even though implementation of the Definite Plan and SCP are outside of the scope of the IRWMP. (Section 6.0)

In the language of CDWR in the California Water Plan (CWP) and the IRWMP Guidelines, RMSs are projects, programs, and policies that local agencies can integrate to solve problems. The Imperial Water Forum[3] (Water Forum) can integrate and combine resources management to configure alternative solutions that can then be compared to select a preferred alternative. Chapter 6 summarizes the CDWR resource management strategies that were reviewed by the Water Forum and Chapters 7 through 11 discusses CDWR RMSs and how they can be tailored to the specific conditions in the Imperial Region, including Water Forum findings and recommendations to further shape how specific alternatives could be configured. Chapter 12 provides information related to the capital project program and policy alternatives, and approaches for financing such alternatives and Chapters 13 and 14 provide information related to the IRWMP Implementation Plan, Measuring Plan Performance, and Data Management.

5.1.2 Other Intended Uses

CDWR requires discussion of how the IRWMP is related to local land use planning and to local water planning.[4] This chapter provides a standardized description and assessment of the Imperial Region's Colorado River water supply that can be used to update other plans, including UWMPs, city or county General Plans, and local lead agency Water Supply Assessments (Appendix J).

Information presented in the water supply availability section is intended to prevent misinterpretation of IID's Colorado River water supply entitlements, contracts and agreements, and to document the availability and reliability of the Colorado River supply. This section is consistent with the information needed for the preparation of a Determination of Wholesale Water Sustainability (Sustainability Report) completed by IID when a project proponent submits a Request for Water Determination as summarized in Appendix J.

5.2 REGIONAL SURFACE WATER (COLORADO RIVER) SUPPLY AVAILABILITY

Detailed description of the existing supply is presented to document baseline Colorado River water supply conditions and future supply availability and reliability assumptions. It documents the Region's historical water rights to the Colorado River and how the Law of the River, Quantification Settlement Agreement and Related Agreements (QSA/Transfer Agreements), and federal contract operating policies influence the availability and reliability of the Region's water supply. The Colorado River entitlement is held by IID, and the senior water rights are highly reliable and relatively stable compared to more junior water right holders on the Colorado River, even in dry or multiple dry years.

[3] Water Forum. "Imperial IRWMP Mission, Goals and Objectives" p 1. Rev. Jun 2011. <http://imperialirwmp.org/20100824%20WF%20GoalsObjectives_rev_16June2011.pdf>
[4] CDWR Guidelines, Appendix C – Guidance for IRWM Plan Standards

Even with a relatively stable and known water supply entitlement, under the terms of the QSA/Transfer Agreements, supply reliability may be an issue due to variations in annual agricultural demand. Understanding how supply and demand is related is important for: 1) identifying problems and potential impacts, 2) developing solutions to manage the supply, and 3) avoiding impacts to present day water users and/or the environment. This chapter discusses how the variation, largely in agricultural demand, can result in supply and demand imbalances (overruns) or in underruns. Overrun conditions result when water is diverted in excess of IID's Colorado River entitlement. Underrun conditions occur when less water is diverted than IID's net consumptive use amount as per the 2003 Colorado River Water Delivery Agreement (CRWDA) Exhibit B, Column 13.

5.2.1 Colorado River and Other Water Supply

The Imperial Valley depends solely on the Colorado River for surface water supply. IID imports raw water from the Colorado River and distributes it primarily for agricultural use (96.17 percent of total 2011 delivery).[5] Historically, non-agricultural water demand has accounted for around 3 percent of IID's delivered Colorado River water; in 2011 that had risen to 3.83 percent. Non-agricultural use percentage will continue to increase both from growth in the non-ag sectors – as municipal water demand continues to rise due to population growth; as industrial (renewable energy) water demand increases due to increased geothermal energy production; and as feedlot, dairy and fishery, and environmental and recreation uses all continue to increase – and as agricultural water use declines due to the terms of the QSA/Transfer Agreements.

IID distributes water for non-agricultural is to the Valley's seven municipalities, one private water company, and two community water systems for treatment to potable standards (1.25 percent); to industrial (renewable energy) users (0.88 percent); feedlot, dairy and fishery users (1.35 percent), and environmental resources demand and recreational uses (0.35 percent). Rainfall is less than three inches per year and does not contribute to IID water delivery, although at times it does increase or reduce agricultural water demand.[6] Groundwater in the Imperial Valley is of poor quality and is generally unsuitable for domestic or irrigation purposes, though some is pumped for industrial (geothermal) use. In addition, to avoid agricultural root zone contamination, tile drains are used to dewater the root zone. The tile drain and other drainage waters ultimately discharge to the Salton Sea.

5.2.2 Colorado River Water Rights

IID's rights to appropriate Colorado River water are long-standing. Beginning in 1885, a number of individuals, as well as the California Development Company, made a series of appropriations of Colorado River water under California law for use in the Imperial Valley. Pursuant to then-existing California laws, these appropriations were initiated by the posting of public notices for approximately 7 million acre-feet per year (MAFY) at the point of diversion and recording such notices in the office of the county recorder.

[5] IID Water Information System (WIS), Provisional Water Balance 2011 volumes.
[6] One inch of rainfall across the IID irrigated area results in a reduction of about 50 KAF in net consumptive use.

The individual appropriations were subsequently assigned to the California Development Company, whose entire assets, including its water rights, were later bought by the Southern Pacific Company. On June 22, 1916, the Southern Pacific Company conveyed all of its water rights to IID.

IID's predecessor water right holder made reasonable progress in putting their pre-1914 appropriative water rights to beneficial use. By 1929, the beneficial was 424,145 acres out of the Imperial Valley's approximately one million irrigable acres.

Colorado River water rights are governed by numerous compacts, state and federal laws, court decisions and decrees, contracts, and regulatory guidelines collectively known as the "Law of the River." Together, these documents allocate the water, regulate land use, and manage the Colorado River water supply among the seven basin states and Mexico. The following legal and regulatory documents are among those that have significant bearing on IID.

5.2.2.1 Colorado River Compact (1921)

With the authorization of their legislatures and at the urging of the federal government, representatives from the seven Colorado River basin states began negotiations regarding the distribution of water from the Colorado River in 1921. In November 1922, an interstate agreement, the Colorado River Compact, was signed by the representatives giving each basin perpetual rights to annual apportionments of 7.5 MAFY of Colorado River water.

5.2.2.2 Boulder Canyon Project Act (1928)

Pursuant to the provisions of the Boulder Canyon Project Act which Congress authorized in 1928, the California Limitation Act, and the Secretary's contracts with the California water users, California was apportioned 4.4 MAFY out of the lower basin allocation of 7.5 MAFY, plus 50 percent of any available surplus water. Further apportionment of California's share of Colorado River water was made by the Secretary entering contracts with California right holders. The Secretary entered into a permanent service water delivery contract with IID on December 1, 1932. The District undertook to pay the cost of the works (Imperial Dam and the All-American Canal) and to include within itself certain public lands of the United States and other specific lands. The United States undertook to deliver to the Imperial Dam the water that would be carried by the new canal to the various lands to be served by it. IID's contract with the Secretary incorporated the provisions of the Seven-Party Agreement. IID's contract has no termination date; it is a contract for permanent water service.

5.2.2.3 California Seven-Party Agreement (1931)

On November 5, 1930, the Secretary of the Interior requested the California Division of Water Resources to recommend a proper method of apportioning the water that California was entitled to receive under the 1922 Colorado River Compact and the Boulder Canyon Project Act. Thereafter, a number of users and prospective users of Colorado River water entered into the Seven-Party Agreement on August 18, 1931. The California Seven-Party Agreement (condensed and summarized in Table 5-1) states the following:

The Division of Water Resources to, in all respects, recognize said apportionments and priorities in all matters relating to State authority and to recommend the [apportionment and priority provisions] to the Secretary of the Interior of the United States for insertion in any and all contracts for water made by him (sic) pursuant to the terms of the Boulder Canyon Project Act.

Table 5-1. Seven-Party Agreement for Apportionments and Priorities[7]

Priority Order	Description	Annual Apportionment (Acre-feet)	Annual Present Perfected Rights (PPRs) (Acre-feet)
1	Palo Verde Irrigation District – for use exclusively on a gross area of 104,500 acres of land within and adjoining the district	3,850,000	**219,790** (or consumptive use for 33,604 acres)
2	Yuma Project (Reservation District) – for use on California Division, not exceeding 25,000 acres of land		**38,270** (or consumptive use for 6,294 acres)
3a	Imperial Irrigation District - for use on lands served by All-American Canal in Imperial and Coachella Valleys		**2,600,000** (or consumptive use for 424,145 acres) - (IID only)
3b	Palo Verde Irrigation District – for use exclusively on an additional 16,000 acres of mesa lands		
4	Metropolitan Water District and/or City of Los Angeles and/or others – for use by themselves and/or others on Southern California coastal plain	550,000	
	Subtotal	**4,400,000**	
5a	Metropolitan Water District and/or City of Los Angeles and/or others on coastal plain	550,000	
5b	City and County of San Diego	112,000	
6a	Imperial Irrigation District - lands served by the All-American Canal (AAC) in Imperial and Coachella Valleys	300,000	
6b	Palo Verde Irrigation District – for exclusive use on 16,000 acres of mesa lands		
	Total	**5,362,000**	
7	California Agricultural Use - Colorado River Basin lands in California	All remaining available water	

As a result of the Seven-Party Agreement, IID agreed to limit its California pre-1914 appropriative water rights in quantity and priority to the apportionments and priorities contained in the Seven-Party Agreement.

5.2.3 IID State Applications and Permits

Following execution of the Seven-Party Agreement, IID filed eight applications with the California Division of Water Rights between 1933 and 1936 to appropriate water pursuant to the California Water Commission Act. These applications each reserved the pre-1914 appropriative rights. However, the applications also incorporated the terms of the Seven-Party Agreement (Table 5-1), including the priority and apportionment parameters into IID's California appropriative applications. Permits were granted on the applications in 1950. A summary of issued permits is shown in Table 5-2.

[7] IID. "2010 Annual Water Report" < http://www.iid.com/Modules/ShowDocument.aspx?documentid=5057>. p 14.

Table 5-2. California Permits Issued to IID

Permit Number	AFY	Place of Diversion	Purpose of Use
7643	7,239,680	Imperial Dam	Irrigation and domestic
7649	5,791,744	Imperial Dam	Power-related
7648	4,343,808	Imperial Dam	Power-related
7647	5,791,744	Imperial Dam	Power-related
7646	5,791,744	Imperial Dam	Power-related
7645	5,791,744	Imperial Dam	Power-related
7644	9,411,584	Imperial Dam	Power-related
7651	1,447,936	Imperial Dam	Power-related

5.2.4 Subordination by Coachella Valley Water District

CVWD was formed in 1918 to protect and conserve local water sources. At the time IID entered into its contract with the Secretary of the Interior, it was anticipated that the lands to be served with Colorado River water in the Coachella Valley to the north would also become a part of IID. However, Coachella farmers eventually decided that they preferred to have their own delivery contract with the Secretary, and an action was brought by the Coachella Valley Water District (CVWD) to protest IID's court validation of the 1932 IID water service and repayment contract with the Secretary of the Interior.

In 1934, IID and CVWD executed a compromise agreement that paved the way for CVWD to have its own contract with the Secretary, and which provided that CVWD would subordinate its Colorado River entitlement, in perpetuity, to IID's entitlement. That is, within the third, sixth, and seventh priority order (Table 5-1), as set forth in the Seven-Party Agreement and California water delivery contracts, IID water use takes precedence over CVWD use. As a practical matter, under Priority 3, CVWD receives what is left of 3.85 MAFY after Palo Verde Irrigation District, Yuma Project, and IID uses are deducted.

In summary, when California is limited to 4.4 MAFY of Colorado River water, IID has senior water rights established under state law in the amount of 3.85 MAFY minus the amounts used by Priorities 1 and 2. Priorities 1 and 2 are not fixed quantities and have ranged from 364,817 AFY to 602,181 AFY over the last 25 years.[8]

5.2.5 IID Present Perfected Rights, and Arizona v. California US Supreme Court Decision (1964, 1979)

The term "present perfected rights" first appeared in the Colorado River Compact executed on November 24, 1922. The Compact provided that present perfected rights to the beneficial use of waters of the Colorado River system are unimpaired by this Compact. The Boulder Canyon Project Act Section 6, effective on June 25, 1929, recognized and protected these rights by providing that "the dam and reservoir ... shall be used; second, for irrigation and domestic uses and satisfaction of present perfected rights in pursuance of Article VIII of said Colorado River Compact ..." Pursuant to the terms of the

[8] "East Brawley Geothermal Development Project SB 610 Water Supply Assessment Review" letter, February 12, 2009, p. 15, and calculations from Derek Dessert, Design Development & Engineering, as emailed to Anisa Divine, June 2012.

Boulder Canyon Project Act, California's 4.4 MAFY of mainstream water was to be used to satisfy "any rights which existed on December 21, 1928." Such rights included present perfected rights within IID's pre-1914 state-law appropriative rights.

Although the United States Supreme Court in Arizona v. California defined "perfected right" and "present perfected rights" in its 1964 Decree, IID's present perfected rights were not quantified until the Supreme Court issued a Supplemental Decree in 1979. That Supplemental Decree defined IID's present perfected rights as a right to Colorado River water:

> *In annual quantities not to exceed (i) 2,600,000 acre-feet of diversions from the mainstream or (ii) the consumptive use required for irrigation of 424,145 acres and for the satisfaction of related uses, whichever of (i) or (ii) is less, with a priority date of 1901.*

IID's present perfected rights are very important because Article II(B)(3) of the Supreme Court Decree provides that in any year in which there is less than 7.5 MAF of mainstream water available for release for consumptive use in Arizona, California, and Nevada, the Secretary of the Interior shall first provide for the satisfaction of present perfected rights in the order of their priority dates without regard to state lines before imposing shortage cutbacks on other junior water right holders.

5.2.6 Colorado River Basin Project Act (1968)

In 1968, Congress authorized various water development projects in both the upper and lower basins, including the Central Arizona Project (CAP). Under the Colorado River Basin Act of 1968, priority was given to California's apportionment over the CAP water supply in times of shortage. Also under the act, the Secretary was directed to prepare long-range criteria for the Colorado River reservoir system in consultation with the Colorado River Basin states.

5.2.7 Quantification Settlement Agreement and Related Agreements (2003)

Due to completion of a large portion of the Central Arizona Project (CAP) infrastructure in 1994, creation of the Arizona Water Banking Authority in 1996, and the growth of Las Vegas in the 1990s, California encountered increasing pressure to live within its Priority 1-4 rights of 4.4 MAFY under the Law of the River. After years of negotiating among Colorado River Compact States and affected California water delivery agencies, the Quantification Settlement Agreement and Related Agreements and associated documents (QSA/Transfer Agreements) were signed by the Secretary of Interior, IID, CVWD, MWD, the SDCWA, and other affected parties on October 10, 2003.

With execution of the QSA/Transfer Agreements, IID's Priority 3(a) consumptive use was capped at 3.1 MAFY for the 45-year term of the IID/SDCWA transfer agreement, with possible extension for an additional 30 years. Apportionment of Colorado River water to California signatories is contained in the Colorado River Water Delivery Agreement: Federal QSA for purposes of Section 5(b) Interim Surplus Guidelines (CRWDA).

5.2.7.1 Colorado River Water Delivery Agreement (CRWDA)[9]

As part of the 2003 QSA/Transfer Agreements among California and federal agencies, the CRWDA was entered into by the Secretary of the Interior, IID, CVWD, MWD and SDCWA. The CRWDA involves the federal government because of the change in place of use of Colorado River water from the All-American Canal to the Colorado River Aqueduct.

The CRWDA lays out how the California 4.4 Plan will be met by quantifying for a specific term of years deliveries of certain Colorado River entitlements within shared priorities, so that transfers may occur. In particular, for the term of the CRWDA, quantification of Priority 3(a) is effected through caps on consumptive use measured at Imperial Dam for IID (3.1 MAFY) and CVWD (330 KAFY). Quantification of Priority 6(a) is effected through quantifying consumptive use amounts to be made available in order of priority to MWD (38 KAFY), IID (63 KAFY), and CVWD (119 KAFY) with the provision that any additional water available to Priority 6(a) be delivered under IID and CVWD existing water delivery contracts with the Secretary. The CRWDA also provides a source of water to effect a San Luis Rey Indian Water rights settlement. The CRWDA provides that the underlying water delivery contract with the Secretary remain in full force and effect. (*Colorado River Documents 2008*, pages 6-12 and 6-13).

Under the terms of the CRWDA, the Secretary of the Interior shall deliver IID's Priority 3(a) consumptive use entitlement pursuant to Exhibit A (Table 5-3); and an annual water consumptive use limit is imposed on IID, pursuant to Exhibit B (Table 5-4). Additionally, the CRWDA satisfies the 2001 Interim Surplus Guidelines (ISG) requirement that a quantification settlement agreement be adopted as a prerequisite to an interim surplus determination by the Secretary.

Table 5-3. Delivery of Priority 3(a) Consumptive Use Entitlement to IID (CRWDA Exhibit A)

Delivered to (entity)	At (point of diversion)	Amount Not to Exceed (AFY)
CVWD	Imperial Dam	103,000
MWD [1 *]	Lake Havasu	110,000[*]
SDCWA [2]	Lake Havasu	56,200
SDCWA [3]	Lake Havasu	200,000
SLR [4]	*See note 4*	*see note 4*
Misc. & Indian PPRs [5]	Current points of delivery	11,500
For benefit of MWD/SDCWA [6]	Lake Havasu	145,000
IID	Imperial Dam	Remainder
IID's Priority 3(a) Total		3,100,000

[1] Agreement for Implementation of a Water Conservation Program and Use of Conserved Water, dated Dec 22, 1988; Approval Agreement, dated Dec 19, 1989. Of amount identified: up to 90 KAFY to MWD and 20 KAFY to CVWD.
[*] By IID/MWD agreement, the 1988 IID/MWD transfer was fixed at 105 KAFY, beginning with calendar year 2007.
[2] Water conserved from construction of a new lined canal parallel to the AAC from Pilot Knob to Drop 3.
[3] Agreement for Transfer of Conserved Water, dated Apr 29, 1998, as amended. As set forth in Exhibit B (Table 5-4), delivery amounts shall be 205 KAF in calendar year 2021 and 202.5 KAF in calendar year 2022.
[4] Water conserved from AAC lining and made available for benefit of SLR Parties under applicable provisions of PL 100-675, as amended. Quantity may vary, not to exceed 16 KAFY, as may point of diversion, subject to terms of Allocation Agreement.
[5] Water to be delivered to misc. and Indian PPRs identified in the Decree in AZ v. CA, as supplemented. Delivery of water will be to current points of delivery unless modified in accordance with applicable law.
[6] As provided in CRWDA subsection 4(g).

[9] 2003 CRWDA: Federal QSA. <http://www.usbr.gov/lc/region/g4000/crwda/crwda.pdf>

Table 5-4. IID Net Consumptive Use Schedule 2003-2077 (KAF, CRWDA Exhibit B)

IID Quantification and Transfers, as of 2011 (KAF) [1]										
Col 1	2	3	4	5	6	7	8	9	10	11
	IID Priority 3(a)									
		IID Reductions								IID Net Available for Consumptive Use (Col 2 - 10)
Year	IID Quantified Amount	1988 MWD Transfer [2]	SDCWA Transfer	AAC Lining	Salton Sea Mitigation SDCWA Transfer [3]	Intra-Priority 3 CVWD Transfer	MWD Transfer w\ Salton Sea Restoration [4]	Misc. PPRs	IID Total Reduction (Σ Cols 3-9) [5]	
2003	3,100	105.1	10.0	0.0	0.0	0.0	0.0	11.5	126.6	2978.2
2004	3,100	101.9	20.0	0.0	15.0	0.0	0.0	11.5	148.4	2.743.9
2005	3,100	101.9	30.0	0.0	15.0	0.0	0.0	11.5	158.4	2756.8
2006	3,100	101.2	40.0	0.0	20.0	0.0	0.0	11.5	172.7	2909.7
2007	3,100	105.0	50.0	0.0	25.0	0.0	0.0	11.5	191.5	2872.7
2008	3,100	105.0	50.0	8.9	26.0	4.0	0.0	11.5	205.4	2825.1
2009	3,100	105.0	60.0	65.5	30.2	8.0	0.0	11.5	280.2	2566.7
2010	3,100	105.0	70.0	67.7	33.7	12.0	0.0	11.5	299.9	2545.6
2011	3,100	103.9	63.3	67.7	0.0	16.0	0.0	11.5	246.4	2915.8
2012	3,100	105	90	67.7	45	21	100	11.5	440.2	2,659.8
2013	3,100	105	100	67.7	70	26	100	11.5	480.2	2,619.8
2014	3,100	105	100	67.7	90	31	100	11.5	505.2	2,594.8
2015	3,100	105	100	67.7	110	36	100	11.5	530.2	2,569.8
2016	3,100	105	100	67.7	130	41	100	11.5	555.2	2,544.8
2017	3,100	105	100	67.7	150	45	91	11.5	570.2	2,529.8
2018	3,100	105	130	67.7	0	63	0	11.5	377.2	2,722.8
2019	3,100	105	160	67.7	0	68	0	11.5	412.2	2,687.8
2020	3,100	105	193	67.7	0	73	0	11.5	450.2	2,649.8
2021	3,100	105	205	67.7	0	78	0	11.5	467.2	2,632.8
2022	3,100	105	203	67.7	0	83	0	11.5	470.2	2,629.8
2023	3,100	105	200	67.7	0	88	0	11.5	472.2	2,627.8
2024	3,100	105	200	67.7	0	93	0	11.5	477.2	2,622.8
2025	3,100	105	200	67.7	0	98	0	11.5	482.2	2,617.8
2026	3,100	105	200	67.7	0	103	0	11.5	487.2	2,612.8
2027	3,100	105	200	67.7	0	103	0	11.5	487.2	2,612.8
2028	3,100	105	200	67.7	0	103	0	11.5	487.2	2,612.8
’29-37	3,100	105	200	67.7	0	103	0	11.5	487.2	2,612.8
‘38-47 [6]	3,100	105	200	67.7	0	103	0	11.5	487.2	2,612.8
‘48-77 [7]	3,100	105	200	67.7	0	50 [8]	0	11.5	484.2	2,665.8

[1] Information conveyed is volume at Imperial Dam from USBR CRWDA Exhibit B. Volumes for 2003-2011 are adjusted for USBR Decree Accounting actual values. For 2003-2011, IID Net Available for Consumptive Use may not equal Col 2 minus Col 10, due to IID uses not reported in this table.

[2] Second Amendment to IID/ MWD 1988 Agreement provides that, starting in 2007, MWD transfer is fixed at 105 KAFY and can be reduced to 101.5 KAFY depending on tailwater return systems conservation and potable water project potentially funded by MWD. IID Total Reduction and IID Net Available for Consumptive Use have been recalculated to reflect this change.

[3] Salton Sea Mitigation volumes may vary based on conservation volumes and method of conservation.

[4] Would transfer water to MWD subject to satisfaction of certain conditions and to appropriate federal approvals, may also be subject to state approvals. *Note: This transfer is not likely to occur given lack of progress on Salton Sea restoration as of 2012.*

[5] Reductions include conservation for 1988 IID/MWD Transfer, IID/SDCWA Transfer, AAC Lining; SDCWA Transfer Mitigation, MWD Transfer w/Salton Sea Restoration (if any), and Misc. PPRs. Amounts are independent of increases and reductions as allowed under the IOPP.

[6] Assumes SDCWA does not elect termination in year 35.

[7] Assumes SDCWA and IID mutually consent to renewal term of 30 years.

[8] Modified from 100 KAFY shown in CRWDA Exhibit B as MWD will provide CVWD 50 KAFY of the 100 KAFY starting in year 46.

Notes: Substitute transfers can be made provided total volume of water to be transferred remains equal or greater than amounts shown consistent with applicable federal approvals. Shaded columns represent amounts that may vary.

Source: QSA CRWDA Exhibit B, p 13 <http://www.usbr.gov/lc/region/g4000/QSA/crwda.pdf>

5.2.7.2 Inadvertent Overrun Payback Policy (IOPP)

The Inadvertent Overrun Payback Policy adopted by the Secretary contemporaneously with the execution of the CRWDA, provides additional flexibility to Colorado River management and applies to entitlement holders in the Lower Division States.[10] The IOPP defines inadvertent overruns as "Colorado River water diverted, pumped, or received by an entitlement holder of the Lower Division States that is in excess of the water users' entitlement for the year." In the event of an overrun, the IOPP provides a structure to payback the overrun for that year.

5.2.7.3 Impacts on Water Supply

The annual water consumptive use limit imposed by CRWDA Exhibit B (Table 5-4) creates complicated accounting for both IID and USBR, and is still evolving. The record included herein represents IID efforts to consolidate USBR and IID numbers. As IID works with USBR to develop consolidated accounting formats, the presentation of these values is likely to be refined and updated. The 3.1 MAFY cap and the water efficiency conservation and transfer programs present unique challenges as data prior to 2003 cannot always be compared or averaged with QSA/Transfer Agreements data absent additional data rectification or benchmarking.

As a result of the QSA/Transfer Agreements, IID will be able to more efficiently deliver Colorado River water to the Imperial Valley. Imperial Valley agricultural water users will be able to more efficiently use their irrigation water; thus, preserving Imperial Valley agricultural output while reducing their use of Colorado River water. The voluntary on-farm efficiency conservation program will financially compensate participants for the water they conserve. USBR will not challenge reasonable and beneficial use under the 43 C.F.R. Part 417 as long as IID participates in the QSA/Transfer Agreements; thus, the Imperial Valley will be able to rely on the senior rights to a large volume of Colorado that IID possesses.

In short, the QSA/Transfer Agreements ensure that IID will receive Colorado River water as scheduled in CRWDA Exhibit B (Table 5-4) and provide the means to allow IID and the customers it serves to elevate their Colorado River water use to efficient 21st Century standards and ensure the continued availability of this precious supply, while meeting delivery obligations as shown in Table 5-5.

The impact of the QSA/Transfer Agreements on the Region's water supply is limitation of the amount of Colorado River water available for delivery by IID to its customers. IID has agreed to 45 years of large-scale water conservation and transfer, increasing from 120,000 AFY in 2003, to 408,000 AFY in year 24 (2026). From 2026 through 2047, the IID reduction is stabilized at 408,000 AFY. The conserved amounts are to be delivered to urban areas in California's Colorado River and Southern Coast Hydrologic Regions.

As shown in Table 5-5, the conserved water will be delivered (volumes at Imperial Dam), as follows:

- 105,000 AFY to MWD, can be reduced by up to 3.5 KAFY subject to tailwater return systems performance and potable projects potentially funded by MWD

[10] 2003 IOPP <http://www.usbr.gov/lc/region/g4000/4200Rpts/DecreeRpt/2006/agreements/IOPP.pdf>

- 200,000 AFY to SDCWA
- 103,000 AFY to CVWD
- 11,500 AFY of Miscellaneous PPRs

These transfers are to be achieved within the 3.1 MAFY cap of Colorado River water and without reducing agricultural productivity; thus, increasing productive water use. Under the QSA/Transfer Agreements, IID is also to deliver mitigation water to Salton Sea in calendar years 2003-2017. Mitigation is being implemented to address impacts throughout the region with particular focus on the Salton Sea.

Table 5-5 presents the amounts to be delivered and the recipients of the conserved water. Table 5-6 shows the conservation practice that is planned to be employed during the period of transition from fallowing to full conservation efficiency (2003 through 2017). The purpose of the fallowing is to provide mitigation water to the Salton Sea. From 2018 on, all of the transferred water can be from efficiency conservation, should IID and the customers it serves decide to follow that course.

Table 5-5. IID Conserved and Mitigation Water Delivery Schedule 2003-2077 (KAF, CRWDA Exhibit B)

		Delivery to:					
QSA Year	**Calendar Year**	**MWD**	**SDCWA**	**Salton Sea Mitigation (SDCWA)**	**CVWD***	**MWD**	**Total Delivery**
1	2003	110	10	5	0	0	120
2	2004	110	20	10	0	0	130
3	2005	110	30	15	0	0	140
4	2006	110	40	20	0	0	150
5	2007	105	50	25	0	0	155
6	2008	105	50	25	4	0	159
7	2009	105	60	30	8	0	173
8	2010	105	70	35	12	0	187
9	2011	105	80	40	16	0	201
10	2012	105	90	45	21	0	216
11	2013	105	100	70	26	0	231
12	2014	105	100	90	31	0	236
13	2015	105	100	110	36	0	241
14	2016	105	100	130	41	0	246
15	2017	105	100	150	45	0	250
16	2018	105	130		63	0	298
17	2019	105	160		68	0	333
18	2020	105	192.5		73	2.5	373
19	2021	105	205		78	5.0	393
20	2022	105	202.5		83	2.5	393
21	2023	105	200		88	0	393
22	2024	105	200		93	0	398
23	2025	105	200		98	0	403
24	2026	105	200		103	0	408
25	2027	105	200		103	0	408
26	2028	105	200		103	0	408
27·45	2029·2047[1]	105	200		103	0	408
46·75	2048·2077[2]	105	200		50	0	355

*or MWD if CVWD declines to acquire
[1] Assumes SDCWA does not elect termination in year 35 when its wheeling agreement with MWD ends.
[2] Assumes SDCWA and IID mutually consent to renewal term of 30 years.
Source: <http://www.usbr.gov/lc/region/g4000/QSA/crwda.pdf>

Table 5-6. Compromise IID QSA Delivery Schedule, 2003-2017 (KAF)

	Delivery for Transfer			Conservation Practice			
1	2	3	4	5	6	7	8
Year	to SDCWA	to CVWD	Total Transfer (Col 2+3) or (Col 5+6)	Efficiency for Delivery	Fallowing for Delivery	Fallowing for Mitigation	Total Fallowing (Col 6+7)
2003	10	0	10	0	10	5	15
2004	20	0	20	0	20	10	30
2005	30	0	30	0	30	15	45
2006	40	0	40	0	40	20	60
2007	50	0	50	0	50	25	75
2008	50	4	54	4	50	25	75
2009	60	8	68	8	60	30	90
2010	70	12	82	12	70	35	105
2011	80	16	96	16	80	40	120
2012	90	21	111	21	90	45	135
2013	100	26	126	46	80	70	150
2014	100	31	131	71	60	90	150
2015	100	36	136	96	40	110	150
2016	100	41	141	121	20	130	150
2017	100	45	145	145	0	150	150
Total	**1,000**	**240**	**1,240**	**540**	**700**	**800**	**1,500**

Source: "QSA by and among IID, MWD, and CVWD, Exhibit C." p 39 of 44. 10 Oct 2010. Volumes at Imperial Dam. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=882>

5.2.8 Other Colorado River Operating Policies and Agreements

A number of other federal operating policies could affect IID diversions, deliveries and operations, and influence the reliability of the Imperial Valley's Colorado River supply under different hydrologic conditions.

5.2.8.1 1970 Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs[11]

These Operating Criteria control operation of the Colorado River reservoirs in compliance with requirements set forth in the Colorado River Compact of 1922, the United States-Mexico Water Treaty of 1944, the Colorado River Storage Project Act of 1956, the Boulder Canyon Projects Act (Lake Mead) and the Colorado River Basin Project Act (Upper Basin Reservoirs) of 1968, and other applicable federal laws.[12] Under these Operating Criteria, the Secretary of the Interior makes annual determinations published in the USBR Annual Operating Plan for Colorado River Reservoirs (discussed below) regarding the release of Colorado River water for deliveries to the Lower Basin States. A requirement to equalize active storage between Lake Powell and Lake Mead when there is sufficient storage in the Upper Basin is included in these operating criteria.

[11] Criteria for Coordinated Long-Range Operation of Colorado River reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1967 (P.L. 90-537). June 8, 1970. <http://www.usbr.gov/lc/region/pao/pdfiles/opcriter.pdf
[12] USBR website: The Law of the River, for Operating Criteria and other agreements visit <http://www.usbr.gov/lc/region/g1000/lawofrvr.html>

5.2.8.2 Annual Operating Plan (AOP) for Colorado River Reservoirs

Annual operating plans are developed in accordance with Section 602 of the Colorado River Basin Project Act (Public Law 90-537); the Criteria for Coordinated Long-Range Operations of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of 1968, as amended, promulgated by the Secretary of the Interior; and Section 1804(c)(3) of the Grand Canyon Protection Act (Public Law 102-575).[13] As part of the AOP process, the Secretary makes determinations regarding the availability of Colorado River water for deliveries to the Lower Basin States, including when normal, surplus, and shortage conditions occur on the lower portion of the Colorado River.

5.2.8.3 2007 Interim Guidelines for Lower Basin Shortages

Circumstances that triggered the need for the 2007 guidelines are described by the USBR, as follows. The Colorado River Upper Basin experienced a protracted multi-year drought which began in October 1999 and ended in 2010. In the summer of 1999, Lake Powell was essentially full with reservoir storage at 97 percent of capacity. However, it became evident with precipitation totals at only 30 percent of average for October, November, and December that the stage was set for the low runoff that occurred in 2000.

In the late 1990s, inflow to Lake Powell was above average and the lake stayed full from 1995 through 1999. As late as September 1999, Lake Powell was still 95 percent full. Inflow into Lake Powell from water years 2000 through 2004 was about half of what is considered average. The 2002 inflow was the lowest recorded since Lake Powell began filling in 1963. However, by August 2011, unregulated inflow volume to Lake Powell in July was 279 percent of average.

Table 5-7. Unregulated Inflow to Lake Powell, 2000-2010 (Percent of Historic Average)

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
62%	59%	25%	51%	49%	105%	73%	68%	102%	88%	73%

Source: USBR website: Drought In the Upper Colorado River Basin <http://www.usbr.gov/uc/feature/drought.html>

Whether a drought exists is determined by comparison with normal hydrology for an area. Normal is defined as a long-term average of annual precipitation data, which may include droughts and extremely wet periods. No single year will ever be normal due to the complexity of weather patterns. Because the occurrence of a drought affects this average, the definition of normal for the American Southwest, will be altered for the next several decades.[14]

In the midst of the drought period, USBR developed the 2007 Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead. By consensus the seven Basin States (Figure 5-1) selected the Preferred Alternative[15] as the new basis for USBR operation of the reservoirs, determining that it best meets all aspects of the purpose and need for the federal action.

[13] For the AOPs, visit <http://www.usbr.gov/lc/region/g4000/aop/>
[14] USBR. Drought in the Upper Colorado River Basin. August 2011. <http://www.usbr.gov/uc/feature/drought.html>
[15] USBR. Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake

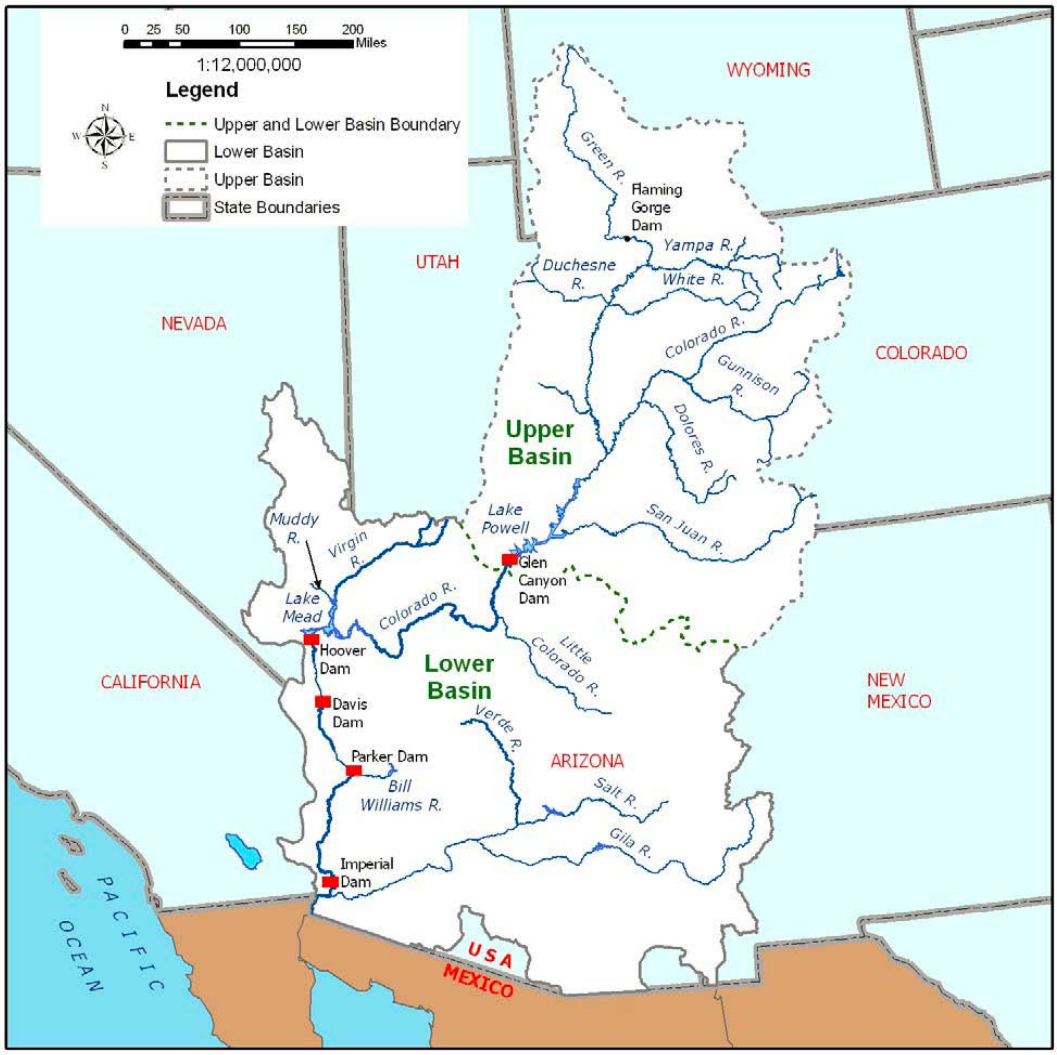

Figure 5-1. Major Colorado River Reservoir Storage Facilities and Basin Location Map.
Source: Final EIS – Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead

The 2007 Interim Guidelines Preferred Alternative highlighted the following:

1. Need to remain in place for the extended period of the interim Guidelines
2. Desirability of the alternative based on facilitated consensus recommendation from Basin States
3. Likely durability of the mechanisms adopted in the Preferred Alternative in light of the extraordinary efforts that the Basin States and water users have undertaken to develop implementing agreements that will facilitate the water management tools (shortage sharing, forbearance, and conservation efforts) identified in the Preferred Alternative

Mead. ROD Dec 13, 2007. <http://www.usbr.gov/lc/region/programs/strategies.html>

4. Range of elements in the alternative that will enhance the Secretary's ability to manage the Colorado River reservoirs in a manner that recognizes the inherent tradeoffs between water delivery and water storage.

Importantly for the long-term stable management of the Colorado River, adoption of this decision activates a legal agreement among the Basin States that contains a critically important provision: the Basin States have agreed to mandatory consultation provisions to address future controversies on the Colorado River through consultation and negotiation, as a requirement, before resorting to litigation. With respect to the various interests, positions and views of each of the seven Basin States, this provision adds an important new element to the modern evolution of the legal framework for the prudent management of the Colorado River.

In June 2007, the USBR announced that a preferred alternative for Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations of Lake Powell and Lake Mead (Preferred Alternative) had been determined.[16] The Preferred Alternative, based on the Basin States consensus alternative and an alternative submitted by the environmental interests called "Conservation Before Shortage," was comprised of four key operational elements. These four key elements of the Preferred Alternative which would guide operations of Lake Powell and Lake Mead through 2026 are:

1. Shortage strategy for Lake Mead and Lower Division states: The Preferred Alternative proposed discrete levels of shortage volumes associated with Lake Mead elevations to conserve reservoir storage and provide water users and managers in the Lower Basin with greater certainty to know when, and by how much, water deliveries will be reduced during low reservoir conditions.
2. Coordinated operations of Lake Powell and Lake Mead: The Preferred Alternative proposed a fully coordinated operation of the reservoirs to minimize shortages in the Lower Basin and to avoid risk of curtailments of water use in the Upper Basin.
3. Mechanism for storage and delivery of conserved water in Lake Mead: The Preferred Alternative proposed the Intentionally Created Surplus (ICS) mechanism to provide for the creation, accounting, and delivery of conserved system and non-system water thereby promoting water conservation in the Lower Basin. Credits for Colorado River or non-Colorado River water that has been conserved by users in the Lower Basin creating an ICS would be made available for release from Lake Mead at a later time. The total amount of credits would be 2.1 MAF, but this amount could be increased up to 4.2 MAF in future years.
4. Modifying and extending elements of the Interim Surplus Guidelines, which determine conditions under which surplus water is made available for use within the Lower Division states. These modifications eliminate the most liberal surplus conditions thereby leaving more water in storage to reduce the severity of future shortages.

[16] USGR website: <http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=17341>. description of the preferred alternative is available on Reclamation's Lower Colorado Region web site, at <http://www.usbr.gov/lc/region/programs/strategies/documents.html>.

The time span to 2026 provides an opportunity to gain operating experience for the management of Lake Powell and Lake Mead and to improve the basis for making additional future operational decisions, whether during the interim period or thereafter.

Figure 5-2 shows how the coordinated operation element allows for the adjustment of Lake Powell releases to respond to low reservoir storage conditions in either Lake Powell or Lake Mead. The ICS water conservation mechanism encourages efficient use and management of Colorado River water, and enhances conservation opportunities in the Lower Basin and the retention of water in Lake Mead.

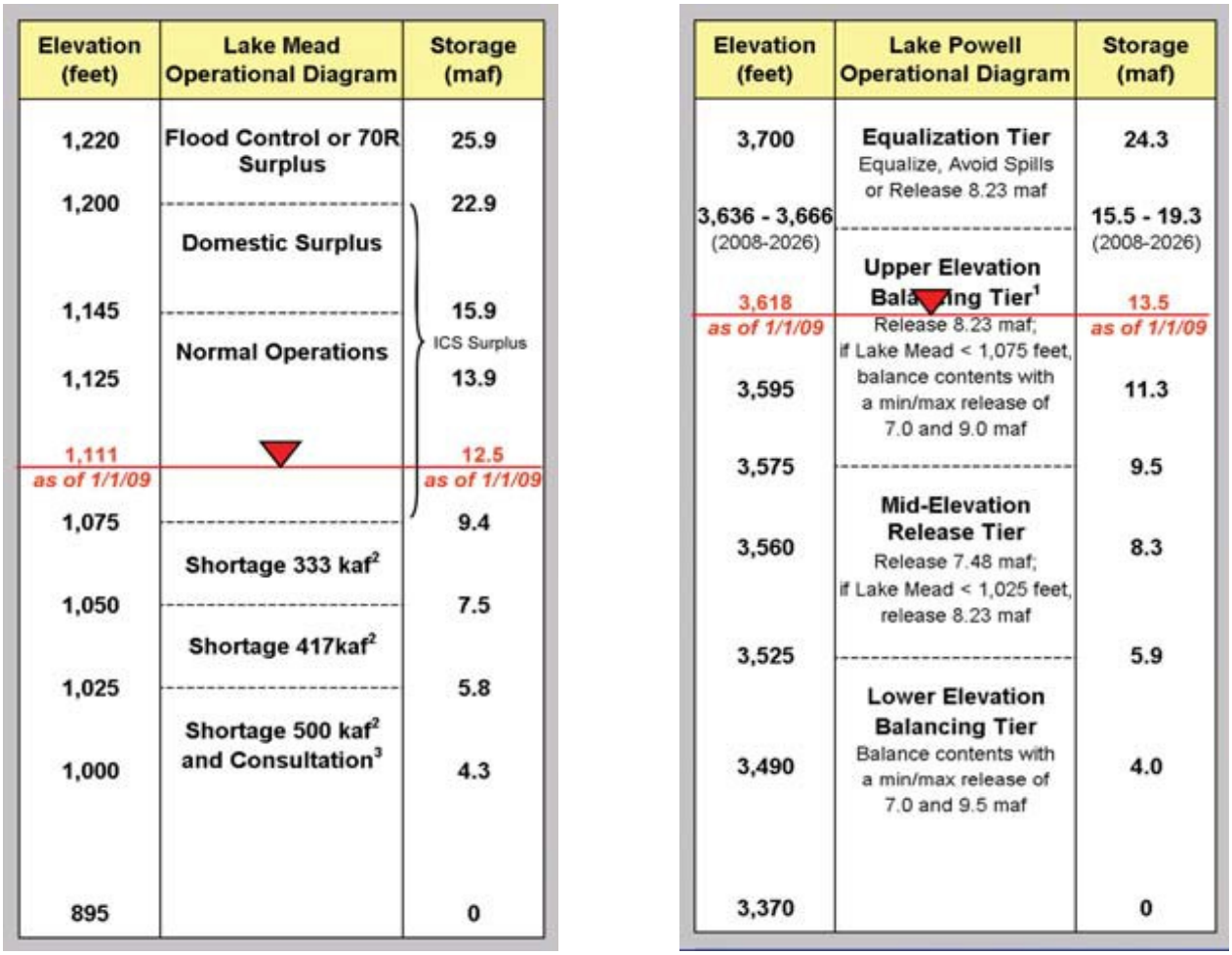

Figure 5-2. Prescribed Operations and Lake Powell and Lake Mead in the Interim Guidelines

[1] Subject to April adjustments that may result in balancing releases or releases according to the Equalization Tier

[2] These are amounts of shortage (i.e., reduced deliveries in the United States)

[3] If Lake Mead falls below elevation 1,025 feet; USDOI will initiate efforts to develop additional guidelines for shortages at lower Lake Mead elevations.

Source: < http://wwa.colorado.edu/IWCS/archive/IWCS_2009_Jan_feature2.pdf>

5.2.8.4 Annual 417 Process

Pursuant to the Code of Federal Regulations Title 43 Part 417 (43 CFR part 417), prior to the beginning of each calendar year, USBR consults, as appropriate, with holders of Boulder Canyon Project Act Section 5

contracts (Contractors) for the delivery of water. IID is one such Contractor. Under these consultations, USBR makes recommendations related to water conservation measures and operating practices in the diversion, delivery, distribution, and use of Colorado River water as stated by USBR in the following the following excerpt:

> *The Regional Director or his (sic) representative will, prior to the beginning of each calendar year, arrange for and conduct such consultations with each Contractor as the Regional Director may deem appropriate as to the making by the Regional Director of annual recommendations relating to water conservation measures and operating practices in the diversion, delivery, distribution and use of Colorado River water, and to the making by the Regional Director of annual determinations of each Contractor's estimated water requirements for the ensuing calendar year to the end that deliveries of Colorado River water to each Contractor will not exceed those reasonably required for beneficial use under the respective Boulder Canyon Project Act contract or other authorization for use of Colorado River water.*[17]

5.3 GROUNDWATER SUPPLY

The Salton Basin, which is comprised of the broad region draining directly into the Salton Sea, lies within the Salton Trough of southern California. The Salton Trough as shown in Figure 5-3 is the dominant feature of the Colorado Desert geomorphic province of California. The Basin is about 130 miles long and up to 70 miles wide, and is generally considered the northwesterly landward extension of the Gulf of California (Loeltz et al., 1975).

While the Salton Trough extends to the Gulf of California; the Salton Trough is a concave desert basin that descends to 235 feet (72 m) below sea level at the Salton Sea. The earth's thin crust in the region, and the proximity of hot magma beneath it, relates to the Imperial Valley's location at the top end of a fault in which tectonic plates are moving apart from one another to form the Gulf of California.

Groundwater storage capacity of the Region has been estimated at approximately 14 MAF of water (CDWR, 1975). Groundwater in the Imperial Region can be discussed in terms of three principal physiographic and hydrologic areas: (1) Imperial Valley (irrigated area), (2) West Mesa, and (3) East Mesa. IID, as water wholesaler, does not derive any of its supplies from groundwater. Groundwater TDS in the Region ranges from hundreds to an extreme of up to tens of thousands of milligrams per liter (ppm). Imperial Valley groundwater is of generally poor quality and is unsuitable for domestic or irrigation use due to high levels of total dissolved solids (TDS), fluoride concentration, and boron concentration. Groundwater in the West Mesa comes from a sole source aquifer of good quality. East Mesa groundwater is largely undeveloped and quality varies, however, the USBR operates the Lower Colorado River Water Supply Project along the All-American Canal, which operates as follows:

> *Under a May 22, 1992 contract with Reclamation, IID and CVWD have agreed to exchange a portion of their rights to divert water from the Colorado River for an equivalent quantity and*

[17] 43 CFR, Subtitle B, Ch. I §417.2. 10–1–07 Edition. "Procedural Methods for Implementing Colorado River Water Conservation Measures with Lower Basin Contractors and Others."<http://www.usbr.gov/cio/im/rules/docs/43%20CFR%20417.pdf>

quality of groundwater ("exchange water") to be withdrawn from a well field located in the Sand Hills along the All-American Canal in Imperial County. IID and CVWD would reduce their diversions from the Colorado River in an amount equal to the volume of groundwater discharged into the All-American Canal up to a maximum of 10,000 acre-feet per year. An amount of Colorado River water equal to the amount of water that would have otherwise been diverted by IID and CVWD would be made available for beneficial consumptive use by Project beneficiaries. The Project facilities are being developed in stages: Stage 1 has a capacity to provide 5,000 acre-feet of exchange water per year. Stage 1 was declared substantially complete on October 1, 1996, and was officially turned over to the IID for operation and maintenance on January 1, 2000. [18]

Figure 5-3. Map of the Salton Basin in Southern California [19]

Source: Ground Water Availability within the Salton Sea Basin: A Final Report, Lawrence Livermore National Laboratory, Jan. 29, 2008. <http://www.usbr.gov/lc/region/saltnsea/SaltonSeaBasinGroundwater.pdfv>

[18] Source: Lower Colorado River Water Supply Act of 1986. <www.crb.ca.gov/083101_3_QA1_rv.doc>

[19] Red dashed line is sea level elevation contour within Salton Trough. Shaded area corresponds to watershed basin, 8360 square miles (21,700 square kilometers) in area. Imported water aqueducts are shown in purple. Thick gray line indicates lined portion of the Coachella Canal in 2008.

5.3.1 Imperial Valley (Central Irrigated Area)

Imperial Valley is located in the central portion of the Imperial Region. Imperial Valley lies south of the Salton Sea, north of the U.S./Mexico International Border, and generally in the 500,000 acre irrigated area between the Westside Main and East Highline canals. Studies of groundwater conditions in the Imperial Valley focus exclusively on the upper 1,000 feet of water-bearing strata; however, data is limited owing to the fact that groundwater in the upper 300 feet of this area is generally of poor quality (saline) and well yields are quite low. In addition, historically there has been little need to investigate and develop the groundwater in the Imperial Valley due to the availability and relatively higher quality of imported Colorado River water.

5.3.2 West Mesa

Located in the southwestern portion of the Imperial Region, West Mesa consists of gently southwest to northeasterly sloping, non-irrigated desert land that lies to the south and east of the Salton Sea, west of the Imperial Valley and east of the Coyote and Jacumba Mountains. With a saturated thickness of about 400 feet and an average depth to groundwater of approximately 100 feet, the aquifer is generally homogenous and of a more coarse-grained nature than the Imperial Valley area. Thus, the data do not indicate separate water-bearing zones or intervening aquitards of any regional significance. Groundwater and surface water flow mimics the topography.

The area includes portions of several relatively small groundwater subbasins for which little direct information is known. The exception to this is the Ocotillo/Coyote Wells Subbasin, for which studies on both the quality and quantity of available groundwater exist (Bookman-Edmonston, 1996; Bookman-Edmonston, 2004; and U.S. Gypsum Final EIR/EIS). Project studies show the sustainable and sole reliance on the Ocotillo-Coyote Wells Groundwater Basin, which was designated a sole source aquifer by the U.S. Environmental Protection Agency in 1996.[20] As a result of this designation, new projects relying on and overlying the Ocotillo-Coyote Wells Groundwater Basin shall be based on safe yield consideration and resource constraints to protect correlative rights of overlying users.

5.3.3 East Mesa

East Mesa is located in the southeastern portion of the Imperial Region, and is described as the broad area that lies that lies to the south and east of the Salton Sea, east of IID's East Highline Canal and to west of the Sand Hills Fault.[21] That is, East Mesa is roughly bordered by East Highline Canal on the west, Coachella Canal on the east and the All-American Canal on the south. East Mesa, a non-irrigated alluvial surface that slopes gently northwest towards the Salton Sea, is covered with thin veneers of wind-blown sand. The East Mesa aquifer is chiefly unconfined, homogenous, and composed of coarse-grained deposits of gravels, sands, silts, and silty clays that are thought to be deposited by the Colorado River

[20] 61 FR 47752, 10 Sept 1996, or visit <ftp://ftp.co.imperial.ca.us/icpds/eir/usg/final/17revisions-sect3.pdf>.
[21] Sand Hills Fault (also named Algodones Fault), an easterly splay of the San Andreas Fault system, is mapped as bordering the east side of the Sand Hills (Loeltz et. al., 1975).

during the Pliocene era, 5 million to 1.6 million years ago. Available aquifer storage within East Mesa lying between the East Highline Canal and Coachella Canal is estimated to be one million acre-feet (USBR, 1988). Much of the groundwater in East Mesa was replenished as a result of Coachella Canal seepage.

5.3.4 Groundwater Recharge from Coachella Canal

The 123 mile-long Coachella Canal was completed in 1948. Prior to the Coachella Canal completion in 1948, imported water was not available to the Coachella Valley. The first water deliveries took place in 1949. In the 1960s, CVWD and Desert Water Agency became State Water Project (SWP) contractors. Together, the two agencies use their entitlement to SWP water to replenish the western Coachella Valley aquifer using the Whitewater Spreading Area, Coachella Valley's largest groundwater recharge facility. The combined entitlement is the third largest among SWP contractors. Since 1973, CVWD and DWA have replenished more than 2.5 MAF of imported water at this site. Previously, the water districts relied on rain and snow melt from nearby mountains to naturally replenish the aquifer at the location.[22]

In December 2006, CVWD celebrated completion of a two-year Coachella Canal lining project, the construction of a 34.8-mile concrete waterway to replace two remaining earthen sections of the original canal. The other sections of the 123-mile canal were either lined when built or in the 1980s to conserve water. The latest project conserves net of 26,000 acre-feet of Colorado River water annually that previously seeped into the rugged desert terrain.[23] Opportunities for groundwater development, storage, and conjunctive management are discussed in Chapter 7, while Appendix P provides guidelines for the appropriate groundwater management elements to be included as part of what ultimately is to be an open stakeholder process to create a formal and adopted Groundwater Management Plan with focus on the East Mesa groundwater basin.

5.4 RELIABILITY OF COLORADO RIVER SURFACE WATER SUPPLIES

As discussed under the Law of the River in Section 5.2.2 (above), IID has significant historical legal protections in place to maintain its Priority 3(a) water right to consumptive use of 3.1 MAF per year under the QSA/Transfer Agreements and its Priority 6(a) to 300 KAF per year. IID's present perfected right of 2.6 MAF per year makes the supply very reliable in terms of IID's ability to provide water to the service area even in dry years (as defined by elevations in Lake Mead under the 2007 Interim Guidelines for Lower Basin Shortages) as present perfected rights are the last to be reduced in time of drought. However, given the terms of IID's Priority 3(a) quantification (Table 5-5), even with this level of reliability, IID has begun experiencing years with a supply/demand imbalance (overrun) resulting from fluctuations in agricultural use. This is expected to be exacerbated if municipal (residential, commercial, and urban industrial) and industrial (renewable energy) demands increase as forecasted.

[22] CVWD website: Where does my water come from? <http://www.cvwd.org/about/wherewater.php>
[23] CVWD Media Advisory — Canal Lining Completion <http://www.cvwd.org/news/newsarchive/2006_11_20_Canalliningdedication.pdf>

The reliability and certainty of IID's ability to deliver Colorado River water and to meet its customers' demands are governed by a number of factors as briefly summarized below (a link follows each bulleted item for a detailed discussion found in Section 5.2.2):

1. In years with normal or average Colorado River flows and adequate reservoir storage in Lakes Powell and Mead, IID's allocation will remain capped at 3.1 MAF.[24] (Section 5.2.7)
2. In years with surplus flows of more than 7.5 MAF in the Lower Basin (triggered by elevation of Lake Mead), the Seven-Party Agreement and the QSA/Transfer Agreements provide for diversions above 4.4 MAF for use in California. The likelihood of surplus flows in the Colorado River has been diminished by increased Colorado River water use by Nevada and Arizona and by the 11-year drought (1999-2010) in the Colorado River watershed that resulted in historically low levels in Lake Mead. (Section 5.2.5)
3. Even in drought years, with Lower Colorado River flows less than 7.5 MAF Lees Ferry, existing laws and agreements provide security that IID will receive its annual present perfected right of 2.6 MAF and its overall annual water allocation of 3.1 MAF. However, should levels in Lake Mead fall below 1075 feet (critical shortage), other agreements take effect.[25](Section 5.2.5)

IID's protections are based on the following:

1. 1885 California water right, based on reasonable and beneficial use annually of approximately 7 MAF conveyed to IID on June 22, 1916. (Section 5.2.2)
2. 1922 Colorado River Compact requires the Upper Basin states to ensure the annual supply of 7.5 MAF at Lees Ferry for use by the Lower Basin states (actually stated as 75 MAF over 10 years). Thus, it is the responsibility of the Upper Basin states to provide the full Lower Basin allocation, even in drought years and even if the 10-year running average annual water supply of the river is less than 15.0 MAF. (Section 5.2.2.1)
3. 1931 Seven-Party Agreement provides a schedule of apportionments and priorities. (Section 5.2.5)
4. In 1931, as a result of the Seven Party Agreement, IID agreed to limit its California pre-1914 appropriative water rights in quantity and priority to the apportionments and priorities contained in the Agreement. (Section 5.2.2.3)
5. 1964 Supreme Court decree in California v. Arizona defined the present perfected rights on the Colorado River and set IID's at 2.6 MAF annually because that was the annual quantity historically diverted by IID and used to irrigate 424,145 acres. (Section 5.2.5)
6. 1968 Colorado River Basin Project Act states that all deliveries to the Central Arizona Project (CAP) and all other post-1968 water deliveries are subordinate to pre-existing Colorado River

[24] 2012 IID Approved Diversion is 2,817,798 AF. p 2. <http://www.usbr.gov/lc/region/g4000/hourly/forecast12.pdf>
[25] Water levels in Lake Mead averaged 1093.26 feet for the month of October 2010, before beginning to rise. By December 2012, the average level had risen to 1132.83 feet. Since filling of Lake Mead, average level is 1173 feet. <http://www.usbr.gov/lc/region/g4000/hourly/mead-elv.html>

water rights in the Lower Basin, regardless of each state's allocations under the 1928 Boulder Canyon Project Act. (Section 5.2.5)

7. 1979 Supplemental Decree in *Arizona v. California* retains IID's present perfected rights to use of Colorado River water. If water supply shortages occur along the Colorado River, IID's present perfected rights must be satisfied prior to the satisfaction of any non-perfected rights, regardless of state lines and federal agreements. (Section 5.2.5)
8. 2007 *Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead* provide that shortages in Lake Mead storage (decreasing water levels in the reservoir) will prompt reductions in the annual deliveries to Arizona and Nevada but that California will remain at 4.4 MAF per year.[26]

If California's annual consumptive use remains at 4.4 MAF, then IID deliveries should likewise remain at the levels described in CRWDA Exhibit B (Table 5-5), decreasing form just over 2.97 MAF in 2003 to 2.53 in 2017 (due to required Salton Sea mitigation flow), then increasing in 2018 to just over 2.7 MAF; and declining again until the reduction is stabilized in 2026 at just over 2.6 MAF per year. This reduction in net consumptive use is to be achieved through conservation efficiency practices; thereby, retaining the productivity of the agricultural system and meeting the demand of the existing MCI users, allowing for 3.1 MAF in net annual consumptive use. Values given are volume at Imperial Dam (IID Priority 3(a) Amount equals IID net consumptive use plus IID reductions for QSA transfers and the AAC Lining).[27]

Furthermore, IID has significant historical legal protections in place to maintain its annual Priority 3(a) right to 3.1 MAF of Colorado River water even during periods of lower flow in the Colorado River. These protections are described above in Section 5.2.

5.4.1 Colorado River Historical Annual Flow

Starting in the early 1940s, information about the long-term climate and hydrologic conditions of the Colorado River Basin has been greatly expanded through analysis of tree ring data. These efforts have enabled researchers to reconstruct the annual flows of the Colorado River back to the 1500s and even back to the mid-700s. This new information allows water resource planners and managers to compare the twentieth century gage flow record to the multi-century long-term record.

Table 5-8 summarizes the findings of the most relevant studies to date. The results of tree ring reconstruction studies indicate that the long-term (multi-century) average annual flow of the Colorado River is between 13 MAF and 14 MAF, as shown in Table 5-8. An equally important observation of the tree ring reconstruction efforts has been identification of prolonged drought periods where high flows are absent for over 50 years. Figure 5-4 and Figure 5-5 are graphs of various reconstructions for 1500 to 2000 AD, and for 800 to 2000 AD, respectively.

[26] USBR. Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead. *2007.* < http://www.usbr.gov/lc/region/programs/strategies/documents.html>
[27] USBR Colorado River Water Delivery Agreement. 10 Oct 2003. <http://www.usbr.gov/lc/region/g4000/QSA/crwda.pdf>

Table 5-8. Tree Ring Reconstructions of Annual Colorado River Flow, 1490-2005 (MAFY)

Study	Calibration Period	Gage Data Source	Chronology Type	Regression Approach	Variance Explained	Reconstruction Period	Long-Term Average Flow (MAFY)
Stockton and Jacoby, 1976	1899-1961	Hely, 1969	Standard	PCA with lagged predictors	0.75	1512-1961	14.2
	1914-1961	Hely, 1969			0.78	1512-1962	13.9
		UCRSFIG, 1971			0.87	1511-1961	13.0
		Average of Above			--	1520-1961	13.4
Michaelson et al., 1990	1906-1962	Simulated flows	Residual	Best subsets	0.83	1568-1962	13.8
Hidalgo et al., 2000	1914-1962	USBR	Standard	Alt. PCA w\ lagged predictors	0.82	1493-1962	13.0
Woodhouse et al., 2006	1906-1995	USBR	Residual	Stepwise	0.81	1490-1997	14.7
			Standard	Stepwise	0.84		14.5
			Residual	PCA	0.72		14.6
			Standard	PCA	0.77		14.1
Meko et al., 2007	1906-2003	USBR	Residual	2-Step Regression with PCA	0.60	762-2003	14.7
	1906-2002				0.74	1182-2002	
	1906-2002				0.77	1365-2002	
	1906-2004				0.57	1473-2005	

Chronology Type: Standard chronologies contain low order autocorrelation related to biological persistence; residual chronologies have been pre-whitened and contain no low order autocorrelation.
Regression Approach: Principal Component Analysis (PCA) is principal regression procedure. Best subsets are multiple linear regressions using Mallows Cp to select best subset. Alternative PCA used an algorithm to find the best subset of predictors on which to perform PCA for regression. Stepwise is forward stepwise regression.
UCRSFIG*:* Upper Colorado Region State-Federal Interagency Group
Source: USBR 2007

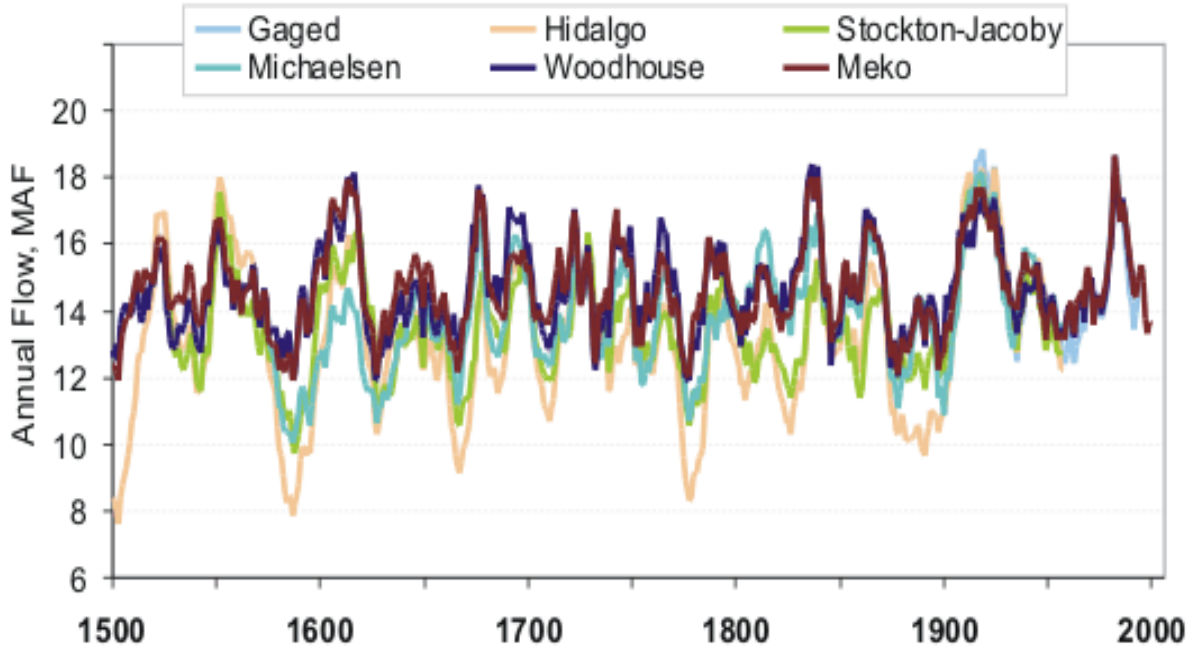

Figure 5-4. Tree Ring Reconstructed Annual Flows of the Colorado River, 1500-2000 AD (MAFY)

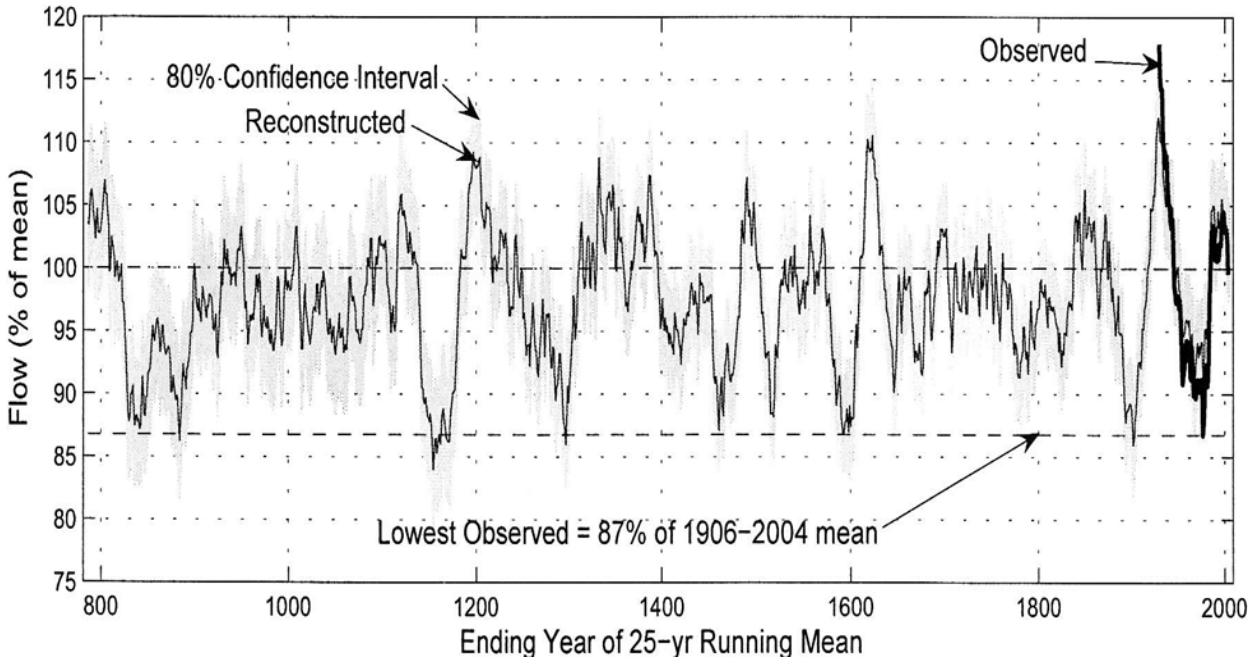

Figure 5-5. Tree Ring Reconstructed Annual Flows of the Colorado River, 800-2000 AD (Percent of Mean)

5.4.2 Historical Data on the Colorado River Water Supply

Colorado River flow at Lees Ferry has been gauged since 1921. By removing reservoir and diversion effects, the USBR has created a "natural flow" record for this site. The long-term (1906 to 2004) annual average natural flow is estimated to be about 15.1 MAF based on the gauge record. The annual natural flow record is shown in Figure 5-6 and Figure 5-7. A few important points can be noted from the natural flow record:

1. The period of 1906 to 1930 and prior was the gauge record available when many of the Colorado River compacts were drafted. This period had a 10-year running average annual flow of about 17.0 MAF, which is higher than most other periods in the gauge record.
2. From 1934 to 1984, the 10-year running annual average was almost always less than 15 MAFY, meaning that the 1922 Compact annual apportionment of 7.5 MAF each to the Upper and Lower Basins could not have been fully satisfied for most of this 50-year period.
3. Annual allocations from the Colorado River total 16.5 MAF, divided as 7.5 MAF each to the Upper and Lower Basins, and 1.5 MAF to Mexico. Long-term average natural flows from the gauge record are less than these total allocations.

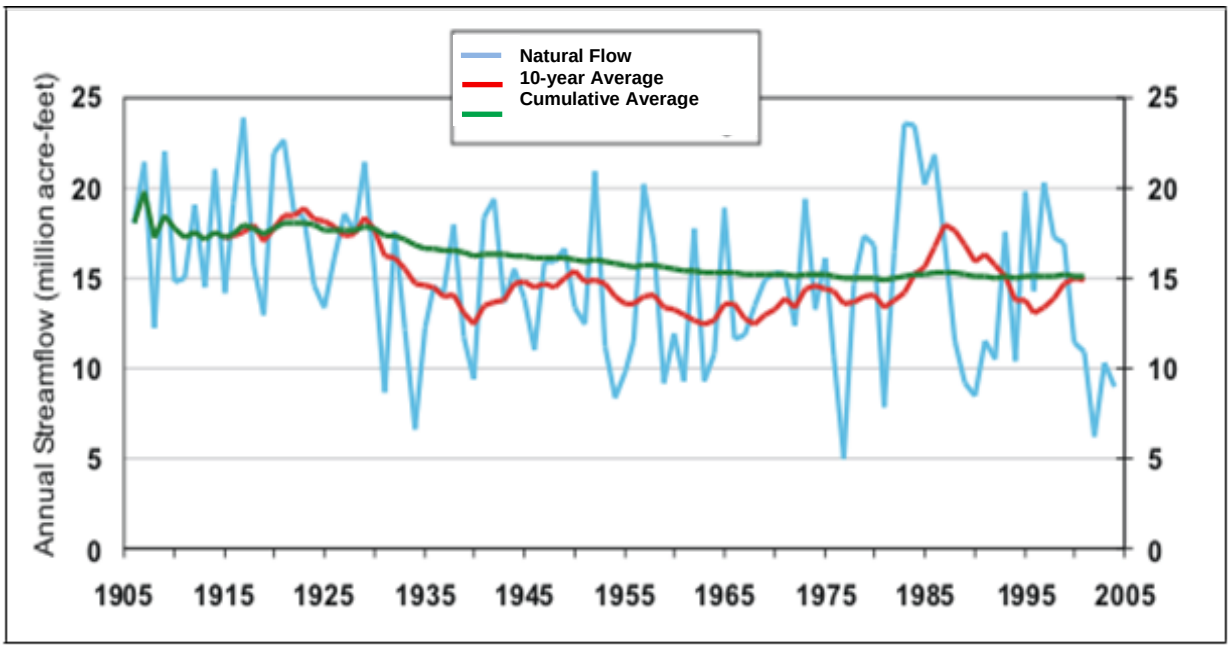

Figure 5-6. Annual Streamflows of Colorado River at Lees Ferry, 1905-2005 (MAFY)

Source: USGS

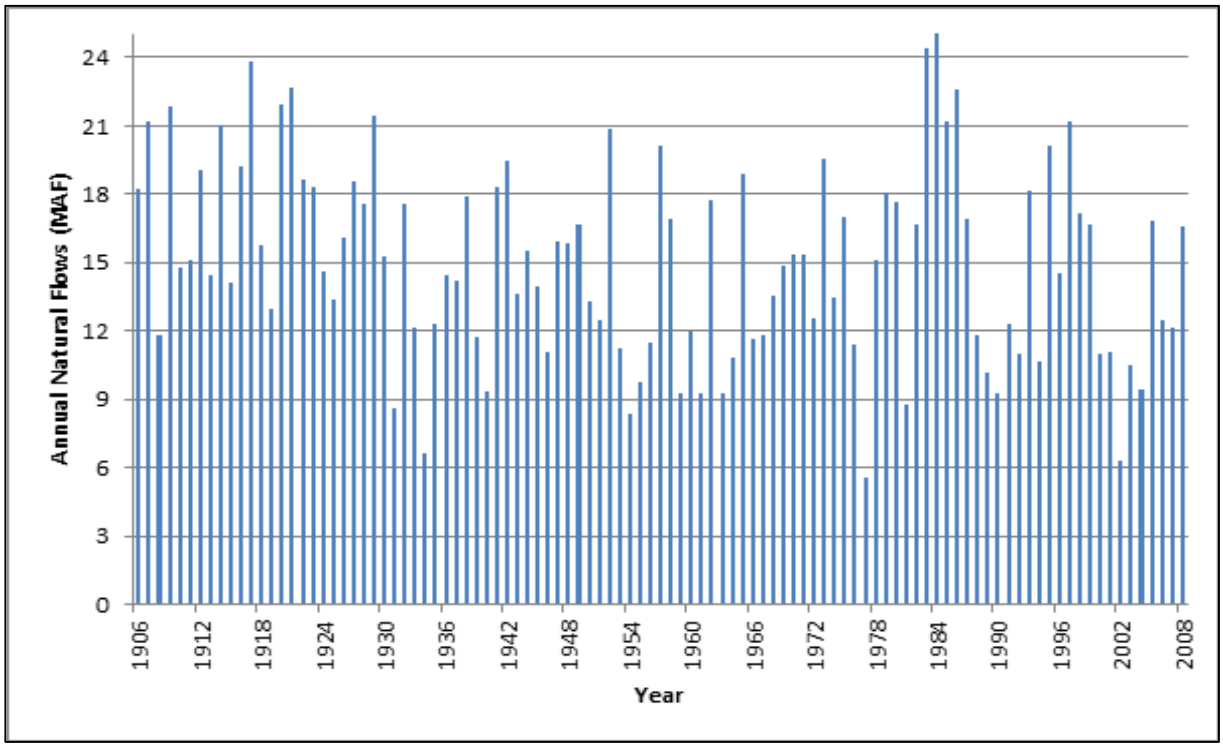

Figure 5-7. Annual Natural Flows of Colorado River at Lees Ferry, 1906-2008 (MAFY)

Source: USGS

Lake Mead reservoir elevations for 1939 to 2011 are shown in Figure 5-8. The variation in recent annual natural flows displayed in Figure 5-7 along with the change in reservoir elevation and, hence, storage shown in Figure 5-8 reveal the role and importance of storage on the Colorado River.

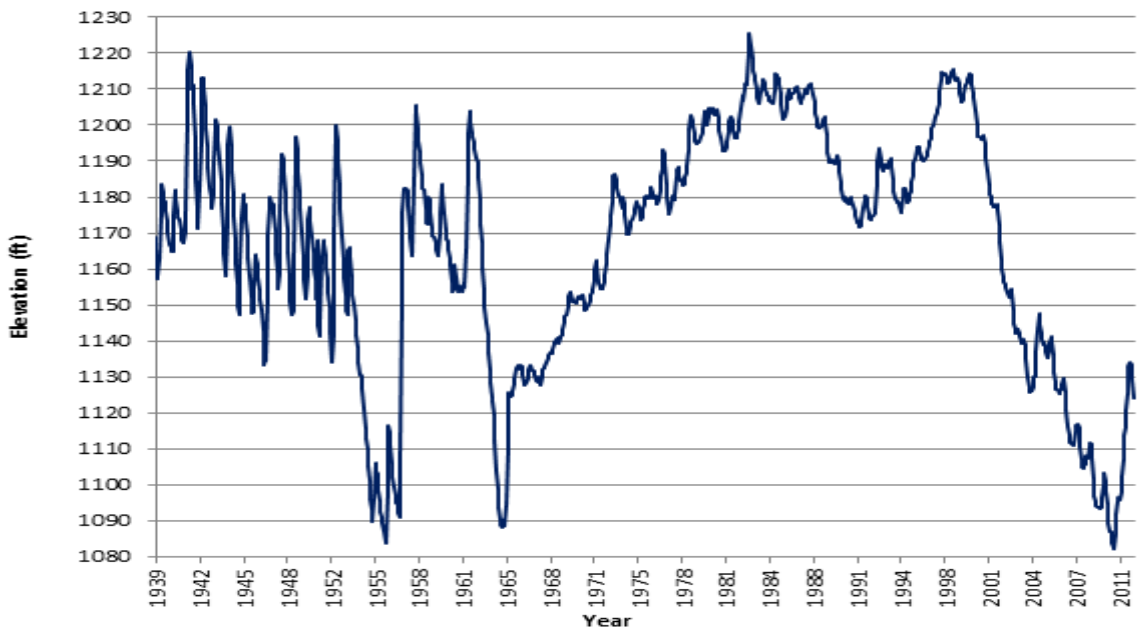

Figure 5-8. Lake Mead Reservoir Elevation, 1939-2011

Source: USBR <http://www.usbr.gov/lc/region/g4000/hourly/mead-elv.html>

5.4.3 Future of Colorado River Supplies

Studies by scientists at the Scripps Institution of Oceanography at the University of California at San Diego indicate that climate change scenarios predict a decrease in annual runoff from the watershed to the Colorado River of about 400,000 acre-feet of water 40 percent of the time by 2025. That is equivalent to the amount of water needed to supply 400,000 to 800,000 households or around 80,000 acres of irrigated agriculture in the desert southwest.[28]

Under this scenario, the Colorado River would be able to provide all of its allocated water only 10 to 40 percent of the time. USBR, using a different set of calculations, reached a similar prediction; that by 2050, the Colorado River could run short 58 to 73 percent of the time (meet allocated flows 27 percent to 42 percent of the time). These findings are significant because decreased supplies on the Colorado River would affect the water and energy supply for both of millions of people and hundreds of thousands of acres of irrigated farmland that supply up to 25 percent of the nation's winter vegetables as well as a myriad of other crops.

Several studies since 1979 have looked at potential impacts that changes in average temperature and precipitation might have on the flow of the Colorado River. Table 5-9 provides a brief summary of some relevant studies that include hydrological models and statistical analyses. However, it is to be borne in mind that while results of global climate models have improved over time, they are not necessarily more accurate than scenario results based on temperature and precipitation inputs into statistical

[28] Study: Shortages Likely on Colorado by 2050. Associated Press. April 21, 2009. <http://trib.com/news/state-and-regional/article_55cf4396-d8af-5b09-aca7-4abb17cb32b4.html>

hydrologic regression analyses. Similarly, hydrologic models can capture many of the processes that affect basin runoff, but their complexity harbors uncertainty and error.

The general conclusion from the model results shown in Table 5-9 is that Colorado River average annual runoff (flow) could decrease by 1 MAF to 3 MAF (6 to 20 percent) in the next few decades as a result of changes in regional temperature and precipitation. In terms of water rights, this should not impact IID's Priority 3(a) quantified amount of 3.1 MAFY of Colorado River water as reported at Imperial Dam.

Table 5-9. Studies of Climate Change Impacts on Colorado River Streamflow

Study	Climate Variable Source	Runoff Generation Technique	Results				
			Temperature Change (^{o}C)	Precipitation Change (%)	Runoff Change (%)	Annual Runoff (MAF)	Notes
Stockton and Boggess, 1979	4 Scenarios on +/-2°C temp change and +/-10% change in precipitation	Empirical, Langbein (1949) historical runoff-temp-precip relationships	+2.0	-10	-33	10	
			+2.0	+10	-33	10	
			+2.0	+10	+50	23	
			+2.0	-10	0	15	
Revelle and Waggoner, 1983	Regression equation can accommodate any combination of temp and precip	Statistical Regression on Upper Basin historical temp and precip based on period 1931-1976	+2.0	-10	-40	9	Regression explains 73% of variance gage flow record
			+2.0	0	-29	11	
			0.0	-10	-11	13	
Nash and Gleick, 1991, 1993	10 Scenarios / GCM Simulations from 3 models	NWS River Forecasting System (NWS-RFS) Hydrology Model	+2.0	-10	-20	12	(52 results, range 33% to +19%)
			+2.0	0	+4 to +12	14	
Christensen et al., 2004	GCM simulations from PCM for 3 time periods, "Business as Usual" future emissions and a control run (no additional emissions)	Variable Infiltration Capacity (VIC) Hydrology Model	+0.5	-1	-10	14	(Control)
			+1.0	-3	-14	13	(2010-2039)
			+1.7	-6	-18	12	(2040-2069)
			+2.4	-3	-17	12	(2070-2098)
Hoerling and Eischeid, 2008	GCM results from IPCC Fourth Assessment Report, "Business as Usual" emissions	Statistical regression on Palmer Drought Severity Index (PDSI) using data from 1895-1989	+1.4	0	-33	10	(2006-2030)
			+2.8	0	-45	8	(2035-2060)
Christensen and Lettenmaier, 2008	GCM results from IPCC 4th Assessment Report, emission scenarios A2 (high) and B1 (low), for 3 time periods	Variable Infiltration Capacity (VIC) Hydrology Model	+1.2	-1	0	15	(A2, 2040-2069)
			+2.6	-2	-6	14	(A2, 2040-2069)
			+4.4	-2	-11	13	(A2, 2070-2099)
			+1.3	+1	0	15	(B1, 2010-2039)
			+2.1	-1	-7	14	(B1, 2040-2069)
			+2.7	-1	-8	14	(B1, 2070-2099)

Source: USBR, 2007

5.5 Climate Change Impact on Imperial Region Water Demand

Climate change predictions for the Imperial Region were derived by analyzing global climate model (GCM) simulations of past and future climate. Six future climatologies of precipitation, temperature, wind and evapotranspiration in Imperial Region were analyzed to assess the magnitude of predicted climate change. These climatologies are described in more detail in Appendix O. The six climatologies are comprised of three different future greenhouse gas emission scenarios that were simulated using two different GCMs. For the Imperial Region, the results indicate more variation in magnitude of future changes between the two GCMs than among future emission scenarios. Thus, future climate studies should focus on using more GCMs to capture a full range of variability. All climate model runs predict increases in temperature, with greater increases in minimum temperatures (2 percent to 14 percent) than in maximum temperatures (1 percent to 5 percent). The largest predicted increases in minimum temperatures occur in winter and fall. Seasonal patterns of increase in maximum temperature are less consistent across model runs. The narrowing of the range of daily temperatures impacts both wind speed and evapotranspiration. Predicted changes in wind range from decreases of 3 percent to increases of 2 percent. While most model runs predicted small increases of less than 4 percent in evapotranspiration, a few predict evapotranspiration decreases, likely due to decreases in wind speed. However, all model runs consistently predict higher evapotranspiration rates in summer.

The predicted warming will impact crop development and water use, since plants have different water requirements at each growth stage. Growing degree day (GDD) is used as the primary measure for assessing plant development under the influence of heat. GDD is computed by summing mean daily temperatures in excess of 46°F, up to a daily temperature maximum of 90°F. GDD is accumulated from the beginning of the season and is used to predict key growth benchmarks such as flowering and maturity. The analysis shows an increase in the GDD for all seasons with large increases of up to 19 percent in winter and spring by 2050. The results indicate that crop water use is likely to increase if cropping patterns remain unchanged.

Predictions of change in precipitation are less consistent across the six model runs with the largest inconsistencies occurring for fall and summer. Predicted changes in summer rainfall vary between -12 percent and +24 percent while fall rainfall changes of -21 percent to +28 percent are predicted. However, a majority of model runs predict winter precipitation to increase between 3 percent and 19 percent while spring precipitation is predicted to decrease from 15 percent to 30 percent.

While the predicted changes would make for improved winter growing conditions with warmer temperatures, the shift from spring to winter precipitation increases the chances of precipitation during the winter harvest season could damage crops just prior to harvest. Excessive summer heat could lead to seed germination problems, sunburn and lower yields. Increased temperatures throughout the year could lead to alterations in crop growth and water use patterns. Hotter summers could also increase water demand and power consumption for domestic and industrial cooling with associated increases in power generation emissions.

Farmers are sure to respond to weather changes that impact quality and economic value of crop yields; their response may include changing cropping calendars, type and amount of crop planted, etc. These changes would in turn impact water consumption patterns. However, with its 24/7 delivery schedule, these types of changes in demand patterns can be accommodated by IID.

5.6 Greenhouse Gas Emissions Related to Water Services

In the process of transporting, treating or pumping of water, power is expended. Emissions associated with water related activities are attributed to this electricity use. Appendix O presents the GHG analysis for the Imperial Region. The analysis is intended to provide metrics to compute emissions from each type of energy intensive water related activity that presently occurs or is expected to occur due to implementation of IRWMP project alternatives.[29] Energy intensities of water related operations can be multiplied by emissions generated per unit of energy used to obtain the carbon dioxide equivalent (CO_2e) emissions for processing the water.

As of April 2012, water-energy intensity (the amount of energy required to process a million gallons of water) in the Imperial Region is estimated at 3067 kWh/MG for wastewater treatment, 800 kWh/MG for potable water treatment, 314 kWh/MG for non-irrigation agricultural operations, and 1228 kWh/MG for recycling water. Colorado River water is transported by gravity from Imperial Dam to the Region, and IID generates hydropower along the All-American Canal. Therefore, a minus 304 kWh/MG water-energy intensity is associated with water deliveries to the Imperial Region. There are no desalination plants or groundwater banks operating in the Imperial Region. However, typical water-energy intensities from other regions indicate that 2840 kWh/MG is required for water desalination while groundwater pumping requires 2410 kWh/MG. For 2008, IID reported an emissions factor of 1270.9 lbs of CO_2e/MWh of electrical energy generated (excluding exports) or purchased and used within the service area. Net emissions from all water-related activities are negative (-4,926 metric tons of CO_2e emissions) since avoided emissions benefits for hydropower energy generation exceed total emissions from power use in the water sector in the region.

Four project alternatives for creating 100 KAF annually of new water to supplement IID's Colorado River water supply were evaluated in terms of their impacts on greenhouse gases emissions: groundwater banking, recycling wastewater, retiring agricultural land and desalination. The water-energy intensities and electricity emission factors presented above are used in the computations. The results of the project alternatives analysis are presented below:

1. Groundwater banking of underruns yielding of 100 KAF annually runs would cause an increase of about 45,280 metric tons of CO2e in water-related emissions.
2. Recycling projects yielding 100 KAF annually of wastewater would increase emissions by 23,070 metric tons of CO2e.

[29] Does not include Definite Plan or System Conservation Plan project activity, which is outside the scope of the IRWMP.

3. Retirement of agricultural land to obtain 100 KAF annually of water would result in an overall emissions reduction of about 5,907 metric tons of CO2e, excluding reductions in indirect fuel emissions from farm equipment operations and live-cycle emissions from products such as insecticides and fertilizers.
4. Desalination projects yielding 100 KAF annually would lead to an increase of about 53,356 metric tons of CO2e.

Geothermal energy generation cannot be considered as a separate alternative for reducing water use. Geothermal energy is considered a likely future water user as there are plans to develop the resource. Emissions from use of water in geothermal energy generation are between 0.68 lb CO_2e /AF and 0.85 lbs CO_2e /AF. Use of 100 KAFY of water for geothermal energy generation would lead to an emissions increase of between 30 metric tons of CO_2e and 38 metric tons of CO_2e.

An analysis of transportation-related and energy generation emissions in the Imperial Region was performed to provide context to the scale of the water-related emissions. The analysis shows that for 2010, energy generation emissions from the net electrical energy delivered and used within IID amounted to 2.022 million metric tons of CO_2e while emissions from fossil-fuel use in transportation amounted to 1.376 million metric tons CO_2e. Even desalination, which is the highest emitting 100 KAFY water project alternative, would contribute less than 4 percent of either the energy generation or transportation-related emissions. The water project alternatives in the Imperial Region will therefore have minimal climate mitigation impacts.

5.7 Forecasted Water Demands Methodology

Colorado River water net consumptive use for the Imperial Valley, under terms and conditions of the QSA/Transfer Agreements, is described above in Section 5.2.7 and below in Section 5.10. Under the QSA/Transfer Agreements efficiency conservation measures are to be implemented and operated to transfer water historically used in the Imperial Region out of the region to urban areas in Southern California. Agricultural water consumptive use is to remain the same unless there is permanent irrigated land retirement as a result of planned land use changes consistent with the Imperial County General Plan, agricultural lands are annexed to an incorporated city consistent with prevailing city general plans, or an area is rezoned or given a Conditional Use Permit for a non-agricultural use. As has been the case historically, annual agricultural demands are expected to vary year-to-year based on commodity markets, rainfall, temporary or long-term fallowing and other factors.

Changes in agricultural use due to the QSA/Transfer Agreements, although described herein, are out of scope for the Imperial IRWMP, because they are the result of years of negotiation, and have been agreed to and signed by California and non-California water agencies, the state of California and the federal government. Potential changes due to urban, geothermal and/or solar voltaic development on agriculture water use are discussed in Chapter 8, on the ecosystem in Chapter 11, and on IID and Imperial Region policy in Chapter 12.

Non-agricultural water demand includes municipal (domestic, commercial, and urban industrial; MCI); industrial (renewable energy); feedlots, dairy and fishery; and environmental uses. Non-agricultural water demand is anticipated to increase over the IRWMP planning horizon (2010 to 2050) from that in the baseline year of 2005.

Historic non-agricultural demands are documented to identify baseline conditions from which to calculate municipal water conservation requirements using methods in the 20x2020 Water Conservation Plan (CDWR, 2010). CDWR guidelines define the methodology for forecasting MCI demand and for calculating the 20 percent conservation goal to be achieved by the year 2020. Future MCI demands were forecasted consistent with CDWR methods. Multiple future municipal demand scenarios were developed based on population growth projections and on population growth associated with adopted land use plans and for future demands with conservation and without conservation. These are presented in Appendix D Historical and Future Municipal, Commercial, and Industrial Water Demands.

This section summarizes the historical and future non-agricultural water use, which are presented in detail in Appendix D. This section summarizes the data, methods and assumptions used for forecasting demands both with and without water conservation for areas within and outside of the Imperial Valley, which comprises the IID water service area.

5.7.1 Data, Methods, and Assumptions

California legislation that shapes CDWR requirements for establishing baseline conditions, forecasting future water demands, and calculating MCI conservation saving goals include:

- CDWR methods for 20x2020 Water Conservation Plan, Water Conservation Act of 2009 [30]
- CDWR Urban Water Management Plan (UWMP) Guidelines [31]

Updated methodologies were provided by CDWR in 2010 Urban Water Management Plan Guidebook (Final) and in Methodologies for Calculating Baseline Compliance Urban Per Capita Water Use Requirements Report (Water Conservation Act of 2009) (CDWR, 2011) to be adhered to when preparing urban water management plans. CDWR methods were used to forecast future demands, meet state requirements and ensure consistency between the Imperial IRWMP and UWMPs prepared by the cities in the Imperial Region. Appendix D technical analysis included:

1. Evaluating historic population, land use, and water supply data
2. Describing assumptions related to water demand on a per capita, per acre, and EDP apportionment basis and to the renewable energy(geothermal and solar thermal) industry
3. Using published and stakeholder data to project changes in population to 2050
4. Using County general plan and community plans to project changes in land uses to 2050

[30] Steinberg. "Senate Bill SBx7-7 Water Conservation Act of 2009." <http://www.water.ca.gov/wateruseefficiency/sb7/>
[31] CDWR. "Guidebook to Assist Urban Water Suppliers to Prepare a 2010 Urban Water Management Plan." Mar 2011. <http://www.water.ca.gov/urbanwatermanagement/docs/2010FinalUWMPGuidebook_linked.pdf>

5. Calculating annual per capita water use in acre-feet per capita per year (AFCY) and gallons per capita per day (GPCD) and applying to population-based forecasting methods
6. Calculating annual acre-feet per acre (AF/AC) and gallons per acre (Gal/AC) for land use-based forecasting methods
7. Calculating acre-feet per year (AFY) and million gallons per day (MGD) to forecast MCI water demand using the EDP Apportionment method
8. Calculating acre-feet per year (AFY) and million gallons per day (MGD) to forecast renewable energy (geothermal and solar thermal) industry water demands to 2050
9. Evaluating municipal and renewable energy water conservation goals and assumptions
10. Comparing demand forecasting methods and selecting a methodology for forecasting Imperial Region municipal demand to 2050

5.7.2 Water Use Sectors

This demand analysis presents historic and forecasted water demands for non-agricultural water use. IID 2009 Regulations for Equitable Distribution Plan defines non-agricultural water as:

> *Water used for municipal needs (domestic, commercial, and urban industrial), industrial needs (geothermal, solar, and thermal), feed lots, dairies (and fish farms), or Environmental Resources Water.* (EDP, p 3)

Municipal (MCI) water demand for each city is included in a single IID wholesale account number. Future water demands for the renewable energy industry were calculated and evaluated separately since they represent the largest potential future increase.

5.7.3 Historic Population and Demographic Data

Population data from the Imperial Valley Association of Governments (IVAG) and California Department of Finance (CDOF) were used to forecast demand in five-year increments (CDWR, 2011). Table 5-10 and Figure 5-9 show the 2000 through 2009 population for the cities in the Imperial Valley.

Table 5-10. Historic Population for Cities within IID Water Service Area, 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brawley	21,980	21,760	21,531	21,609	21,852	21,934	22,037	22,314	22,593	23,342
Calexico	27,340	28,274	30,423	32,093	33,630	35,113	36,230	37,095	37,978	38,827
Calipatria	7,314	7,514	7,538	7,552	7,606	7,636	7,601	7,595	7,566	7,685
El Centro	38,126	37,773	37,661	37,664	37,876	38,966	39,797	39,476	40,081	41,241
Holtville	5,597	5,545	5,490	5,462	5,411	5,356	5,283	5,359	5,396	5,487
Imperial	7,714	7,855	8,033	8,784	9,423	9,470	11,406	12,580	13,444	13,878
Westmorland	2,114	2,093	2,071	2,060	2,043	2,203	2,170	2,168	2,185	2,221
Total	**112,185**	**112,815**	**114,749**	**117,227**	**119,845**	**122,683**	**126,530**	**128,594**	**131,251**	**134,690**

Source: US Census, *Population Estimates, Incorporated Places and Minor Civil Divisions, All Place: 2000 to 2009, California.*

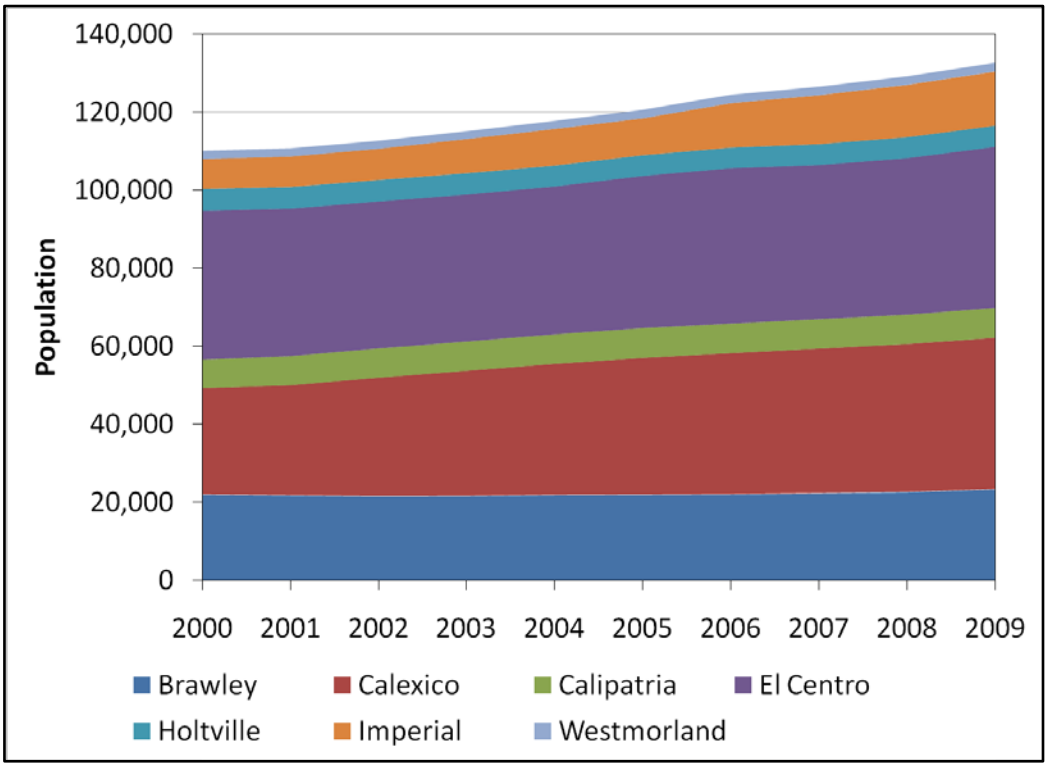

Figure 5-9. Imperial Region City and Community Population, 2000-2009

Table 5-11 provides 2000 census demographic data including population, number of housing units, average household size, land area, population per acre, and housing units per acre for Imperial Valley cities. Total population for incorporated cities within the IID water service area rose from 110,185 in 2000 to 132,681 in 2009, about 20 percent over the 10-year period. The City of Imperial had the largest growth between 2000 and 2009 with an increase of 6,164. Unincorporated communities, which are not included in the census data, make up about 12 percent of Imperial Region's municipal population. (See Table 5-12)

Table 5-11. Demographic Data for Cities within IID Water Service Area, 2000

	Population [1]	Housing Units [1]	Average Household Size [2]	Land Area Acres [3]	Population per Acre [4]	Housing Unit per Acre [5]
Brawley	21,980	7,038	3.1	2,686	8.2	2.6
Calexico	27,340	6,983	3.9	3,188	8.6	2.2
Calipatria	7,314	961	7.6	467	15.7	2.1
El Centro	38,126	12,263	3.1	5,050	7.5	2.4
Holtville	5,597	1,617	3.5	525	10.7	3.1
Imperial	7,714	2,385	3.2	964	8.0	2.5
Westmorland	2,114	677	3.1	189	11.2	3.6
Total	**110,185**	**31,924**		**13,069**		
Weighted Average			**3.6**		**8.4**	**2.4**

[1] Data from Population Estimates, Incorporated Places and Minor Civil Divisions, All Place: 2000 to 2009, California.
[2] Average household size calculated by dividing population by housing units.
[3] Data extracted from AutoCAD files provided by Imperial County Planning Department, LAFCO and City of Calexico.
[4] Population per acre calculated by dividing population by land area.
[5] Housing unit per acre calculated by dividing housing unit by land area.
Source: US 2000 Census

5.7.4 Future Population

Based on IVAG historical data, average annual growth rate for the Region's incorporated municipal areas for 2010 to 2035 is forecasted as 2.4 percent per year. Seven Specific Plans exist for land within the IID water service area: Imperial Center, Gateway of Americas, and Mesquite Lake are commercial; Rio Bend, Imperial Lakes, McCabe Ranch, and McCabe Ranch II are residential. According to the Specific Plans, land use in these areas was predominantly agricultural. Using this rate and historical population data from Table 5-10, the population forecast was extended to 2050.

For unincorporated communities in the Region, 2006 population estimates were used. One Specific Plan outside the IID Water Service area has received a Conditional Use Permit: Coyote Wells/Wind Zero Specific Plan, which is zoned for low-density residential or desert residential, equivalent to about one housing unit per 40 acres. Future water demand for the Coyote Wells/Wind Zero Specific Plan is expected to be 65 AFY (0.06 MGD) of well water by build-out. Based on SCAG household forecasts for Imperial County, average annual growth rate of unincorporated areas within the Region for 2010 to 2035 was projected to be 3.8 percent per year.[32] This growth rate was used to extend unincorporated 2006 populations to the year 2050, unless otherwise noted.

Figure 5-10 and Table 5-12 present 2010 and forecasted population data for the Imperial Region.

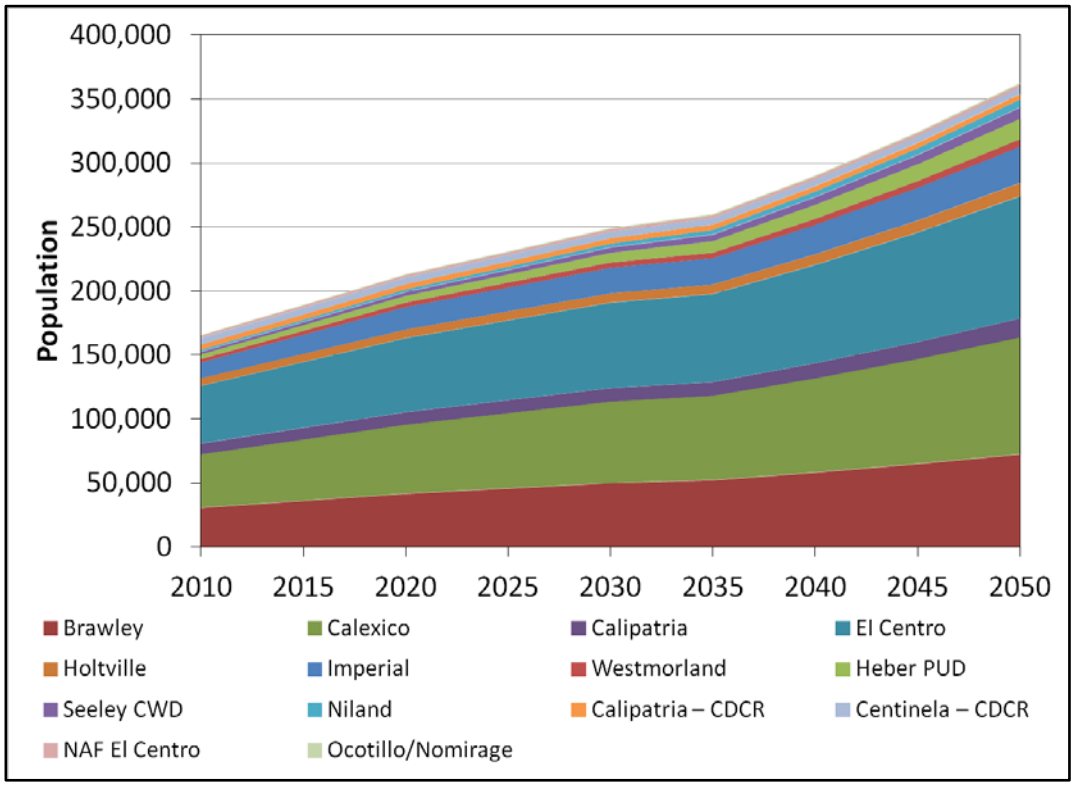

Figure 5-10. Imperial Region Population, 2010-2050

[32] SCAG County Population Forecasts. <http://eltoroairport.org/issues/population.html>

Table 5-12. Forecasted Imperial Region Population, 2010-2050

	2010	2015	2020	2025	2030	2035	2040	2045	2050
Within IID Water Service Area									
Brawley	30,705	36,206	41,707	45,852	49,996	52,266	58,274	64,972	72,441
Calexico	41,653	47,764	53,874	58,751	63,628	65,905	73,481	81,927	91,344
Calipatria [1]	4,381	4,992	5,602	5,997	6,392	6,515	7,264	8,099	9,030
El Centro	45,003	51,406	57,808	62,257	66,705	68,836	76,749	85,571	95,407
Holtville	5,939	6,305	6,671	6,937	7,202	7,309	8,149	9,086	10,130
Imperial	12,321	14,956	17,591	18,783	19,974	20,543	22,904	25,537	28,473
Westmorland	2,846	3,245	3,644	3,934	4,223	4,367	4,869	5,429	6,053
Heber PUD [2]	6,993	8,019	9,045	9,864	10,683	12,325	14,218	16,403	18,923
Seeley	1,957	2,358	2,841	3,424	4,126	4,972	5,991	7,219	8,699
Niland	1,377	1,660	2,000	2,410	2,904	3,499	4,217	5,081	6,122
Calipatria – CDCR [3]	4,180	4,180	4,180	4,180	4,180	4,180	4,180	4,180	4,180
Centinela – CDCR [3]	5,110	5,110	5,110	5,110	5,110	5,110	5,110	5,110	5,110
NAF El Centro [4]	1,692	1,787	1,888	1,994	2,106	2,224	2,349	2,481	2,621
Specific Plan Area [5]	876	1,753	2,629	3,505	4,382	5,258	6,134	7,011	7,887
Total	**165,033**	**189,741**	**214,590**	**232,998**	**251,611**	**263,309**	**293,889**	**328,106**	**366,420**
Outside IID Water Service Area									
West Mesa									
Ocotillo/Nomirage [6]	266	200	200	200	200	200	200	200	200
Specific Plan Area [7]	24	47	71	95	118	142	166	189	213
East Mesa	-	-	-	-	-	-	-	-	-
Region Total	**165,323**	**189,988**	**214,861**	**233,293**	**251,929**	**263,651**	**294,255**	**328,495**	**366,833**

[1] Reported IVAG population minus Calipatria California Department of Corrections and Rehabilitation (CDCR) population.
[2] Heber PUD 2010 population and projections corrected per November 2013 Heber PUD and IID data reconciliation.
[3] No growth is assumed for these CDCR institutions.
[4] Average seasonal population, interpolated at 11% increase over 10 years. Provided by William Kagele, NAF El Centro.
[5] Population estimates extrapolated from Ocotillo/Coyote Wells Hydrology and Groundwater Modeling Study, Table 4-3.
[6] Population estimates from US 2010 Census and stakeholder (Edie Harmon) declining population in Ocotillo/Nomirage.
[7] Unless in Specific Plan, based on Specific Plan land use changes, Table 5-11 demographic data and linear growth to 2050.
Source: *2009 EDP Apportionment*, IID file: *EDP Class data Muni IVAG_CA DoF CHG v31.xls*.

5.7.5 Municipal Per Capita Water Demand

Table 5-13 lists daily per capita municipal (domestic, commercial, and urban industrial) demand in acre-feet per year (AFY) and gallons per day (GPD) for the urban areas within the Imperial Valley.

Table 5-13. Baseline Per Capita Municipal Demand for Cities within IID Water Service Area (AFY, GPD)

Municipal Cities and Communities	*AFY*	*GPD*
Brawley	0.34	301
Calexico	0.17	154
El Centro	0.22	194
Holtville	0.22	196
Imperial	0.25	220
Westmorland	0.26	236
Heber PUD	0.24	211
Calipatria/Niland	0.28	251
Seeley	0.15	133
Population Weighted Average	**0.23**	**205**

Source**:** For Brawley, Calexico and Imperial, 2005 UWMP; for El Centro, 2010 UWMP; for others, IID 2005 delivery record and 2005 IVAG population estimates.

5.7.6 Future Land Use

GIS land use maps were produced based on city and county General Plans and land use diagrams (GEI, 2011).[33] Table 5-14 and Figure 5-11 show projected municipal land use within the Imperial Region assuming full build-out would occur by 2050. Build-out of the spheres-of-influence would result in a nearly 450 percent increase in municipal land use – shown here occurring by the year 2050, which given the 2008 economic downturn is improbable. Outside of the Imperial Valley one Specific Plan has received a Conditional Use Permit: Coyote Wells/Wind Zero Specific Plan, which includes 943 acres.

Table 5-14. Developed Land Use Area within IID Water Service Area, Historic and Forecasted, 2005-2050 (AC)

	Developed Municipal Area									
	2005	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Brawley	2,686	4,193	5,699	7,207	8,714	10,218	11,725	13,231	14,738	16,244
El Centro	5,050	6,576	8,105	9,631	11,158	12,685	14,213	15,739	17,267	18,794
Calexico	3,188	3,893	4,599	5,303	6,008	6,714	7,419	8,124	8,829	9,534
Imperial	964	2,084	3,206	4,326	5,445	6,565	7,685	8,805	9,925	11,045
Calipatria	467	1,651	2,837	4,021	5,206	6,389	7,574	8,758	9,943	11,127
Holtville	525	1,160	1,794	2,428	3,063	3,698	4,333	4,967	5,602	6,236
Westmorland	189	416	646	873	1,101	1,329	1,557	1,785	2,013	2,241
Heber PUD [1]	325	409	493	577	661	745	829	913	997	1,081
Seeley	92	202	313	424	534	645	756	866	977	1,088
NAF El Centro	2,734	2,734	2,734	2,734	2,734	2,734	2,734	2,734	2,734	2,734
Specific Plan Areas	0	862	1,724	2,586	3,448	4,311	5,173	6,035	6,897	7,759
Total	**16,220**	**24,180**	**32,150**	**40,110**	**48,072**	**56,033**	**63,998**	**71,957**	**79,922**	**87,883**

[1] Heber PUD area updated based on November 2013 Heber PUD and IID data reconciliation.
Source: Data extracted from AutoCAD files provided by Imperial County Planning Department, LAFCO and City of Calexico. Heber PUD and Seeley area estimated.

Planned land use changes for renewable energy projects (geothermal and/or solar thermal) would occur on land designated as open space (agricultural land and/or natural habitat) based on the land use policies of Imperial County and of the USBLM which oversees the majority of land in federal ownership in the Imperial Region. Where and when such growth may occur is subject to market forces and proposals from private renewable energy project development interests.

[33] See Volume 2. Appendix D, Historical and Future Municipal, Commercial, and Industrial Water Demands.

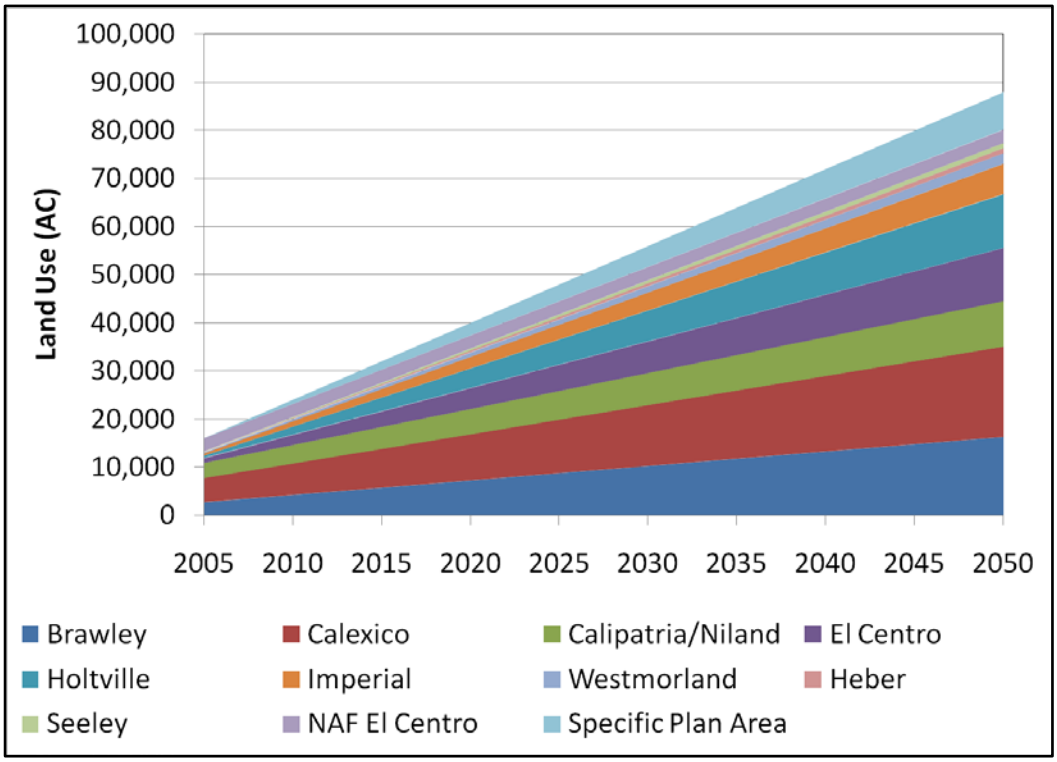

Figure 5-11. Developed Land Use within IID Water Service Area, Historic and Forecasted, 2005-2050 (AC)

5.8 HISTORIC NON-AGRICULTURAL DEMANDS[34]

Imperial region has non-agricultural demands related to municipal, commercial and industrial (MCI) uses as well as renewable energy (geothermal and solar thermal) and environmental resources uses. In addition, IID categorizes feedlots, dairy and fishery as non-agricultural. This convention will be followed in this analysis.

5.8.1 Municipal (Domestic, Commercial, and Urban Industrial) Demand

Municipal water demand historically accounts for around 5 percent of IID's delivered Colorado River water. However, it is expected that MCI water demand will increase with population growth. Figure 5-12 and Table 5-15 provide a summary of historic IID municipal water deliveries in acre-feet per year (AFY) and million gallons per day (MGD) for 1995 to 2009 and 2005 to 2009, respectively (IID water sales record).

Ocotillo/Nomirage, which is outside of the IID water service, has a water demand of less than 100 AFY, which is supplied from local wells accessing a sole-source aquifer.

[34] The IRWMP Planning Grant Agreement's Scope of Work requires "Quantification of current demands and forecast of future demands…" However, for purposes of the Imperial IRWMP, *current* will be referred to as *existing* or *historic*.

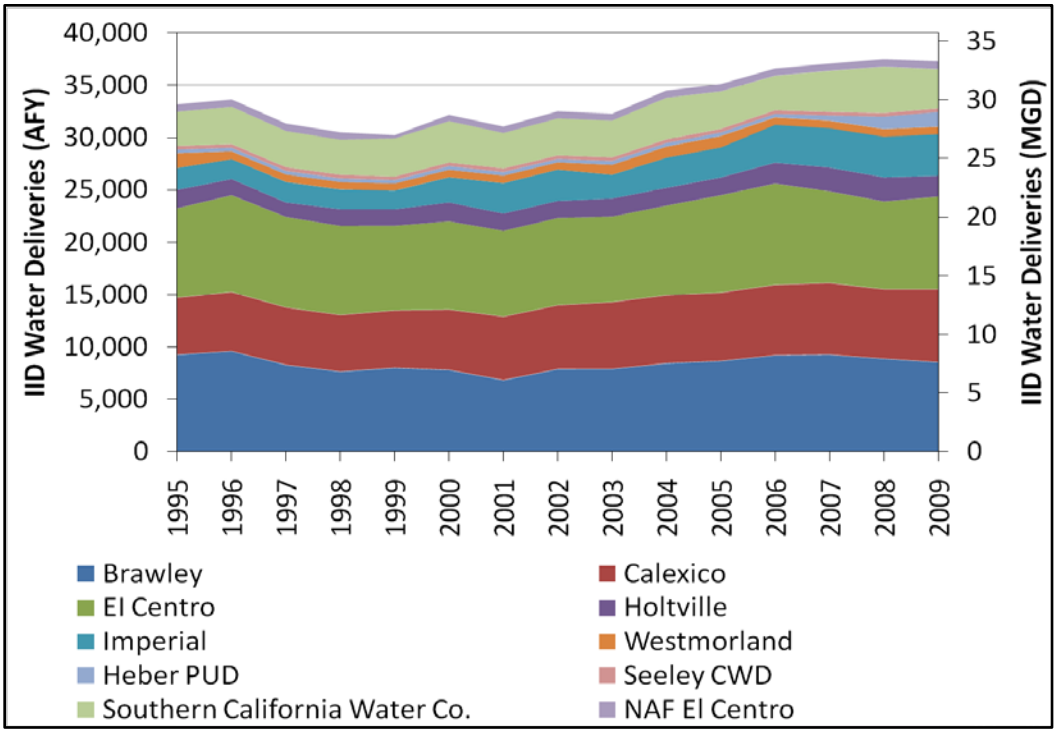

Figure 5-12. IID Municipal Water Deliveries, 1995-2009 (AFY, MGD)

Table 5-15. Historical IID Municipal Water Deliveries, 2000-2009 (AFY, MGD)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Acre-Feet Per Year										
Brawley	7,804	6,830	7,885	7,898	8,442	8,662	9,225	9,280	8,887	8,544
Calexico	5,766	6,048	6,097	6,382	6,506	6,522	6,709	6,833	6,623	6,954
El Centro	8,436	8,202	8,340	8,174	8,549	9,306	9,678	8,756	8,381	8,868
Holtville	1,795	1,666	1,625	1,718	1,700	1,693	1,983	2,260	2,304	1,971
Imperial	2,406	2,886	2,988	2,268	2,885	2,883	3,643	3,786	3,905	3,995
Westmorland	719	721	707	959	1,073	1,099	713	714	730	724
Heber PUD [1]	362	358	341	385	355	352	1,236	1,217	1,193	1,415
Seeley County WD	345	348	338	345	346	342	346	346	351	350
Southern CA Water Co. [2]	3,974	3,420	3,539	3,522	3,982	3,591	3,301	3,927	4,441	3,744
NAF El Centro	592	610	686	655	694	682	685	690	713	761
Total	**32,199**	**31,089**	**32,546**	**32,306**	**34,532**	**35,132**	**37,519**	**37,809**	**37,528**	**37,326**
Million Gallons Per Day										
Brawley	6.97	6.10	7.04	7.05	7.54	7.73	8.24	8.28	7.93	7.63
Calexico	5.15	5.40	5.44	5.70	5.81	5.82	5.99	6.10	5.91	6.21
El Centro	7.53	7.32	7.45	7.30	7.63	8.31	8.64	7.82	7.48	7.92
Holtville	1.60	1.49	1.45	1.53	1.52	1.51	1.77	2.02	2.06	1.76
Imperial	2.15	2.58	2.67	2.02	2.58	2.57	3.25	3.38	3.49	3.57
Westmorland	0.64	0.64	0.63	0.86	0.96	0.98	0.64	0.64	0.65	0.65
Heber PUD [1]	0.32	0.32	0.30	0.34	0.32	0.31	1.10	1.09	1.07	1.26
Seeley County WD	0.31	0.31	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Southern CA Water Co. [2]	3.55	3.05	3.16	3.14	3.56	3.21	2.95	3.51	3.96	3.34
NAF El Centro	0.53	0.54	0.61	0.58	0.62	0.61	0.61	0.62	0.64	0.68
Total	**28.75**	**27.75**	**29.05**	**28.83**	**30.85**	**31.36**	**33.50**	**33.77**	**33.50**	**33.33**

[1] Heber PUD 2000-2005 water delivery records, which are low with respect to 2006-2009, are not validated
[2] Southern California Water Co. provides water to Calipatria, Niland, Calipatria CDCR, and Centinela CDCR
Source: Imperial Irrigation District Water Department

5.8.2 Industrial (Renewable Energy) Demand

Table 5-16 provides a summary of water demand for renewable energy plants for both construction and operation in and around the Imperial Region. This information is from the California Energy Commission website and from information submitted during the review and approval process for plants located in the Imperial Region and other similar desert environments. As shown in Table 5-16, total water demand in the Imperial Region for geothermal and solar thermal energy is in the range of 32 KAF annually. For planning purposes, water demand for other renewable energy sources such as solar voltaic is relatively small when compared to geothermal and solar thermal energy water use. As such, water demand for other renewable energy sources was not added to geothermal and solar thermal build-out demand.

Table 5-16. Water Use at Geothermal and Solar Thermal Power Plants within Imperial Region

Plant Owner	Plant Name	Type	Capacity (MW Net)	IID Water Use (AFY)	AFY per MW	IID Water Use (MGD)	MGD per MW	Online/ producing energy
CalEnergy Generation	Salton Sea 1	Dual Flash	10	9.9* (One meter)	0.4	0.01	0.0003	
	Salton Sea 2		17					
	Salton Sea 3	Dual Flash	50	399* (One meter)	4.4	0.36	0.0040	
	Salton Sea 4		40					
	Salton Sea 5	Dual Flash	49	1200*	24.5	1.07	0.0219	
	Del Ranch	Dual Flash	42	948*	22.6	0.85	0.0202	
	Vulcan	Dual Flash	38	164*	4.3	0.15	0.0039	
	Leathers	Dual Flash	42	1354*	32.2	1.21	0.0288	
	Elmore	Dual Flash	42	1910*	45.5	1.71	0.0406	
	CE Turbo	Single Flash	10	-*	-	-	-	
	Black Rock 1,2,3 ^	Single Flash	195	483 Est.*	2.5	0.43	0.0022	NO
	Black Rock 4,5,6 ^	Single Flash	195	483 Est.*	2.5	0.43	0.0022	NO
EnergySource	Hudson Ranch 1	Dual Flash	49.9	850 Est.	17.0	0.76	0.0152	
	Hudson Ranch 2	Dual Flash	49.9	850 Est.	17.0	0.76	0.0152	In 2015
Ormat Technologies	Ormesa 1	Binary	38	1665	43.8	1.49	0.0391	
	Ormesa 1E	Binary	8	923	115.4	0.82	0.1030	Shut down
	Ormesa 1H	Binary	12	1040	86.7	0.93	0.0774	
	Ormesa 2	Binary	18	1993	110.7	1.78	0.0989	
	GEM 2	Dual Flash	22	-	-	-	-	
	GEM 3	Dual Flash	18	-	-	-	-	
	Heber 1	Dual Flash/ Binary	52	1800	34.6	1.61	0.0309	
	Heber 2	Binary	48	3663	76.3	3.27	0.0681	
	North Brawley **	Binary	49.9	6600 Est.	132.3	5.89	0.1181	
	East Brawley ^	Binary	49.9	5500 Est.	110.2	4.91	0.0984	NO
Ram Power	Orita	Dual Flash	50	800 Est.	16.0	0.71	0.0143	NO

*Past 10 year average use from IID delivery gate meters
** Under construction (partially operational)
^ Proposed project

5.9 FUTURE NON-AGRICULTURAL DEMANDS

Future water demand in the 2009 Regulations for EDP is categorized into four main groups:

- Municipal (domestic, commercial, and urban industrial)
- Industrial (renewable energy, geothermal, solar, thermal)
- Feedlots, dairies, and fisheries
- Environmental resources

5.9.1 Municipal (Domestic, Commercial, and Urban Industrial) Demand

Three methods were used to calculate and compare municipal (residential, commercial, and urban industrial) water demands:

- Per Capita Demand Model
- Land Use Demand Model
- EDP Apportionment Methodology[35]

Application of these methods for forecasting future municipal demands is described in Appendix D.[36]

Per capita demand model results were selected for use in the IRWMP. In the per capita demand model, distribution of demand to the different types of municipal water use (domestic, commercial, and urban industrial) is used to develop total water demand based on projected future population.

Using the projected increase in urban population presented in Figure 5-10, and baseline per capita water demand for each city area presented in Table 5-13, forecasted municipal water demand for 2010 to 2050 was calculated. For communities not listed in Table 5-13, the population weighted average value of 0.23 AFY was used. Table 5-17 and Figure 5-13 present municipal demand for the Imperial Region using the per capita demand model. By 2050, municipal demand within the Imperial Valley is forecast to increase from 33,308 to 85,180 AF (up more than 155 percent from 2010 to 2050), and for areas outside the IID water service area water demands are projected to decrease from 68 to 46 AF (down more than 30 percent from 2010 to 2050).

[35] IID 2009 Regulations for EDP state that future municipal water use is to be calculated as "Base amount of 2006 usage plus current District-wide average use per capita multiplied by the increase in population since 2006."
[36] For calculation details and results for each method, see Appendix D Historical and Future Demand Forecast.

Table 5-17. Municipal Water Demand Calculated Using Water Demand, Per Capita Model, 2005-2050 (AFY)

	Forecasted Demand									
	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Within IID Water Service Area										
Brawley	8,344	10,351	12,206	14,060	15,458	16,855	17,620	19,645	21,903	24,421
Calexico	6,293	7,184	8,238	9,292	10,133	10,975	11,367	12,674	14,131	15,755
Calipatria	1,249	1,445	1,617	1,789	1,900	2,011	2,045	2,391	2,776	3,206
El Centro	9,015	9,778	11,169	12,561	13,527	14,494	14,957	16,676	18,593	20,730
Holtville	1,273	1,304	1,384	1,464	1,523	1,581	1,604	1,789	1,995	2,224
Imperial	2,426	3,036	3,685	4,334	4,628	4,922	5,062	5,644	6,292	7,016
Westmorland	636	752	858	963	1,040	1,116	1,154	1,287	1,435	1,600
Heber PUD	1,025	1,653	1,895	2,138	2,331	2,525	2,913	3,360	3,876	4,472
Seeley County WD	233	292	351	423	510	615	741	892	1,075	1,296
Niland	310	387	467	562	677	816	984	1,185	1,428	1,721
Calipatria – CDCR	961	961	961	961	961	961	961	961	961	961
Centinela – CDCR	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175	1,175
NAF El Centro	368	389	411	434	459	484	512	540	571	603
Total	**33,308**	**38,707**	**44,417**	**50,156**	**54,322**	**58,530**	**61,095**	**68,219**	**76,211**	**85,180**
Outside IID Water Service Area										
Ocotillo/Nomirage	68	61	46	46	46	46	46	46	46	46

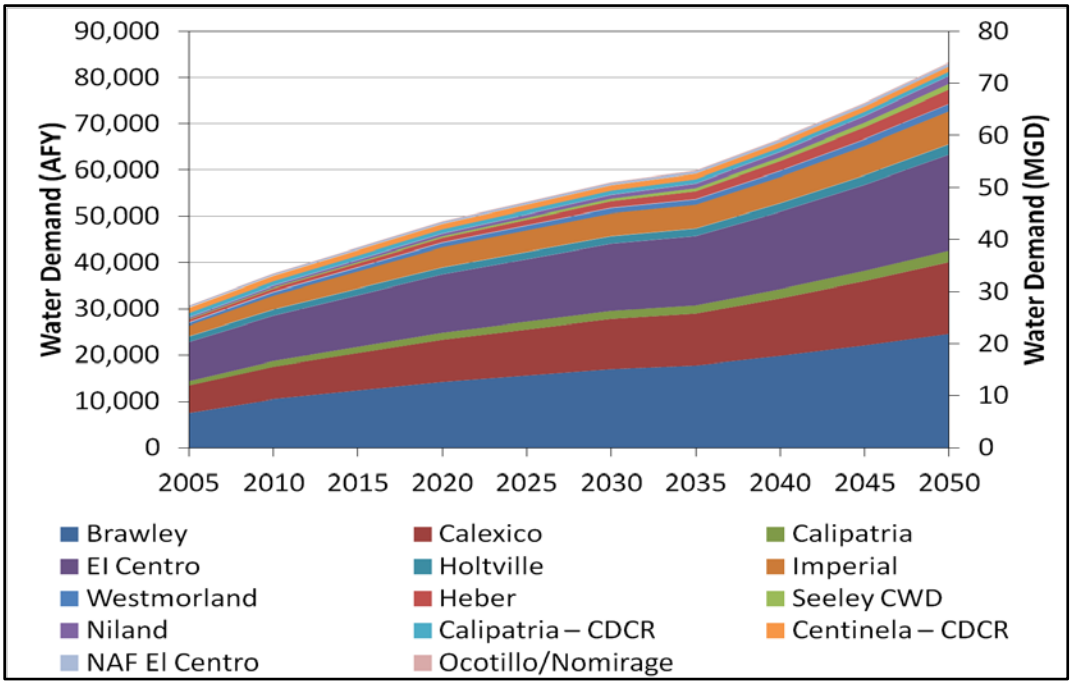

Figure 5-13. Imperial Region Municipal Water Demand, Per Capita Demand Model, 2005-2050 (AFY, MGD)

California's Water Conservation Act of 2009 sets an overall goal of reducing per capita urban water use by 20 percent by December 31, 2020, with the state to make incremental progress towards the goal by reducing per capita water use by at least 10 percent by December 31, 2015.[37] Conservation estimates

[37] Steinberg. Senate Bill X7-7." < http://www.water.ca.gov/wateruseefficiency/sb7/>

are to be calculated using the Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use (CDWR, 2011).[38]

Using the CDWR methodologies, Imperial Region average per capita municipal baseline water demand, 2015 target (10 percent demand reduction), and 2020 target (20 percent demand reduction) were calculated. Table 5-18 shows the CDWR baseline, 2015 interim and 2020 target values for the Region.

Table 5-18. Baseline and Target Per Capita Municipal Water Demand, CDWR 20X2020, 2015 and 2020 (AFY, GDP)

	Baseline (CDWR Methodologies)	2015 Interim Target (10% Demand Reduction)	2020 Target (20% Demand Reduction
AFY	0.25	0.23	0.20
GPD	224	201	179

CDWR Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use

Table 5-19 and Table 5-14 show per capita municipal water demand, with and without conservation based on the CDWR methodologies. In 2050 with conservation the Imperial Region is forecasted to have municipal water demand of 11,950 AFY (10.68 MGD) less than it would have had without conservation.

Table 5-19. Forecasted Municipal Water Demand for Imperial Region, Per Capita Model, 2005-2050 (AFY, MGD)

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Without Conservation										
AFY	33,308	38,707	44,417	50,156	54,322	58,530	61,095	68,219	76,211	85,180
MGD	29.74	34.56	39.67	44.79	48.51	52.26	54.55	60.92	68.06	76.06
With Conservation										
AFY	33,308	38,707	43,475	43,459	46,982	50,548	52,728	58,790	65,593	73,230
MGD	29.74	34.56	38.81	38.80	41.94	45.13	47.07	52.48	58.56	65.38

5.9.1 Industrial (Renewable Energy) Demand

Use of water for cooling purposes at renewable plants is potentially the largest future non-agricultural demand. As with other industries, renewable energy water users within the IID water services area are governed by the terms of the 2009 Regulations for EDP. For 1997 through 2008, average water demand for industrial uses other than renewable energy in the Imperial Region was 7,092 AFY (6.33 MGD). Located in the West Mesa, the U.S. Gypsum Company estimates a baseline groundwater demand of 767 AFY (0.68 MGD), according to the Ocotillo/Coyote Wells Hydrology and Groundwater Modeling Study (GEI Consultants, Inc., 2004). For planning purposes, it was assumed that the historic water demand of other industries will remain around 8 KAF annually going into the future. According to the 20x2020 Water Conservation Plan, industrial water use reduction is to be 5 percent by the year 2015 and 10 percent reduction by the year 2020.

[38] CDWR, 1 Oct 2010. <http://www.water.ca.gov/wateruseefficiency/sb7/docs/methodologies-urban-per-capita-water-use-10042010.pdf>

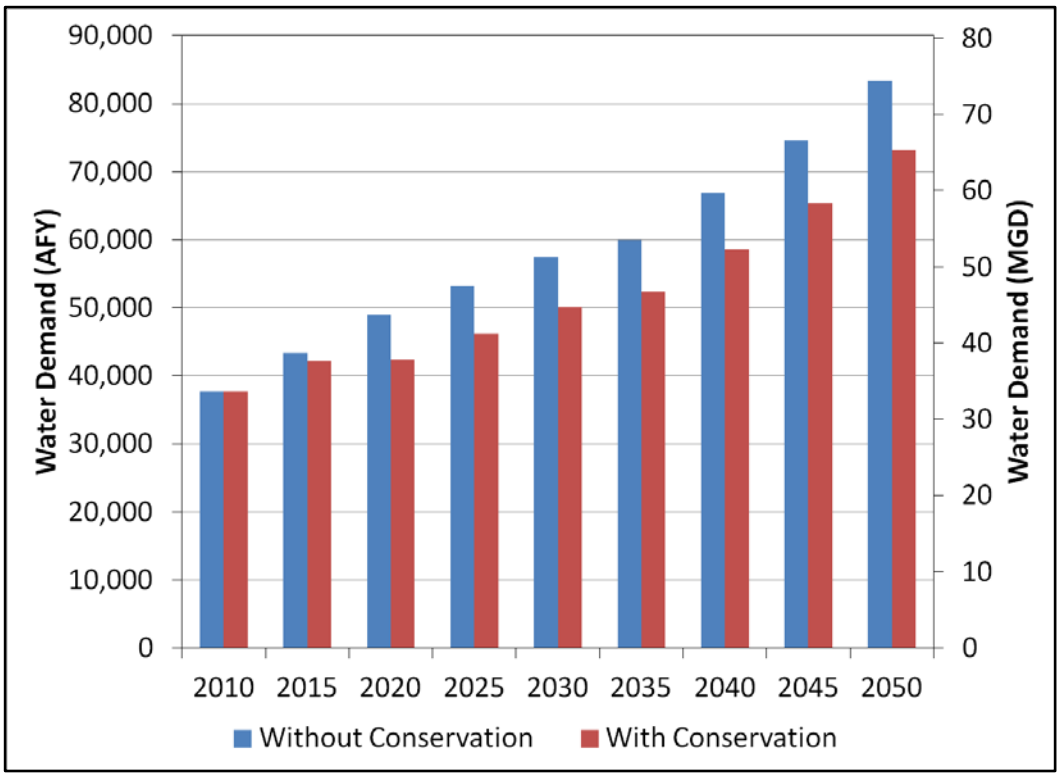

Figure 5-14. Forecasted Imperial Region Municipal Water Demand, with and without Conservation, 2010-2050 (AFY, MGD)

Solar mirror or photovoltaic industries, which are to be developed in the Imperial Region, typically do not require as much water as agricultural users since water is used only for washing the mirrors and dust control. However, solar thermoelectric plants require use of water for cooling. Solar thermoelectric water use varies with the cooling technology with demand similar to binary geothermal plants.[39]

Geothermal water demand shown in Table 5-16 for flash geothermal plants range from 2 to 40 acre-feet per megawatt-hour (AF/MWh) in the Imperial Region, averaging 15 AF/MWh. The binary geothermal plants listed all employ or propose to employ wet cooling and water demand ranges from 43 to 132 AF/MWh, averaging 96 AF/MWh. Geothermal electric power plants use the hot groundwater (steam) as the thermal energy source. Steam sources use steam Rankin-cycle turbines on a smaller scale than coal and nuclear power plants. Northern California Power Authority operates two geothermal power plants and typically withdraws approximately 17 pounds of steam per kilowatt-hour (lbs/kWh) or 2000 gallons per megawatt-hour (Gal/MWh) from the geothermal field. According to the Geothermal Energy Association (GEA), these values are not representative of actual water use for geothermal power plants and point out that the DOE report fails to differentiate between geothermal fluid and freshwater.[40] According to the GEA, geothermal plants use five gallons of freshwater per megawatt hour, while binary air-cooled plants use no fresh water.[41] A recent article in IEEE Spectrum provided water use estimates

39 See Attachment D, Solar and Geothermal Energy Water Use Technical Memorandum of Appendix D, Historical and Future Municipal, Commercial, and Industrial Water Demands.
[40] Geothermal Energy Association. "GEA Issue Brief: Geothermal Energy and Water Consumption." http://www.geo-energy.org/pdf/Geothermal_Energy_and_Water_Consumption_Issue_Brief.pdf Accessed December 2010.
[41] Kagal, Alyssa; Bates, Diana; Gawell, Karl. Geothermal Energy Association. "A Guide to Geothermal Energy and the

for binary and flash systems in the Salton Sea geothermal area using surface water (Binary: 4,463 Gal/MWh (120 AFY), Flash: 361 Gal/MWh (9.7 AFY).[42]

Table 5-20 and Figure 5-15 show forecasted water demands for geothermal, solar thermal, and other industrial users in acre-feet per year (AFY) through 2050. Table 5-21 shows the same water demands in million gallons per day (MGD). The Imperial County General Plan estimates that at full build-out, water demand for renewable energy plants will be 187,859 AFY (167.1 MGD).

Table 5-20. Forecasted Geothermal and Solar Thermal, and Industrial Water Demand within Imperial Region, 2005-2050 (AFY)

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Without Conservation										
Geothermal and Solar Thermal	31,931	48,383	64,835	81,287	97,739	114,192	130,644	147,096	163,548	180,000
Industrial	7,859	7,859	7,859	7,859	7,859	7,859	7,859	7,859	7,859	7,859
Total	**39,790**	**56,242**	**72,694**	**89,146**	**105,598**	**122,051**	**138,503**	**154,955**	**171,407**	**187,859**
With Conservation										
Geothermal and Solar Thermal	31,931	48,383	58,352	65,030	78,192	91,353	104,515	117,677	130,838	144,000
Industrial	7,859	7,859	7,466	7,073	7,073	7,073	7,073	7,073	7,073	7,073
Total	**39,790**	**56,242**	**65,818**	**72,103**	**85,265**	**98,426**	**111,588**	**124,750**	**137,911**	**151,073**

Table 5-21. Forecasted Geothermal and Solar Thermal, and Industrial Water Use within Imperial Region, 2005-2050 (MGD)

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Without Conservation										
Geothermal and Solar Thermal	28.51	43.19	57.88	72.57	87.26	101.94	116.63	131.32	146.01	160.69
Industrial	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02
Total	**35.53**	**50.21**	**64.90**	**79.59**	**94.28**	**108.96**	**123.65**	**138.34**	**153.03**	**167.71**
With Conservation										
Geothermal and Solar Thermal	28.51	43.19	52.09	58.05	69.81	81.56	93.31	105.06	116.81	128.56
Industrial	7.02	7.02	6.67	6.31	6.31	6.31	6.31	6.31	6.31	6.31
Total	**35.53**	**50.21**	**58.76**	**64.36**	**76.12**	**87.87**	**99.62**	**111.37**	**123.12**	**134.87**

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Environment." April 2007.

[42] Adde, Sally and Moore, Samuel K. "In the American Southwest, the Energy Problem is Water." IEEE Spectrum: Inside Technology (website). June 2010.

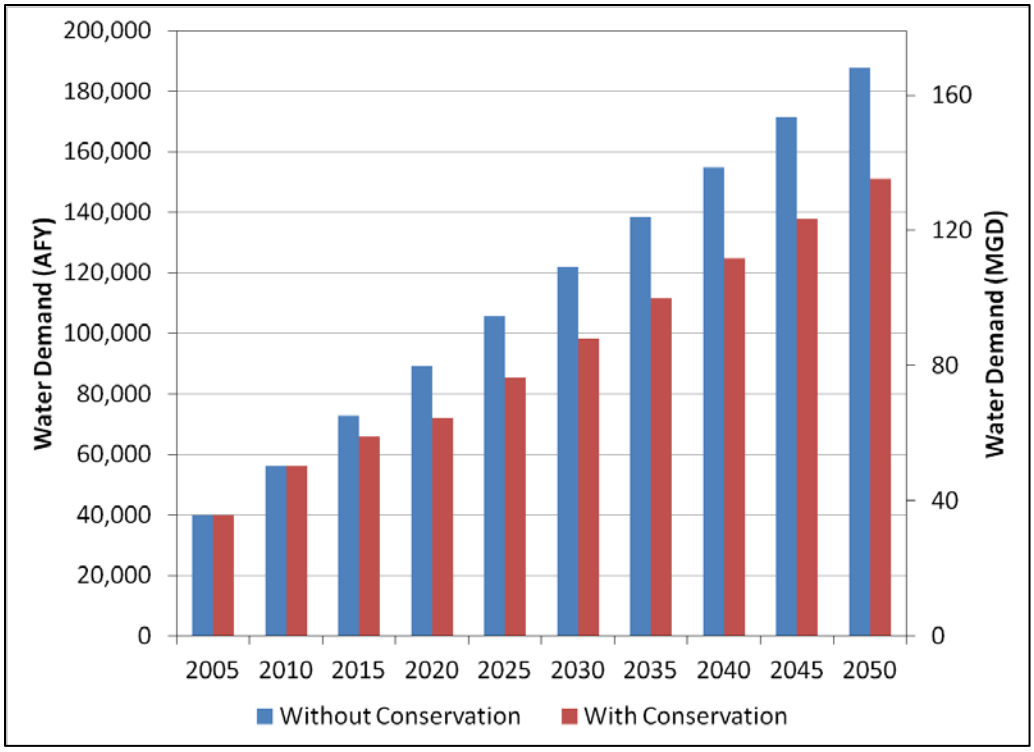

Figure 5-15. Forecasted Imperial Region Industrial Water Demand, 2005-2050 (AFY, MGD)

With conservation, Imperial Region can expect renewable industry (geothermal and solar thermal) water demand of 151,073 AFY (134.87 MGD) less than without conservation in the year 2050.

5.9.2 Feedlots, Dairy, and Fishery Demand

From 1998 to 2008, adjusted annual average water use by feedlots and dairies is estimated at 20,000 AFY (17.86 MGD). Under the 2009 Regulations for EDP, future feedlot and dairy use is based on past use and other considerations. It is assumed that future feedlot, dairy, and fishery water demand will remain unchanged from the average. The 20x2020 Water Conservation Plan only addresses potable water use. Thus, 20 percent reduction in water use is not calculated for feedlot and dairy water demand.

5.9.3 Environmental Resources Demand

Environmental resources water is required for mitigation associated with the QSA/Transfer Agreements.[43] A total of 960 acres of freshwater marsh habitat will be constructed, 320 acres were completed in October 2009, 320 acres more are scheduled for completion by December 2014, with the final acreage to be constructed by December 2019. This project, part of IID's Habitat Conservation Plan, is being developed as mitigation for the QSA/Transfer Agreement programs and for operation and maintenance impacts on drains. Water demand for the managed marsh is 12 AF/AC per year (3.91MG/AC per year) and the water delivered to the marsh must be equivalent to Colorado River water

[43] Water conserved and discharged to the Salton Sea for mitigation associated with the IID/SDCWA transfer is not included in environmental demand.

quality. The marsh complex is designed as a flow through system, with small volumes of water discharged to the IID drainage system.

Additional mitigation efforts may include a 2,000 acre saline habitat complex (does not use freshwater); up to 100 acres of native tree habitat to mitigate for impacts to tamarisk scrub vegetation, a non-native invasive species (will use approximately 500 AFY or 0.45 MGD of fresh water); and desert mitigation (which has no water demand). The 2009 Regulations for EDP include 1,500 AF (489 MG) per year for environmental resources water. Using the marsh complex development schedule, water demand for 320 acres should be 3,840 AFY (3.43 MGD), growing to 11,520 AFY (10.28 MGD) by October 2019. With a fully developed tamarisk mitigation area, the environmental resource water requirement would be 12,020 AFY (10.73 MGD) by 2020 and through 2050.

5.9.4 Cumulative Forecasted Non-Agricultural Demand

Based on Per Capita Model results, Imperial Region total future non-agricultural water demands with conservation is forecasted to be 256,323 AFY (228.86 MGD). From 2005 to 2050, the Region's non-agricultural water demands without conservation are forecasted to increase by 211,961 AFY (over 225 percent), or with conservation by 163,225 AFY (175 percent). Imperial Region historic and forecasted water demand for non-agricultural uses (within and outside the IID water service area) are summarized in five-year increments for 2005 through 2050 in Table 5-22 and Table 5-23.

Table 5-22. MCI Water Demand within and outside IID Water Service Area, Historic and Forecasted, 2005-2050 (AFY)

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Without Conservation										
Municipal	33,308	38,707	44,417	50,156	54,322	58,530	61,095	68,219	76,211	85,180
Geothermal	31,931	48,383	64,835	81,287	97,739	114,192	130,644	147,096	163,548	180,000
Industrial	7,859	7,859	7,859	7,859	7,859	7,859	7,859	7,859	7,859	7,859
Feedlots/Dairies	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Environmental Resources	0	3,840	7,930	12,020	12,020	12,020	12,020	12,020	12,020	12,020
Total	**93,098**	**118,789**	**145,041**	**171,322**	**191,940**	**212,601**	**231,618**	**255,194**	**279,638**	**305,059**
With Conservation										
Municipal	33,308	38,707	43,475	43,459	46,982	50,548	52,728	58,790	65,593	73,230
Geothermal	31,931	48,383	58,352	65,030	78,192	91,353	104,515	117,677	130,838	144,000
Industrial	7,859	7,859	7,466	7,073	7,073	7,073	7,073	7,073	7,073	7,073
Feedlots/Dairies	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Environmental Resources	0	3,840	7,930	12,020	12,020	12,020	12,020	12,020	12,020	12,020
Total	**93,098**	**118,789**	**137,223**	**147,582**	**164,267**	**180,994**	**196,336**	**215,560**	**235,524**	**256,323**

Table 5-23. MCI Water Demand within and outside IID Water Service Area, Historic and Forecasted, 2005-2050 (MGD)

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Without Conservation										
Municipal	29.74	34.56	39.66	44.78	48.5	52.26	54.55	60.91	68.05	76.05
Geothermal	28.51	43.2	57.89	72.58	87.27	101.96	116.65	131.34	146.03	160.71
Industrial	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02	7.02
Feedlots/Dairies	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86
Environmental Resources	0	3.43	7.08	10.73	10.73	10.73	10.73	10.73	10.73	10.73
Total	**83.13**	**106.07**	**129.51**	**152.97**	**171.38**	**189.83**	**206.81**	**227.86**	**249.69**	**272.37**
With Conservation										
Municipal	29.74	34.56	38.82	38.8	41.95	45.13	47.08	52.49	58.57	65.38
Geothermal	28.51	43.2	52.1	58.06	69.81	81.57	93.32	105.07	116.82	128.57
Industrial	7.02	7.02	6.67	6.32	6.32	6.32	6.32	6.32	6.32	6.32
Feedlots/Dairies	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86	17.86
Environmental Resources	0	3.43	7.08	10.73	10.73	10.73	10.73	10.73	10.73	10.73
Total	**83.13**	**106.07**	**122.53**	**131.77**	**146.67**	**161.61**	**175.31**	**192.47**	**210.3**	**228.86**

Table 5-24 and Table 5-25 show baseline (2005), and forecasted water demand (2050) with and without conservation, for five non-agricultural water demand categories. For the 2050 forecasted non-agricultural water use, a 49,190 AF conservation reduction is included for within IID water service area and a 50 AF conservation reduction for outside IID water service area.

Factors that could potentially affect future non-agricultural water demands include:

- Imperial Region economic conditions
- Population growth
- Land use changes
- Renewable energy development policies
- Climate change

Table 5-24. Baseline and Forecasted MCI Water Demand Within and Outside IID Water Service Area, 2005 and 2050 (AFY)

	2005	2050			
		Without Conservation	With Conservation	Use Reduction	% Reduction
Within IID Water Service Area					
Municipal	33,310	85,180	73,018	12,162	14.28
Geothermal/Solar Thermal	31,931	180,000	144,000	36,000	20.00
Industrial	7,092	7,092	6,064	1,028	14.50
Feedlots/Dairies	20,000	20,000	20,000	-	0.00
Environmental Resources	0	12,020	12,020	-	0.00
Total	**92,333**	**304,292**	**255,102**	**49,190**	**48.78**
Outside IID Water Service Area					
Municipal	-2	65	92	-27	-40.92
Industrial	767	767	690	77	10.00
Total	**765**	**832**	**782**	**50**	**- 30.92**

Table 5-25. Baseline and Forecasted MCI Water Demand Within and Outside IID Water Service Area, 2005 and 2050 (MGD)

	2005	2050			
		Without Conservation	With Conservation	Use Reduction	% Reduction
Within IID Water Service Area					
Municipal	29.74	76.04	65.19	10.86	14.28
Geothermal/Solar Thermal	28.51	160.69	128.56	32.14	20.00
Industrial	6.33	6.33	5.41	0.92	14.50
Feedlots/Dairies	17.85	17.85	17.85	-	0.00
Environmental Resources	0.00	10.73	10.73	-	0.00
Total	**82.43**	**271.64**	**227.74**	**43.92**	**48.78**
Outside IID Water Service Area					
Municipal	0.00	0.06	0.08	-0.02	-40.92
Industrial	0.68	0.68	0.62	0.07	10.00
Total	**0.68**	**0.74**	**0.70**	**0.05**	**- 30.92**

5.10 Overview of the Imperial Region Colorado River Water Supply Portfolio

The Imperial Region Water Supply Portfolio consists of Colorado River water assets held in trust by Imperial irrigation District for use by residents of the Imperial Valley. The Region also has groundwater assets in West Mesa that are used by the town of Ocotillo and by U.S. Gypsum in Plaster City. In East Mesa, a few other farming operations are in place between the East Highline and Coachella canals, from near Calipatria north to the end of the East Highline Canal. IID delivers water to users these users vial the Coachella Canal. That land is included in the IID Crop Report. There is one center pivot farming operation in East Mesa, and the Lower Colorado Well Supply Project operated by USBR is located in the Sand Hills along the All-American Canal.

As described in Section 5.2.7, under the terms of the QSA/Transfer Agreements, IID's Priority 3(a) right to consumptive use of Colorado River water has been quantified at 3.1 MAF annually, with IID net consumptive use reduced from 3.1 MAF annually by the volume of transfers to urban areas out of Imperial Region, Salton Sea mitigation and water conserved by the All-American Canal Lining Project (values are consumptive use volumes at Imperial Dam). These conserved waters will be made available to South Coast and Colorado Region urban users through 2037, when SDCWA's wheeling agreement with MWD ends; or through 2047, after which SDCWA and IID will have to mutually consent to renewal for the term of 30 years. The transfer schedule is described in the Colorado River Water Delivery Agreement Exhibit B.[44] However some modifications are already in place; for an overview of the transfer and IID reductions schedule as of 2010 (Table 5-5).

Undeveloped assets that could be added to the Imperial Region's water portfolio include Colorado River water banking in East Mesa and/or storage in the Coachella Valley IRWM Region, desalination of IID

[44]Colorado River Water Delivery Agreement Exhibit B, p 13 of 14. <http://www.usbr.gov/lc/region/g4000/QSA/crwda.pdf>

drain water or brackish groundwater in the Imperial Valley or East Mesa, recycling of municipal wastewater; and/or reapportionment of water from agriculture to municipal and industrial consumptive use through a change in land use (e.g., urban development, fallowing, solar photovoltaic project) or conservation efficiency practices.

Imperial Region pre-QSA Colorado River water portfolio (supply and use, 1987-2003) is shown in Figure 5-16. IID future water supply portfolio and uses (2004-2047) is shown in Figure 5-17, Figure 5-18, Figure 5-19 and Figure 5-20 show the projected water use and the impact of possible projects and policies to meet future demand. Note that none of these tables show the impact of payback requirements for inadvertent overruns.

Figure 5-16 illustrates the historic distribution and use of Colorado River in the Imperial Valley (volumes prior to QSA implementation). The figure shows that just over half of the imported Colorado water went to agricultural consumptive use and that about one-third flowed to the Salton Sea, primarily as tailwater, tilewater, and operational spill discharged into IID drains. The figure also shows that , historically, a relatively constant portion of water was consumed by MCI uses; indicates the inception and ramping up of the IID/MWD efficiency transfer, a conservation program designed to generate water for transfer by improving IID's system infrastructure and operations.

Implementation of the QSA/Transfer Agreements affects the Regional water portfolio in a number of ways, as shown in Figure 5-17. The major changes are phased introduction of agricultural water conservation programs that are similar to the efficiency transfer program to MWD described above. These programs are intended to conserve water for transfer to SDCWA and CVWD through improvements in on-farm and irrigation system efficiency including lining of the All-American Canal (AAC). The net impact of the agricultural efficiency programs is to support transfers while maintaining crop production in the District. As the conservation programs are being implemented, various land fallowing programs are also introduced to aid in meeting transfer commitments and to partially compensate for reduced flows of tailwater and operational spill to the Salton Sea that result from improvements in irrigation efficiency. The fallowing programs are scheduled to end in 2017 while the SDCWA/CVWD efficiency transfer will continue to expand until 2025. Beginning in 2026, transfer agreements instituted under the QSA will be fully mature and are anticipated to continue at a constant level until 2047.

The linchpin of the Imperial IRWMP is to identify 100,000 AFY of water that can be managed to meet MCI and environmental water demands within IID's service area, with 50,000 AFY to be identified by no later than 2010, and the balance to be defined by 2040.

Managing the current 3.1 MAFY Water Supply Portfolio to meet this goal can be accomplished by different methods, including:

1. Expanding the size of the Portfolio
2. Preventing or recapturing water leaving the Region

3. Reapportioning of water within the Portfolio

As shown in Figure 5-18, expanding the Portfolio could include actions such as developing local groundwater. Both drain water and municipal wastewater flow to the Salton Sea and after which they are no longer available for other beneficial use within IID's water service area. Preventing or recapturing water leaving the Portfolio would also result in more water for local use and could be accomplished by desalination of drain water or recycling municipal wastewater. Potential for drain desalination and MCI recycling are shown in Figure 5-19.

Reapportioning water within the water portfolio is shown conceptually in Figure 5-20. The volume of water needed for future MCI uses would come from reapportioning water from existing uses to new uses, either through conservation or by reducing water consumed by one use and making this water available for a different use.

Reallocation would occur under a mechanism to be used within IID to account for changes in the place or type of water use. A process to manage reallocation is needed to protect legal users of water, and to ensure that there is a net economic benefit to IID's service area.

The following notes apply to Figure 5-16 through Figure 5-21.

Figure Notes: Categories of water consumption are from measured and otherwise calculated record an IID Water Balance spreadsheet (1987-1996) and in IID's WIS for all later years. Layering of the categories in the figures provides a road map of Imperial Valley uses of Colorado River water and their changes both in the past and in the future. The broader purpose of the figures is to visually describe the time-series of Table 5-4 IID Net Consumptive Use Schedule (KAF, CRWDA Exhibit B). The following describes each of the categories and references tables and subsections of Chapter 5, where applicable.

1. MCI, Recreation, and Environmental Consumptive Use – Water delivered to retail suppliers for potable domestic, commercial and urban use and irrigation of urban and recreation areas; untreated water for other recreational uses and for environmental use for QSA/Transfer Agreements mitigation (Section 5.9.3).
2. Agricultural CU – Irrigation water consumed to meet crop evapotranspiration requirements).
3. Fallowing to SDCWA – See "SDCWA, SWRCB, and SS Mitigation Fallowing Programs End" below.
4. SWRCB Fallowing to Salton Sea – See "SDCWA, SWRCB, and SS Mitigation Fallowing Programs End" below.
5. AAC Seepage – Amount of water seeping from the All-American Canal less IID return credits for flow diverted to the AAC that returns downstream to the Colorado River.
6. AAC Lining to SDCWA – Water conserved for delivery to SDCWA (Table 5-4).
7. SDCWA/CVWD Efficiency Transfer –Water from IID system and on-farm efficiency conservation for delivery to SDCWA and to CVWD (Section 5.2.7).
8. MWD Efficiency Transfer– Water conserved from system efficiency for delivery to MWD (1988 Agreement, projects completed Sept 1998) (Section 5.2.7).
9. Drain and River Evap and ET – Water that evaporates from IID's open channel system and that is used by plant life along the conveyance pathways.
10. Fallowing to Salton Sea – See "SDCWA, SWRCB, and SS Mitigation Fallowing Programs End" below.

11. MCI, Recr & Envr to Salton Sea – Return flow from non-agricultural uses to the Salton Sea (e.g., treated wastewater and irrigation/drainage/environmental runoff).
12. Operational Spill to Salton Sea – IID discharge from main canals and laterals which flows via the drainage system via the rivers to the Salton Sea or directly to Salton Sea.
13. Tilewater to Salton Sea – Irrigation (leaching) water captured by tile drains underlying farmed land that is discharged to IIDs drainage system via the rivers to the Salton Sea or directly to Salton Sea.
14. Tailwater to Salton Sea – Agricultural irrigation surface runoff from the ends (tails) of fields that discharges to IID drainage system, rivers and ultimately the Salton Sea.
15. IID Priority 3(a) Quantified Amount (3.1 MAF) – Water to be accounted to IID Net CU at Imperial Dam in a calendar year for the term of the QSA/Transfer Agreements. (Section 5.2.7).
16. Expanded Water Portfolio – Water from developing local groundwater (Figure 5-18), desalination and MCI recycling (Figure 5-19),
17. Forecasted Amounts – Quantified amounts closely tied to CRWDA Appendix B (Table 5-4).
18. SDCWA, SWRCB, and SS Mitigation Fallowing Programs End – Water conserved by fallowing agricultural lands to provide flows to the Salton Sea to meet SWRCB Salton Sea mitigation requirements (2003-2017), and for delivery to SDCWA (2003-2016)().
19. IID QSA Reduction Stabilized – Under the QSA/Transfer Agreements IID agreed to 45 years of water transfers to urban areas outside of the Imperial Region; for years 2026-2047, that amount remains constant (Section 5.2.7.3).
20. Underruns/Overruns – IID Net Consumptive Use at Imperial Dam (USBR Decree Accounting report) for a given year is less than (underrun) or exceeds (overrun) the IID Priority 3(a) Quantified Amount of 3.1 MAF: IID Net Consumptive Use equals all Imperial Valley use of Colorado River water plus the volume of water transferred out of the region, including AAC Lining to SDCWA and Other Water (e.g., ICS, IOPP, LCRWSP well field pumpage) , plus the volume of AAC seepage and other flow that is not accounted by USBR as IID return flow credit. (Section 5.2)
21. IID Quantified Net CU (2012-2047) – IID Quantified Priority 3(a) Amount less the sum of water transferred out of the region, including AAC Lining to SDCWA, Other Programs, and AAC seepage and other flow that accounted by USBR as IID return flow credit. (Figure 5-21).
22. Other Programs – Water conserved by IID that is credited to such programs as ICS, IOPP, and LCRWSP well field pumpage. (Figure 5-21).

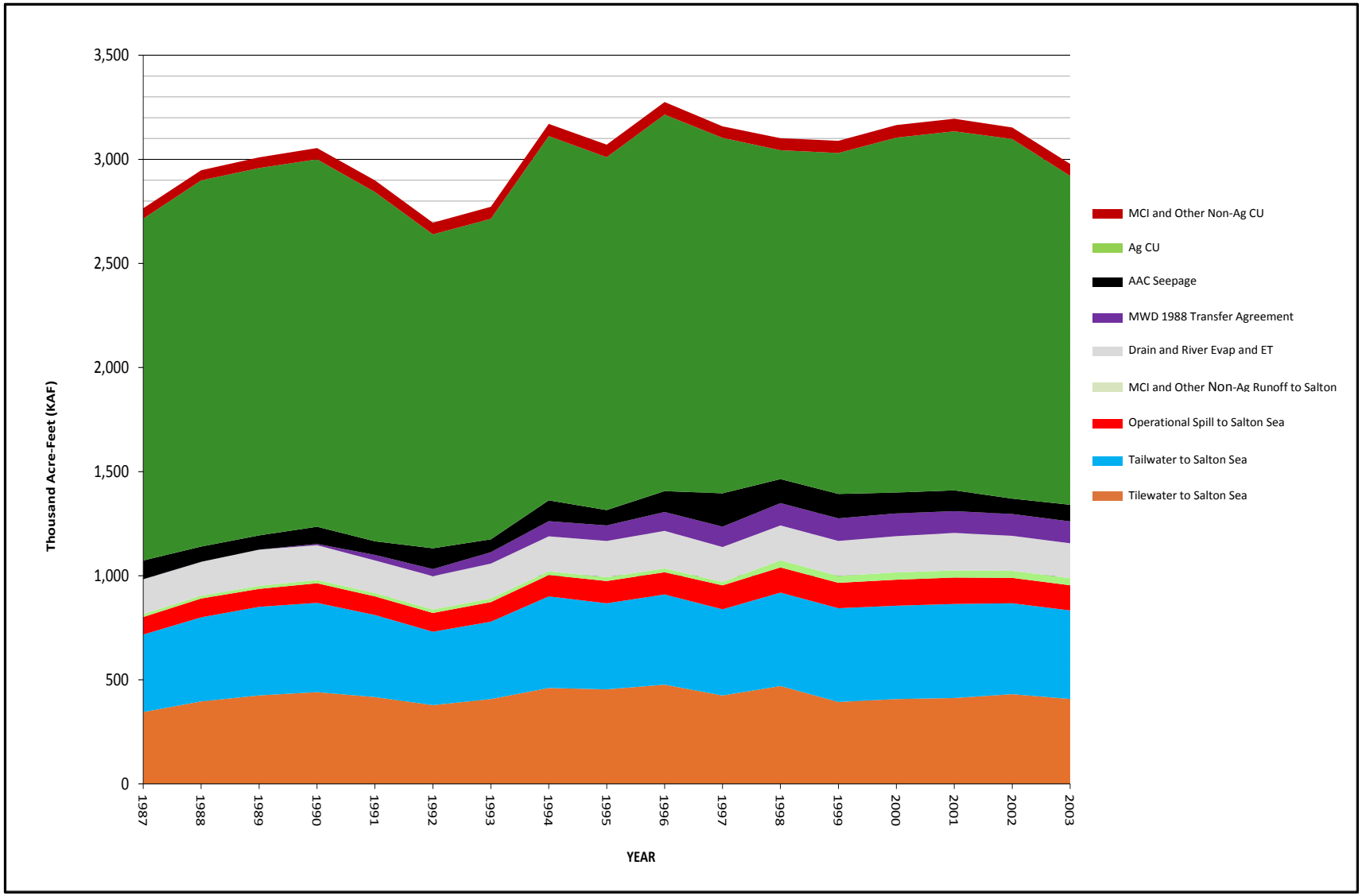

Figure 5-16. Pre-QSA Water Supply Portfolio 1987-2003 (KAF)

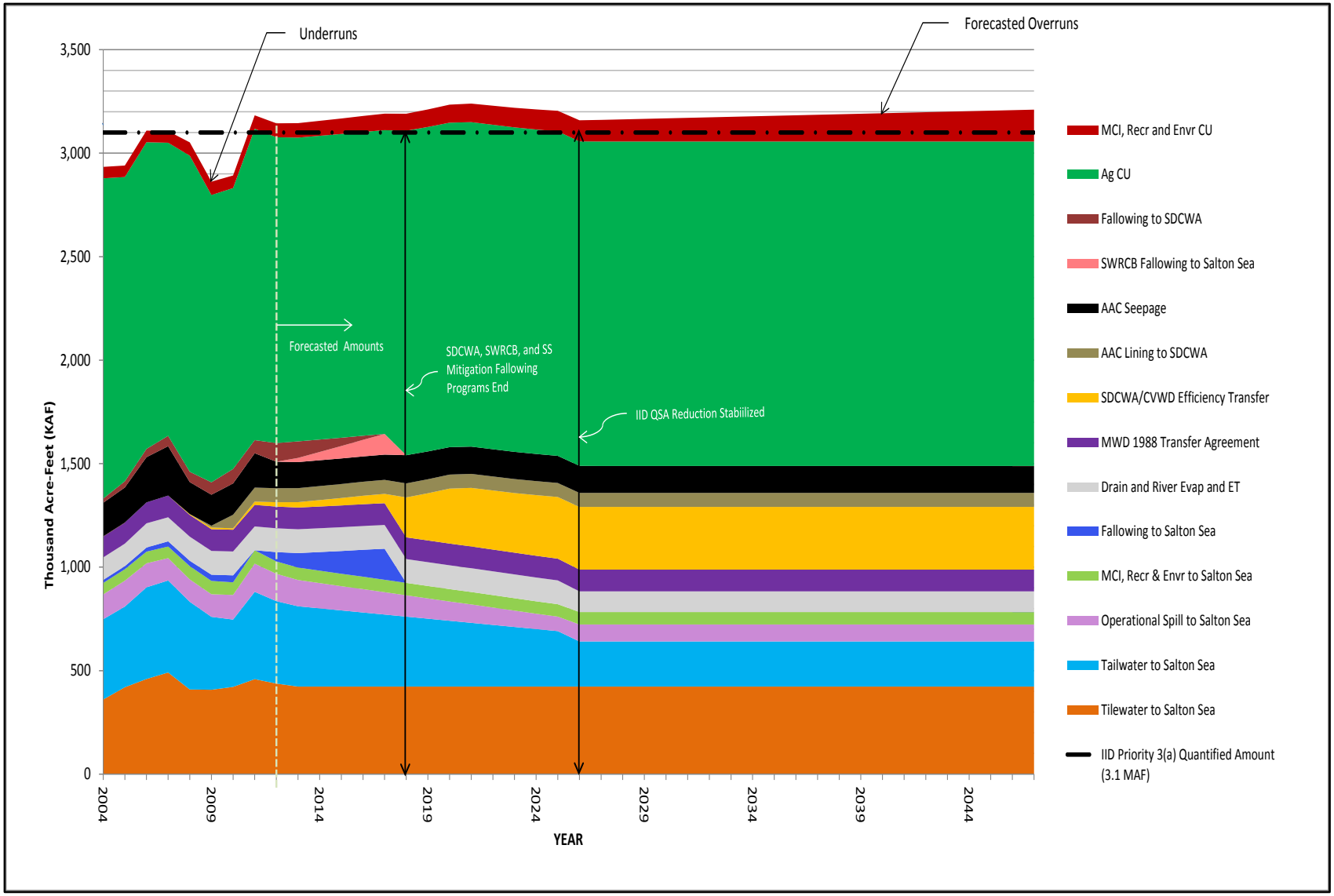

Figure 5-17. Future Water Supply Portfolio with the QSA/Transfer Agreements 2004-2047 (KAF)

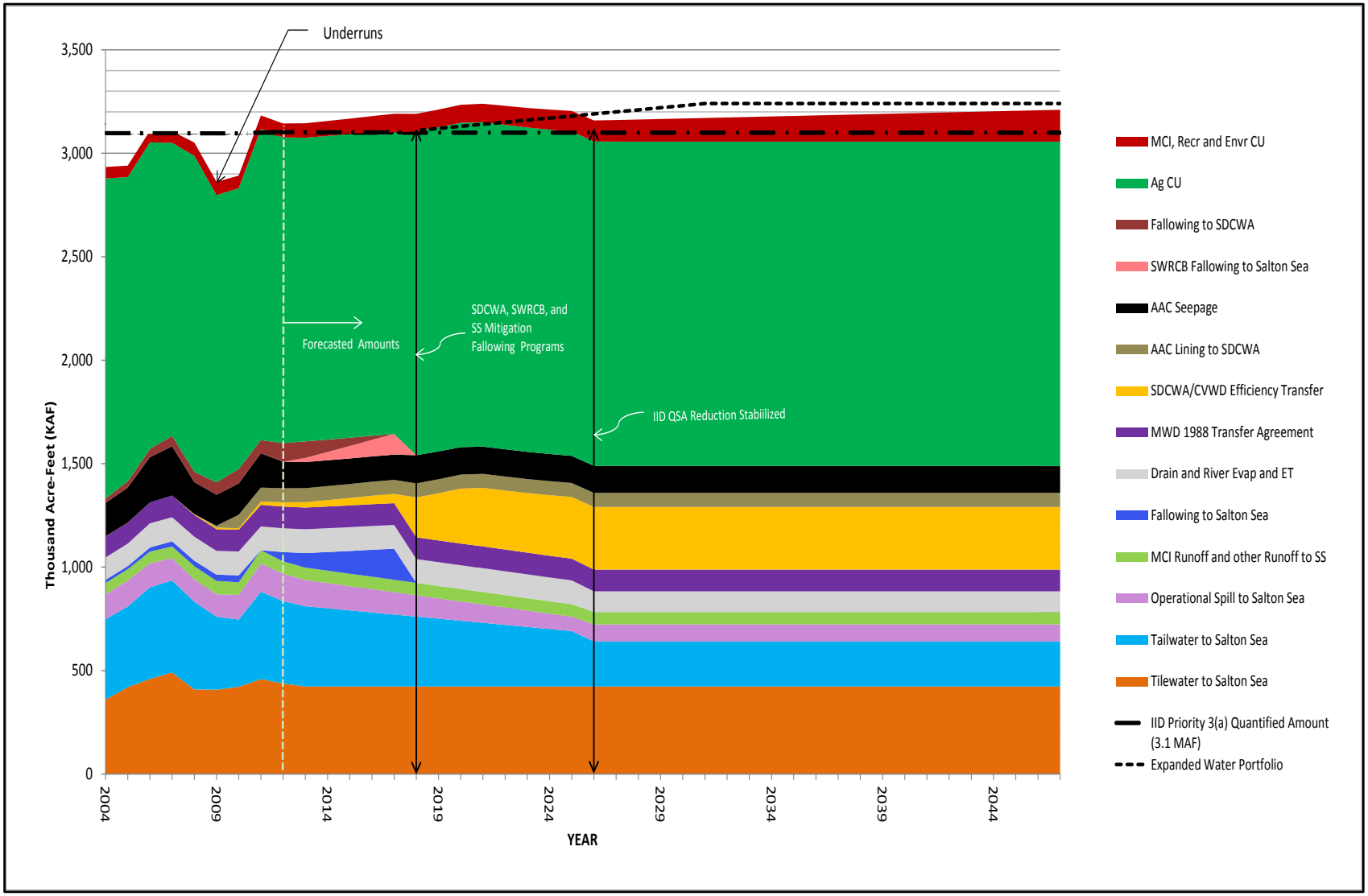

Figure 5-18. Expanding the Size of the Water Supply Portfolio, Groundwater 2004-2047 (KAF)

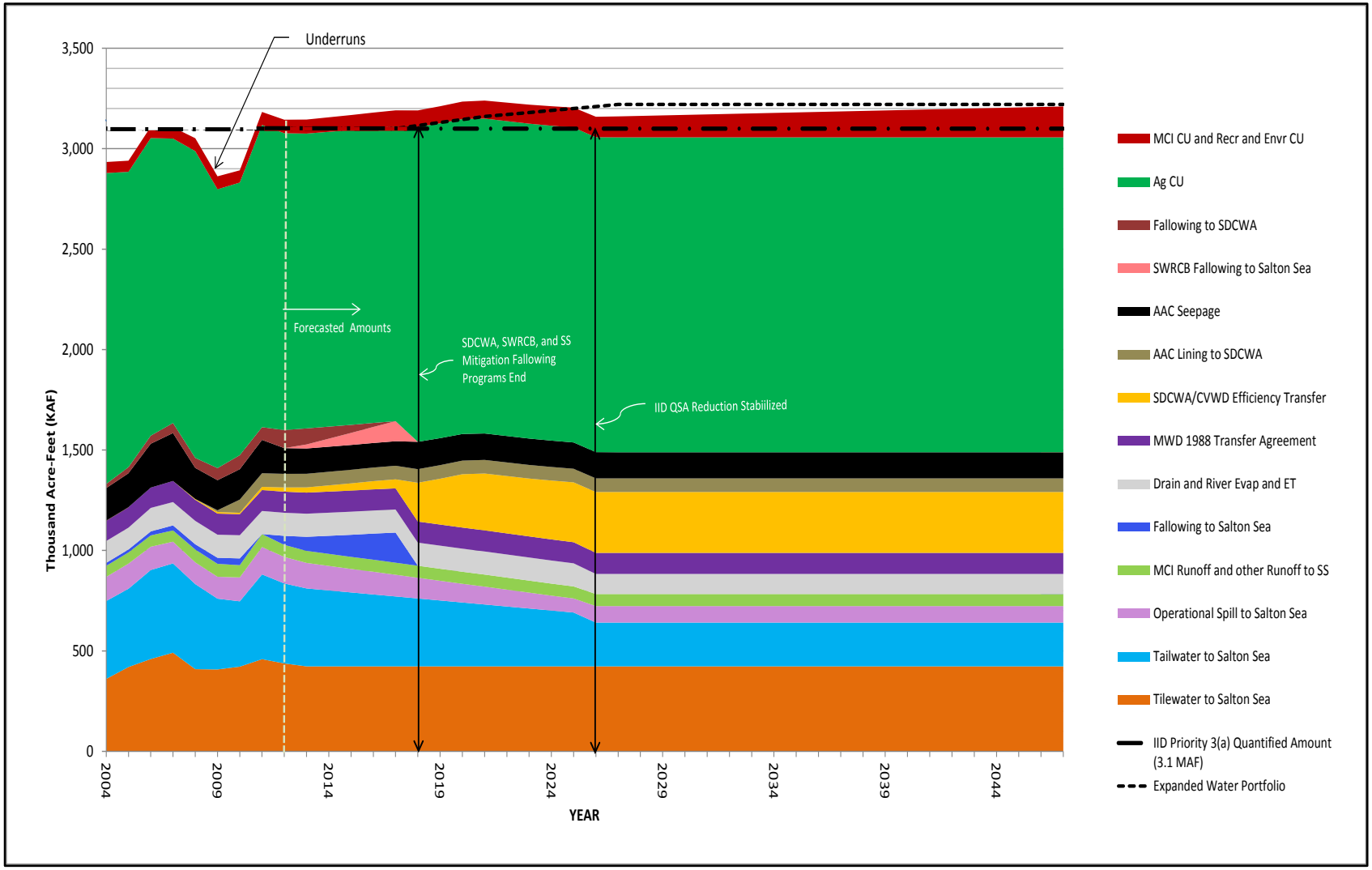

Figure 5-19. Expanding the Water Supply Portfolio, Drain Desalination and MCI Recycling 2004-2047 (KAF)

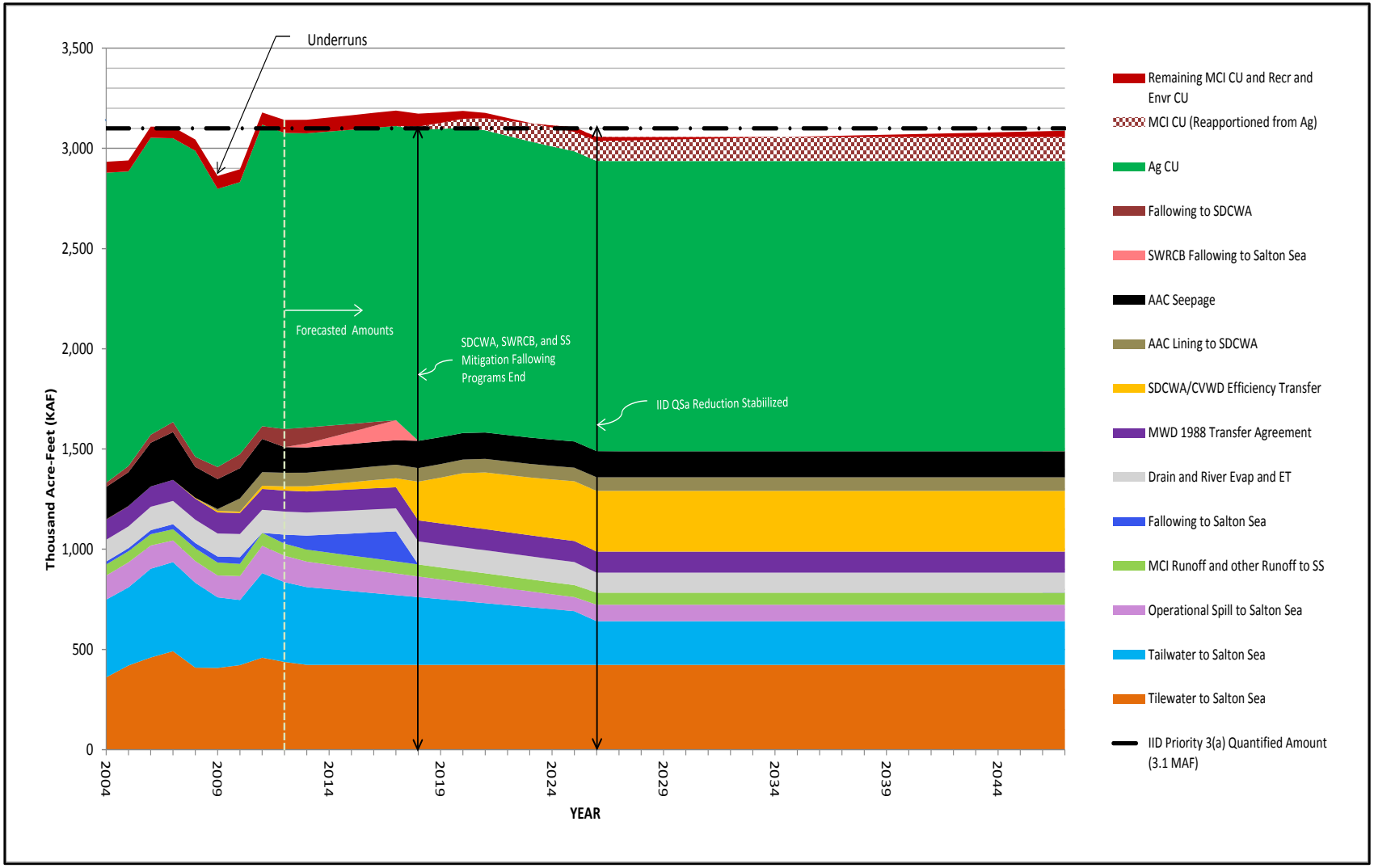

Figure 5-20. Reapportionment of the Water Portfolio, from Ag to MCI 2004-2047 (KAF)

5.10.1 Imperial Valley Demand Variability

Historically, Imperial Valley agricultural demands vary from year to year as a result of changes in markets and cropping patterns and other factors. Historically, weather has been consistent and has not affected agricultural demand, except that an inch of rainfall throughout the IID water service area reduces net consumptive use at Imperial Dam by about 50 KAFY and raises the level of the Salton Sea.

Quantification of IID's Priority 3(a) right at 3,100 KAF per year and the consequent reduction of IID's net consumptive use as measured at Imperial Dam are part of an effort to reduce California's annual consumptive use of Colorado River water to match its right of 4,400 KAF (plus 50 percent of any declared surplus). However, quantification does not change the underlying conditions that cause year-to-year fluctuations in irrigation demand. To deal with these fluctuations, the IID board adopted the 2009 Regulations for Equitable Distribution Plan (EDP) to help match IID net consumptive use to the quantified amount in years when demand is forecast to exceed supply. However, even with the EDP in place, IID diversions are occasionally expected to result in inadvertent overruns (net consumptive use greater than the quantified amount for the calendar year) or underruns (net consumptive use less than the quantified amount). Overruns have to be paid back by extraordinary conservation in future years, because they represent the right of the junior right holder (MWD); and, since IID has no off-river storage or groundwater banking facilities, IID underruns (use less than the quantified amount) go to MWD.

Figure 5-20 shows IID net consumptive use of Colorado River water according to USBR Decree Account records for 1970 through 2011. From 2003 through 2047, the QSA/Transfer Agreements projected net consumptive use by IID is shown, adapted from CRWDA Exhibit B. IID's historic net consumptive use, shown in Figure 5-17, is representative of agricultural consumptive use variability, since IID's MCI consumptive has been fairly consistent historically and is small relative to agriculture and.

Historic variations in agricultural water demand are similar in magnitude to the 408 KAFY of transfers called for in the QSA/Transfer Agreements. For 1970-2003, for example, annual agricultural water demands for varied from a low of 2,555 KAF to a high of 3,172 KAF, a variation of 617 KAF. The greatest variation from one year to the next was 326 KAF, while several 2-year variations have been in excess of 300 KAF. This result is that, with a quantified cap, IID has a highly variable demand and a fixed supply that can lead to the supply/imbalances described above (overruns and underruns); however, with implementation of the EDP, these variations are expected to be greatly reduced.

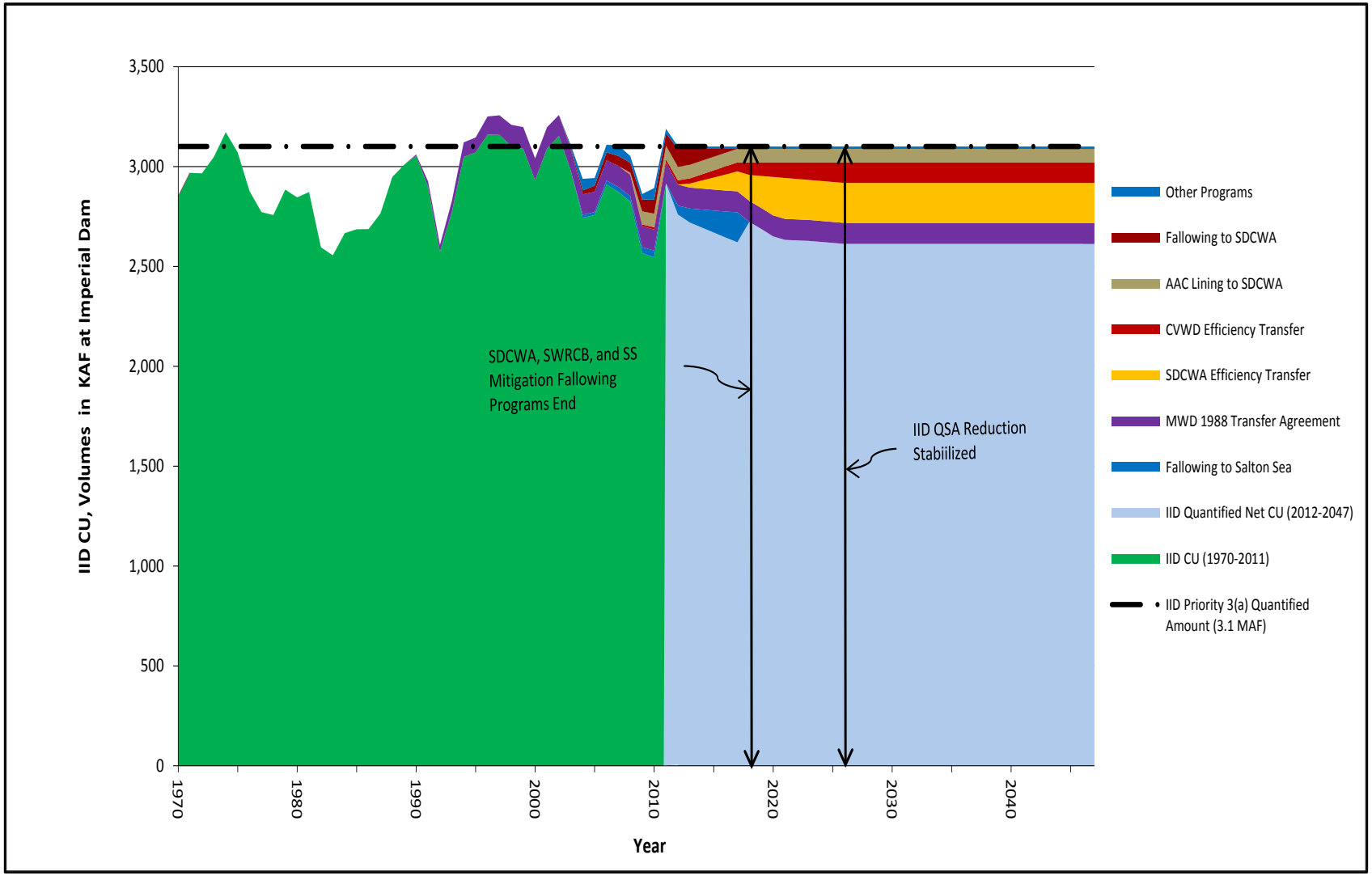

Figure 5-21. IID Colorado River Net Consumptive Use (1970-2008, USBR Decree Accounting) and Projected Net Consumptive Use (2004-2047,CRWDA Exhibit B)

Prior to implementation of the QSA/Transfer Agreements, Imperial Valley water users receiving Colorado River water from IID were part of a demand-based system. In any given year, each farmer made choices regarding what crop to plant and how much acreage to plant based on economics rather than water supply. Under the amended EDP, the amount of water available to users is to be restricted in years for which the board declares a supply/demand imbalance. In such years, a fixed volume per acre is to be apportioned for agricultural water along with various stipulations for other uses, see below. The EDP provides some flexibility for agricultural users to use more than the fixed allocation by participating in the District Water Exchange, which is described below. Even with the Equitable Distribution Plan in place, an overrun or underrun can occur.

The IID Board established the EDP and implementing regulations, together referred to as the Equitable Distribution Program, designed to provide for distribution of water in any year when expected demand for water is likely to exceed expected supply.[45] Under EDP Regulations, a fixed volume of water is to be apportioned to six types of water users: municipal; industrial; feed lots, dairies and fish farms; environmental resources water; agricultural lands, and non-agricultural users.[46] Through the District Water Exchange, agricultural water users would be able to participate in the sale and purchase of water.

As part of the 2009 Regulations for EDP, a District Water Exchange is to be established so that agricultural water users can sell and buy water. This provides flexibility for some agricultural water users to obtain water in addition to their apportionment.

IID's annual net consumptive use water supply and transfer obligations illustrated on Figure 5-21 are a modified version of CRWDA/Federal QSA Exhibit B, (Table 5-4). The annual record of IID's water deliveries, conservation efforts, and water transfers are tracked through a series of water budgets described in the next section.

5.11 IID Provisional Water Budget, 2006-2011

In 1998, IID agreed to a water transfer to SDCWA that would start in 2003, ramp up to 205 KAF by 2021 and stabilize at 200 KAF annually through 2047, the remainder of the agreement. The water for delivery to SDCWA is being generated according to an agreed upon schedule, first by fallowing and then through efficiency conservation. In October 2003, provisions of the IID/SDCWA transfer agreement were incorporated into the QSA/Transfer Agreements which also includes transfers to MWD, CVWD, AAC Lining to SDCWA, and for Miscellaneous PPRs. For 2026 - 2047, total amount of reduction by Imperial Valley residents in consumptive use volume at Imperial Dam will reach nearly 420 KAF annually.

Water for these transfers is to be generated through fallowing (2003-2017) as well as efficiency conservation for transfer to CVWD starting in 2008 and efficiency conservation for transfer to SDCWA starting in 2012/13. The efficiency measures include improvements to IID's system infrastructure and

[45] See IID website: Equitable Distribution <http://www.iid.com/Water/EquitableDistribution>
[46] The WIS-based IID Water Balance was modified in spring 2012 to include these six types of use.

operations and improvements in on-farm irrigation practices. The IID Efficiency Conservation Definite Plan was prepared in 2007 to provide a roadmap for meeting these near- and long-term conservation obligations.

IID's water balance is designed to track water movement, conservation and use – into, within and through, and out of the IID water service area. Figure 5-22 is a water balance schematic of IID inflows and outflows, and flows within and through the water service area. The water balance schematic provides an overview of the IID water accounting centers (major systems) and the components for each system.

IID contracts with TruePoint Solutions (TP) for a software system to record delivery gate flow and volume data and process billing. IID's Oracle-based Water Information System (WIS) is used to quality control and warehouse IID water measurement record and CIMIS and IID weather data. It also functions as a decision support system (DSS) for on-farm delivery and for main system operation. The WIS contains algorithms for calculating the volumes presented in the provisional water budgets for the accounting centers. Volumes reported for the elements are in thousands of acre-feet (KAF) measured or calculated for the IID water service area, and are not reconciled to USBR reported consumptive use (CU) at Imperial Dam.

Annual USBR Decree Accounting adjusts IID flow volume components associated with the QSA/Transfer Agreement to account for the difference in flow volume in the AAC at Imperial Dam (Station 60) to that which arrives at the IID water service area AAC downstream of Mesa Lateral 5 (Station 2900). The difference is the result of evaporation, seepage and phreatophyte evapotranspiration (ET). USBR Decree Accounting credits IID with measured returns from seepage into drains along the AAC from Imperial Dam (Station 60) to Pilot Knob (AAC Station 1117). This volume is deducted from IID Consumptive Use. Finally, delivery to IID from Brock Reservoir is added to IID Consumptive Use. USBR accounting, which is performed on a monthly basis, is reconciled on an annual basis and reported in late spring of each year.

Table 5-27 through Table 5-34 present provisional water volumes for calendar years 2006 to 2011 for IID's water balance accounting centers (major systems):

1. Inflow and Outflow Provisional Water Budget, Table 5-27
2. Consumptive Use Provisional Water Budget, Table 5-28
3. Delivery System Provisional Water Budget, Table 5-29
4. Agricultural Provisional Water Budget, Table 5-30
5. Non-Agricultural Provisional Water Budget, Table 5-31
6. Environmental Provisional Water Budget, Table 5-32
7. Recreation Provisional Water Budget, Table 5-33
8. Drainage System Provisional Water Budget, Table 5-34

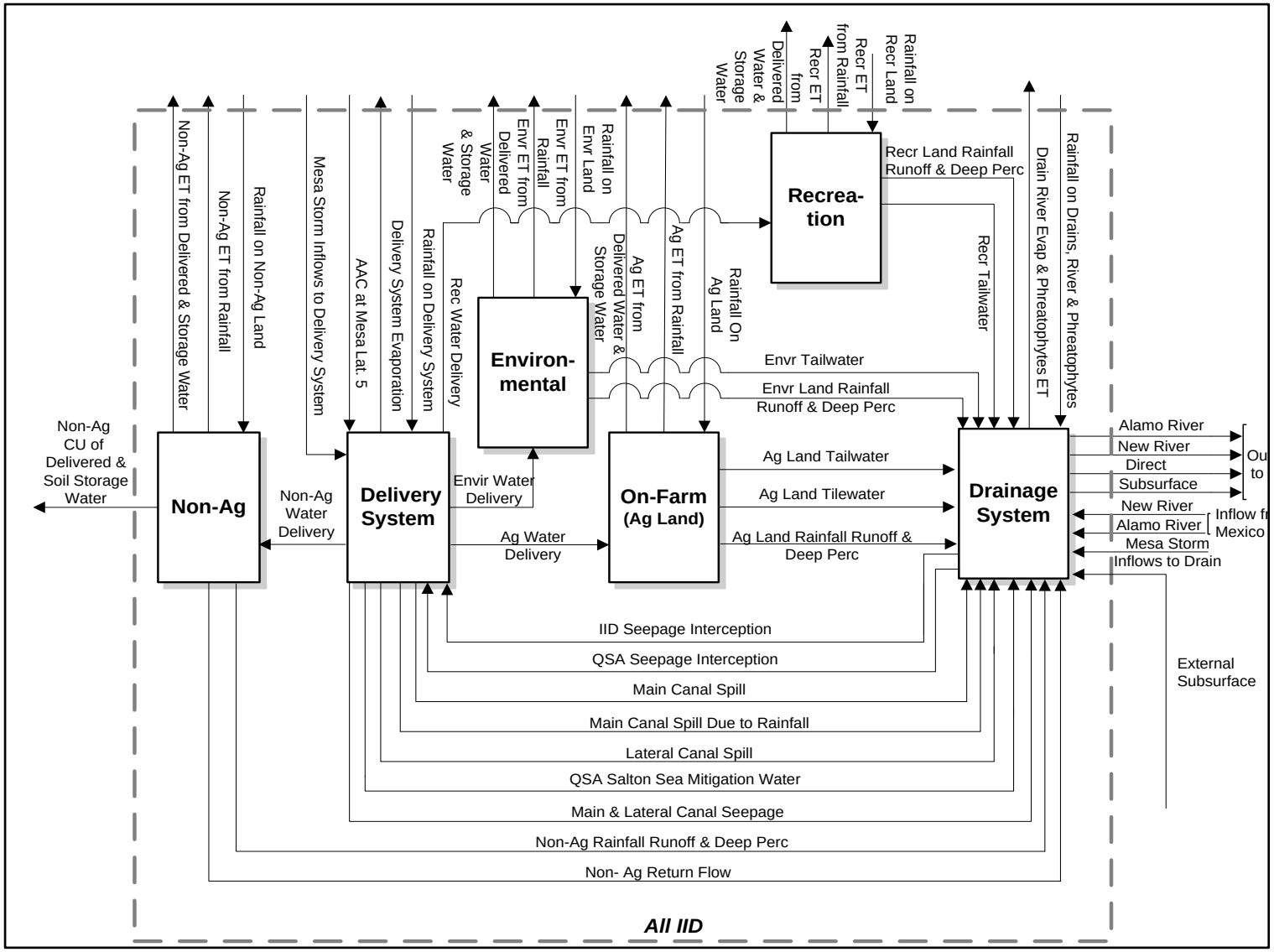

Figure 5-22. IID Water Balance Schematic

Source: Bryan P. Thoreson, Davids Engineering, Inc.

5.11.1 IID AAC Flows Downstream of Pilot Knob Provisional Record

Table 5-26 presents IID's provisional flow volumes in the AAC downstream of Pilot Knob and from Brock Reservoir.

Table 5-26. IID AAC Flows Downstream of Pilot Knob Provisional Water Record, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
IID AAC Flows Downstream of Pilot Knob						
IID AAC at Pilot Knob (Station 1117)	2,906	2,867	2,820	2,564	2,530	2,797
Salton Sea Mitigation, AAC at PK (Station 1117)	0	23	26	30	80	0
Brock Reservoir Outlet to AAC (Station 2192)	nr	nr	nr	0	11	115
Total IID AAC Flow Downstream of Pilot Knob	**2,906**	**2,890**	**2,846**	**2,595**	**2,621**	**2,912**

[1] Volumes reported for the elements are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam.

5.11.2 IID Inflow and Outflow Provisional Water Budget

Table 5-27 presents IID's provisional volumes for the flow paths into (inflow) and out of (outflow) IID's water service area.

Table 5-27. IID Inflow and Outflow Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Total Inflow						
All-American Canal at Mesa Lateral 5	2,690	2,660	2,761	2,547	2,580	2,872
Alamo River Flow from Mexico	1	t	1	1	1	1
New River Flow from Mexico	113	90	86	80	90	82
Total Rainfall	20	65	63	30	190	110
Mesa Storm Inflows to Drains	1	4	4	2	11	6
Mesa Storm Inflows to Delivery System	0	t	2	1	6	2
External Subsurface Inflows	20	20	20	20	20	20
Total Inflow	**2,844**	**2,839**	**2,936**	**2,681**	**2,898**	**3092**
Total Outflow						
Alamo River Flow to Salton Sea	613	608	583	523	587	612
New River Flow to Salton Sea	422	415	402	378	415	393
Direct-to-Sea Drain Flow	94	111	108	103	117	121
Subsurface Flow to Salton Sea	1	1	1	1	1	1
Total Consumptive Uses and Change in Soil Storage	1,713	1,704	1,842	1,676	1,778	1,966
Total Outflow	**2,844**	**2,839**	**2,936**	**2,681**	**2,898**	**3,092**

[1] Volumes reported for the elements are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any discrepancy between the component sum and Total Inflow or Total Outflow is due to rounding error (to nearest 1000 AF).

5.11.3 IID Consumptive Use Provisional Water Budget

Table 5-28 presents provisional consumptive use volumes for components of the IID water service area.

Table 5-28. IID Consumptive Use Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Consumptive Use						
Delivery System Evaporation	25	24	25	24	24	25
Ag ET from Delivered Water & Soil Water Storage	1,515	1,472	1,593	1,461	1,440	1,680
Ag ET from Rainfall	16	45	51	24	128	80
Non-Ag CU of Delivered Water	57	57	65	65	64	66
Non-Ag ET from Rainfall	2	8	8	4	22	13
Environmental ET from Delivered Water & Stored Soil Water	nr	nr	nr	nr	2	3
Environmental ET from Rainfall	nr	nr	nr	nr	t	t
Recreation ET from Delivered Water & Stored Soil Water	6	7	8	7	6	6
Recreation ET from Rainfall	t	t	t	t	t	t
Drain Evaporation & Phreatophytes ET	73	72	73	72	72	74
River Evaporation & Phreatophytes ET	19	19	19	19	19	20
Total Consumptive Use	**1,713**	**1,704**	**1,842**	**1,676**	**1,778**	**1,966**

[1] Volumes reported for the components are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any discrepancy between the component sum and Total Consumptive Use is due to rounding error (to nearest 1000 AF).

Continued on next page . . .

5.11.4 IID Delivery System Provisional Water Budget

Table 5-29 presents provisional volumes for components of IID's delivery system (water service area). "Ag Water Delivery, closure term," which is the largest Delivery System Outflows component, is calculated as the closure term for Delivery System Outflows. While "Ag Water Delivery, closure term" is considered the more accurate; for both "Ag Water Delivery, closure term" and "Ag Water Delivery, TP record", the confidence interval is 3 percent (that is, there is a 95 percent probability that the actual value is within 3 percent of the value presented in the water balance).

Table 5-29. IID Delivery System Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Delivery System Inflows						
All-American Canal at Mesa Lateral 5	2,690	2,660	2,761	2,547	2,580	2,872
QSA Seepage Interception	nr	nr	7	21	7	26
IID Seepage Interception	12	11	11	10	8	7
Rainfall on Delivery System	t	t	t	t	1	1
Mesa Storm Inflows to Delivery System	0	t	2	1	6	2
Total Delivery System Inflows	**2,702**	**2,672**	**2,781**	**2,579**	**2,603**	**2,908**
Delivery System Outflows						
Ag Water Delivery, closure term	2,363	2,319	2,410	2,207	2,172	2,522
Non-Ag Water Delivery	92	93	106	105	104	107
Environmental Water Delivery	nr	nr	nr	nr	2	3
Recreation Water Delivery	7	8	9	7	7	7
Canal Seepage	98	97	97	96	94	93
Main Canal Spill	2	2	3	3	3	5
Main Canal Spill Due to Rainfall	0	t	2	1	6	2
Lateral Canal Spill	114	106	106	107	116	145
QSA Salton Sea Mitigation Water	0	22	25	29	74	0
Delivery System Evaporation	25	24	26	24	24	25
Total Delivery System Outflows	**2,702**	**2,672**	**2,781**	**2,579**	**2,603**	**2,908**
Ag Water Delivery Check						
Ag Water Delivery, closure term	2,363	2,319	2,410	2,207	2,172	2,522
Ag Water Delivery, TP record	2,319	2,377	2,411	2,244	2,212	2,529
Unaccounted Canal Water	44	-58	-2	-38	-41	-8
Unaccounted Canal Water Percent	1.90	-2.44	-0.08	-1.69	-1.85	-0.32

Note: Unaccounted Canal Water = (Ag Water Delivery, closure term) - (Ag Water Delivery, TP record)

[1] Volumes reported for the components are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any discrepancy between the component sum and Total Inflows or Total Outflow and Ag Deliver Check component totals is due to rounding error (to nearest 1000 AF).

5.11.5 IID Agricultural (On-Farm) Provisional Water Budget

Table 5-30 presents provisional flow volumes for components of the IID agricultural (on-farm) water budget.

Table 5-30. IID Agricultural (On-Farm) Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Ag Water (On-Farm) Inflows						
Ag Water Delivery, closure term	2,363	2,319	2,410	2,207	2,172	2,522
Rainfall on Ag Land	16	52	51	24	154	89
Total Ag Water (On-Farm) Inflows	**2,380**	**2,372**	**2,461**	**2,231**	**2,325**	**2,611**
Ag Water (On-Farm) Outflows						
Ag ET from Delivered Water & Soil Water Storage	1,515	1,472	1,593	1,461	1,440	1,680
Ag ET from Rainfall	16	45	51	24	128	80
Ag Land Tilewater	447	453	407	400	400	439
Ag Land Tailwater	402	394	410	345	332	403
Ag Land Rainfall Runoff & Deep Percolation	0	8	0	0	26	9
Total Ag Water (On-Farm) Outflows	**2,380**	**2,372**	**2,461**	**2,231**	**2,325**	**2,611**

[1] Volumes reported for the components are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any value discrepancy between the component sum and Total Inflows or Total Outflows is due to rounding error (to nearest 1000 AF).

5.11.6 IID Non-Agricultural (MCI) Provisional Water Budget

Table 5-31 presents provisional volumes for inflows to non-ag uses and outflows associated with non-ag (MCI) water use. Comparison of volumes presented in Table 5-30 and Table 5-31 show both the relative magnitude of agricultural (on-farm) and non-ag (MCI) uses and their variability from 2006 through 2011.

Table 5-31. IID Non-Agricultural (MCI) Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Non-Ag (MCI) Inflows						
Non-Ag Water Delivery	92	93	106	105	104	107
Rainfall on Non-Ag Land	3	10	10	5	30	17
Total Non-Ag (MCI) Inflows	**95**	**103**	**116**	**110**	**134**	**124**
Non-Ag (MCI) Outflows						
Non-Ag CU of Delivered Water	57	57	65	65	64	66
Non-Ag ET from Rainfall	2	8	8	4	22	13
Non-Ag Return Flow	35	36	41	40	40	41
Non-Ag Land Rainfall Runoff & Deep Perc.	1	3	3	1	7	4
Total Non-Ag (MCI) Outflows	**95**	**103**	**116**	**110**	**134**	**124**

[1] Volumes reported for the components are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any value discrepancy in this table between the sum of components and Total Inflows or Total Outflows is due to rounding error (to nearest 1000 AF).

5.11.7 IID Environmental Provisional Water Budget

Table 5-32 presents provisional volumes for IID's Managed Marsh complex, a three-phase complex that will total approximately 959 acres of habitat for IID's Habitat Conservation Plan drain covered species. Phase I of the complex, consisting of approximately 365 acres, was completed in 2009.

Table 5-32. IID Environmental Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Environmental Inflows						
Environmental Water Delivery	nr	nr	nr	nr	2	3
Rainfall on Environmental Land	nr	nr	nr	nr	t	t
Total Environmental Inflows	**nr**	**nr**	**nr**	**nr**	**3**	**3**
Environmental Outflows						
Environmental ET from Delivered Water & Stored Soil Water	nr	nr	nr	nr	2	3
Environmental ET from Rainfall	nr	m	nr	nr	t	t
Environmental Tailwater	nr	nr	nr	nr	t	t
Environmental Land Rainfall Runoff & Deep Percolation	nr	nr	nr	nr	t	t
Total Environmental Outflows	**nr**	**nr**	**nr**	**nr**	**3**	**3**

[1] Volumes reported for the components are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any value discrepancy in this table between the sum of components and Total Inflow or Total Outflow is due to rounding error (to nearest 1000 AF).

5.11.8 IIID Recreational Provisional Water Budget

Table 5-33 presents provisional volumes for components of IID's recreational water budget.

Table 5-33. IID Recreational Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Recreational Inflows						
Recreation Water Delivery	7	8	9	7	7	7
Rainfall on Recreation Land	t	t	t	t	t	t
Total Recreational Inflows	**7**	**8**	**9**	**7**	**7**	**7**
Recreational Outflows						
Recreation ET from Delivered Water & Stored Soil Water	6	7	8	7	6	6
Recreation ET from Rainfall	t	t	t	t	t	t
Recreation Tailwater	1	1	1	1	1	1
Recreation Land Rainfall Runoff & Deep Percolation	0	t	t	0	t	t
Total Recreational Outflows	**7**	**8**	**9**	**7**	**7**	**7**

[1] Volumes reported for the components are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any value discrepancy in this table between the sum of components and Total Inflow or Total Outflow is due to rounding error (to nearest 1000 AF).

5.11.9 IID Drainage System Provisional Water Budget

Table 5-34 presents provisional annual volumes for flow paths associated with IID's drainage system.

Table 5-34. IID Drainage System Provisional Water Budget, 2006-2011 (KAF)

Accounting Center	Year [1]					
	2006	2007	2008	2009	2010	2011
Drainage System Inflows						
Alamo River Flow from Mexico	1	t	1	1	1	1
New River Flow from Mexico	113	90	86	80	90	82
Mesa Storm Inflows	1	4	4	2	11	6
External Subsurface Inflows	20	20	20	20	20	20
Main Canal Spill	2	2	3	3	3	5
Main Canal Spill Due to Rainfall	0	t	2	1	6	2
Lateral Canal Spill	114	106	106	107	116	145
Canal Seepage	98	97	97	96	94	93
QSA Salton Sea Mitigation Water	0	22	25	29	74	0
Non-Ag Return Flow to IID Drains	35	36	41	40	40	41
Ag Land Rainfall Runoff & Deep Percolation	0	8	0	0	26	9
Non-Ag Land Rainfall Runoff & Deep Percolation	1	3	3	1	7	4
Environmental Land Rainfall Runoff & Deep Percolation	nr	nr	nr	nr	t	t
Recreation Land Rainfall Runoff & Deep Percolation	0	t	t	0	t	t
Rainfall on Drains and Phreatophytes	t	1	1	1	4	2
Rainfall on Rivers and Phreatophytes	t	t	t	t	1	1
Ag Land Tilewater	447	453	407	400	400	439
Ag Land Tailwater	402	394	410	345	332	403
Environmental Tailwater	nr	nr	nr	nr	t	t
Recreation Tailwater	1	1	1	1	1	1
Total Drainage System Inflows	**1,235**	**1,238**	**1,204**	**1,127**	**1,226**	**1,253**
Drainage System Outflows						
Alamo River Flow to Salton Sea	613	608	583	523	587	612
New River Flow to Salton Sea	422	415	402	378	415	393
Direct-to-Sea Drain Flow	94	111	108	103	117	121
Subsurface Flow to Salton Sea	1	1	1	1	1	1
Drain Evaporation & Phreatophytes ET	73	72	73	72	72	74
River Evaporation & Phreatophytes ET	19	19	19	19	19	20
QSA Seepage Interception	nr	nr	7	21	7	26
IID Seepage Interception	12	11	11	10	8	7
Total Drainage System Outflows	**1,235**	**1,238**	**1,204**	**1,127**	**1,226**	**1,253**

[1] Volumes reported for the components are measured or calculated for the IID water service area and are not reconciled to USBR reported CU at Imperial Dam. Any value discrepancy in this table between the sum of components and Total Inflow or Total Outflow is due to rounding error (to nearest 1000 AF).

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WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 6

Review of Resource Management Strategies

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Chapter 6. Review of Resource Management Strategies

A resource management strategy (RMS) is defined by California Department of Water Resources (CDWR) as a project, program, or policy that local agencies can implement to manage water and related resources to meet integrated plan objectives. CDWR's standard for RMS review is to encourage diversification of water management approaches, plan for uncertain future circumstances, and comply with state law.[1] Local groups like the Water Forum must consider the RMSs identified in California Water Plan Update 2009 when developing their IRWMP.

This chapter provides a summary of the methodology and results of the Imperial Water Forum's review and evaluation of the CDWR RMSs. Region-specific discussion of the strategies and Water Forum Findings and Recommendations are presented in Chapters 7 through 11.

6.1 RMS Review Process

The Water Forum considered the CDWR RMS to build and diversify the Imperial Region water management portfolio. RMS review was part of the IRWMP scoping process to tailor the RMSs to the Imperial Region.

The Water Forum RMS review process is shown in Figure 6-1. The process allowed the Water Forum to add, integrate, adapt, eliminate, and/or re-group strategies to meet the Region's mission, goals, objectives, and needs.

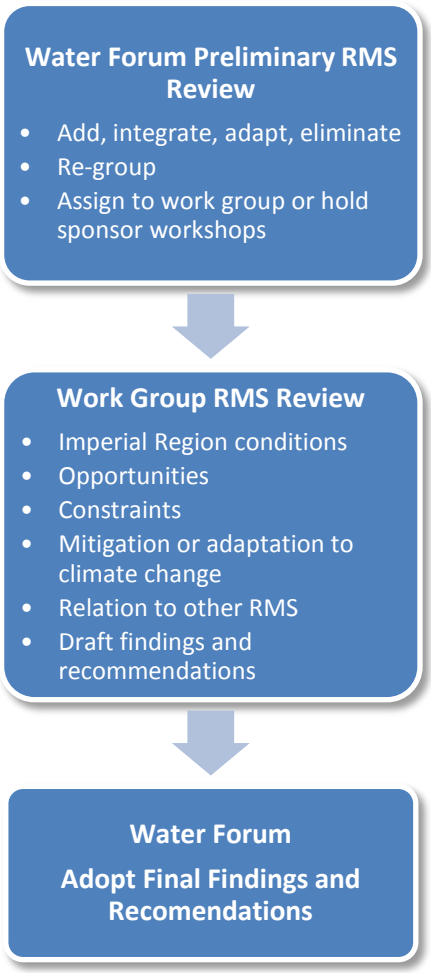

Figure 6-1.Water Forum Review

6.1.1 Preliminary Review

The RMSs are interrelated and linked to other activities in the Region. The Water Forum considered each RMS individually to tailor and regroup them to reflect local conditions.

The Water Forum made findings and recommendations which provide broad guidelines to focus the IRWMP and support development of specific projects, programs and policies to be integrated and, ultimately, to be implemented by agencies with the appropriate jurisdiction and authority.

[1] California Public Resources Code §75026(a) and California Water Code §10541(e)(2).

Table 6-1, Resource Management Strategies as Applied and Grouped for the Imperial Region, lists the seven CDWR Management Objectives and 33 associated Resource Management Strategies.[2] Table 6-1 provides a summary of how the Water Forum subdivided, regrouped and adapted the CDWR RMS into Imperial Management Objectives to reflect Imperial Region circumstances.

Table 6-2, Resource Management Strategies for Further Development and Integration, lists the five Imperial Management Objectives and 17 associated Imperial Resource Management Strategies, and provides the rationale for the approach and Water Forum determination on how the strategy would be applied. The rationale describes how each strategy could be integrated with other strategies or with existing programs, projects, and policies. The Water Forum determination column indicates the Water Forum's judgment of whether the strategy would meet Imperial IRWMP objectives either separately or when integrated with other strategies.

Table 6-3 Resource Management Strategies Set Aside from Further Development and Integration, lists 19 strategies that were removed from further consideration after the preliminary review. The Water Forum set aside a strategy if it did not meet Water Forum objectives, was not applicable to the Region, or could meet objectives but was adequately addressed by existing or planned programs. Some elements of an RMS that was set aside were integrated with other strategies.

Strategies can be brought back into subsequent IRWMP updates to respond to changing conditions as part of adaptive management.

[2] California Water Plan Update 2009 Volume 2 and CDWR 2010 IRWMP Guidelines

Table 6-1. ***Resource Management Strategies as Applied and Grouped for the Imperial Region***

CDWR Management Objective	CDWR RMS	Imperial RMS	Imperial Management Objective
Reduce Water Demand	Agricultural Water Use Efficiency	Agricultural Water Use Efficiency	Reduce Water Demand (Chapter 8)
	Urban Water Use Efficiency	Urban Water Use Efficiency	
		Renewable Energy Sector Water Use Efficiency	
Improve Operational Efficiency and Transfers	System Reoperation	System Reoperation – Regional, Interregional	(Table 6-3)
	Water Transfers	Transfers – Into and Out of Region	
	Conveyance – Delta (Table 6-3)		Increase Water Supply (Chapter 7)
	Conveyance – Regional/Local	Conveyance -– Regional, Interregional (Table 6-3)	
		Conveyance – Local, Planned	
		Conveyance – Municipal Systems Interconnections	
Increase Water Supply	Conjunctive Management and Groundwater Storage	Groundwater Development, Storage, and Conjunctive Management	
	Desalination		
	Recycled Municipal Water		
	Surface Storage – Regional/Local	Surface Storage – Local	
		Surface Storage – Regional (Table 6-3)	
	Surface Storage – CALFED (Table 6-3)		
	Precipitation Enhancement (Table 6-3)		
Improve Water Quality	Matching Water Quality to Use		
	Drinking Water Treatment and Distribution		Improve Water Quality (Chapter 10)
	Pollution Prevention (Table 6-3)		
	Salt and Salinity Management (Table 6-3)		
	Groundwater and Aquifer Remediation (Table 6-3)		
	Urban Runoff Management		Improve Flood Management (Chapter 9)
Improve Flood Management	Flood Risk Management	Regional Flood Control	
Practice Resources Stewardship	Agricultural Lands Stewardship		Practice Resources Stewardship and Other Strategies (Chapter 11)
	Economic Incentives (Loans, Grants and Water Pricing)		
	Ecosystem Restoration		
	Forest Management (Table 6-3)		
	Land Use Planning and Management [1]		
	Recharge Area Protection (Table 6-2)		
	Water-Dependent Recreation (Table 6-2)		
	Watershed Management [2] (Table 6-3)		
Other Strategies	Crop Idling for Water Transfers (Table 6-3)		
	Irrigated Land Retirement	Irrigated Land Retirement for Local Apportionment	
	Dewvaporation or Atmospheric Pressure Desalination		(Table 6-3)
	Fog Collection		
	Rainfed Agriculture		
	Waterbag Transport, Storage Technology		

[1] Land Use Planning and Management: Imperial County Use Permits for Solar Development, and IID Temporary Land Conversion Fallowing Policy

[2] Crop Idling for Water Transfers: IID 2009 Regulations for Equitable Distribution Policy, Temporary Land Conversion Fallowing Policy, and proposed fallowing for In-lieu MCI Exchange (Table 6-3, and Recycled Water RMS)

Table 6-2. ***Resource Management Strategies for Further Development and Integration***

Imperial Management Objective	Imperial RMS	Rationale	Water Forum Determination
Increase Water Supply (Chapter 7)	Conveyance – Local	Includes planned conveyance facilities identified in local capital improvement plans for City or County systems. IID system improvements are part of IID System Conservation Program.	Integrate to meet objectives
		Can integrate new conveyance infrastructure as part of recycling, groundwater banking or other local projects. Includes concepts for interties to connect municipal drinking water treatment or wastewater treatment systems.	
	Groundwater Development: Storage, and Conjunctive Management	Groundwater storage/banking could help meet Water Supply goals and objectives; facilitate management of overrun/underrun of IID's Colorado River entitlement; increase operational flexibility; and help mitigate and adapt to climate change.	Meets objectives
		Unlikely to develop groundwater supplies in quantity needed to meet forecasted MCI demand. Very limited opportunities due to basins approaching or exceeding safe or sustainable yields (overdraft), low rates of natural recharge, and/or poor quality water.	Integrate to meet objectives
		Integrate East Mesa brackish groundwater development into desalination concepts.	
	Desalination	Potential new water source (secondary use of Colorado River supply). Could provide water for proposed In-lieu MCI Exchange/in-valley use.	Meets objectives
	Recycled Municipal Water	Potential new source (secondary use of Colorado River supply). Match to appropriate water use based on treatment level and water quality. Could support renewable energy (geothermal) industry by providing supply cooling water, support DACs through upgrade of treatment plants, and help mitigate or adapt to climate change. Could provide water for proposed In-lieu MCI Exchange/in-valley use.	Meets objectives
	Surface Storage – Small Local for Raw or Treated Water	Small surface storage is integrated into system optimization and conservation strategies in the IID System Conservation Plan. Could include wholesale water delivery system, operational storage improvements, and municipal raw or treated water storage to address deficiencies identified during DAC outreach and Projects Work Group meetings.	Integrate to meet objectives
	Matching Quality to Use	Moved to Increase Water Supply to emphasize use of brackish water to increase supply for economic activity, match recycled municipal wastewater to appropriate use under state requirements, and put brackish water to beneficial use where cost effective (e.g. algae production).	Meets objectives

Table 6-2. Resource Management Strategies for Further Development and Integration, continued

Imperial Management Objective	Imperial RMS	Rationale	Water Forum Determination
Reduce Water Demand (Chapter 8)	Agricultural Water Use Efficiency	IID Definite Plan and System Conservation Plan identify efficiency conservation projects, programs, and policies to be implemented. Up to 8 KAFY of system efficiency conservation costing more than $500/AF may be available above that required to meet IID QSA/Transfer Agreements obligations.	Meets objectives
	Urban Water Use Efficiency	Further definition of local and regional program is needed. Could integrate IRWMP and UWMP.	Meets objectives
	Renewable Energy Sector Water Use Efficiency	Renewable energy sector (geothermal) water use efficiency is added to reflect water use for cooling as the largest component of forecasted future water demand. Development of renewable geothermal energy is part of County General Plan and economic development strategy; supported by IID Board; sector has unique BMPs for conservation; and addresses specific state/federal requirements. Imperial IRWMP supports regional and state goals for increasing renewable energy production to reduce greenhouse gasses and to mitigate and adapt to climate change.	Added to meet objectives
Improve Flood Management (Chapter 9)	Urban Runoff Management	Address stakeholder concerns with management of stormwater runoff from cities. Integrate efforts to improve urban runoff water quality consistent with NPDES stormwater permit requirements. Potential to create regional benefits and projects. Could integrate with habitat management. Could consider altering purpose of IID drainage system to meet multiple objectives, but would be expensive, and DACs have few resources.	Integrate meet objectives
	Regional Flood Control	Coordinate urban runoff management efforts to create a regional approach to flood management. No cost-effective major regional flood control projects have been identified; regional policies could be developed.	Integrate to meet objectives
Improve Water Quality (Chapter 10)	Drinking Water Treatment and Distribution	Address system deficiencies. Potential for consolidation of facilities to provide economies of scale and achieve cost-effectiveness.	Integrate to meet objectives

Table 6-2. Resource Management Strategies for Further Development and Integration, continued

Imperial Management Objective	Imperial RMS	Rationale	Water Forum Determination
Practice Resources Stewardship (Chapter 11)	Economic Incentives (Loans, Grants and Water Pricing)	Identify opportunities to integrate projects and compete for state and federal grants. Could develop water rates that provide economic incentives to conserve and generate revenues to implement projects that provide an alternative supply to the Colorado River and/or for secondary uses of Colorado River water. DAC status militates against rate increases. Would integrate with water substitution or exchange concepts.	Integrate to meet objectives
	Ecosystem Restoration	Could integrate with recycled municipal wastewater strategy to mitigate for potential impacts of reduced flow to IID drains. Could develop regional habitat mitigation banking concept.	Integrate to meet objectives
	Water-dependent Recreation	Could integrate with groundwater banking, stormwater/ flood management and habitat mitigation banking where feasible to provide multiple economic and other benefits. In 2011, IID recreational water delivery was 7 KAF, for golf courses, cemeteries, schools US Navy, an RV park, and other uses; environmental delivery was 3 KAF for the IID managed marsh; agricultural deliveries in the range of 24 KAF were made to duck clubs, lakes/ponds and recreational/ wildlife areas, including land farmed for habitat for Sonny Bono Salton Sea National Refuge.	Integrate to meet objectives
	Recharge Area Protection	Could be integrated into any groundwater recharge and storage program; i.e., as laid out in Groundwater Management Plan (GMP) element of the IRWMP (Appendix P).	Integrate to meet objectives
	Irrigated Land Retirement for Local Apportionment	Long term retirement of agricultural lands through conversion to other permanent uses consistent with city or County general plans would provide water for long term in-valley apportionment and to meet certain QSA/Transfer Agreements obligations. Integrate with other strategies; coordinate with land use planning and management.	Integrate to meet objectives
		Could apply administrative or legal mechanisms to permanently reduce agricultural water use on a property (e.g.; conservation easement, title changes). County approach and IID Temporary Land Conversion Fallowing Policy suggest there will be no long-term retirement except for urban and MCI development for lands in city & County general plans.	

Table 6-3. ***Resource Management Strategies Set Aside from Further Development***

Imperial Management Objective	Imperial RMS	Rationale	Water Forum Determination
Improve Operational Efficiency and Transfers	System Reoperation – Regional, Interregional	Regional (local) system reoperation is part of IID Definite Plan and System Conservation Program. Interregional reoperation is integrated with concepts for groundwater storage in the Coachella Valley IRWM Region. Lower Colorado River operations are directed by USBR rules.	Existing program
	Transfers – Out-of-basin	Out-of-basin transfers do not meet Imperial Region IRWMP objective to provide a firm, verifiable, and sustainable supply to meet current and future demands. Out-of-basin transfers beyond those in the QSA/Transfer Agreements are not part of the IRWMP.	Set Aside
	Transfers – Into Region	All water delivered by IID enters the Region from the Colorado River. No further transfer into the Region is proposed by any public agency. Public and private interests may seek to transfer water into region if cost effective. Could be part of long-term adaptive management strategy.	Set Aside
	Conveyance – Delta	Could influence competition for Colorado River supplies on the part of South Coast and Coachella Valley IRWMP regions dependent on Delta supply; not directly applicable.	N/A
Increase Water Supply (Chapter 7)	Conveyance – Regional, Interregional	Large interregional project concepts to support Salton Sea enhancement and/or integrate with desalination to provide new supplies and facilitate transfers are cost prohibitive compared to other alternatives. Limited local political support. Could be future long-term strategy.	Set Aside
	Surface Storage – Regional	Large surface storage reservoirs not feasible due to flat terrain, cost, environmental compliance requirements, high evaporation rate, and regulatory constraints.	Set Aside
	Surface Storage – CALFED	Could influence competition for Colorado River water by South Coast and Coachella Valley; not directly applicable.	N/A
	Precipitation Enhancement	Not applicable to Region (desert climate).	N/A
Improve Water Quality (Chapter 10)	Pollution Prevention	Programs are adequate at this time.	Existing program
	Salt and Salinity Management	IID and growers have a long history of salt and salinity management to maintain agricultural productivity.	Existing program
	Groundwater/ Aquifer Remediation	Programs adequate at this time; generally limited to salt management and leaching practices.	Existing program
Practice Resources Stewardship and Other Strategies (Chapter 11)	Crop Idling for Water Transfers	Crop idling is part of IID Equitable Distribution Plan and SDCWA transfer/Salton Sea mitigation (2003-2017).	Set Aside
		Additional crop idling is contrary to IID and County policy. County Use Permits (CUPs) for solar development and IID Temporary Land Conversion Fallowing Policy; could result in supply to meet certain QSA/Transfer Agreements, obligations or forecasted MCI use. Integrate with other strategies; coordinate with land use planning and management.	
	Agricultural Lands Stewardship	To preserve and protect agricultural water supplies is a Region objective. Existing programs for to preserve and protect ag lands and IID's water supply are exemplary.	Existing Program
	Forest Management	Not applicable to Region.	N/A
	Watershed Management	Coordinate with state and federal agency activities.	Set Aside
	Dewvap/Atmospheric Pressure Desal	Not applicable to Region (low humidity, average rainfall around 3 inches per year.)	N/A
	Fog Collection	Not applicable to Region.	N/A
	Rainfed Agriculture	Not applicable to Region.	N/A
	Waterbag Transport	Not applicable to Region.	N/A

6.1.2 Work Group RMS Review

Work group and workshop meetings allowed discussion of an RMS in small group settings. The Demand Management Work Group reviewed strategies associated with the Reduce Water Demand management objective, and the Projects Work Group reviewed the strategies in the Increase Water Supply and Improve Operational Efficiency objectives. Workshops were conducted for Improve Flood Management, Improve Water Quality, and Ecosystems Restoration management objectives. The Charter Work Group drafted the Imperial IRWMP Water Forum and RWMG Charter. IID, as lead regional water agency, and the County, as the lead regional land use agency, engaged in discussion of coordinated approaches to land use planning and water supply management through the IID/County Water Planning Group.[3] Water Forum, work group, and workshop participants were provided access to prior reports, briefing materials, and presentations, including:

- Description of the CDWR standards and resource management strategies
- Documentation of Imperial Region conditions and how the resource management strategies are being applied
- Analysis of opportunities relevant to future application of the strategies in the Imperial Region
- Documentation of constraints and challenges within the Region
- Identification of the relationship to other resource management strategies
- Draft findings and recommendations

In developing specific strategies for the Imperial Region, the Water Forum considered:

- ***Imperial IRWMP Goals and Objectives*** **–** How well does the strategy work to meet the Imperial IRWMP objectives?
- ***Complexity*** - Does the strategy face complex legal, political, or technical hurdles that would impede the ability to design, permit, or implement it?
- ***Resolution of Conflicts, Colorado River*** **–** Would the strategy help to resolve or avoid conflicts on the river?
- ***Resolution of Conflicts, Imperial*** **–** Would the strategy help to resolve or avoid conflicts within the Imperial Region?
- ***Regional Benefits*** **–** Would the strategy provide benefits to multiple participants?
- ***Timeliness*** - Is the strategy well defined for the Imperial Region; are potential projects ready to proceed; does a project have a feasibility study, preliminary design, and environmental clearance and approvals?
- ***Political Acceptability, Local*** **–** Would the strategy be widely supported within the Imperial Region; could it receive local funding and support?
- ***Political Acceptability, Interregional*** **–** Would the strategy be widely supported within the Colorado River basin; would it generate political controversy; could it receive state or federal funding and support?

[3] The IID/County Water Planning Group consists of two members from the IID Board of Directors and two members from the County Board of Supervisors.

- ***Integration Opportunities –*** Would the strategy provide additional benefits when combined with other strategies?
- ***Adaptability to Climate Change –*** Would the strategy help mitigate climate change within the Colorado River basin; would it help the Region adapt or respond to climate change?

6.2 WATER FORUM FINDINGS

Findings and recommendations drafted by the work groups were presented to the Water Forum, where they moved through the process to Water Forum final action. Following considerable discussion, collaboration and wordsmithing, the Water Forum reached consensus and adopted all findings and recommendations presented in the IRWMP.

Chapters 7 through 11 of the IRWMP present an expanded discussion of the RMSs identified by the Water Forum for further development, grouped by Imperial Management Objective. These chapters present the Water Forum's consensus findings and recommendations and provide information that supported the findings. Findings adopted by the Water Forum define the scope of the IRWMP, and ultimately provide guidance for developing and integrating stakeholder projects, programs and policies.

6.3 RATIONALE FOR STRATEGIES SET ASIDE FROM FURTHER CONSIDERATION

The following strategies are either being implemented through an existing program, were determined to be not applicable, or were set aside for reasons identified below. Future IRWMP updates may include these strategies as part of the adaptive management process.

6.3.1 System Reoperation – Regional, Interregional

The IID Definite Plan and System Conservation Plan include system reoperation to improve water delivery flexibility and reduce operational spill. Development of groundwater storage and banking projects could involve reoperation of the All-American and Coachella canals. Interregional system reoperation of the Coachella Canal and other facilities for groundwater storage by IID in the Coachella Valley IRWM Region would be coordinated between CVWD and IID.

Lower Colorado River operations are directed by USBR. Any interregional system reoperation would be under USBR direction consistent with Lower Colorado Region Operations, including the Annual Operating Plans, and Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead.

6.3.2 Transfers – Out-of-basin

Out-of-basin transfers do not meet the Imperial Region IRWMP objective to provide a firm, verifiable, and sustainable supply to meet current and future demands in the Imperial Region. IID holds legal title to all its water and water rights in trust for landowners within the district (CWC Code §§20529 and 22437: Bryant v. Yellen, 447 U.S. 352, 371(1980), fn.23). The Water Forum determined the QSA/ Transfer Agreements to be out of scope for the IRWMP, and no out-of-basin transfers beyond those identified in the QSA/Transfer Agreements are included in the IRWMP. The Water Forum set aside this strategy from further consideration.

6.3.3 Transfers – Into Region

All water delivered by IID enters the Region from the Colorado River. No further transfer into the Region is proposed by any public agency. However, transfers of water into the Imperial Region could include public agency or private procurement of a transfer agreement from a third party and compliance with wheeling policies to convey (wheel) the water through the All-American Canal, Coachella Canal or other canals.[4] Opportunities for procurement of a water right from a Colorado River water rights holder are limited. The water would have a high price due to the competitive market and would not be cost effective. Nothing would preclude the Cities or other urban water suppliers from independently obtaining and transferring water into the Imperial Region.[5] This strategy is not currently proposed by any public agency engaged with the Water Forum. Private interests have considered transferring water into the basin; however, to date these concepts have not proven cost effective. Such transfers could be part of long-term adaptive management. The Water Forum set aside the strategy from further consideration for this version of the IRWMP.

6.3.4 Conveyance – CALFED

Delta conveyance is not directly related to the Imperial Region; however, it is indirectly related in the form of CALFED conveyance of water through the Sacramento-San Joaquin Delta to the State Water Project (SWP). Improved Delta conveyance could have a strong influence on the volume, reliability and availability of SWP supplies that flow to water agencies in the South Coast (MWD, SDCWA) and Coachella Valley (CVWD) IRWM regions. Increased competition with other regions, especially those with large voter population, tax base, and legislative influence, would create additional political pressure on the Imperial Region's Colorado River supply. Should there be a catastrophic disruption in the SWP delivery; Imperial Region Colorado River supply could be impacted. The Water Forum set aside this strategy from further consideration for purposes of the Imperial IRWMP.

[4] In practice, no one on the Colorado River system transfers water rights; water transfer agreements are entered into to preserve existing water rights.

[5] The UWMP Act requires urban water providers to evaluate exchanges or transfers of water on short-term or long-term basis (CWC 10631(d)). Also see Chapter 11 for discussion of Imperial Region water exchanges.

6.3.5 Conveyance – Regional, Interregional

The IID System Conservation Plan identifies regional conveyance improvements; and use of the old, unlined Coachella Canal was integrated into the groundwater development, storage, and conjunctive management strategy.

Large interregional conveyance concepts have been proposed by private sector interests. The concepts are related to restoring the Salton Sea or facilitating additional transfers of water into and out of the Imperial Region. One example is the Sea-to-Sea Project which would include a number of variants to bring Sea of Cortez ocean water into the Imperial Region and remove hypersaline Salton Sea water to the Sea of Cortez. Other evolving concepts, if cost effective, could be part of the long-term strategy to address regional and interregional water demands. The elements of such a strategy may provide long-term opportunities, but are not sponsored by any public agency, would involve complex agreements and permitting requirements, and none of the projects was well defined or ripe for a decision. As such, this strategy is not included in this version of the Imperial IRWMP, but could be included in an update of the Imperial IRWMP as part of adaptive management.

6.3.6 Surface Storage – Large Local/Regional

Regional large-scale surface storage is not feasible due to the Region's flat terrain, high evaporation rates and environmental issues. Imperial Region has no practical location at which to site a large scale reservoir. Furthermore, pan evaporative rates in the region are upwards of eight feet per year and environmental constraints are great. The Water Forum determined that opportunities to store additional water off of the Colorado River would be better realized through groundwater storage and banking.

Smaller surface storage reservoirs on the IID system would provide operational flexibility; 36 mid-lateral reservoirs are listed in the IID System Conservation Plan. Other surface storage opportunities, if identified and cost effective, would be integrated into the Increase Water Supply management objective.

Following a protracted 11-year drought, which began in late 1999 and ended in 2010, and full use of Colorado River water rights, there is excess reservoir storage capacity on the Colorado River. IID continues to evaluate opportunities to use Lake Mead's available storage; however, this must be coordinated with USBR Lower Colorado River Region and with other holders of Lower Colorado River water rights. No local or regional large scale surface storage opportunities are available, and the Water Forum set aside this resource management strategy from further development.

6.3.7 Surface Storage – CALFED

CALFED surface storage projects are not directly related to the Imperial Region. They are indirectly related to the Region because CALFED storage has a strong influence on the volume, reliability and

availability of Sacramento-San Joaquin Delta water and SWP supplies that flow to water agencies in the South Coast (MWD/SDCWA) and Coachella Valley (CVWD) IRWM regions. Increased competition with other regions, especially those with large voter population, tax base, and legislative influence, would create additional political pressure on the Imperial Region's Colorado River supply. Should there be a catastrophic disruption in the SWP delivery; Imperial Region Colorado River supply could be impacted. The Water Forum set aside this strategy from further consideration for purposes of the Imperial IRWMP.

6.3.8 Precipitation Enhancement

Imperial Region rainfall averages less than three inches a year (the same as Cairo, Egypt). There are no opportunities for precipitation enhancement, and the strategy was set aside from consideration.

6.3.9 Pollution Prevention

In general, a pollution prevention approach to water quality is a more cost effective than end-of-the-pipe treatment of wastes or advanced domestic water treatment for drinking water, since they generally require less initial capital investment and have lower operation and maintenance costs. For the Imperial Region, all domestic water supplies are Colorado River water. State and federal programs are deemed sufficient to protect beneficial uses, and additional pollution prevention programs are not a priority.

To comply with US Environmental Protection Agency (USEPA) requirements and avoid termination of canal water service, residents in the IID water service area who access canal water and do not have access to treated water must obtain alternative water service for drinking and cooking from a state-approved provider. To avoid penalties that could exceed $25,000 a day, IID strictly enforces this rule. IID tracks nearly 4,000 raw water service accounts that are required by the California Department of Public Health (CDPH) to have alternate drinking water service. IID maintains a small-acreage pipe and drinking water database, and provides an annual compliance update to CDPH.

In 2000, the Colorado Region Basin Regional Water Quality Board (RWQCB) developed a Total Maximum Daily Load (TMDL) for Imperial Valley waterways which requires agricultural dischargers to reduce the amount of silt, and concomitant nutrients, that leave their fields. Imperial County Farm Bureau in collaboration with IID developed an award-winning TMDL program, which they describe as follows:

> *TMDLs have had a huge impact on Imperial Valley agriculture and the Imperial County Farm Bureau developed a voluntary compliance program to help defend growers from the onslaught of TMDLs. The TMDL program is voluntary, however nearly all farmers in Imperial Valley participate in the program because it offers growers and landowners a straightforward path to compliance with the mandatory TMDL regulation. Farmers implement a variety of Best Management Practices (BMPs) to reduce silt and mineral runoff on their own farms, and maintain a record of their efforts, and attend annual meetings to keep up-to-date and share information relating to BMPs and TMDL management on their farms.*

> *Since implementation, the Farm Bureau's TMDL program has prevented more than 33,000 tons of silt from entering the New and Alamo rivers, achieving the goal for the New River within three years. The program has seen a significant reduction at the Alamo River well ahead of the 12-year implementation schedule.*[6]

No additional pollution prevention actions were identified during initial scoping phase or during project definition, and no further measures are included in this IRWMP. Existing programs, monitoring and other ongoing efforts are acknowledged and integrated into the IRWMP.

6.3.10 Recharge Area Protection

Most areas in the Imperial Region that could be developed for groundwater recharge are on public lands that are managed under federal plans and regulations. Others are in natural drainages and floodways and protected under the County General Plan, Flood Plain Management Plan, zoning and County codes. Project designs will seek to avoid, minimize, and mitigate any potential impacts to recharge areas.

6.3.11 Salt and Salinity Management

Given the desert climate and salinity of Colorado River water flowing into the IID water service (averaged 744 ppm over the 21 years, 1990-2010);[7] Imperial farmers practice salt and salinity management as a routine measure. IID maintains approximately 1,406 miles of drainage ditches used to collect surface runoff and subsurface drainage from 32,000 miles of tile drains underlying some 475,000 acres of farmland. The tile drains act as conduits to carry off percolated applied water and thus serve to carry away salts that would otherwise accumulate in the root zone. Most IID drainage ditches discharge into either the Alamo River or New River, which flow to the Salton Sea, while a few discharge directly to the Salton Sea. The Water Forum found existing programs and strategies for salt and salinity management adequate to protect water quality and maintain agricultural productivity. Although new programs are not developed as a part of the IRWMP, salt and salinity management is discussed in Chapter 7 since this strategy is important for the Imperial Region.

While inflows to the Salton Sea contain elevated concentrations of salt, the main cause of high salinity in is that the sea has no outlet, resulting in concentration of salts through evaporation. Efforts to manage the salinity concentrations in the inflow waters could reduce the amount of salt entering the sea, but the salinity concentration in the closed basin lake will continue to increase. The Salton Sea Ecosystem Restoration Plan (California Natural Resource Agency, 2007) includes a number of alternatives that address increasing salt concentrations in the sea, including blending of inflow and sea water, and with differing configurations and sizes of habitat and open water areas. The restoration plan also recognizes that the Salton Sea will be managed as a saline water body, and many of the alternatives include some variant of a saline brine sink as part of the design. All of the alternatives to manage Salton Sea salinity are expensive; require an interregional solution and local, state, and federal cooperation. While the

[6] Imperial County Farm Bureau website: TMDL Voluntary Compliance Program. 5 Jul 2012. <http://www.icfb.net/tmdl.html>
[7] Every acre-foot of Colorado River imported into the Region carries one (1) ton of salt.

State of California legislatively assumed responsibility for Salton Sea restoration; funding and specific roles and responsibilities have not been identified; and the cost of the preferred alternative, at $9.8 billion, is very expensive.[8]

The extent and magnitude of managing the sea's salt concentrations are beyond the scope of work for the Imperial Region IRWMP. Salt management on the Colorado River is an interstate and international issue. Constraints related to disposal of a residual brine stream from potential desalination projects are addressed Chapter 7. Export of salts by constructing large conveyance facilities to import seawater and export highly saline Salton Sea water has not proven cost effective or feasible.

Within the Region, salt and salinity management is already a part of farmer and IID operations (drainage system and delivery of water sufficient for required leaching), and no new salt or salinity management programs or actions have been identified for further development in this version of the Imperial IRWMP. Removal of salts from drain water or brackish groundwater is being considered in the Region's desalination strategy as a possible strategy to meet the IRWMP objective to provide a firm, verifiable, and sustainable supply of 50 to 100 thousand acre-feet per year for new MCI demand by 2025 (IRWM Goals, 2009). Imperial IRWMP projects that result in decreased drain flows could increase salinity and TMDL load and any negative impacts may need to be mitigated.

6.3.12 Groundwater Remediation/Aquifer Remediation

Groundwater remediation involves extracting contaminated groundwater from the aquifer, treating it, and discharging it to a water course or using it for some other purpose, or injecting it back into the aquifer.[9] Contaminated groundwater can result from of both naturally occurring and anthropogenic sources. Remediation can result in an additional water source that would not be available without remediation. A wide array of regulatory programs have the sole purpose to prevent or remediate pollution of groundwater. Additional regulatory programs were not identified or recommended for inclusion in the IRWMP. Desalination of brackish groundwater or drainwater is a strategy that is being carried forward as part of the Increase Water Supply objective. No other groundwater remediation projects, programs, or policies are anticipated for inclusion in the IRWMP.

[8] See Jan 2008 LAO review of preferred alternative <http://www.lao.ca.gov/2008/rsrc/salton_sea/salton_sea_01-24-08.aspx>
[9] For the Region, the only groundwater extraction and recharge are is for geothermal energy production; the water is not treated before being injected back into deep aquifers not used for domestic water supply.

6.3.13 Water-dependent Recreation

The IRWMP environmental protection and enhancement goal includes an objective to:

> *Identify opportunities for open spaces, trails, parks and other recreational projects in the Imperial Region that can be incorporated with water supply, water quality or flood protection projects, consistent with public use and property rights.*

Where cost effective, opportunities to include recreational features and benefits will be integrated into other IRWMP projects. For example, created wetlands will seek to accommodate public access; and IID will continue to deliver operational spill, if available, to local fresh water lakes, duck ponds, etc. Water-dependent recreation will not affect nor be affected by the proposed strategies being considered in the IRWMP. None of the primary IRWMP objectives would be supported by further consideration of water-dependent recreation strategies, and none of the regional conflicts would be resolved through this strategy. No actions were identified by the Water Forum in this level of scoping and project conceptualization to be carried forward for further review.

6.3.14 Agricultural Lands Stewardship

One of the primary objectives of the County General Plan and IRWMP is to protect agricultural resources and to ensure any new industrial development or water intensive land use changes do not affect water supplies or water delivery facilities that are used to convey water to agricultural and other municipal, commercial and industrial (MCI) water users. Agricultural lands stewardship is an ongoing practice in all water and land use planning strategies in the Region. Imperial County has agricultural preservation goals and objectives in its General Plan, backed up by zoning and other ordinances, and no new aspects of this strategy would make a significant contribution to the realization of the IRWMP objectives. No actions or programs were identified by the Water Forum in this level of scoping and project conceptualization to be carried forward for further review.

6.3.15 Forest Management

The Imperial Region, with rainfall of less than three inches a year, does not have any forested land. There are no opportunities for forest management, and the strategy was set aside from consideration as not applicable to the Region.

6.3.16 Watershed Management

The Imperial Region includes or is surrounded by extensive areas of federally owned public lands. Federal agencies are responsible for land/watershed management plans on federal lands, and a number of federal plans are in development or undergoing environmental review. The Water Forum recognizes federal land management planning efforts (See Chapter 4) and the effects that these plans may have on the Imperial IRWMP and on project development in the Imperial Region. The federal plans have an

influence on the Imperial IRWMP. For example, groundwater recharge facilities could be located on federal property. Also, the complexity of leasing and permitting photovoltaic and other renewable energy facilities on federal lands has resulted in project proponents seeking to locate facilities on private (agricultural) lands that are covered under the County General Plan. Locating solar photovoltaic facilities on lands currently in agricultural production would change water use on that land and affect the IID water budget.

The Water Forum did not identify any watershed management practices during scoping that would significantly contribute to the realization of the IRWMP goals and objectives. The Water Forum set aside this strategy from further consideration in the interest of addressing higher priority water supply and management priorities.

6.3.17 Dewvaporation or Atmospheric Pressure Desalination

Dewvaporation is not applicable or appropriate to the desert climate. Atmospheric Pressure Desalination could meet small project requirements and demands, but would not be cost effective for the size and scale of the projects being considered in the IRWMP. Costs are estimated at approximately $500 to $1,100 per acre-foot, depending on the source of energy used.[10]

6.3.18 Fog Collection

Not technically feasible given the desert climate.

6.3.19 Rainfed Agricultural

Not technically feasible given the desert climate. Growers factor rainfall into their irrigation scheduling and water orders. IID also factors local rainfall into its Colorado River water order from the USBR. Historic data demonstrates the sensitivity of agricultural water demands to rainfall and recordable precipitation results in decreased water orders.

6.3.20 Water Bag Storage Technology

Not technically feasible or applicable in the Imperial Region since there is no connection to an ocean.

[10] USBR, 1999. <http://www.usbr.gov/pmts/water/publications/reportpdfs/report052.pdf>

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 7

Increase Water Supply

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Chapter 7. Increase Water Supply

Imperial Region resource management strategies to increase the water supply are discussed in this chapter, which is organized as follows:

- Groundwater Development, Storage, Banking and Conjunctive Management
- Recycled Municipal Water
- Desalination
- Source In-Lieu Use
- Matching Water Quality to Use
- Conveyance-Local
- Surface Storage-CALFED, Regional, and Local
- Precipitation Enhancement

This chapter and subsequent chapters present an introduction to the topic followed by:

- Findings and recommendations
- Historic conditions
- Opportunities
- Constraints
- Integration and relation to other resource management strategies
- Support for mitigating or adapting to climate change

7.1 Groundwater Development, Storage, and Conjunctive Management

Prior evaluation of groundwater development, storage, banking, and conjunctive use is reported in Appendices B and M. Analysis of IID capital project alternatives, including groundwater development is reported in Appendix N. This information was available to the Water Forum during review of the groundwater strategies. Groundwater banking and storage project concepts on the East Mesa and in the Coachella Valley Water District were proposed for further development.

Groundwater development is the use of wells to economically extract water from a groundwater basin or aquifer system for beneficial use. Ideally, the total amount of groundwater extracted annually is balanced with the amount of water recharged naturally or through intentional groundwater recharge.

Groundwater storage and banking is the intentional recharge of surface water in the available and manageable groundwater basin storage space. Recharge can be through spreading ponds, injection wells, unlined canals, or through surface water substitution for groundwater pumping. Surface water substitution, also known as in-lieu recharge, leaves the groundwater that would have been pumped in

the groundwater basin for future extraction and use. Active monitoring and accounting is recommended for all groundwater storage and banking recharge and extraction operations.

For groundwater storage operations, locally controlled groundwater basins and facilities are used to store and manage available surface water. On the other hand, groundwater banking involves providing or subscribing to services for use groundwater basins and facilities that are not directly under the control of the agency with available surface water. For example, Imperial Region interests could build groundwater storage facilities in the Region to store the Region's Colorado River supplies (groundwater storage) and provide groundwater banking services to others, thus creating a revenue stream and sharing of costs. Alternately, available Colorado River water could be banked in a groundwater basin through agreements to access groundwater storage space using facilities under the control of another agency.

Groundwater storage operations must not result in degradation of any potable groundwater basin designated by USEPA as a Sole Source Aquifer where the vast majority of overlying domestic users take groundwater from individual domestic wells for drinking water purposes without any treatment.[1]

Conjunctive water management is the coordinated and combined use of surface water and groundwater to increase the overall water supply to a region and improve the reliability of that supply. Conjunctive use implies some safe or sustainable yield from the groundwater basin (USBR, 1992).

7.1.1 Findings and Recommendations

Draft Groundwater Development, Storage, and Conjunctive Use findings were prepared November 25, 2010; reviewed by the Projects Work Group on November 18, 2010; discussed at the Water Forum on November 19, 2010; and confirmed by the Projects Work Group on January 19, 2011. At the March 2011 Water Forum meeting, the Water Forum adopted the following priority for the Imperial IRWMP:

> *Groundwater storage and banking is the IRWMP number one priority to maximize Imperial Irrigation District's (IID) annual water supply entitlement and minimize underruns.*[2]

7.1.1.1 Findings

On April 14, 2011, the Water Forum adopted the following findings:

- ***Imperial IRWMP Goals and Objectives*** – Development of groundwater storage and/or banking of Colorado River underruns would help to meet the goal to diversify the regional water supply portfolio and ensure a long-term, verifiable, reliable and sustainable supply to meet current and future agricultural, municipal, commercial, industrial, and environmental demands.

[1] For example, USGS scientists believe Ocotillo-Coyote Wells groundwater basin in southwest Imperial County has no significant natural recharge. This Sole Source Aquifer is outside the IID Colorado River water service area.
[2] IID is said to have an 'underrun' when demand is less than the full entitlement available for diversion. During underrun years, California interests with junior water right priorities can divert and beneficially use the water that IID does not use. IID is

Groundwater banking and storage would meet objectives by:

- Helping to avoid impacts to existing users
- Providing a firm, verifiable, and sustainable supply
- Supporting protection of surface water rights by putting the underrun water to beneficial use and by optimizing the Colorado River entitlements

- ***Complexity***
  - Groundwater storage and banking locally in the East Mesa would require integration with the desalination strategy. Legal, political, and technical issues need to be addressed, but no fatal flaws were identified. Facilities need to be consistent with U.S. Bureau of Land Management plans and policies if federal lands are used. This would necessitate compliance with National Environmental Policy Act (NEPA). Technical issues related to water quality, hydrogeology, and operations need to be further addressed.
  - Interregional groundwater storage and banking in the Coachella Valley, either through use of Coachella Valley Water District (CVWD) facilities or development of IID facilities within the Coachella Region consistent with the existing Quantification Settlement Agreement (QSA), are technically feasible, but require further study and analysis of specific site conditions. There are more political and legal complexities when compared to locally controlled facilities or groundwater storage areas.

- ***Resolve Conflicts, Colorado River –*** Groundwater banking and storage of underruns is consistent with existing agreements, though junior appropriators that use the underruns will likely resist development of projects to bank or store this water.
- ***Resolve Conflicts, Imperial Region –*** Groundwater banking and storage of underruns could provide a firm, verifiable, and sustainable supply for new users in-lieu of apportioning Colorado River supplies from current users to the new users. This would support land use agencies when making findings and determinations on available supplies and impacts to current users pursuant to state law. This will result in reducing the potential for local conflicts between the IID and the land use agencies, between current and future water users, and between the types of use.
- ***Regional Benefits –*** Groundwater storage and banking would provide benefits to all of the Region's Colorado River water users by increasing the reliability of the supply, protecting the local water rights, and ensuring reasonable and beneficial use.
- ***Timeliness –*** Groundwater banking and storage projects need to be further defined through feasibility study and/or additional pilot and demonstration projects. Project alternatives are still being developed and compared, and a preferred alternative has not been selected. Further exploration, field work, and pilot or demonstration projects would fill data gaps, test and demonstrate the technologies and operational concepts, and support completion of alternatives evaluations and final design of full-scale projects.
- ***Political Acceptability, Local –*** With the exceptions of the West Mesa, there is support for groundwater storage and banking of underruns. Such support is expected to increase with

seeking opportunities to divert and store this water to increase water supply reliability in the Imperial Region.

greater understanding and awareness of the need to protect Colorado River water rights. Ability to pay and willingness to pay, cost-benefit analysis, cost distribution, and fiscal evaluation have not been fully determined and require additional economic evaluation to gage acceptability and to compare to other structural and non-structural alternatives.

- ***Political Acceptability, Interregional*** **–** Groundwater storage and banking in the Coachella Region could be favorably regarded by the interests in that region depending on the terms and conditions for use of the storage space in their basins.
- ***Adapting to Climate Change*** **–** Groundwater banking and storage would allow the Imperial Region to make maximum use of the IID water rights and improve the ability for the Imperial Region to respond to variable climate conditions. Regardless of the long-term effects of climate change to Colorado River Flows, whether increase or decrease to the flows, groundwater banking would help the Imperial Region respond to vulnerabilities, make maximum beneficial use of the current entitlements, and help meet Imperial IRWMP objectives.

7.1.1.2 Additional Specific Findings

- ***Groundwater Development*** **–** Further groundwater development opportunities are very limited because basins are approaching or currently exceeding safe or sustainable yields (overdraft), natural recharge rates are low, and/or the groundwater is of poor quality.
    - ***West Mesa*****.** The Ocotillo-Coyote Wells Groundwater Basin area of West Mesa is at or exceeding sustainable yield, and further development or use of these resources would need to be consistent with the Imperial County Groundwater Ordinance and existing policies to prevent additional local overdraft. [3]
    - ***East Mesa.*** Groundwater development on a large scale (greater than 25,000 acre-feet per year) may not be sustainable over the long-term (50-year planning horizon), since both natural recharge and sustainable yield are limited; groundwater quality is variable and in most areas brackish; and the potential for subsidence is unknown.
        - Large-scale development may have to be coupled with desalination and a recharge program to be viable.
        - Additional study is needed to determine the feasibility of further groundwater development.
        - Groundwater in storage in East Mesa is mostly the result of the seepage from the historical operations of the conveyance canals.
        - East Mesa groundwater development coupled with desalination of the brackish groundwater would take advantage of water in storage, but would still result in depletion of groundwater over time unless integrated with strategies to recharge and store Colorado River water.
    - ***Blending East Mesa Brackish Groundwater.*** Blending with Colorado River water to extend the supply would increase the salt content of the water, impacting agricultural

[3] Ocotillo-Coyote Wells Groundwater Basin, as defined by US EPA Sole Source Aquifer Designation. CFR Vol 61, No. 176. September 10, 1996. Projects relying on and overlying the Ocotillo-Coyote Wells Groundwater Basin shall be based on safe

uses; but such blended water could be matched to beneficial uses where a lower water quality may be acceptable.
  - ***Imperial Valley*** development of brackish groundwater would require desalination.

- ***Groundwater Storage and Banking –*** Groundwater storage and banking of underruns should be the highest priority for the Water Forum and Imperial IRWMP.
  - Local areas for groundwater water management strategies that were carried forward and where reconnaissance-level projects have been configured for purposes of comparison and feasibility analysis include:
    - East Mesa groundwater development and desalination with recharge
    - East Mesa, Sand Hill, and Pilot Knob groundwater storage
    - IID groundwater bank development in the Coachella Valley
  - A potential timely, near-term solution would be to bank IID water through agreements with the CVWD and subscribe to the existing and/or expanded groundwater banks. The Coachella Region has an existing groundwater management plan.
  - Groundwater storage and banking projects are mid- to long-term opportunities. Specific groundwater storage and banking projects require further feasibility study and site investigations to better define water quality, hydrogeology, and design parameters; to optimize the recharge/extraction operations; and to compare local and interregional opportunities.
  - The following local and regional groundwater development and storage strategies have been eliminated from further consideration in the Imperial IRWMP based on technical feasibility or institutional constraints:
    - Imperial Valley Upper Aquifer
    - Imperial Valley Deep Aquifer
    - West Mesa groundwater development and large-scale banking
    - Arizona groundwater bank

- ***West Mesa –*** The concept of in-lieu groundwater recharge should include providing Colorado River water to existing high volume industrial water users, in-lieu of groundwater pumping to reduce the pressure on local groundwater supplies, and reduce or avoid overdraft.
- ***Groundwater Management Plan –*** The Imperial IRWMP will need to include groundwater management plan elements to meet requirements for state grant funding; support storage of Colorado River underruns in the Imperial Region; to make best use of the Imperial County and IID make best use of the Imperial County and IID authorities and responsibilities; and to protect current overly**ing users.**

7.1.1.3 Recommendations [4]

1. The number one priority for the Water Forum should be to develop groundwater storage and banking facilities, to capture Colorado River underruns, and protect local water rights.

yield considerations and resource constraints to protect correlative rights of overlying users.
[4] Recommendations were numbered for ease of reference.

2. Develop groundwater management plan elements in the Imperial IRWMP to support groundwater storage and banking projects and meet requirements for state grant funding.
3. Conduct needed feasibility studies and/or pilot and demonstration projects to obtain needed data, select a preferred groundwater banking alternative, and develop final project designs and funding requirements.
4. Seek state and federal grant funding to conduct the needed evaluations and pilot projects.

7.1.2 Imperial Region Groundwater Basin Characteristics

Groundwater basins within the Imperial Region are presented in Figure 7-1, and include portions of Coyote Wells Valley Basin, Borrego Valley Basin, Ocotillo-Clark Valley Basin, West Salton Sea Basin, Ogilby Valley Basin, Imperial Valley Basin, East Salton Sea Basin, and Amos Valley Basin, which in all total approximately 2,800 square miles (DWR, 1983). As noted in Chapter 4, groundwater development in the Region has been very limited due to low natural recharge, limited yields and poor water quality found in most areas. Historic groundwater conditions and the potential for groundwater development and recharge in the Imperial Region are discussed in greater detail in Appendix B.

Shallow aquifers beneath the Imperial Valley are affected by imported Colorado River water which contains one ton of salt per acre-foot (1 ton/AF) of water. Other factors impacting the shallow aquifers are the high rate of evaporation; depth of agricultural tile drains beneath farm lands; and seepage from canals, drains and rivers. Agricultural practices also contribute to groundwater salinity because of the need for leaching soils in the early days of the district, and now due to the imported salts in Colorado River water and some residual soil salinity.

7.1.2.1 Groundwater Development and Recharge

Recharge by underflow from tributary areas is small compared to recharge from imported Colorado River water, which is the largest source of recharge into the shallow aquifers. Historically, the unlined All-American, Coachella, and the East Highline canals have contributed to recharge. In the Imperial Valley, canal lining and seepage recovery wells have been developed over the past 60 years to conserve water and reduce seepage. In addition, farmers throughout the Imperial Valley have lined their head ditches and installed tile drainage systems.

Figure 7-1 also shows areas where recharge is occurring or may occur through development of recharge facilities. Recharge conditions in the Region are dictated by permeability of the topsoil and underlying sediments. Figure 7-1 shows the area covered by ancient Lake Cahuilla, which deposited an extensive clay layer that underlies the Imperial Valley and reduces or precludes water from recharging the lower sediments. Outside of the area where the clay layer is present, highly permeable soil overlies the East and West mesas.[5] The best available soil data was used to map permeable areas; however, soil data was not available for the entire East Mesa, hence the abrupt eastern boundary of the permeable soils layer shown in Figure 7-1.

[5] Hydrologic soils group A in the USDA Soil Conservation Service Maps was used to indicate areas with high permeability.

Direct recharge from rainfall, which averages less than 3 inches per year, may be a minor part of the groundwater budget. However, on higher alluvial slopes and in the washes and drainages that discharge to the Imperial Valley and the Salton Sea, precipitation can be sufficient for runoff to concentrate and infiltrate to groundwater. The location of the 100-year floodplain was used to indicate areas where natural runoff could percolate and recharge the groundwater basins in the East and West mesas. The Federal Emergency Management Agency (FEMA) has not mapped the 100-year flood plain in the East Mesa west of the Sand Hills area.

Figure 7-2 shows a proposed East Mesa Groundwater Management Area (East Mesa GMA). It includes the area east of the East Highline Canal to the Algodones Fault, which defines the groundwater basin boundary. If recharge projects are to be developed in the East Mesa GMA, monitoring programs would have to be designed consistent with the County Groundwater Ordinance and project-specific environmental documentation. The monitoring programs have to track project performance and ensure that potential impacts or third party effects were monitored.

The West Mesa has not been designated a Groundwater Management Area (GMA) since the Water Forum and stakeholders eliminated the area based on technical feasibility and institutional constraints.[6]

7.1.2.1 Groundwater Management

Four basic methods are available for managing groundwater resources in California: (1) local government groundwater ordinances or joint powers agreements, (2) management by local agencies under authority granted in the California Water Code or other applicable State statutes, (3) court adjudications, and (4) appropriation.

Local Ordinance and General Plan. Imperial County is responsible for groundwater management in the Imperial Region under the land use planning and police powers of the Board of Supervisors. Imperial County provides local groundwater management through the County Groundwater Ordinance and under the Water Element of the Imperial County General Plan (Imperial County 2003c).

Two Imperial County ordinances provide the foundation for managing and protecting groundwater within the County, including regulating groundwater storage and banking, requiring monitoring, and defining the well drilling and project permit process and public involvement. County requirements for managing groundwater are defined in Title 9, the County Land Use Ordinance, which provides comprehensive land use regulations for all unincorporated areas.[7] Title 9 includes Division 21 – Water Well Regulations, and Division 22 – the County Groundwater Management Ordinance.

[6] See Findings, Section 7.1.1.1
[7] Title 9, County Land Use Ordinance <http://www.icpds.com/?pid=573>

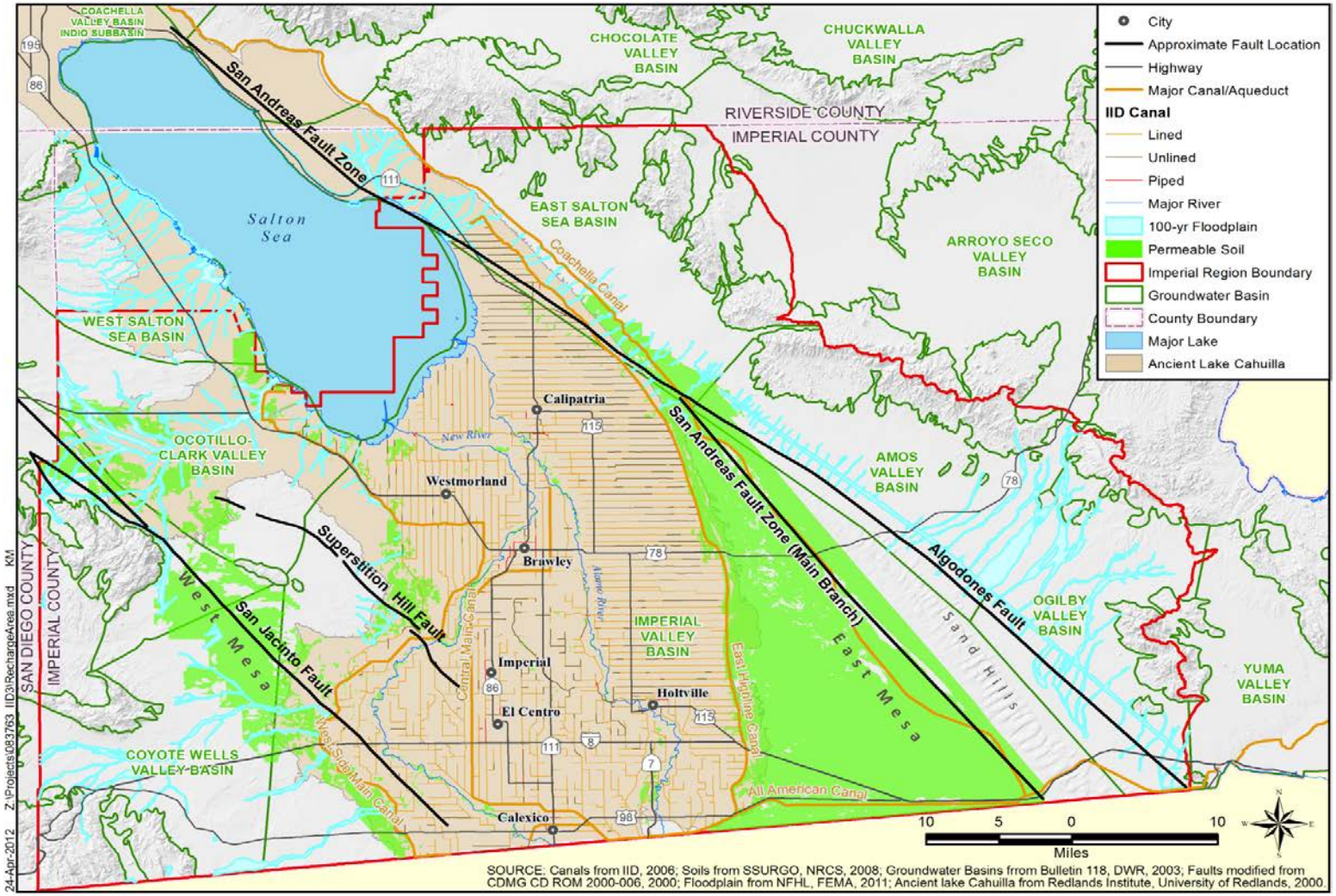
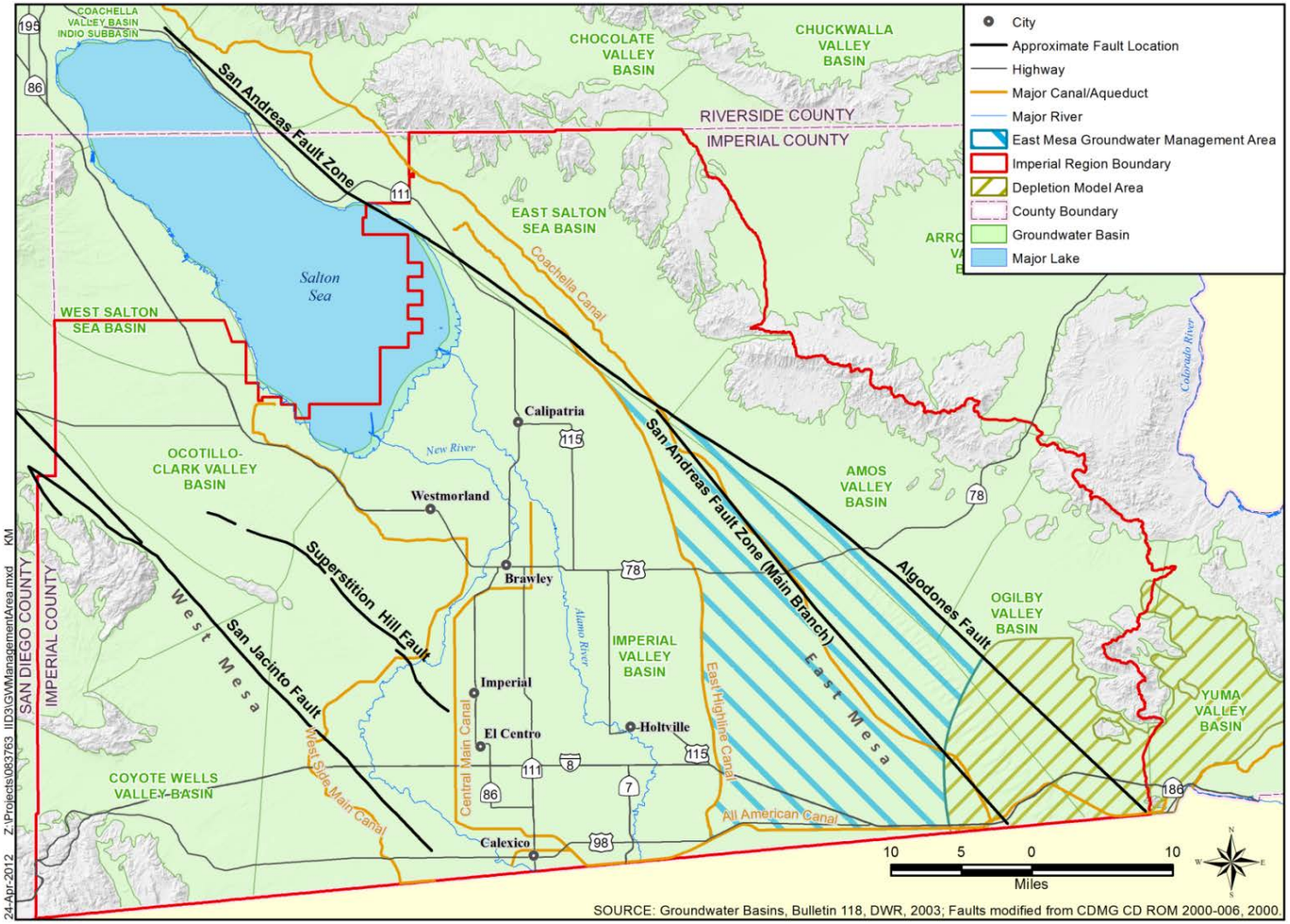


Figure 7-1. Imperial Region Recharge Areas


City
Approximate Fault Location
Highway
Major Canal/Aqueduct
Major River
East Mesa Groundwater Management Area
Imperial Region Boundary
Depletion Model Area
County Boundary
Groundwater Basin
Major Lake
COACHELLA VALLEY BASIN
INDIO SUBBASIN
CHOCOLATE VALLEY BASIN
CHUCKWALLA VALLEY BASIN
RIVERSIDE COUNTY
IMPERIAL COUNTY
EAST SALTON SEA BASIN
WEST SALTON SEA BASIN
Salton Sea
San Andreas Fault Zone
San Andreas Fault Zone (Main Branch)
Algodones Fault
Coachella Canal
Colorado River
New River
Alamo River
Calipatria
Westmorland
Brawley
Imperial
El Centro
Holtville
Calexico
OCOTILLO-CLARK VALLEY BASIN
AMOS VALLEY BASIN
OGILBY VALLEY BASIN
YUMA VALLEY BASIN
IMPERIAL VALLEY BASIN
Superstition Hill Fault
San Jacinto Fault
West Mesa
East Mesa
SAN DIEGO COUNTY
IMPERIAL COUNTY
COYOTE WELLS VALLEY BASIN
West Side Main Canal
Central Main Canal
East Highline Canal
All American Canal
10 5 0 10
Miles
SOURCE: Groundwater Basins, Bulletin 118, DWR, 2003; Faults modified from CDMG CD ROM 2000-006, 2000.
24-Apr-2012 Z:\Projects\083763 IID3\GWManagementArea.mxd KM

The County's General Plan Water Element identifies and analyzes the sources and availability of water within the County and establishes policies and programs to maintain, conserve, and preserve the supply quality; and to provide for the management and wise use of water resources for groundwater recharge.[8] The Water Element states that the County of Imperial shall:

- Make every reasonable effort to limit or preclude the contamination or degradation of all groundwater and surface water resources in the County.
- Direct the departments to review existing ordinances, policies, and guidelines and determine their adequacy in protecting groundwater from contamination.
- Coordinate with the state and federal agencies to ensure that these agencies are taking active steps to protect and reclaim groundwater from contamination.
- Encourage inter-agency and inter-jurisdictional coordination and cooperation for management of groundwater recharge.
- Require active consultation with other agencies regarding the limitation or elimination of impacts to surface and groundwater resources due to agricultural and urban development.
- Regulate land development to protect the limited, but important areas that contribute to groundwater recharge.

County Management through IRWMP and GMP. The California Water Code defines the requirements for a Groundwater Management Plan (GMP). [9, 10] The courts have not adjudicated the Region's groundwater basins. Urban water suppliers are not reliant on groundwater but could participate in future plans to fund, build, and operate groundwater recharge, banking, and/or conjunctive management projects to meet Imperial IRWMP goals to store Colorado River water and protect the Region's rights and entitlements. None of the Region's 2010 UWMPs projected a need for groundwater to be pumped by any of the urban water suppliers.

Both Imperial County and IID have the authority to manage the groundwater resources within the County through California Water Code, Division 6, Part 2.75 (Sections 10750 et seq.).

- ***Legislative Requirements***. Groundwater management in California is planned and coordinated locally to ensure a sustainable groundwater basin to meet future water supply needs. With passage of the Groundwater Management Act of 1998 (AB 3030), local water agencies were provided a systematic way of formulating Groundwater Management Plans (GMPs).[11] AB 3030 also encourages coordination between local entities through joint power authorities or Memorandums of Understanding (MOU).

  AB 3030 was amended in 2002 with passage of the Groundwater Management and Planning Act of 2002 (SB 1938). The act amends existing law related to groundwater management by local agencies. The law requires any public agency seeking State funds administered through the

[8] Water Element Objective 5.1
[9] CWC Division 6, Part 2.7, § 10750-10795
[10] An adopted GMP is required to pursue State grant funding for groundwater projects: CDWR Proposition 84 IRWM grants <http://www.water.ca.gov/irwm/index.cfm>; Local Groundwater Assistance grants <http://www.water.ca.gov/lgagrant/>
[11] Groundwater Management Act of 2009 (AB3030) <http://www.water.ca.gov/groundwater/gwmanagement/ab_3030.cfm>

California Department of Water Resources (CDWR) for the construction of any groundwater projects or groundwater quality projects to prepare and implement a GMP with certain specified components. Prior to this legislation, there were no required plan components. New requirements include establishing Basin Management Objectives, preparing a plan to involve other local agencies in a cooperative planning effort, and adopting monitoring protocols that promote efficient and effective groundwater management.

- ***New Requirements since 2002***. SBX 7-6 was signed by the Governor of California in November 2009. The bill directed CDWR to establish a statewide groundwater monitoring program. The purpose was to establish groundwater elevation monitoring programs by local entities in each groundwater basin or subbasin in California, and make the collected data available for planning. The local entities would work with CDWR to develop appropriate groundwater elevation monitoring plans. CDWR has established the California Statewide Groundwater Elevation Monitoring (CASGEM) program to manage, track, and evaluate groundwater data and monitoring results.[12]

  The development of a CASGEM monitoring plan is important for Imperial County to maintain local program control and qualify for grant funding. If the County or some other local entity does not have a groundwater monitoring program, then the state is required to perform monitoring functions and the County would not be eligible for grants or loans administered by the state.[13]

  AB 359, passed in 2011, expanded the existing law to require local agencies to include public participation when preparing the GMP, provide specific public notification, and include a recharge area map in the GMP.[14]

Groundwater Monitoring. The one significant gap identified for the Region to meet State groundwater management plan requirements is related to groundwater monitoring. Groundwater monitoring programs by the County have not been active due to the limited use of groundwater. The County does not have groundwater monitoring records.[15]

Nearby water levels are monitored by USGS in the Sand Hills area.[16] USGS conducted a well canvas to find wells suitable for monitoring, and was able to outfit 12 wells with data loggers. Some of the wells in the monitoring program are also sampled for water quality. The majority of the wells are located east of the Coachella Canal. USGS is also collecting microgravity data at each well location once a year. These data can be used to monitor change in storage. In the future, the USGS plans to use the data from these

[12] CASGEM homepage <http://www.water.ca.gov/groundwater/casgem/ >
[13] CWC §10933.7(a). "If the department is required to perform groundwater monitoring functions pursuant to §10933.5, the county and the entities described in subdivisions (a) to (d), inclusive, of Section 10927 shall not be eligible for a water grant or loan awarded or administered by the state." "If the department is required to perform groundwater monitoring functions pursuant to §10933.5, the county and the entities described in subdivisions (a) to (d), inclusive, of Section 10927 shall not be eligible for a water grant or loan awarded or administered by the state."
[14] Chaptered by Secretary of State Huffman - Chapter 572, Statutes of 2011
[15] Personal communication, Jim Minnick, Imperial County Assistant Planning & Development Services Director, Feb, 14, 2012
[16] Personal communication, Michael Land, USGS, February 23, 2012

wells to create a groundwater model of the Sand Hills area. Much of the USGS monitoring data for wells in Imperial County is available at the USGS websites.

In the West Mesa, the USGS monitors 20 wells in the Ocotillo/Coyote Wells Groundwater Basin (Todd Engineers, 2007).

Groundwater Models. Groundwater models can be used to evaluate a basin water budget and support or dissuade evaluation of projects and management alternatives. Several numerical groundwater models have been completed for areas of the Imperial Region. The models could be further developed to evaluate alternatives, and to support project development, designs, and environmental review. These models include:

- Coachella Canal Seepage model was developed by Lawrence Berkeley National Laboratory in 1977.[17]
- USGS 1977 computer model simulating the steady-state transport of fluid mass and heat in a shallow confined aquifer within the East Mesa area. Data for the model consist of information from water wells, geothermal wells, oil test wells, and included water quality data.
- Imperial County Groundwater Model referenced in the County Groundwater Ordinance (MWH, 1996).
- Ocotillo/Coyote Wells Basin Hydrology and Groundwater Modeling Study (Bookman-Edmonston Engineering, 1996).
- Ocotillo/Coyote Wells Basin Hydrology and Groundwater Modeling Study (Bookman-Edmonston Engineering, 2004), used for environmental analysis of the U.S. Gypsum project is an update of 1996 model.
- Lawrence Livermore National Laboratory MODFLOW groundwater model (LLNL, 2008).

7.1.3 Opportunities

7.1.3.1 Groundwater Development

Groundwater development opportunities that were reviewed include:

- West Mesa
- Imperial Valley
- East Mesa
- East Mesa blending in IID canals
- East Mesa blending on-site
- East Mesa blending and conveyance in IID drains
- Wellfield and conveyance conceptual designs

The purpose for evaluating groundwater development potential was to:

[17] Narasimhan, et al., 1977, 1978

- Document whether natural yield is available to help meet forecasted future demand
- Evaluate the potential to develop wellfields to either recover recharged Colorado River water or to provide brackish groundwater for desalination
- Provide reconnaissance-level wellfield designs and costs

The reconnaissance-level wellfield designs and costs were prepared to configure an array of recharge projects concepts both with and without desalination and are reported in Appendix B.

West Mesa. The safe or sustained yield of this area is limited and existing levels of development are probably at, or exceeding, the natural recharge rates, but there is uncertainty and varying interpretations of the available data. Groundwater of good quality can be found in the Ocotillo-Coyote Wells Groundwater Basin in the West Mesa. In the western section of the West Mesa, water quality varies widely. Almost all of the wells in Coyote Valley had total dissolved solids concentrations below 500 mg/L; however, West Mesa wells had levels between 1,800 and 5,200 mg/L (Imperial County, 2003). The area has been designated a sole source aquifer by the U.S. Environmental Protection Agency (USEPA).[18] Furthermore, local development for specific projects would be reviewed under requirements of the County General Plan, Groundwater Ordinance, and pursuant to California Environmental Quality Act (CEQA). Additional groundwater development in the West Mesa is not considered viable as a regional strategy for the Imperial IRWMP.

Imperial Valley Deep Aquifer. Imperial Valley is underlain by at least two regional aquifers. The upper aquifer is about 200 feet thick and may contain 0.8 million acre-feet of water. The deep aquifer beneath is about 600 feet thick and may contain 24 million acre-feet of water.

The shallow aquifers are for the most part relatively thin sand beds. Recovery of water could be by wells or drains, but they are hampered by low aquifer permeability, poor and highly variable water quality, and other impacts such as land subsidence. The deep aquifers are relatively thick sand beds that could be favorable for developing higher capacity wells. Salinity of the groundwater ranges from a relatively low 700 to 3,330 mg/L, which makes treatment of the water more feasible. The full extent of the deep aquifer is unknown and its hydraulic interconnection to the upper aquifer is poorly understood. Geologic information is insufficient to ascertain the source area for recharge to the deeper aquifer, and development potential for direct use without treatment to improve water quality is limited; but this aquifer could provide brackish water for desalination, or be blended with Colorado River water to reduce the salinity and be provided for uses consistent with water of the resultant quality. This water could be integrated with a desalination strategy.

Development of Imperial Valley groundwater as a stand-alone strategy was eliminated from further consideration for the Imperial IRWMP because it would not provide a sustainable, long-term supply.

[18] Groundwater storage operations must not result in the degradation of any potable groundwater basin that has been designated by the USEPA as a Sole Source Aquifer for drinking water purposes where the vast majority of overlying domestic users take groundwater from individual domestic wells without any treatment; see footnote 1.

East Mesa. East Mesa may contain water of adequate quality to sustain limited overlying uses, with the caveat that natural recharge and yield are minimal. For purposes of the Imperial IRWMP, groundwater development in the East Mesa would imply extraction of water that seeped from the historical operation of the All-American, Coachella, and East Highline, canals. The volume of groundwater associated with historic canal seepage underlying these areas was estimated at between 700,000 and 1,500,000 acre-feet.[19] The aquifer is favorable for development of high capacity wells; and water is generally of relatively good quality, with total dissolved solids (TDS) ranging from 500 to 1,000 mg/L. Water in storage could be economically recovered to provide an interim supply over a number of years, but development without additional recharge would deplete the water in storage over time, and the resultant overdraft would be contrary to the County Groundwater Ordinance.

Development of East Mesa groundwater as a stand-alone strategy was eliminated from further consideration in the Imperial IRWMP because it would not provide a sustainable long-term supply.

Development of brackish groundwater in East Mesa could be a sustainable practice as part of an integrated strategy for groundwater development, recharge and storage of Colorado River water to prevent overdraft, desalination or matching water quality to an appropriate beneficial use. East Mesa groundwater development would help to evacuate storage for subsequent groundwater recharge and storage operations. The cost of this operation would be over $500/AF (see Table 12-5 and Appendix N).

East Mesa Blending in IID Canals. This would involve pumping of East Mesa brackish groundwater and blending the water with Colorado River water the All-American Canal or East Highline Canal for delivery to agricultural users. The increase in groundwater pumping could be accounted as supply to meet new MCI demands. Blending groundwater would increase the salinity of the delivered water, which would increase the amount of irrigation water demand to satisfy salt leaching requirements.

Preliminary reconnaissance-level evaluations were conducted. Groundwater pumping volume was calculated for three levels of groundwater salinity to show the net supply that would result after accounting for increased crop water and leaching requirements (GEI, 2009c) and (Davids Engineering, 2009), see Appendix M. These results are shown in Table 7-1**.**

The net in supply available to maintain crop productivity is less than water pumped because increased application is required to leach salts. For example, total groundwater pumping of 50,000 acre-feet would result in a net increase in supply of 46,648 acre-feet for groundwater with 1,000 ppm of total dissolved salt. This was factored into the sizing of wellfields. For 1,000 ppm, the increase in total groundwater water requirements to satisfy the blending ratio and crop requirements is small. Needed adjustments to irrigation and other management practices in response to small increases in water salinity are also likely to be small; however, over time and in aggregate growers can be *expected* to have to apply additional irrigation water to maintain a salt balance in the root zone that is favorable for crop production. At higher levels of salinity, 2,000 ppm or 3,000 ppm, the increases are concomitantly larger

[19] This volume represents less than 7 months of All-American Canal flow into the IID service area, but could be a viable source for years when IID is experiencing overrun of its Colorado River entitlement or is required to make paybacks.

Table 7-1. Pumping Needed to Satisfy On-Farm Demands with Varying Groundwater Salinity (AF)

Pumping Needed (AF)	Net Supply to Satisfy On-Farm Demands (AF)		
	Groundwater Salinity		
	1000 ppm	2000 ppm	3000 ppm
1,000	932	656	380
5,000	4,660	3,283	1,904
10,000	9,321	6,569	3,810
15,000	13,983	9,858	5,720
20,000	18,646	13,152	7,634
25,000	23,311	16,449	9,550
30,000	27,976	19,750	11,470
40,000	37,310	26,362	15,319
50,000	46,648	32,988	19,180
60,000	55,991	39,628	23,055
70,000	65,337	46,283	26,942
80,000	74,687	52,951	30,842
90,000	84,042	59,634	34,755
100,000	93,401	66,330	38,680
110,000	102,763	73,040	42,617
120,000	112,130	79,763	46,568
130,000	121,500	86,500	50,530
140,000	130,874	93,251	54,505
150,000	140,252	100,015	58,493

Development of brackish groundwater in the East Mesa and blending in IID conveyance canals for agricultural use was eliminated from further consideration due to concerns expressed by growers related to the increase in salinity and potential impacts on production.

East Mesa with Blending On-site. This element would involve pumping East Mesa brackish groundwater, blending it with Colorado River water at a project site, and matching the resultant water to potential economic uses such as growing algae and producing high value co-products. Where IID turnouts are available, new conveyances would not be needed to deliver Colorado River water for blending with groundwater. This strategy could extend the Colorado River supply and be integrated with desalination. Saline water from agricultural and municipal wastewater could be blended to grow algae as part of an integrated regional strategy to manage and control dust on the playas along the Salton Sea, to support Salton Sea enhancement, or provide feed water for desalination.

East Mesa Blending and Conveyance in IID Drains. This element would involve pumping East Mesa brackish groundwater, blending it with Colorado River water, and conveying it using IID drains, new canals, or pipelines to deliver water to locations that can use the resultant water for an economically viable beneficial use such as algae production. This strategy could extend the Region's Colorado River supply and be integrated with desalination. In addition, saline water from agricultural and municipal wastewater could be blended to grow algae as part of an integrated regional strategy to manage and control dust on the playas along the Salton Sea, and to support Salton Sea enhancement or provide feed water for desalination.

Wellfield and Conveyance Conceptual Designs. Wellfields and pipelines were configured that could be used to extract and deliver brackish water to desalination facilities; extract and deliver clean recharged

Colorado River water to existing canals for direct delivery, and/or to evacuate groundwater storage so Colorado River can be recharged (Appendix B). Aquifer characteristics from available data were used to determine the potential well pumping rate over the 30-year life of the concept projects, and analysis was conducted to space wells to limit interference. The work provided reconnaissance-level costs to compare a range of integrated alternatives.

Since the largest forecasted future water demand is for geothermal energy projects, wellfields were configured to serve the East Brawley, East Mesa, Heber, and Salton Sea known geothermal resource areas (KGRAs). Preliminary designs and costs for wellfields were developed to supply 5,000 acre-feet per year (acre-feet per year), 25,000 acre-feet per year, and 50,000 acre-feet per year of brackish groundwater to the KGRA desalination plants. Costs also included pipelines to municipal systems when integrated with desalination strategies. Appendix B contains conceptual sketches of the wellfields, recharge sites, and pumped and finished water distribution systems for the desalination program.

7.1.3.2 Groundwater Storage, Banking and Conjunctive Management

Development of groundwater storage and banking facilities requires a source of good quality water; conveyance facilities to put water into groundwater storage (canals, pipelines, recharge ponds); facilities to extract water from storage and deliver the water to the point of use (wells, canals, or pipelines); and recharge areas with appropriate groundwater conditions. The type of groundwater storage and banking being considered is sometimes referred to as a “put and take” operation. Operational scenarios and facility designs are based on the timing and amount of available supply and user demand. Conveyance includes using the existing regional Colorado River delivery canals when there is available capacity and developing smaller conveyances to move water into and out of the recharge area or wellfields used to recover recharged water. Developing recharge ponds requires access to relatively large tracts of land. In areas like East Mesa where the groundwater levels are relatively high, groundwater can be pumped to make storage space available. The groundwater conditions that influence site selection and design of recharge ponds and wells include permeability of the surface soils and underlying aquifers, the extent of clay layers, location of faults, groundwater quality, and current levels of groundwater use.

Sources of Water for Groundwater Storage. Alternative supplies available for groundwater storage or banking in the Imperial Region are limited. Potential sources of water for storage or banking include:

- Colorado River water
- Local runoff and floodwaters
- Imported water from other regions

Colorado River Water – IID Colorado River entitlements were determined to be the best and most feasible source for groundwater storage (Appendix B). Groundwater storage is a beneficial use consistent with IID Colorado River water rights and California state law. The IID entitlement is fixed, but the agricultural demands vary year to year, resulting on underruns and overruns.[20] IID could divert water in underrun

[20] An underrun occurs when all of the Colorado River water available is not diverted or delivered. An overrun occurs when IID has taken more water than is available under the cap to the Colorado River supply.

years to store in a groundwater basin for future use. 0 shows the last eight years of Colorado River overruns and underruns under the QSA/Transfer Agreements. The U.S. Bureau of Reclamations (USBR) has developed the Inadvertent Overrun and Payback Policy (IOPP) that provides accounting for overruns and manner of payback (USBR , 2003).

IID underruns and overruns for 2003-2012 IID are shown in Figure 7-3. Given the groundwater banking and storage options available to the Region, not all underruns could be captured for groundwater recharge. Conservatively estimated, the yield could be between 19,000 and 55,000 acre-feet per year depending on assumptions related to capping overruns, depleting groundwater storage, and how the water would be distributed (NRCE, 2009). Higher yields are related to managing overruns through demand management and the IID Equitable Distribution Plan, because limiting overruns decreases IID's payback requirement, thus increasing the amount of water available for use or retained in storage in future years. The stored water could be pumped and used by agricultural and other current users, and/or be provided to meet future water demands to avoid potential impacts to current water users. When IID is not able to divert underrun water in any given year to store the water in the groundwater basin, those with junior rights to the Colorado River are able to divert the water.

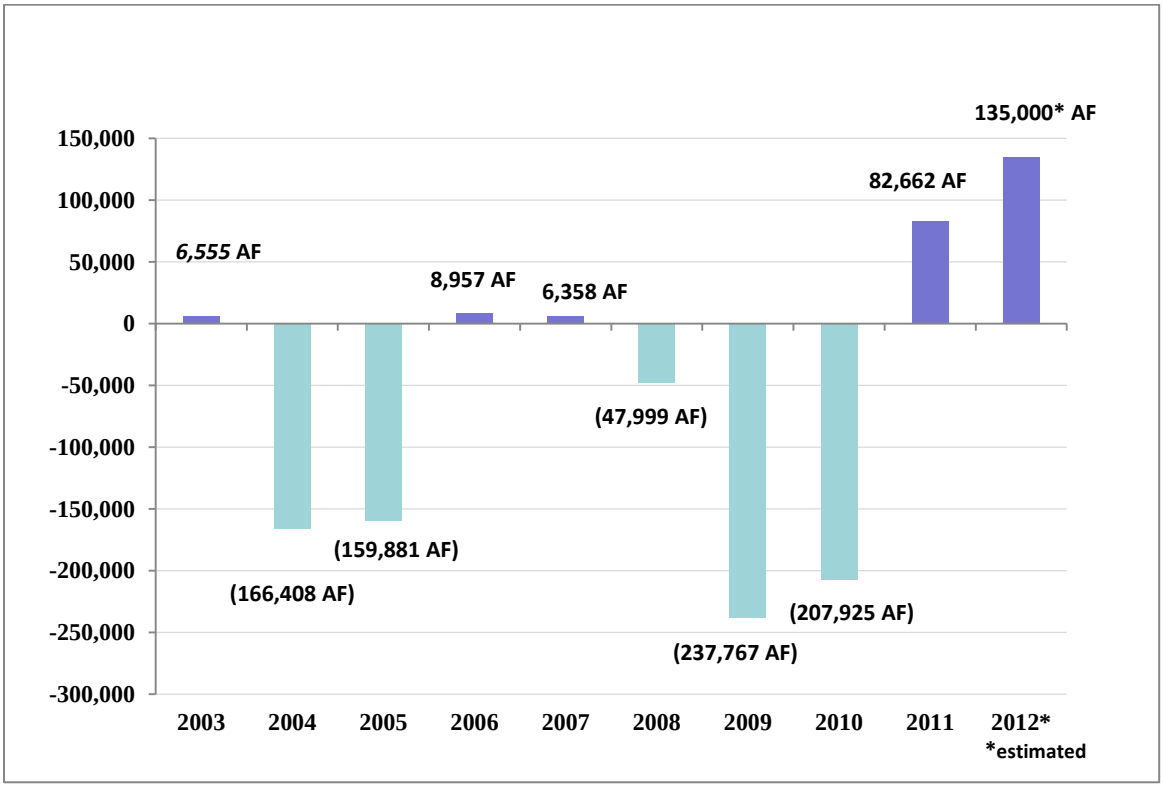


Figure 7-3. Colorado River Overruns and Underruns, 2003-2012 (AF)

Colorado River water averages approximately 760 mg/l total dissolved solids (Figure 7-4); however, this is a good quality in comparison to the groundwater quality in some of the areas considered for recharge, and is likely better than East Mesa ambient water quality. This level of salinity is worse than West Mesa ambient groundwater quality; which is a sole source aquifer not available for development.

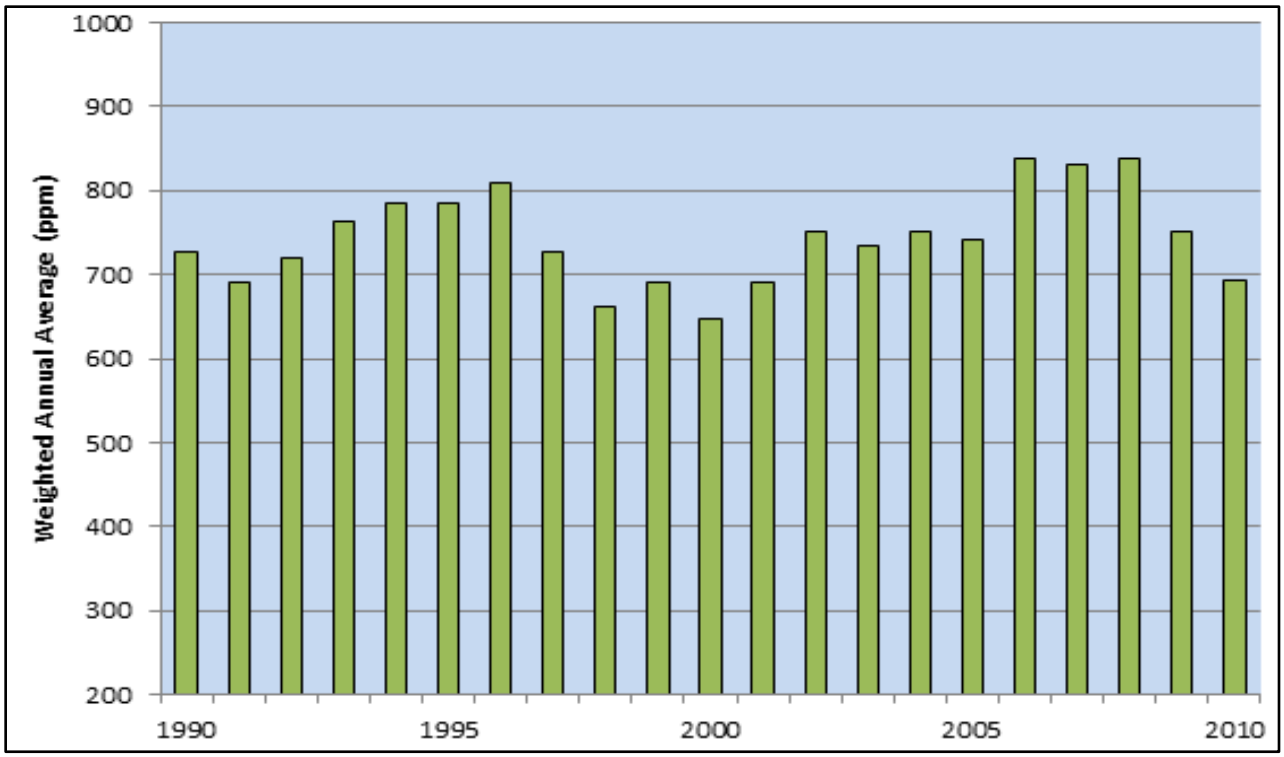


Figure 7-4. Colorado River Salinity at All-American Canal below Drop 1, 1990-2010 (Weighted Annual Average PPM)
Source: IID 2010 Annual Water Report

Local Runoff and Floodwaters – While local runoff and floodwaters could be used for recharge, such waters are episodic, come at a high rate and volume when available, carry large sediment loads, and face other constraints related to environmental effects and the Salton Sea.[21] Local runoff and floodwaters were removed from further review as a source of supply for recharge.

Imported Water from Other Regions – A potential source of water for groundwater storage could be water transfers into the Imperial Region. Water Forum members or other private development interests could procure water through transfer, convey (wheel) the water through existing IID canals, and store the water in a regional groundwater bank should one be developed. IID has adopted a wheeling policy that would allow others to convey water in its canals when capacity is available.[22] This source of water for banking was removed from further review for purposes of the Imperial IRWMP.

Conveyance Facilities for Recharge Operations. Imperial Region is fortunate to have facilities to convey Colorado River water to candidate groundwater recharge locations. Colorado River water is conveyed through the 80-mile-long All-American Canal and diverted to CVWD's Coachella Canal and to IID's East Highline, Central Main, and Westside canals. Operational capacity in the All-American Canal and other canals would be needed when Colorado River water is available for delivery to recharge sites. No capacity limitations were identified in existing conveyance facilities based on the water availability and operational scenarios that were considered. For the reconnaissance study, smaller conveyance canals

[21] While not relied upon for supply, local runoff and floodwaters may recharge aquifers to some degree and should be monitored as part of a groundwater management program
[22] IID Water Wheeling Policy Adopted February 8, 2011.

were configured to move water from the main canals to proposed recharge areas and from wellfields to the point of delivery (GEI, Inc., 2009b), see Appendix N. A more detailed capacity analysis during feasibility and pre-design is recommended to refine the operation scenarios.

Imperial Region Groundwater Recharge Areas. Recharge areas are described in Section 7.1.2; whereas, this review addresses concerns and development potential of specific recharge projects. Conducting additional feasibility study and/or pilot projects is recommended to fill data gaps and resolve uncertainties regarding selection of a preferred area and location. In October 2011, IID initiated an independent review of prior work to determine which East Mesa area is most appropriate, to define specific sites within the area, and to identify next steps. The next steps are included in Appendix P - Groundwater Management Planning Elements Guidance Document

Under California law, water recharged into an aquifer is recoverable by the party that conducted the recharge operation and put the water into storage, so any water intentionally recharged should be recoverable. According to the U.S. Geological Survey (USGS), the Colorado River accounting surface does not appear to extend to East Mesa, Sand Hills, or Pilot Knob Mesa areas.[23] USGS subsequently published a model to define where Colorado River water was being depleted (USGS, 2008). Figure 7-5 shows the approximate extent of the Colorado River depletion model areas. The modeled depletion area would overlap into the Pilot Knob area (see Figure 7-5). It is unknown how this USGS report would affect potential East Mesa water banking projects, and a new federal rule may emerge that uses the accounting surface or depletion zones. Given the uncertainty, the depletion model area was not considered for recharge or wellfields in the Imperial IRWMP analysis.

For the Imperial IRWMP, the feasibility of wellfields and recharge facilities in East Mesa, Sand Hills, and the Pilot Knob Mesa areas were reviewed using existing data and reports. The general concept of a groundwater recharge program in the East Mesa was investigated by the Colorado River Board of California and the USBR (USBR, 1992; USBR, 1979). West Mesa groundwater storage and in-lieu storage were also explored.

East Mesa provides the best opportunity for development of recharge and storage projects. IID entitlements to Colorado River water could be conveyed through the All-American and Coachella canals, and smaller project-specific conveyance could be developed to move water to proposed recharge ponds or the unlined portions of the old and unused Coachella Canal.

A 15-mile section of the unlined Coachella Canal west of the San Andreas Fault was abandoned when the lined canal was constructed. The unlined Coachella Canal has the ability to recharge about 10,000 acre-feet per year per mile (USBR, 1992). If all of the unlined section were used, up to 150,000 acre-feet per year could be recharged. Clay was used to reduce seepage from the unlined canal and removal of the clay layer might increase the percolation rate. To keep the recharge near the wellfields, modifying a two-mile long section of the unlined Coachella Canal could provide capacity to percolate 20,000 to

[23] The accounting surface was proposed in the July 16, 2008 Federal Register but was subsequently withdrawn.

40,000 acre-feet per year. Wellfields would be located to extract water from storage and to recapture the recharged water.

Groundwater levels are relatively shallow in this area. This means available groundwater storage space is relatively full and could be pumped to create storage for Colorado River water. Pumped water quality may be ready for direct delivery or for blending.

In areas of saline water, water pumped to evacuate groundwater storage for recharging Colorado River waters would either need to be treated (desalination) before use or the brackish groundwater be matched to an appropriate beneficial use. Put and take operations could be configured and tested to time recharge and pumping cycles to create and maintain a pocket of Colorado River water in the East Mesa.

Project feasibility study and field investigations are recommended to include shallow and deeper drilling in the East Mesa to allow evaluation of groundwater and aquifer conditions, water quality, and structural geology. This includes identifying whether the East Mesa recharge water would reach the deeper aquifer under the Imperial Valley. Should hydraulic communication exist between the East Mesa recharge area and the deeper aquifer, this could expand the recharge and storage opportunity and allow the aquifers to convey the water to a larger area within the Imperial Region. This information would help with design of the recharge ponds and wellfield.

Possible constraints to East Mesa groundwater storage include the presence of listed species, critical habitats and/or cultural resources; and potential land use conflicts with U.S. Bureau of Land Management (USBLM), special management areas, and U.S. Navy target areas; presence of clay layers or faults; water quality; legal or political issues; ownership or entitlement to surface water seeped to the groundwater basin over the historic operation of the regional canals; projects costs; and distribution of costs and benefits. Species and habitat constraints are shown in Figure 7-5. The endangered species habitats were not considered for recharge or wellfields in the Imperial IRWMP analysis

Approval from USBR and USBLM would be needed to use the unlined Coachella Canal for recharge. Other concerns relate to raising the groundwater table around existing canals and structures and the potential for flotation of the Coachella Canal lining, and the potential for liquefaction associated with seismic activity resulting in structural damage. Pumping groundwater to create storage would lower groundwater levels and could create a potential for subsidence if depressed below historical low levels.

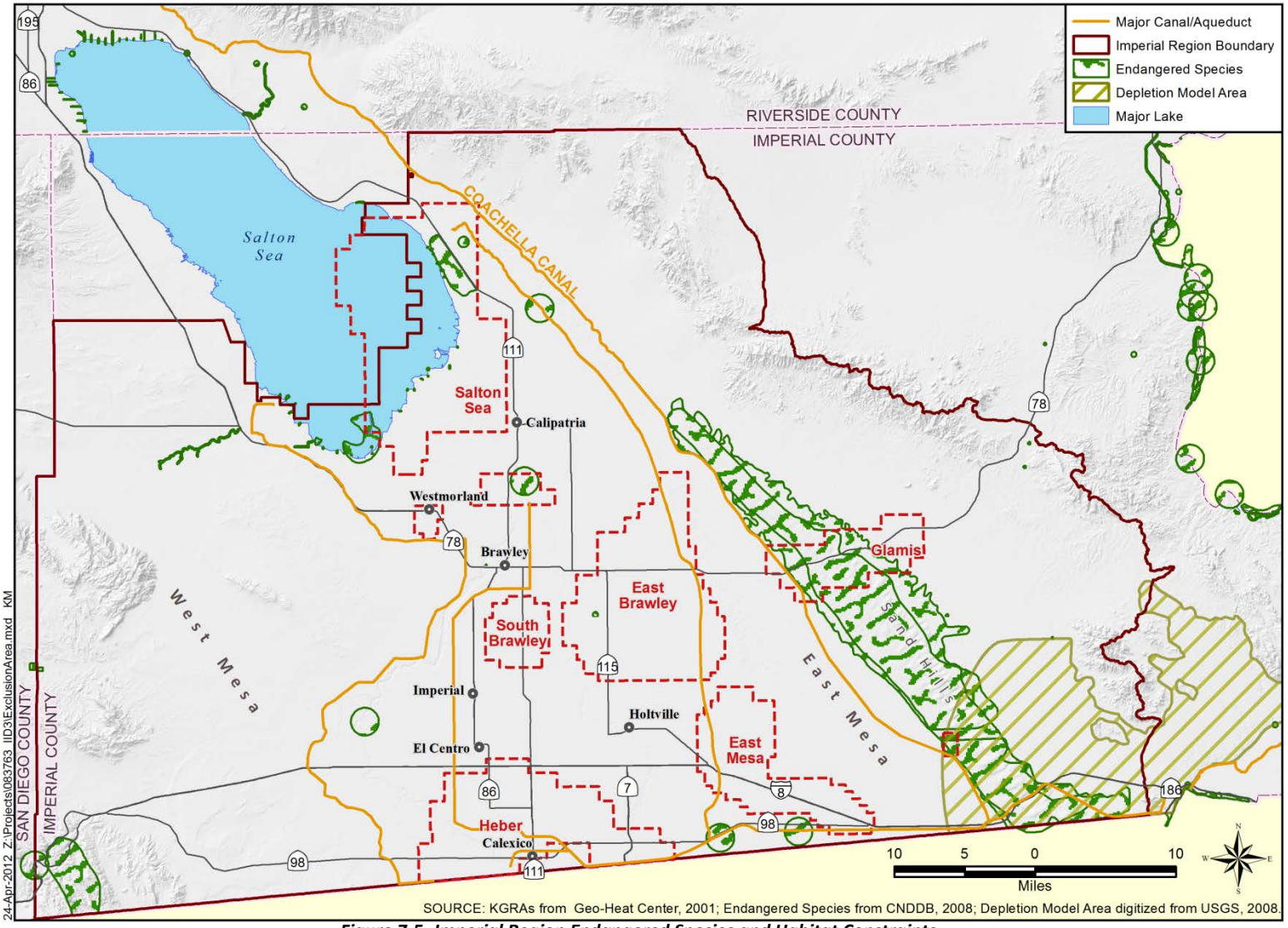


Figure 7-5. Imperial Region Endangered Species and Habitat Constraints

Critical unknowns to be addressed pertain to the underlying geological and aquifer conditions and existing groundwater quality. Underlying geological and aquifer conditions control the recharge rate, volume and direction of flow of the recharged water, well design, and ability to recover the water. Groundwater pumping in East Mesa, depending on the rate and depth, could induce eastward inflow of poor quality groundwater from Imperial Valley aquifers, could reduce groundwater discharge to the Alamo River, or could increase infiltration from the East Highline Canal. Additional site-specific studies and analysis of proposed put and take scenarios are needed to locate and design recharge facilities and wellfields. Further definition of groundwater quality would be required for an accurate assessment.

Sand Hills – Between the San Andreas main branch and Algodones faults, the Sand Hills has storage space available and recharge would be limited only by available Coachella Canal capacity. Recharged Colorado River water in this area would likely remain contained between the faults, making it more manageable. Depending on location, groundwater storage in the shallow, unsaturated zone could be limited by the relatively shallow depth to groundwater. Storage could be increased by pumping to lower the water table then refilling the storage when water becomes available. The aquifer is favorable for development of high capacity wells and water is generally of relatively good quality, with TDS ranging from 500 to 1,000 mg/L. Other constraints would be similar to the East Mesa area. This area is a viable recharge location and should be further reviewed.

Pilot Knob – The Pilot Knob area is likely to have appropriate hydrogeologic conditions and may have higher water quality than other areas. An important consideration for the Pilot Knob area is whether the groundwater is classified as part of the Colorado River Aquifer and subject to restriction of groundwater pumping. Groundwater in the river aquifer is considered to be Colorado River water and, therefore, water pumped from the river aquifer would be considered river water.

West Mesa – Areas could be considered viable for groundwater banking if west of (i.e., outside) the shoreline of ancient Lake Cahuilla, and up-gradient of the San Jacinto Fault (see Figure 7-1). Areas that technically could be viable are near Carrizo Wash or Palm Canyon. The largest constraint to groundwater banking in the West Mesa is that the area is outside of the place of use for IID's water rights, and would likely imply changes to the water rights permit and IID regulation. The ability to recover the water is also uncertain as water could migrate over a large area. The area is at, or approaching, overdraft conditions. West Mesa stakeholder interests are not supportive of groundwater storage of Colorado River water due to the potential for water quality degradation of local groundwater, which groundwater is typically much lower in total dissolved solids than Colorado River water, and due to the perception that groundwater storage could increase development. West Mesa could be a viable area from a technical standpoint; however, institutional issues and constraints make this area a low priority when compared to other opportunities. West Mesa groundwater storage was not supported by local interests and is not recommended for inclusion in the Imperial IRWMP.

West Mesa In-lieu Storage – The concept of surface water substitution and in-lieu storage could have application in the West Mesa. Colorado River water, desalinated water, or recycled water could be provided to groundwater users as a substitute supply (in-lieu use) of groundwater pumping. The water

left in groundwater storage (in-lieu recharge) would reduce the pressure on local groundwater supplies and reduce or avoid overdraft conditions. A project to deliver Colorado River water as a substitute supply to groundwater for industrial use at U.S. Gypsum has been proposed. No other large users were identified and further development of this concept was not included in the Imperial IRWMP.

Interregional Groundwater Storage and Banking – California Department of Water Resources (CDWR) is encouraging IRWM planning regions to work together to develop interregional facilities that provide multiple benefits and support management of imported water supplies. The QSA/Transfer Agreements provide interregional coordination between IID and Coachella Valley Water District (CVWD) to store Colorado River water in the Coachella Valley groundwater basin.[24] Two further groundwater storage facility concepts have been proposed, and both are options for further development in the mid- to long-term. Both projects would use the same basic operating concepts: IID Colorado River water would be diverted into the Coachella Canal to be stored in a Coachella Valley groundwater basin. Extraction would be through existing groundwater wells or additional new wells.[25] The amount of the water exchanged would be subject to negotiation between CVWD and IID. For example, IID may only be able to exchange some percentage of the water placed in groundwater storage.

Participation in Coachella Valley Storage and Banking – Coachella Valley IRWM region has four recharge areas:

- **Whitewater Spreading Area** artificially recharges stormwater and State Water Project (SWP) water, with a historical peak recharge of 288,000 acre-feet in 1986.
- **Mission Creek Spreading Facility** recharges Colorado River water from the Colorado River Aqueduct and has a recharge capacity of 30,000 to 40,000 acre-feet per year.
- **Thomas E. Levy (Dike No. 4) Recharge Facility** recharges Colorado River water obtained from the Coachella Canal and has a recharge capacity of about 40,000 acre-feet per year.
- **Martinez Canyon Pilot Recharge Project (Avenue 72)** stores Colorado River water and currently has capacity of about 2,000 acre-feet per year. It includes 8 recharge basins on 20 acres as part of a pilot project that began operating in 2005. Long-term plans call for it to be expanded into a full-scale facility by 2014 and eventually provide up to 40,000 acre-feet per year.

In 2010, IID delivered 526 acre-feet of Colorado River water to the Coachella Canal for storage in the CVWD recharge facilities, demonstrating opportunities available through interregional coordination. Use of the CVWD facilities under the groundwater storage QSA/Transfer Agreements provides the best near-term opportunity for groundwater storage of Colorado River water. Specific agreements with CVWD would be needed to define conditions and costs for this alternative. This alternative is included in the Imperial IRWMP.

IID-developed Facility in Coachella Region – Under the groundwater storage QSA/Transfer Agreements with CVWD, IID can develop groundwater storage facilities in the Coachella Region. IID conducted

[24] Agreement for Storage of Groundwater by and between the Coachella Valley Water District and Imperial Irrigation District. October 2003.
[25] CVWD would trade Colorado River entitlement water for IID's stored groundwater.

reconnaissance-level evaluations for groundwater storage projects in the eastern part of the Coachella Valley that are under review and could be further developed. Additional feasibility studies, including site-specific investigations, agreements with CVWD, acquisition of land or easements, environmental review and permitting, and design work are needed. This concept is a potential opportunity for the mid- to long-term and is an alternative included in the Imperial IRWMP.

Interstate Storage and Banking in Lower Colorado Basin – Groundwater storage and banking in the Lower Colorado River Basin would involve diverting unused IID entitlement to depleted groundwater basins in other states using existing or new conveyance or recharge facilities. Groundwater storage has been pursued in the Lower Colorado, because limited banking is allowed in the Colorado River reservoirs, Lake Mead and Lake Powell. Water banking would require agreement between participating parties, usually including an incentive for the banking entity. The Arizona Water Bank, an example of water banking in the Lower Colorado, was established in 1996 and is overseen by the Arizona Water Banking Authority.[26] The banking authority has been diverting unused Colorado River allocations from Nevada and Arizona into a large depleted groundwater aquifer in Arizona. Nevada pays Arizona to bank its unused water. In the future, Nevada can use direct diversions from the Colorado River above its annual allocation and Arizona will decrease its diversions by an equal amount, instead withdrawing from the banked water. An evaluation of water banking as a water supply augmentation option was completed in 2008 by the Colorado River Water Consultants for the Seven Basin States. The evaluation focused on the Arizona Water Bank and several water banks in California. The study estimated the cost of water banking at $400 to $700 per acre-feet.

The potential for banking groundwater in Arizona or areas along the Colorado River would face a range of institutional constraints. This alternative is not considered timely, and is not recommended for further consideration in the Imperial IRWMP at this time. This concept could be part of a subsequent update and included as part of the Imperial Region's adaptive management strategy.

7.1.4 Constraints

Many of the constraints to develop specific groundwater storage and banking opportunities were discussed above. These constraints are summarized here:

- **Lack of Data and Uncertainty of Groundwater and Aquifer Conditions –** Technical constraints for further development of groundwater storage and banking projects are related to lack of historical data and information on the areas proposed in the East Mesa and Coachella Region.
- **Access to Federal Lands and Procurement of Easements and Rights of Way –** Much of the land being considered for recharge sites is in federal ownership. Easements and rights of way are needed. Some private lands may be available in areas with good recharge and groundwater conditions and these would need to be acquired. Some sections of land that are privately

[26] Proposed legislation authorizing the Arizona Water Banking Authority to obtain excess Central Arizona Project Water for certain purposes be it enacted by the Arizona Legislature: Section 1. Section 45-2402, Arizona Revised Statutes, <http://www.azwaterbank.gov/awba/default.shtml>

owned are located within the areas that are primarily under federal ownership. It could be possible to acquire these lands for development of recharge facilities and/or exchange these lands for other federal land to meet the objectives of both the Imperial IRWMP and the USBLM, acting as the federal land management agency. Use of federal lands, funding or permits requires compliance with NEPA.

- **Listed Species and Protected Habitats –** Much of the viable recharge areas are in native habitats and may be constrained by the presence of listed species and federal land and species management plans.
- **Origin and Legal Status of Groundwater –** There are policy questions related to management and access to East Mesa groundwater and groundwater storage. The issues are related to the origin of the water, legal status of the water, and who can recover and use the water for what purpose.
- **Need for Agreements –** Detailed agreements with the Coachella Valley interests, and development of final terms and conditions are needed for Coachella Valley storage.
- **Funding and Finance –** The costs to conduct exploration, characterize basin conditions, develop pilot and demonstration projects, and obtain information to prepare final designs may be substantial. Additional economic and fiscal analyses are needed to quantify who benefits and who pays. A Proposition 218 initiative would be needed prior to changing assessments or rates for a large regional project.

7.1.5 Integration and Relation to Other Strategies

- **Desalination –** East Mesa groundwater development can be integrated with desalination strategies to meet water quality requirements for agriculture, municipal, commercial cooling water, and other industrial uses.
- **Ecosystem Restoration, Matching Quality to Use –** East Mesa brackish groundwater water could be pumped and/or blended with Colorado River water and matched to the needs of ecosystem restoration projects, algae production, or playa dust control. The use of the old Coachella Canal could include development of oasis habitats for desert species to provide multiple benefits from recharge operations.
- **Import, Transfer –** Water transferred and imported to the Imperial Region could be used in groundwater storage and banking facilities.
- **Water Quality Protection –** Increased recharge into aquifers with impaired water quality would improve groundwater quality, but could likely degrade the quality of the recharge water.
- **Land Use Planning and Management –** Groundwater banking elements could provide a new source of supply to support future water needs and provide mitigation for potential impacts to existing supplies and users.

7.1.6 Support for Mitigating or Adapting to Climate Change

Groundwater banking and storage would allow the Imperial Region to make maximum use of the available Colorado River supply and improve the ability for the Imperial Region to respond to variable climate conditions. Regardless of the long-term effects of climate change to Colorado River flows, whether it increases or decreases flows, groundwater banking would help the Imperial Region respond to supply vulnerabilities, make maximum beneficial use of the current entitlements, and help meet Imperial IRWMP objectives.

7.2 RECYCLED MUNICIPAL WATER

Recycled municipal water is water that, as a result of wastewater treatment, is suitable for a direct beneficial use, or other intentional use under a controlled environment, that would not otherwise occur and is therefore considered a valuable resource.[27] Recycled water and reclaimed water have the same meaning.[28] Applications of recycled wastewater at the various treatment levels are defined by state and regional regulations. Table 7-2 lists minimum treatment levels for specific water uses. The permitted uses of recycled water increase with advanced levels of treatment.[29]

To protect water quality and public health, state regulations mandate that producers and users of recycled water meet waste discharge and water reclamation requirements from the Regional Water Quality Control Boards (RWQCBs), including the water recycling criteria adopted by the California Department of Public Health (CDPH). These criteria specify approved uses of recycled water, numerical limitations and requirements, treatment methods, and performance standards. Regulations and policies are continuing to be developed, refined, and updated. In January 2009, the CDPH released updates to recycled water statues and regulations.

In 2009, SWRCB adopted the Recycled Water Policy whose purpose is to increase the use of recycled water from municipal wastewater sources in a manner that implements state and federal water quality laws, and streamlines permitting of projects.[30]

[27] California Water Code §13050
[28] California Water Code §26
[29] California Water Plan Update 2009: Volume 2 Resource Management Strategies – Chapter 11 Recycled Municipal Water
[30] State Water Resources Control Board Resolution No. 2009-0011; Adoption of a Policy for Water Quality Control for Recycled Water. <http://www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/docs/recycledwaterpolicy_approved.pdf>

Table 7-2. Demand Sectors and Minimum Treatment Levels for Specific Uses to Protect Public Health

Type of Use	Treatment Level		
	Disinfected Tertiary	Disinfected Secondary	Un-disinfected Secondary
Urban Uses and Landscape Irrigation*	✓		
Fire protection	✓		
Toilet and urinal flushing	✓		
Irrigation of parks, schoolyards, residential landscaping	✓		
Irrigation of cemeteries, highway landscaping		✓	
Irrigation of nurseries		✓	
Landscape impoundment	✓	✓*	
Agricultural Irrigation			
Pasture for milk animals		✓	
Fodder and fiber crops			✓
Orchards (no contact between fruit and recycled water)			✓
Vineyards (no contact between fruit and recycled water)			✓
Non-food bearing trees			✓
Food crops eaten after processing		✓	
Food crops eaten raw	✓		
Commercial/Industrial			
Cooling and air condition –with cooling towers	✓	✓*	
Structural fire fighting	✓		
Commercial car washes	✓		
Commercial laundries	✓		
Artificial snow making	✓		
Soil compaction, concrete mixing		✓	
Environmental and Other Uses			
Recreational ponds with body contact	✓		
Wildlife habitat/wetland		✓	
Aquaculture	✓	✓*	
Groundwater Recharge			
Seawater intrusion barrier	✓*		
Replenishment of potable aquifers	✓*		

* Restrictions may apply

7.2.1 Findings and Recommendations

The Imperial IRWMP Projects Work Group reviewed the recycled municipal wastewater strategy in December 2010 and January 2011. The Water Forum reviewed and discussed the recycled municipal wastewater strategy in January 2011 and February 2011 and adopted the recycled water findings and recommendations over the course of two meetings, on March 24, 2011, and April 20, 2011.

7.2.1.1 Findings

Recycling municipal wastewater would increase the Region's usable supply. Recycled wastewater could be integrated with strategy for a disadvantaged community to help meet its required reduction in use under the state's goal of 20 percent conservation by the year 2020, and could support development of a water exchange strategy.[31]

Reclaiming all forecasted future municipal wastewater flows would provide an estimated 36,000 acre-feet per year, approximately 25 percent of the forecasted future MCI demand.[32]

Findings related to the criteria used to screen the CDWR Resource Management Strategies include:

- ***Imperial IRWMP Goals and Objectives*** **–** Reclaimed municipal wastewater would help to meet the goal to diversify the regional water supply portfolio and ensure a long-term, verifiable, reliable, and sustainable supply to meet current and future agricultural, municipal, commercial, industrial, and environmental demands. Reclaimed wastewater would help meet objectives by:
    - Helping to avoid impacts to existing users by providing a new supply.
    - Supporting disadvantaged and other communities in meeting wastewater discharge and permit requirements when coupled as a regional strategy for use of water and funding facilities.
    - Matching water quality to appropriate uses and supply treated wastewater to extend use of Colorado River supplies.
    - Supporting the 20 percent conservation goals in the region.
- ***Complexity*** **–** Treatment technologies to reclaim municipal wastewater are well established. Complexity would be related to integrating funding strategies for upgrading existing plants or developing regional wastewater facilities to reclaim wastewater. There are some permitting issues that would need to be resolved and potential impacts to IID drains and the Salton Sea present challenges.
- ***Resolve Conflicts, Colorado River*** **–** Reclaiming municipal wastewater would neutrally affect in resolving Colorado River conflicts, but this practice would demonstrate the regional commitment to making use of this resource.
- ***Resolve Conflicts, Imperial Region*** **–** Reclaiming municipal wastewater could provide a firm, verifiable, and sustainable supply for new users in-lieu of apportioning Colorado River supplies from current users to the new users. This would support land use agencies when making findings and determinations on available supplies and impacts to current users pursuant to state law. This would result in reducing the potential for local conflicts between the IID and the land use agencies; between current and future water users; and between types of use.

[31] CDPH requirement that no recycled water discharged to IID canals can be used for MCI supplies.
[32] Original Water Forum finding edited to be consistent with the updated demand forecast.

- ***Regional Benefits –*** A regional strategy for reclaiming municipal wastewater could provide regional benefits by helping to meet the requirements to conserve 20 percent by 2020; increasing the reliability of the supply, and supporting economic development.
- ***Timeliness –*** A number of potential reclaimed municipal wastewater facilities are currently in the planning and design stages, and a number of projects are near or ready to proceed. Regional strategies and policies to account for the conserved water and use of this source in-lieu of Colorado River water, and a regional approach to mitigating impacts are needed. Development of regional plants to realize economies of scale and increase cost-effectiveness will take more time.
- ***Political Acceptability, Local –*** Upgrading individual plants without subsidy by new water users would encounter political opposition due to the increase in rates required to fund upgrades to existing plants. Regional plants could be resisted due to loss of control of individual facilities. Regional strategies for accounting for the conserved water could also face opposition. Marketability of crops irrigated with reclaimed water can be problematic for growers. During periods of high agricultural demand the ability to use the IID distribution system is limited or nonexistent. Stranded investments are a concern as are the initial capital and operations and maintenance costs.
- **Political Acceptability, Interregional –** Reclaiming municipal wastewater is not expected to encounter resistance by other lower Colorado River users or regions, and would likely be supported as a means of reducing Colorado River demands.
- ***Adaptability to Climate Change –*** Reclaiming municipal wastewater would help to adapt to climate change by secondary uses of available supplies, by providing flexibility in operations, and increasing ability to respond to changing conditions.

7.2.1.2 Recommendations

1. A number of projects could be ready to proceed in the near-term. Recycling municipal wastewater should be integrated with a regional mitigation banking strategy.
2. Support wastewater facility plant upgrades that propose reclaiming municipal water for use in renewable energy projects that are planned for Seeley, Brawley, and Imperial and include as part of the near-term strategy.
3. Require mitigation to meet state and federal environmental requirements related to reduction in flows to IID drains and to the New and Alamo rivers and other waterways through development of a regional mitigation bank; seek to provide regional benefits, create partnerships, and meet multiple Imperial IRWMP goals by using reclaimed wastewater for this purpose where cost-effective and timely.
4. Consider regional municipal water reclamation projects to increase cost-effectiveness of project development and operation, provide benefits to multiple parties, and improve opportunities to reuse the water.

5. Provide policy and financial incentives for public/private partnerships to construct municipal recycling facilities and for crediting the produced water to sponsoring entities to allow for exchange of produced water for delivery of Colorado River water.
6. Continue to evaluate the cost-effectiveness and political viability of regional municipal wastewater treatment facilities that include reclaiming wastewater as part of the mid- and long-term water management strategy.
7. Imperial County and IID should coordinate and adopt appropriate policies to encourage use of recycled municipal water in-lieu of Colorado River water to mirror California Energy Commission (CEC) and SWRCB policy.

7.2.2 Imperial Region-Recycling

As noted in Chapter 4, Section 4.1.5 Wastewater Systems, no community in the Imperial Region is recycling municipal water. However, a number of potential projects are being considered. The 2010 Urban Water Management Plan (UWMP) updates reviewed recycled water, noting cost, limited funding and ratepayer support for rate increases, and potential impacts to environmental resources.[33]

Wastewater facilities within the Imperial Region ultimately discharge to the Salton Sea (via drains and/or the Alamo River or New River). The flows help sustain habitat along IID drains and the New and Alamo rivers. The Salton Sea depends on agricultural and IID system discharges, direct rainfall, and municipal wastewater inflows to offset the effect of evaporation on salinity levels.[34] Even with the mitigation measures undertaken as part of the IID/SDCWA water transfer, the Salton Sea elevation has continued to decline as a result of (1) lowered water use within the Region over the past 10 years, (2) reduced inflows in the New River from Mexico, and (3) low precipitation rates.[35] Further reduction in flows from Mexico would occur were the Municipality of Mexicali to implement a reclaimed water program.[36]

The owner of a wastewater treatment plant used for treating wastes from a sanitary sewer system holds exclusive right to the treated wastewater against anyone who supplied water discharged into the wastewater collection and treatment system, including a person using water under a water service contract, unless otherwise provided by agreement. This implies that any of the entities treating and disposing of wastewater have exclusive right to treat, sell, and convey the water. The wastewater treatment entity needs approval from the RWQCB to ensure consistency with the Water Quality Control Plan and that the new uses have appropriate permits or waste discharge requirements.

[33] The UWMP Act requires cities and urban water suppliers to evaluate recycled water opportunities. UWMP Guidebook Checklist #44–#51.<http://www.water.ca.gov/urbanwatermanagement/guidebook/>
[34] Salton Sea salinity increased from 44 PPT in 2000, to 52 PPT in 2010 (i.e., from around 25 percent to nearly 50 percent more saline than ocean water), while the water surface fell from -226 feet below MSL to -229 feet.
[35] Joint Petition by the Imperial Irrigation District and the San Diego County Water Authority ("Petitioners") requesting changes to the State Water Resources Control Board Revised Order WRO 2002-0013.
[36] Salton Sea Authority Plan for Multi-Purpose Project July 2006 Draft for Board Review.

7.2.3 Opportunities for Recycled Water

Review of regional recycled water opportunities was coordinated through the Water Forum. The Imperial IRWMP provides reconnaissance-level costs for a number of recycled water projects and evaluated the feasibility of recycling wastewater in the Region. Recycling treated wastewater offers potential benefits to the Region and could supplement supply by giving Colorado River water a second life. Recycled water could be matched to new or current uses suitable to the level of treatment and quality of the recycled water. Recycled water could be used to supplement or replace Colorado River water used to irrigate local golf courses, recreational areas, green spaces, or nearby agricultural land. Reclaimed water could be used to create or maintain habit features or for algae production. This would help to free Colorado River water for future industrial growth or other beneficial uses.

7.2.3.1 Upgrade Wastewater Treatment Plants

Imperial Region has 14 wastewater treatment plants and discharge locations (Chapter 4). Wastewater effluent volume is approximately 16,000 acre-feet per year and future volume is projected to exceed 36,000 acre-feet per year. If all the wastewater available were reclaimed, it would only provide a fraction of the Region's forecasted future demand for renewable energy, which is between 146,000 and 180,000 acre-feet per year, with and without conservation, respectively.

Wastewater treatment plants under review for upgrading to provide tertiary wastewater treatment to supply cooling water for a renewable energy facility are:

- City of Imperial
- City of Brawley
- Seeley

While recycled water may not be cost-effective for individual communities since they can obtain less expensive water from IID, it may be a viable method to increase regional water supplies or may become more cost-effective as the cost of water for new users is factored into the planning process.

Many communities in the Region are not in compliance with waste discharge permit conditions and are having trouble finding funding to improve existing plants. Working with renewable energy facilities to fund upgrades to wastewater treatment plants would allow communities to comply with permit requirements. State and federal grants that support recycling can help overcome fiscal constraints.

7.2.3.2 Regional Recycling

For cities in relative proximity to one another, economies of scale might be achieved through consolidation and aggregation of wastewater treatment plants. The 1992 IID Regional Water and Wastewater Utilities Feasibility Study considered five alternatives to develop recycled water facilities, from no change to full regionalization, and concluded that regional facilities were in the best interest of the Imperial Region, citing economies of scale among the reasons (Black and Veatch, 1992). An additional feasibility study completed in 1994 evaluated four treated water alternatives weighing more

than 13 criteria and found that a centralized or regional treatment and distribution would be best for the area (Black and Veatch, 1994). The proximity to agricultural areas reduces piped distribution costs from the regional treatment facilities to potential customers.

7.2.3.3 Support to Achieve Regional Conservation Goal

In November 2009, the Water Conservation Act of 2009 was signed into law as part of a comprehensive water legislation package. The act addresses both urban and agricultural water conservation. The legislation sets a goal of achieving a 20 percent statewide reduction in urban per capita water use and directs urban retail water suppliers to set 2020 urban water use targets. Use of recycled water can be counted as part of the conservation goal.

7.2.4 Constraints

7.2.4.1 User Acceptance

Successful water recycling projects require water user acceptance and commitment, public support and acceptance, evaluation of environmental impacts and benefits, and analysis of economic feasibility. Growers have expressed concern with proposals to blend tertiary treated Title 22 compliant water in IID irrigation canals. Public acceptance of recycled water remains a major obstacle to implementation of water recycling projects. The following four water quality characteristics have been identified as being of particular concern regarding confidence in the safety of the water: (1) microbiological quality, (2) salinity, (3) heavy metals, and (4) organic and inorganic substances such as pharmaceuticals and personal care products, household chemicals and detergents, fertilizers, pesticides, fungicides, and animal growth hormones.

7.2.4.2 Salinity

Salinity is a particular concern in the Imperial Region. Municipal water supplies of raw Colorado River water typically have salinity levels above 760 ppm, and municipal use typically adds 300 ppm. TDS levels of 1,000 ppm adversely affect most crops or require changes in irrigation practices (e.g., increased leaching). Thus, recycling for irrigation may require desalting, blending with other supplies, or changes in agricultural practices.

7.2.4.3 Cost

Disadvantaged Community (DAC) and Severely Disadvantaged Community (SDAC) residents have limited ability and willingness to pay for increased treatment. The effect of the variability of local conditions on treatment and distribution costs is such that estimated capital and operational costs of water recycling ranges from $300 to $1,300 per acre-foot. The cost to install a new distribution system is a major obstacle to the expansion of water recycling; however, the IID IWSP tiered-rate schedule, which starts at around $240/AF (it is updated annually), has created some interest on the part of new geothermal

industry project developers.[37] Because recycled water is not classified as potable, regulatory constraints prohibit conveying recycled water and potable water in the same pipelines. Recycled water must be conveyed in a separate (purple pipe) distribution system that is readily distinguished from traditional water lines.

Regionalization constraints include gaining individual communities' support and the status of community investment in local facilities and facility upgrades planned or underway (i.e., sunk costs).

7.2.4.4 Environmental Concerns

The County General Plan Water Element identifies the major environmental issues expected to be of concern with local tertiary treatment systems:

- Reduction of flows in IID drains
- Reduction of flows to Salton Sea
- Increase in drain water salinity
- Impact on fish and wildlife, recreation, and aesthetic values

Any diversion of flows may have environmental impacts on the drains, rivers and/or the Salton Sea, and related mitigation costs must be factored into reuse strategies. Directing treated discharges away from the Salton Sea may not be feasible until the Salton Sea salinity level impedes fish production or has been restored and is not dependent on the inflows (Salton Sea Authority, 2006). Also, additional treatment to facilitate recycling could result in the concentration of contaminants in the remaining flows discharged to the drains or rivers.

7.2.5 Relation to Other Strategies

Implementation of water recycling can affect other water management strategies:

- **Water Use Efficiency, and Matching Water Quality to Use –** Recycled water can be used to reduce reliance on the Colorado River supply. State policies supporting use of recycled water.
- **Economic Incentives –** State bond monies are available for recycling. Historic industrial users seeking alternatives to Colorado River water could support DACs and SDACs in upgrading wastewater treatment plants.
- **Salt and Salinity Management –** Reduced wastewater influent volume could increase TDS levels on drains and rivers.
- **Local Land Use Planning and Management –** Recycled water could provide a long-term, verifiable, and sustainable source of supply and support land use agencies when making defensible findings during project environmental review and permitting.
- **Ecosystem Restoration –** Reduced flows to drains could impact drain flows and related habitat and require mitigation. Some recycled wastewater could be used to support creation or

[37] See Table B Interim Water Supply Policy, Annual Non-Agriculture Projects Water Supply Development Fee <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5395>

maintenance of habitat utilizing a regional mitigation bank. A regional mitigation bank could provide mitigation for loss of drain or river flow, or any identified impacts to the Salton Sea.

7.2.6 Support for Mitigating or Adapting to Climate Change

Recycling of municipal wastewater could allow the Imperial Region to provide secondary use of Colorado River water, support development of untapped resources, and improve the ability for the Region to respond to variable climate conditions. Regardless of the long-term effects of climate change to Colorado River flows, whether it increases or decreases flows, recycling would help the Region respond to vulnerabilities and make maximum beneficial use of the current entitlements by reducing reliance on Colorado River supplies when meeting the demands for cooling water or other uses.

7.3 DESALINATION

Prior project concepts for desalination of brackish groundwater and drain water were evaluated (see Appendices B and G) and the information was made available to the Water Forum during review of desalination strategies.

Two principal methods for large-scale production of desalted water are available; distillation and reverse osmosis. Distillation uses heat to evaporate water that is then captured and condensed as fresh water leaving the dissolved solids in the waste stream. This is a reliable, but energy-intensive process and is primarily used in fuel-rich areas of the world. Heat energy can be far less costly than electrical energy. Distillation in the Imperial Region would require a low cost heat source to be competitive. Low cost heat may be available in the Region from geothermal, solar thermal, industrial waste heat, cogeneration with power plants, or other sources.

Distillation of geothermal brine is an integral part of the flash geothermal distillation process extensively used in the Imperial Region. It economically supplies the majority of the cooling water needed by local geothermal power plants that employ a flash distillation process, reducing demand on the Colorado River supply. Low grade heat from a geothermal process can also be applied to desalinate other water resources.

Reverse osmosis is a more energy-efficient process that uses semi-permeable membranes to separate fresh water from salt water. Water is forced at very high pressures through tightly wrapped membranes, which facilitate the passing of water molecules that are smaller than almost all impurities through the membranes. Improvements in reverse osmosis technologies have reduced the amount of energy required to produce fresh water, making desalination a viable alternative. As a result, desalination of brackish water is becoming cost-competitive with other water supply options available in water-stressed regions.

7.3.1 Findings and Recommendations

The Water Forum adopted the following desalination findings and recommendations on March 24, 2011.

7.3.1.1 Findings [38]

- Desalination of brackish groundwater could be a near- or mid-term project opportunity and could provide a new source of water to be used in place of imported Colorado River water.
- Desalination of brackish drain water has more constraints, but could be an opportunity for long-term development, but this is likely to require higher mitigation costs and environmental compliance requirements.
- Large-scale desalination, coupled with interregional conveyance could be a long-term opportunity, but is considered costly when compared to other water supply strategies, and is not considered a near- or mid-term opportunity for purposes of the Imperial IRWMP.

Findings related to the criteria used to screen the desalination resource management strategy include:

- ***Imperial IRWMP Goals and Objectives –*** Desalination of brackish groundwater, drain water, the New or Alamo river water, and other local saline water sources could help to meet the goals toward diversifying the regional water supply portfolio and could help to ensure a long-term, verifiable, reliable, and sustainable supply to meet current and future agricultural, municipal, commercial, industrial, and environmental demands. Desalination would help meet objectives by providing a new water source to avoid impacts to existing users.
- ***Complexity***
    - Desalination technologies for brackish water are relatively well defined, and relatively cost-effective as compared to other opportunities to develop new water supplies.
    - Constraints to be overcome include:
        - Access to sites in the East Mesa
        - Mitigation requirements for potential impacts to drain habitat, riparian resources, and the Salton Sea
- ***Resolve Conflicts, Colorado River –*** Desalination of the source water proposed would not be expected to increase conflicts with the Colorado River users.
- ***Resolve Conflicts, Imperial Region***
    - Desalination could reduce conflicts over existing Colorado River water supplies by providing a firm supply for new users and projects in lieu of Colorado River supplies.
    - Reduced flow from drains or river water could have impacts to the Salton Sea and increase conflicts related to responsibility for and costs of mitigation.

[38] The desalination materials and briefings were reviewed by the Projects Work Group 11/18/10 and 12/08/10, introduced and discussed at Water Forum 12/08/10, further reviewed by the Projects Work Group 1/19/11, and further reviewed and discussed by the Water Forum 1/20/11 and 2/24/11.

- ***Regional Benefits*** **–** Desalination would provide regional benefits by increasing the supply and by providing water for economic development while protecting current agricultural uses.
- ***Timeliness***
    - Projects to desalinate brackish groundwater could be developed in the near- to mid-term if IID and the County work cooperatively with industry to develop and permit such projects.
    - Adding a groundwater recharge component could slow project development and implementation, but an integrated project could be developed in phases over the mid- to long-term.
    - Desalination projects to use drain or river water would likely require greater environmental review and a longer time period to design, permit, and implement and could encounter significant regulatory compliance requirements.
- **Political Acceptability, Local**
    - The method of financing and distribution of cost needs to be determined. Ability to pay and willingness to pay for desalination has not been fully determined and requires additional economic evaluation.
    - Desalination of drain and river water will likely have higher mitigation costs, greater potential impacts, and potentially higher political resistance as compared to groundwater desalination.
- **Political Acceptability, Interregional –** Drain and river water projects would face a higher degree of scrutiny due to potential effects on the Salton Sea as compared to brackish groundwater and could create political controversy.
- **Adaptability to Climate Change –** Desalination of brackish water sources would develop an untapped resource and improve the ability for the Imperial Region to respond to variable climate conditions.

7.3.1.2 Recommendations

1. Desalination of brackish groundwater in the East Mesa is a near- to mid-term proposition and could be sustainable when integrated with recharge project elements
    a. Pilot and demonstration projects should be undertaken to provide a basis for design and to determine the feasibility of large-scale projects.
    b. Federal or state funding opportunities for development of pilot projects should be pursued if a local funding match can be developed.
2. Imperial County and IID should coordinate and adopt appropriate policies to allow for and promote development and desalination of East Mesa groundwater resources. Such policies could be targeted to requiring use of desalination or recycled water in-lieu of Colorado River water to mirror CEC and SWRCB policy.

3. Operational concept—Consider and further evaluate economic and political feasibility for including desalinated water in a regional water exchange whereby those that fund development of desalination facilities would receive credit for the produced water and receive Colorado River water in exchange.
    a. Cooperative public/private partnerships should be investigated for creating a new water supply for non-agricultural water users using desalination technologies.
    b. Economic incentives and pricing would need to be worked out to finalize a business model, and additional economic evaluations are recommended.

7.3.2 Imperial Region – Desalination

The Imperial Region has very few desalination facilities. Some of the geothermal plants are using very high temperature fluids that flash to steam under the reduced pressures at the land surface. The resultant steam, once condensed, results in fresh water. The highly concentrated fluids and solids that remain are then re-injected into the underground formations. One of the possibilities is to desalinate IID drain water to create additional fresh water supplies and support transfer of water via exchange.

Outside of the Region, CVWD using federal grant funding completed a pilot project to demonstrate desalination of brackish groundwater and agricultural drainage water to produce potable water (Malcom-Pirnie, 2008). This study concluded that brackish groundwater and agricultural drainage water can be effectively treated for reuse as non-potable water and potentially as new potable water. The estimated cost of drain water desalination, including brine disposal to managed wetlands, ranges from $480 to $740 per acre-foot depending on facility capacity and source configuration. Brine disposal using zero liquid discharge approaches could increase the cost of drain water desalination to as much as $1,200 per acre-foot. Metropolitan Water District of Southern California also initiated a study with CVWD (Whitewater Demonstration Project) to examine the feasibility of desalting agricultural return flows within the Coachella Valley (MWD/CVWD, 1999).

7.3.3 Opportunities

7.3.3.1 Imperial Region Desalination Plant Projects

To configure desalination alternatives and develop projects at a reconnaissance-level of detail and cost, the desalination plants were configured assuming use of reverse osmosis (RO) as the treatment process. Cost estimates were based on the U.S. Bureau of Reclamation Desalting Handbook for Planners (USBR, 2003). Based on this handbook, the most cost-effective technology for desalting brackish water is RO. The Cities and urban water suppliers are required to evaluate desalinated water opportunities in their UWMPs, including brackish water and groundwater as a long-term supply. [39]

Factors considered in locating and developing reconnaissance-level project concepts included:

[39] UWMP Act (CWC 10631(i)), IRWMP adoption by the Cities will support the city in meeting the requirement.

- Types of use and proximity to the potential demands for the water produced
- Types of available source water supply
- Access to power
- Avoidance of environmental constraints
- Land ownership
- Brine disposal
- Locations with easy access to major highways

Desalinated Water Use. Alternative uses of desalinated water have been considered including geothermal, agricultural, and municipal. Consideration was given to delivering the desalted project water to geothermal power plants, municipalities, industrial users, or to the IID distribution system. For reconnaissance evaluation and for purposes of comparison, desalination plant facilities were located near the known geothermal resources areas (KGRAs) since geothermal demands are anticipated to be the largest increase in water use over the planning period. If wellfields were located adjacent to canals or drains that extend to the desalination plants, the drains could be used to convey source water to the plant instead of more costly piping. Capital project alternatives have been created that outline the use of this approach.

Two concepts for the use of desalinated water are 1) desalinated water could be delivered directly to meet the water demands of proposed projects, and 2) desalinated water could be put into IID canals, accounted for as new water in the Imperial Region water supply portfolio to be apportioned to new demands for use even if desalinated water were not directly delivered to the point of demand. Reconnaissance-level facilities designs were based on an assumed 650 mg/L TDS for the delivered water.

Desalination Source Water. Local desalination strategies were developed for five sources of water:

- Brackish groundwater
- Drain water
- New and Alamo river water
- Salton Sea water
- Imported ocean water

Brackish Groundwater – Desalination of brackish groundwater would remove water that is in storage in the groundwater basin (Section 7.1.3). Environmentally, brackish groundwater is the least constrained. In certain locations within the Imperial Region the groundwater temperatures range from 180 to 300 degrees Fahrenheit. In order for the water to undergo RO, it would need to be cooled to approximately 100 degrees Fahrenheit. Without cooling, the water would damage the desalination membranes.

Drain Water – Salinity levels of the drain flows affect desalination costs. The QSA/Transfer Agreements will reduce drain and river flows, but opportunities will remain to capture drain water before it reaches the New and Alamo rivers. IID drain data were used to estimate future drain inflow and salinity along the New and Alamo rivers. [40] These estimates are used to project the amount of drain water that may

[40] See Appendix G - Water quality and flows from IID drains and the New and Alamo rivers were evaluated as sources for feed water for desalination (NRCE, 2009).

be available for industrial uses. Spatial and temporal distribution of drain flow into the New and Alamo rivers was used to estimate future flows under the QSA/Transfer Agreements by distributing flows along the rivers based on estimated and metered drain contribution. Unmetered drain flows were based on length of drains. The results provide estimated monthly average and annual average future flows. USGS water quality data for the Alamo and New rivers were used to estimate salt loading at each drain discharge point according to the flow contributions. Salt loading in the New River from Mexico was accounted for based on USGS measured salinity.

QSA era drain flow and salinity from three large drains, the Holtville Main, Central, and Rose drains were analyzed as a case study for siting desalination facilities the results are summarized in Table 7-3. The three-drain system could reasonably provide about 90,000 acre-feet per year of water (70 percent of the low flow monthly average), with any two drains providing about 60,000 acre-feet per year.

Table 7-3. Estimated QSA-Era Flows and Salinity for Holtville Main, Rose, and Central Drains

Drain	Average Annual Flow (AF)	Maximum Monthly Flow (AF)	Minimum Monthly Flow (AF)	Maximum TDS (mg/L)	Average TDS (mg/L)
Holtville Main Drain	55,600	5,800	3,300	3,670	3,190
Rose Drain	55,000	5,300	3,900	3,670	3,190
Central Drain of upstream Mesquite Drain Cutoff	59,900	6,300	3,600	3,670	3,190
TOTAL	**170,500**		**10,800**		

The drain system could be modified by cross-connections to link and expand the usable and recoverable portion of drain water. In so doing, it would be necessary to re-grade the channels to improve capacity. Linkage of the Central, Mesquite, Holtville Main, and Rose drain systems were studied to combine drain systems and supply drain water for Keystone Development-area desalination plant concepts.

Reclamation of the Region's drainage water represents a significant and potentially useful source of water for uses within IID's service area. The flow of recoverable drain water exceeds the raw water feed requirements for a 50,000 acre-feet per year (product water) desalination plant. The salinity within the drain system varies between 2,702 and 3,680 (mg/L) under estimated post-QSA/Transfer Agreements conditions. Reducing drain water volume may affect riparian habitats and inflow to the Salton Sea and could require mitigation. Mitigation costs could add to the overall project cost.

New and Alamo River Water – New and Alamo river flows are potentially viable sources for a desalination plant, but river diversions would be complicated to permit, and facilities could be subject to flooding. Both drain water and river water support habitat, could have potential environmental effects, and would face greater permitting challenges as compared to brackish groundwater.

Consideration of river flow variability is important when studying the quantity of water that can be reclaimed. Variability in salinity is important when considering costs of treatment and of suitability of the water supply. It is noted that New River flows from Mexico across the U.S./Mexico border to the Salton Sea will likely decrease with time. Generally, a decrease in return/drain flow will result in an increase in salinity.

Salton Sea – The Salton Sea as a source of water is not reasonably feasible due to the high salt content and related increase in treatment cost when using RO technology. Distillation using a brine concentrator type configuration can be feasible if a low cost thermal energy source is available, but the associated costs are not yet fully defined. The Salton Sea was eliminated from further consideration for purposes of the Imperial IRWMP.

Imported Ocean Water – Imported seawater would involve construction of a large-scale conveyance. Concepts have been proposed for further development by a number of private interests, and there are public/private partnership opportunities that have been actively promoted. For this round of the Imperial IRWMP, and since there are no public agency sponsors, these are not recommended for further consideration, though it is noted that they could be long-term opportunities.

Brine Disposal. For purposes of brine management resulting from Imperial Region facilities, strategies for brine disposal were limited to three general categories:

- Deep well injection with new or existing wells
- Evaporation ponds
- Disposal ponds at the Salton Sea

Deep Well Injection with New or Existing Wells – Typically with deep well injection, desalting concentrate is injected into unusable groundwater aquifers through new wells or utilizing existing geothermal wells. Both alternatives can only occur in areas where large volumes of concentrate can be accepted by the aquifers. Therefore, additional study of the site-specific geological and hydrological conditions is needed to determine the suitability of aquifers. Also, the constituent makeup of the brine concentrate must be compatible with the aquifers and the injection wells. To determine the proper location to site an injection well, the depth to the saline aquifer must be known. If a desalination plant is proposed to serve a small number of geothermal plants, opportunities may exist for collaboration between the desalination plant and the geothermal plant. Such opportunities may include joint use of facilities such as cooling towers and injection wells, optimization of water quality for the intended use, or more efficient use of thermal or electric power generated by the geothermal plant.

Evaporation Ponds – Evaporation ponds dispose of brine from inland desalination plants by discharging the concentrate to ponds, where it is evaporated for final disposal in an appropriately designated landfill for non-hazardous waste. Evaporation ponds are generally suitable for small inland desalination plants located in arid and semi-arid areas due to high evaporation rates, and are relatively easy to construct, and require little maintenance and minimal operator attention. In many instances, evaporation ponds are the least costly method of brine disposal, especially in areas with high evaporation rates and low land costs. The ponds could provide an attractant to wildlife and potentially concentrate toxic elements that could limit this disposal method.

Discharge to the Salton Sea – One option for discharge of brine to the Salton Sea area is to build evaporation ponds on the Salton Sea playa to create a salt crust. Something similar was demonstrated by USBR and the Salton Sea Authority in 2002. A second option is to use highly concentrated brine to

create energy generating solar ponds on the playa. A third option would be discharge of concentrated bring directly to the Sea. This third strategy was eliminated from further considerations due to habitat, permitting, political, financial, and technical issues.

7.3.3.2 Interregional Desalination Plant Projects

Imperial Region could buy capacity and partner on regional desalination projects. Interregional projects may represent viable longer-term opportunities that may provide economies of scale and partnership opportunities with other public and private interests reliant on the Colorado River. Interregional projects could include:

- Yuma Desalting Plant
- International Boundary and Water Commission (IBWC) proposed projects in Baja and Sonora, Mexico
- Navagua Desalination and Sea-to-Sea are proposed concept projects sponsored by different private and public interests

The elements of this strategy may provide long-term opportunities, but participation in such projects are not sponsored by any of the Imperial Region public agencies, would involve complex agreements, would be complex to permit, and thus were not included in the Imperial IRWMP.

7.3.3.3 Other Management Concepts

Desalination Supply Reliability. A major benefit of desalination of local groundwater or drain water is the reliability of the supply. Future MCI users within the Region need a high degree of reliability, both seasonally and during times of shortage. The large amount of brackish groundwater in storage, and drain water and flow in the New River and Alamo River provide a potentially large volume of brackish feed water. As such, desalination could also provide a response to a number of shortage scenarios. For example, desalination could help respond to potential service interruptions of the All-American Canal.

Integrate Power and Water Facilities. IID provides power for the Imperial and Coachella Valley regions. The opportunity exists to develop a combined desalination/power plant operation to generate wholesale or off peak power, then purvey both the desalinated water and power to increase project cost-effectiveness. Additional economic analysis is needed to further evaluate cost-effectiveness and feasibility of such project concepts.

Public/Private Partnerships. Cooperative public/private partnership could be developed to invest in desalination. Economic incentives and pricing would need to be worked out and a business model developed. Private sector interests have proposed desalination of agricultural drainage in exchange for Colorado River water. This could be pursued under public sponsorship.

7.3.4 Constraints

Desalinated brackish groundwater or drain water may be a viable option, but a host of constraints and issues would have to be addressed.

7.3.4.1 Cost

Cost is a primary constraint for desalination projects. As part of the IID Capital Projects review, desalination projects were configured by combining source water elements, groundwater banking, storage elements, and operational elements (see Table 12-5; and Appendix N).

Desalination cost estimates were developed predominately from publications by USBR for desalination and USEPA for wastewater treatment. The costs calculated in the reconnaissance evaluation for desalination and combined recharge/ desalination project costs ranged from $500 to $1,300 per acre-foot, which is consistent with published data.

Energy use is a major factor in the cost of desalinated water. Based on information for existing facilities, brackish groundwater desalination consumes about 1,300 to 3,200 KWh of energy per acre-foot, depending largely on source water quality, plant capacity, and technology (California Desalination Task Force, 2003). Summarized energy usage associated with desalinating water is presented in Table 7-4.

Table 7-4. Energy Usage for Desalinating Water by Source Water

Source Water	kWh	
	Per MG	Per AF
Brackish Groundwater	2,840	946
Wastewater	3,067	1,022
Seawater	13,215	4,405

Costs associated with desalinating brackish groundwater could be reduced by siting facilities near power plants, which could reduce facility investments. Table 7-5 summarizes the total unit water cost that can be expected from desalting groundwater and wastewater using RO technology, based on a 20 to 30 year plant life expectancy.

Table 7-5. Cost Using Reverse Osmosis Technology

Source Water	Cost	
	$/MG	$/ AF
Brackish Groundwater	1,535 - 2,763	500 – 900
Wastewater	1,535 - 6,140	500 – 2,000
Seawater	2,763 - 7,675	900 – 2,500

Source: California Water Plan Update, 2009, Volume 2

Desalination costs of dependent on numerous other variables including baseline water quality, existing infrastructure, available disposal options, treated water conveyance costs, and energy consumption. The total cost for brackish water desalination, including amortized costs for planning, designing,

construction of a desalination facility, operation (i.e., energy, chemicals, disposal, etc.), and distribution of product water is based on site-specific conditions (California Desalination Task Force, 2003). Site-specific pilot and demonstration projects should be developed prior to developing full-scale projects.

7.3.4.2 Regulatory Requirements

Inland desalination plants present challenges that are different from building a similar facility at a coastal location. The issue of greatest concern involves development of a cost-effective brine disposal system that conforms to regional and federal requirements. National Pollution Discharge Elimination System (NPDES) permits for navigable waters and permits Waste Discharge Requirements for land discharges within the Colorado River drainage are issued by the RWQCB. The RWQCB has included in the discharge permit requirements for land discharges, a prohibition against disposing of brine into evapo-percolation ponds that overlie groundwater that is in hydraulic continuity with the Colorado River System. The RWQCB further stipulates that discharges are to be confined in impervious (lined) evaporation basins. Other regulatory restrictions could arise over the acquisition of land and pipeline construction for delivery of waste streams from a desalination facility. Even at high product water recovery and establishment of brine minimization technology, volumes of highly concentrated plant discharge streams can be very large.

7.3.4.3 Environmental Concerns

The County General Plan Water Element identifies the major environmental issues expected to be of concern with local water system projects:

- Reduction of flow in drains
- Reduction of inflow to Salton Sea
- Increased salinity of drain water
- Impact of reduced flow to fish and wildlife, recreation, and aesthetic values
- Potential impacts to habitat and water quality from brine disposal

7.3.5 Relation to Other Strategies

Implementation of desalinated brackish source water can be integrated with, or may be affected by the following strategies:

- **Groundwater Development, Storage and Conjunctive Use –** Desalination of East Mesa brackish groundwater.
- **Land Use Planning and Management** – Desalination could provide a long-term, verifiable, and sustainable source of supply and support land use agencies when making defensible findings during project environmental review and permitting.
- **Agricultural Water Use Efficiency, Salt and Salinity Management** – Desalination could support other aspects of a salinity management program. Agricultural water conservation will reduce available drain water and increase its salinity.

- **Drinking Water Treatment and Distribution** – Brackish water could be treated and put to beneficial use for new developments or industry.

7.3.6 Support for Mitigating or Adapting to Climate Change

Desalination of brackish water sources would allow the Imperial Region to provide a secondary use of Colorado River water, develop untapped resources, and improve the ability for the Region to respond to variable climate conditions. Regardless of the long-term effects of climate change to Colorado River flows, whether an increase or decrease, developing brackish water sources through desalination would help the Imperial Region respond to vulnerabilities and make maximum beneficial use of the current entitlements by reducing reliance on Colorado River supplies when meeting the demands for cooling water or for other new projects that would increase the total demand for Colorado River water.

7.4 MATCHING WATER QUALITY TO USE

Matching water quality to use could allow the Imperial Region to realize an increase in economic activity by using poor quality water for purposes like algae production and use high quality water, like recycled water, to provide secondary uses for Colorado River water. One common measure of water quality is its suitability for an intended beneficial use; a water quality constituent often is only considered a contaminant when that constituent adversely affects the potential beneficial use of the water. High quality water sources can be directed to drinking and industrial purposes, and lesser quality water can be directed for uses that can take economic advantage of such water. The Water Forum review included matching water quality to:

- Agricultural uses
- Algae production
- Ecosystem uses
- Industrial and commercial uses

7.4.1 Findings and Recommendations

7.4.1.1 Findings

- Evaluate and support the use and development of impaired quality water where cost-effective and where such uses could provide economic benefits to the Imperial Region.
- Conduct pilot and demonstration projects that demonstrate economic use of poor quality water to expand the water supply portfolio and support economic growth.
- Treat and recycle wastewater to a level of quality that is legally acceptable for beneficial use in lieu of the region's Colorado River supply.

7.4.1.2 Recommendations

The Water Forum made no recommendations on this subject.

7.4.2 Imperial Region – Matching Water Quality to Use

Sources and volumes of impaired water were discussed in the groundwater, recycling and drain water sections of this chapter. Numerous industries are looking to develop businesses and economic use of impaired quality water through use of brackish or highly saline waters. As discussed in the next section, potential projects could provide economic benefits to the Region by putting poor quality water to a beneficial use. There are neither recycled water facilities in the Imperial Region nor direct reuse of wastewater, but a number of projects are being considered by the Cities in partnership with private sector sponsors. A number of algae production facilities that operate in the Region.

7.4.3 Opportunities

Potential opportunities include algae production or thermal energy development projects that would put impaired water quality to economic use. CDWR has identified numerous opportunities for matching water quality to use. How these can be applied to the Imperial Region is discussed below. Use of impaired waters for aquatic habitat and industrial service supply would free up Colorado River supplies to be used for those beneficial uses that depend on high water quality.

7.4.3.1 Matching Water Quality to Agriculture Use

As discussed in the recycled water strategy, marketing of crops limits use of secondary treated municipal wastewater.

7.4.3.2 Matching Water Quality to Algae Production

Algae production is considered an agricultural water use by IID, and this type of operation can often use higher salinity or contaminated water with other constituents that would preclude the water's use for other purposes. The Imperial Valley has an abundance of land and water, and is situated in one of the best locations in the entire United States for year round solar radiation. Microalgae can transform solar energy into high valued products, while taking advantage of waste nutrients in non-potable water supplies (high salts/nutrients) and on non-arable land (heavy clay soils, high-alkalinity soils, etc.). In addition, the Imperial Region is an advanced agricultural community and has the infrastructure required for an algae-based products industry. Algae production could be used for the bioremediation of environmental pollution resulting from eutrophication (nutrients from agricultural and municipal drainage). Some algae absorb heavy metals, like selenium, that can bioaccumulate. Algae production could essentially pre-treat water prior to discharge to New River, Alamo River, or Salton Sea; could provide viable use of playa lands that are exposed as the Salton Sea recedes; and could be integrated into an interregional Salton Sea enhancement plan.

7.4.3.3 Matching Water Quality to Ecosystem Use

Use of salty or brackish water to create habitat and reduce dust emissions would support a Salton Sea enhancement plan. Impaired water quality may be used to support ecosystem enhancement projects that provide habitat and passive recreational features such as bird watching. Ambient, instream water must be suitable to support a wide range of aquatic habitats and conditions. Thus, water quality for instream uses generally must meet physical, chemical, and biological objectives specific to the habitat and instream needs. New River water coming from Mexico is highly contaminated. As part of the New River Improvement Project, this water is being considered for water quality treatment through wetlands and bioengineered systems. In fact, there are two wetland projects on the New River, one near Brawley and one near Imperial.[41]

7.4.3.4 Matching Water Quality to Industrial and Commercial Uses

Economic incentives and/or local policy can be used to support businesses in matching water quality to a use. Cooling water used in energy production is often of lower quality than drinking water. Use of saline water and wastewater for power plant cooling (geothermal and/or solar) is supported by state and federal policy (see Energy Sector Water Use Efficiency Strategy, Chapter 8). Secondary or tertiary treated wastewater can be used for certain types of industrial supplies as defined in the Basin Plan.

7.4.4 Constraints

No major local policies or regulatory impediments prevent or encourage matching quality to appropriate use. Constraints to the use of recycled water, brackish groundwater, and drain water were discussed above. The low relative cost of Colorado River water delivered by IID (in 2011, $20/AF agricultural rate and $68/AF urban rate) discourages development of impaired supplies. The lack of local policy regarding use of alternative sources for appropriate beneficial uses in lieu of Colorado River water serves as a disincentive to private investment. Cost-effectiveness and level of investments are business decisions of the individuals or industries that would develop and apply strategies to match water of impaired quality to appropriate uses, or treat sources of poor quality water so that it could be used as a substitute for Colorado River supplies.

7.4.5 Relation to Other Strategies

- **Recycled Municipal Water –** Promote the use of recycled or treated wastewater.
- **Renewable Energy Sector Water Use Efficiency –** Promote BMPs for renewable energy cooling water sources for purposes of solar/geothermal plants; make local policies consistent with the state and federal requirements for renewable energy projects in desert environments.
- **Pollution Prevent –** Algae production could make economic use of impaired quality water while also cleaning up or remediating certain contaminants. This could include use of drain water, and

[41] <http://ponce.tv/brawley_imperial_wetlands_doc.html >

New River or Alamo River water. Algae operations could also be part of systems to treat non-point sources of runoff from dairy or animal feeding operations.

- **Ecosystems Restoration –** Ecosystem enhancement projects can be developed with water of impaired quality and ecosystem enhancement projects could be designed to provide habitat and water quality benefits.

7.4.6 Support for Mitigating or Adapting to Climate Change

Matching quality to an appropriate use would extend the available supply, provide for economic use of water not being used, and support adaption to climate change by creating uses for recycled water or brackish water. Vulnerabilities from potential increases in temperature, evapotranspiration, or reduced precipitation are related to higher rates of decline in the level of the Salton Sea from direct evaporation and/or because of reduced inflows. This could expose playa and increase dust emissions. Use of brackish water for algae production or creation of brackish water habitat would help adapt to this circumstance. Algae production could also help sequester carbon, but this could be contravened if the algae are used for biofuels.

7.5 CONVEYANCE – LOCAL/REGIONAL [42]

Conveyance provides for the movement of water and includes natural water courses and infrastructure like canals, pipelines, and diversion structures. Conveyance strategies include consideration of large interregional facilities like the All-American Canal, Coachella Canal, and Colorado River Aqueduct that move large quantities of water within or between hydrologic regions. It also includes the locally owned and managed conveyance infrastructure such as IID canals used to deliver raw water and city pipelines that take IID raw water to retail customers. Two resource management strategies were defined for the Imperial Region:

- ***Conveyance – Local, Planned*** includes projects identified in IID and the Cities' capital improvement plans, master plans or other existing plans.
- ***Conveyance – Local, New Projects*** includes new conveyance infrastructure related to recycling, groundwater banking, or other proposed Imperial IRWMP projects such as interties between drinking water treatment plants or wastewater treatment plants of the Cities.

Concepts for large interregional conveyance facilities to import seawater into the Imperial Region have been proposed for inclusion in the Imperial IRWMP.

[42] Conveyance strategies were reviewed by the Imperial Water Forum Projects Work Group 1/19/2011; Discussed at the Water Forum 1/20/1, 2/24/11, 3/24/11, and Findings and Recommendations adopted 4/20/11.

7.5.1 Findings and Recommendations

7.5.1.1 Findings

Water Forum findings based on criteria used to screen the CDWR Resource Management Strategies are listed below:

- ***Imperial IRWMP Goals and Objectives –*** Large interregional conveyances coupled with water quality treatment could help meet the Imperial IRWMP goals and objectives, but the cost estimates are higher than any historic users would be willing to pay in the near-term. A large interregional conveyance designed primarily for the restoration of the Salton Sea is beyond the scope of this Imperial IRWMP.
- ***Complexity –*** Large-scale interregional conveyance projects would be very complex and face permitting, economic, and engineering challenges. Projects could involve complex international boundary water issues.
- ***Resolve Conflicts, Colorado River –*** Large interregional conveyances could avoid conflicts on the Colorado River by providing a new source of supply. This is balanced by unknowns related to costs and benefits, and potential for legal conflicts between competing interests.
- ***Resolve Conflicts, Imperial Region –*** Until the projects are better defined, it is hard to evaluate whether they would increase or reduce ongoing conflicts or help avoid future conflicts.
- ***Regional Benefits –*** Large interregional conveyances have the potential to provide multiple benefits to multiple participants, but this is balanced against unknown environmental, economic, and other impacts, and the complexity of development.
- ***Timeliness –*** Large interregional conveyances require further definition and feasibility study to resolve technical, environmental, economic, and institutional issues and would be considered a mid- to long-term prospect.
- ***Political Acceptability, Local –*** Unknown until better defined. Neutral at this time.
- ***Political Acceptability, Colorado River –*** Unknown until better defined. Neutral at this time.
- ***Adaptability to Climate Change –*** New conveyances could transport alternative water supplies to the region and help adapt to uncertainties related to climate change.

Other general Water Forum findings and recommendations are listed below:

- ***Community Benefits –*** IID's conveyance and water distribution system provides benefits to the entire region and needs adequate resources to be maintained.
- ***Local IID Conveyance Infrastructure***
    - No major local conveyance improvements to the IID system were identified as stand-alone projects for inclusion in the Imperial IRWMP.
    - The IID conveyance infrastructure provides regional economic benefits to all water users.

  - IID regional supply, conveyance, and distribution infrastructure is aging and faces a backlog of maintenance. The backlog of maintenance is not being met due to revenue constraints. Additional investment is needed to preserve and protect these assets.
  - IID does not currently have a policy for other agencies or interests to use their distribution canals and should adopt a wheeling policy.[43]
  - Existing IID drainage facilities convey flood water to the New or Alamo rivers from the developing urban areas, but were not designed as flood/stormwater conveyance and need improvements to meet these objectives.

- ***Integration of Local Conveyance Improvements with Other Strategies***
  - Conveyance needs or requirements for individual or regional projects will be integrated into those projects.
  - Local conveyance will be integrated or evaluated in the context of individual Imperial IRWMP water supply or flood/stormwater management projects.
  - The IID Definite Plan and System Conservation Plan identify conveyance system improvements to conserve water that are not currently being implemented and these improvements could be included in the Imperial IRWMP through the agricultural water use efficiency strategy.

- ***Disadvantaged Community Water Supply and Quality Needs***
  - **System reliability.** Improvements to local conveyance could provide supply reliability and back-up in the event of catastrophic supply interruptions. Cities could realize regional benefits by planning and designing regional interconnections for domestic or wastewater systems.
  - **Water quality.** Conveyance system interconnection should also be factored into evaluation of larger regional efforts for wastewater treatment, recycling, and drinking water treatment and distribution.
  - System expansion and annexation. Continue to evaluate connecting areas that surround existing larger water systems and are served by individual pipe connections to the larger municipal water systems.

- ***Large Interregional Conveyance –*** Projects should be integrated with other strategies like desalination. These could be long-term prospects for inclusion in updates of the Imperial IRWMP, but such projects are low priority for action at this time.
- ***CALFED Conveyance –*** CALFED conveyance projects are not directly related to the Imperial Region, though increased conveyance as anticipated by CALFED and the CWP could increase reliability of State Water Project and Central Valley Project supplies to southern California, potentially reducing competition for Colorado River supplies.

[43] IID subsequently developed and has adopted a wheeling policy.

7.5.1.2 Recommendations

The Water Forum should support IID in defining the long-term maintenance requirements for the regional conveyance infrastructure and a cost distribution model to preserve these assets for the Imperial Region.

7.5.2 Imperial Region – Conveyance – Local/Regional

Regional conveyance infrastructure was described in Chapter 4. Both the Imperial and Coachella IRWM regions have large conveyance systems to move water within the Colorado River Hydrologic Region and their respective jurisdictions, as does MWD to move water to the South Coast Hydrologic Region. IID conveyance infrastructure provides regional economic benefits to all water users in its water service area.

Some IID infrastructure is aging and faces a maintenance backlog. Maintenance requirements have not been currently met due to revenue constraints and resistance to increasing user water rates. The DACs have identified a need for improving and replacing drinking water and wastewater conveyance systems.

Large interregional conveyance connections between regions create interdependencies and present both opportunities and constraints. Such facilities can both solve and create problems and conflicts. The politics and economics of water in the Imperial Region are shaped by interregional conveyance. The QSA/Transfer Agreements demonstrate the interdependencies. The Colorado River Aqueduct is used by MWD to convey Colorado River water to the urban Southern California Hydrologic Region, including large metropolitan areas on the coast. Water conserved by IID under the QSA/Transfer agreements is conveyed through the Colorado River Aqueduct.

MWD's Colorado River Aqueduct is designed to carry a maximum of 1.25 MAFY, and in 2010 delivered 1.1 MAF of water supplies.[44] The remaining capacity is limited to 125,000 AF under very high flow conditions. At present, MWD has fallowing agreements with Palo Verde Irrigation District in addition to the IID/MWD transfer agreement. SDCWA also has a wheeling agreement with MWD for the transport of QSA Transfer Agreement waters that are deliverable to SDCWA. These keep the Colorado River Aqueduct flowing at a minimum of 1.1 MAFY for the term wheeling agreement.

MWD and other agencies in southern California also receive water from the State Water Project, which delivers water from the Sacramento/San Joaquin Delta into the South Coast Region. While CVWD is the fourth largest SWP contractor, it does not have its own aqueduct or pipeline to bring SWP water into the Coachella Valley. Instead, a "bucket for bucket" exchange agreement was reached with MWD to trade MWD SWP entitlements for Colorado River water, which is released from the Colorado River Aqueduct into the Whitewater River for use by CVWD. This water and natural runoff flow to 19 recharge ponds

[44] Metropolitan Water District of Southern California. "The Metropolitan Water District of Southern California Annual Report 2011." 2011. p 11

where water percolates into the Coachella Valley aquifer. Given these connections, CALFED conveyance issues can have an impact on the Imperial Region.

7.5.3 Opportunities

7.5.3.1 Local Planned Conveyance

IID System Conservation Plan. Opportunities to improve regional conveyance infrastructure beyond those anticipated or planned as part the IID System Conservation Plan to improve the IID conveyance system, conserve water, and meet QSA obligations are very limited. As such, proposed improvements are integrated into the agricultural water use efficiency effort (Chapter 8). As discussed in that section, some opportunities beyond what is anticipated to meet QSA/Transfer Project obligations may exist to implemented as part of the Imperial IRWMP.

City and County Capital Improvement Programs. As discussed in Chapter 4, the DAC outreach identified needs to improve both the drinking water distribution conveyance systems and the wastewater collection conveyance systems. It was anticipated that stakeholders would define specific projects and submit these during the call for projects to be included in the Imperial IRWMP.

7.5.3.2 Municipal Systems Interconnection

Municipal systems interconnection would include developing interties between municipal drinking water systems or wastewater systems to provide supply reliability, as part of regionalization of wastewater and drinking water treatment, or to provide backup in the event of catastrophic supply interruptions. This could include interconnections for domestic or wastewater systems, or for developing redundant connections to IID raw water supplies.

7.5.4 Constraints

City and County capital improvement plans for the communities are in various levels of development. Funding to complete plans and design improvements has been limited. Obtaining voter approvals for rate changes to fund improvements to and replacement of existing drinking water and wastewater conveyance systems has been challenging. No system intertie plans have been developed and such projects are conceptual at this time.

7.5.5 Integration and Relation to other Strategies

- **Agricultural Water Use Efficiency –** Conveyance improvements and systems operations are part of the Definite Plan and System Conservation Program.
- **Regional Flood Control –** Address capacity and policy issues for use of IID drain facilities for conveying stormwater.

- **Water Transfers –** The existing large-scale interregional conveyance projects could support development of alternative sources of supply to the Imperial Region by facilitating interregional transfers.
- **Ecosystem Enhancement –** In-region conveyance may be part of projects to create habitat to mitigate impacts from other projects.

7.5.6 Support for Mitigating or Adapting to Climate Change

The existing conveyance system or improved conveyance related to local projects would enhance operational flexibility and improve the ability for the Imperial Region to respond to variable climate conditions. Identifying interconnections between cities for wastewater and treated water would also support adaptive management, and response to catastrophic supply interruptions of reductions in supply.

7.6 SURFACE STORAGE

Surface storage includes new reservoirs or other surface storage facilities. Imperial strategies considered for further project development were for municipal system storage for raw or treated water.

7.6.1 Findings and Recommendations

Water Forum general findings and recommendations are listed below.

- ***Small Local Storage Projects***
    - Cities in the region have identified a need for raw or treated water storage facilities to meet state and local requirements and support responses to supply interruption and damages due to catastrophic events such as was experienced in the 2010 earthquake.
    - Small local storage projects will be integrated into other efforts, including the agricultural water use efficiency strategy through the IID Definite Plan and System Conservation Plan.
- ***Large Local or Regional Surface Water Reservoirs –*** Large surface water reservoirs would not be cost-effective or feasible in the Imperial Region when compared to other supply and groundwater storage opportunities. Constraints and the basis for eliminating these from further consideration include:
    - No local runoff or yield of Imperial Region watersheds, high evaporation rates.
    - Development of surface storage of imported water would include high cost for construction and pumping lifts to reservoir sites.
    - Potential for significant environmental impacts, and major permitting and regulatory compliance issues.

- ***Colorado River Storage –*** No opportunities exist for additional large-scale reservoir facilities on the Colorado River.
- ***CALFED surface storage –*** CALFED surface storage is unrelated to the Imperial Region, though increased surface storage statewide could increase reliability of SWP and Central Valley supplies to southern California, potentially reducing competition for Colorado River supplies.

7.6.2 Imperial Region-Surface Storage

DAC outreach identified a need for increasing raw and/or treated water storage to meet requirements. Each of the municipal systems has different needs.

Small local operational storage projects on the IID delivery system are integrated into the agricultural water use efficiency strategy through the IID System Conservation Plan.

In 2008, building of an operational storage facility was along the All-American Canal was begun. Brock Reservoir (previously referred to as the Drop 2 reservoir) was cooperatively developed by a number of partners including the Southern Nevada Water Authority, Central Arizona Project, and Metropolitan Water District of Southern California. The project cost an estimated $172 million and will yield as much as 70,000 acre-feet per year. Construction was completed in 2010. Brock Reservoir provides operational storage to capture and use Colorado water that was ordered, but not actually captured by the calling party. Without Brock Reservoir the water would have been delivered to Mexico. This project provides interregional and interstate benefits to Colorado River water users. No other operational storage opportunities were identified.

The Colorado River system contains numerous reservoirs that provide an aggregate of approximately 60 million acre-feet of storage (or roughly four years of Colorado River average flow). The Lower Colorado River reservoir system, consisting of Lake Mead and Lake Powell, are capable of storing 26.2 million acre-feet and 24.3 million acre-feet, respectively.

7.6.3 Opportunities and Constraints

7.6.3.1 Surface Storage Local – Small for Raw or Treated Water

Stakeholder assessment and outreach to the DACs in the Region indicate that Cities and water retailers need additional raw water storage to accommodate outages. The need for this has been integrated into the Improve Water Quality objective discussed in Chapter 10. Communications with the Cities in the Region have identified a need to consider additional raw or treated water storage facilities to meet state and local requirements and support responses to supply interruption and damages due to catastrophic events as was experienced in the 2010 earthquake. A regional project to integrate individual systems storage for raw and treated water and support DACs would meet local needs and Imperial IRWMP objectives. It was anticipated that stakeholders would define specific projects and submit these during the call for projects for inclusion in the Imperial IRWMP.

7.6.4 Support for Mitigating or Adapting to Climate Change

The ability for IID to store surface water in Lake Mead would support adaption to climate change, but this strategy is constrained by existing agreements and federal operational requirements. Local storage of raw water on the IID distribution system would support operational flexibility and increase supply reliability, and help respond to catastrophic supply interruptions (e.g., increased flooding and impacts to delivery infrastructure).

7.6.5 Relation to Other Strategies

- **Groundwater Development, Storage, Banking, and Conjunctive Use –** Water that would be available to IID for surface storage of existing Colorado River supplies would be better stored in available groundwater basins.
- **Agricultural Water Use Efficiency –** Operational storage in the IID system is integrated with the agricultural water conservation.

7.7 PRECIPITATION ENHANCEMENT

The precipitation enhancement resource management strategy is not applicable to the Imperial Region and was eliminated from consideration (see Chapter 6).

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 8

Reduce Water Demand

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Chapter 8. Reduce Water Demand

California Water Plan Update 2009 addresses the importance of reducing water demand and for increasing water use efficiency by of the different types of water users. As described in Chapter 5, IID's senior Colorado River water rights provide a stable and reliable supply to the Imperial Region. Chapter 5 also discussed how annual agricultural demands can vary; resulting in times when water demand may exceed available supply (overrun) for a particular calendar year. Areas in the Imperial Region outside of the IID service area that are reliant on groundwater must also conserve water to make best use of the available groundwater supply and to avoid or mitigate overdraft. Chapter 7 described alternative water supply projects and strategies to increase supply to meet current and future demands.

This chapter discusses water conservation and water use efficiency strategies to reduce water demand. The Imperial IRWMP water supply goal includes an objective to protect surface water rights by implementing water conservation measures that demonstrate reasonable beneficial use of the available supplies and are consistent with established industry standards, and state and federal requirements. The Imperial Water Forum reviewed three water use efficiency resource management strategies to reduce water demand:

- Renewable Energy
- Agriculture
- Urban (Municipal, Commercial, and Industrial)

Water use efficiency implies doing the same water using activity (agriculture, energy production) but with less water; for example, getting the same level of agricultural production and economic output using less water. The Reduce Water Demand management objective is related to urban best management practices and agricultural efficiency water management practices that increase water use efficiency. BMPs and EWMPs are specific to the particular types of water use.

Other resource management strategies that would reduce agricultural water demand are temporary fallowing land, referred to as crop idling by CDWR, and permanent land retirement. However, these are not regarded as water use efficiency practices, because they reduce agricultural activity or output and have related socioeconomic impacts. State regulations require urban water users to adopt BMPs and agricultural water users to adopt cost-effective EWMPs; USBR regulations require that the water conservation plan show how the irrigation district is addressing specific water use efficiency practices; and both state and federal regulations require reasonable, beneficial use. The state has worked with trade groups and agencies to define industry-specific technology, standards and regulatory requirements for BMPS and EWMPs specific to the type of water use, and these are evolving with technology and experience.

Practices that reduce agricultural water demand, while maintaining or even increasing farm production, have been implemented by IID and farmers since the 1940s. Additional implementation of such practices is central to IID's plans for reducing water use in the Imperial Valley to meet QSA/Transfer Agreements obligations. Under the QSA/Transfer Agreements it is possible for IID water users to

experience supply/demand imbalances (underruns and overruns). The short term response to supply/demand imbalances is through fallowing as defined by the IID Equitable Distribution Plan. Fallowing is being used to provide SDCWA transfer and Salton Sea mitigation flows from 2003-2017.[1, 2]

What is less well defined is how the Region's forecasted, long term MCI water demands (mainly due to geothermal development) will be met without reductions to the supply or reliability of supply to current users. Increases in future MCI demands in the IID water service area are expected to increase the total water demands to levels that exceed historical use. Increased demands could be met through water conservation by current water users or through land use changes that reduce water demand (e.g., agricultural land converted to municipal).

Changes to land use, whether temporary (crop idling, e.g., voluntary fallowing; or conditional use permit, e.g., solar development) or permanent (irrigated land retirement, e.g., growth of the urban footprint) are referenced in this chapter and discussed in more detail in Chapter 11, Practice Resources Stewardship and Other Strategies, which includes a proposal for how IID might account for and apportion for in-valley MCI use water made available by increased water use efficiency or as a result of changes in land use. Changes in land use in the Imperial Region could increase or decrease annual water demands. Reductions or increases in annual demand need to be accounted for and could have negative or positive effects on existing and new users. Land use decisions have an effect on water management, and water management decisions have an effect on land use planning, making it important for Imperial County and the Cities and IID to develop consistent policies and standards.

8.1 Agricultural Water Use Efficiency

Since the 1940's IID and Imperial Valley growers have worked aggressively to implement system-wide and on-farm water conservation measures. These measures are documented in IID's 2007 Water Conservation Plan. Additional water conservation efficiency strategies are identified in IID's *Efficiency Conservation Definite Plan* (Definite Plan) (Davids Engineering 2007)[3] and *System Conservation Plan and Delivery Measurement Description* (System Conservation Plan) (IID 2009), while adaptive management is being used to modify these plans as practices and conditions change. To support integration of the existing plans, these three plans that define the Imperial Region agricultural water use efficiency strategies and are incorporated by reference and made part of the Imperial IRWMP. Updates to these plans as well as changes resulting from adaptive management will be incorporated by reference in future Imperial IRWMP updates.[4]

[1] QSA by and among IID, MWD, and CVWD, Exhibit C. 10 Oct 2010. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=882> (p 39 of 44)
[2] On September 13, 2011, IID board of directors approved a resolution presented by General Manager Kevin Kelley to petition the State Water Resources Control Board to amend its 2002 water order regarding mitigation water for the Salton Sea from 2014-2017
[3] Due to terms in the QSA, on-farm conservation efforts were not start until 2017. Attempts are being made to start on-farm conservation as early as 2013 if agreed to by the QSA JPA.
[4] SB7x-7 (Steinberg) adopted by the state legislature in 2009 requires agricultural water suppliers to measure the volume of

Together, the Definite Plan and System Conservation Plan, as being adapted, define how IID and Imperial Valley growers will conserve water to be transferred out of the Imperial Region under the QSA/Transfer Agreements. Under the QSA/Transfer Agreements, historical levels of agricultural production are to be maintained and only water conserved through efficiency practices would be transferred. However, to address impacts of the IID/SDCWA transfer, fallowing of agricultural land has been included to meet SWRCB requirements for Salton Sea mitigation (2003-2017). Fallowing has also been used for payback of inadvertent overruns and to meet early QSA commitments and other opportunities, such as Intentionally Created Surplus. For a description of the Fallowing Program, see Section 8.1.2.3, below, and Chapter 11.

The Imperial IRWMP baseline assumes full implementation of the QSA/Transfer Agreements reduction in use by IID, and other practices detailed in the IID 2007 Water Conservation Plan (IID 2007); and that future agricultural consumptive use does not change, but that overall agricultural deliveries are reduced through on-farm and IID system conservation efficiency projects such as those documented in these plans.

8.1.1 Findings and Recommendations

Preliminary findings were drafted by the Demand Management Work Group and Water Forum.

8.1.1.1 Findings

Until IID's QSA transfer requirements (water use reductions) are met, other potential on-farm and system improvement/practices are held in reserve due to the uncertainty related to program water yield and verification.

- **Definite Plan and System Conservation Plan Implementation –** By 2026 and for the term of the QSA/Transfer Agreements, IID has to conserve the full additional 303,000 acre-feet per year under these plans at an estimated average cost of $300 per acre-foot.
    - Definite Plan and System Conservation Plan programs represent over $300 million of investment in system and on-farm improvements by IID and Imperial Valley growers and owners, respectively, in return for the transfer and sale of water to agencies in the South Coast and Coachella Valley of up to 303,000 acre-feet per year of conserved water through increased system and on-farm efficiency that does not decrease agricultural production. Without an agreement regarding returns from the purchase of conserved water and protecting IID water rights, this level of investment would be neither possible (e.g., if these costs were to be distributed to IID rate payers in the Imperial Region) nor politically acceptable.

water delivered to customers and to have a pricing structure based on least in part on quantity of water delivered. The measurement requirements do not apply to IID during the period the QSA is in effect (CWC § 10608.8(d)).

- The most cost-effective conservation measures have already been implemented, or will be implemented to meet QSA/Transfer Agreements obligations. Thus, potential conservation projects that remain are costly. In addition, the potential water yield is uncertain, because yield of the planned measures will not be known with certainty until the measures proposed for the QSA/Transfer Agreements have been implemented and the monitoring and measurement history is available.

- **Achievable System Efficiency Conservation and On-Farm Fallowing –** Of the potential water conservation projects only a limited amount of additional yield is achievable (Table 8-1):
  - System efficiency conservation projects not currently planned for implementation as part of the Definite Plan and System Conservation Plan could provide as much as 38,700 acre-feet per year: 30,000 acre-feet per year from full system automation and 8,000 acre-feet per year from not-built QSA projects (both can be built in phases, but would have to be built in conjunction with System Conservation Plan construction), and 700 acre-feet per year from additional canal lining projects.
  - The cost for system efficiency conservation is estimated to be $1,211 per acre-foot for 38,000 acre-feet per year and $1,196 per acre-foot for 38,700 acre-feet per year. These projects were identified from materials used in the review and development of the Interim Water Supply Policy and from the Definite Plan.
  - While 38,700 acre-feet per year from full IID system automation may be available, water yield will be uncertain until a history of operation for the QSA projects has been observed.
  - Of the identified not-built QSA projects in the near- to mid-term, canal lining could provide 700 acre-feet per year of water for MCI use.
  - Cost for on-farm fallowing is estimated to vary from over $165 per acre-foot in 2012 to an anticipated $350/AF, and could exceed $500 per acre-foot as the program ramps up.[5] Water yield from fallowing depends on the acreage of land fallowed by willing tenants or owners, the historic use on each parcel, and how much that use can be reduced using new practices.
  - Incentives for on-farm participation can be performance/result and/or conservation practice payment based. The degree of participation that might occur is unknown. This uncertainty makes it hard to quantify firm yield of additional water that could be apportioned to MCI uses. Fallowing is not an agricultural water use efficiency practice.

- **Infeasible Actions –** Agricultural conservation actions determined not applicable or feasible include:
  - Replacing concrete-lined canals with pipelines to reduce evaporation (about 650 acre-feet per year) is a non-feasible option due to high costs.
  - Reduction in tilewater is not considered a conservation opportunity, because of leaching requirements to manage salts and maintain crop productivity.

[5] Cost of 2012-2013 Fallowing Program: $125/AF to participants plus $40/AF for program administration

- Crop selection is a grower decision made in response to market conditions. Any related water conservation would be hard to verify and defend, and this is not considered an agricultural water use efficiency practice.
- Yield reduction could involve eliminating one irrigation and one cutting on alfalfa, which might achieve 0.5 acre-feet per acre per year at a cost similar to fallowing (over $500 per acre-foot). Potential exists to conserve up to 50,000 acre-feet per year from alfalfa, as over 100,000 acres of alfalfa are grown in the valley. However, the level of acreage enrolled in the QSA on-farm programs would likely limit enrollment in such a program. Enrollment would be influenced by the payment incentive offered, and would need monitoring for compliance. This could be part of a longer-term Imperial IRWMP adaptive management strategy to be reconsidered once the QSA on-farm efficiency program is fully implemented and an operational history is available to gauge the success of the agricultural water efficiency conservation efforts. Any practice that results in yield reduction is not considered an efficiency practice.

- **Voluntary Fallowing –** A well-managed fallowing program could provide water for new in-valley MCI uses; however, substantive political, economic and environmental constraints need to be addressed to ensure third-party effects and impacts are addressed.

  - Through 2012-2013 and perhaps through 2017, IID will continue the Fallowing Program started in 2003 to meet interim SDCWA water transfer and Salton Sea mitigation requirements. The Fallowing Program is anticipated to require enrollment of around six percent of farmable Imperial Valley land to produce 135,000 acre-feet (27,000 acres) for 2012, and 150,000 acre-feet per year (30,000 acres) for 2013-2017.[6] In 2018, the Fallowing Program ends. As a result, fallowing to produce MCI supply in the years before 2018 is constrained. After that time, fallowing could be implemented, and the resulting water use reduction quantified and apportioned to new MCI uses.
  - Acreage constraint: From 2018 on, QSA on-farm efficiency conservation efforts are projected to require 300,000 acres to meet the 200,000 acre-feet per year target; voluntary fallowing would require 12,000 acres to provide 60,000 acre-feet per year; this would mean a total of up to 334,000 acres enrolled in voluntary programs out of 475,000 farmable acres in the IID water service area.
  - IID would have to develop programs and policies to accommodate temporary or long-term fallowing as part of a managed in-valley water exchange. Long-term fallowing would damage farming infrastructure.
  - The cost of water from fallowing could rise to over $400/AF,[7] and water yield is related to the amount of land fallowed by willing growers or owners.
  - No IID or Imperial County policies were identified that would prohibit fallowing for purposes of providing water for non-agricultural in-valley uses, but significant political

[6] Source: QSA By and Among IID, MWD and CVWD, Exhibit C <http://www.iid.com/Modules/ShowDocument.aspx?documentid=882> (p39 of 44)
[7] Fallowing that is not part of the Salton Sea mitigation program could have environmental impacts, adding an estimated $40/AF to the cost of the program.

challenges and potential third-party and environmental effects must be addressed if expansion of current fallowing program were to be considered.

8.1.1.2 Recommendations

1. Proceed with implementation of the Definite Plan and System Conservation Plan actions planned as part of the QSA/Transfer Agreements, evaluate the program once there is an operational history, and use an Imperial IRWMP adaptive management strategy to plan additional measures for implementation to produce "new" water for MCI use once the effectiveness of the program can be better measured – after 2020.

2. Move forward to finance and construct the 'not-built' QSA projects as a near-to mid-term solution to provide measurable water for industrial use. These projects could provide up to 8,000 acre-feet per year for future MCI uses; to be included in some type of water exchange; or to cover water included in the Interim Water Supply Policy.

3. Aggressively develop a funding mechanism and policies that can be put in place to allow for use of 'not-built' QSA project conserved water for purposes of mitigation for potentially significant environmental impacts associated with increased industrial water demands for geothermal projects or other projects already in the Imperial County Planning queue.

4. Reserve from further consideration as part of the Imperial IRWMP program on-farm efficiency conservation beyond that anticipated in the Definite Plan to meet QSA/Transfer Agreements requirements; cannot be considered as a potential source for future MCI supplies.

5. Additional on-farm efficiency conservation has to be integrated with implementation of Definite Plan projects and/or should be part of a longer-term Imperial IRWMP adaptive management strategy to be reconsidered once the Definite Plan is implemented and an operational history is available by which to gauge the yield of the agricultural water efficiency conservation efforts.

6. Review development of an in-valley fallowing program that expands on or modifies the current Fallowing Programs. Developing such a program should involve the full participation and input of the Imperial Region stakeholders. Fallowing for in-valley uses and economic development could provide a sure method to reduce agricultural demand and apportion water to new industrial uses but only if a program can be designed that is fair, equitable, mitigates for any third-party and environmental effects, and is voluntary with the support of the farm community. This needs to be closely tied to the development of funding and policy alternatives.

8.1.2 Imperial Region Conditions

As noted above, IID and local growers have been active since the 1940s in testing and implementing agricultural water use efficiency strategies which are now estimated to conserve at least 400,000 acre-

feet per year of water. IID is also a charter member of the Agricultural Water Management Council.[8] IID's 2007 Water Conservation Plan (IID 2007) meets state and federal requirements for planning and implementation of appropriate agricultural conservation measures to conserve water, and documents the reasonable and beneficial use of the available supplies. The water conservation plan is updated every five years to comply with federal and state requirements. The history of the IID's water conservation programs is described in detail in the 2007 Water Conservation Plan. Table 8-1 shows the historic yield for the IID Seepage Recovery programs. IID's pre-QSA programs are listed in Table 8-2.

IID's 2010 Annual Water Report (IID 2010) explains how QSA/Transfer Agreements conservation goals are to be achieved. The QSA stipulates that IID must increasingly reduce its Colorado River Priority 3a water use, until by 2026 (and through 2037 or 2047), its reduction totals 487.2 KAFY.[9] To achieve that reduction, IID must conserve and transfer out of the Imperial Region a total of 408,000 acre-feet per year, 105,000 from the IID/MWD 1988 Water Conservation Program and an additional 303,000 from other QSA water conservation activities.[10] The additional amount is from AAC Lining (67,600) and for Misc. PPRs (11,500). IID/MWD Water Conservation Program project construction was were completed in December 1997. As described in detail in the 2009 QSA Annual Report (IID 2009b) and summarized below, IID is making progress in implementing efficiency conservation activities to meet the additional 303,000 acre-feet per year needed by 2026.

Table 8-1. IID System Conservation Yield, 2011 (AFY)

Project	Volume Conserved
IID Canal Lining	58,000
IID Seepage Recovery	6,800
IID Regulating Reservoirs	16,000
Total	80,800
12-Hour Delivery Program	Program savings go to IID/MWD Program

Source: 2011 IID Pocket Guide
Note: Seepage from the AAC and EHL are pumped back into the respective canals. AAC recovered seepage is included in reported flow at AAC Mesa Lateral 5. EHL recovered seepage is part of IID's net in-valley water supply.

[8] The Agricultural Water Management Council is a non-profit organization established in 1996 dedicated to bringing together all interested parties in agricultural water management with the expressed goal to achieve greater water management efficiency. <http://www.agwatercouncil.org/>
[9] Assumes SDCWA does not elect termination in year 35 of the QSA when its wheeling agreement with MWD ends.
[10] In addition, under the QSA/Transfer Agreements, any IID overruns must be paid back through extraordinary conservation (see IRWMP Chapter 5). As of 2011, overruns have been paid back with reductions in use resulting from fallowing.

Table 8-2. IID Pre-QSA Water Conservation Programs and Projects

Conservation project	Year	Activity summary
On-farm tile drainage	1940-present	IID and USDS SCS design and install tile drainage systems.
AAC seepage recovery, Drain 2	1947-present	AAC seepage returned to the canal.
AAC seepage recovery, Drain 1	1948-present	AAC seepage returned to the canal.
AAC seepage recovery, Drain pumps 4, 5, 6, 11, 12 and 34	1951-present	AAC seepage returned to the canal.
Line canals and laterals	1954-present	Concrete lining 3,679 miles of canals, laterals and head ditches.
Water distribution system automation	1958-present	Install telemetry system with automated structures on upper reaches of main canals (1958). Develop SDADA system (1990's).
Drain pipelines	1962-present	Installed 119 miles of drain pipe by 2006.
East Highline seepage recovery	1967-present	Construct 12 pumps for seepage recovery.
Regulating reservoir construction and operation	1976-1988	Singh (1976), Sheldon (1977), Fudge (1981), Sperber (1983), Carter (1988), total storage capacity of 1,619 AF.
13-point water conservation program	1976-1987	Program to reduce tailwater, canal seepage and operational spill.
Water Conservation Advisory Board	1979-present	Form 15-member board to makes water conservation recommendations to the IID Board of Directors.
21-point water conservation program	1980-1987	Board adopts policies and procedures for water orders, delivery system operation and charges for excessive water use.
Water conservation program	1981-present	Personnel hired to staff the water conservation program.
Irrigation scheduling program	1981-present	Assist growers to reduce on-farm tail and tile water loses.
Aquatic weed control	1981-present	Support research, build and operate fish hatchery to produce sterile triploid grass carp that feed on hydrilla and reduce clogs to canals and drains.
Field irrigation evaluations	1982	Improve on-farm irrigation management.
Modified demand irrigation trial	1984	Terminate water orders up to four hours before or after regular 24-hour end time.
Irrigation training program	1984	Support growers and irrigators to reduce volume of on-farm tailwater.
IID water conservation plan	1985-1987	Plan with yearly updates.
East Highline seepage study	1985-1989	IID/USBR study to identify water conservation opportunities.
Tailwater recovery demonstration program	1985-1990	Five-year demonstration of 5 tailwater-return and recovery systems.
12-hour delivery program	1986; 1989-present	Program for 12-hour water delivery schedule and ordering.
Lateral fluctuation study	1986, 1987	Study of causes and effects of water level fluctuation in open channel irrigation to identify conservation opportunities.
Irrigation field trials	1987 and 1988	Determine effect of testing soil moisture conditions.
15-point water conservation program	1987-present	Replaced the 13-point and 21-point water conservation programs.
Non-crop irrigation demand reduction program	1991-1992	Limit on length of time water could be applied to lands that were not seeded (i.e., could be flooded).
Crop specific modified irrigation pilot program	1991	Evaluate removal of irrigation water from alfalfa during the period August 1-October 15, 1991
Concrete lining rehabilitation	2003-2006	IID received a $2.5 million, 3-year matching grant
IID water management system (WMS)	2006	IID contracted with consultants to develop WMS to manage water ordering/delivery/operations, reduce manual procedures, and manage response to QSA requirements by improved tracking of water and system performance.
Canal automation	2005	USBR grant for use in automation of 10 headings and 15 gates.
TMDL water quality monitoring	2005	SWRCB grant for water quality monitoring for TMDL program.
AAC flow monitoring	2006	USBR grant to install flow measurement and monitoring.
Equitable distribution plan study	2006-2011	Study to distribute water during supply and demand imbalance.
Tailwater education program	2007-present	Provide technical support to growers, monitoring and evaluate tailwater for 3 consecutive irrigations.

8.1.1.3 IID/MWD 1988 Water Conservation Program

January 1990 marked the beginning of construction activities by IID to implement 15 projects identified in the landmark December 1988 IID/MWD Water Conservation Agreement between IID and in the December 1989 Approval Agreement between IID and MWD, Palo Verde Irrigation District and Coachella Valley Water District (CVWD).[11] These agreements provided for MWD to invest in construction, operation and maintenance of water conservation projects in exchange for the conserved water. A total of just under $96.5 million dollars (1988 equivalent dollars) were invested in project construction to conserve nearly 110,000 acre-feet per year, with budgeted 1999 O&M of nearly 5.6 million dollars ($127/AF, 1988$). The IID/MWD Water Conservation Program included improvements to the IID Water Control Center, non-leak headgates, canal lining, automated and centrally controlled structures, regulating reservoirs, interceptor canals and reservoirs, 12-hour water delivery scheduling, tailwater recovery systems, on-farm irrigation systems, and conservation verification. The IID/MWD programs and projects are summarized in Table 8-3. Figure 8-1 shows the history of water conserved under the IID/MWD program through 2009, and Table 8-4 provides the list of projects and project-specific yield.

Table 8-3. IID/MWD Water Conservation Agreements, Programs, and Projects

Conservation Project	Year	Activity Summary
Agreements		
IID/MWD Water Conservation Agreement	1988-present	Provides for water conservation projects to be constructed by IID, including AAC lining. Conservation savings of up to 110 KAF per year. MWD funded all costs for 15 of the 17 projects in return for having conserved amount of Colorado River water available for diversion to its Colorado River Aqueduct.
1989 Approval Agreement among IID, MWD, PVID and CVWD	1989-present	Approval Agreement called for a Water Conservation Measurement Committee (WCMC) to provide an orderly basis among the parties for verification of amount of water conserved.
Second Amendment to 1988 Agreement	2007-present	IID, MWD, et al. agree that the amount transferred is 105 KAF per year.
Programs and Projects		
IID/MWD Water Conservation and Transfer-Construction	1990-1998	Project construction, water conservation studies completed. (IID, 2000)
IID/MWD Water Conservation and Transfer – Delivery	1990-2005	Transfer for each calendar year.
	2007-present	IID is to transfer 105 KAF per year to MWD.
Augmentation Program, (Projects 1 and 2)	See Table 8-4	IID construct Carter Reservoir and completes South Alamo Canal Lining Phase I to make conserved water available to MWD.
Lateral Interceptors. (Projects 3, 8, 17)	See Table 8-4	Three interceptor projects constructed.
Reservoirs (Projects 1, 3, 4, 8, 9, 17)	See Table 8-4	Two regulating reservoirs, four interceptor reservoirs and pumping plant constructed.
Concrete Lining – Main and Lateral Canals. (Projects 5, 7, 10, 11, and 16)	See Table 8-4	Line 197 miles of lateral canals and 13.3 miles of main canals (South Alamo II, Vail Supply, Rositas, and Westside Main)
12-Hour Delivery, (Project 9)	See Table 8-4	Delivery requirement changed from 24-hour order to 12-hours to provide flexibility and match on-farm crop requirements.
Non-Leak Gate, (Project 12)	See Table 8-4	Developed 19 sites. (5 subsequently removed).

[11] IID/MWD Conservation Program Projects 1 and 2 were already constructed; Project 9 did not require construction. For further details, visit IID & MWD Water Conservation Program <http://www.iid.com/index.aspx?page=201>

Table 8-3. IID/MWD Water Conservation Agreements, Programs, and Projects, continued

Conservation Project	Year	Activity Summary
Programs and Projects		
Irrigation Water Management (Project 14)	1995-present	Irrigation evaluations are performed using portable water level sensors to monitor delivery and tailwater flow on selected fields.
System Automation, (Project 15)	See Table 8-4	Water Control Center (WCC) was constructed to house computer-based monitoring equipment, including workstations, map board, file and database servers, and centralized communications equipment; field site improvements were upgrade of 63 water control sites (34 major and 6 minor sites, 23 overshot gates); SCADA system was developed to monitor and operate IID's irrigation distribution system.
Additional Irrigation Water Management (Project 18)	See Table 8-4	25 tailwater recovery systems, serving 6,779 acres, were installed; first TRS began operation in June 1991, last installation was completed in August 1995
Conservation Verification Program		
Systemwide Monitoring (SWM)		Program developed to identify and explain trends in IID system performance as a function of operational environment within which IID/MWD conservation projects operate.
Water Information System (WIS)		To collect and process flow data needed in support of water conservation verification, an automated data collection, quality control, processing and retrieval system was developed; generates daily, monthly, calendar year and water year tables, summary tables and charts that are available and/or are presented in annual reports.

Source: Abstracted from IID 2007 Water Conservation Plan, Table 31

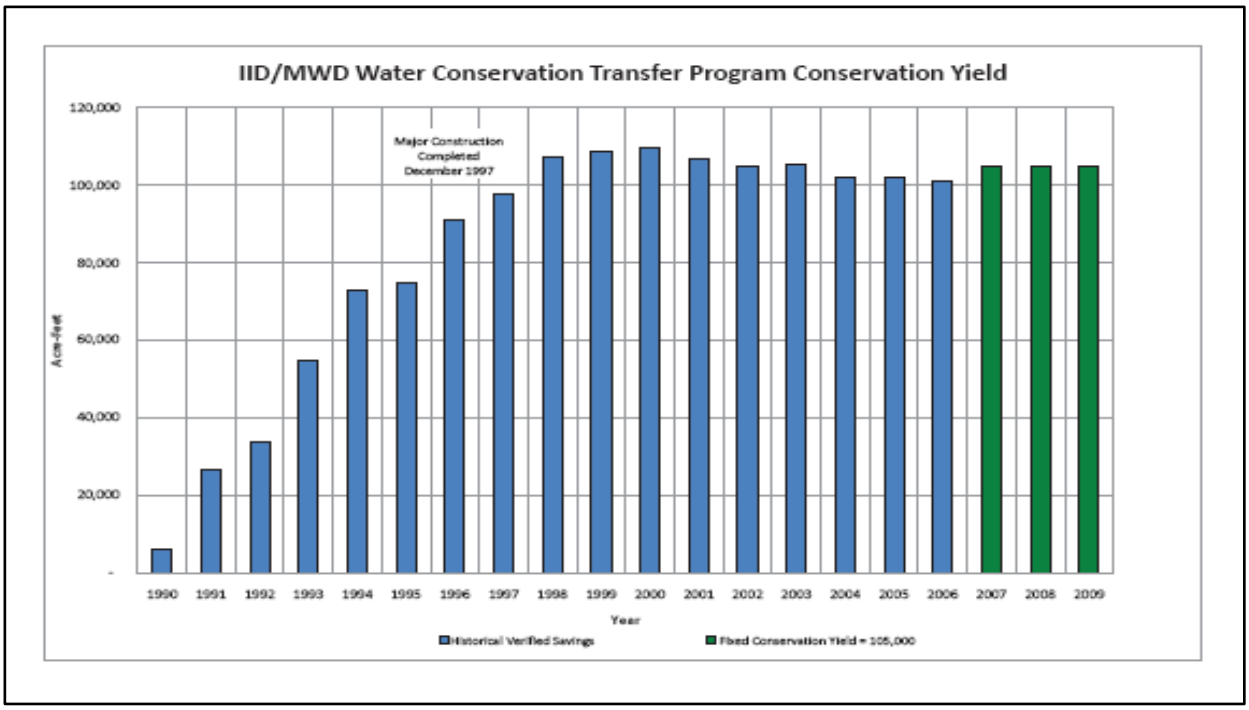


Figure 8-1. IID/MWD Conservation Transfer Program Yield, 1990-2009 (AF)

Source: 2009 QSA Annual Report (IID, 2009b)

Table 8-4. IID/MWD Water Conservation Projects and Yield, Water Year 2005 (AF)

Project No.	Project Name	Delivery Dates	HSV 2005[1]
1	Robert F. Carter (Trifolium) Reservoir	1990-present	3,880
2	South Alamo Canal Lining, Phase I	1990-present	510
3	Plum-Oasis (Lateral) Interceptor	1993-present	6,750
4	Bernard Galleano (Z) Reservoir	1992-present	4,490
5	South Alamo Canal Lining, Phase II	1991-present	900
e	Lateral Canal Lining	1991-present	24,250
8	Trifolium Interceptor	1998-present	12,990
9	12-Hour Delivery	1991-present	21,060
10	Vail supply Canal Lining	1992-present	10
11	Rositas Supply Canal Lining	1992-present	130
12	Non-Leak Gates	1991-present	630
14	Irrigation Water Management	1995-2002	14,720
15	System Automation	1991-present	260
16	Westside Main Canal Lining, North	1992-present	7,640
17	Mulberry-D (Modified East Low line) Interceptor	1996-present	3,720
18	Additional Irrigation Water Management	1992-present	3,880
	Total		**101,940**

Source: 2007 IID Water Conservation Plan, Table 34. Historical Verified Savings (HVS) for Water Year 2005 are available for delivery to MWD in calendar year 2006. Effective January 1, 2007, by agreement, total water available to MWD is 105 KAF per year with continued operation of tailwater return systems or implementation of a potable water conservation program.

8.1.2.1 Quantification Settlement Agreement Water Conservation Program

The QSA and Related Agreements were signed on 10 October 2003. The QSA /Transfer Agreements and associated schedule for water conservation and transfer commitments were discussed in detail in Chapter 5. IID's 2009 QSA Annual Report (IID 2009b) documents the conservation and transfer accounting from 2003 through 2009. Figure 8-2 shows volume by program of water IID conserved under the QSA for 2003 to 2009.

As mentioned above, IID is implementing the Definite Plan, System Conservation Plan and water management activities as part of the QSA efficiency conservation program. These plans are to provide a roadmap for conserving water while providing flexible, reliable service to growers, and a mix of on-farm and system projects to best meet IID's water transfer obligations. An on-farm water conservation goal of 200,000 acre-feet per year and a system conservation program goal of 103,000 acre-feet per year will meet the 303,000 needed for QSA transfer commitments beyond the 1988 IID/MWD program.

The Definite Plan was designed with public outreach and grower involvement to develop both on-farm and system water conservation strategies. On-farm efficiency conservation projects are to be voluntarily implemented by farmers to reduce tailwater runoff.

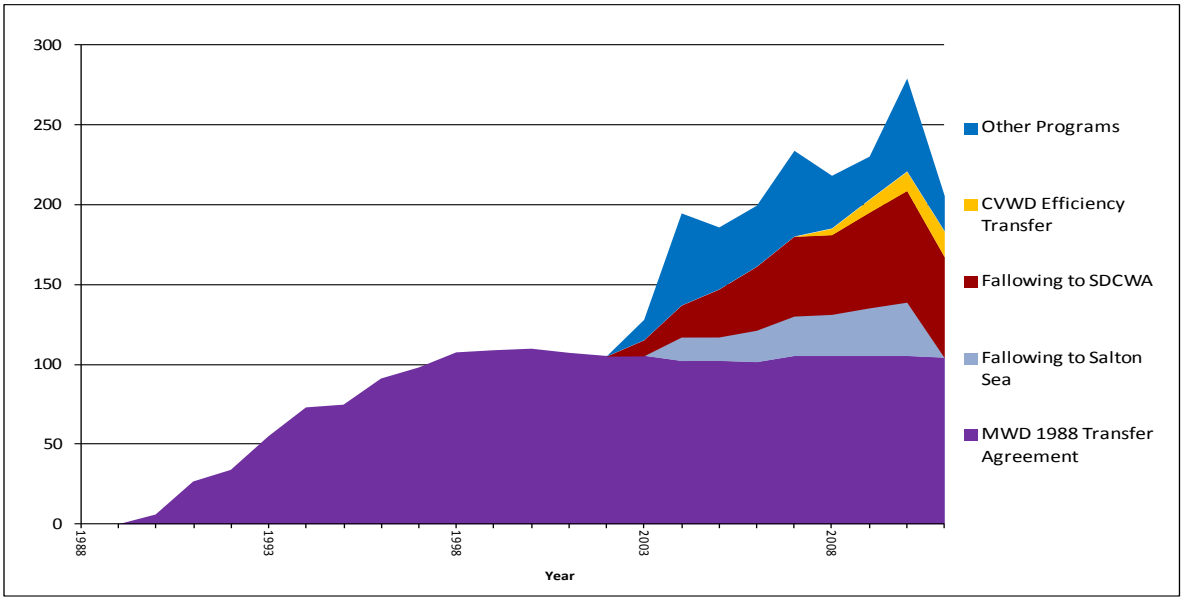
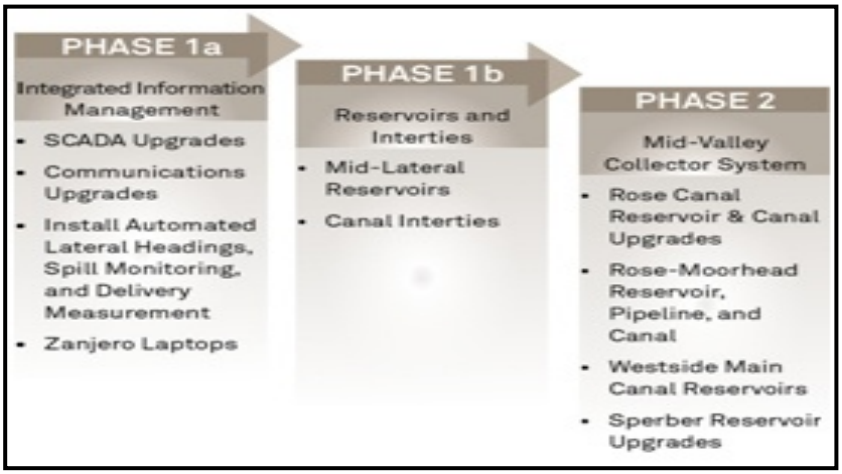


Figure 8-2. QSA Conserved Water, Volume at Imperial Dam, 1990-2011 (KAF, USBR Decree Accounting Reports)
Source: IID QSA Annual Reports and USBR Decree Accounting Reports

The System Conservation Plan is explained on IID's website, as follows: [12]

> *The System Conservation Program is a defined integrated package of system improvements to existing infrastructure and construction of new facilities designed to conserve water through targeted operational spill reductions, and to enable the scale of water delivery operations required to achieve the on-farm conservation goals in the Efficiency Conservation Definite Plan.*
>
> *The SCP has been developed as a targeted strategy for capturing and reusing operational spill from laterals within the IID service territory. Water conservation savings generated from the implementation of these efficiency improvements are required to fulfill water transfer obligations under the QSA and related agreements.*
>
> ***Program Phasing***
> *The implementation of the SCP within IID is organized around three major phases of work.*



[12] IID website: System Conservation Program. <4 Jul 2012>. <http://www.iid.com/index.aspx?page=205>

Phase 1a consists of the major Integrated Information Management components of the program including SCADA system upgrades, communication system upgrades, Zanjero laptops, and a set of automated lateral headings, spill monitoring, and delivery measurement units. This phase is proceeding with the development and issuance of two separate Work Packages described further below: 1a-1/3 and 1a-2. Phase 1b consists of the construction of the mid-lateral reservoir and canal intertie elements of the SCP. This phase is not proceeding at this time.

Phase 2 consists of the Mid-Valley Collector System projects, including the Rose Canal Reservoir, Rose-Moorhead Reservoir, Westside Main Canal Reservoir, various pumped and pipeline connections, and upgrades to the Sperber Reservoir. This portion of the SCP will not proceed until after Phase 1b is complete so the effectiveness of water savings under Phase 1a and 1b can be measured before proceeding. It is possible that Phase 2 elements may change significantly based on the spill reduction performance of the Phase 1a and 1b elements.

Work Package 1a-1/3 is comprised of two major components: Supervisory Control and Data Acquisition system, and a number of Flow Monitoring & Control Devices. This package also includes the requirement for long-term Operational Maintenance of the installed devices. This package will utilize the design-install-maintain contracting mechanism.

The SCADA component is comprised of physical radio frequency equipment and data processing equipment on each of the devices, as well as the software and hardware that collect, analyze and process the data sent from the devices, which includes the graphical interface on zanjero laptops and the graphical interface in the Water Control Center. The contractors will develop detailed plans and specifications to upgrade IID's existing SCADA system. The major elements involved in the development of the system are as follows:

- *Design, configuration, integration, implementation, and maintenance of the central SCADA software package and associated peripheral equipment for the SCP project sites and all sites currently monitored by the existing SCADA system.*
- *Programming, testing, commissioning of the automated SCP field sites not included in other bid packages.*
- *Configuration and maintenance of a remotely accessible zanjero application. Development of the application will be by IID.*

Flow Monitoring & Control Devices are comprised of following elements:

Element	***Approximate No.***
Farm Deliveries	*4,780*
Lateral Headings	*233*
Spill/Flow Monitoring	*147*
Canal Gates	*70*
Non-Leak Gates	*20*

This Work Package will provide for the selection of one vendor that will design, install and maintain all the elements in two stages: Part 1 and Part 2. Part 1 will provide for the design of all the elements and for the installation of a limited number of elements. The limited number of

elements in Part 1 will be based on available funding and so that performance of the vendor's design can be verified prior to execution of the full system contract. Part 1 will include farm deliveries associated with two zanjero runs. Part 2 of the contract will include furnishing canal gates to the future RFP Packages 1b and 2.

Work Package 1a-2, the Communication System, is comprised of the radio frequency links that will provide acceptable signal quality to each end field device, microwave links and fiber backbone that will transport the SCADA data from the gates and other field devices to the Water Control Center. The communication system may also potentially include the voice requirements of the IID, including both water and energy personnel business voice needs. This package will utilize design-install.

The Communications System design will be coordinated with the design for the SCADA system. The construction phase will require the vendor to conduct a performance verification program that will implement delivery gate monitoring via SCADA data along the same two zanjero runs.

Program Schedule
Only Work Package 1a-1/3 and Work Package 1a-2 are scheduled to be completed and issued for proposals/bidding before the end of 2011 with construction proceeding in early 2012. As these facilities are constructed and made operational, and as future funding becomes available, IID will determine which elements of the remaining phases (Phases 1b and 2) will be required and/or if other elements such as additional system automation will be employed.

When fully implemented, Definite Plan and System Conservation Plan programs will represent an investment of over $300 million in on-farm and system efficiency conservation improvements.

IID staff is working with local growers and other stakeholders adapt and modify plans and to implement that will enable IID to meet QSA/Transfer Agreement requirements, including inadvertent overrun payback. Results of these efforts will be included in IID's Annual Water Report and Water Conservation Plan updates and in future IRWMP updates.

8.1.2.2 Fallowing

Fallowing to meet QSA obligations and respond to supply and demand imbalance is discussed in the 2009 IID QSA Annual Report. Crop Idling (fallowing) and Irrigated Land Retirement are resource management strategies could reduce agricultural demand, but both reduce agricultural productivity, so are not a practice for improving agricultural water conservation efficiency which posits that agricultural productivity is maintained. Crop Idling and Irrigated Land Retire are discussed in Chapter 11, Practice Resources Stewardship.

8.1.3 Opportunities

Table 8-5 presents potential water sources for conserved water that may not have to be included in the QSA/Transfer Agreements programs. Water conservation from these potential sources may not be cost-effective as compared to other sources identified in the IRWMP that could be used to meet forecasted

future demands. The Imperial IRWMP is based on the assumption that IID will implement projects needed to conserve 303,000 acre-feet per year of water required for the QSA/Transfer Agreements at an estimated average cost of $300 per acre-foot. Projects that could result in additional water savings and be directed to new MCI users would be in addition to those projects actions – and would be at a higher per acre-foot cost.

Table 8-5. Potential Water Sources Currently Not Designated for QSA/Transfer Agreements (AFY, $/AF)

	Maximum (AFY)	Average Cost Estimate ($/AF)	Constraints
System Conservation Projects			
Full IID system automation	30,000	$1,376	SCP Construction Schedule
Not-built QSA projects	8,000	$590	
Additional canal lining	700	$416	
System Total	**38,700**	**$1196**	
Voluntary On-Farm Conservation Projects			
TRS, drip, linear move, etc.	60,000	$481	Acreage in QSA programs, see Note 4
Temporary, Voluntary Fallowing (Not an AWUE measure)			
Voluntary starting in 2018	60,000	$500 and up	Acreage in QSA programs, see Note 4

Table Notes:

1. Full IID system automation and not-built QSA project costs include $67/AF for administration and $90/AF for environmental mitigation.
2. On-farm conservation cost range varies with the farmer payment option.
3. On-farm conservation and fallowing programs are likely mutually exclusive – cannot add 60K acre-feet per year on-farm + 60K acre-feet per year fallowing
4. Acreage constraint: QSA on-farm efforts are anticipated to require 150 KAC 400 KAC to meet targeted 200K acre-feet per year; Voluntary Fallowing (above) requires 12 KAC to meet 60K acre-feet per year; Voluntary On-farm projects (above) are anticipated to require 45 KAC to 120 KAC to meet 60K acre-feet per year; this would mean a total of195 KAC to 520 KAC enrolled in voluntary programs, out of 475 KAC farmable acres in IID service area.
5. Mitigation requirements (community impacts, environmental impacts, etc.) for these water sources are unknown.

Source: IID Agricultural Water Management Section. July 2012.

8.1.1.1 System Efficiency Conservation Opportunities

When compared to other alternative sources to manage supplies and meet future demands, the most cost-effective system conservation projects are not-built QSA projects (8,000 AF at $590 per acre-foot) and additional canal lining (700 acre-feet per year at $416 per acre-foot). Not-built QSA projects may also include a small number of seepage and operational spill recovery projects.[13]

Full system automation which involves projects that would establish delivery system controls is not cost-effective ($1,376) as compared to other efficiency conservation improvements or alternatives to manage the Colorado River water supply. Until the System Conservation Plan is fully operational, it is difficult to determine if there are further opportunities for system automation improvements.

As part of the 1988 IID/MWD program, IID conducted seepage analysis on the main and lateral canals, and any reaches with seepage recovery costs of $200 per acre-foot or less (1988$) were lined as part of

[13] Temporary, voluntary fallowing is discussed in Chapter 11, Practice Resource Stewardship since it is not an agricultural water use efficiency strategy.

the program. In the mid-1960s, IID installed cost-effective seepage recovery systems on the All-American and East Highline canals. Canal lining and seepage recovery were both investigated for the Definite Plan which concluded, "Lateral canal lining and other more involved delivery system changes appeared to offer either limited savings or exceed available revenue or both." Main canal seepage occurs on two of IID's three main canals, the East Highline and the Westside Main both of which are wide and flat and very expensive to line. The Definite Plan evaluation shows seepage recovery systems to be a much more cost effective and practical way to conserve main canal seepage. In April 2009, IID completed major construction on all 22 QSA seepage recovery systems on the East Highline and Westside Main canals. The potential for further conservation by seepage recovery (beyond QSA) is not cost-effective at this time.

Additional system conservation projects are part of IID's contingency to meet requirements of the QSA/Transfer Agreements and cannot be included in the Imperial IRWMP agricultural water use efficiency strategy. The potential for additional savings can be revisited as part of the Imperial IRWMP adaptive management strategy and update process.

8.1.3.1 On-farm Efficiency Conservation Opportunities

Under the Definite Plan, on-farm efficiency conservation projects are to be implemented on a voluntary basis by Imperial Region farmers or landowners. Participants will not receive funds to install projects; rather IID will pay them for the amount of water conserved with funds IID receives from SDCWA for transferred water. On-farm water conservation is directly related to the number of farmed acres implementing conservation practices. Net irrigated area in the Imperial Valley is about 475,000 acres, and the Definite Plan projected that 300,000 acres (or 63 percent of irrigated acreage) would have to implement conservation measures to meet the targeted 200,000 acre-feet per year of on-farm water conservation.[14,15] Assuming that owners and growers on 84 percent of the irrigated area were able and willing to implement conservation projects, 100,000 acres would available on which to implement practices for the Imperial IRWMP. Performance/result-based payment incentives and/or conservation practice payment incentives could be used to attract to participation.

Specific practices to be implemented would depend upon what is most efficient and cost effective for the farmer. Having a total of 400,000 acres enrolled in on-farm programs (200,000 for the QSA and 100,000 for the Imperial IRWMP) may not be realistic; and potential future savings for an Imperial IRWMP on-farm agricultural water use efficiency program cannot be determined with any certainty at this time.

Although the Imperial IRMWP on-farm conservation measures would be the same as those described in the Definite Plan, the cost per acre-feet of conserved water is likely to be higher, because the most

[14] This is the area with an irrigation history eligible to participate in IID Definite Plan on-farm programs. IID website. 5 Jul 2012. IID Annual Inventory of Areas Receiving Water Years 2011, 2010, 2009. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5607>.

[15] In 2012, analysis by IID Agricultural Water Management section has led to projections of of195 KAC to 520 KAC enrolled in voluntary programs, out of 475 KAC farmable acres in IID service area.

feasible projects would be implemented by growers first. The Definite Plan estimated cost of on-farm water conservation is $241 to $290 per acre-foot depending on farmer payment option at the 200,000 acre-feet per year level; incremental costs for an additional 60,000 acre-feet per year could range from approximately $343 per acre-foot to $619 per acre-foot depending on the incentive mechanism selected and including mitigation costs associated with impacts to habitat from reduction in drain flows.[16]

Although the projected costs may be feasible, the level of grower participation beyond 200,000 acre-feet per year for the QSA/Transfer Agreements cannot be predicted. Effects of the on-farm program need to be assessed to evaluate the realistic potential for further on-farm water savings. Additional on-farm conservation is not considered a viable program for inclusion in the Imperial IRWMP until such time as the Definite Plan program has been further implemented.

8.1.3.2 Temporary, Voluntary Fallowing

Temporary, voluntary fallowing is discussed in Chapter 11, Practice Resource Stewardship and Other Strategies.

8.1.3.3 Fallowing, Crop Selection and Yield Reduction

Two related agricultural water management strategies, fallowing and changes to crop selection, could temporarily reduce agricultural water demand, and the water be apportioned to other uses in the short-term or in response to a supply/demand imbalance. These would not increase agricultural water use efficiency on-farm. Chapter 11, Practice Resources Stewardship and Other Strategies provides discussion of these strategies.

8.1.4 Constraints

The major constraints to implementing agricultural water use efficiency measures for the IRWMP are: 1) high marginal cost for on-farm and system improvements beyond those needed for the QSA programs, and 2) level of participation in the on-farm program.

The remaining on-farm and system conservation opportunities are less cost-effective in terms of the unit cost for water conserved (dollars per acre-foot) than most of the measures to be implemented under the Definite Plan and System Conservation Plan and than those identified in the IRWMP. On-farm water conservation also requires voluntary participation by farmers within IID. The level of participation is unknown. For purposes of this version of the Imperial IRWMP, it would be remote and speculative to identify how much additional water could be conserved until the QSA water conservation program is more fully implemented. The Imperial IRWMP is to identify a firm, verifiable, and sustainable water supply, some of which could be provided through demand reduction and efficiency conservation by users, but until the QSA water conservation program is more fully implemented and water volumes are

[16] IID Definite Plan Appendix 4 Section 4.e., Tables 1 and 4. 15 March 2012. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=798>

verified, opportunities for additional on-farm or delivery systems improvements are unknown and anticipated to be limited.

Verifying conserved savings and monitoring the performance is part of the IID program (2009 QSA Annual Report, p 15). Monitoring and tracking program performance to identify potential additional conservation opportunities is part of the Imperial IRWMP and adaptive management strategy.

8.1.5 Relation to Other Strategies

- **Increase Water Supply –** If additional water conservation savings are to be invested in, the "new" water would be apportioned for use by IID within the Imperial Region. The Imperial IRWMP is not seeking additional agricultural conservation for transfers out of the Region.
- **Water Transfers –** Agricultural water conservation savings from the 1988 IID/MWD Program and 2003 QSA/Transfer Agreements were or will be transferred out of the Region in exchange for assurances to IID and the Imperial Region regarding water rights and reasonable and beneficial use determinations under the 417 Process, and for funding to implement the conservation and efficiency measures (IID/MWD program) or for payment for transferred water (QSA transfer programs).[17]
- **System Reoperation –** IID system reoperation is part of the System Conservation Plan.
- **Salt and Salinity Management –** Salt management is part of the IID system operation (drainage system) and on-farm water management by growers (tile drainage and other leaching). The need to apply water to leach salts carried by the Colorado River out of the root zone and maintain productivity is part of the reasonable and beneficial use of irrigation water.
- **Ecosystem Restoration –** Changes in agricultural water use efficiency could reduce drain water and require mitigation. This could add mitigation costs in the range of $40 to $67 per acre-foot to the cost of a program to reduce agricultural demands through improvements to on-farm or delivery system efficiency.[18]
- **Other Strategies –** Crop Idling for Water Transfers (Fallowing) and Irrigated Land Retirement, conditional use permits for solar development, urban growth.

[17] California Water Plan, Agricultural Water Use Efficiency RMS (CWP Update 2009 Vol. 2, Chapter 2): "For some water supplies, funding for water use efficiency comes from the ability to transfer water, such as in the Colorado River Region. While transfer to urban areas may reduce the amount of water available to grow crops, they [such transfers]are expected to play a significant role in financing future water use efficiency efforts."

[18] If agricultural water use efficiency reduces the amount of water in the IID drains tile drainage water will then become a larger part of the water in the drain system. Other problems will then surface such as higher levels of selenium in the drain water which is currently diluted by surface run-off into the drains. See 2012 Imperial IRWMP Chapter 5)

8.1.6 Support for Mitigating or Adapting to Climate Change

Agricultural water conservation efficiency strategies to achieve the reduced water demand management objective would allow the Imperial Region to maximize use of IID's Priority 3(a) Quantified Amount. However, because the Region has neither surface nor groundwater storage, implementing water use efficiency practices would reduce the ability for the Region to respond to and mitigate for reduced Colorado River delivery due to the long-term effects of climate change that decrease Colorado River flows beyond what will sustain Lake Mead above Critical Shortage levels (1075 feet). In such cases, agricultural demand management could help the Imperial Region respond to vulnerabilities related to climate change, make maximum beneficial use of existing entitlements, and meet Imperial IRWMP objectives; however, it would be at the expense of agricultural productivity.

8.2 RENEWABLE ENERGY WATER USE EFFICIENCY

CDWR resources management strategies to reduce water demand did not include a specific renewable energy water use efficiency strategy. The Water Forum developed the separate Imperial Region renewable energy water use efficiency strategy because the industry represents a significant economic development opportunity to the Region, has the largest forecasted increase in future water demand, and requires a reliable long-term supply that does not impact agricultural productivity.

The Imperial County General Plan (Imperial County, 2003) identifies the economic development potential of the renewable energy industry and established a future water demand of 180,000 acre-feet per year. The Imperial IRWMP forecasted future renewable energy water demands with conservation as 146,000 acre-feet per year. This assumes a 20 percent water conservation savings consistent with the state's goal for 20 percent conservation by the year 2020. The largest consumptive use for geothermal and solar thermal generation is for cooling water. Reducing water demand for imported Colorado River water is, therefore, related to improving water use efficiency for the cooling process. Solar Photovoltaic facilities have limited water demands for domestic water use and for washing panels and have a potential to decrease water demand.

A reliable water supply for renewable energy industry demand could come from the following:

- Capital projects to extend existing Colorado River supplies (e.g., recycled water, desalination of brackish groundwater, groundwater banking of underruns)
- Conservation by existing users and managed apportionment
- Demand reduction that results from changes in land use:
    - Temporary changes include crop idling, referred to as fallowing in the Imperial Region
    - Permanent changes through irrigated land retirement by rezoning land from agricultural to urban uses or other measures such as a conservation easement
- A combination of capital projects, and programs and policies to reduce current water demand and reapportion water to new users

In developing their findings and recommendations, the Water Forum discussed local, state, and federal policy environment; water conserving technologies; and the opportunities and constraints to meet the future water demands for the renewable energy industry.

8.2.1 Findings and Recommendations

The findings and recommendations related to Renewable Energy Industry water use efficiency, alternative supplies for cooling water, use of conserved water and related policies were developed by the Demand Management Work Group and presented to the Water Forum to inform its discussion. In December 2010 and January 2011, the work group reviewed and discussed the draft findings and recommendations, prior studies and technical information, state requirements for cooling water for energy facilities, and a range of management strategies. Meetings were also held by the Geothermal Energy Stakeholder Group to discuss the state's Renewable Energy Action Team recommended best management practices for desert environments (REAT, 2011), prior studies, and the draft findings and recommendations. Based on the work group and energy stakeholder group input, revised draft findings and recommendations were presented to the Water Forum in February 2011. Changes were made, and the re-drafted findings and recommendations were discussed by the Water Forum in March 2011 and the energy stakeholder group meeting in April 2011. Final draft findings and recommendations were reviewed and adopted by the Water Forum in June 2011.

8.2.1.1 Findings

- **Impacts, Benefits, and Mitigations**
    - Renewable energy provides economic benefits to the Imperial Region.
    - A goal of the Imperial IRWMP is to optimize the use of available supplies and/or to create additional water supplies to address increased MCI demands, and mitigate impacts where needed.
    - Renewable energy projects that result in intensification of water use could have a negative effect on agricultural water supplies unless mitigated. MCI demands are granted a higher reliability by IID and are less subject to cut back in response to overruns or shortages on the Colorado River.
    - To the extent that water is proposed for power plant cooling, the developer shall demonstrate that alternative water supply sources and alternative cooling technologies are unavailable, environmentally undesirable, or economically unsound.
- **Best Management Practices for Geothermal/Renewable Water Sources, Cooling Alternatives, and Other Uses**
    - State policy supports the use of dry or hybrid cooling to conserve water in desert environments.
    - Dry cooling technology has limits and is not presently cost-effective in the Imperial Region.

- Hybrid cooling should be encouraged if Colorado River water is used in order to demonstrate reasonable beneficial use of Colorado River entitlements.
- The feasibility of changing wet cooled plants to dry or hybrid cooled plants may be cost prohibitive for the remaining life of the plant.
- A critical factor for conserving water used for cooling and other uses is the water quality. The higher the incoming water quality, the more cooling cycles can occur, resulting in both less use and reduced wastewater discharge.
- Use of recycled municipal water or desalination of brackish water for cooling and other uses in lieu of Colorado River water would mitigate for potential impacts to current agricultural water users, and would demonstrate reasonable beneficial use of Colorado River entitlements.
- Storage of Colorado River water in a groundwater bank would provide a supply for renewable/geothermal energy water use and could serve to mitigate or eliminate impacts to existing agricultural water users.
- Use of recycled municipal water or desalination of brackish water for cooling purposes could provide multiple regional benefits. Project, program, and policy recommendations should be developed through the Imperial IRWMP process.
- Encouraging use of recycled municipal water for cooling and other uses could support local communities by providing a source of revenue to upgrade treatment plants so as to improve water quality.
- Recycled municipal water or desalinated brackish water maybe cost-effective when compared to the price of water from voluntary fallowing, and would serve to mitigate third party impacts to agriculture.
- Industrial customers shall be required by IID to follow appropriate water use efficiency BMPs, including but not limited to those established by the California Urban Water Conservation Council and California Energy Commission, as well as other water use efficiency standards, adopted by the District or local government agencies. (Interim Water Supply Policy (IWSP No. 11). IID may prescribe additional or different Best management practices for certain categories of Municipal and Industrial Water Users (IWSP No. 12).

8.2.1.2 Recommendations

Integrate Renewable Energy Water Use Efficiency Resource Management Strategies with related strategies (Increase Water Supply and Practice Resource Stewardship) as part of the Imperial IRWMP to address geothermal/renewable energy water needs, promote economic development and ensure mitigation of any environmental and third party effects.

1. The lead jurisdiction agencies (IID, Imperial County, and the Cities) need to work together during project review to ensure that direct, indirect, and cumulative impacts of individual energy projects are adequately evaluated with input from agriculture and other local stakeholders. Potential impacts could occur to agriculture and agricultural water supplies; habitats and flows

in IID drains, the Alamo River, New River and/or Salton Sea, IID facilities, DACs, and other impacted stakeholders. If needed, appropriate levels of mitigation are to be formulated, and implementation of such mitigation measures are to be made conditions of the IID, County, and the Cities approval and permits.

2. The Imperial IRWMP should compare the cost of developing new water supplies, efficiency conservation, voluntary fallowing, or other measures related to coordinated land use/water supply (e.g., apportioning water saved when land use changes), including mitigation costs if required.

3. Imperial IRWMP should recommend local policies and standards for geothermal/renewable Best management practices that are consistent with the Renewable Energy Action Team Report.

4. Imperial IRWMP should recommend a consistent review process to ensure that geothermal/renewable energy projects have mitigated all impacts and meet the local, state and federal agency BMP requirements.

8.2.2 Imperial Region-Renewable Energy Water Use Efficiency

Chapter 4 discussed the geothermal resources, existing or proposed geothermal and solar facilities, and land use management plans that could influence where renewable energy facilities could be located. This section reviews the local, state, and federal planning environment and policies.

8.2.2.1 Local

CDWR standards seek to integrate local land use planning and water management activities. Imperial County has the land use authority and is the lead agency for reviewing and approving renewable energy projects consistent with the Imperial County General Plan, conducting environmental review, and coordinating with other agencies. If the project boundaries are in the City, the City is the lead agency and will coordinate with other agencies, if needed. IID is the regional wholesale water management agency with the authority to develop water supply plans; review changes in the place, volume and type of water use; assign contracts and to apportion the Colorado River supply within its service area. Regional cities and other water agencies are the retail water management agencies with their own authorities and responsibilities. IID is a responsible agency during the land use permitting and development review process and is required to consult with the County and Cities during development review. IID also must rely on the Imperial County project environmental impact reports to support its discretionary decision on water use by proposed renewable energy projects.

County General Plan. The Imperial IRWMP is to be consistent with the Imperial County General Plan and support the County in meeting the goals and objectives. The County General Plan has policies to protect agriculture and agricultural water supplies, while also working to create economic development opportunities through promoting and locating renewable energy facilities. Imperial County General Plan – Geothermal/Alternative Energy and Transmission Element (Imperial County, 2006) was implemented

to guide land use decisions and approvals involving renewable energy.

Imperial County General Plan supports and encourages the full, orderly, and efficient development of Geothermal/Alternative Energy Resources, while at the same time preserving and enhancing possible agricultural, biological, human, and recreational resources (Goal 1). In addition, the General Plan seeks to minimize impacts to agricultural lands and biological resources (Goal 2) by carefully analyzing the potential impacts on agricultural and biological resources from each project (Objective 2.4). Geothermal/Alternative Energy Operations are required to efficiently utilize water (Goal 3) in order to maintain at least the present level of agricultural production while encouraging efficient water use (Objective 3.1).

The Geothermal/Alternative Energy Element states that geothermal development will have first priority of conserved and/or excess water over other uses which the County has jurisdiction (Objective 3.2). The County also encourages the efficient utilization of water in Geothermal/Alternative Energy Operations, and fosters the use of non-irrigation water (Objective 3.3). The County also recognizes that subsidence could be an issue (Goal 4) and requires alternative energy to have no net impacts detrimental to existing land uses (Objective 4.1) and that energy projects be responsible for monitoring potential subsidence (Objectives 4.3 and 4.4). IID has documented subsidence in IID canals and drains. Steps are needed to oversee and manage water extraction to reduce existing and eliminate future subsidence.

Conditional Use Permit language for several of the local geothermal plants state that “permittee shall diligently pursue the development of alternative sources to replace the use of irrigation water.” Renewable energy project proponents have been in discussions with the cities in the Imperial Region regarding development or upgrade of wastewater treatment plants to provide recycled municipal wastewater.

IID Plans and Programs. IID plans and programs influence how much water is available in a year’s supply and demand imbalance, and how water is to be apportioned to new renewable energy projects.

The 2009 IID Interim Water Supply Policy (IWSP) provides for apportionment of up to 25,000 acre-feet per year for development of renewable energy industries and establishes a pricing structure. The IWSP defers to IID’s Integrated Water Resources Management Plan to define the long-term source of supply. IWSP fees and assessments are to be used to fund capital projects to produce new supplies and for other IID programs to mitigate any impacts to third parties and ensure that a firm and verifiable supply is available for the renewable energy industry.

IID 2009 regulations for Equitable Distribution Policy (EDP) define the response to a supply/demand imbalance and potential overruns. The IID Board of Directors can declare a supply/demand imbalance and apportion supplies.

8.2.2.2 State Policy and Regulations

State and federal policy promote development of the renewable energy industry and create market incentives for geothermal, wind and solar project development in the Imperial Region.[19, 20] The Governor has issued Executive Orders (S-14-08; S-21-09) to expedite development of Renewable Portfolio Standards, also requiring the California Energy Commission (CEC) to define required best management practices for water use efficiency at renewable energy facilities.

State laws related to use of water supplies by renewable energy projects could influence local renewable energy projects, as follows:

- SB 610 and SB 221 require lead agencies like Imperial County or the CEC to prepare and review a Water Supply Assessment (WSA) for projects that would require significant amounts of water.[21] This requires definition of the firm water supply to be committed; consultation between the County and IID; evaluation of impacts and third party effects; and making of findings.
- Porter-Cologne Water Quality Control Act and Division 7 of the California Water Code Section 13550 mandates that recycled water be used for power plant cooling purposes instead of potable water, provided the following conditions exist:
    - Recycled water source is of adequate quality and is available in sufficient quantity and at reasonable cost
    - Use of recycled water does not adversely affect any existing water right
    - Use of recycled water does not impact public health
    - Use of recycled water will not degrade downstream water quality or harm plant life, fish, or wildlife
- State Water Resources Control Board Resolution 75-58 Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling regulates the source of power plant cooling water.[22] The policy states that such water should come, in order of priority, from the following:
    - Wastewater being discharged to the ocean
    - Ocean water
    - Brackish water from natural sources or irrigation return flow
    - Inland waste waters of low total dissolved solids (TDS)
    - Other inland waters
- State Water Resources Control Board Resolution 77-1 – Policy with Respect to Water Reclamation in California. This policy specifically addresses wastewater and encourages its reuse rather than disposal

[19] Governor Schwarzenegger signed Executive Order S-14-08 in 2008 establishing California's goal of increasing renewable energy generated electricity and directed collaboration between the California Energy Commission (CEC) and Department of Fish and Game (CDFG) to expedite Renewable Portfolio Standard (RPS).
[20] United States Department of Interior (USDOI) Secretary Kenneth Salazar issued Secretarial Order 3285 in March 2009 to make renewable energy production, development, and delivery one of USDOI's highest priorities
[21] SB 610 (Chapter 643, Statutes of 2001) and SB 221 (Chapter 642, Statutes of 2001)
[22] A copy of the policy is available on the IID Board's website: www.swrcb.ca.gov/plnspols/wqplans/pwrplant.doc

- California Department of Health Services requires the use of tertiary treated, disinfected effluent in cooling towers[23]

The California Division of Oil, Gas, and Geothermal Resources (CDOGGR) does not have any specific regulations governing the use of surface water for power plant use, but they work in conjunction with the State Water Quality Control Boards (SWQCB) to enforce the existing standards and policies.

The CEC has produced facility siting and permitting for renewable energy facilities that are intended to help land use agencies like the Imperial County with developing land use and general plan policies for locating plant facilities and transmission lines (CEC 2010).

8.2.2.3 Federal Policy and Regulations

As noted in Chapter 4, federal land management plans impacting the renewable energy industry are also being updated or are in development. There is the potential to locate geothermal and solar power projects on federal lands. The U.S. Bureau of Land Management (USBLM) has a Geothermal Resource Leasing Program that has undergone environmental review (USBLM, 2008) and could affect water demands for geothermal projects on Federal lands.

BLM and the U.S. Department of Energy (USDOE) are also taking actions to facilitate solar energy development in compliance with federal orders, mandates, and agency policies that promote renewable energy. The Solar Energy Development Programmatic Environmental Impact Statement (PEIS) is being prepared by USDOE and USBLM to assess environmental impacts associated with development and implementation of programs that would facilitate utility scale solar energy development on USBLM-administered lands in six southwestern states, including California (USBLM 2011). USBLM and USDOE are working jointly as lead agencies to prepare the PEIS to evaluate the proposed USBLM program. Once adopted, the PEIS could expedite the siting of facilities on federal lands in the Imperial Region.

The USBLM is also updating its Land Management Plan for the Imperial Sand Dunes Recreation Area (USBLM, 2010b) and defining land that would be available for solar, wind, or geothermal leasing. The preferred alternative identifies roughly 38,000 acres for wind, solar, or geothermal development. Pending adoption of the federal plans and certification of the PEIS, locating renewable energy facilities on federal lands is problematic and can result in delays to project implementation.

The lack of final federal policy and environmental compliance requirements on federal lands creates an incentive for locating facilities on private lands in where the County is the lead agency.

8.2.2.4 Joint State and Federal Policy

The Renewable Energy Action Team (REAT) is a combined state and federal effort that produced a document titled, “Management Practices and Guidance Manual: Desert Renewable Energy Projects”

[23] CDHS regulations. Purple Book, Sect. 13552.8. Recycled water for floor trap priming, cooling towers, and air conditioning. <http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Recharge/Purplebookupdate6-01.PDF >

(REAT 2011).[24] In December 2010, California Energy Commission (CEC) adopted the REAT report to serve as state policy for renewable energy facilities subject to review and permitting. The purpose of the REAT report is to identify BMPs for the renewable energy industry; and to provide a consistent approach for developers to use in planning and local, state, and federal agencies to use reviewing and permitting a project; thereby, avoiding rewrites and delays.

The REAT report encourages agencies like IID and Imperial County to adopt local BMPs for cooling water for consideration when permitting and authorizing projects under their respective jurisdictions. Guidance and BMPs are suggestions, not requirements, for project developers and/or public agencies to reduce permitting timelines and to enhance and maximize environmental protections. The REAT BMPs are presented below.

The REAT report points to the Warren-Alquist Act (CEC, 2009) that reiterates state water policy in terms of conserving water and using alternative sources of water supply:

> *It is further the policy of the state and the intent of the Legislature to promote all feasible means of energy and water conservation and all feasible uses of alternative energy and water supply sources.*

California Energy Commission has delegated projects below 50 MWh to Imperial County for review. CEC review of larger projects is consistent with the State Water Resources Control Board policy and the Warren-Alquist Act. The REAT report states that CEC:

> *...will approve the use of fresh water for cooling purposes by power plants which it licenses only where alternative water supply sources and alternative cooling technologies are shown to be 'environmentally undesirable' or 'economically unsound.*

CEC defines "environmentally undesirable" to mean the same as having a significant adverse environmental impact and "economically unsound" to mean the same as economically or otherwise infeasible. Specific local policy to define "significant adverse environmental impact" and "economically or otherwise infeasible" would help expedite local project review and permitting.

The REAT report identifies strategic actions to address major significant issues related to development of renewable energy projects and states:

> *The project will use air-cooling technologies for thermal power plant cooling.*

Further into the document, geothermal BMPs for water use specific to the Imperial Region Valley are addressed:

> *For binary geothermal plants located: a) In the Imperial Valley, minimize water use for power plant cooling by using hybrid (wet-dry) cooling technology. Use wet cooling only during extremely hot temperature conditions in summer. (Hybrid cooling technology has had limited*

[24] REAT includes CDWR, California Energy Commission, California Department of Fish and Game (CDFG), U.S. Department of Interior Bureau of Land Management (USBLM), and Fish and Wildlife Service (USFWS).

application to date, but is commercially available.). Use a degraded or reclaimed water source for the wet-cooling portion of the hybrid cooling system's operation. (pg 78).

8.2.3 Opportunities

8.1.1.1 Best Management Practices for Power Plant Cooling Water Use

The County and IID could adapt or adopt the REAT BMPs for the Imperial Region; and adopt local policies, requirements, and standards to reduce cooling water demand.

8.2.3.1 Treat Cooling Water to Improve Quality

Cooling water demands are in part based on water quality. Pre-treatment, whether on-site or off-site of the power plant or by a public agency or the power plant developer, would allow for more cooling cycles as compared to use of water of lesser quality.

8.2.3.2 Manage and Coordinate Changes in Land Use

Improve coordination of the development review process by integrating IID's water supply plans and policies and city and county land use plans (general plan) and policies of Imperial County as applied to the renewable energy industry BMPs would:

- Ensure implementation of water use efficiency measures and best management practices
- Expedite renewable energy project review and approval
- Support economic development
- Help meet Imperial IRWMP goals and objectives

Land use changes could result in either intensification of water use and increased demands above historical uses (e.g., locating geothermal on previously uncultivated open space lands), or could result in saving water that could be managed and apportioned by IID (e.g., agricultural to solar; agricultural to urban). IID could develop accounting procedures to track changes in water use that result from changes in land use.

8.2.3.3 Economic Incentives

Inverse block rate structures, like those used in the IID Interim Water Supply Policy, could continue to be used to provide an economic incentive to conserve water, and to provide revenue to invest in groundwater banking/storage or other capital projects to increase or extend the Colorado River supply (recycling, desalination). Such structures and projects could also be used to fund new projects and programs to mitigate impacts to historic users when apportioning water or managing shortage under the existing or expanded fallowing program (crop idling).

Economic evaluations would help define the marginal cost of water and the least cost mix of investments in capital projects, demand management/conservation, apportioning water and mitigating

existing users. This would help identify the cost of providing water to the Imperial region, determine ability and willingness to pay, and set investment priorities. If solutions are not affordable based on ability and willingness to pay, the Imperial Region could consider finding willing partners to invest in local solutions using a model similar to the QSA.

8.2.4 Constraints

Discussion by Water Forum, Demand Management Work Group, and Geothermal Energy Stakeholder Group members identified the following issues and constraints to developing integrated energy water use efficiency measures, BMPs, and meeting renewable energy industry demands through strategies that reduce cumulative regional water demands.

- No standard procedure or guidelines for submitting water supply assessments.
- Lack of local policies or inconsistent policies regarding BMPs for cooling water supply sources and for cooling water use conservation.
- Other than the Interim Water Supply Policy, no alternative water supplies have been firmly identified.
- Other than 2009 regulations for EDP and 2012 Temporary Land Conversion and Fallowing Policy (TLCFP), no mechanisms currently exist for IID to exchange or apportion water between use sectors or users; or between current and future users except if EDP supplies decrease.
- Impacts to historic water users need to be evaluated and mitigated.
- Uncertainty in water supply, price for water, and costs to mitigate environmental or third party effects, and this impedes economic development of renewable energy projects.

Based on discussion with the work groups, energy stakeholder group, and the Water Forum, differences in perspective among the water use communities could pose constraints to developing and integrated solution to renewable energy water use efficiency. A summary of the water user perspectives follows.

8.2.4.1 Cities Perspective

- Many wastewater plants are out of compliance with water quality standards.
- Financial resources to upgrade wastewater plants to existing standards or to fund tertiary treatment or recycling are limited.
- Ability to raise water treatment and sewer rates is constrained due to DAC and SDAC status.
- Cities are looking for willing partners with a need for water and resource money to upgrade wastewater plants for reuse of the wastewater.

8.2.4.2 Agricultural Industry Perspective

- The renewable energy industry, IID, and Imperial County need to recognize potential impacts to historic water users and the agriculture industry, and mitigate impacts by requiring use of alternative supplies or compensating current users for loss of supply.

- The agricultural industry is the historical user of water and the base of the local economy. Growers want to protect the agricultural water supply, but also recognize the need for economic development and jobs.
- Desire to maintain difference in price points for water between the agricultural rate and what others pay for "new" water (as in the 2009 Regulations for EDP and IWSP).
- New users must pay for new water supplies: cover cost of the new supply and mitigate for any environmental and third party impacts arising from water being reapportioned to new uses.
- No more fallowing of land for other types of non-agricultural water uses should be allowed unless there is fair compensation.

8.2.4.3 Geothermal Energy Stakeholder Perspective

- Need certainty in supply and cost in order to make investment decisions and obtain lender support.
- Need certainty regarding standards, requirements and review process to avoid costly delays and establish realistic schedules.
- Agricultural rates are inexpensive.
- Renewable industry provides economic benefits.
- Recycled water is a potentially cost-effective supply and a secondary use of Colorado River water.
- Water is plentiful in most years, let the renewable industry put the water to use and reduce underruns.

8.2.4.4 Further Points

The following constraints were raised regarding implementing efficient water use cooling systems and developing alternative supplies:

- Data and information on cooling cost; and for engineering and economic feasibility of cooling technology used to conserve water are limited.
- Cost to develop projects for secondary uses of Colorado River water as compared to existing agricultural and municipal rates is high.
- Political will or agreement to put additional costs and requirements on the energy industry that represents an economic growth opportunity for the economically distressed Imperial Region is limited.
- Coordination of land use and water management decisions is limited, resulting in conflicts between the County and IID, and inconsistent policies.
- Accounting for changes in land use and a program to apportion water savings or mitigate supply impacts to historic users is lacking.
- Ability for further conservation is limited – for agriculture by the QSA/Transfer Agreements obligation by agriculture, for urban municipal agencies by their low volume of use.

Engineering and economic data and information are insufficient to define economical or otherwise infeasible BMPs and/or discrepancies exist regarding interpretation of available information. Data from private entities is considered proprietary. Lack of price certainty for alternative supplies to the Colorado River makes it difficult for the energy industry, IID and Imperial County to compare the cost-effectiveness of cooling water use efficiency/conservation and alternative water supplies. At present, decisions regarding economically or otherwise infeasible BMPs are up to the project proponent who must prioritize investments in either water supply development or conservation technology (cooling system) based on ability and willingness to pay, market conditions, business models, and other information that may be considered proprietary.

In the absence of new water supplies or of regional plans to apportion the existing supply, renewable energy industry interests will continue to independently negotiate and develop supply solutions; may seek to obtain water from outside the Imperial Region, and/or fund engineering and economic studies to demonstrate that alternate cooling systems to conserve water and/or that requirements for a supply alternative to Colorado River water are not economical or technically feasible.

8.2.5 Relation to Other Strategies

- **Increase Water Supply –** New water supplies are needed to provide for the increased demands for the renewable energy industry and avoid impacts to agriculture and current users.
- **Agricultural Water Use Efficiency or Urban Water Use Efficiency –** Agricultural or urban water conservation could provide water for renewable energy industry for cooling. The renewable energy industry needs to demonstrate reasonable and beneficial use to protect Colorado River entitlements.
- **Crop Idling/Fallowing, Irrigated Land Retirement –** Both strategies could provide a source of water for the renewable energy industry if impacts are mitigated and the water is managed through an apportionment program by IID, such as in the EDP and TLCFP.
- **Land Use Planning and Management –** Locating solar facilities on lands zoned for agriculture would temporarily free up water that could be apportioned to renewable energy or another use by IID under contract. The program would need to ensure water was available to return the property to agricultural use. Integrating land use and water management policies and consistent standards for renewable energy will reduce conflicts and expedite permitting. IID 2009 Regulations for EDP and 2012 TLCFP, and Imperial County proposed solar ordinance are steps in this direction.

8.2.6 Support for Mitigating or Adapting to Climate Change

Renewable energy water use efficiency strategies in support of the reduce water demand management objective would allow Imperial Region to maximize use of IID's Priority 3a Quantified Amount and improve the ability for the Region to respond to and mitigate for variable climate conditions. Regardless of long-term effects of climate change to Colorado River flows, whether to increase or decrease the

flows, renewable energy water use efficiency would help the Imperial Region respond to vulnerabilities related to climate change, make maximum beneficial use of existing entitlements, and meet Imperial IRWMP objectives.

8.3 URBAN WATER USE EFFICIENCY

California Water Plan Update 2009 addresses the importance of demand reduction and water use efficiency as elements of statewide water management and identifies urban water conservation and increases in urban water use efficiency as an important statewide CDWR strategy. Benefits of urban water use efficiency extend beyond improvement of water supply reliability include:

- Saving capital and operating costs for utilities and consumers
- Delaying capital cost of new infrastructure to treat and deliver water
- Reducing demand for and thus cost of wastewater treatment
- Environmental protection
- Making best use of imported Colorado River water in the state's Colorado River and South Coast regions

The state has set aggressive water conservation goals, increased emphasis on water conservation for areas like the Imperial Region that are reliant on imported supplies, and tied state funding for local projects to implementation of best management practices (BMPs) by municipal water suppliers.[25] BMPs for municipal suppliers are referred to as Demand Management Measures (DMMs) in state statue and urban conservation guidelines. CDWR produced the 2010 UWMP Guidebook (CDWR 2010) to support water suppliers in preparing an Urban Water Management Plan (UWMP).[26]

The California Urban Water Conservation Council (CUWCC) was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities.[27] Three hundred and eighty-nine (389) CUWCC members are signatory to a Memorandum of Understanding which guides the council's work to define DMMs. The City of Calexico is the only Imperial Region member of CUWCC. The Water Conservation Act of 2009 (SB 7X) and the Governor's 20 X 2020 Conservation Plan (CDWR et al. 2010d) require 20 percent water use reduction by MCI users by the year 2020.[28, 29]

Implementation of DMMs in the Imperial Region would reduce existing and future urban (MCI) demand, stretch water supplies, and demonstrate that MCI users in the Region are making reasonable, beneficial

[25] AB 1420 (Chapter 628, Statutes of 2007, Laird) requires the terms of, and eligibility for, any water management grant or loan made to an urban water supplier and awarded or administered by CDWR, the SWRCB, or the California Bay-Delta Authority, with certain exceptions, to be conditioned on the implementation of the water DMMs described in the urban water management plan.
[26] See CDWR website: About Urban Water Management. <http://www.water.ca.gov/urbanwatermanagement/>
[27] See CUWCC website. <http://www.cuwcc.org/about/default.aspx>
[28] The Water Conservation Act of 2009 <http://www.water.ca.gov/wateruseefficiency/sb7/>
[29] 20x2020 Water Conservation Plan. February 2010, CDWR, et al. <http://www.water.ca.gov/wateruseefficiency/sb7/docs/20x2020plan.pdf>

use of the Colorado River supply. As required by statute, the Cities of Brawley, Calexico, El Centro and Imperial each prepared and submitted to CDWR their 2010 UWMP, which identify planned water use efficiency practices and DMMs.

8.3.1 Findings and Recommendations

In January 2011, the Demand Management Work Group discussed draft Urban Water Use Efficiency (WUE) findings and recommendations. The Water Forum reviewed the resulting draft Urban WUE findings at its February 2011 meeting, but did not take action pending participation of key stakeholders. Written comments were requested from all Water Forum members and comments were received. In March 2011, the Water Forum reviewed the proposed revisions and adopted the Urban WUE Findings.

8.3.1.1 Findings

- Urban water use efficiency improvements are consistent with Imperial IRWMP goals and objectives and could serve to reduce current or potential conflicts in the Imperial Region by demonstrating that the MCI users are committed and investing in DMMs to conserve water.
- Additional programmatic evaluation and design, including economic analysis of costs and benefits, are needed to allow for comparison of costs for implementing DMMs for water conservation to other alternatives.
- Urban water use efficiency achieved through implementation of DMMs is an important water management strategy that can be used in the Imperial Region to lower demand, help meet future needs, and stretch existing water supplies.
- The state has set aggressive urban water use conservation goals and increased requirements for urban water conservation, especially in areas like the Imperial Region that are reliant on imported supplies.
- IID, as a wholesaler, is not required to produce an UWMP, and IID's role in urban water conservation has been limited. The greatest return on investment can be achieved by IID working with the Cities to target urban water use efficiency and conservation by future water uses while playing a supporting role for water conservation efforts targeted towards existing users.
- Review of the 2005 UWMP reveals limited implementation of DMMs by the Imperial Region Cities.
    - Imperial Region Cities have not been as aggressive as wealthy desert communities to the north in implementing DMMs or making investments in urban water conservation. Imperial Region Cities (including towns and communities), except for the City of Imperial, are Disadvantaged Communities (DACs) and Severely Disadvantaged Communities (SDACs) having a rate base with limited ability to pay; therefore, their revenues are directed to priorities such as maintaining and operating drinking water

treatment plants and distribution infrastructure, and ensuring water quality standards and regulatory requirements are met.[30]

  - The UWMP prepared for the 2005 update cycle was prepared prior to dissemination of the QSA/Transfer Agreements and, therefore, did not include the QSA/Transfer Agreements limitation on IID supply.

- 2015 UWMP updates should be consistent with the new state requirements and subsequent UWMPs should be consistent with the Imperial IRWMP.
  - DMMs should be undertaken to ensure urban/MCI users are reasonably and beneficially using the water; that urban/MCI users are being held to similar high standards as agricultural users; and that all practical conservation measures are being implemented.
  - State grant funding for urban water use efficiency projects is tied to having an approved UWMP and documented implementation of DMMs.
  - Consistency between the Imperial IRWMP and the cities' UWMPs will support streamlining project development review and permitting, reduce costs for environmental review, and be a step toward integrating land use and water supply planning consistent with state law.
- The Imperial IRWMP can serve as a mechanism to define regional opportunities to cost-effectively support programs for implementing DMMs and to comply with state and federal requirements.
- Constraints to implementing DMMs include administrative costs to develop and implement programs; lack of financial incentives to support program implementation; relatively low cost of wholesale water; program costs or rates; political acceptability for changing lifestyles and resistance to making investments in water conservation infrastructure; and concern that conservation would reduce the ability to respond to a drought or shortage year, resulting in unnecessary hardships on communities if straight-line water conservation quotas are imposed under IID Regulations for EDP.
- Urban Water Use Efficiency would enable local agencies to mitigate greenhouse gas (GHG) emissions by reducing water and energy use. Improving water use efficiency is a mitigation strategy because of the relationship between GHG emissions and the use of fossil fuels to create the energy required to treat and distribute water.

8.3.1.2 Recommendations

1. IID should plan to have a moderate degree of involvement in the urban water conservation programs targeted to MCI users, assuming a stewardship role, providing support to municipal purveyors responsible for developing their urban water conservation programs, and coordinating regional efforts if resources are provided for this purpose.

[30] DAC, median household income less than 80 percent of the statewide average; SDAC, median household income less than 60 percent of the statewide average (PRC §75005 (g)) <http://leginfo.legislature.ca.gov/faces/codes_displayexpandedbranch.xhtml>

2. The Cities, through the Water Forum or its successor, should coordinate parts of their UWMP updates. [31] Some activities might be as follows:

    a. Investigate regional funding mechanisms and approaches to urban water conservation.

    b. Develop drought management/contingency and catastrophic supply interruption plans.

    c. Implement water conservation public information and outreach campaigns.

    d. Review and track progress in implementing DMMs included in the 2010 UWMPs.

    e. Prepare an annual report to document regional progress.

    f. Develop an in-school education program in English and Spanish.

3. The Cities, County and IID should work separately or together to achieve the following:

    a. Ensure measurable savings when agricultural land is converted to MCI uses consistent with existing land use plans.

    b. Ensure that water conservation BMPs and DMMs are implemented at the time of project development and project approval.

    c. Streamline development review and permitting processes for land use projects requiring SB 610 Water Supply Assessments and SB 221 Written Verifications of Water Supply to better integrate water and land use planning.

    d. Implement the California 2010 Plumbing Code, effective January 2011, as a standard for new development and for development or update of local ordinances in Imperial IRWMP updates. [32]

    e. Implement the Model Water Efficient Landscape Ordinance as a standard for new development and development or update of local ordinances. [33]

    f. The Cities should consider implementing a conservation rate structure (e.g., increasing block rates).

    g. The Cities should consider developing standardized MCI water use categories to support aggregation of data by use category for purposes of tracking changes in water use; and developing unit water requirements or duty factors for forecasting future demands and preparing water budgets, UWMPs, and land use and/or water supply plans.

[31] Amended from March 2011 Water Forum recommendation to coordin2010 UWMPs; the Cities did not prepare a Regional 2010 UWMP and the Imperial IRWMP was not completed until October 2012.
[32] See CDWR website <http://www.water.ca.gov/recycling/DualPlumbingCode/> For Dual Plumbing Code see <http://www.iapmo.org/Pages/2010CaliforniaPlumbingCode.aspx>
[33] See CDWR website <http://www.water.ca.gov/wateruseefficiency/landscapeordinance/> By law, for any local agency that did not adopt a landscape ordinance as of January 1, 2010, the State Model becomes effective by default; however, a local agency can adopt a new version as long as any ordinance is at least as effective as the State Model.

8.3.2 Imperial Region – Urban Water Use Efficiency

8.3.2.1 Planning and Management Environment

The Urban Water Management Planning Act defines standards and requirements for UWMPs. [34, 35] The cities are the service providers, and Imperial Region Cities with more than 3,000 service connections that are required to prepare UWMPs are Calexico, El Centro, Imperial and Brawley. IID as a wholesale provider of untreated water is not required to prepare an UWMP.

For purposes of coordinating urban water suppliers in the Imperial Region, discussions were held by the Demand Management Work Group. On February 9, 2011, an UWMP Workshop that included Cities' and CDWR representatives was held to identify opportunities to prepare a regional UWMP.[36] Calexico, El Centro, Imperial and Brawley independently updated their 2010 UWMPs as they had already established a course of action and it was not timely to integrate the individual plans for the 2010 UWMP update. The draft 2010 UWMPs were reviewed to identify opportunities to make the UWMPs consistent with the Imperial IRWMP. The 2010 UWMP updates were submitted by the Cities to meet the August 2011 deadline. CDWR review and acceptance of the 2010 UWMPs are required to qualify for Imperial IRWMP Proposition 84 Implementation Grant money.

The 20 X 2020 Water Conservation Plan (CDWR 2011b) defines the method to be used to calculate baseline water demand and the required 20 percent reduction. Imperial Region is within California's Colorado River Hydrologic Region (Region 10), so the information in Table 8-6 represents the targets for per capita water use that apply to the Imperial Region.

Table 8-6. Baseline and Target - Conservation Water Demand for Colorado River Hydrologic Region (Region 10), **(GPCD)**

Period	Per Capita Use
Baseline (1995-2005)	346
Interim Target (2014)	278
2020 Target	211

The California 20 X 2020 Water Conservation Program recognizes that the targets were developed for planning at the statewide and regional level, and that the target for a hydrologic region may not be appropriate for a particular supplier within a region. It further recognizes that there is significant variation in urban water use within the Colorado River Hydrologic Region and the Imperial Region due to climatic, demographic, and/or economic factors as well as differing levels of conservation implementation.

[34] Find all CWC references at <http://www.leginfo.ca.gov/.html/wat_table_of_contents.html>
[35] The UWMP Act, CWC §10610 - 10656
[36] UWMP Act requires urban water suppliers to coordinate with other agencies (CWC 10620(d)(2))

8.3.2.2 Imperial Region MCI Demand

CDWR methods were used to evaluate and forecast urban/MCI demands for the Imperial Region (GEI 2011c). The UWMP Act requires baseline daily per capita water use and urban water use targets. The Imperial IRWMP forecast used both California Department of Finance and 2010 U.S. Census Bureau Data.[37] Imperial Region baseline per capita demand for each community is shown in Table 8-7. For consistency between the 2010 UWMPs and the Imperial IRWMP, the pertinent forecast was used by each city that prepared a 2010 UWMP.

As seen in Table 8-6, baseline population weighted average water demand in the IID water service area (Ocotillo is outside the IID water service area) is 205 gallons per capita per day (GPCD), which is less than the state's 2020 target conservation level of 211 GPCD. This is attributed to the Cities and communities in the Imperial Region, with the exception of the City of Imperial, being DACs or SDACs, which typically have smaller houses and lots, lower outdoor water use, and limited incomes to pay high water bills for nonessential uses.

Table 8-7. Baseline Weighted Average per Capita Demand for Cities within IID Water Service Area, 1995-2005 (AFY, GPCD)

City	AFY	GPCD
Brawley	0.34	301
Calexico	0.17	154
El Centro	0.22	194
Holtville	0.22	196
Imperial	0.25	220
Westmorland	0.26	236
Heber	0.19	171
Calipatria/Niland	0.28	251
Seeley	0.15	133
Population Weighted Average	**0.23**	**205**

The potential for Imperial Region Cities to conserve additional water is very limited since per capita water use is so low, even when as compared to other California communities with similar climatic conditions. Limited water use also means the opportunity for Cities to generate revenue to implement DMMs or for other water projects is very limited.

The state statute requires urban water supplier to meet the conservation targets defined in their UWMP or lose eligibility for state grant funding; however, disadvantaged communities may seek a waiver and exemption from this provision and DACs may also obtain grants to implement state conservation requirements and comply with other provisions of the statute.[38]

[37] UWMP Act requires use of population forecasts available from state, regional or local service agencies (CWC §10631(a).
[38] CWC δ 10608.56 (e) ". . . the department shall determine that an urban retail water supplier is eligible for a water grant or loan. . . if the urban retail water supplier has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community."
CWC δ10608.60 ". . . In the allocation of funding, it is the intent of the Legislature that the department give consideration to disadvantaged communities to assist in implementing the requirements of this part."

Table 8-8 presents Imperial Region baseline and forecast MCI demand (for details, see Appendix D).[39] For urban areas not listed in Table 8-7, population weighted average per capita demand was used to calculate future demand. Imported raw Colorado River water delivered by IID is the source for meeting these demands except for the community of Ocotillo/Nomirage which is outside the IID water service area and uses well water. IID provides wholesale water to cities without a contract.

Table 8-8. Imperial Region Municipal Water Demand, Per Capita Demand Model, 2005-2050 (AFY)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Acre-Feet Per Year										
Brawley	7,804	6,830	7,885	7,898	8,442	8,662	9,225	9,280	8,887	8,544
Calexico	5,766	6,048	6,097	6,382	6,506	6,522	6,709	6,833	6,623	6,954
El Centro	8,436	8,202	8,340	8,174	8,549	9,306	9,678	8,756	8,381	8,868
Holtville	1,795	1,666	1,625	1,718	1,700	1,693	1,983	2,260	2,304	1,971
Imperial	2,406	2,886	2,988	2,268	2,885	2,883	3,643	3,786	3,905	3,995
Westmorland	719	721	707	959	1,073	1,099	713	714	730	724
Heber Public Utilities District [1]	362	358	341	385	355	352	1,236	1,217	1,193	1,415
Seeley County Water District	345	348	338	345	346	342	346	346	351	350
Southern California Water Co. [2]	3,974	3,420	3,539	3,522	3,982	3,591	3,301	3,927	4,441	3,744
NAF El Centro	592	610	686	655	694	682	685	690	713	761
Total	**32,199**	**31,089**	**32,546**	**32,306**	**34,533**	**35,132**	**37,519**	**37,809**	**37,527**	**37,325**
Million Gallons Per Day										
Brawley	6.97	6.10	7.04	7.05	7.54	7.73	8.24	8.28	7.93	7.63
Calexico	5.15	5.40	5.44	5.70	5.81	5.82	5.99	6.10	5.91	6.21
El Centro	7.53	7.32	7.45	7.30	7.63	8.31	8.64	7.82	7.48	7.92
Holtville	1.60	1.49	1.45	1.53	1.52	1.51	1.77	2.02	2.06	1.76
Imperial	2.15	2.58	2.67	2.02	2.58	2.57	3.25	3.38	3.49	3.57
Westmorland	0.64	0.64	0.63	0.86	0.96	0.98	0.64	0.64	0.65	0.65
Heber Public Utilities District [1]	0.32	0.32	0.30	0.34	0.32	0.31	1.10	1.09	1.07	1.26
Seeley County Water District	0.31	0.31	0.30	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Southern California Water Co. [2]	3.55	3.05	3.16	3.14	3.56	3.21	2.95	3.51	3.96	3.34
NAF El Centro	0.53	0.54	0.61	0.58	0.62	0.61	0.61	0.62	0.64	0.68
Total	**28.75**	**27.75**	**29.06**	**28.84**	**30.83**	**31.36**	**33.50**	**33.75**	**33.50**	**33.32**

Source: Anisa Divine, Ph.D., Senior Planner-Agricultural Water Management Section, Imperial Irrigation District
[1] Heber PUD's 2000-2005 water delivery records are not validated
[2] Southern California Water Co. provides water to Calipatria, Niland, Calipatria CDCR, and Centinela CDCR

8.3.3 Opportunities

By means of the IRWM process, future Imperial IRWMP and local UWMPs updates can become complementary and consistent. This can lead to streamlined decision-making, facilitate future land use and water supply decisions, and help promote regional consensus on approaches to expansion of the region's water supply and conservation programs. Consistency between the will also help the Imperial Region comply with legislative requirements.

[39] UWMP requires population in five year increments to 20 years (CWC 10631(a)). The Imperial IRWMP forecast and planning horizon is to 2050 to overlap with QSA/Transfer Agreements time frame. Information is also to support consistency with Water Supply Assessment and Written Verification of Water Supply (CWC §10910-10915)

Increased urban water use efficiency, whether by existing users or new development, will reduce the need for capital investments in projects to create new water or for water quality treatment, including costs that could be associated with groundwater development and banking, recycled water, desalination, water transfers, or other projects to increase the available supply.

8.3.3.1 Regional Urban Water Management Committee and Cost Sharing Agreements

The Water Forum is the type of regional alliance encouraged by state law. The UWMP Act recommends preparation of a regional UWMP. The Cities of Calexico, El Centro, Imperial, and Brawley could form a standing urban water management committee to coordinate programs to implement DMMs, share costs and pursue grants, contract with a consultant to develop a regional UWMP, and coordinate with smaller municipal water suppliers to address shared issues. Urban retail water suppliers in the Imperial Region could meet urban water use targets through mutual, written agreement by means of a regional agency authorized to plan and implement water conservation, by means of a regional water management group like the Water Forum, or through the Imperial IRWMP.[40]

Within the Region, opportunity may exist for regional programs and collaboration that make compliance with UWMP requirements more cost-effective. While the urban water supplier is responsible for implementing required DMMs, regional collaboration may reduce implementation costs. Some DMMs are logical candidates for a cooperative regional effort and water-saving actions (Table 8-9). Consistent Regional standards for new development landscaping, plumbing codes, and information submittal for permitting could reduce costs to developers and support expedited development review and permitting.

8.3.3.2 Financial Incentives and Savings

Imperial Region Cities face challenges in generating funds to invest in capital infrastructure and/or programs that result in reduced water use. Enacting some sort of public goods charge to support urban water conservation and management would help to ensure stable and adequate funding to support future projects or programs that would have a co-benefit of improving water quality and water supply reliability for customers. However, such a charge could prove unpopular and even untenable for the poorer residents in the DACs and SDACs.

[40] CWC §10608.28(a) "An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following: (1) through an urban wholesale water supplier; (2) through a regional agency authorized to plan and implement water conservation. . .; (3) through a regional water management group as defined in [CWC] §10537 [a group in which three or more local public agencies, at least two of which have statutory authority over water supply, participate by means of a joint powers agreement, memorandum of understanding, or other written agreement, as appropriate, that is approved by the governing bodies of those local public agencies]; (4) by an integrated regional water management funding area; (5) By hydrologic region; (6) Through other appropriate geographic scales for which computation methods have been developed by the department.

"(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier."

Table 8-9. Demand Management Measures and Regional Program Candidates (DMMs)

DMMs	Regional Program Candidate
1. Water Survey Program	✓
2. Residential Plumbing	
3. System Water Audits, Leak Detection, and Repair	✓
4. Metering with Commodity Rates	
5. Large Landscape Conservation Program	✓
6 High-Efficiency Washing Machine Rebate Program	
7. Public Information System	✓
8. School Education	✓
9. Commercial, Industrial, and Institutional Program	✓
10. Wholesale Agency Program	✓
11. Conservation Pricing	
12. Water Conservation Coordinator	✓
13. Water Waste Prohibition	
14. Residential Ultra Low Flush Toilet Replacement	

A regional approach to developing urban water conservation programs could be more cost-effective and more administratively and fiscally efficient than for each city to act on its own. Financial incentives could be in the form of financial assistance to implement water conservation measures or through pricing signals through appropriate water pricing structures.

8.3.4 Constraints

California urban water agencies sponsored a study that identified a number of implementation challenges for urban water conservation programs (Table 8-10). Any of these is exacerbated by Imperial Region economic constraints and made more challenging due to the presence of a large non-English (Spanish-speaking) population.

Table 8-10. Urban Water Conservation Implementation Constraints

Program Type	Implementation Challenges
Residential indoor	Marketing; lack of incentives; communication barriers.
Residential outdoor	Persistence of water savings; follow-up visits; communication barriers.
Public information	Difficult to quantify water savings; communication barriers; need to update information on a regular basis.
Commercial, industrial, and institutional	Lack of reliable savings estimates; lack of adequate in-house technical skills; resistance to changes in a process that works; communication barriers; low water costs make water conservation a low priority for some businesses.
Large landscape	Incentives (the hand on the spigot may not pay the bill); persistence of water savings; communication barriers.
Targeting public entities	Incentives (some public entities do not directly pay for the water); school's lack of funding inhibits participation.
Plumbing code	Lack of coordinated effort to revise the standards
Water rates, efficiency pricing	High risk local political issue.
Leak detection	High expense of leak detection; requirements for retrofit or rehabilitation.

8.3.4.1 Financial

The biggest constraint for most Imperial Region communities is financial. Statewide analysis shows that the DMMs result in significant conservation or conservation-related benefits and are technically and economically reasonable, environmentally or socially acceptable, and reasonable for most water suppliers to implement.[41]

However, this may not be true for Imperial Region DACs and SDACs that, at 205 GPCD, are below the state's 20 X 2020 Region 10 target, and that have limited revenue and competing investment priorities for treating drinking water to meet California Department of Public Health (CDPH) standards and for treating wastewater to meet Regional Water Quality Control Board requirements.

8.3.4.2 Economic Justice

A further concern is that the state has a standard that, if the per capita water use target is already being met, communities are to achieve an additional 5 percent reduction. The state's expected 2020 levels of conservation for the Imperial Region are not realistic given the already low baseline (205 GPCD) and the economic realities of the region's DACs and SDACS.

Additional conservation to decrease the already low per capita water use baseline represents an economic justice issue. It is not appropriate to hold the Imperial Region to the existing lower baseline, to expect additional reduction, or to compare the Imperial Region to other areas with greater economic advantage and a much higher baseline. This situation demonstrates the need for flexibility in the design of the program for the Imperial Region, and for recognition of the economic realities within the area by CDWR. Imperial Region Cities remain committed to implementation of DMMs and efficient water management practices within the fiscal realities of the local communities, and in context of the overall goals of the IRWMPs and UWMPs.

8.3.4.3 Specific Imperial Region Constraints to Implementing DMMs

- Limited tax base and revenue generating capacity of DAC and SDAC communities
- Rate impacts and limited ability of rate payers to pay for DMMS
- Administrative costs to develop and implement programs, hire staff, and comply with regulatory requirements
- Lack of financial incentives to support program implementation
- Political unacceptability for rate change
- Concern that conservation would reduce the community's revenue stream
- Loss of flexibility to respond to shortage years
- Economic justice concerns related to requirement to decrease the already low per capita water use baseline

[41] CUWCC <http://www.cuwcc.org/about/default.aspx>

8.3.5 Relation to Other Strategies

- **Increase Water Supply –** Urban conservation could reduce or delay the need to invest in additional water supply or treatment facilities
- **Agricultural Water Use Efficiency –** IID and local growers are implementing state of the art agricultural water conservation to comply with state law and federal requirements.
- **Recycled Municipal Wastewater –** UWMP Act requires assessment of the potential for recycling of municipal wastewater. This is an Imperial IRWMP water supply strategy, and a regional strategy for recycling could be credited to meeting required conservation goals. Recycled water is conserved water that expands the size of the water supply portfolio.
- **Land Use Planning and Local Water Planning –** New development could be required to implement all DMMs at the time of approval. New development that involves conversion of agricultural lands to municipal and commercial uses, if implementing conservation measures, could reduce demands on the Colorado River supply.

8.3.6 Support for Mitigating or Adapting to Climate Change

Urban water use efficiency enables local agencies to both adapt to increased dryness including drought on the Colorado River that may impact the region's water supply and to mitigate greenhouse gas (GHG) emissions by reducing water and energy use. The Imperial IRWMP seeks to be adaptable to impacts associated with climate change. Improving water use efficiency is a mitigation strategy because of the relationship between GHG emissions and the use of fossil fuels that create the energy required to produce, convey, treat, and distribute water and to treat and discharge urban wastewater. This required energy varies from community to community, depending on local circumstances. Increasing water use efficiency serves as a way to mitigate and adapt to climate change.

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 9

Improve Flood Management

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Chapter 9. Improve Flood Management

9.1 Regional Flood Control

California Water Plan Update 2009 Management Objective, Improve Flood Management consists of a Flood Risk Management Resource Management Strategy (RMS) that is *specifically intended to enhance flood protection*, and *which includes projects and programs that assist individuals and communities to manage flood flows and to prepare for, respond to, and recover from a flood*.[1] Another RMS, Urban Runoff Management, to address concerns about water quality impacts of urban runoff, was included in the CWP Update 2009 Improve Water Quality Management Objective. The Water Forum integrated these two resource management strategies into the Imperial Region management objective Improve Flood Management and a combined RMS called Regional Flood Control.

During stakeholder assessment and interviews by the Imperial IRWMP facilitator (see Appendix Q) and subsequent evaluation of Disadvantaged Community (DAC) needs, Imperial Region stakeholders identified conveying stormwater off from developed areas, reducing localized flooding, and improving economic development potential within the urban areas as high priorities.

The Water Forum established Flood Protection and Stormwater Management as the IRWMP goal No. 4 out of five goals, and laid out the following objectives:

1. Assess regional flood control and local storm water management needs through a collaborative effort to develop policies and cost effective physical solutions.
    a. Address vector control and safety concerns related to overflow ponds.
    b. Encourage local agencies to maintain and enforce FEMA floodway and flood plain maps and regulations adopted by Imperial County in 1984 so Imperial Region communities are eligible for federal flood insurance.
2. Document and define technical and policy approaches for flood and storm water management that can be integrated with other water management actions to meet multiple objectives and provide multiple benefits.
3. Evaluate and define local and regional projects that prevent or minimize flooding and damage to public and private facilities and property.

The Projects Work Group discussed stormwater and flood control in its early meetings, and a Flood/ Stormwater Workshop was held in May 2011 to draft findings and recommendations. The draft findings and recommendations were introduced to the Water Forum in June 2011. Subsequently, local agency staff sought input from other groups, including the Imperial County Transportation Commission's City

[1] CWP Update 2009, Volume 2, Chapter 19 Urban Runoff Management, and Chapter 28 Improve Flood Management
<http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v2c19_urbrunoffmgmt_cwp2009.pdf>
<http://www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v2c28_floodriskmgmt_cwp2009.pdf>

Managers Committee and Technical Advisory Committee composed of local public works engineers. Flood control challenges and opportunities were also discussed at a local American Society of Civil Engineers meeting. The Water Forum adopted findings and recommendations at the March 2012 meeting, as follows.

9.1.1 Findings

- Stakeholder assessments and DAC needs analysis have documented localized stormwater and runoff concerns and an awareness of the need for regional solutions.
- Economic development of planned urban areas will be constrained without management structures, capital facilities, and funding mechanisms to provide regional and local drainage solutions and benefits.
- The Preliminary Drainage Master Plan prepared by IID (Black and Veatch, 1994) and other city and county master plans provide a basis for discussion of structural solutions and for development of priorities for regional drainage.
- IID, Imperial County and the Cities cannot solve flood and stormwater management problems independently. The lack of a regional organization with a stable funding mechanism and a clear mission is the largest constraint to solving stormwater and flood problems.
    - IID is not chartered as a flood control district. IID has drainage facilities that meet their intended purpose within the service area. If improved, these facilities could provide the underlying infrastructure for additional regional stormwater benefits and solutions to the developing areas.
    - As the Cities develop, they will potentially increase runoff and impair drain and river water quality. The Cities have the largest need for improved regional stormwater management and conveyance, but do not have authority to deal with regional drainage or manage areas outside of their jurisdiction.
    - The land use authorities have the ability to require improvements, condition new development and make improvements to develop stormwater facilities and mitigate increased runoff or water quality impairments.
    - Imperial County has the appropriate jurisdictional authority to lead formation of a regional flood control district, or to combine land use authorities of the County and the Cities to address both urban stormwater runoff and the larger regional flood control issues. IID, Imperial County, and the Cities all face financial limitations. Competing for funding within the Imperial Region and not combining resources or authorities to address the issues will limit the ability to successfully obtain grant funding and compete with other regions.
- CDWR funding is available through the Proposition 1E IRWM Stormwater Flood Management (SWFM) grant program; however, it requires 50 percent cost sharing by the local region, with local matching funds secured prior to contract award.

9.1.2 Recommendations

1. Use the Water Forum process to evaluate and set up a framework for a regional flood control district, including evaluating alternative institutional structures, management programs, and funding mechanisms for project solutions to stormwater management and flood control.
2. The Imperial IRWMP should include both program solutions and potential integrated stormwater/flood projects that would qualify for CDWR grant funds under Propositions 84 and 1E and serve to demonstrate regional stormwater planning ideas.
3. The Imperial IRWMP Projects Work Group should have sessions that focus on preferred projects for the region that collectively reduce flood damage, show multiple benefits and are competitive fir future SWFM grant solicitations. One or more of those projects could be singled out as a regional stormwater retention project or similar flood reduction project.
4. Identify a regional stormwater retention project to serve as a case study and demonstrate economic costs and benefits of regional facilities to serve developing areas.
    a. Fund the project through an MOU of multiple partners willing to provide the local match.
    b. Provide a basis for future planning efforts aimed at detailed study of populated areas in Imperial Region to identify specific drainage system improvements and provide a model of how the Cities, County, and IID can coordinate.
5. Initiate high-level policy discussion among select members of the County Board of Supervisors, IID Board of Directors and City Council representatives for creation of a Flood Control District or Joint Powers Authority for flood management. This will likely be needed to secure region-wide funding that would benefit more than a single local water supplier or local stormwater interest.
6. The IRWMP should lay out a program that can be phased in over time. In setting priorities, the Water Forum should consider the following:
    a. Possible loss of life or injury to people would take precedence over major property damage, and major property damage would take precedence over occasional flooding that could result in inconvenience and/or annoyance.
    b. More highly developed areas should be protected prior to less developed areas.
    c. Main drains that serve as collectors for tributary reaches should have priority over more localized reaches.
    d. Improvement of a downstream reach would have priority over an upstream reach.
    e. Thorough regulatory and legal reviews should be performed to determine what constraints and opportunities associated with the existing drainage system would impact the potential formation of a flood control district.
7. Develop a Hydrology Manual (or similar set of regional standards) that defines consistent methods for engineering evaluation of pre- and post-project stormwater runoff. This would support design of on-site and off-site retention facilities based on regional analysis of runoff

from drainage areas that contribute storm flow to the watershed areas drained by IID facilities and to the New River and Alamo River.

8. Develop a stable funding stream to: a) establish the program and needed policies, b) draft engineering plans and prepare engineering reports to seek voter approval for benefit assessment zones; c) implement programs approved by voters.
9. A regional funding program for multiple agencies will likely require significant public outreach, particularly if the regional agency would be securing local cost-sharing funds through a Proposition 218 assessment or similar means.

9.1.3 Imperial Region – Flood and Stormwater Management

U.S. Army Corps of Engineers (USACE, 1989) noted that two types of flooding occur in Imperial County:

- Major regional floods (as during a hurricane event), and
- Localized floods from runoff originating in developed (agricultural and urban) areas.

Major destructive flood flows generally result from runoff that originates outside of the Imperial Valley; i.e., from West Mesa or East Mesa that are conveyed by alluvial fan washes into the valley. No facilities exist to convey these flows through developed areas, so they impact developed areas before they reach points of disposal into the New and Alamo rivers or their tributaries, and ultimately the Salton Sea.

Runoff within the developed area of the Imperial Region constitutes the second type of flooding. This runoff arises from rain falling directly on these areas. Existing interior drainage facilities – irrigation drains in the agricultural areas, and storm drains in the communities – convey part of the interior runoff to IID drains and other the points of disposal cited above. IID has a limitation as to the amount of water that can be allowed to flow into a drain, so the Cities and other developers are required to have retention basins to hold the flow and limit its discharge rate into the drainage system.

9.1.3.1 Watershed and Drains

Regional flood control facilities are minimal. Structural flood protection measures in the Imperial Region include a system of dikes that provide flood protection from 100 to 500-year events for areas adjacent to the Salton Sea. Additionally, breakwaters have been sited at some locations near the shore of the Salton Sea to prevent damage from wave action. Natural channelization of washes along the western shore of the Salton Sea has allowed many of those channels to contain the 100-year flood within the channel banks.

IID's drainage system includes a network of over 1,450 miles of open and closed (pipeline) drains, 750 surface and subsurface drainage pumps, and thousands of miles of landowner-developed subsurface tile drains. IID's drains are designed to collect surface and subsurface discharge waters from the Region's agricultural operation and convey them to the Salton Sea, either directly, or through the New and Alamo rivers. Each quarter-section of land (160 acres) is permitted one 12-inch diameter tailwater outlet for

discharging surface runoff from irrigation. Consequently the system has little capacity to intercept and convey storm runoff from the surrounding desert, mountains, or municipal areas in the Imperial Region.

To the degree possible and based on design capacity, IID operates and maintains the drainage system to provide flood control benefits. The Cities, County, and private landowners rely on IID drains and expect to be able to discharge into the IID system. A clear delineation of roles and responsibilities between the agencies in the County has not been developed. IID is providing stormwater and flood control services that are not part of the design of the drainage system. IID rates and charges do not cover providing flood control, improving drains to provide flood or stormwater relief, nor to accommodate anticipated increased stormwater runoff from new urban development.

9.1.3.2 Management Plans and Policies

Imperial County developed the Imperial County Flood Management Plan (FMP) (Imperial County, 2007) to review flood history; identify the County's known flood problem areas; establish goals, objectives, policies, and implementation programs to reduce flooding and flood related hazards; and ensure that natural and beneficial functions of the floodplains are protected.

Imperial County continues to plan and implement solutions for flooding conditions. In an effort to reduce costs associated with flood hazard mitigation and flood insurance, the Imperial County FMP identifies flood hazards within Imperial County and proposes potential mitigation measures. The Imperial County FMP is a future-oriented approach to planning in flood risk areas. It is a pre-disaster planning approach that is required by the Federal Emergency Management Agency (FEMA) as a condition of the County's continued participation in the National Flood Insurance Program (NFIP). Imperial County and the cities of Brawley, Calexico, Calipatria, El Centro, Holtville, Imperial, and Westmorland all participate in the NFIP Program. The Imperial County General Plan Seismic and Public Safety Element (Imperial County, 2003) sets the overall flood control goals and objectives for the County. Imperial County and the Cities' land use plans and local ordinances require development to mitigate for stormwater impacts.[2] The County FMP summarizes the City policies.

IID Rules and Regulations (IID, 2007) do not require pre- and post- development runoff flows to be the same. The IID Developer Project Guide (IID, 2008) contains standard drawings for connecting to IID facilities and an explanation of the process by which these facilities are authorized (planning phase, design phase, construction phase, and close-out), but does not specify pre- or post-development runoff requirements.

County, Cities, and IID policies require on-site retention at the time of development, and the developer is responsible for mitigating stormwater impacts. The County has an ordinance requiring detention basins to empty a 100-year storm within 72 hours; however, the retention basins rarely drain in the allotted time due to factors that include tight soils with slow percolation, a high water table (just below the agricultural tile drain system), and restriction regarding the discharge into IID drains (one 12" pipe

[2] County of Imperial Title 9 Land Use Ordinance, Division 16, Flood Damage Prevention

for every 160 acres). The Cities have general plans, building codes, and drainage management requirements to retain stormwater consistent with the regional requirements of IID, Imperial County, and/or the state.

IID coordinated development of the Preliminary Drainage Master Plan, cited above, that investigated regional options for flood control and stormwater management. This document was a comprehensive study of drainage issues and possible solutions. Projects identified included development of procedures for analyzing and designing storm drainage systems, identification of capital improvements to mitigate flooding problems, development of water quality criteria for handling storm drainage, evaluation of steps required to finance the improvements, and the outline of an organizational structure to implement the plan. The study identified facilities and improvements (both regional and stormwater related) at a conceptual level. It was not detailed enough for final design, but focused on planning and engineering efforts that would need to be conducted before proceeding to construction. The IID board did not adopt the Preliminary Drainage Master Plan due to funding and jurisdictional considerations.

IID has a Drain Water Quality Improvement Plan (IID, 2005) which was approved by the Regional Water Quality Control Board, and a Vegetation Management Plan to minimize drain water quality degradation during system maintenance. Both have been implemented by IID.

A number of cities in the Imperial Region are working to develop master drainage plans, but such plans are reliant on improvement to regional flood conveyance. The County has developed master drainage plans for Heber (Nolte, 2006) and Niland (Nolte, 2007).

9.1.3.3 State Programs

9.1.3.3.1 Statewide Flood Management Plan

The Statewide Flood Management Planning (SFMP) program is led by CDWR through the FloodSAFE Initiative.[3, 4] The SFMP program is working on a draft report titled, "Flood Future: Recommendations for Managing California's Flood Risk" (Flood Future Report)[5] that will identify flood risks, challenges and opportunities along with recommendations for improving and financing integrated flood management. The state is exploring financial, institutional, legislative, and policy options to help improve local and regional flood management systems.

CDWR is collaborating with local, state, and federal agencies and tribes throughout California and has met with representatives in the Imperial Region. The SFMP will help guide the state's decisions, and inform federal decisions about policies and financial investments related to Integrated Flood Management (IFM) throughout California, including the Imperial Region. IFM is an approach to dealing with flood risk that recognizes the connection of flood management actions to water resources management, land use planning, environmental stewardship, and sustainability. IFM evaluates opportunities and potential impacts from a system perspective, and promotes coordinating across

[3] Statewide Flood Management Planning Program. <http://www.water.ca.gov/sfmp/update.cfm>
[4] FloodSAFE California. <www.water.ca.gov/floodsafe>
[5] SFMP Team Continues Moving Forward on Flood Future Report. <www.water.ca.gov/sfmp/update.cfm#team>

geographic and agency boundaries.

9.1.3.4 Stormwater Flood Management (SWFM) Grant Funding

The Proposition 1E grant program[6] is a source for financial support. Proposition 1E applicants must engage in the IRWM Planning process, and adhere to both CDWR IRWM Guidelines and to the Proposal Solicitation Package (PSP). Proposition 1E seeks to fund projects that show measurable reductions to local/regional flood risks and potential reductions in flood damage costs while yielding other multiple benefits such as groundwater recharge, water quality improvement, and/or ecosystem enhancement.

Proposition 1E is limited to $30 million per project. To participate, local resource agencies need to devise their local cost-share of at least 50 percent by Proposition 218 Assessments and/or by other funding mechanisms. The Proposition 1E solicitation is unclear whether concessions will be allowed for lowering the cost-sharing percentages below 50 percent for DACs. Similar to other Imperial IRWM funding programs, Proposition 1E funding requires monitoring, assessment, and performance measures. Only seismic related improvements will be funded in future grant solicitations.

9.1.4 Opportunities

- The Preliminary Drainage Master Plan provides a valuable analysis of structural and management opportunities to improve regional flood and localized stormwater management. City and County drainage master plans identify projects, funding requirements, and benefits. Numerous opportunities for more efficient flood management include the following:
- Identify local projects in City and County drainage master plans that are ready to proceed, have funding, and can be competitive for state and/or federal grant monies.
- Develop a regional hydrology manual to establish standards and guidelines for the Imperial Region.
- Adopt a regional drainage master plan, or at minimum, localized drainage master plans for specific areas slated for future development or experiencing stormwater runoff problems.
- Develop regional integrated stormwater management facilities that provide multiple benefits. Sample projects include:
    - A total storage approach to provide flood protection, as advocated in the Preliminary Drainage Master Plan. This would include on-site, in-city and off-site stormwater detention and retention ponds,[7] along with flood/stormwater improvements to IID drainage.

[6] IRWM Grant Program – Proposal Solicitation Package for Stormwater Flood Management Grants. <http://www.water.ca.gov/irwm/integregio_stormwaterflood.cfm>

[7] A retention pond is designed to hold a specific amount of water indefinitely. Usually the pond is designed to have drainage leading to another location when the water level gets above the pond capacity, but still maintains a certain capacity. A detention pond is a low lying area that is designed to temporarily hold a set amount of water while slowly draining to another location. 9 July 2012. <http://www.newton.dep.anl.gov/askasci/eng99/eng99219.htm>

  - Regional detention and retention ponds that have multiple beneficial uses, instead of development-specific detention ponds, which occupy acreage and reduce development potential.
  - Adapt IID drains to convey additional flow from increased urban runoff.

- Work with developers to identify specific areas where multiple benefits can be attained.
- Clarify regional roles and responsibilities, and consider formation of benefit assessment zones, special districts, or a joint powers authority to manage and fund implementation of flood master plans.

9.1.5 Constraints

A number of constraints affect the ability to implement effective flood risk and urban runoff management strategies in the Imperial Region. Technical constraints and flood problems are documented in the Preliminary Drainage Master Plan, County FMP, and the City drainage plans, including areas subject to frequent flooding and where structural improvements are needed. However, the lack of defined regional flood management roles and responsibilities, combined with local economic and fiscal constraints have prevented improvements in flood and stormwater management.

The Imperial Region has no countywide or regional flood control districts, nor any benefit assessment zones. No regional master plans for drainage have been adopted to coordinate the activities of the County, IID, and the Cities. Jurisdictional roles and responsibilities are not clearly delineated, and zones of benefit and revenues are not defined. This constrains regional solutions and an integrated approach.

The cost of structural solutions can be substantial and competition for local resources and legal requirements for approval of new funding may impede implementation of structural flood improvements. Additionally, maintenance of flood facilities has the potential to impact sensitive environmental resources, such as riparian habitat and special-status species.

The lack of management structure and limited funding capacity on the part of Regional agencies make it challenging, if not impossible, for Imperial IRWMP projects to be competitive for state or federal grant funds when they become available.

9.1.6 Relation to Other Strategies

Other RMS's related to Regional Flood Control include:

- **Land Use Planning and Management**—agency decisions influence potential risk to lives and property on floodplains and alluvial fans from flooding, and may affect the intensity and duration of some flood events. Application of appropriate standards at the time of project development can mitigate both on-site and off-site flood, stormwater and water quality impacts.

- **Water Quality Protection**—must be factored into development of a regional program, with specific facility designs to reduce loading from agricultural and urban nonpoint sources of pollution during flood events in accordance with the Water Quality Control Plan, Colorado River Basin – Region 7 (Basin Plan).[8]
- **Ecosystem Restoration**—can be integrated into regional flood retention facilities to provide multiple benefits.
- **Recharge Area Protection**—can be achieved by preserving the 100-year flood plain.
- **Conveyance**—strategies could include improving the IID agricultural drainage system to meet regional stormwater management objectives using the concepts identified in the Preliminary Master Plan of Drainage.

9.1.7 Support for Mitigating or Adapting to Climate Change

The Imperial Region may be vulnerable to climate change which may increase the frequency and severity of flood events due to changes in precipitation and runoff patterns. As stream flows and velocities change, erosion patterns will also change, altering channel slopes and depths. A regional approach to flood control and stormwater management will help the Imperial Region plan for and adapt to climate change.

[8] Colorado River Basin – Basin Planning. <http://www.waterboards.ca.gov/coloradoriver/water_issues/programs/basin_planning/>

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 10

Improve Water Quality

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Chapter 10. Improve Water Quality

California Water Plan Update 2009 Improve Water Quality Management Objective includes six resource management strategies, as follows:

- Drinking Water Treatment and Distribution
- Groundwater and Aquifer Remediation
- Matching Water Quality to Use
- Pollution Pretention
- Salt and Salinity Management
- Urban Runoff Management

The Imperial IRWMP is required to be consistent with the State's Water Quality Control Plan (RWQCB, 2006) for the Colorado River Basin Region.[1] The Water Quality Control Plan (Basin Plan) defines the beneficial uses for the water bodies in the Imperial Region, establishes water quality standards and objectives to protect the designated beneficial uses, and includes implementation plans to improve water quality where it is impaired.[2]

As described in Chapter 6, some CWP Update 2009 strategies for the Improve Water Quality management objective were moved to reflect the Imperial Region conditions and objectives. The Matching Quality to Use strategy was moved to Increase Water Supply Management (Chapter 7), and Urban Runoff Management is included in Improve Flood Management (Chapter 9).

10.1 Drinking Water Treatment and Distribution

The Water Forum has prioritized Drinking Water Treatment and Distribution strategies because of the critical water quality needs of DACs in the Region. This strategy includes planning and development of facilities to provide a safe, high-quality drinking water supply in compliance with state and federal requirements to protect public health and safety.[3] Opportunities and constraints were discussed at a Water Forum-sponsored Improving Water Quality Workshop on May 17, 2011. The Water Forum adopted the following findings at their March 2012 meeting.

10.1.1 Findings

- When applying for IRWMP grant monies, to the extent possible, identify common needs when developing regional priorities.

[1] Proposition 84 & Proposition 1E Integrated Regional Water Management Guidelines, Pgs 41-42.
[2] RWQCB, 2006, Basin Plan Table 2-2: Beneficial Uses of Surface Waters in the East Colorado River Basin.
[3] Chapter 17 Title 22 of California Code or Regulations, California Department of Public Health requirements, Environmental Protection Agency Clean Water Act and/or in accordance with Public Utilities Commission General Order 103.

  - Define opportunities to interconnect the drinking water treatment systems to reduce the risks of catastrophic supply interruption.
  - Address raw and treated water storage needs and opportunities.
  - Encourage and support multiple connections to potable and new water delivery and storage facilities from IID and/or other sources for municipal water purveyors.

- *Consider opportunities* to consolidate drinking water treatment facilities.
- Imperial Region disadvantaged communities (DACs) need technical, management and financial support to design projects, so they are ready to proceed to compete for state and/or federal funds.
- The Imperial IRWMP should be used to inventory project-level investments to:
  - Address public health or environmental emergencies.
  - Repair, rehabilitate, or replace treatment, collection, and/or distribution systems.
  - Attain compliance with applicable state and/or federal regulatory requirements.
  - Meet applicable local service levels and future requirements consistent with the respective agencies' General Plans.
- Use the Imperial IRWMP to match projects to available funds.
- Establish how local rates and assessments should be used to meet local matching fund requirements for state and/or federal grants.
- Develop the region's political capital to minimize local competition, establish regional priorities, and define integration opportunities and approaches for generating local funds to leverage state and federal monies and invest in needed infrastructure.

10.1.2 Planning Principles

Utilities must be well managed locally to ensure long-term sustainability of collection, treatment, and distribution systems. The local water and wastewater utilities must be well maintained and operated with sufficient local funding. The Water Forum expressed support for the following water quality planning principles:

- Strong professional staff that are viewed as advocates for clean and safe water in the community and on the state and federal levels. In addition, utilities must have employee development and training programs that ensure that utility staff has the skills needed to manage, operate and maintain the utility using best management practices.
- Full cost-of-service pricing systems that encourage local communities to establish rates that reflect, to the maximum extent practicable, the system's true life-cycle costs, including debt service, and that can support long-term management needs.
- Sustainable management approaches, including asset management and environmental management systems that proactively ensure long-term viability of each component of the system while simultaneously ensuring compliance with local, state, and federal environmental regulations.

- A culture of constant innovation and research into new technologies and management approaches that support best management practices – including conservation, efficiency, and reuse – and a system to ensure transparency and public participation so the utility remains accountable to ratepayers and the general public.

The Water Forum recognizes that even if local utilities do all of the above and are managing their systems using best management practices, federal and state assistance to financing infrastructure will continue to be essential for many Imperial Region communities. In addition, significant and continuing state and federal investment is needed to help Imperial Region agencies meet their obligations under the Clean Water Act and the Safe Drinking Water Act. Specifically, the Water Forum supports the following:

- Reauthorize and fund Clean Water and Safe Drinking Water State Revolving Fund Programs with appropriations that reflect financing needed to meet requirements.
- Improve administration of State Revolving Loan Fund to (1) streamline the application process, (2) provide increased flexibility for the State to determine project eligibility and environmental compliance standards with public input, (3) encourage innovative partnerships that bring diverse stakeholders together for more effective broad-based solutions, and (4) reduce paperwork burdens on communities.
- Flexible forms of need-based financing to assist communities that do not have the rate base to support conventional or State Revolving Fund (SRF) loan financing costs, including extended loan terms, loan forgiveness programs and grants. DACs in the Imperial Region face costly environmental challenges and expenses to correct problems and/or meet regulatory and security requirements.
- Affordability criteria that are more comprehensive should be developed by the State to use in allocating SRF financing.
- Increase federal support for California to administer clean water programs, including:
    - Support for technical assistance to small communities.
    - Federal investment for research and development of treatment and infrastructure technologies and asset management strategies that improve the life-cycle of drinking water treatment systems.
    - Support development of a program to educate the public about the benefits and economic importance of water and wastewater infrastructure.

The Water Forum supports strategies that encourage participation by the general public and the business community to ensure clean and safe water for the Imperial Region, including:

- Water suppliers entering partnerships and cooperative relationships with the business community to develop innovative, cost-effective solutions to infrastructure sustainability.
- Public-private partnership decisions that are made locally based on what local officials determine is most appropriate for preserving and enhancing water supply systems.

- Elected officials and non-governmental organizations, including public health organizations, advocacy groups, business associations and other civic organizations, playing a leadership role in highlighting the importance of water infrastructure and continued investment in it.
- A continued commitment to public outreach to increase the public's support for investment in infrastructure for a clean, safe water supply.

10.1.3 Imperial Region Conditions – Improve Water Quality

Surface water imported from the Colorado River provides the vast majority of water in the region. IID supplies wholesale water to all Imperial Region cities and developed communities except Ocotillo though an open channel, gravity system that transports untreated Colorado River water to delivery gates (turnouts) for each water supplier for treatment. Water treatment and distribution facilities vary from city to city but the basic process is similar throughout the IID service area. Wholesale raw water is received from IID canals is stored prior to treatment and distribution. A treatment facility typically includes a screening and filtration system. After screening, the water goes through clarifiers and additional filtration to remove smaller particles. After being filtered and clarified, the water undergoes disinfection to remove viruses and bacteria, and can be pumped directly into the distribution system or stored in treated water reservoirs.

In remote areas, some residents have untreated canal water plumbed into their homes for nonpotable uses and are required to have a drinking water contract with a water company. To comply with US Environmental Protection Agency (USEPA) requirements and avoid termination of canal water service, residents in the IID service area who do not receive treated water service must obtain alternative water service for drinking and cooking from a state-approved provider. To avoid penalties that could exceed $25,000 a day, IID strictly enforces this rule. The section tracks nearly 4,000 raw water service accounts required by the California Department of Public Health (CDPH) to have alternate drinking water service. IID maintains a small-acreage pipe and drinking water database, and provides an annual compliance update to CDPH (IID, 2007),

Table 10-1 lists laterals and canals that provide water to Imperial Region water treatment plants. Of the communities listed in Table 10-1, only Brawley, Calexico, El Centro, and Imperial have redundant connections to multiple canals. Heber is upgrading its water treatment plant and a redundant pipeline connection will be constructed to provide water from the Central Main Canal. This project will begin construction once funding is secured.

Table 10-2 lists the annual average daily demand flow through water treatment facilities in the region. The table also includes design capacity, planned future capacity, and type of storage available in each community.

Table 10-1. Canals that Deliver Water to Water Treatment Plants

Imperial Region City	Canals that Supply the Water Treatment Plants
Brawley	Mansfield Canal and Central Main Canal
Calexico	Date Canal and Dahlia Lateral1
*Calipatria**	C West Lateral Gate 38
El Centro	Date Canal anal and Dahlia Lateral 1
*Heber**	Dogwood Canal Gate 37
*Holtville**	Pear Lateral
Imperial	Newside Canal and Dahlia Canal
*Niland**	C West Lateral Gate 38
*Seeley**	Elder Canal
*Westmorland**	Westmorland Canal

*Communities in italics do not have recommended redundancy.
Source: Service area plans for Holtville (Oct 2006), Brawley (Feb 2007), Calipatria (Nov 2004), Westmorland (Mar 2005); URWMP for Calexico (Mar 2007), El Centro (Mar 2006), Imperial (Dec 2005).

Table 10-2. Imperial Region Water Treatment Plants

Imperial Region City/Community	Average Daily Demand (MGD)	Capacity (MGD)	Future Capacity (MGD)	Raw Water Storage (MG)	Treated Water Storage (MG)
El Centro	7.8	21	63	40	10
Calexico	6.7	16	16	25	8
Brawley	8.4	15	30	35	9
Imperial	1.8	7	7	10	6
Calipatria*	2.5	6	8	9	9
Holtville	3	3.15	6	9	3.9
Westmorland	0.7	2	4	2	1.05
Heber	1.1	2	16	5.8	5.5
Seeley	0.29	0.75	---	2	1.3
Niland*	---	---	---	---	---

* Southern California Water Company services both Calipatria and Niland
+ From Service Area Plans, 2004-2007

Stakeholders were identified early in the process through interviews conducted by the IRWMP Facilitator, Dale Schafer, and during the disadvantaged communities (DAC) outreach (GEI, 2011). Water treatment plant and water distribution network concerns faced by almost all of the communities include:

- Inadequate treated water storage
- Inadequate fire flows
- Aging and inadequate water distribution networks
- Limited financial capacity to plan and fund improvements

IID recommends that each city have enough storage capacity to meet seven to 10 days of peak month demand in case of canal shutdowns for required maintenance or catastrophic supply interruption. Many cities and smaller communities do not have the minimum required storage capacity and it is recommended that this capacity be expanded improve water supply reliability.

Many of the water distribution systems were installed in the 1960s and have been slowly upgraded. Older pipe segments consist of cast iron pipe or asbestos lined cement pipe. Older cast iron pipe is heavily corroded from alkaline soils and water in the region. Also, solids in water tend to accumulate in cast iron pipe over time, causing a decrease in effective pipe diameter which, in one case, has reduced the capacity by half (City of Holtville, 2006). Since the 1980s, polyvinyl chloride (PVC) pipe has been used due to its relatively low cost and long life expectancy.

Many of the cities and some communities have developed flow models to identify which pipe segments are undersized and require replacement. Replacement provides for future growth and helps provide recommended fire flows. Developers are required by local communities to install 8-inch pipe segments in new development to keep future replacement pipe to a minimum.

Water rates in most Imperial Region water systems are not adequate to address new regulatory requirements, maintain the facilities, or generate adequate reserves for replacements. Financing major improvements to the water distribution network is a hurdle these communities have to face.

10.1.4 Opportunities

This section discusses opportunities and potential alternatives to address identified water quality challenges and needs.

10.1.4.1 Develop Disadvantaged Communities (DAC) Projects

All of the Cities except the City of Imperial are disadvantaged communities (DACs) that can access State grants and low interests loans. Some funding is specifically set aside for disadvantaged communities, but is contingent on project's inclusion in the Region's IRWMP. Two major funding programs for California public water systems include the Drinking Water State Revolving Fund (DWSRF) and Proposition 84, which could help improve water distribution networks.

The Imperial IRWMP can be used to define, quantify and integrate drinking water supply system infrastructure and financing needs so that regional funding priorities can be established.

At the May 2011 Improving Water Quality Workshop, drinking water treatment and distribution project concepts and integration themes were discussed. The objective was to identify where the Cities had a need in common and where a regional program could be developed, and demonstrate success for the IRWMP process. Regional themes identified included:

- System interconnection
- Raw and treated water storage
- Water distribution system improvements
- Multiple connections to IID canals
- Integrating projects under themes of Increased Reliability and Catastrophic Supply Interruption

The workshop participants also identified specific projects including:

- Connecting Imperial Valley College to the City of Imperial
- Connecting Niland to Calipatria for wastewater treatment
- Connecting Westmorland to Brawley
- Creating an intertie between the El Centro and Imperial drinking water systems
- Upgrading school district wastewater treatment facilities

10.1.4.2 Investigate Consolidation of Drinking Water Treatment Systems into Regional Facilities

Consolidation of drinking water treatment systems and developing long term plans for cost-effective consolidation or regionalization of facilities should be considered. Prior studies evaluated consolidation of drinking water treatment facilities (Black and Veatch, 1992), which reviewed both regional drinking water and wastewater treatment facilities. This report found that:

> *Regional facilities are in the best interest of the Imperial Valley because they would provide services where they are needed on an area-wide basis. The Regional approach is also desirable because it provides economy of scale and eliminates duplication of effort*.

The Black and Veatch report also stated that all contacted city representatives agreed that regional plants would benefit the region because rates would be stabilized and future regulations would be met by a central administrative entity.

A separate report, prepared for the Imperial Valley Treated Water Task Force (Black and Veatch, 1994), presented results of a feasibility study of four proposed alternative methods to provide high quality, affordable treated drinking water to Imperial Valley residents. The four alternatives were developed by the Imperial Valley Treated Water Task Force, which also reviewed financial and institutional aspects of the alternatives. The Imperial Region has continued to maintain independent systems and has not further sought to create regional facilities.

10.1.4.3 Extending Drinking Water Distribution Systems to Rural Areas

Extending drinking water distribution systems to adjacent developed rural areas has been studied (CDM, 2006) (CDM, 2007). The CDM 2007 report demonstrated benefits of providing a safe and reliable water source to unserved households in unincorporated areas of the Region. However, the cost-effectiveness, defined as number of households that could be connected per dollar spent, of alternatives varied greatly. Given the probability that sufficient funding would not be available to implement all of the alternatives, a phased implementation approach was recommended.

A number of projects have been funded by Safe Drinking Water State Revolving Funds (DWSRF). However, limited funding has been received from the DWSRF for annexation projects. The City of Holtville is the only entity in the Imperial Region to use funding from the DWSRF to annex previously un-serviced or underserviced residences into their service area.

10.1.4.4 Expand Training and Professional Development Programs

At the Projects Work Group Meeting on November 16, 2011, participants raised discussed the need for trained, educated, and certificated staff to run drinking water and wastewater treatment plants. It was noted that experienced persons are retiring and it is hard to recruit, train and retain qualified staff. Imperial Valley Community College has Workforce Development Training Programs and water treatment courses students can take to meet the American Water Works Association training requirements and obtain certification. Additional course work, or certification for business and management, was identified as a potential opportunity to improve financial, technical, and management capacity of DAC public works staff. Opportunities to fund scholarships through economic development or other grants and to further design education and training programs were supported and it was recommended that a team be formed to identify specific educational and training programs and funding.

10.1.5 Constraints

Primary constraints associated with water quality challenges and needs are related to:

- Most cities and smaller utility districts lack the technical, managerial, and financial capacity to prepare engineering plans and implement projects.
- Increased costs to maintain, operate, and repair existing treatment plants and distribution facilities.
- The cost to maintain and replace aging and failing water and wastewater pipes are not known by the public, impacting willingness to pay and funding for system maintenance.
- Increased state and federal regulatory compliance requirements and costs.
- Resources to plan, engineer, and obtain environmental compliance for projects to meet future needs, or to seek and obtain grants are lacking.
- Ability and willingness to pay higher rates is limited.

Many projects are single-purpose and are intended to serve an individual community, and though they provide water quality and supply benefits within the region, many do not provide multiple benefits, partners, or water management strategies. The Cities are operating independently and there may not be the political will to evaluate regional facilities or consolidations. Increased regulatory requirements and increasing costs to capitalize, operate, administer, and maintain facilities may move independent operators to review economies of scale.

Because all Cities in the Imperial Region except the City of Imperial are economically disadvantaged, drinking water treatment and distribution projects are eligible for regional funding under Proposition 84. However, the needs are far greater than available Proposition 84 funds, placing these communities in competition with each other for the available funding.

10.1.6 Relation to Other Strategies

- **Local Land Use Planning and Management –** The general plans and capital facilities plans must be consistent with existing or planned treatment plant capacity so new development can be provided drinking water and wastewater services.
- **Urban Water Use Efficiency –** A water conservation program could also alleviate or delay some of the costs to upgrade distribution systems or treatment plants. This would also help to keep water rates low and the level of service high.

10.2 SALT AND SALINITY MANAGEMENT

The CDWR Salt and Salinity Management Strategy is described in the CWP as a way to manage total dissolved solids (TDS) in a water supply so that the ability to put water to beneficial uses is not adversely impacted (CDWR, 2009a). The salt level can limit the use of available supply if the water is degraded beyond its ability to be put to use, or it may increase the treatment costs necessary to allow the water to be used.

10.2.1 Findings

- Salt and salinity management are essential in the Imperial Region due to the salt content in the Colorado River water (1 ton of salt per acre-foot of imported water).
- Salt and salinity management are integrated with the other management strategies or as part of existing practices and programs, and no new activities or actions have been identified.
    - In the IID service area, growers incorporate leaching, subsurface tile drainage, soil amendments and other salinity management practices as a part of their regular farming activity.
    - Programs, both private and public, support growers in managing the salt that comes in with Colorado River water supplies. The QSA/Transfer Agreements include mitigation flow to the Salton Sea (2003-2017).[4]
    - Desalination RMS (Chapter 7) includes a clause addressing removal of salts from drain water, brackish groundwater, and/or other water sources and anticipates requirements for brine disposal.
    - Stakeholders have proposed desalinization projects as part of IRWMP implementation.

[4] In 2001, an Amended Joint Petition of the IID and the SDCWA was filed with the State Water Resources Control Board for approval of a long-term transfer of conserved water pursuant to an agreement between IID and SDCWA, as well as a petition by IID to change the purpose and place of use and the point of diversion under Permit No. 7643 (Application 7482). Additional details can be accessed from the SWRCB project archives website. In October 2011, IID and the San Diego County Water Authority filed a joint petition requesting changes to the State Water Resources Control Board's Revised Order WRO 2002-0013. These changes would allow for an early-start approach to ecosystem enhancement and preservation while assisting in the ongoing efforts to mitigate impacts on the Salton Sea from the 2003 Quantification Settlement Agreement.
Source: IID website: State Water Resources Control Board. 7 Jul 2012.<http://www.iid.com/index.aspx?page=212>

  - Recycled Municipal Water RMS (Chapter 7) includes projects and programs that could change drain flows and potentially affect salinity. Decreased drain flow or increased salinity may require mitigation for identified impacts.

- Regional stakeholders should actively engage in efforts to address the Salton Sea to realize benefits and avoid impacts to the region.
- Imperial Region is not recommending additional new programs or projects related to salt and salinity management as part of the IRWMP.

10.2.2 Imperial Region – Salt and Salinity Management

10.2.2.1 Policy Environment

The Basin Plan of the Colorado River Basin Regional Water Quality Control Board (Region 7) defines RWQCB activities to protect water quality consistent with the established beneficial uses of the waters within the Imperial Region. The Basin Plan designates the beneficial uses of water (e.g., agriculture, municipal, industrial) and establishes standards and objectives to protect water quality. Salinity is a constituent that can limit designated beneficial uses, and the Basin Plan has goals and objectives based on total dissolved solids (TDS) concentrations for water bodies based on the designated beneficial use. The general objective for TDS, found in Chapter 3 – Section H of the Basin Plan, states the following:

> *Discharges of wastes or wastewater shall not increase the total dissolved solids content of receiving waters, unless it can be demonstrated to the satisfaction of the Regional Board that such an increase in total dissolved solids does not adversely affect beneficial use of receiving waters.*

Additionally, discharges from agricultural sources shall not cause concentration of TDS in surface waters to exceed the limits in Table 10-3.

Table 10-3. Surface Water Quality Salinity Limits

Receiving Waters	TDS (mg/L)	
	Annual Average	Maximum
New River	4,000	4,500
Alamo River	4,000	4,500[5]

The general and measurable objective for the Salton Sea is *to reduce the present level of salinity (44,000 mg/L), and stabilize it at 35,000 mg/L unless it can be demonstrated that a different level of salinity is optimal for the sustenance of the Sea's wild and aquatic life*.[6]

Given the extreme desert climate, irrigated agriculture in the Salton Sea watershed requires drainage to remove irrigation water applied to leach salts from the root zone of the irrigated lands and away from

[5] Water Quality Control Plan, Colorado River Basin-Region 7, CH 3, Section II-H, Pgs. 3-2 and 3-3. 17 Nov 1993. <http://www.waterboards.ca.gov/coloradoriver/publications_forms/publications/docs/basinplan_2006.pdf>.
[6] Water Quality Control Plan, Colorado River Basin-Region 7, Chapter 3, Section III-C, Pg. 3-7.

the irrigated area. To protect the agricultural industry in the Salton Sea watershed, President Coolidge declared specific sections of land under the Salton Sea to be withdrawn from settlement, location, sale, or entry, and reserved for the purposes of creating a drainage reservoir. These declarations were provided in Public Water Reserve No. 90-1 signed in March 1924 and Public Water Reserve No. 114 signed in February 1928. These orders designated the lands below -220 feet mean sea level (msl) at the Salton Sea to be used as a repository to receive and store agricultural, surface, and subsurface drainage waters from Imperial and Coachella valleys.

In 1968, the California legislature adopted a statute declaring the primary use of the Salton Sea to be for the collection of agricultural drainage water, seepage, and other flows (Assembly Bill 461, 1968; Statutes 1968, Chapter 392). The Basin Plan reflects this designation (RWQCB, 2006) stating:

> *The primary purpose of the Salton Sea and the agricultural drains in the Imperial, Palo Verde, Coachella, and Bard Valleys (sic) is for collection, transport, and/or storage of drainage (including subsurface) waters from irrigated cropland in order to maintain adequate soil salinity balance for agriculture in the Region. Although this is clearly the primary purpose of these waters, this cannot be recognized as a beneficial use since federal regulations specify that waste transport or assimilation cannot be designated as a beneficial use for any waters of the United States (as per Clean Water Act, 40 CFR Section 131.10 (a)).*

The SWRCB has an Antidegradation Policy (SWRCB, 1968) that applies only to high quality waters and requires that existing high quality be maintained to the maximum extent possible. The policy allows lowering the quality if the change is consistent with maximum benefit to people of the state, will not unreasonably affect present and potential beneficial uses, and will not result in water quality lower than applicable standards.

10.2.2.2 Salt and Salinity Sources and Sinks in the Region

As described in Chapter 5, salinity in Colorado River water delivered by IID has averaged 744 mg/L over the 21 years from 1989 to 2009. This means that slightly over one ton of salt is imported with every acre-foot of delivered water. If not managed, the salts would accumulate in the agricultural soils in the Imperial Region, impacting irrigation uses, soil productivity, and crop production. Irrigation practices, on-farm drains, and IID's regional drainage system are designed to manage salt. The drainage network consisting of over 1,400 miles of drainage ditches used to collect surface runoff and subsurface drainage from 32,227 miles of tile drains underlying 462,202 acres of farmland conveys drainage water to the New River, Alamo River, which flow to the Salton Sea, while some discharge directly to the Salton Sea. IID drain water over the period 2003-2009 ranged from a low of 1,300 mg/L to a high of over 4,000 mg/L, with an average of 2,245 mg/L. The salinity of the New River, Alamo River, and groundwater was described in Chapter 7.

The Salton Sea, like all closed-basin lakes, is saline due to the accumulation of salts through evaporation, which averages eight feet (84 inches) per year in the Imperial Region. Prior to the 1905 inflow of the entire discharge of the Colorado River to the Salton Sea, large amounts of salts had accumulated on the

ancestral sea bed which lies below sea level with no external drainage. The Salton Sea was a dry lake bed where local runoff would collect, the water would evaporate and the dissolved solids would be left. There is evidence that the basin has been occupied periodically by multiple lakes. Once inundated by the current sea, these salts rapidly dissolved. This re-dissolution of salts, combined with high evaporation rates and minimal inflows, caused the salinity to quickly rise to above 40,000 mg/L by 1925. The salinity decreased in the late 1920s, as irrigated agriculture drainage flows entered the Salton Sea. During the 1930s, agricultural activity declined, and the salinity increased to more than 43,000 mg/L. As agricultural activities increased in the 1940s and 1950s, the salinity decreased to near marine, or ocean, salinity (35,000 mg/L with a range from 30,000 to 40,000 mg/L). In the 50 years through 2006, the average Salton Sea salinity has slowly risen to over 48,000 mg/L (CDWR, 2006). Average salinity in the Sea in 2010 was 51,829 mg/L (CRA, USACE, 2011).

10.2.2.3 Salinity Management

Salinity management is often a matter of source control to reduce the loading of salt into an area. Options for source control are limited since the salts originate in the upper reaches of the Colorado River or are already present in the Imperial Region due to the nature of the Salton Sea and ancestral playa where water flowed, then evaporated, leaving large amounts of salt. The IID Definite Plan and System Conservation Program (Chapter 8) define how the Region will reduce water imports through efficiency conservation, continue high levels of agricultural productivity, manage incoming Colorado River salt loads, and demonstrate reasonable beneficial uses of IID's water supply. Reducing diversion and importation of Colorado River water reduces the salt load coming into the Imperial Region. At the same time, implementation of efficient agricultural water management practices will increase salinity in IID drains by an average of approximately 500 mg/L as the volume of tailwater is reduced.

10.2.2.4 Inter-Regional Salinity Management Efforts

Salinity control on the Colorado River could affect the quality of the Colorado River water received by the Imperial Region. There are number of federal efforts[7] to control Colorado River salinity sources or to reduce salinity to meet flow and quality obligations to Mexico. Any programs seeking to reduce salt in the upper watershed that reduced the salinity of water diverted into the All-American Canal would be beneficial to the Imperial Region by reducing the salt loads in the imported Colorado River supply.

10.2.3 Salinity and the Salton Sea Ecosystem

Chapter 11 describes efforts to manage the Salton Sea and respond to the increasing salinity.

[7] <http://www.usbr.gov/uc/progact/salinity> for USBR Colorado River Salinity Control Program
<http://www.ussl.ars.usda.gov/lcrsan/index.htm> for USBR Lower Colorado Region Salinity Assessment Network
<http://www.nrcs.usda.gov/programs/salinity/>for NRCS Colorado River Basin Salinity Control Program

10.2.4 Opportunities

Management of salt imported in Colorado River water has been factored into the water management regime in the Imperial Region since farming began in the early 1900s. Salt and salinity management is integrated with existing programs and no other standalone salt strategies have been identified for inclusion in the IRWMP (e.g., Agricultural Water Use Efficiency, Matching Quality to Use, etc.). No additional local or regional salt or salinity management actions are envisioned for the Imperial IRWMP

10.2.5 Constraints

While the inflows to the Salton Sea contain elevated concentrations of salt over Colorado River irrigation water, the main cause of salinity in the lake is concentrations of salts through evaporation. Efforts to manage the salinity concentrations in the inflow waters could reduce the amount of salt entering the system, but the salinity in the closed basin lake will continue to increase as salt levels accumulate as a result of evaporation. The Salton Sea Ecosystem Restoration Plan (California Natural Resource Agency, 2007) includes a number of alternatives that address the issue of increasing salt concentrations in the lake with various techniques, including blending of inflow and lake water and with differing configurations and sizes of habitat and open water areas. The plan also recognizes that the Salton Sea will be managed primarily as a saline water body and many of the alternatives include some variant of a saline brine sink as part of the design. All of the current alternatives to manage Salton Sea salinity are expensive; require an inter-regional solution, and local, state, and federal cooperation. While the State of California has legislatively assume responsibility for Salton Sea restoration; funding, specific roles and responsibilities, and a cost effective preferred alternative have not been identified.

Salt management on the Colorado River is an interstate and international issue. Constraints related to disposal of a residual brine stream from potential desalination are addressed in relation to specific projects in Chapter 7. Export of salts by constructing large conveyance facilities to bring in seawater and export highly saline Salton Sea water has not proven cost effective or feasible. The extent and magnitude of the salt problems are beyond the scope of work for the Imperial Region.

10.2.6 Relation to Other Strategies

- **Desalination and Groundwater Development -** Desalting brackish groundwater or drain water, and brine disposal are discussed in Chapter 7.
- **Agricultural Water Use Efficiency –** Salt and salinity management is integrated into the IID QSA/Transfer Agreement efficiency conservation programs.
- **Recycled Municipal Water -** Recycling municipal wastewater could reduce drain flows, increasing salinity and requiring mitigation.
- **Ecosystem Enhancement –** There is potential for regional mitigation banking to address impacts of recycling and desalination.

10.2.7 Support for Mitigating or Adapting to Climate Change

Additional salt and salinity management actions would not reduce or increase greenhouse gas emissions nor would they provide mitigation for climate change. Increased salt in Colorado River water could result in less agricultural yield and reduction in GHG emissions from farming operations and related businesses in the Region; however, the response might be increased leaching, which would result in no impact on GHG emissions.

The Imperial Region is vulnerable to any effects of climate change that would increase the salt load and salinity of Colorado River water. Vulnerabilities are related primarily to increased temperature, reduced precipitation, and changes to snowmelt and runoff rates in the watersheds, tributaries, and main stem of the Colorado River, and to whether the changes would affect salt and salinity levels in imported Colorado River supply. Increased salinity would negatively impact the quality of the supply, and decreases would improve the quality. For example, if irrigated areas upstream of the Imperial Dam lose supplies as a result of climate change and are no longer productive, then the salt loads could be reduced. Increased salinity would increase leaching requirements, agricultural water demand, and drain water salinity. Increased temperature and evaporation would also increase the evaporation from the Salton Sea, resulting in further increases to its salinity and shoreline recession.

10.3 POLLUTION PREVENTION

For the vast majority of contaminants, it is generally accepted that a pollution prevention approach to water quality often is more cost-effective than end-of-the-pipe treatment of wastes or advanced domestic water treatment for drinking water. Pollution prevention measures usually are more cost-effective because they have lower initial capital costs and less ongoing operation and maintenance costs than traditionally engineered treatment systems. Pollution can originate from point or non-point sources. Point sources are well controlled. Water quality impairment in the Imperial Region comes primarily from non-point sources such as urban or agricultural runoff, or from sources originating across the Mexican border. This section describes programs with primary purposes to remediate water quality of existing impaired waters in the Imperial Region.

10.3.1 Findings

- Existing local, state, and federal laws, ordinances, regulations, and statutes are sufficient to control the sources of regulated contaminants within the Imperial Region.
- No additional pollution prevention actions were identified during initial Imperial IRWMP scoping or project definition and no further measures are anticipated for inclusion as part of the plan.
- The Water Forum and ongoing planning efforts should be used to identify, integrate, and coordinate existing non-regulatory programs where feasible.
- The Imperial County Farm Bureau Total Maximum Daily Load Program to meet silt discharge and other requirements consistent with the RWQCB's Colorado River Basin Plan is being voluntarily

and successfully carried out by Imperial Region growers, and no program expansion or changes are anticipated as part of the Imperial IRWMP.

- IID's Drain Water Quality Improvement Program (DWQIP) provides for periodic monitoring of water quality for several constituents of concern in major IID drains, both within and outside of IID's service area. Resulting data are reported to the RWQCB.
- IID's Vegetation Management Plan supports the enhancement of water quality within the IID drainshed by reducing sediment loads in the drainage conveyance channels.
- There should be coordination with the New River Improvement Project efforts to remediate contaminated water and improve water quality flowing across the Mexican border into the United States via the New River (see Ecosystem Enhancement Restoration RMS).
- There should be coordination with the Citizen's Congressional Task force on the New River to continue to build and maintain wetlands and other nutrient remediation technologies such as algae production systems as funds allow.

10.3.2 Imperial Region – Pollution Prevention

In 2002, the Colorado River Basin RWQCB adopted an updated Clean Water Act 303(d) list of water bodies where beneficial uses are impaired by a contaminant. Water quality standards set for the designated beneficial uses are exceeded due to elevated levels of one or more constituents in the following Imperial Region water bodies:

- The Alamo River, which includes suspended silt, pesticides, and selenium.
- The New River, which includes suspended silt, pesticides, nutrients, and several other contaminants that are discharged from a combination of industrial point sources, wastewater, and out-of-country sources [Mexico].
- The Imperial Region agricultural drains, which include suspended silt, pesticides, and selenium.
- The Salton Sea, which includes nutrients, selenium, and salinity. Non-point source pollution in this region also originates from sources other than agriculture including but not limited to abandoned mines, stormwater runoff, boating activities, alterations to land (e.g., urban development), and animal production activities.

In order to improve the water quality of impaired surface waters, the RWQCB developed Total Maximum Daily Load (TMDL) standards. A TMDL is the amount of a particular material that a water body can absorb while remaining safe for people and wildlife. TMDLs established for the Imperial Region include:

- Alamo River - Sedimentation/Siltation TMDL
- New River Pathogen TMDL
- New River Sedimentation/Siltation TMDL
- New River Trash TMDL
- Imperial Valley Drains Sedimentation/Siltation TMDL

TMDLs being developed include the Salton Sea Nutrient TMDL, the New River Volatile Organic Compounds TMDL, and New River Oxygen TMDL.

The Imperial County Farm Bureau in collaboration with IID developed an award winning TMDL program, which they describe as follows:

> *. . . Imperial County Farm Bureau developed a voluntary compliance program to help defend growers from the onslaught of TMDLs. The TMDL program is voluntary, however nearly all farmers in Imperial Valley participate in the program because it offers growers and landowners a straightforward path to compliance with the mandatory TMDL regulation. Farmers implement a variety of Best Management Practices (BMPs) to reduce silt and mineral runoff on their own farms, and maintain a record of their efforts, and attend annual meetings to keep up-to-date and share information relating to BMPs and TMDL management on their farms.*
>
> *Since implementation, the Farm Bureau's TMDL program has prevented more than 33,000 tons of silt from entering the New and Alamo rivers, achieving the goal for the New River within three years. The program has seen a significant reduction at the Alamo River well ahead of the 12-year implementation schedule.*[8]

The Cities and County are responsible for addressing urban stormwater pollution through the National Pollution Discharge Elimination System (NPDES) permitting program administered by the RWQCB.

Agricultural non-point sources of pollution are addressed in IID's DWQIP (IID, 2005), which specifies the actions that IID will take to help monitor and improve the quality of water within Imperial Region watersheds. The DWQIP includes a water quality monitoring program that will satisfy the requirements in the current Basin Plan, and additional requirements that may be incorporated into future revisions of the Basin Plan. In June 1994, IID developed a DWQIP in response to the Regional Board's demand for action regarding water quality impairments. The DWQIP was in effect until March 1998, at which time the RWQCB requested that these efforts be suspended until TMDLs could be developed and implemented for these water bodies. Following the development and implementation of the Alamo River Sedimentation/Siltation TMDL in September 2003, IID submitted a Revised DWQIP to the RWQCB, as required in the Region 7 Water Quality Control Plan.

The Revised DWQIP states that IID will perform monthly water quality monitoring within 14 drains throughout the service area for several constituents of concern and report these results to the RWQCB. IID will also perform special studies to determine water quality impacts caused by drain maintenance operations and supply the RWQCB with a list of current owners and tenants of agricultural land on an annual basis. IID has a network of water quality monitoring stations to test drain water quality. Since February 2004, IID has added 26 TMDL drain monitoring sites as part of the DWQIP.

Table 10-4 lists the sampling locations, constituents, frequency of sampling and responsible agency.

[8] Imperial County Farm Bureau website: TMDL Voluntary Compliance Program. *5 Jul 2012.* <*http://www.icfb.net/tmdl.html*>

Table 10-4. Water Quality Monitoring Locations

Location	Monitored Constituents	Frequency	Agency
Source Water			
Imperial Dam	EC (salinity)	Daily	USBR
AAC Drop 1 [1]	TDS, pH, Ca+, Mg, Na+K, CO_3, HCO_3, SO_4, Cl, Temp	Monthly	IID
Salton Sea (5 sites)	TDS, pH, Ca+, Mg, Na+K, HCO_3, SO_4, Cl	Semi-annually	IID
10 Sites: AAC, EHL, CM, WSM	Total coli. Fecal coli, E. coli	Monthly	IID
AAC (12 sites) [2]	Site load analyses	Monthly	IID
4 Sites: AAC, EHL, CM, WSM [3]	Title 22 Compliance	Yearly	IID
Drain Water			
Alamo R at US/Mexico Border [4]	TDS, pH, Ca+, Mg, Na+K, CO_3, HCO_3, SO_4, Cl, Temp	Monthly	IID
Alamo R Outlet at Salton Sea			
New R Outlet at Salton Sea			
TMDL Drain Water [5]			
7 Main Drains:	DO, EC, pH, Field and Lab turbidity, TSS, NH_3-, NO_2-, NO_3, Kjeldahl-N, Orthophosphate Total P, Total hardness, Ca+, Mg, Total A, $HC0_3$+CO_3, SO_4	Monthly	IID
5 to Alamo River			
2 to New River			
18 minor drains:		Quarterly	IID
9 to Alamo River			
6 to New River			
4 Direct to Salton Sea			

[1] Collected by IID; analysis by ATS Labs, Inc. Brawley, CA
[2] Collected by IID; analysis by IID.
[3] Physically collected and analysis by Clinical Lab of San Bernardino, CA, www.clinical-lab.com.
[4] Alamo River at US/Mexico Border discontinued Jan 2008 due to low flow (410.4 AF in 2008)
[5] Collected by IID; analysis by Babcock Labs, Riverside, CA,< http://www.babcocklabs.com>Flow data collection at 6 minor drains: I, Nettle, Peach, North Central Spruce, and Timothy 2.
Source: IID 2007 Water Conservation Plan, p 32

The Calexico New River Committee is an organized community effort for New River cleanup. The committee is dedicated to eliminating the negative impacts of the New River which arise in and around Mexicali, Mexico and flow across the International border. It has successfully consolidated community and political support behind the New River Public Health Protection Project. The Calexico New River Committee has identified a number of solutions, proposed improvements, a project concept, and development activities.

Calexico New River Committee is a member of the New River Improvement Project which is sponsored by the Secretary of Environmental Protection, California EPA = for more details see (also New River Improvement Project is an IRWMP stakeholder).
<http://www.calepa.ca.gov/border/newriver/Documents/TeamCharter.pdf >

10.3.3 Opportunities

No opportunities for new Pollution Prevention programs or expanding existing programs were identified by the Water Forum.

10.3.4 Constraints

Funding to expand or continue existing local programs or to create new programs is a constraint.

10.3.5 Relation to Other Strategies

- **Recycled Municipal Water** — Recycling municipal wastewater would increase treatment, improve water quality, and prevent pollution.
- **Ecosystem Restoration** — Chapter 11 discusses potential for regional mitigation banking to address impacts of recycling and desalination is discussed in, along with opportunities to improve water quality or prevent additional pollution from agricultural or urban runoff.
- **Regional Flood Control** — Integrating wetland and habitat into retention and detention ponds can improve the water quality of stormwater runoff.
- **Matching Water Quality to Use** — Chapter 7 discusses development of wetlands or algae production facilities to treat pollution and prevent pollution loading to the Salton Sea.

10.3.6 Support for Mitigating or Adapting to Climate Change

Pollution prevention was identified as potential mitigation for greenhouse gas emissions. Development of wetlands or algae production facilities could help sequester or recycle carbon and reduce nutrient contaminants in source water. Climate change could reduce the available water supply. Pollution prevention would help ensure the water quality of the available supply is protected.

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 11

Practice Resources Stewardship and Other Strategies

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Chapter 11. Practice Resources Stewardship and Other Strategies

11.1 Practice Resources Stewardship and Other Strategies Management Objectives

CDWR Practice Resources Stewardship and Other Strategies management objectives are discussed in this chapter. After preliminary review, the Water Forum made findings on four of the strategies:

- Crop Idling (fallowing) for Water Transfers and Irrigated Land Retirement (see 11.2.1)
- Land Use Planning and Management (see 11.2.2)
- Economic Incentives (loans, grants, and water pricing) (see 11.2.2)
- Ecosystem Restoration (see 11.7.1)

The Water Forum also considered:

- Water-Dependent Recreation
- Recharge Area Protection

Regarding the Land Use Planning and Management resource management strategy, IRWM Draft Guidelines (CDWR, July 2012) require that *IRWMP Plans must contain processes that foster communication between land use managers and RWMGs [Regional Water Management Groups] with the intent of effectively integrating water management and land use planning*.

Further, *IRWM Plans must document:*

- *Current relationship between local land use planning, regional water issues, and water management objectives.*
- *Future plans to further a collaborative, proactive relationship between land use planners and water managers.* (CDWR 2012, IRWMP Guidelines, p 21)

The Water Forum determined that the following resource management strategies either are being adequately addressed by existing programs or are not applicable in the Imperial Region:

- Agricultural lands stewardship (existing programs)
- Forest management (not applicable , no forests in Imperial region)
- Watershed management (coordinate with state and federal agency activities)
- Dewvaporation or atmospheric pressure distillation (not applicable)
- Fog collection (not applicable)
- Rainfed agriculture (not applicable, average rainfall of less than there inches a year
- Waterbag transport /storage technology (not applicable, no connection to ocean)

11.2 FINDINGS

11.2.1 Crop Idling (Fallowing) for Water Transfers and Irrigated Land Retirement

- After preliminary review, the Water Forum eliminated from further consideration fallowing for transfer out of the IID area.
- In 2005, the IID Board of Directors voted unanimously to strongly confirm its commitment to prohibition of fallowing for any out-of-valley transfers in Resolution 25-2005, which in part states that IID fully intends to move away from fallowing as a means of developing conserved water for temporary transfer to others outside of the Imperial Valley and instead intends to utilize efficiency conservation measures so as to allow for the farming of the same amount of land with less water. [1]

11.2.2 Land Use Planning and Management, and Economic Incentives

- No action has been taken regarding a proposed MCI Exchange, which would include possible crop idling, fallowing, irrigated land retirement, capital projects, economic incentives (grants, loans, water pricing, etc.) and other measures. Depending on developments within the Imperial Region, this could be a topic for a future Imperial IRWMP update.

11.3 CROP IDLING FOR WATER TRANSFERS, AND IRRIGATED LAND RETIREMENT

California Water Plan Update 2009 identifies Crop Idling for Water Transfers as a resource management strategy. In the Imperial Region, crop idling is called fallowing. Fallowing can be temporary (as in the QSA Fallowing Program) or long-term (as for solar energy development). In either case, the land is expected to return to agricultural use once fallowing is terminated. The Water Forum addressed fallowing and irrigated land retirement.

11.3.1 Fallowing for Water Transfers

To be consistent with IID policy and County policy, early in the IRWMP process the Water Forum eliminated from further development the Transfers – Out of basin resource management strategy (See Chapter 6). However, temporary or long-term fallowing may prove a viable strategy to make water available for use within the Imperial Valley or to meet some QSA/Transfer Agreements obligations.

[1] IID Resolution 25-2005. IID's Commitment to Implement QSA Programs and Opposing Forbearance of Any IID Water. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=3891>

11.3.1.1 IID's SDCWA Transfer and Salton Sea Mitigation Fallowing Program

In cooperation with land owners and growers, IID manages a voluntary Fallowing Program that eliminates agricultural water consumptive use, tailwater and tilewater from participating fields. The conserved water is used for environmental (Salton Sea) mitigation and the SDCWA transfer (see Chapter 5). The program was instituted in 2003, and subsequent Fallowing Programs were undertaken through 2012-2013. The Fallowing Program is anticipated to last through 2017; however, this is under review, see below. The decision to fallow land is voluntary, made by the landowner or by the tenant with landowner approval – this policy is also under review.

IID's website describes the IID/SDCWA Fallowing Program:

> *While fundamentally opposed to fallowing during the QSA negotiations, IID ultimately agreed to a 15 year fallowing program in order to eliminate potential effects to the Salton Sea resulting from the transfer of water out of the Imperial Valley. Water conserved from the fallowing program and transferred to SDCWA ramps up for the first 10 years and then decreases for the next five years as efficiency conservation projects are developed and implemented. Efficiency conservation replaces all fallowing by 2018.*
>
> *The purpose of the Fallowing Program is that willing land owners and/or lessees will contract with the Imperial Irrigation District to fallow fields to meet the transfer and Salton Sea mitigation water needs for the first 15 years of the IID/SDCWA and QSA Compromise Delivery Schedule. Each year the price for the water to be conserved from fallowing is set by IID and solicitations are sent out asking for voluntary participation to fallow a field in return for payment of the conserved water. Fields are then contracted based on a random selection to meet the amount of conserved water needed each year. Each field's participation in the fallowing program is limited to two out of every four years.*
>
> *The Fallowing Program for 2012-2013 consists of a voluntary proposal process designed to yield the annual fallowed water requirements outlined in the QSA water delivery schedule. This program will consist of a contract between IID and participating landowners and/or tenants for a one-year fallowing period and may allow for an early or delayed start (with an associated payment modification based on the actual fallowed period and conservation yield calculation), during which time no water can be delivered to the contracted field.*
>
> *For this solicitation, fallowing participants will be paid a set rate of $125 per acre-foot of a field's baseline water use history, although this payment may be affected by IID's trending analysis and 6 af/ac payment cap.*[2]

During the first seven Fallowing Programs, enrollment increased from nearly 6,000 acres to over 16, 500 acres, conserving from 38,641 acre-feet to 90,981 acre-feet, respectively. Payment to program participants has ranged from $1.8 million ($47 per acre-foot) to $6.9 million ($100 per acre-foot) in 2010; and the 2012-2013 program payment is set at $125 per acre-foot. (See Figure 11-1

[2] Source: IID website. 4 Jul 2012. <http://www.iid.com/index.aspx?page=190>

Payment per acre-foot is expected to increase as the volume of water needed from fallowing increases to 150,000 acre-feet per year for 2013-2017. Variance in payment is anticipated due to fluctuation in agricultural commodity prices and corresponding intensification or weakening in Imperial Valley agricultural activity.

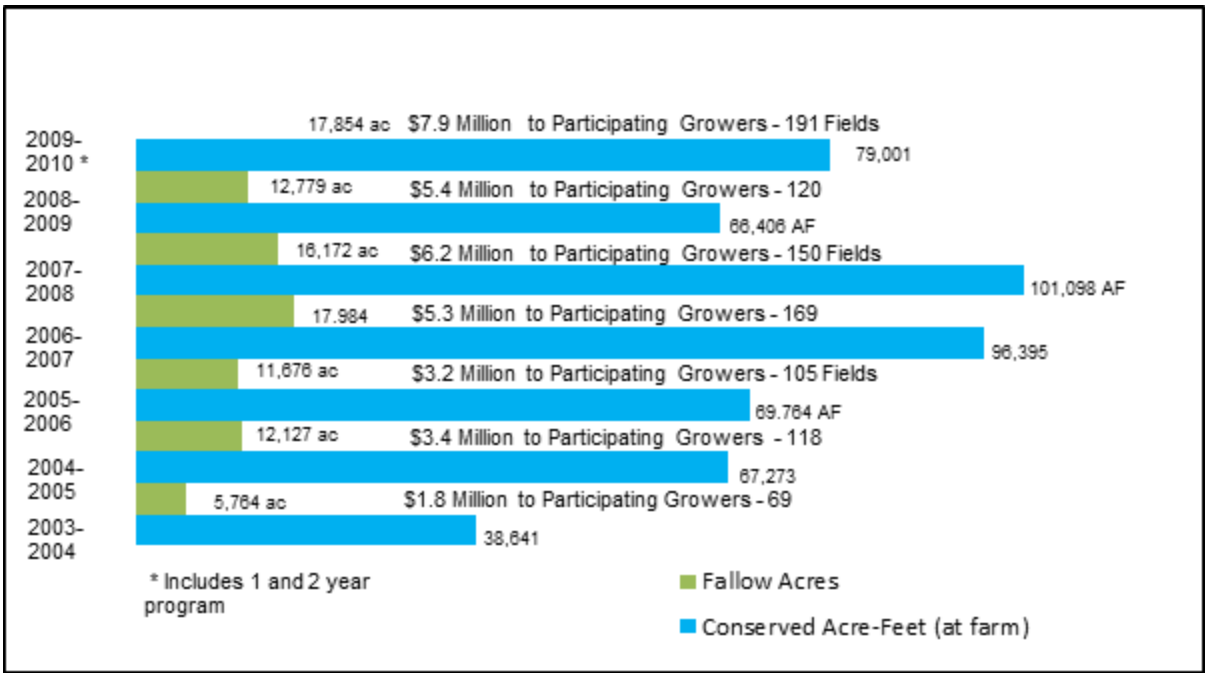

Figure 11-1. History of QSA Fallowing Program for SDCWA Transfer and Salton Sea Mitigation, 2003-2010 (AC,AF,$)
Source: IID 2010 Annual Water Report

As noted above, the future of the Fallowing Program is under review. As reported in The Bulletin: Board Meeting Highlights for Employees:

> *On September 13, 2011, the IID board approved a resolution presented by General Manager Kevin Kelley to petition the State Water Resources Control Board to amend its 2002 water order regarding mitigation water for the Salton Sea from 2014-2017.[3] The resolution states that if the state has not settled on a preferred plan for restoration of the Salton Sea and appropriated funding for its implementation by Dec. 31, 2013, IID should not be bound by the original water order in the last four years (2014-2017) of what was to have been a 15 year period of the state to meet its restoration responsibility under the Quantification Settlement Agreement. Instead, that volume of water, a total of 480,000 acre-feet, would be sold ideally to the Metropolitan Water District of Southern California. The proceeds would be redirected to the QSA joint powers authority to pay for durable and lasting mitigation measures for the sea in an effort to reduce air emissions, preserve habitat and allow for the development of geothermal and other renewable energy.[4]*

[3] IID Board of Directors. Resolution 27-2011 Petition to Amend SWRCB Revised Order WRO 2002-13. 31 Sep 2011. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=4994>
[4] Source: The Bulletin - Board Meeting of September 13, 2011. IID Internal Communication. Email 14 Sep 2012.

In 2001, an Amended Joint Petition of the Imperial Irrigation District and the San Diego Water Authority was filed with the State Water Resources Control Board[5] for approval of a long-term transfer of conserved water pursuant to an agreement between IID and SDCWA, as well as a petition by IID to change the purpose and place of use and the point of diversion under Permit No. 7643 (Application 7482). Additional details can be accessed from the SWRCB project archives website.[6]

In October 2011, IID and the San Diego County Water Authority filed a joint petition requesting changes to the State Water Resources Control Board's Revised Order WRO 2002-0013. [7] These changes would allow for an early-start approach to ecosystem enhancement and preservation while assisting in the ongoing efforts to mitigate impacts on the Salton Sea from the 2003 Quantification Settlement Agreement.

For FAQs and other details visit IID's website.[8]

11.3.1.2 Other Fallowing

Fallowing may be permanent or temporary, but must be consistent with IID board policies, state and federal laws, the QSA/Transfer Agreements, and County land use plans and policies.

Under the terms of the QSA/Transfer Agreements, future land fallowing for environmental mitigation or transfer would require development of a land fallowing conservation plan, and consultation with the Board of Supervisors to identify adequate mitigation measures to avoid or mitigate unreasonable economic or environmental impacts.[9]

Landowners can make decisions to fallow agriculturally zoned lands and dedicate the land to some other purpose (e.g., solar photovoltaic development). The landowner's decision is subject to review by the County Planning Commission and/or Board of Supervisors. A Conditional Use Permit would be required for such long-term fallowing. The Conditional Use Permit preserves the agricultural zoning and the presumption that the land would return to agricultural production. Long-term fallowing decision by the landowner and County would make water available for IID to allocate to other beneficial uses, and the IID board has adopted a Temporary Land Conversion Fallowing Policy to deal with such projects.[10]

11.3.2 Irrigated Land Retirement

In a desert environment, irrigated land retirement involves permanent removal of land from agricultural production and a change of land use. Irrigated land retirement can occur as a result of planned changes in land use including, but not necessarily limited to:

[5] <http://www.waterboards.ca.gov/>
[6] <http://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/iid_sdcwa/>
[7] < http://www.iid.com/Modules/ShowDocument.aspx?documentid=5071>
[8] IID website: State Water Resources Control Board. 7 Jul 2012. <http://www.iid.com/index.aspx?page=212>
[9] California Water Code δ 1013. <http://law.onecle.com/california/water/1013.html>
[10] IID Temporary Land Conversion Fallowing Policy. 8 May 2012. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5646>

- Decisions by individual private property owners to permanently change land use (e.g., conservation easement)
- Annexation of land to a city consistent with the city general plan, zoning and state law [11]
- Rezoning of agricultural lands for other uses in unincorporated areas by the County Board of Supervisors[12]
- Permanent changes in land use from agriculture to other uses consistent with the existing zoning, County General Plan, specific plan, or community plan zoning [12]

Permanent land retirement as a result of land use changes that are consistent with private property rights and the prevailing land use plans and city or County policies could make water available for alternative uses within the Imperial Region. IID is responsible for managing and allocating to other beneficial uses any water that might be so conserved.

Permanent land retirement for the purpose of transferring water out of the Imperial Region is contrary to IID water policies, County land use policies, and adopted land use plans. Permanent irrigated land retirement would reduce the volume of water discharged to the IID drains and to the Salton Sea. Proposals to permanently retire land for transfer out of the Imperial Region are not in the scope or purview of the Water Forum and not proposed as part of the Imperial IRWMP.

11.3.3 Opportunities

Owners of private property and the Cities and County can and may make land decisions that permanently retire agricultural land, or result in long-term or temporary fallowing that reduces water demand and makes water available for other uses.

On May 8, 2012, the IID board acted to adopt the IID Temporary Land Conversion Fallowing Program under Water Code Section 1013 for QSA.[13] IID policy sets forth how IID will manage water made available as a result of land use decisions by private property owners and/or the Cities and County. This policy was developed mainly in response to the County decision to grant conditional use permits for solar development projects.

IID Resolution 17-2012 Recital K stipulates that:

> *. . . land being utilized for the temporary land conversion fallowing policy be required to return to farmland within the term of the QSA so as to best protect the Colorado River water rights held by IID under state and federal law; and to have a mechanism by which to enforce that obligation* [9]

The board resolution requires consultation between the County and IID as part of CEQA review and other procedures, and sets for how IID for will determine the amount conserved:

[11] Subject to environmental review under the California Environmental Quality Act and California Water Code, and to review by the Local Agency Formation Commissions.
[12] Subject to environmental review under California Environmental Quality Act and California Water Code.
[13] IID Temporary Land Conversion Fallowing Program. 18 May 2012. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5646>

> *The water conserved from such temporary removal of such land from agricultural production shall be determined by IID staff based on the conserved water yield outlined in Recital M [of the board resolution], and] shall be available for transfer or other use under the QSA and its related agreements, or otherwise as allowed by law.* [14]

The Water Forum may provide a venue for collaboration and input regarding how the unique land use authorities of the Cities and County, and the separate water management powers and authority of IID can be applied to make best use of the available water resources and support economic growth and development consistent with private property rights and in partnership with business and the community. Results of such communication and collaboration would be included in future IRWMP updates as part of the region's adaptive management strategy.

11.3.4 Constraints

There have been past conflicts and litigation over water, and challenges remain. Although decision-makers with authority to negotiate and commit their agencies to alternative courses of action have not been fully engaged in the IRWM process, the Water Forum has demonstrated a new approach, and has taken very positive steps toward addressing the complex legal, social, political, and economic issues facing the region.

11.3.5 Relation to Other Strategies

- **Increase Water Supply** —Temporary and/or permanent land retirement could reduce total water use, make water available for other planned uses, and meet future demands identified in the Imperial IRWMP consistent with adopted land use plans.
- **Land Use Planning and Management** - The Cities and County are required to make findings that water supply is sufficient to satisfy the demands of proposed development projects.

11.3.6 Support for Mitigating or Adapting to Climate Change

Changes to land use from crop idling or permanent land retirement could increase or decrease the emission of greenhouse gases and the associated effects of climate change. Such land use changes is project-specific, and effects need to be evaluated pursuant to CEQA. Also, if conserved water from fallowing or changes in land use is dedicated to renewable energy, this could have a net positive effect on greenhouse gas emissions. The existing Equitable Distribution Plan provides a mechanism to respond to supply/demand imbalances.

[14] IID Resolution 17-2012. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5630>

11.4 LAND USE PLANNING AND MANAGEMENT

As noted in Chapter 11, the Cities and County have authorities for land use planning and management. The larger cities in the region and the County have general plans. These have been considered in the IRWMP to analyze future MCI demand as presented in Chapter 5 and Appendix D. Information in the general plans, including interest in renewable energy development, are the foundation for the Water Forum's number one and two Water Supply objectives:

1. Meet 100 percent of future demands without adverse impact to existing users that are not mitigated
2. Implement projects or programs that will provide a firm, verifiable, and sustainable supply of 50 to 100 thousand acre-feet per year (KAFY) for municipal, commercial or industrial demands by 2025.

IIID, the County and a member of the consulting team met to discuss how to ease the process of assuring a water supply for project proponents. In addition, IID worked with the consulting team to develop *Supporting Guidelines for the Determination of Wholesale Water Sustainability* (Appendix J) for a water supply applicant to follow. The preparer of a WSA is requested to use the guidelines in Appendix J verbatim where factual data is needed regarding the sustainability of wholesale water from IID. IID will update time-series data on an annual basis by March of each year for IID data and by June of each year for Colorado River Decree Accounting record.

11.4.1 Opportunities

As of July 2012, Imperial County Planning Department is working on a Solar Ordinance, which will involve conditional use permits for such projects. Until the Ordinance is in effect, applications for a conditional use permit for solar projects are being handled on a case by case basis. This has resulted in IID's Temporary Land Conversion Fallowing Policy. If developed, solar projects would reduce agricultural consumptive use and runoff, which can be used to meet some QSA/Transfer Agreements obligations and also be made available for other beneficial uses.

The four larger cities in the region have prepared their 2010 UWMPS and are following the state's guidelines for reduction in water use (20 x 2020) and other measures.

11.4.2 Constraints

The Imperial Region consists largely of land owned and managed by federal and state agencies. Within the Imperial Valley, the preponderance of land is under irrigated agriculture. Some of that land is being considered for geothermal and solar development, which is in the purview of the County or local city or community. All parties (the County, IID and the Cities) support development of renewable energy in the region – except not in the West Mesa if it were to impact the Ocotillo –Coyote Well Groundwater Basin which is designated as a sole source aquifer.

The economic slowdown of 2008 has had an impact on housing and commercial development in the region. However, renewable energy development is still moving forward.

11.4.3 Relation to Other Strategies

- **Increase Water Supply** —Land planning and management, as currently envisioned, could free up water to satisfy some QSA/Transfer obligations and for other in-valley beneficial uses.
- **Crop Idling and Irrigated Land Retirement** – Any additional land use will reduce the area of irrigated agriculture, unless it is done outside the Imperial Valley, as with groundwater development projects.
- **Flood Risk Management and Urban Runoff** – Could be impacted if land use planning locates development in New River floor.

11.4.4 Support for Mitigating or Adapting to Climate Change

Land use planning and management can have a profound impact on avoiding or mitigating impacts to climate change. Planning developments near existing towns and cities and near existing transportation and water supply infrastructure will minimize the amount of energy needed to travel for work or shopping, and minimize energy needs for pumping water and for water conveyance construction.

11.5 ECONOMIC INCENTIVES (LOANS, GRANTS, AND WATER PRICING)

The CDWR economic incentives strategy includes financial assistance, water pricing/rates, and water market policies intended to influence water management. Economic incentives can influence the amount of use, time of use, wastewater volume, and source of supply. The state provides economic incentives in the form of financial assistance through grants and low interest loans. The availability of grants often requires local match or specific conditions such as having the Imperial IRWMP to qualify, or waiving local match requirements for DACs.

Chapter 12 will discuss revenue-generating mechanisms and grant and loan alternatives for funding Imperial IRWMP projects and programs. This section will look at opportunities and constraints for use of other economic incentives. This section talks about local considerations related to water pricing/rates and the creation of economic incentives.

11.5.1 Findings

- No action was taken by the Water Forum regarding economic incentives (loans, grants, and water pricing).

11.5.2 Imperial Region –Economic Incentives

All urban communities within the region except the City of Imperial are disadvantaged. Water rates are low (around $285/AF) and revenues are not available to fund some of the types of incentives proposed by the State (e.g., toilet or landscape rebates to conserve water). Most cities have or are moving towards inverse block rate structures where the users pay higher prices as the volume of use increases.

The IID Definite Plan provides for growers and tenants to participate in on-farm conservation efficiency programs starting in 2013. These programs are voluntary and incentive driven. Growers will receive payment for the amount of water conserved. For long-term (multi-year) contracts, payments will be quarterly based on amount expected to conserve with an annual true-up. For short-term (seasonal) contracts, payment will be made after seasonal delivery reduction verification is finalized.

IID has established the Interim Water Supply Policy (IWSP) that uses an inverse, block rate structure to encourage conservation and sets the price for water to be dedicated to new users and proposed projects. The revenue is to cover the potential future costs for development of projects that would conserve water, allow for groundwater storage and banking of Colorado River supplies, or create secondary uses of Colorado River water.

11.5.3 Opportunities

- The difference between the ability and willingness to pay in the Imperial Region compared to other regions in Southern California should be recognized. The QSA/Transfer Agreements provide a model for subsidizing local projects with external money to keep local water rates low, meet local needs, protect water rights and comply with state and federal requirements.
- Define the marginal cost of water and determine a mix of fallowing and capital projects that will provide supply for the forecasted 140,000 acre-foot per year renewable energy industry water demand and mitigation for impacts.[15]
- Evaluate the different water use sectors' ability and willingness to pay for water in the Imperial Region to assess potential revenue streams and rate structures to fund local projects (e.g., recycling, groundwater banks) and programs and equitably distribute the costs and benefits.
- Define the mix of local revenue (water sales, land assessments, etc.) and grants that provide the revenue to build projects of local benefit to support economic development in the Imperial Region.
- Conduct regional economic analyses to quantify the economic benefits and costs and produce the economic studies required to obtain federal and state grants and loans and conduct a ballot measure (Proposition 218) seeking voter approval for revised rates and assessments.
- Define stable local funding and revenues for projects and/or management programs that would support fallowing for an in-valley exchange.

[15] The marginal cost of water for some projects is presented in Table 12-4 and in Appendix N for desal, blending, and groundwater storage; does not include recycling.

- Continue with inverse block rate structures to encourage conservation and provide a local revenue stream for building projects that manage existing Colorado River supplies (groundwater banking), provide for secondary uses of Colorado River Water (desalination, recycling), or manage water made available from land use changes or fallowing water conservation activities.
- Prioritize funding and revenues to provide incentives to upgrade DAC wastewater treatment plants and for recycling municipal wastewater.

11.5.4 Constraints

There is a limited ability to pay for new projects. Affordability is a constraint to achieving public support or for obtaining a positive vote for increased assessment or higher rates when a Proposition 218 initiative is required. There is strong political resistance to higher water rates, fees or taxes. At the same time, there is resistance to water transfers out of the Imperial Region which could provide revenue to fund projects and keep local rates down.

Grants may require local matching funds that are not available, and other expensive requirements that DACs in the Imperial Region cannot afford. There are limited local resources to conduct necessary engineering studies, or to conduct economic evaluations and rate studies to quantify costs and benefits, equitably distribute costs and benefits, and prioritize different local revenue sources.

The agricultural economy and DACs in the region create limited tax and assessment capacity, resulting in competition among the Cities, County, and IID for available public revenue. Given the unit cost for raw water, agriculture cannot compete with the large urban rate base in other Southern California Regions. The major difference in ability to pay between the Imperial Region and other Southern California Regions creates competition and conflict related to public-versus-private benefits.

11.5.5 Relation to Other Strategies

The right mix of economic incentives and disincentives, revenue sources, and rates is needed to create stable funding to implement all of the other strategies to manage the available water, expand the supply, and to sustain or expand the economy.

11.5.6 Support for Mitigating or Adapting to Climate Change

Energy markets create economic incentives for outside investment to flow into the region to develop renewable energy (geothermal and solar) to mitigate effects and the reduction of greenhouse gases. A reliable, sustainable supply of water at known costs would support development of renewable energy in the Imperial Region. The Imperial Region is well positioned to support development of geothermal, solar thermal and solar photo voltaic generation and other renewable energy projects to help adapt to climate change.

11.6 Local Land Use Planning and Local Water Planning

CDWR IRWMP Proposition 84 and Proposition 1E Guidelines define the requirements for an IRWMP. The Imperial IRWMP will be reviewed and may be scored against CDWR standards, two of which are related to how well local land use plans and water plans are related to Imperial IRWMP actions, and how well the land use agencies and water agency interact and coordinate efforts.

The IRWMP is required to meet CDWR Standards (CDWR, 2012. Draft IRWMP Proposition 84 and Proposition 1E Guidelines p.21) for:

12. Relation to Local Water Planning

The IRWMP must document the local water planning documents on which it is based including:

- A list of local water plans used in the IRWMP.
- A discussion of how the IRWMP relates to planning documents and programs established by local agencies.
- A description of the dynamics between the IRWMP and local planning documents.

13. Relation to Land Use Planning

The IRWM Plan must contain processes that foster communication between land use managers and RWMGs with the intent of effectively integrating water management and land use planning. The Imperial IRWMP must document:

- Current relationship between local land use planning, regional water issues, and water management objectives.
- Future plans to further a collaborative, proactive relationship between land use planners and water managers.

11.6.1 Imperial Region –Land Use and Water Planning

Land-use decisions by the Cities and County have an impact on IID water management, and IID water management decisions have affect potential land use, making it important for the County, IID and the Cities to coordinate and find strategies to improve collaboration.

IID is the wholesale water agency responsible for management of the Colorado River supply. IID must account for and manage changes to type of water use, the place of water use, and amount of water use. To protect its Colorado River water right, IID works to ensure reasonable and beneficial uses of the water – that water is conserved to the degree possible. IID is the lead agency for discretionary decisions to build water supply projects, allocate water or issue a water supply contract.

The Cities and County have land use authority and are responsible for evaluating and approving land use changes. Land use decisions could result in long-term or temporary fallowing, irrigated land retirement, or reduction to total cumulative water demand. Alternately, approving projects such as a geothermal

power plant could significantly increase total water demands. Land use decisions have a potential effect on the Imperial Region's water supply, environmental compliance, existing users, or other third parties. Land use changes can change the type or amount of water use, and this requires coordination with IID. The Cities and County are the lead agencies for land use decisions and CEQA compliance, and are required to consult with IID as the water supplier. The Cities or County, as the lead agencies, need to *determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project in addition to existing and planned future uses*.[16]

IID is a responsible agency when the cities or county are the lead agency to conduct environmental review of a project. Pursuant to CEQA and the California Water Code, IID and the lead land use agency (city or County) must demonstrate that the projected water supply will be available for the next 20 years, and will meet the projected demand for the proposed project and all of the current water users; that there are no impact to current users; and/or there are plans to acquire, manage, or develop additional supplies.

As described in Chapter 5, an increase in total water demand as a result of changes in land use could increase the size and frequency of overruns, with potentially significant impacts. Large decreases in water demand from land-use changes such as urban or solar energy development could impact IID water management if underruns increase. Larger or more frequent underruns could impact third parties or the Colorado River supply, and IID drains and the Salton Sea by reducing the amount of water applied (in the case of solar development) and reducing tailwater, tile water and drain water runoff. On the other hand, fluctuations between overruns and underruns would increase the likelihood of IID pursuing groundwater banking, storage, and/or other capital project alternatives.

Prior to the federal government limiting California's Colorado River supply to its annual water right of 4.4 MAF plus fifty percent of declared surplus, there were not conflicts in the Imperial Region between water users, among types of water uses (agricultural, MCI, environmental), or between the Cities and County as the land-use authority and IID as the water management authority. Settlement of interstate and California conflicts over water resulted in the QSA/Transfer Agreements. Litigation and changes to state laws have required increased coordination among land use and water agencies. In the March 2012 Projects Work Group, discussion arose spontaneously regarding how agencies could work together to benefit their service areas.

11.6.2 Opportunities

The consulting team identified program and policy alternatives for presentation to the Water Forum. The intent is for the Water Forum to define and integrate RMS's that can be used in the Imperial Region. These can then be considered by the IID Board of Directors, County Board of Supervisors and City Councils as decision-making authorities in their jurisdictions. The following strategies were not

[16] California Water Code Section 10911

addressed by the Water Forum, but may prove useful for future Imperial IRWMP update as part of the region's adaptive management.

- Develop an in-valley water exchange managed by IID to allocate water from water storage or conservation measures or to allocate water resulting from other land use changes.
- Develop requirements for allocation of water and issuance of a water supply contract or agreement to provide water.
- The Cities, County and IID develop consensus on consistent standards for developers that:
    - Clarify roles, responsibilities, and communication among agencies and project proponents.
    - Define what information is required at the time of application for new projects, when such information would be required by what type of project, and how the information will be reviewed and by whom.
    - Identify significant, potentially significant, and less-than-significant impacts to water supplies, users, and water rights.
    - Define mitigation measures, requirements, and costs to reduce impacts.
- Provide guidelines for developers and staff to follow to streamline the application, review, and decision making process, and expedite compliance with CEQA for land use and water supply decisions.

11.6.3 Constraints

The Cities, County, and IID are operating under changing circumstances with new data, information and practices. The region is continuously working to recognize and adapt to its changing water supply and to determine what qualifies as a need for mitigation.

11.6.4 Relation to Other Strategies

The Imperial Region's water portfolio is best managed or expanded through a combination of strategies to increase water supply, reduce water demand, and practice resource stewardship.

11.6.5 Support for Mitigating or Adapting to Climate Change

Integration of land use and water management planning, the land use authority of the Cities and County, and the water management authority of IID should provide additional flexibility to respond and adapt to climate change. The Imperial IRWMP, when coordinated with land use plans, UWMPs, and Floodplain Management Plans can adapt to potential climate change effects. Integration of land use and water management to provide a reliable supply to the renewable energy industry will support reduction in greenhouse gas emissions as compared to the same amount of water being provided to conventional generation facilities.

11.7 ECOSYSTEM RESTORATION

The focus of the Ecosystem Restoration RMS is management, creation and enhancement of ephemeral channels, aquatic, riparian, and floodplain ecosystems – the natural systems most directly affected by water and flood management actions and climate change. The Imperial IRWMP goal for ecosystem protection and enhancement is to *protect and enhance aquatic ecosystems and wildlife habitat consistent with municipal, commercial, industrial and agricultural land uses*. The two objectives (Section 1.7.6) to meet the ecosystem restoration RMS goals are to:

1. Recognize, and mitigate impacts to the IID drains, small natural channels, and the New or Alamo Rivers that could result from reduced flows or water quality impairments as a result of development or reclaimed water use.
2. Investigate and develop regional mitigation programs to provide cost-effective environmental mitigation for proposed projects that reduce IID drain flow or have other impacts.

A draft ecosystem restoration strategy briefing was presented at a Water Forum workshop on June 15, 2011. The workshop participants reviewed draft materials and prepared findings and recommendations that were subsequently presented to the Water Forum on June 16, 2011. The Water Forum made revisions and requested comments from all of the stakeholders. No comments were received and the Water Forum made the findings listed below.

The Water Forum identified recycling municipal wastewater or desalinating drain water as important water supply opportunities (Chapter 7), recognizing that development of these types of facilities was constrained by potential impacts to habitat and species from the loss of flow and/or water quality impairments to IID drains, the Alamo River, New River, and the Salton Sea. The Water Forum recognized that the Salton Sea restoration was a major influence in the Imperial Region and could affect existing and proposed programs. Though the potentially significant impacts for any one project may be minimal, the cumulative impacts could be significant. Mitigation requirements could increase the costs for recycling or drain water desalination. A regional mitigation program was identified as a potential opportunity to provide a regional solution and for overcoming constraints.

11.7.1 Findings

- Restoration of the Salton Sea is beyond the scope of work of the Imperial IRWMP due to the scale and scope of the restoration effort and the limited focus of the Imperial IRWMP goals and objectives.
- The Water Forum should seek to identify opportunities for interregional coordination to address Salton Sea issues and maintain communications with agencies involved in Salton Sea restoration and mitigation.
- Stakeholders should seek to identify ecosystem restoration and enhancement opportunities that could be integrated into proposed IWRMP projects.

- While the IID Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP) can be used as an example for evaluating individual and cumulative impacts of projects on drains, further development of mitigation and impact analysis criteria is needed.
- Recycled water and energy projects should not be delayed pending implementation of a mitigation program.

11.7.2 Imperial Region Conditions – QSA, Salton Sea, and the New River

This section summarizes the ecosystem management planning efforts and identifies project examples in the Imperial Region. The current planning efforts and projects could be coordinated or expanded to meet Imperial IRWMP goals and objectives.

11.7.2.1 Ecosystem Planning Efforts and Projects

There are a number of ecosystem management, enhancement and restoration activities in the region. This section discusses projects that are most relevant to the Imperial IRWMP, and includes:

- IID Draft Habitat Conservation Plan/Natural Communities Conservation Plan and related permits and documents, includes Salton Sea Habitat Conservation Strategy and QSA Legislation,
- State and Federal restoration plans for the Salton Sea,
- New River Improvement, and
- Example Projects.

11.7.2.2 IID Habitat Conservation Plan/Natural Communities Conservation Plan

IID is actively engaged in preparing a Natural Community Conservation Plan (NCCP) and Habitat Conservation Plan (HCP) in consultation with the California Department of Fish and Game (CDFG) and the United States Fish and Wildlife Service (USFWS). The IID HCP/NCCP will address the impacts and mitigation strategies of the QSA water transfer and IID's operation and maintenance activities.[17]

At the time of writing this plan, QSA water transfer mitigation measures are being implemented through a water and regulatory agency implementation team in compliance with the In-Valley Biologic Opinion issued by USFWS; the In-Valley California Endangered Species Act (CESA) Permit issued by CDFG, the draft HCP, and related CEQA/NEPA documentation. IID will work to ensure that the required mitigation measures are implemented to minimize impacts to IID drains, drain flows, or related habitat. An implementation team has been formed to coordinate implementation with existing Salton Sea management, and assure that implementation is consistent with the restoration and enhancement plans and projects proposed by the state and others.

[17] <http://www.iid.com/index.aspx?page=235>

11.7.2.3 Salton Sea Habitat Conservation Strategy

Water has been dedicated to the Salton Sea as part of IID Salton Sea Habitat Conservation Strategy (a component of the draft HCP and related QSA approvals) as part of QSA.[18] Under the IID Salton Sea Habitat Conservation Strategy, the amount of mitigation water provided to the Salton Sea will be substantially equivalent to the reduction of inflow to the Salton Sea attributable to the IID/SDCWA conservation and transfer program, and the plan is to deliver mitigation water to the Salton Sea through the year 2017.[19]

The rationale for the Salton Sea mitigation water recognized that Salton Sea restoration was being evaluated by the state and federal governments, and that during the 15-year period (2003 to 2017) there would either be a definitive restoration plan and program, or it would be clear that no such program was feasible. The Salton Sea mitigation water measure was designed to maintain the status quo (declining water elevation and increasing salinity) until the state restoration plan provided stable and sustainable wildlife habitat at the Salton Sea.

The QSA and related documents also establish that the participating agencies would be responsible for QSA mitigation and established a funding cap, documenting that if total costs exceeded the funding cap over the 75-year term of the project, the state would be responsible for those mitigation costs that exceeded the cap.[20]

In October 2011, IID and the San Diego County Water Authority filed a *Joint Petition for Modification of Revised Order State Water Resources Control Board Water Resource Order 2002-0013* (SWRCB, 2002) seeking to alter the schedule of mitigation water delivered to the Salton Sea and instead to implement projects at the sea that will provide higher quality, more sustainable habitat, and provide dust suppression and management. Instead of delivering 480,000 acre-feet of Colorado River water from 2014-2017 to the Salton Sea, IID would use the same water supply (not an additional transfer) to provide revenue to fund the accelerated and supplemental habitat and air quality mitigation projects. Implementation of the habitat and air quality projects would start as soon as the environmental review process was complete and the necessary state and federal permits were granted.

IID is in the preliminary stages of developing and evaluating a mitigation plan for the Joint Petition. Conceptually, the plan will be designed to provide habitat modeled after the state's proposed Salton Sea Species Conservation Habitat Project (a preliminary project as part of the Salton Sea Ecosystem Restoration Program, see below). Additional habitat and air quality mitigation is also included in the preliminary plan.

[18] Pursuant to SB317 which amended Section 2081.7 for the Fish and Game Code; and as defined in the Agreement between IID and DWR for Transfer of Colorado River Water Agreement-between-IID-and-DWR. Section 2081.7(c) (1) and (c) (2) define types of water committed to mitigation.
[19] Other CRWDA Exhibit B IID reductions were excluded from Salton Sea mitigation: 1988 IID/MWD Water Conservation Transfer Program had no mitigation requirement; IID/CVWD transfer has no impact on the Salton Sea, as CVWD agricultural drainage is to the sea; water recovered through AAC Lining Program did not reach IID service area nor the sea.
[20] Cal Fish & Game Code § 2931(b)

11.7.2.4 QSA Legislation

In 2002, the California Legislature passed Senate Bill (SB) 482 which was intended to facilitate implementation of the QSA/Transfer Agreements and support restoration of the Salton Sea. [21] Additional implementing legislation was enacted in 2003 to establish state policy for restoring the Salton Sea. The legislation required the State of California to take action with respect to the restoration of the Salton Sea and coordinate aspects of the QSA/Transfer Agreements implementation with the state's Salton Sea restoration effort. [22] The Legislation recognized the distinction between Salton Sea Restoration and mitigation required for effects of the water transfer on the Salton Sea, acknowledging that these are independent issues that have different goals.

The legislation declared that the:

> *. . . intent of the legislature that the State of California undertakes the restoration of the Salton Sea ecosystem and the permanent protection of the fish and wildlife dependent on that ecosystem.*

The legislation also identified the state and federal efforts that were anticipated to provide for the long term restoration of the Salton Sea, if such restoration plans were to be found feasible. A separate part of the legislation notes that federal agencies failed to comply with the Salton Sea Restoration Act of 1998 which required federal agencies to offer alternative restoration options for the Salton Sea. [23, 24]

11.7.2.5 State of California Salton Sea Restoration Plan [25]

The legislation gave the California Resources Agency the responsibility for developing an ecosystem restoration study and programmatic environmental documents for restoration of the Salton Sea ecosystem. The state evaluated alternative restoration plans, costs and feasibility, and presented the Salton Sea Ecosystem Restoration Program Preferred Alternative Report and Funding Plan (Preferred Alternative Report) (CRA, 2007) to the Legislature in May 2007.[26] The state report found that diminished inflows to the Salton Sea would be the result of numerous factors and the Salton Sea would no longer support existing wildlife within twenty years with or without the QSA. The Preferred Alternative Report demonstrated that the preferred restoration alternative would not be to save the Salton Sea in its present state, but to create a much reduced sea.

The Salton Sea Restoration Council was created by the Resources Agency as the governing structure responsible for determining and implementing a preferred alternative for the restoration of the Salton Sea ecosystem. [27] The Governor's 2012 budget and recent legislation have recommended eliminating

[21] SB 482 (Kuehl, 2002) Ch. 617 § 2
[22] SB 277, Salton Sea Restoration Act (Ducheny, 2003) Ch. 611); SB 317 (Kuehl, 2003) Ch. 612; SB 654 (Machado, 2003) Ch. 613), as amended by SB 1214 (Kuehl, 2004)
[23] SB 654, Chapter 613 § 2(g)
[24] Public Law 105-372
[25] More information on the state's restoration effort can be found at <http://www.water.ca.gov/saltonsea/>
[26] QSA Legislation originally required a preferred alternative be presented to the Legislature by December 31, 2006.
[27] SB 51 (Ducheny, 2010) Salton Sea Restoration Council

the Salton Sea Restoration Council (AB 939, Perez) and transfer restoration authority to the Salton Sea Authority (SSA; see below).

A Final Programmatic EIR for the Salton Sea Ecosystem Restoration Project was completed in 2008 (CDWR, 2007) and components of a preferred alternative were identified. The Programmatic EIR identified specific activities referred to as Period I activities that could be funded and implemented prior to definition of a final preferred alternative. The Period I activities included demonstration projects; biological, water quality, air, geotechnical, and construction investigations; tribal coordination; development of agreements; and project level environmental review. Salton Sea Species Conservation Habitat Project (SCH Project), described more below, is part of the Period I activities.

The legislature requires updates on the progress and funding to support planning and restoration activities (CDWR, CDFG, 2011), this includes total and annual expenditures from the Salton Sea Restoration Fund, which includes the contributions from local agencies and from Propositions 84 and 50. To date, a total of approximately $97 million has been allocated, $32 million have been expended and $56 million remain.

11.7.2.6 Federal Salton Sea Restoration

The Salton Sea Restoration Act of 1998 required federal agencies to offer alternative restoration options for the Salton Sea. [28] In December 2007 the Bureau released its final federal feasibility study report (USBR, 2007) on a preferred alternative for the Salton Sea.[29] The feasibility report identified five potential project alternatives but only partially fulfilled congressional requirements. USBR found the lack of available data, time, and funding required to analyze the Sea did not allow a full feasibility level study, but estimated costs of between $3.5 and $14 billion. Since release of the feasibility report, the federal government has not taken any steps to recommend or fund a preferred alternative to restore the sea.

The federal Salton Sea Restoration Project is evaluating actions to stabilize the surface elevation and reduce the salinity of the Salton Sea. [30, 31] USBR issued the Salton Sea Study, Status Report in 2003, which presented a summary evaluation of 14 alternatives (USBR, 2003). In addition, USBR released the Mid-Sea Dam and Barrier Concepts Report in 2004, which evaluated mid-Sea dam and barrier concepts for elevation and/or salinity control (USBR, 2004).

The Water Supply, Reliability, and Environmental Improvement Act of 2004, Public Law 108-361, directed the Secretary of the Interior to *complete a feasibility study on a preferred alternative for Salton Sea restoration*, and Reclamation is preparing the feasibility study on behalf of the Secretary of the Interior. In January 2007, Reclamation released the Restoration of the Salton Sea Final Report and a Summary Report (USBR, 2007). The 2007 report evaluated five alternatives for restoration of the Salton

[28] Public Law 105-372 § 101
[29] The federal report was originally due in December 2006.
[30] For more information on the federal effort, see <http://www.usbr.gov/lc/region/programs/saltonsea.html>
[31] Prepared pursuant to the Salton Sea Reclamation Act of 1998 (Public Law 105-372).

Sea. No preferred alternative has been selected at the time of issuance of this supplement. One year later, in February 2008, Reclamation published a Final Report and Summary Report about the agency's study efforts to determine a preferred alternative action for restoring the Salton Sea.

11.7.2.7 Salton Sea Authority [32]

The Salton Sea Authority (SSA) is a joint powers agency chartered by the State of California by a Joint Powers Agreement on June 2, 1993 for the purpose of ensuring the beneficial uses of the Salton Sea. The SSA was formed to work with California state agencies, federal agencies, and Mexico to develop programs that would continue beneficial use of the Salton Sea. In the agreement, beneficial use includes the primary purpose of the sea as a depository for agricultural drainage, stormwater, and wastewater flows; for protection of endangered species, fisheries, and waterfowl; and for recreational purposes. The SSA is comprised of the Coachella Valley Water District, Imperial Irrigation District, Riverside County, Imperial County, and the Torres Martinez Desert Cahuilla Indians. A number of federal, state, and tribal agencies are ex-officio members of the Authority.

11.7.2.8 New River Improvement Project [33, 34]

The New River Improvement Project was created in 2009 by AB 1079 (V. Manuel Pérez) to *study, monitor, remediate and enhance the New River water quality in the County of Imperial to protect human health, and develop a river parkway suitable for public use and enjoyment*. AB 1079 requires the California Mexico Border Relations Council (Border Council) to develop a plan to guide implementation of the New River Improvement Project. This plan must contain the following elements:

1. Quantification of current and projected New River water quality impairments and their threat to public health.
2. Prioritization of the actions necessary to protect public health and to meet New River water quality objectives and other environmental goals, such as improving the quality of water flows into the Salton Sea.
3. Identification of potential funds for the implementation of the project, and potential lead agencies that would be responsible for environmental review of activities related to the cleanup and restoration of the New River.
4. A plan for a river parkway.

AB 1079 also identifies the value in convening a technical advisory committee consisting of impacted cities and counties, relevant local, regional and state agencies and departments, non-governmental organizations and other stakeholders.

[32] Salton Sea Authority website: 27 April 2012. <http://www.saltonsea.ca.gov/index.html>
[33] CalEPA website: New River Technical Advisory Committee. 11 July 2012. <http://www.calepa.ca.gov/border/newriver/ >
[34] New River Improvement Project is an Imperial IRWMP stakeholder.

11.7.2.9 Calexico New River Committee [35]

Calexico New River Committee, which is a member of the New River Improvement Project Technical Advisory Committee, was formed by the City of Calexico, local citizens, and state and federal agencies. In cooperation with Calexico New River Committee, California Mexico Border Relations Council developed a strategic plan to guide implementation of the New River Improvement project. The purpose of the New River Improvement Project is to provide public health and environmental improvements, including native vegetation and restored or created wetlands to mitigate adverse impacts of constructing other capital improvements which include trash collectors and box culverts. Trails and other recreational facilities are also proposed.

11.7.2.10 Example Projects

Salton Sea Species Conservation Habitat Project. The project is a Period I activity under the Salton Sea Ecosystem Restoration Plan. The project is designed to function as a sustainable fishery at the Salton Sea for piscivorous (fish eating) birds that either are transient or resident to the area. Along with immediate habitat benefits, the project will also be used to evaluate various construction, management, and enhancement techniques for additional habitat creation projects at the Salton Sea. In August 2011, the United States Army Corps of Engineers, CDWR, and CDFG released a Draft Environmental Impact Statement/Environmental Impact Report (DEIS/DEIR) to evaluate the impacts of alternative methods of implementing the SCH Project (USACE, CDWR, CDFG, 2011). The SCH DEIS/DEIR was circulated for public review, and the SCH Final EIS/EIR is expected in mid 2012. The state is in the process of developing final construction plans for the SCH Projects. Depending on funding allocation, the plan is to begin construction in 2014.

U.S. Fish and Wildlife Service Sonny Bono National Refuge Habitat Project. The refuge, in partnership with IID, United States Geological Service, and local geothermal interests, is proposing development of shallow wading and shore-bird habitat at Red Hill Bay. As proposed, this project will provide additional avian habitat and will provide playa dust suppression in an area that has demonstrated emissive characteristics. This project will also evaluate various habitat design and management techniques including the management of salinity and drain water to minimize selenium concentrations and potential bioaccumulation.

IID Managed Marsh. The marsh complex is a three-phase project totaling approximately 959 acres of habitat as mitigation for impacts to wildlife species within the agricultural drain system. Phase I was completed in 2009, with Phases II and III to be completed in 2014 and 2019 respectively. Phase I of the Managed Marsh is approximately 365 acres of emergent wetland, riparian, and scrub-shrub habitat. Information gathered from this phase will be use to improve the design for Phases II and III.

New River Wetlands Project. The wetlands project is a good example of a multi-benefit project to address water quality issues on the New River and reduce pollutants carried by the New River to the

[35] Calexico New River Committee website. 27 April 2012. <http://www.calexiconewriver.com/>

Salton Sea. In early 1997, Desert Wildlife Unlimited worked with local, state, and federal agencies to obtain grant monies and permits and has constructed two wetlands. While the projects were designed primarily as water treatment wetlands, they have demonstrated value as wildlife habitat. Additional monitoring and evaluation is necessary to further understand the potential for these areas as habitat and the potential for selenium bioaccumulation by bird species using the wetlands.

11.7.3 Opportunities – Regional Mitigation, Salton Sea, Program Design

11.7.3.1 Develop an Imperial Regional Mitigation Program

Develop regional mitigation program concepts to increase the cost-effectiveness of recycled water and drain water desalination projects. This could include refining existing programs or agreements to share costs for a regional mitigation bank. Once the HCP/NCCP is finalized, mitigation costs of future projects that could impact drain and river flows will be better known and can be factored into Imperial IWRMP projects.

Similarly, projects proposed by private development interests, the Cities, or those that would be approved by Imperial County must incorporate mitigation into their projects, including anticipated mitigation costs. The HCP/NCCP and the IID Managed Marsh Project are examples of the kinds of projects that can be used in an Imperial Region Mitigation Program to mitigate for possible impacts from recycled water, desalination projects, or other projects with potential impacts to loss of drain flow, habitat, or sensitive species.

11.7.3.2 Salton Sea Financial Assistance [36]

CDWR and CDFG released the Salton Sea Financial Assistance Program Guidelines and Application Package on October 2011 for public review and comment. The comment period closed and responses to comments are being prepared with a final proposal solicitation package. The program will be funded through the Salton Sea Restoration Fund, which was established with enactment of the Salton Sea Restoration Act (Chapter 13 of Division 3 of the Fish and Game Code commencing with Section 2930) and funded in part by Proposition 84. Approximately three million dollars will be available this funding cycle. As currently proposed, the program focuses on conservation measures necessary to protect the fish and wildlife species dependent on the Salton Sea, and the urgent need to stabilize the habitat, including activities conducted at the Salton Sea or along its tributaries. Proposed projects should contribute to meeting the conservation objectives.

11.7.3.3 Coordinate Regional and Interregional Restoration Activities

Within the Imperial Region, the Water Forum can continue to support ecosystem restoration projects and coordinate activities to meet Imperial IRWMP goals and objectives.

[36] 2012 Salton Sea FAP Guidelines and Proposal Solicitation Package website. 27 April 2012. <http://www.water.ca.gov/saltonsea/habitat/financial.cfm>

The Coachella Regional Water Management Group and the Imperial Water Forum are the two most likely candidates to continue to coordinate interregional ecosystems restoration activity, share information and data, and further develop interregional opportunities. The Salton Sea Authority provides the mechanism and structure for interregional cooperation on Salton Sea restoration since IID, Imperial County, CVWD, Riverside County, tribal representatives, and other local stakeholders are members of the Joint Powers Authority.

11.7.3.4 Conduct Additional Pilot Demonstration Projects and Local Salton Sea Mitigation Planning Efforts

The SCH Project and the proposed Red Hill Bay project are examples of pilot and demonstration projects to test the feasibility of Salton Sea restoration approaches, including those that would meet objectives for habitat creation, water quality improvement, and reduction in playa dust emissions. These programs are examples of local, state, and federal cooperation.

The IID Joint Petition could also provide funding to advance Salton Sea ecosystem enhancement efforts to provide more functional value and more sustainable wildlife habitat in a shorter period of time. This proposed mitigation plan also preserves and promotes opportunities for renewable energy development on exposed Salton Sea shoreline. The petition mitigation plan also provides for timely implementation of dust suppression and air quality mitigation on Salton Sea shoreline. Cost savings could also be realized by co-locating service and infrastructure facilities and jointly conducting operation and maintenance activities. These moves could effectively reduce the total costs of restoring the Salton Sea, and, more importantly, accelerate the schedule for habitat development.

11.7.3.5 Factor Mitigation Costs into Project Design

Future water supply or other capital projects that may be proposed as part of the Imperial IWRMP should avoid, minimize, and mitigate project impacts at the time of design to the degree that this is feasible in order to avoid costly schedule delays. It is generally recognized that avoidance of impacts is likely to be the most cost effective strategy, and as such, proposed projects will use environmental criteria to screen alternatives.

11.7.4 Constraints

There are currently no multi-use mitigation programs in the region. Mitigation requirements could increase the cost and reduce the cost-effectiveness of some recycling or drain water desalination projects.

The administrative, governance and funding mechanisms for Salton-Sea related restoration activities is uncertain; the roles of the State's Salton Sea Restoration Council and the more locally oriented SSA have not been clearly defined. There is no final integrated state and federal restoration strategy or plan, or an integrated local, state or federal plan that has been acceptable to all parties, and there is uncertainty as to the state and federal roles and commitments to the Salton Sea restoration.

Locally, there are a limited staff and financial resources to further develop ecosystem related projects and manage a mitigation bank. Local financial resources are constrained and there are many competing needs for funding. There is reluctance to further burden development projects with additional costs since this could impede economic development opportunities in the Region, and there has been limited political support and funding for additional ecosystems restoration or management actions.

11.7.5 Relation to other Strategies

There may be opportunities to integrate ecosystem features into other RMS's, and the Water Forum will factor environmental criteria into project screenings to avoid, minimize, or mitigate impacts at the time of design. This includes the following water management strategies:

- Groundwater development, storage, banking and conjunctive use
- Desalination of drain water
- Matching water quality to use
- Local land use planning and management
- Pollution prevention

11.7.6 Support for Mitigating or Adapting to Climate Change

Habitat restoration or enhancement could help mitigate for loss of habitat due to other climate change impacts such as reduced rainfall and runoff, reduction in the availability of Colorado River water, or more rapid declines in the level of Salton Sea.

11.8 RECHARGE AREA PROTECTION

Recharge areas are lands that provide the primary means of replenishing groundwater. The objective for protecting recharge is to ensure that areas suitable for recharge, whether natural or from development of groundwater storage projects, continue to be capable of adequate recharge; and to prevent pollutants from entering the groundwater to avoid expensive treatment that may be needed prior to potable, agricultural, or industrial beneficial uses. Protection of recharge areas is necessary if the quantity and quality of groundwater in the aquifer are to be maintained or improved through recharge of freshwater.

For the Imperial Region, recharge area protection is considered as part of the plan to develop groundwater storage facilities by IID; review of the County Ordinance for potential improvements; and developing groundwater management plan elements or recommended actions where gaps are identified. The County's land use planning process is important for protecting recharge areas in the unincorporated areas and for the County Groundwater Ordinance. Additional protection of recharge areas through land use plans, or through the County groundwater ordinance could be considered as part

of the groundwater management plan elements of the IRWMP. Protecting groundwater recharge areas implies working with federal agencies to ensure access to federal lands within the Imperial Region.

Inter-regionally, this implies coordinating with the Coachella Valley Region to protect access to viable recharge areas and protect the region's aquifers and water quality if IID were to develop groundwater storage projects.

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 12

Review of Project, Program, Policy, and Funding Alternatives

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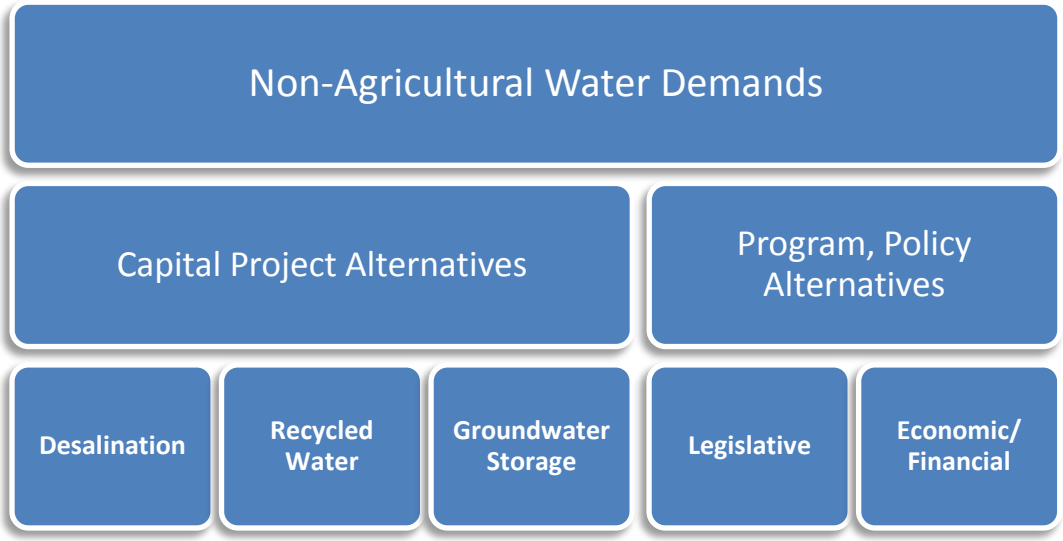
Chapter 12. Review of Project, Program, Policy, and Funding Alternatives

CDWR resources management strategy (RMS) findings by the Water Forum provided the basis for configuring alternatives to meet Imperial IRWMP goals and to address water management and water supply/demand issues described in prior chapters. RMS findings can be implemented as 1) capital project alternatives to build infrastructure to develop new water supplies and/or extend the existing supply, and/or 2) Program, Policy alternatives to manage and/or apportion the Region's water supplies. A third element, funding, completes the picture for analysis and resolution of IRWM challenges facing the Region. Project solutions would be engineered, while Program, Policy solutions would be legislated by the Cities, County or IID.

A range of solutions can be configured through combinations of capital projects and Program, Policy alternatives. For example, the Cities, County and IID have authorities to manage water and land use and to expend funds for the public benefit. With these authorities, they have the capacity to act individually or collaboratively to build projects, implement programs/policies, or to implement an alternative that integrates Program, Policy solutions with capital projects.



Capital project alternatives could consist of standalone or an integration of projects reviewed by the Water Forum. Capital projects that develop new municipal, commercial and/or industrial (MCI) supplies are known to be expensive and may require debt service, face a range of environmental and economic constraints, take time to implement and increase local costs.

Program, Policy alternatives imply that the Cities and IID, as water management authorities, and the Cities and County, as the land use authorities, could coordinate implementation of non- structural resource management strategies. They could adopt policies, programs, rules, regulations, or guidelines

to manage and coordinate and land and water management decision. Program, Policy alternatives could rely on regulatory or fiscal regulatory authorities. If the increased cost of new capital infrastructure is beyond the ability and/or willingness of the water users to pay, the only way to meet new demands would be through Program, Policy alternatives that apportion water among users.[1]

Section 12.1 describes the Imperial IRWMP project submittal and review process, and reviews both IID capital project alternatives identified by the consulting team and stakeholder projects submitted to the Water Forum for inclusion in the Imperial IRWMP.[2]

Section 12.2 presents Program, Policy alternatives that have been set aside for this version of the Imperial IRWMP.

Section 12.3 and the Grant Funding Matrix (Section 12.4) present funding alternatives to be considered for implementing projects, policies or programs and integration of available local funding with State, federal or private funding. The challenge is to recognize local ability and willingness to pay, and the realities of limited tax and rate base in the Imperial Region. Alternative sources of funding can be integrated and matched to alternatives.

12.1 CAPITAL PROJECT ALTERNATIVES

12.1.1 Imperial IRWMP Project Submittal and Review Process

On December 9, 2010, CDWR standards for projects review process, listed in Table 12-1, were introduced to the Water Forum, and the Projects Work Group began work on project submittal and review, that would address the following:

- Need for a fair, equitable and transparent process
- Schedule a First Call for projects
- Requirement for projects to be included in the Imperial IRWMP and to be eligible for state grant programs
- Considerations for developing the decision criteria

The first level of a two-level review process was developed to address how well the projects submitted addressed Imperial IRWMP goals and objectives, while the second-level review involved applying CDWR criteria to evaluate the projects. The entire process was intended to assist the Projects Work Group and the Water Forum to determine which projects would to be included in the Imperial IRWMP Implementation Project grant application.

[1] Apportionment among existing users implies moving water from agricultural uses to MCI. This is generally in conflict with the stated position of IID's Board of Directors and of IRWMP objectives, which is to have no impact on existing agricultural users. The Imperial General Plan Policies also seek to preserve and protect agriculture.
[2] For IID capital project alternatives and stakeholder submitted project details, see Appendices N and K, respectively.

Table 12-1. CDWR IRWM Project Review Process Standards

The IRWM Plan must contain a process or processes to select projects for inclusion in the IRWM Plan that includes the following components:

- Procedures for submitting a project to the RWMG
- Procedures for review of projects considered for inclusion into the IRWM Plan. These procedures must, at a minimum, consider the following factors:
  - How each project contributes to the IRWM Plan objectives
  - How the project is related to resource management strategies selected for use in the IRWM Plan
  - Technical feasibility of the project
  - Specific benefits to DAC water issues
  - Environmental Justice (EJ) considerations
  - Project costs and financing
  - Economic feasibility, including water quality and water supply benefits and other expected benefits and costs
  - Project status
  - Strategic considerations for IRWM Plan implementation
  - Contribution of the project in adapting to the effects of climate change in the region
  - Contribution of the project in reducing GHG emissions as compared to project alternatives
  - Whether the project proponent has adopted or will adopt the IRWM Plan
- A list of the selected projects

Source: <http://www.water.ca.gov/irwm/grants/guidelines.cfm>

It was envisioned that the First Call for IRWMP Projects would produce a list of projects, and that a Second Call would occur, if needed, to obtain additional project details to support prioritizing projects for the Imperial IRWMP and for any subsequent grant application. The Projects Work Group was tasked with developing criteria to be used to rank and evaluate submitted projects. The criteria were drafted by the Projects Work Group for Water Forum adoption, and were provided prior to the Second Call. The proposed submittal and review process in shown in Figure 12-1.

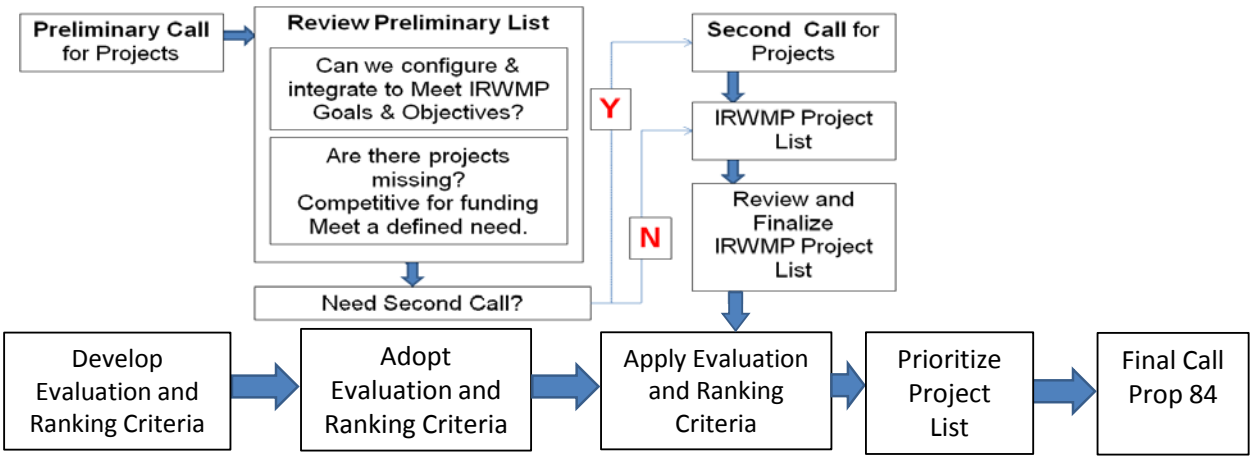


Figure 12-1. Project Information and Review Process

CDWR Standards for Project

The Water Forum defined the process for:

1. Submitting a project to be included in the IRWMP
2. Reviewing a submitted project
3. Communicating the list(s) of selected projects to stakeholders and the public

The Imperial Region Water Forum continued discussion of project submittal at the January 2011 meeting and authorized the First Call for projects, reviewed the Project Information Form, and recommended that a Project Submittal Workshop be conducted. In summer 2011, the Projects Management Team determined that a Second Call for Projects should be conducted to provide an opportunity for further outreach to the DACs and increase stakeholder participation, and the Water Forum endorsed this proposal. The Project Information Forms were updated to capture additional information needed to apply the adopted evaluation criteria.

12.1.1.1 IRWMP First Call for Projects

The primary purpose of the Preliminary Call is to identify potential projects that would meet Imperial Region goals and objectives.

The First Call was to identify stakeholder projects and ideas and begin evaluating readiness to proceed and how to integrate projects to meet Imperial IRWMP goals and objectives and. Submittal of a wide variety of projects at different levels of readiness to proceed was anticipated. Even when not completely ready for funding, the process sought to include projects that were planned for development over the planning horizon. The long-term nature of the Imperial IRWMP was stressed. Near-term or mid-term projects are considered grant ready, near-term was defined as ready to proceed in 1 to 3 years, mid-term in 3 to 6 years and long-term was greater than 6 years.

The First Call for Imperial IRWMP projects ran from February 16, 2011 to March 16, 2011. Written announcements and letters of invitation were sent via email and regular mail, and were posted on the Imperial IRWMP website. A press release was issued and an ad announcing the workshop was run in the local paper. Eligible project sponsors, including public agencies and nonprofit corporations, were encouraged to submit project concepts that they believed would meet the Imperial IRWMP goals and objectives regardless of whether the project was ready to proceed or would qualify for Proposition 84 Implementation Grant funding. The First Call project information forms are presented in Appendix K.

12.1.1.2 First Call for Projects Workshop

The First Call Project Submittal Workshop was held on February 16, 2011. The purpose of the workshop was to:

- Prepare eligible project sponsors to submit projects for consideration by the Water Forum
- Provide an overview of the project review process and criteria

- Explain Imperial IRWMP requirements
- Review Proposition 84 Implementation Grant requirements
- Present and review the project information form

The target audience was members of the Water Forum, other public agencies, and nonprofit organizations that are eligible to submit proposed projects that would help meet the Imperial Region Goals and Objectives. A briefing on the Water Forum and CDWR process was prepared and presented at the workshop.

12.1.1.3 Preliminary Project List

Information submitted in the First Call for Projects was used to build an unranked preliminary project list which was presented to the Water Forum at the April 2011 meeting. The list was provided in two parts:

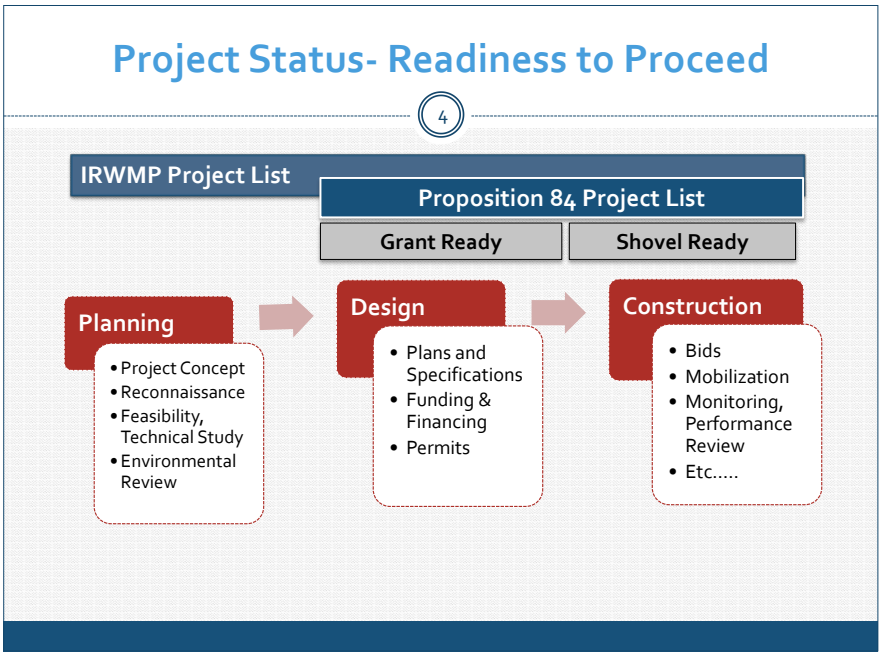
- A project list sorted by the primary projects goal, including project type (plan development, construction, feasibility study, etc.), water supply yield, total costs, and funding needed.
- A summary of readiness-to-proceed information including proposed timing for the project and the status of permitting and environmental review.

A draft preliminary project list was provided to the Projects Work Group and Water Forum in April 2011. Based on discussion of the list, the process was refined, and a two-tier system developed: Tier 1, grant and/or shovel ready projects that could be included in a CDWR grant application, and Tier 2, projects that should go into the Imperial IRWMP but are not yet ready to proceed. Imperial IRWMP projects, shovel ready and grant ready were defined as:

- **Imperial IRWMP projects** are those that meet the goals and objectives of the Imperial IRWMP**.** This includes project concepts that might not be ready to implement for a number of years.
- **Grant ready projects** are those that have completed work plan, budget, schedule and designs, and have a plan for completing funding, partnering agreements, environmental documents, and permitting prior to receiving grant money. These projects must have a complete economic analysis consistent with CDWR requirements and be included in the Imperial IRWMP. The project sponsors must adopt the Imperial IRWMP.
- **Shovel ready projects** are those projects ready to construct if Proposition 84 grant monies are received. This means that before CDWR would issue a contract to the Region, the projects to be funded and built would have all final funding, agreements, plans, permits, and environmental documents completed.

12.1.1.4 Second Call for Projects

Based on the response to the First Call and review of the preliminary project list, the Projects Work Group recommended that the Water Forum conduct a Second Call, to be open from Tuesday July 11, 2011, through Friday, September 2, 2011, and sponsor a second Project Submittal Workshop in July 2011. In June 2011, the Water Forum accepted the recommendation.



The Second Call was needed because of limited response to the First Call, extent of identified DAC needs, and to provide time to conduct additional outreach and promote the Imperial IRWMP. Many of the DACs do not have staff or funding to prepare project descriptions, let alone resources to conduct the required engineering and environmental review. The Water Forum wanted to ensure the opportunity for maximum participation and that the Imperial IRWMP was being used to identify critical water supply and water quality needs of the DACs in the Region.

The Projects Work Group recommended specific changes to the Project Information Form to support DACs in defining what level of support they needed to plan, design and permit a project. This included capturing information on the need for engineering design and a work plan schedule with budget development, obtaining environmental clearance and permits, conducting economic benefit analysis, and need for local match financing. The updated form also sought additional information on technical documentation (studies, feasibility report, and environmental review or design documents), funding and willingness to partner on projects. The Second Call used the updated Project Information Form.

12.1.1.5 Second Call for Projects Workshop

The second Project Submittal Workshop was held on July 20, 2011. As with the first workshop, it was widely noticed with email, press release, and advertisement in the local media. The draft evaluation Criteria and review process were presented so project sponsors would know how their projects would be evaluated. The revised Project Information Form was reviewed, and it was explained that project sponsors that responded to the First Call must submit the additional information and supporting documentation called for in the revised form. Workshop participants recommended further changes to the Ranking and Evaluation Criteria and to the Project Information Form. The updated project list was provided to the Water Forum at the October 2011 meeting.

12.1.1.6 Project Ranking and Evaluation Criteria

The Projects Work Group began developing the Project Ranking and Evaluation Criteria in January 2011. The Water Forum and Projects Work Group considered specific CDWR review factors when developing the criteria (Table 12-22).

Table 12-2. CDWR Project Review Factors for the Imperial Evaluation Criteria

• Contributes to IRWM Plan goals and objectives • Project costs and financing • Technical feasibility of the project • Project status (design, permits, environmental review) • Strategic considerations for IRWM Plan implementation • Benefits to DAC water issues	• Economic feasibility • Reducing greenhouse gas (GHG) emissions Environmental Justice (EJ) considerations • Use of resource management strategies • Adapting to the effects of climate change

At the March 2011 Projects Work Group meeting, draft criteria were presented for discussion. The proposed criteria were configured to identify projects to include in the Imperial IRWMP, and for review of the most competitive projects for CDWR's Proposition 84 grant. The criteria were designed to address four categories:

- Imperial IRWMP Goals
- Strategic Considerations for IRWMP implementation
- Readiness to proceed
- California DWR Statewide IRWMP Criteria, Statewide Preferences and Priorities

Specific evaluation factors and questions were identified for each category. Working with the consulting team, the Projects Work Group developed weighting factors and performance measures for each evaluation criterion and question. Revisions to the draft criteria were made based on Projects Work Group and Water Forum comments, and to match the Region's prioritized goals and objectives. The second draft of the Ranking and Evaluation Criteria was prepared and discussed at the June 2011 Projects Work Group and Water Forum meetings.[3] The final draft of the Ranking and Evaluation Criteria was presented to the Water Forum in October 2011 and adopted by consensus with minor changes.

The Ranking and Evaluation Criteria are presented in Appendix K, and a summary is presented in Table 12-3 While Table 12-3 does not provide the performance measures and metrics for each question, it does show the relative weight applied to each criterion. Total possible projects points and the relative percentage within the four categories are presented in Table 12-4, which also shows possible total points and relative percentage for each Imperial IRWMP goal category. The ability to meet the Imperial IRWMP goals was the basis for a preliminary project list.

The Water Forum also established the project review process. Based on a recommendation from the Program Management Team (PMT), the Water Forum determined that the consulting team would direct

[3] The Water Forum determined to add 25 additional points assigned by Water Forum members to the Readiness to Proceed category, in addition to the 38 points assigned by the independent reviewers

GEI Consultants, Inc. staff who had not been involved in the Imperial IRWMP to perform the review based on the adopted Ranking Evaluation Criteria. Their results were brought back to the Projects Work Group and then to the Water Forum. All Projects Work Group and Water Forum the meetings were open to stakeholders and the public.

Table 12-3. Summary of Ranking and Evaluation Criteria

	Criteria	Performance Measure	Weight
IRWMP Goals	**Water Supply Goal**	1. Effect to agricultural users of water	2
		2. Improve Water Supply	3
		3. Protect Surface Water Rights, maintain Colorado River yields	4
		4. Conserves Colorado River Supplies	4
		5. Support for in-lieu uses or substitution for Colorado River Water	4
		6. Integrate Resource Management Strategies	2
		7. Plan Consistency	2
		8. Groundwater Rights	1
	Water Quality Goal	1. Match Water Quality to use	2
		2. Support DACs- Wastewater	1
		3. Support DACs- Drinking Water	4
		4. Effect on Existing Waterways	2
		5. Comply with Total Maximum Daily Loads (TMDLs)	1
		6. Preserve or Improve Groundwater Quality	2
	Environmental Protection and Enhancement Goal	1. Environmental Enhancements	3
		2. Integrated Design Elements	2
	Flood Protection and Stormwater Management Goal	1. Reduce impacts from stormwater events	2
Other Goals and Strategies	**Strategic Considerations for IRWMP Implementation**	1. Public Acceptance/Public Support	3
		2. Cost Effectiveness	3
		3. Equitable cost sharing	2
		4. Promote Economic Development	3
	Readiness to Proceed Category	1. Timeliness	2
		2. Technical Feasibility of Project	4
		3. Environmental Compliance	2
		4. Permitting	1
		5. Funding	5
	Other CDWR Criteria	1. Provides multiple benefits	5
		2. Involves multiple participants and stakeholders	2
		3. Provides regional benefits	4
		4. State Program Preferences	2
		5. Statewide Priorities	2
		6. Climate Change Adaption	2
		7. Greenhouse Gas Emissions Contribution- Project	1
		8. Greenhouse Gas Emissions -Support to Renewable Energy	1

Table 12-4. Project Review Criteria Possible Total Points and Relative Percentage of the Score

Project Review Criteria, Distribution of Available Points		Subtotal Goals	Percent of Goal	Total Points	Percent of Total
IRWMP Goals				87	43%
1.	Water Supply Goal	51	58%		
2.	Water Quality Goal	24	28%		
3.	Environmental Protection and Enhancement Goal	8	9%		
4.	Flood Protection and Stormwater Management Goal	4	5%		
Subtotal IRWMP Goals		**87**	**100%**		
Strategic Considerations for IRWM Plan Implementation				33	16%
Readiness to Proceed Category				63	31%
Other CDWR Statewide IRWMP Criteria				22	1%
Potential Total Project Score				**205**	**100%**

12.1.2 IID Capital Project Alternatives

The consulting team identified a range of capital project alternatives that IID could implement. These projects were assessed at a reconnaissance level to allow for comparison of project costs. This section summarizes the results of the evaluation undertaken to define potential mid-, near-, and long-term water supply alternatives that IID might develop for the Imperial Region. Capital facilities solutions include projects to expand the supply through groundwater development and/or desalinization, or to reduce discharge from the IID water service area to the Salton Sea. Projects were configured to provide new supplies and to meet anticipated future demands, integrating resource management strategies where it was believed that multiple benefits could be achieved. The alternatives were configured around several major themes, including:

- Desalination of brackish groundwater – East Mesa and Imperial Valley
- Desalination of drain water – from drains or after discharge to Alamo River or New River
- Groundwater banking – Coachella Valley IRWM Region
- Groundwater development and blending – East Mesa
- Recycling municipal wastewater

Consideration of recycled wastewater was deferred to the Imperial IRWMP, because the Cities own and operate the wastewater facilities. Nevertheless, reconnaissance-level analysis of recycled water projects was included so their costs could be compared with other projects by the IID board. Design considerations varied by the type of project:

- Ability to create new water; i.e., tap unused resources, or capture water that would otherwise discharge to the Salton Sea
- Potential to capture and use underruns or prevent overruns
- Consistency with existing QSA/Transfer Agreements
- Measurable firm yield that could be committed to forecasted MCI uses
- Potential to avoid, minimize or mitigate environmental impacts as part of the design

These design considerations were also used to rank or screen the alternatives. A number of technical studies were conducted to refine the design concepts and evaluate the feasibility of potential projects.

- Drain water sources and quality were evaluated to determine if drain water could be used as make-up water for the proposed desalination plants. The amount and quality of drain water, New River water, or Alamo River water are presented in Appendix G, Drain Water (NRCE, 2009).
- Desalination/Groundwater Development Feasibility Study (GEI, 2009) is provided as Appendix B.
- Potential for blending East Mesa groundwater in the All-American Canal is presented in Appendix M. Ambient groundwater quality has elevated levels of TDS.[4]
- Summary descriptions of IID capital project alternatives that remained after screening are presented in Appendix N.
- The basis of design for IID capital project alternatives s is presented in Appendix N.

12.1.2.1 Screening and Prioritization of IID Capital Project Alternatives

Qualitative and quantitative screening criteria and assumptions were developed in consultation with IID staff. Areas within IID's service area with physical, geographical (i.e., market demand for the water), and environmental characteristics most suited to implementing short- and long-term alternatives were identified. Technical project evaluation criteria included volumes of water that could be delivered and/or stored by each project, regulatory and permitting complexity, preliminary engineering components, land use requirements, and costs.

After preliminary evaluation, a total of 27 projects were configured: 17 groundwater or drain water desalination, 2 groundwater blending, 6 recycled water alternatives, 1 groundwater banking alternative, and 1 IID system conservation project alternative.

The level of detail included in the definition of each project was intended to allow comparison of the alternatives, preliminary evaluation of project feasibility, definition of major implementation challenges, and development of approximate costs. Project descriptions, including cost estimates, project schematics or maps, and potential variations on each project are further detailed in Appendix N.

[4] Blending groundwater was not favored by Water Forum agricultural stakeholders. Colorado River water is already salty and difficult to manage. Increased salt levels in the all-American Canal water, which is delivered to all users, would impact ability to grow certain crops.

Table 12-5. IID Capital Project Alternatives and Cost

Name	Description	Capital Cost	O&M	Equivalent Annual Cost	Unit Cost ($/AF)	Yield (AF)
GW 18	Groundwater Blending- East Mesa Well Field Pumping to All-American Canal	$ 39,501,517	$ 198,000	$ 2,482,000	$ 99	25,000
GW 19	Groundwater Blending- East Mesa Well Field Pumping to All-American Canal with Percolation Ponds	$ 48,605,551	$ 243,000	$ 3,054,000	$ 122	25,000
WB 1	Coachella Valley Groundwater Storage Project	$ 92,200,000	$ 7,544,000	$ 5,736,746	$ 266	50,000
DES 8	25 KAF East Brawley Desalination with Well Field and Groundwater Recharge	$ 100,991,177	$ 6,166,000	$ 12,006,000	$ 480	25,000
AWC 1	Systems Conservation Projects (2)	$ 56,225,000	N/A	$ 4,068,000	$ 504	8,000
DES 12	East Mesa 25 KAF Desalination with Well Field and Groundwater Recharge	$ 112,318,224	$ 6,336,000	$ 12,831,000	$ 513	25,000
DES 4	50 KAF Keystone Desalination with IID Drainwater/Alamo River	$ 147,437,743	$ 15,323,901	$ 23,849,901	$ 477	50,000
DES 14	South Salton Sea 50 KAF Desalination with Alamo River Water and Industrial Distribution	$ 158,619,378	$ 15,491,901	$ 24,664,901	$ 493	50,000
DES 15	South Salton Sea 50 KAF Desalination with Alamo River Water and MCI Distribution	$ 182,975,327	$ 15,857,901	$ 26,438,901	$ 529	50,000
DES 2	50 KAF Keystone Desalination with Well Field and Groundwater Recharge	$ 282,399,468	$ 13,158,000	$ 29,489,000	$ 590	50,000
RW 5	Regional Plant Serving Tertiary Water to IID Canal	$ 20,818,710	$ 829,853	$ 2,033,801	$ 308	6,600
RW 1	Disinfected Secondary Effluent from Existing Wastewater Treatment Plants Applied to Adjacent Agriculture	$ 18,779,688	$ 486,671	$ 1,572,702	$ 118	13,300
RW 3	Upgrade Existing Plants to Tertiary and Deliver Effluent to IID Canal System	$ 90,531,216	$ 2,992,257	$ 7,498,347	$ 562	13,300
RW 6	Regional Plant Serving Tertiary Water to Local Service Area and IID Canal	$ 102,374,854	$ 2,280,145	$ 8,200,493	$ 488	16,800
DES 7	East Brawley 25 KAF Desalination with Well Field	$ 100,409,542	$ 6,157,000	$ 11,964,000	$ 479	25,000
DES 11	East Mesa 25 KAF Desalination with Well Field	$ 111,746,590	$ 6,327,000	$ 12,789,000	$ 512	25,000
DES 1	Keystone 50 KAF Desalination with Well Field	$ 281,817,834	$ 13,149,000	$ 29,447,000	$ 589	50,000
DES 10	East Brawley 5 KAF Desalination with Well Field	$ 24,751,185	$ 1,525,000	$ 2,956,000	$ 591	5,000
DES 6	Keystone 25 KAF Desalination with Well Field	$ 160,695,766	$ 7,061,000	$ 16,354,000	$ 654	25,000
DES 17	Heber 5 KAF Desalination with Well Field	$ 95,899,356	$ 2,476,000	$ 3,303,000	$ 661	5,000
DES 13	East Mesa 5 KAF Desalination with Well Field	$ 33,027,263	$ 1,648,000	$ 3,558,000	$ 712	5,000
DES 16	South Salton Sea 5 KAF East Desalination with Well Field	$ 62,177,056	$ 1,971,000	$ 5,567,000	$ 1,113	5,000
DES 3	Keystone Desalination 50 KAF with Well Field and Groundwater Recharge and MCI Distribution	$ 306,357,788	$ 13,518,000	$ 31,235,000	$ 625	50,000
DES 9	East Brawley 25 kAF Desalination with Well Field, Groundwater Recharge and MCI Distribution	$ 162,175,609	$ 7,084,000	$ 16,463,000	$ 659	25,000
RW 2	Upgrade Existing Plants to Tertiary and Deliver Effluent to a Local Market	$ 140,568,145	$ 2,597,145	$ 10,726,215	$ 919	11,700
RW 4	Regional Plant Serving Tertiary Water Locally	$ 51,323,358	$ 1,438,723	$ 4,406,758	$ 938	4,700
DES 5	Keystone 25 KAF Desalination with Well Field, Groundwater Recharge & Evaporation Ponds	$ 372,088,101	$ 10,232,000	$ 31,750,000	$ 1,270	25,000
	Project alternatives were considered to have a lower priority - Unit cost > $600/AF , and were not ranked (NR) in the overall Alternatives Ranking Criteria Matrix					
	Project Alternatives were considered to have a lower priority due to no groundwater banking/storage elements and not enough annual yield production < 5,000 AF, and were not ranked (NR) in the overall Alternatives Ranking Criteria Matrix					
	Project Alternatives were considered to have a lower priority due dependance on outside agency parternability, and were not ranked (NR) in the overall Alternatives Ranking Criteria Matrix.					
(1)	Assumed 50 year lifespan, 5% interest. Other project used 30 yrs and 4%. Costs will be normalized in final report					
(2)	System Conservation includes 24 projects, costs from $398/AF to $1169/AF, averaging $504/AF					
(3)	Source water collected from Imperial and proposed Keystone Development					
(4)	Source water collected from Imperial, Brawley, El Centro, Colexic and proposed Keystone Development					

12.1.2.2 Analysis of IID Capital Project Priorities and Preferences

IID staff and the board stressed key factors identified to categorize project alternatives and establish priorities. Lower priority projects were defined as those projects that were less feasible due to technical, political, or financial constraints. Preferential criteria were those project characteristics that could increase the relative benefits of a project and grant it a higher priority. After consultation with IID staff, four criteria were selected to prioritize the IID capital projects:

- **Financial Feasibility.** Projects whose unit cost was more than $600/AF were eliminated from further consideration.
- **Annual Yield.** Project alternatives generating 5,000 acre-feet or less of total annual yield were determined not to be cost-effective and lacking necessary economies of scale.
- **Groundwater Banking.** Groundwater banking to capture and store underruns is recognized as a beneficial use of Colorado River water. Project alternatives without groundwater banking were given a lower priority.
- **Partnering.** Project alternatives in which IID was dependent on others (private and/or public agencies) for implementation were considered to have a lower priority in the IID review; this criterion was reserved for the IRWMP process, where partnering is a desirable attribute.

Using these criteria, 6 desalination, 2 groundwater blending, 1 system conservation, and 1 groundwater storage project remained. These projects are displayed in the unshaded area at the top of Table 12-5. It should be noted that the recycled water projects have competitive unit costs ($/AF) and were only deferred due to the need to partner to build projects with the Cities that own and operate the facilities. Appendix N provides a summary description of the projects in Table 12-5

12.1.3 IRWMP Capital Project Alternatives

As a result of the First and Second calls for projects, 49 proposed projects were submitted for inclusion in the Imperial IRWMP. Table 12-6 presents a summary of submitted stakeholder sponsored projects. The projects are presented according to the Imperial IRWMP goal that each project supports; the list is not prioritized. The prioritized list, which can be found in the Executive Summary and in Appendix K, will be maintained by the Water Forum as an active document and updated at least annually.

Table 12-6. Imperial IRWMP Project Submittal Summary List

Project Title	Submitting Agency/Org	Estimated Cost	IRWMP Goals Met
HPUD WWTP Upgrade to Tertiary Treatment	Heber Public Utility District	$12,500,000	Water Supply
Keystone Desalination with IID Drain Water/Alamo River Source (50 KAFY)	Imperial Irrigation District	$147,440,000	Water Supply
East Brawley 25 KAFY Desalination with Well Field and Groundwater Recharge (Desal 12)	Imperial Irrigation District	$101,000,000	Water Supply
City of Brawley Raw Water Storage Project	City of Brawley	$4,000,000	Water Supply
Keystone Water Reclamation Facility	City of Imperial	$65,000,000	Water Supply
IID System Conservation/Improvement Projects for IWSP	Imperial Irrigation District	$4,752,000	Water Supply
Ramer Lake Conservation Plan for Water Savings	Southern Low Desert Resource Conservation & Dev Council	$280,000	Water Supply

Table 12-6. Imperial IRWMP Project Submittal Summary List

Project Title	Submitting Agency/Org	Estimated Cost	IRWMP Goals Met
Ave. 62, Thomas Levy Recharge Site.	Imperial Irrigation District	---	Water Supply
Painted Canyon	Imperial Irrigation District	---	Water Supply
East Mesa Groundwater Storage Project	Imperial Irrigation District	---	Water Supply
Drainage Upgrade (Holt Avenue, Imperial to 12th)	City of El Centro	$468,455	Water Supply
Drainage Upgrade (Development west of Wake Ave and 8th St: Cypress Dr: Farmer Dr: 10th St: 9th St)	City of El Centro	$1,000,848	Water Supply
Drainage Upgrade (Broadway St., No. Eighth St., Commercial Ave. from Imperial Ave to sixth street.)	City of El Centro	$5,653,723	Water Supply
Drainage Upgrade (Dogwood Rd., Ross Rd., Heil Ave., Hope Ave. between 1st and Orange)	City of El Centro	$7,371,448	Water Supply
Phased Underrun Storage and Agricultural Wastewater Reclamation Project	Imperial Irrigation District	---	Water Supply
Ave 72, Martinez Canyon Groundwater Storage Project	Imperial Irrigation District	---	Water Supply, Regional Policy
Water distribution storage tanks, 2 each 5MG	City of El Centro	$10,000,000	Water Supply, Water Quality, Regional Policy
Interconnection projects between City of El Centro, City of Imperial and Heber PUD	City of El Centro	$1,400,000	Water Supply, Water Quality, Regional Policy
Regional Wastewater Treatment and Recycled Water Project	City of Brawley and City of Imperial	$60,000,000	Water Supply, Water Quality, Regional Policy
City of Brawley Reclaim Water Project	City of Brawley	$12,500,000	Water Supply, Environ-mental Protection/ Enhancement, Water Quality, Regional Policy
Imperial Valley Biogas Initiative	Southern California Gas Company	$20,000,000	Water Supply, Environ-mental Protection/ Enhancement, Water Quality, Regional Policy
Macroalgae Solutions for the Imperial Valley and Salton Sea Region	The Gas Technology Institute (GTI)	$5,000,000	Water Supply, Environ-mental Protection/ Enhancement, Water Quality, Regional Policy
City of Brawley Water Meter Project	City of Brawley	$4,000,000	Water Supply, Environ-mental Protection/ Enhancement, Regional Policy
New River Bioremediation & Wildlife Habitat Restoration & Process Evaluation Project	SDSU Research Foundation	$600,000	Water Quality
Holtville Water Distribution System Project	City of Holtville	$3,040,000	Water Quality
Holtville Wastewater Treatment Plant Improvement Project	City of Holtville	$6,149,000	Water Quality
New River Bioremediation & Wildlife Habitat Restoration & Process Evaluation Project	SDSU Research Foundation	$600,000	Water Quality
Holtville Water Distribution System Project	City of Holtville	$3,040,000	Water Quality
Holtville Wastewater Treatment Plant Improvement Project	City of Holtville	$6,149,000	Water Quality
Holtville Wastewater Collection System Project	City of Holtville	$4,100,000	Water Quality
Holtville UV Transmittance Water Treatment System Project	City of Holtville	$540,000	Water Quality
Holtville Sewer Master Plan/Map Update	City of Holtville	$84,000	Water Quality

Table 12-6. Imperial IRWMP Project Submittal Summary List

Project Title	Submitting Agency/Org	Estimated Cost	IRWMP Goals Met
Project			
Holtville Water Master Plan/Map Update Project	City of Holtville	$75,000	Water Quality
Poe Colonia Wastewater Treatment Plant Upgrade	County of Imperial	---	Water Quality
Microalgal Cultivation for Improved Yields, Economic Value & Water Use Efficiency on Agricultural lands in Imperial Valley, CA	Scripps Institution of Oceanography (SIO), UCSD	$3,500,000	Environmental Protection/ Enhancement, Water Quality, Regional Policy
Large-Scale Microalgal Cultivation on Recently-Exposed Playa Lands for Improving Salton Sea Water Quality and Regional Air Quality	Scripps Institution of Oceanography (SIO), UCSD	$5,620,000	Environmental Protection/ Enhancement, Regional Policy Goals, Water Quality
Integrated Microalgae Cultivation Process for Improving Water Quality in Imperial Valley Drainage Canals	Scripps Institution of Oceanography (SIO), UCSD	$3,500,000	Environmental Protection/ Enhancement, Regional Policy Goals, Water Quality
Drainage Upgrade (La Brucherie Rd. to 23rd; Barbara Worth Ave. to Orange)	City of El Centro	$652,273	Flood Protection/ Stormwater Management
Drainage Upgrade (8th St., Woodward to Villa)	City of El Centro	$1,080,684	Flood Protection/ Stormwater Management
Drainage Upgrade (Lincoln Ave.; 6th St.)	City of El Centro	$1,570,900	Flood Protection/ Stormwater Management
Drainage Upgrade (Oak St. from San Diego to Villa)	City of El Centro	$595,039	Flood Protection/ Stormwater Management
Drainage Upgrade (Evan Hewes Hwy. Dogwood to Cooley)	City of El Centro	$3,633,099	Flood Protection/ Stormwater Management
Drainage Upgrade (8th St. from Villa to Central Main Drain)	City of El Centro	$3,069,597	Flood Protection/ Stormwater Management
Holtville Stormwater Master Plan Project	City of Holtville	$60,000	Flood Protection/ Stormwater Management
Holtville Stormwater Conveyance System and Detention Basin Project	City of Holtville	$7,095,000	Flood Protection /Stormwater Management
Drainage Improvements in the Township of Seeley; County Project No. 5363	Imperial County Public Works	$1,916,794	Flood Protection /Stormwater Management
Spearheading with Spirulina: An Sustainable Approach to Desert Aquaculture	Southern Low Desert RC&D Council	$350,000	Regional Policy Goals

The Projects Work Group heard presentations from project proponents in March and April 2012, and those in attendance scored the projects based on readiness to proceed. These readiness-to-proceed scores were added to the consultant scores to establish a grant funding priority list. This grant priority list will be maintained as an active document by the Water Forum on its website. This will provide flexibility to coordinate responses to state and federal grant opportunities.

A report, Stakeholder Sponsored Projects (GEI, 2012) was prepared to document the proposed projects. Using the Ranking and Evaluation Criteria adopted by the Water Forum, GEI Consultants, Inc. conducted

reviews and prepared a project ranking list. The ranking results are documented in a report titled Project Review, Prioritization and Ranking (GEI, 2012b). Both reports were provided to the Projects Work Group and Water Forum for review, and are posted on the Imperial IRWMP website Projects & Review tab.[5]

The following sections review Imperial Region programs and policies that are in place, and others that have been proposed by the consulting team.

12.2 Imperial Region Program/Alternatives

For Water Forum findings on the CDWR Land Use and Management resource management strategy, see Chapter 11, Practice Resources Stewardship and Other Strategies. This section presents programs and policies that IID and the County have in place along with concepts for possible future development in the Imperial Region. Imperial IRWMP updates may further analyze program and policy alternatives related to the integration of land use planning and water management.

IID has the authority to manage the Colorado River supply and evaluate changes in the place of water use, type of water use, or amount of water use. County and City land use planning and development review processes provide the opportunity for coordination with IID to ensure that a secure water supply can be provided to new projects, and that potential negative impacts to agricultural water demand for Colorado River supplies, to IID facilities and/or to the environment are avoided or mitigated.

12.2.1 Land Use and Water Management Program, Policy Environment

Early in the planning process it was determined that if an intractable issue were encountered that could not be readily resolved, it would be put in a 'parking lot' or placed on hold so that the Water Forum could move forward in the Imperial IRWMP process. This approach worked well and a number of times the Water Forum revisited a subject that had been put in the parking lot and was able to reach a consensus.

For example, during Water Forum review, it became clear that timing was not right to further develop and integrate some of the CDWR resource management strategies. The Water Forum also recognized that more time would be required to integrate capital projects strategies with identified policy/program strategies. At the March 2011 Water Forum meeting, it was decided that the Program, Policy concepts described in Section 12.2.1.1 that were presented in to the IID board in 2009 were not ripe for decisions and should be set aside until such time as IID and County define an approach.

Addressing uncertainties and resolving outstanding as well as ongoing issues is part of the Imperial IRWMP adaptive management strategy. Other regional uncertainties are related to ongoing litigation,

[5] Imperial IRWMP website: Projects & Review tab. <http://imperialirwmp.org/projects.html>

status of the QSA/Transfer Agreements and Salton Sea restoration. However, the IID/SDCWA Water Transfer Fallowing Program is underway, as described below.

As the County and IID determine a way forward, additional policies and programs can be considered when updating the Imperial IRWMP.

12.2.1.1 Alternatives Presented to IID Board in 2009

The consulting team presented a number of Program, Policy alternatives to the IID board in 2009 that might provide a basis to meet future MCI demand and provide a basis for Imperial IRWMP updates. The Program, Policy alternatives presented to the IID board were structured to integrate long-term or temporary fallowing (crop-idling), irrigated land retirement and economic incentives, while recognizing the opportunities to integrate land use and water management authorities into the project and the review process. These concepts were also presented to the Water Forum during in the course of resource management strategy review.

The overall concept was to develop and assess alternatives to manage the Region's Colorado River supply to meet future demands without building capital facilities. Alternatives configured included:

- No Action Alternative
- Minimalist-IID Develop Policy/Project Proponent Develop Solutions
- Full Apportionment/Fallowing/Managed Industrial Water Pool
- Full Apportionment/Fallowing/Free Market Exchange
- Land Conversion/Industrial Water Portfolio
- Options Market for Fallowing during SDI

A final alternative was not selected by the IID board pending formation of the Water Forum and publication of the Imperial IRMWP. However, the IID board did eliminate two concepts from consideration:

- Unregulated free market for exchange of water
- Fallowing for out of valley transfer beyond that currently required to meet existing commitments as expressed in Board Resolution 25-2005[6]

Since the time when the IID board considered the alternatives, some circumstances have changed. Private land holders, in cooperation with solar photovoltaic companies, are proposing to locate solar photovoltaic facilities on agricultural lands. Such private property owner land use decisions are subject to County review and permitting.

12.2.1.2 IID/SDCWA Water Transfer Fallowing Program

[6] IID Resolution 25-2005. IID's Commitment to Implement QSA Programs and Opposing Forbearance of Any IID Water. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=3891>

IID, while fundamentally opposed to fallowing during the QSA/Transfer Agreements negotiations, ultimately agreed to a 15-year (2003-2017) fallowing program to eliminate potential effects to the Salton Sea resulting from the transfer of water out of the Imperial Valley. Water conserved from the fallowing program that is transferred to SDCWA ramps up for the first ten years, and then decreases for the next five years as efficiency conservation projects are developed and implemented; however, water conserved from the fallowing program that is delivered to the Salton Sea as mitigation water continues to ramp up from 5,000 acre-feet in 2003 to 150,000 acre-feet in for 2013-2017 (a total of 800,000 acre-feet over the 15 years). Efficiency conservation replaces all fallowing by 2018 and no additional mitigation water has to be delivered to the Salton Sea. [7]

Under the Fallowing Program, which IID initiated on December 1, 2003, and has continued on annual and biannual bases since that time, willing land owners and lessees can contract with IID to fallow fields to meet the SDCWA transfer and Salton Sea mitigation water needs for the first 15 years of the IID/SDCWA Water Transfer. Each year the price to be paid for water conserved from fallowing is set by IID and solicitations are sent out asking for voluntary participation to fallow a field in return for payment for the conserved water. Fields are then contracted based on a random selection to meet the amount of conserved water needed each year. Each field's participation in the fallowing program is limited to two out of every four years.

IID staff oversees administration of the Fallowing Program including distributing solicitation announcements and fallowing proposal forms, issuing contracts, locking delivery gates on fields participating in the program, insuring that the fields are not being watered and that dust mitigation is adequate, and making IID payments to participants. IID performs remote sensing to make sure crops are not being grown, with field checking as needed. USBR staff visits once a year and conducts a random check on fields enrolled in the program.

The Local Entity Mitigation Program (LEMP) is intended to offset socioeconomic impacts resulting from the Fallowing Program and was implemented by IID within the IID water service territory. As described above, the fallowing at issue creates conserved water for transfer and for environmental mitigation under the QSA/Transfer Agreements.[8] LEMP funding amounts are determined by a schedule that compares funds available under the full life of the Mitigation Competitive Grant Program to the volume and timing of fallowing to create transfer and mitigation water. For the fallowing years 2005-06, 2006-07, 2007-08, a total of $4,124,008 was allocated to the non-competitive, or farm service provider component, and $2,220,629 to the competitive component for LEMP funding. Awards for the non-competitive component for these fallowing years were made by the Local Entity in 2009. LEMP funds in the amount of $2,220,619 were available for the 2010-2011 Program.[9]

[7] Source: QSA by and among IID, MWD, and CVWD, Exhibit C. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=882> (p 39 of 44)
[8] The program is governed by the Revised Fourth Amendment as modified and amended, to the Agreement between IID and SDCWA for the Transfer of Conserved Water, dated October 10, 2003, and by other agreements.
[9] IID Local Entity Mitigation 2010 Competitive Gran t Program Request for Proposals

12.2.2 Imperial Region Program, Policy Framework

The County and IID coordinate in the SB 610 and SB 221 regulations that require Water Supply Assessment/ Water Supply Verification plans (see Appendix J). In addition the County has a policy for solar development; and IID has policies in place that relate to land use and the available water supply: 1) a Certificate of Ownership policy; 2) an Interim Water Supply Policy for Non-Agricultural Projects, 3) a Temporary Land Conversion Fallowing Program, and 4) an Equitable Distribution Plan and Regulations.

12.2.2.1 IID Water Cards[10]

IID requires completion of a Certificate of Ownership (referred to as a "water card") to establish an Agriculture, Municipal or Service Pipe account and receive IID water delivery. The water card allows the Water Department to acquire owner and tenant information for the property. These records are entered into an IID database.

12.2.2.2 IID Interim Water Supply Policy[11]

In September 2009, the IID Board adopted an Interim Water Supply Policy (2009 IWSP). The purpose of the IWSP is to make ate available for new projects without impacting existing users. IID is looking to more effectively manage existing water supplies and to maximize its ability to store or create water when the available water supplies exceed the demand for such water. The stored water would be made available for use when water demand exceeds supply. Based on known pending requests to IID for water supply assessments/ verifications and pending applications to the County of Imperial for various Non-Agricultural Projects, the District estimated that up to 50,000 acre-feet per year of water could potentially be requested for Non-Agricultural Projects by 2030.

Under the IWSP, IID will evaluate the projected water demand of such projects and the potential means of supplying that amount of water. The 2009 IWSP designates up to 25,000 acre-feet per year of water for potential Non-Agricultural Projects within IID's water service area. Proposed Non-Agricultural projects may be required to pay a Reservation Fee, and the reserved water shall be available for other users until such Non-Agricultural projects are implemented and require the reserved water supply.

ID's 2009 IWSP is to remain in effect until such time as IID identifies potential programs and projects to develop new water supplies and new storage, enhance the reliability of existing supplies, and provide more flexibility for Water Department operations, all in order to maintain service levels within the IID water service area. IID adopted the 2009 IWSP for Non-Agricultural Projects to address proposed projects that will rely upon a water supply from IID until such time as the IWSP is modified and/or superseded to take into consideration relevant policies and data. As of May 2012, 1409 acre-feet per year of water per year have been apportioned to users under the 2009 IWSP.

<http://www.iid.com/Modules/ShowDocument.aspx?documentid=3993>
[10] IID website: Water Cards. <http://www.iid.com/index.aspx?page=466> 10 Jun 2013.
[11] IID website: Municipal, Industrial and Commercial Customers. <http://www.iid.com/index.aspx?page=152>

12.2.2.3 Imperial County CUP Policy for Solar Voltaic Development

In February 2010, as part of the IRWMP effort, IID and the County discussed land use changes and their impact on water management. In January 2012, the County approved conditional use permits (CUP) for solar development. A CUP allowing a solar photovoltaic project on land zoned for agricultural use would result in a reduction of annual water use for the duration of the CUP since solar photovoltaic projects use much less water than agriculture, freeing up water for a new use in each calendar year the project remains in operation.

Such a conditional term of operation for “crop" change presents challenges to IID management of underruns or inadvertent overruns ; i.e., under using or exceeding IID’s annual right to consumptive use of Colorado River water under the terms of the QSA/Transfer Agreement that will have to be resolved for this this approach to be favorable to the Region.

12.2.2.4 IID Temporary Land Conversion Fallowing Policy[12]

Facing the challenge of CUPs being issued for solar voltaic projects, the IID board developed a Temporary Land Conversion Fallowing Policy under California Water Code Section 1013 for Purposes of the QSA. Under this policy, conserved water attributed to longer-term, but temporary, fallowing can be used by IID to meet environmental and certain water transfer requirements.

At its May 8, 2012 meeting the IID board adopted Resolution 17-2012, which provides for a temporary land conversion fallowing policy:

> ***A. WHEREAS,*** *the IID Board of Directors is the decision-making body for IID; and*
>
> ***B. WHEREAS,*** *in furtherance of its responsibility, mission, and intention to protect and preserve its water and water rights for its uses and purposes, IID has entered into the IID Water Conservation and Transfer Project (transfer project), including the Quantification Settlement Agreement and related agreements (collectively, the "QSA"); and*
>
> ***C. WHEREAS,*** *IID has certified a final environmental impact report/environmental impact statement for the IID Water Conservation and Transfer Project and Habitat Conservation Plan in June, 2002, as modified and supplemented by the addendum thereto approved by IID on October 2, 2003, (collectively, "Transfer Project EIR"), together with a mitigation, monitoring and reporting program (MMRP) and CEQA Findings and Statement of Overriding Consideration (CEQA findings) for the transfer project; IID also certified the final supplement to the IID Water Conservation and Transfer Project EIR/EIS for the Managed Marsh Complex on June 24, 2008 (SEIR for the Managed Marsh) and adopted a Final Negative Declaration for the Interim Water Supply Policy for Non-Agricultural Projects on September 29, 2009 (2009 Neg Dec for IWSP); and*
>
> ***D. WHEREAS,*** *the definition of "conserved water'' in the QSA and pursuant to the California*

[12] See: Temporary Land Conversion Fallowing Policy <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5646>; IID Board Resolution 17-2012 and TLCFP Environmental Compliance Report <http://www.iid.com/Modules/ShowDocument.aspx?documentid=5630>; and CWC§1013 <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=wat&group=00001-01000&file=1000-1017>

Water Code allows that water be created that is available for transfer by "temporary land fallowing"; and

***E. WHEREAS,** the term "temporary land fallowing" is defined in the QSA and pursuant to the California Water Code as "the retirement of land from crop production activities for a period starting no earlier than the effective date [of the QSA] and ending on or prior to the termination date [of the QSA]"; and*

***F. WHEREAS,** under the QSA and the California Water Code conserved water may be made available by IID to transfer under the QSA contracts with QSA transferees; and*

*G. **WHEREAS,** California Water Code section 1013 was amended to implement the QSA to ensure that if "land fallowing conservation measures" were implemented by IID for QSA transfer or mitigation water, they would be statutorily deemed to be as if conserved by efficiency improvements, with "land fallowing conservation measures" then being defined as including "removing land from agricultural production regardless of whether the fallowing or removal from agricultural production is temporary or long term, and regardless of whether it occurs in the course of normal and customary agricultural production"; and*

*H. **WHEREAS,** Water Code section 1013 provides that IID perform any "land fallowing conservation measures" as part of a land fallowing conservation plan that includes mitigation provisions adopted by the Imperial Irrigation District Board of Directors. IID has already adopted and approved such measures as part of the Transfer Project EIR, MMRP, and CEQA findings, the SEIR for the Managed Marsh as well as the 2009 Neg Dec for the IWSP; and*

*I. **WHEREAS,** Water Code section 1013 provides that before IID adopts a land fallowing conservation plan, it shall consult with the County of Imperial Board of Supervisors ("county") and obtain the board's assessment of whether the proposed land fallowing conservation plan includes adequate measures to avoid or mitigate unreasonable economic or environmental impacts in the county of Imperial. There are an increasing number of proposed private projects that will temporarily take agricultural land out of agricultural production which must obtain approval from the County and for which the county will be the lead agency for compliance with the California Environmental Quality Act ("CEQA"). Because the conditions for county approval of any particular temporary land conversion fallowing project will vary according to the type of project, its location and size, and other factors, and because the county will evaluate the potential environmental and economic impacts for each such project that will have different potential effects on the environment and economics, this temporary land conversion fallowing policy is not a land fallowing conservation plan. However, the county's permitting and CEQA compliance process will give the county of Imperial and IID the opportunity to consult about each project individually to determine whether there are adequate measures to avoid or mitigate unreasonable economic or environmental impacts in the county of Imperial; and*

*J. **WHEREAS,** the county has been, is currently, and may be in the process of granting approvals to various solar and other industrial projects in the Imperial Valley which, if actually built, may meaningfully reduce water orders to IID, in that such projects are planned to be built on established farmland in the IID service area, though required to be returned to farmland in the future. As part of its permitting process the county of Imperial assesses the effects of such projects on the local region and its environment, and generally requires that the land used for such projects be returned to agricultural use in the future. The county of Imperial does not grant an approval unless it has determined that such project includes adequate measures to avoid or mitigate unreasonable economic or environmental impacts in the county of Imperial; and*

K. WHEREAS, *IID also desires that lands being utilized for the temporary land conversion fallowing policy addressed herein be required to return to farmland within the term of the QSA so as to best protect the Colorado River water rights held by IID under state and federal law, and to have a mechanism by which to enforce that obligation; and*

L. WHEREAS, *IID and its water customers, which consist of most if not all of the citizenry of the Imperial Valley, will be benefited by agreements between IID and landowners/tenants for temporary land conversion fallowing projects within the term of the QSA which: (a) ensure that IID has a right to demand that land being used for the projects will be returned to agricultural production; and (b) will allow IID to transfer or use for environmental mitigation any conserved water created by the temporary fallowing of land at the projects; and*

M. WHEREAS, *when IID enters into land fallowing agreements with landowners/tenants for the temporary land conversion fallowing policy projects, it is necessary for IID to calculate how much water is being conserved per year for the length of the agreement. The determination of how much water is conserved and made available for transfer or environmental mitigation purposes due to the temporary removal of land from agricultural production will be made using IID historical data to determine an appropriately calculated water conservation yield attributable to the land being temporarily fallowed; and*

N. WHEREAS, *any conserved water transfers to be implemented by IID for the QSA water transfers must satisfy the conditions imposed by the State Water Resources Control Board (SWRCB) in its Revised WRO 2002-0013, with all amendments and modifications thereof (the "SWRCB Order"); and*

0. WHEREAS, *approval of a policy for temporary land conversion fallowing is beneficial so that IID may negotiate and enter into agreements for water supply and land fallowing consistent with the policy. The temporary land conversion fallowing policy is attached to this resolution as Attachment A; and*

P. WHEREAS, *IID staff has prepared an environmental compliance report, a copy of which is attached hereto as Attachment B; and*

Q. WHEREAS, *all of the findings and conclusions made by the IID Board of Directors pursuant to this resolution are based upon the oral and written evidence presented to it as a whole and not based solely on the information provided in this Resolution; and*

R. WHEREAS, *the board wishes to approve the environmental compliance report, make findings pursuant to CEQA, approve the temporary land conversion fallowing policy and authorize the general manager to negotiate and enter into agreements substantially in conformance with the policy set forth in Attachment A.*

NOW, THEREFORE, BE IT RESOLVED *as follows:*

(1) The IID Board of Directors hereby finds and determines that the proposed temporary land conversion fallowing policy is consistent with existing IID regulations and will not adversely affect existing customers.

(2) In order to comply with CEQA:

a. The board has reviewed and considered the environmental compliance report attached to this resolution as Attachment B.

b. The board finds that:

(i) The temporary land conversion fallowing policy does not authorize, permit or approve any specific project that will temporarily remove land from agricultural production;

(ii) Any such projects in the unincorporated area of Imperial County must apply to the county of Imperial for permits and undergo CEQA review by the county of Imperial as lead agency;

(iii) IID will have the opportunity to review specific projects as a responsible agency during the county of Imperial's CEQA process;

(iv) The effects of temporarily removing land from agricultural production were assessed by the transfer EIR and appropriate mitigation was defined, which mitigation is in effect on an ongoing basis; and

(v) The temporary land conversion fallowing policy will not change or affect any of the terms of the QSA agreements.

(3) The board finds that it is prudent to adopt a temporary land conversion fallowing policy to enable IID staff to effectively carry out a temporary land conversion fallowing program.

(4) Consistent with the QSA, IID will enter into separate agreements with project developers/ landowners/tenants for the temporary land conversion fallowing policy projects that will allow IID to enforce the obligation of those persons who take lands out of agricultural production during the term of the QSA to restore such lands to agricultural production. The water conserved from such temporary removal of such land from agricultural production shall be determined by IID staff based on the conserved water yield outlined in Recital M above, and shall be available for transfer or other use under the QSA and its related agreements, or otherwise as allowed by law.

(5) IID staff shall review the permitting process at the county for any temporary land conversion fallowing policy projects in the IID service area and determine whether the county has approved the project. If the county has issued an approval, then the requirements of Water Code section 1013 have been satisfied by the county's determination that the temporary conversion of land use for each project includes adequate measures to avoid or mitigate unreasonable economic or environmental impacts in the county of Imperial. If the county has not yet issued its approval of any particular temporary land conversion fallowing policy project, then IID staff will consult with county of Imperial staff, and await a determination from the County Board of Supervisors that the given project includes adequate measures to avoid or mitigate unreasonable economic or environmental impacts in the county of Imperial. Any approval by the county of Imperial for such project shall be deemed a determination by the county that the project includes adequate measures to avoid or mitigate unreasonable economic or environmental impacts in the county of Imperial.

12.2.2.5 IID Equitable Distribution Plan and Regulations[13]

While not yet put into practice due to not being needed, the IID board *approved a plan for the equitable apportionment of water (the 'Equitable Distribution Plan') in the event that in any [calendar] year, the expected demand for water is likely to exceed the supply expected to be available to the District*

[13] IID website: Equitable Distribution. <http://www.iid.com/index.aspx?page=141>

(supply/demand imbalance or 'SDI' condition). In 2009, the IID board approved revised EDP regulations that would implement a District Water Exchange to be administered by the IID based on apportionment when demand is anticipated to exceed supply.[14]

The purpose of the 2009 Regulations for EDP is to allow IID to respond to a situation in which the amount of water available under the terms of the 2003 Colorado River Water Delivery Agreement for its Priority 3(a) quantification is insufficient to meet users' demands and other IID obligations, including payback of inadvertent overruns.[15] Under the 2009 Regulations for EDP, a fixed volume of water is to be apportioned to five types of water users: municipal; industrial; agricultural lands, feed lots, dairies and fish farms; and environmental resources.[16] Through the District Water Exchange, agricultural water users would be able to participate in the sale and purchase of water.

12.2.3 Strawman Concepts for Further Development

Developing viable land use and management alternatives requires involvement of the land use agencies, agriculture, and other stakeholders to be successful. The consulting team has set forth strawman programs and policies for consideration in Imperial IRWMP updates, including water supplier and land use agency roles for water and land use management, program alternatives, land conversion economics, standardized terms and definitions, and recommendations for how an integration strategy might work.

12.2.3.1 Strawman Programs and Policies

Consulting team points, presented to the IID board in 2009, are included for consideration in Imperial IRWM updates:

- Apportionment is technically feasible; implementation would require the IID Board to determine whether solutions exist that do not involve fallowing and, if so, to develop policies, guidelines and/or regulations to handle economic, political, and legal issues including, but not limited to, the role of IID in a local water market, water pricing and rate structures, and whether and how potential impacts to agriculture or local communities from a water exchange, should they arise, could be mitigated.
- Opportunities for in-valley exchange of water may include extraordinary measures for reduction of water use such as fallowing (crop idling or solar development) and irrigated land retirement (e.g., urban development) that are not included in IID's Definite Plan.
- An in-valley exchange of water would require a systematic process by which IID would consider changes to the place or type of use of Colorado River water within the IID service area.[17]

[14] IID Board Resolution 8-2009. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=1210>. On September 22, 2009 IID board rescinded the 2009 SDI declaration, lifting the apportionment limit and implementation of the EDP.
[15] CRWDA, Oct 10, 2003. <http://www.usbr.gov/lc/region/g4000/QSA/crwda.pdf>
[16] The WIS-based IID Water Balance was modified in spring 2012 to include these use types.
[17] In-valley exchange implies that a historical water use is reduced or eliminated and unused water previously apportioned for that place and use is made available for use at a different place; or for a different use on all or a portion of the same property.

- The economics of in-valley MCI Exchange merit further study to document if there are net regional economic benefits, and to ensure that any third-party and socioeconomic effects are identified and can be mitigated.
- An in-valley MCI Exchange (apportionment) to a new MCI use requires a firm supply of water that can be verified by IID and the land use agency for purposes of making findings to permit new development.[18]
- In years with a declared SDI, the certainty that IID gives to MCI supplies would reduce the supply available to agriculture and/or increase the overrun that must be paid back in subsequent years unless projects that developed new water (recycling, groundwater storage, etc.) are operational.
- New MCI water use in the IID service area could reduce the volume of water available to holders of junior rights to use Colorado River water;[19] however, an IID Managed MCI Exchange is likely to be politically acceptable even if not positively construed by other Colorado River diverters.
- If underruns were banked and agricultural use not capped, it is possible that available water may only meet inadvertent overrun payback requirements with none left over for new MCI uses. The IID board would need to develop a policy to resolve this.
- Development of policies, programs, and pricing strategies by IID that would encourage or facilitate an in-valley exchange could be complex; but if well-conceived, they could reduce the potential for conflicts in the IID service area related to competition for the fixed water supply.
- If consensus among Imperial Region stakeholders can be achieved on mechanisms for an in-valley exchange (distribution) of available water, this could be a timely and relatively cost-effective solution for meeting future new MCI demand while minimizing impacts to agricultural, the environment and current MCI users.
- State law requires that IID, the Cities, and Imperial County cooperate and work together to better integrate land use and water supply plans and planning processes and to use water management and land use planning authorities, respectively, to provide water for new MCI demands while minimizing impacts to current users.
- IID is a responsible public agency with jurisdiction by law and has the necessary power and authority to review and approve changes in the place or type of water use of IID's Colorado River entitlement that would occur as a result of any land use decisions by Imperial County or the incorporated Cities.
- IID is required to manage its water right to ensure reasonable and beneficial use; as such IID is in a position to review and approve any change in place or change in type of use that is temporary (e.g., fallowing, conditional use permits) or permanent changes (e.g., urban development).
- IID could institute a permitting process to review and approve temporary (fallowing, CUP for solar development) or permanent (urban use) changes in place or type of water use. Such a

[18] SB610 and SB 221 revised the California Water Code to require that land use entities making land use decisions ensure that there is a verifiable water supply and that there are no impacts to existing water users.
[19] IID diversion of Colorado River water, whether for groundwater banking, ag or non-ag (MCI) use, is included in USBR accounting of IID consumptive use of Colorado River water. IID diversions in times of shortage on the Colorado River may reduce the amount of water available to be diverted by California entities with junior rights.

process could be used to mitigate negative impacts (see next section) and to ensure equity and fairness by increasing consistency and minimizing ad hoc and/or arbitrary decision making.

- An IID permitting process would complement the land use authorities of the Cities and Imperial County, provide a basis for the Cities and County to make legally defensible findings about water supply availability, and create certainty for project proponents.

12.2.3.2 Strawman Programs and Policy Impacts and Mitigations

- Land use changes that result in intensification of water use could have a negative effect on agricultural water supplies, since IID grants MCI demands higher reliability; thus, MCI users and are less subject to cut back in response to IID an overrun payback, SDI declaration and/or shortages on the Colorado River as a result of drought or climate change.
- An SDI declaration would trigger EDP Regulations including apportionment and a district water exchange; whereas, repayment of overruns under the USBR inadvertent overrun payback policy (IOPP) would require agricultural users to implement extraordinary conservation measures including fallowing. As such, without some new policy/program or projects, increased MCI use could increase the frequency or amount of land fallowing.
- Policies, programs and procedures instituted to deal with temporary land use changes that result in reduction of water use (e.g., solar development) may result in an overall lower demand in the IID service area; thereby, reducing IID Water Department revenue with perhaps an increase in local water cost ($/AF), while allowing those with holding Colorado River rights with priorities lower than IID's to increase their uses of water that could be allocated for use in the IID water service area.
- The lead land use agency (County or City) and IID and need to work together during project review to ensure adequate evaluation of direct, indirect, and cumulative impacts of new projects on agriculture water supplies; the environment, including reduction of return flows to IID drains, the Alamo and New rivers; and/or to IID facilities (such as stormwater discharge to IID drains, or subsidence due to groundwater pumping), are adequately evaluated. If needed, appropriate mitigation measures could be formulated and implemented as a condition of the lead agency's approval and permit for the project.

12.2.3.3 Strawman IID Managed In-valley MCI Exchange

While revenue/fiscal models and pricing structures would be needed, an options model (e.g., tiered pricing to generate funds needed to pay for projects and programs that would supply new water could provide sufficient mitigation and financing to allow introduction of an in-valley MCI exchange using a fallowing program or solar development as a bridge to capitalizing projects that would create new sources of water supply.

EDP regulations provide a basis from which to build programs and policies that ensure impacts are appropriately mitigated and water is reasonably and beneficially used. In addition, the requirement that IID pay back inadvertent overruns has resulted in an approach to forecast annual supply and demand, so as to trigger an SDI declaration if needed.

Studies by the consulting team indicate that:

- Land use conversion from agricultural to non-ag (MCI) uses is not expected to result in sufficient reduction in water use to meet projected MCI demands in the long run.
- Conversion of 1,000 acre-feet of water use from agricultural use to non-ag (urban or power production) use would have a positive economic effect.

12.2.3.4 Strawman In-valley MCI Exchange

A hypothetical in-valley MCI exchange based on a theoretical IID water supply portfolio is provided in Figure 12-2. As the agency with water use authority and to ensure fairness and equity, IID should be responsible for managing and tracking the process. Elements shown in the figure are described in the section following the figure. Many of these ideas are presented in Chapter 5 Water Supply, Demand and Water Balance.

New Supply. Expand Imperial Region water supply through reuse of Colorado River water (e.g., recycling) or developing unused water (e.g.; desalination of drain water or brackish groundwater). IID could adopt a water substitution (an *in-lieu*) policy to account for these new supplies. For example, if recycled water were provided to an agricultural user instead of a delivery by IID, the water that would have been delivered for that agricultural use could be provided to a new non-agricultural (MCI) demand.

Manage Existing Colorado River Supplies to Meet New Demands. Changes in land use by property owners and the Cities or County, whether short- or long-term, may change water use. IID would account for such changes in the type, place, or volume of Colorado River water use and apportion it to a new non-agricultural (MCI) demand through an IID Managed In-Valley MCI Exchange.

In-valley MCI exchange elements might include those shown in Figure 12-2, and described below it.

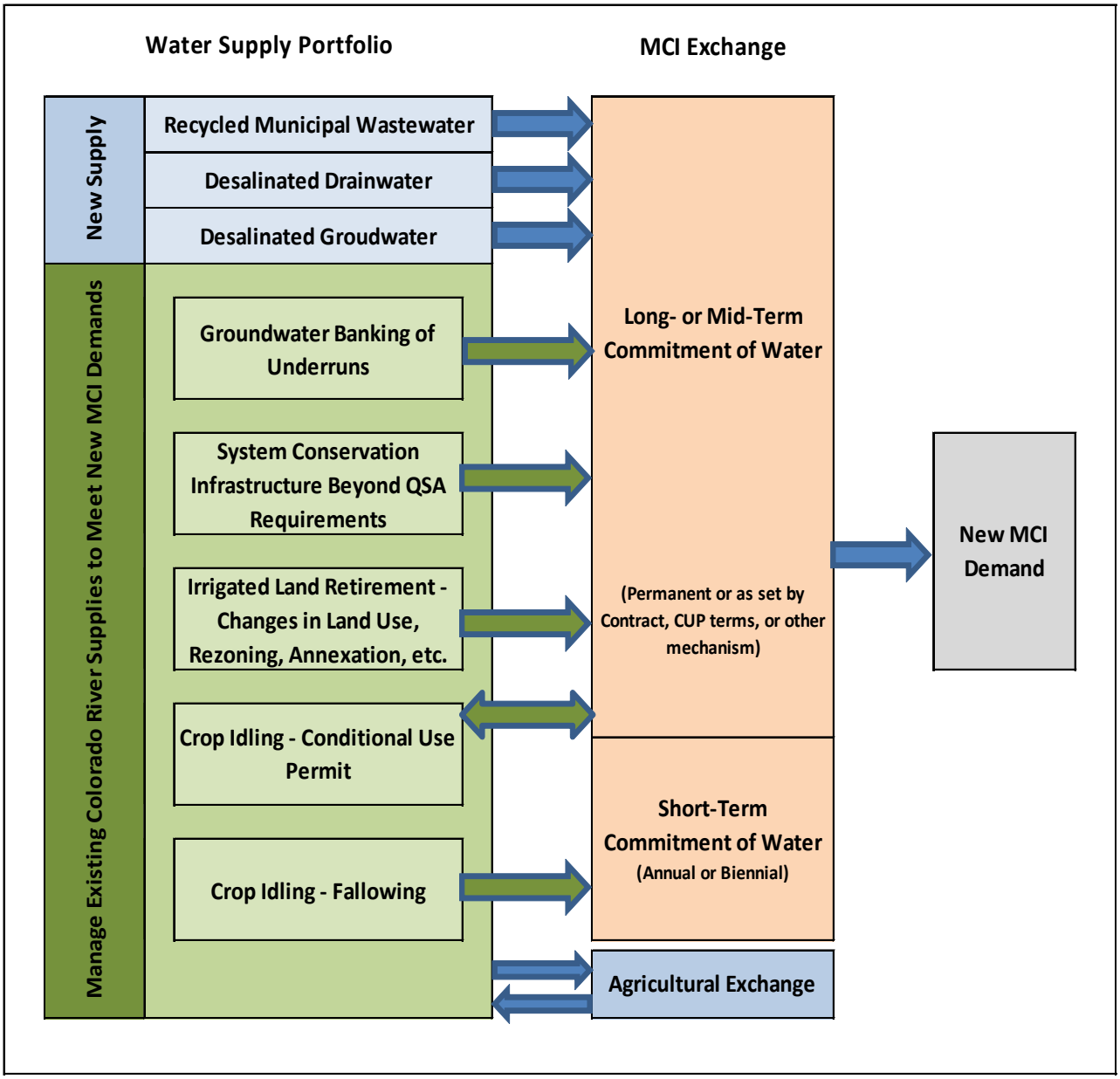


Figure 12-2. Strawman IID Managed In-valley MCI Exchange

- ***Groundwater Banking of Underruns*:** Banked water would allow agricultural users to have the water they need under most economic and environmental circumstances, while helping to prevent overuse of Colorado River water and supporting payback of inadvertent overruns.
- ***IID System Conservation Infrastructure beyond QSA Requirements*:** Several projects remain for changing the IID delivery system that would conserve water that may be available to beyond that required to meet QSA obligations.
- ***Irrigated Land Retirement – Changes in Land Use, Rezoning, Annexation, etc.*:** Permanent irrigated land retirement would occur through rezoning or annexation by the County or Cities. Consequent reduction in water use would be accounted for and apportioned to a land use with an increased water demand through the MCI exchange. As part of the project/development

review process, the land use agency (City or County) is required to obtain a Water Supply Assessment, including a pre- and post- project water balance, from the project proponent. The WSA must also be reviewed and approved by IID for water availability.

- ***Crop Idling – Changes in Land Use, Conditional Use Permit*:** A conditional use permit allows a temporary change in land use. The temporary change from agriculture to another use (e.g., solar photovoltaic) is for the term of the CUP; however, the land remains zoned for agricultural use. As noted above, the County is working on a solar ordinance, and IID has created a policy to manage water that may result from a reduction in use due to a change in use resulting from a CUP being issued.
- ***Crop Idling - Fallowing Program*:** Fallowing (for example for a period of two out of four years) is a short-term change in land use with resultant reduction in water use, and would be similar to the existing Equitable Distribution Plan or Salton Sea Mitigation program.
- ***Agricultural Exchange:*** Transfer of water between or among agricultural users in SDI years as provided in the 2009 IID Equitable Distribution Plan Regulations.
- ***New MCI Demand:*** Water supply primarily for future geothermal/solar thermal cooling with or without conservation best management practices (146 KAF, 180 KAF respectively), but could be the result of proposed changes in land use by a project proponent or the County or City pursuant to their land use authorities (see Appendix D).

12.2.4 Strawman Economic Incentives – Loans, Grants, Water Pricing

Economic incentives could be developed similar to those in the EDP Regulations, or the IID/SDCWA Water Transfer Fallowing Program, or other QSA/Transfer Agreement on-farm efficiency conservation programs that depend on the ability of new MCI users to pay.

12.2.5 Strawman Presentation to Water Planning Group (2-plus-2)

After reviewing and discussing policy alternatives, the IID board with support of IID senior staff, developed a strawman proposal that was presented for consideration to the Imperial Valley Water Planning Group (Two-Plus-Two: two members of the IID board and two County supervisors). Broad policy concepts presented were as follows:

- ***Annual apportionment of water.*** IID board would make an annual yearly determination of forecasted water use among all categories of users and apportion the available supply in a manner consistent with existing Equitable Distribution Plan Regulations.
- ***Joint land-use conversion policy.*** Imperial County, as the land-use planning entity, and IID, as the wholesale purveyor of untreated water to the region, would establish designated corridors that facilitate conversion of agricultural lands to renewable energy production.
- ***Joint groundwater study.*** The County and IID would conduct a joint feasibility study to ascertain availability and accessibility of groundwater resources in the Imperial Region.

- ***Fallowing for in-valley water exchange.*** IID would consider short-term (rotational) fallowing of agricultural land to generate water for MCI use.
- ***Water storage and banking.*** IID would pursue storage projects it has identified within its service area and banking opportunities outside the Imperial Region. While projects to augment the existing water supply are generally more expensive to build and implement than policy options, IID and other Water Forum stakeholders recognize that storage is vital to the long-term management of IID's water supply and that it provides the most durable and defensible means of addressing year-to-year fluctuations in usage.
- ***Commitment to regional planning model.*** In concert with the County, IID would develop a regional water plan that actively solicits and relies on stakeholder input and consent in balancing the needs of the Imperial Region's diverse interests, guided by the twin goals of multiple use and sustained yield.

12.2.6 Concepts for Future IRWMP Consideration

Topics to be considered, developed and resolved include:

- Outreach efforts, workshops and hearings to engage the community in developing an in-valley MCI exchange.
- Firmly define IID's role in reviewing and approving changes in place and type of use for new MCI water use.
- Cities, County and IID work together to:
    - Streamline the development review process so there is transparency and certainty in the process for obtaining water for new MCI water demands.
    - Update their developer guides[20] to define standards for information submittal requirements, water budgets, Water Supply Assessments and Water Supply Verifications (see Appendix J).
    - Develop permit systems to review and approve changes in the place and type of use; land use conversions; and apportionment of water to new MCI water users.
    - Define and communicate potentially significant impacts that could result from new MCI water uses, so stakeholders are aware of the need to avoid, minimize or mitigate impacts; and so project proponents, the Cities and Imperial County can work with IID to define and implement appropriate solutions.
    - Agencies will have to hire and retain staff to support the permitting process for evaluating changes in place and type of use, applying policies, reviewing Water Supply Assessments, making findings related to the impact on the water supply; and ensuring that identified third party impacts are mitigated.

[20] Water Department Developer Project Guide, IID, 2008. <http://www.iid.com/Modules/ShowDocument.aspx?documentid=2328>

- Comprehensive Geothermal Power Plant Water Use Policy: Could require proposed power plants, regardless of generating capacity and as part of the effort to mitigate for intensification of water use, first seek to develop brackish water from natural sources, irrigation return flows, inland wastewaters of low total dissolved solids (recycled water) or other sources (e.g., imports) for purposes of wet cooling, or that hybrid cooling be required if IID delivery of Colorado River water is to be relied upon.
- Apportionment Policy: Accounting for and making an annual apportionment of water resulting from permanent changes in place and type of land use ,or temporary changes to place and type of land use associated with an in-valley fallowing program.
- In- Valley "Bridge" Fallowing Program: Could provide quantifiable water for an MCI Water Portfolio and for generating capital to build projects that provide new supplies for the Imperial region and mitigate for impacts to agriculture from new MCI uses and intensification of water use to use until capital projects are developed.
- MCI Water Pool Option Program: Could provide water for new MCI water use in underrun years, while paying into a mitigation fund to either a) build capital projects, or b) compensate private interests and/or IID for using water that results in fallowing land in overrun years and provides industry with a reliable water supply and Cities and Imperial County with the means of approving development and mitigating impacts.
- Mitigation Fund: Purpose is to capitalize physical facilities, match state or federal grant or loan funds, or fund approaches to allow IID, Cities, and Imperial County to provide tangible mitigation and make appropriate findings pursuant to CEQA and the California Water Code.
- Implement tiered pricing for new MCI users (e.g., renewable energy industry) to provide incentives to conserve water, as in the IID Interim Water Supply Policy.

12.2.7 Imperial IRWMP Status and Water Forum Review

The Imperial Water Forum was formed and the IRWM process initiated to develop independent findings and advise the appropriate lead agency. The Region has made progress through Water Forum review and findings on nine major concepts (described below) and an approach to integrating the CDWR resource management strategies. IID and the County have met to identify opportunities for in-valley water exchange (apportionment and transfer) and to coordinate land use planning and water management.

The Imperial IRWMP mission goals, objectives, and charter were adopted and resolutions of support passed by many of the public agency stakeholders (*Concept 1*). The Water Forum identified impacts, reviewed water supply strategies and developed a consensus on water supply priorities (*Concepts 2 and 3*) that would provide water for new operations by making secondary uses of Colorado River water or through demand management and conservation.

The Water Forum made findings and recommendations on the Renewable Energy Water Use Efficiency strategies and factored in the County General Plan Geothermal Energy Element and the approach for IID assignment of contracts for water through the Interim Water Supply Policy (IWSP). The Water Forum

also considered best management practices for cooling to conserve Colorado River supplies and/or use of alternative supplies consistent with local programs and the state and federal Renewable Energy Action Team Report (*Concept 4*).

In-valley transfers or apportionment of water within the IID service through an in-valley MCI Exchange would account for how water is made available from the existing Colorado River supply to new users. Development of strategies to manage in-valley exchanges of water is the jurisdictional responsibility of IID. Land use decisions are the jurisdictional responsibility of the Cities and County. Overlap of the water and land use authorities occurs during the land use and development review process managed under the authority of the County and Cities acting as the lead agency for project review under their respective General Plans, local zoning and pursuant to the California Environmental Quality Act.

The Water Forum is advisory to the lead agencies. The approach to developing in-valley water transfers, apportionment and a water exchange continue to be evaluated and developed (*Concepts 5, 6, and 7*) by IID with input from the Water Forum and its stakeholders.

The approach to applying economic incentive strategies includes IID adoption of the IWSP, which has tiered pricing to provide economic incentives to conserve water by the proposed new use. The IWSP defines how IID will review and assign water supply contracts to new development on a parallel path to the land use planning and development review process (*Concepts 8 and 9*). The IWSP includes development of a fund to pay for capital facilities and manage water to ensure water supplies are available for apportionment by IID the Cities and County make land use decisions pursuant to CEQA and the California Water Code. Capital facility alternatives for providing new water supplies have been identified by the Water Forum. The TLCFP begins work needed to define the administrative process and program for using water from land use changes; additional work may be needed to define processes for apportionment, and in-valley exchange of the Region's available Colorado River water supply to meet the requirements for forecasted MCI and Industrial (Renewable Energy) demands, should they develop.

12.3 FUNDING ALTERNATIVES

As part of the IRWM planning process, alternative funding opportunities specific to implementation of Imperial IRWMP projects and programs were researched. This section reviews:

- Local government funding by the Cities, County, and IID
- Grants and loans that may be available for Imperial IRWMP stakeholders

Given the impact of the QSA/Transfer Agreements on the Imperial Region, individual city or regional recycled water projects to treat municipal wastewater, as well as IID desalinization projects to treat brackish groundwater, and groundwater banking and/or storage by IID can provide regional benefits as defined by state and federal grant and loan programs. Funding for these types of projects are highlighted in Section 12.3.3.

12.3.1 Local Government Funding

12.3.1.1 Integrating Funding Authorities and Sources

Because most grant programs require a local match, integrating local funding authorities and sources could help the Imperial Region pursue grant funded projects and seek state and federal funding. Integrating available local funding or supporting an approach to cost sharing may be needed to meet local match contributions and for funding project feasibility studies, design and environmental review. Planning and permitting work also often require local investment prior to obtaining state or federal grant funding or loans for construction.

Under their general government authority, the Cities, County and IID generate local revenue from a variety of sources including general funds or enterprise funds, water and/or sewer rates, developer or impact fees, connection fees, property taxes (acreage or ad valorem assessments), sales taxes, etc. The County can also generate fees on groundwater pumping or storage pursuant to the County Ordinance and state law. IID is funded through water standby and availability charges, water rates, impact fees and water sales. Joint Powers Authorities (JPAs) are often formed to coordinate shared project funding.

12.3.1.2 Benefit Assessments, Benefit Assessment Zone Formation

Large regional projects such as groundwater banking facilities are often funded through benefit assessments. Benefit assessments are a special charge levied on property to pay for public improvements that benefit property in a predetermined district. Regional flood control and stormwater projects are also candidates for formation of benefit assessment zones in the Imperial Region.

Benefit assessments link the cost of public improvements to landowners who specifically benefit from the improvements. They are defined geographically and levies are placed on all properties within a designated benefit assessment zone. Boundaries of a benefit assessment district may coincide with those of a city, county, or other special district, or they may cover only part of those jurisdictions.

A comprehensive engineer's report is needed to form an assessment district. The report must outline the proposed area, key projects, estimated project costs, annual cost to each property, and the benefit formula used to determine each property's share of the cost. It forms the legal basis for an assessment district and must be formally approved by the governing body that will administer the district. In November 1996, California voters approved Proposition 218, the Right to Vote on Taxes Act, which among other constraints (see Section 12.3.1.3, below) established a strict definition of special benefits, and instituted a common formation and ratification process for all benefit assessment districts.[21]

[21] Understanding Proposition 218. Legislative Analyst's Office, December 1996. December 1996. <http://www.lao.ca.gov/1996/120196_prop_218/understanding_prop218_1296.html#intro> Chapter 2: "Proposition 218 defines a special benefit as a particular benefit to land and buildings, not a general benefit to the public or a general increase in property values."

12.3.1.3 Local Funding Constraints

Like other regions of the state, the Imperial Region has a limited ability to pay for further projects or programs. Located in one of the poorest counties of the state, with a high unemployment rate and limited ability to raise local revenue, grants and loans are important in leveraging the limited local financing capacity.

Proposition 13 created limits on the ability of city and County governments to raise property taxes. Proposition 218 creates similar constraints to agencies and special districts like IID, including specific procedural requirements related to generating fees and assessments.[22] Any effort to generate new charges and assessments would be subject to voter approval. Planning and construction of new facilities require a full evaluation of benefits and costs and an electoral process, as defined by the proposition and amendments to state law.

12.3.2 Grant and Loan Funding Overview

Grants and/or loans are available that can facilitate implementation of IRWM Plan projects and programs. International, federal and State agencies provide technical assistance and program funding for IRWM Plan-related projects or programs in the Imperial Region, including implementation of CDWR recommended water management strategies. Water Forum stakeholder agencies have submitted projects for groundwater management, water recycling, water quality protection and improvement, desalination of brackish groundwater, and support for meeting critical water supply, treatment, storage and quality needs of DACs and other small cities. DACs often qualify, and many times are prioritized, for grant programs to support basic needs for facility planning, design work, and environmental review.

The number and type of grant and loan programs available to public agencies and utilities in any given year can vary significantly based on whether the Legislature targets appropriations to the programs. Many of the grant programs below are on-going with rounds of grant monies provided upon availability of funding. A given program may go three to four years between funding cycles, while other programs may terminate due to reaching maximum funding limits included in voter approved legislation enacting the program. Regardless of the funding intervals, the grant and loan program listing below, while not comprehensive, is a living accounting that will require updates as part of the Region's IRWM program.

As the Imperial Region develops, at some point the Imperial IRWMP website could be developed to provide links to available State, federal and international grant programs and to provide notification for solicitation of grant applications associated with one or more of the programs. The cost to prepare the grant application is the responsibility of the benefitting agency(ies).

[22] Understanding Proposition 218. Legislative Analyst's Office, December 1996. <http://www.lao.ca.gov/1996/120196_prop_218/understanding_prop218_1296.html#intro> Ch 1: "In general, the intent of Proposition 218 is to ensure that all taxes and most charges on property owners are subject to voter approval. In addition, Proposition 218 seeks to curb some perceived abuses in the use of assessments and property-related fees, specifically the use of these revenue-raising tools to pay for general governmental services rather than property-related services."

12.3.3 Proposition 84 IRWM and Proposition 1E Stormwater Flood Management Grants

A summary of grant programs listed under Proposition 84/1E is provided in Grant Funding Matrix Programs tables at the end of this chapter. Both programs are managed by CDWR under common guidelines.

> *The Integrated Regional Water Management (IRWM) Grant Program is a competitive grant program first created under the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Proposition 50) with continuing funding provided by the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coast Protection Bond Act of 2006 (Proposition 84). Complementary funding was also provided by the Disaster Preparedness and Flood Prevention Bond Act or 2006 (Proposition 1E) for Stormwater Flood Management Grant Program.*
>
> *The program is administered by the Department of Water Resources and awards funds to local public agencies and non-profit organizations, for projects and programs to improve water supply reliability and improve and protect water quality. Such projects and programs must be consistent with an adopted IRWM Plan. Using Proposition 50 IRWM guidelines (2004) as the program foundation, the Department of Water Resources developed Program Guidelines that meet the requirements of Proposition 84 and Proposition 1E and related implementing legislation. These guidelines are used for the disbursement of the Proposition 84 IRWM funding and the related Proposition 1E Stormwater Flood Management funding. Final Program Guidelines were adopted and released by [C]DWR in August 2010 and updated in November 2012. The guidelines include general program requirements, eligibility requirements, proposal selection information, and the IRWM Plan standards and associated guidance. The guidelines establish three component grant programs – the IRWM Planning Grant Program, the IRWM Implementation Grant Program, and the related Stormwater Flood Management Grant Program.*
>
> Source: Strategic Growth Plan Bond Accountability/ IRWM <http://bondaccountability.resources.ca.gov/plevel1.aspx?id=14&pid=4>

12.3.3.1 Proposition 84 Grant Funding[23]

The intent of the program is to promote the practice of integrated regional water management to ensure sustainable water uses, reliable water supplies, better water quality, environmental stewardship, efficient urban development, protection of agriculture, and a strong economy. General obligation bonds in the amount of $5.388 billion were authorized to fund safe drinking water, water quality and supply, flood control, waterway and natural resource protection, water pollution and contamination control, State and local park improvements, public access to natural resources, and water conservation efforts. The September 25, 2013, Round 2 Draft Funding Recommendations provided total funding of $131.1 million to fund 139 projects in 20 grant proposals. Roughly $472.5 million remain for Round 3 implementation grant awards.

[23] Strategic Growth Plan Bond Accountability/Proposition 84 Overview <http://bondaccountability.resources.ca.gov/p84.aspx>

The program recognizes the interconnectivity of water supplies and the environment and rewards points to projects yielding multiple benefits. Proposition 84 allocation amounts are shown in the pie chart in Figure 12-3.

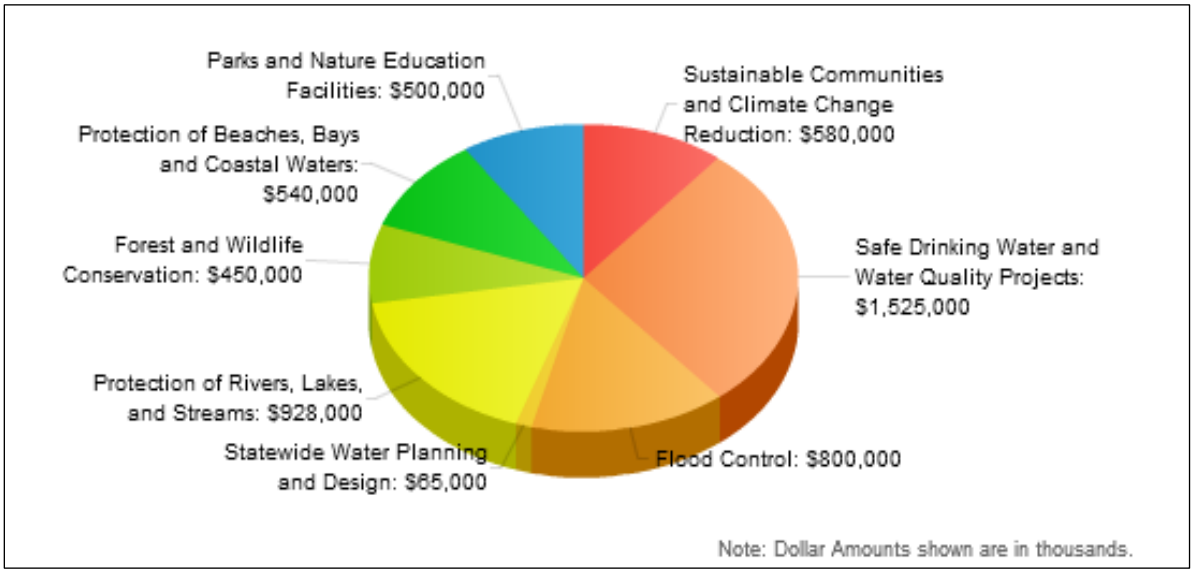


Figure 12-3. Proposition 84 Grant Program Allocations

Source: Strategic Growth Plan Bond Accountability/Proposition 84 Overview <http://bondaccountability.resources.ca.gov/p84.aspx>

The State's IRWM program provides a mechanism for local regions to set priorities to pursue IRWMP Implementation Grant funding. It thereby incentivizes local stakeholders to coordinate, refine, and integrate their planning efforts within a comprehensive, regional context; and to identify specific regional priorities for implementation projects. Each region's IRWMP is its basis to apply for implementation grant funding support for identified plans, programs, and projects.

The Imperial Region developed its IRWMP with substantial local funding and was awarded a $1 million Proposition 84 Planning Grant. In 2013, the Imperial Region applied for, but did not win, Round 2 grant funding. The Region plans to compete for Round 3 Implementation Grant funding to be made available for the IRWMP Colorado River Basin Region (roughly $16. 7 million, likely to be made available in March 2015). [24] Typically, not less than 10 percent of the available funding is used to support projects that address critical water supply or water quality needs for DACs.

12.3.3.2 Proposition 1E Grant Funding[25]

The Legislature was authorized to appropriate $300 million for grants for Stormwater Flood Management (SWFM) projects. To be eligible, projects have to be within an approved IRWM region,

[24] CDWR, Public Meeting Presentation of Draft Funding Recommendations, October 2013. <http://www.water.ca.gov/irwm/grants/docs/Guidelines/Impdrft_funding_rec_handout.pdf>
[25] Strategic Growth Plan Bond Accountability/Proposition 1E Overview. <http://bondaccountability.resources.ca.gov/p1e.aspx>

with special consideration given to projects meeting multiple benefits. In the second round of SWFM Grant funding, projects submitted requested a total of $500 million in funding. Draft Round 2 funding recommendations dated June 12, 2013, provided approximately $92 million in SWFM funding to the top 10 projects located throughout California. At time of writing, appropriations are not in place for funding a third round of the SWFM grant.

12.3.4 State Revolving Funds

12.3.4.1 USEPA Clean Water and Drinking Water State Revolving Funds[26]: ARRA Implementation[27]

The American Recovery and Reinvestment Act of 2009 provides funding for states to finance infrastructure projects needed to ensure clean water and safe drinking water. The Clean Water State Revolving Fund program, in place since 1987, received $4 billion, including funds for Water Quality Management Planning Grants. The Drinking Water State Revolving Fund program, in place since 1997, received $2 billion.

USEPA is making Recovery Act grants to states . . . to capitalize their State Revolving Fund (SRF) programs, from which assistance is provided to finance eligible high priority water infrastructure projects. The states will set priorities based on public health and environmental factors, in addition to readiness to proceed to construction, and identify which projects will receive funding. States must provide at least 20% of their grants for green projects, including green infrastructure, energy or water efficiency, and environmentally innovative activities.

Source: USEPA ARRA. <http://water.epa.gov/grants_funding/eparecovery/index.cfm>

The USEPA Clean Water SRF is a loan program that provides low-cost financing to eligible entities within state and tribal lands for water quality projects including:

- *all types of nonpoint source*
- *watershed protection or restoration*
- *estuary management projects*
- *more traditional municipal wastewater treatment projects*

Source: USEPA/Pacific Southwest, Region 9/CWA SRF <http://www.epa.gov/region9/water/grants/srf-loan-prog.html>

The Safe Drinking Water Act, as amended in 1996, established the Drinking Water State Revolving Fund (DWSRF) to make funds available to drinking water systems to finance infrastructure improvements. The program also emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water.

Source: USEPA Drinking Water State Revolving Fund. <http://water.epa.gov/grants_funding/dwsrf/>

[26]USEPA Drinking Water State Revolving Fund. < http://water.epa.gov/grants_funding/dwsrf/>
[27]USEPA ARRA. <http://water.epa.gov/grants_funding/eparecovery/index.cfm>

The USEPA SRF programs help put the state's Clean Water SRF and Drinking Water SRF on a firmer foundation. USEPA works with the state agencies and local partners to develop sustainability policies including management and pricing for future infrastructure funded through SRFs to encourage conservation and to provide adequate long-term funding for future capital needs. Imperial Region agencies may access SRF funds for regional IRWMP programs that focus on urban water conservation programs that would benefit DACs and/or the entire Region.

12.3.4.2 Clean Water SRF[28]

California State Water Resources Control Board (SWRCB) manages the Clean Water SRF program to finance protection and improvement of water quality. The program is funded by federal grants, State funds, and revenue bonds, offers low interest financing agreements for eligible projects.

Eligible projects include, but are not limited to:

- *Construction of publicly-owned facilities:*
  - *Wastewater treatment*
  - *Local sewers*
  - *Sewer interceptors*
  - *Water reclamation facilities; and*
  - *Stormwater treatment*
- *Expanded use projects include, but are not limited to:*
  - *Implementation of nonpoint source (NPS) projects or programs; and*
  - *Development and implementation of estuary comprehensive conservation and management* plan.

Eligible Applicants

- Any city, town*, district, or other public body created under state law*
- *A Native American tribal government or an authorized Native American tribal organization having jurisdiction over disposal of sewage, industrial wastes or other waste*
- *Any designated and approved management agency under Section 208 of the Clean Water Act*
- *501(c)(3)'s and* National Estuary Programs

Financing Terms

- *Interest Rate - ½ most recent General Obligation (GO) Bond Rate at time of funding approval*

[28] SWRCB Clean Water SRF. <http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/> The Federal Water Pollution Control Act (Clean Water Act or CWA), as amended in 1987, established the Clean Water SRF program, which offers low interest financing agreements for water quality projects. Annually, the State program disburses between $200 and $300 million to eligible projects.

- *Financing Term - 20 Years; up to 30 years for small disadvantaged communities or regionalization projects*
- *Financing Amount - No maximum funding limit*
- *Repayment - Begins 1 year after completion of construction*
- *Interest History*

Applications are being accepted on a continuous basis...

Source: SWRCB/ CWSRF <http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/>

SWRCB Small Community Wastewater Grant (SCWG) Program.

The Small Community Wastewater Grant (SCWG) Program was most recently funded in 2002 (by Propositions 40 and 50), and it provided grants to small (i.e., with a population of 20,000 persons, or less) disadvantaged . . . communities for planning, design, and construction of publicly-owned wastewater treatment and collection facilities.

Source: SWRCB/Small Community Wastewater Grant Program <http://www.swrcb.ca.gov/water_issues/programs/grants_loans/small_community_wastewater_grant/index.shtml>

The types of technical assistance offered included:

- *Preparation of financial assistance applications*
- *Compliance audits and troubleshooting to address permit violations or improve operations*
- *Review of proposed project alternatives to assist in identifying low-cost, sustainable approaches*
- *Assistance with planning and budgets, including capital improvement planning*
- *Assistance with community outreach, awareness, and education, especially with regard to rate setting and Proposition 218 compliance*

January 2013: List of Potentially Eligible Small Disadvantaged Community Wastewater Projects Based on feedback from the Regional Water Quality Control Boards, Environmental Justice and Small Community Assistance Groups, and individual local agency inquiries, the Division of Financial Assistance (DFA) has compiled a list of potentially eligible small, DAC wastewater projects. This list is used to help quantify statewide need, and it will continue to be updated based on any new information provided to DFA staff.

The State Water Board's Small Community Wastewater Grant (SCWG) Program is no longer soliciting projects due to lack of funding. The SCWG Program provided assistance for the construction of publicly-owned wastewater treatment and collection facilities to communities meeting specific population restrictions and income requirements.

Source: CDBH Financial Assistance Programs – Grants and Loans Small Community Wastewater Strategy <http://www.swrcb.ca.gov/water_issues/programs/grants_loans/small_community_wastewater_grant/strategy.shtml>

Table 12-7. Imperial Region Agencies and Projects Included in SCWG List of Potentially Eligible Projects

Applicant	Project Title	Estimated Cost
Calipatria, City of	Improvements to Wastewater Collection & Treatment systems	Unknown
Niland Sanitary District	Improvements to Wastewater Collection & Treatment System	Unknown
Seeley County Water District	Seeley County Water District Mt. signal Pump Station Project	$801,000

Source: Potentially Eligible Small, Disadvantaged Community Wastewater Projects. January 2013. <http://www.swrcb.ca.gov/water_issues/programs/grants_loans/small_community_wastewater_grant/docs/sdac_masterlist.pdf>

12.3.4.3 Safe Drinking Water SRF[29]

California Department of Public Health (CDPH) has a range of funding opportunities for public water systems. *Safe Drinking Water State Revolving Fund Intended Use Plan* (CDPH, Final September 2013) identifies specific programs that assist small communities and DACs.[30] Three of the programs are described, as follows:

Small Water System (SWS) Technical Assistance Set-aside. The program is for communities serving populations of less than 10,000.[31] Technical assistance is provided through the Rural Community Assistance Corporation (RCAC), California Rural Water Association (CRWA) and Self-Help Enterprises (SHE, active only in the Central Valley]. The CDPH Small Water Systems Technical Support Unit holds quarterly meetings with the technical assistance providers (CalTAP). These meetings provide the opportunity to identify and implement more effective and meaningful methods of providing technical assistance to smaller and disadvantaged systems.

Small Water System Technical Assistance. The program strategy was developed with the assistance of interested groups such as CRWA, RCAC, Community Development Block Grant program, California Conference of Directors of Environmental Health, local environmental health agencies, Self-Help Enterprises, American Water Works Association and others. Funding workshops introducing state and federal infrastructure funding programs are held throughout the state each year for an opportunity to provide direct feedback to SDWSRF program representatives.

Small Water Systems Capacity Development Program. Funded through the SDWSRF, CDPH also administers this program.[32]

12.3.1 Additional Resources for Small and/or DAC Water Systems

Financial assistance for small and/or DAC water systems can be found through multiple programs where attention is focused on making the cost of needed assistance technically and economically feasible. The programs described and links provided herein, and those included in Table 12-8, are available to local

[29] CDPH Safe Drinking Water SRF. <http://www.cdph.ca.gov/services/funding/Pages/SRF.aspx>
[30] CDHP Drinking Water SRF Plan Final. September 2013. <http://www.cdph.ca.gov/services/funding/Documents/SRF/2013%20Funding/FINALSFY2013IUP.pdf>
[31] CDPH Small Water Systems Support. <http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Smallwatersystems.aspx>
[32] Small Water Systems Capacity Development Program. <http://www.cdph.ca.gov/certlic/drinkingwater/Pages/TMF.aspx>

communities seeking financial assistance on their own. Below is a discussion on the assistance made available to small water systems through legislation amending the Safe Drinking Water Act and the California Water Code:

> *The federal Safe Drinking Water Act Amendments of 1996 (SDWA) were signed into law in part because of the significant problems that small public water systems (SWS) had in providing safe, reliable drinking water to their customers. The SDWA emphasized technical, managerial, and financial (TMF) prevention and assistance to resolve the problems. It included mandates to the states to prevent new non-viable systems. It also mandated the development and implementation of a comprehensive capacity development strategy to assist public water systems in obtaining adequate capacity. The SDWA provided the resources and flexibility to accomplish the end objective.*
>
> *In 1997 Senate Bill (SB) 1307 became law, enabling California to implement the provisions of the federal SDWA. This statute established a financial assistance program entitled the State Revolving Fund (SRF), which included a comprehensive technical assistance program for small systems. In order to help ensure the provision of safe, reliable drinking water to customers on a long term basis, this legislation was designed to prevent the formation of a new public water system or the approval of a public water system change of ownership unless that system had been determined by the State to have adequate TMF capacity.*
>
> *CDPH developed TMF capacity criteria based on guidance provided by the federal Environmental Protection Agency, experience in CDPH's Drinking Water Program and Local Primacy Agencies, and experiences of other states. Input also was received from affected stakeholders and the public. The current TMF Assessment Information can be found at the links noted below.*
>
> *The Drinking Water Program provides free technical help through contracts with Rural Community Assistance Corporation (RCAC) [and] California Rural Water Association, and Self-Help Enterprises* [active only in the Central Valley]. *If you need help with Technical, Managerial or Financial issues or help with the SRF Funding Program contact your local CDPH District Map or your Local Primacy Agency to see if you qualify.*
>
> *For more drinking water-related information, see the links at Public Drinking Water Systems and Small Water Systems – Technical Support Unit. Or contact: Phone: (916) 449-5652*
>
> *FREE: For a measure of a public water system's TMF capacity and a list of resources to help build TMF capacity, go to the TMF Tune-Up.*
>
> Source: CDPH/Small Water Systems Capacity Development Program <http://www.cdph.ca.gov/certlic/drinkingwater/Pages/TMF.aspx>

Table 12-8. Resources for Small Public Water Systems

- Rural Community Assistance Corporation (RCAC). <http://www.rcac.org/>
- California Rural Water Association (CRWA). <http://www.calruralwater.org/>
- Expense Reimbursement Grant (ERG), CPS Human Resources Services <http://www.cpshr.us/>
- California State University Sacramento, Office of Water Programs (CSUS) <http://www.owp.csus.edu/>
- American Water Works Association (AWWA), California-Nevada Section <http://www.ca-nv-awwa.org/canv/web>

12.3.1.1 USEPA Hardship Grants Program for Rural Communities[33]

The USEPA Hardship Grants program assists small (fewer than 3,000 residents), disadvantaged rural communities address wastewater treatment. California identifies eligible projects and may commit a portion of its grants for technical assistance. Designed to complement the Clean Water SRF loan program, this program distributes funds based on the number of rural communities in California lacking access to centralized water treatment and the rural per capita income.

12.3.1.2 HUD Community Development Block Grant Program[34]

U.S. Department of Housing and Urban Development (HUD) offers Community Development Block Grants (CDBG). They are given directly to California, which then allocates the funds to small cities and nonurban counties. Grants may be used for community and economic development activities, but are primarily used for housing rehabilitation, public infrastructure projects including wastewater and drinking water facilities. Seventy percent of grant funds must be used for activities that principally benefit low- and moderate-income communities. HUD CDBG Programs that are or may be applicable to the Imperial Region are provided in Table 12-9.

Table 12-9. HUD CDBG Program Areas Applicable to the Imperial Region

Entitlement Communities	The program allocates annual grants to larger cities and urban counties to develop viable communities by providing decent housing, a suitable living environment, and opportunities to expand economic opportunities, principally for low- and moderate-income persons.
State Administered CDBG	Also known as the Small Cities CDBG program, States award grants to smaller units of general local government that carry out community development activities. Annually, each State develops funding priorities and criteria for selecting projects.
Section 108 Loan Guarantee Program	CDBG entitlement communities are eligible to apply for assistance through the section 108 loan guarantee program. CDBG non-entitlement communities may also apply, provided their State agrees to pledge the CDBG funds necessary to secure the loan. Applicants may receive a loan guarantee directly or designate another public entity, such as an industrial development authority, to carry out their Section 108 assisted project.
Disaster Recovery Assistance	HUD provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.
Neighborhood Stabilization Program	HUD provides grants to communities hardest hit by foreclosures and delinquencies to purchase, rehabilitate or redevelop homes and stabilize neighborhoods.
Colonias	Texas, Arizona, California, and New Mexico set aside up to 10 percent of their State CDBG funds for improving living conditions for colonias residents.

Source: HUD/CDBG.
<http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs>

[33] USEPA Federal Funding Sources for Small Community Wastewater Systems.
<http://water.epa.gov/type/watersheds/wastewater/eparev.cfm#7>
[34] See HUD/Community Development Block Grant Program – CDBG.
<http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs>
& California Department for Housing and Community Development/CDBG.
<http://www.hcd.ca.gov/fa/cdbg/index.html>

12.3.1.3 USDA Rural Development Utilities Water and Environmental Programs[35]

USDA Rural Development provides grants and loans through its Water and Waste Disposal (WWD) program. The program targets rural communities with 10,000 people or fewer for drinking water, wastewater, solid waste, and storm drainage projects. Rural Utilities Service brings assistance to rural areas for safe, affordable drinking water.[36]

The Rural Development programs are a resource for DACs and colonias in the Imperial Region as they plan and develop their water and wastewater facilities, and can assist them to prepare their projects for other funding sources. Funds can be used for construction, land acquisition, legal fees, engineering fees, capitalized interest, equipment, initial operation and maintenance costs, and costs to complete a project. Both public agencies and nonprofit organizations are eligible.The following types of assistance are available through the USDA Rural Development Utilities Water and Environmental Programs:

> *Water and Environmental Programs (WEP) provides loans, grants and loan guarantees for drinking water, sanitary sewer, solid waste and storm drainage facilities in rural areas and cities and towns of 10,000 or less. Public bodies, non-profit organizations and recognized Indian tribes may qualify for assistance. WEP also makes grants to nonprofit organizations to provide technical assistance and training to assist rural communities with their water, wastewater, and solid waste problems.*
>
> ***Utilities Assistance***
>
> - *Loans and Grants for Rural Communities*
>
> *Program assistance is provided in many ways, including direct or guaranteed loans, grants, technical assistance, research and educational materials. Please check the links below for more*
>
> 1. *Direct Loans and Grants. To develop water and waste disposal systems in rural areas and towns with a population not in excess of 10,000. The funds are available to public bodies, non-profit corporations and Indian tribes.*
> 2. *Guaranteed Loans . To provide a loan guarantee for the construction or improvement of water and waste disposal projects serving the financially needy communities in rural areas. This purpose is achieved through bolstering the existing private credit structure through the guarantee of quality loans which will provide lasting benefits. The water and waste disposal guarantee loans are to serve a population not in excess of 10,000 in rural areas.*
> 3. *Emergency Community Water Assistance Grants. To assist rural communities that have experienced a significant decline in quantity or quality of drinking water due to an emergency, or in which such decline is considered imminent, to obtain or maintain adequate quantities of water that meets the standards set by the Safe Drinking Water Act. This emergency is considered an occurrence of an incident such as, but not limited*

[35]USDA RD /Utilities/Water and Environmental Programs. <http://www.rurdev.usda.gov/uwep_homepage.html>
[36]USDA/RD /Utilities/Water and Waste Disposal Direct Loans and Grants <http://www.rurdev.usda.gov/UWP-dispdirectloansgrants.htm>

to, a drought, earthquake, flood, tornado, hurricane, disease outbreak or chemical spill, leakage or seepage.

4. *Pre-development Planning Grants. Predevelopment planning grants may be available, if needed, to assist in paying costs associated with developing a complete application for a proposed project.*
5. *Loans for Very Small Projects. To assist communities with water and wastewater systems. Qualified private non-profit organizations will receive RFP grant funds to establish a lending program for eligible entities. This grant program is to serve a rural area with a population not in excess of 10,000.*

- *Opportunities for Native American Indian Tribes. Native American Indian Tribes are eligible for most of the Utilities Programs' water and waste water loans and grants. In addition, grants, specifically designed to address Native American water and waste disposal needs are available.*
- *Opportunities for Colonias and Rural or Native Alaskan Villages. In addition to the general loan and grant offerings for water and waste disposal projects, the Utilities Programs offers grants specifically designed to address the needs of Alaskan Native Villages and areas designated as Colonias.*
- *Opportunities for Lenders. The Utilities Programs works with private lenders to guarantee loans to borrowers for the construction of water and waste systems in rural areas. Loan guarantees can be issued for up to 90% on any loss of interest and principal on a loan.*
- *Technical Assistance Programs and Providers. Grants are available to non-profit organizations to provide water and waste disposal-related technical assistance and/or training to rural water systems and rural areas, towns and cities with a population of 10,000 or less.*
- *Individual Household Water Well Program. Grants are available for private non-profit organizations to establish lending programs that provide low-cost loans to individuals living in eligible rural areas for the construction of water wells.*
- *Solid Waste Management Program. To evaluate current landfill conditions to determine threats to water resources. Provide technical assistance and/or training to enhance operator skills in the operation and maintenance of active landfills. Provide technical assistance and/or training to help communities reduce the solid waste stream. Provide technical assistance and/or training for operators of landfills which are closed or will be closed in the near future with the development and implementation of closure plans, future land use plans, safety and maintenance planning, and closure scheduling within permit requirements.*
- *Revolving Fund Program . To assist communities with water and wastewater systems. Qualified private non-profit organizations will receive RFP grant funds to establish a lending program for eligible entities. This grant program is to serve a rural area with a population not in excess of 10,000.*
- *Circuit Rider Technical Assistance for Rural Water Systems . Regulation Citation: Terms established in service contract issued through RD Procurement.*

Source: USDA/RD/Utilities/ Water and Environmental Programs.
<http://www.rurdev.usda.gov/UWEP_HomePage.html>

The program is administered locally by the USDA Rural Development office in El Centro, which has worked extensively with communities in the Imperial Region. HUD also has a Colonias Program, which would apply for Niland, Ocotillo and Poe Subdivision colonias which are located in the Imperial Region. [37]

For Imperial Region Rural Development information and assistance, contact Daniel Cardona or Luis Andrade. Telephone: 760-352-4418 ext. 4, or visit the El Centro USDA Service Center, 177 N. Imperial Avenue, El Centro

12.3.1.4 Economic Development Administration Grants for Public Works and Development Facilities[38]

U.S. Department of Commerce provides grants through the U.S. Economic Development Administration (USEDA) Investment Programs to assist economically distressed areas for public works projects, including water and wastewater facilities. The projects must promote economic development, create long-term jobs, and/or benefit low-income persons or the long-term unemployed, and fulfill a pressing need of the area.

Recycling to create water for expanding the renewable energy industry should be a candidate since it would help to establish industrial plants or facilities. Projects must have an adequate share of local funds; evidence firm commitment and availability of matching funds, be capable of being started and completed in a timely manner. State money could be used to match the federal money. The State, Imperial Cities, and nonprofit organizations would be eligible.

For funding opportunities and other information, visit the USEDA Investment Program website.[38]

- *NEW - 2014 Economic Development Assistance Programs
- EDA's Planning and Local Technical Assistance Programs
- Preliminary Engineering and Environmental Templates *(Required documents for submitting an application for construction assistance to EDA)*

One or more of the EDA programs are shown in Table 12-10 may be applicable Imperial IRWM stakeholders

[37] The term *Colonia* has been borrowed from the Spanish term for a residential neighborhood. In the United States, a *colonia* has a specific meaning, referring to a community within the mainly rural US-Mexico border region with marginal conditions related to housing and infrastructure. Source: HUD/State Community Development Block Grant: COLONIAS. <http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/colonias>.
[38] USEDA Investment Programs <http://www.eda.gov/programs.htm>

Table 12-10. USEDA Investment Programs

Economic Adjustment:	Assists state and local interests in designing and implementing strategies to adjust or bring about change to an economy. Focuses on areas that have experienced or are under threat of serious structural damage to the underlying economic base.
Partnership Planning	Supports local organizations (Economic Development Districts, others) with long-term planning. *The Comprehensive Economic Development Strategies (CEDS) Summary of Requirements* (*PDF*), provides a synopsis of requirements for comprehensive economic development strategies.
Trade Adjustment Assistance for Firms:	National network of *11 Trade Adjustment Assistance Centers* to help strengthen competitiveness of American companies that have lost domestic sales and employment because of increased imports of similar goods and services.
University Centers:	A partnership of the federal government and academia that makes the varied and vast resources of universities available to the economic development community.
Research and National Technical Assistance	Supports research of leading edge, world class economic development practices and information dissemination efforts.
Local Technical Assistance	Helps fill knowledge and information gaps that may prevent leaders in public and nonprofit sectors in distressed areas from making optimal decisions BOUT local economic development.

Source: USEDA Investment Programs. <http://www.eda.gov/programs.htm>

12.3.2 Resources for the U.S./Mexico Border Region

12.3.2.1 USEPA U.S./Mexico Border Water Infrastructure Program[39]

The [US]EPA's U.S.-Mexico Border Water Infrastructure Program provides grant assistance to communities along the U.S.-Mexico border for planning, design, and construction of drinking water and wastewater infrastructure. EPA's grant funding program supports the Project Development Assistance Program (PDAP), administered by Border Environment Cooperation Commission (BECC), and the Border Environmental Infrastructure Fund (BEIF), administered by North American Development Bank (NADB).

What Types of Projects Are Eligible for Funding?

Eligible projects include: sewer systems, pump stations, and treatment plants, on-site wastewater treatment systems, drinking water transmission lines, storage tanks, pump stations and water treatment plants. Recognizing the disparity between the water infrastructure needs of the border region and the limited grant funds potentially available, [US]EPA and the BECC, in coordination with appropriate agency stakeholders including the NADB, have created a process to prioritize projects for funding. The objective of the prioritization process is to ascertain which drinking water and wastewater projects will address the most severe public health and environmental conditions identified in communities along the border. Therefore, the methodology for prioritization assigns first priority to projects that address the most urgent public health needs.

Source: U.S.-Mexico Border Water Infrastructure Program FAQs.
<http://water.epa.gov/infrastructure/wastewater/mexican/faqs.cfm>

[39] USEPA U.S./Mexico Border Water Infrastructure Program.
<http://water.epa.gov/infrastructure/wastewater/mexican/index.cfm>

12.3.2.2 North American Development Bank

NADB and its sister institution, the Border Environment Cooperation Commission (BECC), were created by the governments of the United States and Mexico in a joint effort to preserve and enhance environmental conditions and the quality of life of people living along the U.S.-Mexico border.

Created as interdependent institutions, NADB and BECC function as a team, working with communities and project sponsors to develop, finance and build affordable and self-sustaining projects with broad community support. . . . [E]ach institution is charged with specific responsibilities, with BECC focusing on the technical aspects of project development, while NADB concentrates on project financing and oversight for project implementation.

Specifically, BECC is charged with verifying the technical viability and environmental/health impacts of projects through a certification process that ensures transparency and public participation. Each infrastructure project must be certified by BECC in order to be eligible for financing from NADB. For more information about the BECC and its activities, visit its website.

NADB offers direct financing in the form of loans and grants to public and private entities for the implementation of their projects. NADB verifies that the proposed projects are financially feasible and works closely with the sponsors and other funding partners to structure appropriate and affordable financing packages to meet the specific needs of each community and project.

In addition, NADB works with local governments and other project sponsors to help them implement sound financial and business practices that provide a basis for well-managed debt financing. As part of this strategy, NADB also promotes a comprehensive, long-term approach to infrastructure planning and project finance, as well as offers technical assistance to build institutional capacity and support the development of sustainable infrastructure.

Source: NADB/About Us/Mission. <http://www.nadbank.org/about/mission.asp>

As can be seen in Figure 12-4, the Imperial Region lies within the NADB geographic jurisdiction. Because the New River starts in Baja California, Mexico, NADB funded projects in that area can have an impact on water quality and flow in the Imperial Region.

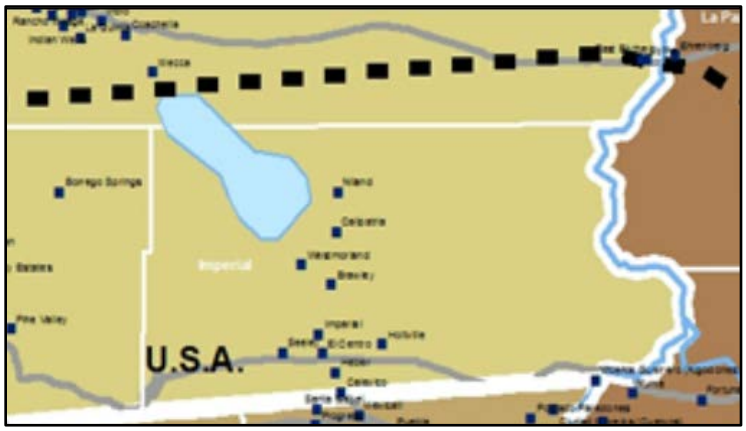


Figure 12-4. NADB-BECC Geographic Jurisdiction in Southeastern California (dashed line above the Salton Sea)

Geographic Jurisdiction. *NADB is authorized to serve communities in the U.S.-Mexico border region, which extends approximately 2,100 miles from the Gulf of Mexico to the Pacific Ocean. Eligible projects must be located within: 100 kilometers (about 62 miles) north of the international boundary in the four U.S. states of Arizona, California, New Mexico, and Texas, and, 300 kilometers (about 186 miles) south of the border in the six Mexican states of Baja California, Chihuahua, Coahuila, Nuevo León, Sonora, and Tamaulipas. Projects beyond these areas may be eligible if they remedy a transboundary environmental or health problem, as determined by the Board of Directors.*

Environmental Sectors/Projects. *Under its charter, NADB is authorized to finance projects that will prevent, control or reduce environmental pollutants or contaminants, improve the drinking water supply, or protect flora and fauna, so as to improve human health, promote sustainable development, or contribute to a higher quality of life. In this context, NADB may finance the following types of* [Imperial IRWMP -related] *projects, including but not limited to* [those shown in Table 12-11].

Source: NADBank/About Us/Scope. <http://www.nadbank.org/about/eligibility.asp>

NADB sectors, shown in Table 12-11, include project types that are or may be related to the water resources uses and requirements in the Imperial Region (water recycling and reuse, renewable energy water use, Salton Sea water-related air quality impairment, TMDLs in drains and rivers, etc.) or as a result of its border with Mexico (New River pollution associated with wastewater treatment shortfalls in Mexicali, etc.). Only two NADB sectors, Waste Management and Energy Efficiency, are not included in the table; those interested in either may check them out at the Source link for Table 12-11.

Table 12-11. NADB Environmental Sectors and Sample Project Types

Environmental Sector	Sample Project Types
Water	Drinking water supply, treatment & distribution Wastewater collection, treatment & reuse Water conservation Storm drainage & flood control
Cleaner & Renewable Energy	Wind Biogas & biofuels Hydroelectric Geothermal
Air Quality	Public transportation Street paving & roadway improvements Bypasses & ports of entry Emission reduction & methane capture
Industrial/Hazardous waste	Treatment & disposal facilities (river cleanup) Industrial site remediation
Energy Efficiency	Equipment replacement Public lighting Building retrofits

Source: NADB/About Us/Scope. <http://www.nadbank.org/about/eligibility.asp>

12.3.3 Recycled Water, Brackish Water Desalination, and Groundwater Development Funding Programs

The Imperial IRWMP Table 12-5 identifies conceptual projects for recycling of wastewater, desalination of brackish groundwater, and groundwater banking and/or storage (for Appendix N). Implementing such projects will help the Region to live within its QSA/Transfer Agreements limitation on imported Colorado River water, and to supply water to meet new uses as the QSA/Transfer Agreements are more fully implemented and the supply of Colorado River water available to the Region is reduced.

State and federal financial programs for recycled water projects are available to the Region through the Clean Water State Revolving Fund (CWSRF), administered by the SWRCB Division of Financial Assistance and the CDWR Desalination Funding Program; and on the federal level, USBRs WaterSMART Title XVI Water Reclamation and Reuse Grant Program and USEPA through its NADB programs. Integrating State, federal and international funding to develop projects is a strategy that can serve the Imperial Region.

CWSRF programs provide low-interest construction loans for water recycling and groundwater development projects, and provide funds for recycling and desalination projects. As shown in Table 12-12, eligible project types include publicly owned wastewater treatment facilities, local sewers, sewer interceptors, and water reclamation facilities, as well as, nonpoint source pollution control projects. The CDWR funds construction of brackish water desalination projects, feasibility studies, research and development, and pilot and demonstration projects.

12.3.3.1 SWRCB Water Recycling Funding Program (WRFP)[40]

Water Recycling Construction Program (WRCP). [41] *The program provides loans and grants to eligible applicants for the design and construction of water recycling facilities. Detailed information on eligible projects, applicants, and the funding process are presented in the Water Recycling Funding Program Guidelines. Applications are accepted on a continuous basis. The available funding is distributed to projects that meet the requirements of these Guidelines and are first ready to proceed to construction. Very limited grant funding is available.*

Water Recycling Facilities Planning Grant Program (FPGP). [42] *Encouraging new recycling planning studies, funds are intended to supplement local funds and enhance the quality of local planning efforts. Funds are provided for planning studies to determine the feasibility of using recycled water to offset the use of fresh and/or potable water from State and/or local supplies.*

Source: Water Recycling Funding Program Guidelines as adopted October 21, 2004 by SWRCB Resolution No. 2004 - 0064_ California State Water Resources Control Board

[40] SWRCB Water Recycling Funding Program (WRFP)
<http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/>
[41] SWRCB Water Recycling Funding Program (WRFP)/Water Recycling Construction Program (WRCP)
<http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/construction.shtml>
[42] Water Recycling Funding Program (WRFP)/ Facilities Planning Grant Program
<http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/facilitiesplan.shtml>

Table 12-12. SWRCB Water Recycling Funding Program Description of Project Categories

Category II - State Water Supply	Provide for treatment and delivery of municipal wastewater or groundwater that is contaminated due to human activity, for uses (including groundwater recharge) that replace the use of the State water supply with recycled water, but do not provide benefits to the Delta.
Category III – Local Water supply	Provide for treatment and delivery of municipal wastewater to users that replace the use of local water supply with recycled water.
Category IV – Local Groundwater Reclamation	Provide treatment and reuse of groundwater contaminated due to human activity; and provide local water supply benefits.
Category V and Category VI projects may only be considered for funding by SRF Loan Program for the objective of pollution control	
Category V – Pollution Control	Provide for the treatment and disposal of municipal wastewater to meet waste discharge requirements for water pollution control.
Category VI – Miscellaneous	Projects that do not have identifiable benefits to the State or local water supply.

Source: Water Recycling Funding Program Guidelines, Table 2.

12.3.3.2 CDWR Desalination Grant Funding Program[43]

This grant program is designed to assist local public agencies to develop new local water supplies through the construction of brackish water and ocean water desalination projects and help advance water desalination technology and its use by means of feasibility studies, research and development, and pilot and demonstration projects.

12.3.3.3 Reclamation Wastewater and Groundwater Study and Facilities Act - Title XVI[44]

Title XVI of Public Law 102-575, the Reclamation Wastewater and Groundwater Study and Facilities Act, authorizes the federal government to partially fund the capital cost of recycling projects. The Title XVI act directs the Secretary of the Interior to undertake a program to investigate and identify opportunities for water reclamation and reuse of municipal, industrial, domestic, and agricultural wastewater, naturally impaired ground and surface waters, and for design and construction of demonstration, and permanent facilities to reclaim and reuse wastewater.

It also authorizes the Secretary to conduct research, including desalting, for the reclamation of wastewater and naturally impaired ground and surface waters. The funds have also been used to evaluate water markets, transfers, and create economic incentives to conserve water. These funds are managed and distributed by the USBR.]

[43] CDWR 2013 Desalination Grant Funding (Round 3) <http://www.water.ca.gov/desalination/2013DesalGrants.cfm>
[44] SWRCB Financial Assistance Funding - Grants and Loans. <http://www.waterboards.ca.gov/water_issues/programs/grants_loans/>

12.3.4 USEPA Water: A Grants & Funding Overview

For USEPA Pacific Southwest, Region 9 contacts, visit
<**http://www.epa.gov/region9/water/contactus.html#grants**>

For USEPA Pacific Southwest, Region 9 Funding Sources for Communities, visit
<http://www.epa.gov/region09/funding/funding-sources/index.html>

For All USEPA Region program funding options and links, visit
<http://water.epa.gov/grants_funding/>

American Recovery and Reinvestment Act (ARRA) of 2009.
ARRA provided significant funding for states to finance high priority water infrastructure projects through a $2 billion appropriation to the DWSRF program and a $4 billion appropriation to the CWSRF program. EPA's CWSRF & DWSRF ARRA Implementation webpage provides information on the status of ARRA implementation as well as guidance and resources for states and other stakeholders.

Beach Grants
Learn about BEACH Act grants awarded to eligible coastal and Great Lakes states, territories, and tribes to develop and implement beach monitoring and notification programs.

Catalog of Federal Funding
Search this database of financial assistance sources (grants, loans, cost-sharing) available for a variety of watershed protection projects

Clean Water State Revolving Fund
The Clean Water State Revolving Fund (SRF) provides attractive, low-cost funding for projects that improve water quality, renew wastewater infrastructure, and support local economies. The Independent, revolving loan funds in all 50 states and Puerto Rico administer the SRF program, providing financial assistance to local communities.

Drinking Water State Revolving Fund (DWSRF)
The Safe Drinking Water Act, through the DWSRF, makes funds available to drinking water systems to finance infrastructure improvements. The program also emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water.

Federal Funding for Water/Wastewater Utilities in National Disasters (Fed FUNDS)
Fed FUNDS features federal disaster funding programs for water and/or wastewater utilities to obtain information on federal disaster funding programs from Federal Emergency Management Agency (FEMA), EPA, U.S. Department of Agriculture (USDA), Housing and Urban Development (HUD), and Small Business Administration (SBA). Using Fed FUNDS, a utility can easily identify appropriate funding opportunities, gain insight on the application process, access customized forms to document costs, download successful utility applications, and contact utility funding mentors.

PPG Performance Partnership (PPG) Grants
Learn how States and certain interstate agencies can combine two or more environmental program grants into a single PPG to reduce administrative costs and direct EPA grant funds to priority environmental problems or program needs.

Section 106 Water Pollution Control Grant Program
Section 106 of the Clean Water Act authorizes EPA to provide federal assistance to states (including territories, the District of Columbia, and Indian Tribes) and interstate agencies to establish and implement ongoing water pollution control programs.

Section 319 Grants Reporting and Tracking System (GRTS)
Discover the GRTS, the primary tool for management and oversight of the EPA's Nonpoint Source Pollution Control Program. These centralized grants and financial databases allow grant recipients to enter detailed information on the individual projects or activities funded under each grant.

Safe Drinking Water Act
The Safe Drinking Water protects public health and our nation's drinking water. It sets national, health-based standards for both naturally occurring and man-made contaminants that may be found in drinking water. EPA, states, and water systems then work together to make sure that these standards are met.

Targeted Watersheds Grants Program
Established in 2003, the Targeted Watersheds Grant program is designed to encourage successful community-based approaches and management techniques to protect and restore the nation's watersheds.

Tribal Funding
EPA is currently soliciting applications to support the National Tribal Water Council to facilitate tribal participation and build tribal capacity to address water quality and drinking water issues.

US/Mexico Border
[US]EPA's U.S.-Mexico Border Water Infrastructure Program provides grant assistance to U.S. and Mexican communities located within 60 miles of the border for the development and construction of high-priority drinking water and wastewater facilities. The program furthers EPA's mission of protecting human health and the environment by providing critical resources for what are often an area's first drinking water and basic sanitation services.

Watershed Funding
Visit this Web site to find tools, databases, and information about sources of funding to practitioners and funders that serve to protect watersheds.

Wetlands
Find out more about two grant programs, Wetlands Program Development Grants and the Five Star Restoration and Grants Programs that help protect the Nation's wetlands

12.3.5 USBR WaterSMART (Sustain and Manage America's Resources for Tomorrow) Grants Program

For USBR *WaterSMART Grants Information <http://www.usbr.gov/WaterSMART/grants.html>*

***USBR WaterSMART contact for Lower Colorado River Region* – Dennis Wolfe, Area Engineer, at dwolfe@usbr.gov or by phone at 951-695-5310**

> *Congress recognizes the stresses on water supplies through the country and the significant climate change-related impacts taking place currently. With the passage of the SECURE Water Act, a law was created that authorizes federal water and science agencies to work together with State and local water managers to plan for climate change and the other threats to our water supplies, and to take action to secure our water resources for the communities, economies, and the ecosystems they support.*

To implement the SECURE Water Act, the WaterSMART program was implemented in February 2010. WaterSMART allows all bureaus of the Department of the Interior to: [45]

> *…work with States, Tribes, local governments, and non-governmental organizations to pursue a sustainable water supply for the Nation by establishing a framework to provide federal leadership and assistance on the efficient use of water, integrating water and energy policies to support the sustainable use of all natural resources, and coordinating the water conservation activities of the various Interior offices.*[46]
>
> *Reclamation plays a key role in the WaterSMART program as the Department's main water management agency. Focused on improving water conservation and helping water and resource managers make wise decisions about water use, Reclamation's portion of the WaterSMART program is achieved through administration of grants, scientific studies, technical assistance, and scientific expertise.*

Planning and implementation of projects associated with the use of recycled or desalinated water should include the WaterSMART program as a resource to investigate as part of any funding alternatives analysis.

***WaterSMART Program links**:*

- *WaterSMART*
- *WaterSMART Grants*
- *WaterSMART Water & Energy Efficiency Grants*
- *System Optimization Reviews*
- *Advanced Water Treatment Grants*

[45] USDOI includes Bureau of Indian Affairs , Bureau of Land Management , Bureau of Ocean Energy Management , Bureau of Reclamation , Bureau of Safety and Environmental Enforcement, National Park Service ,Office of Surface Mining, Reclamation and Enforcement , U.S. Fish and Wildlife Service , and U.S. Geological Survey
[46] USBR WaterSMART. <http://www.usbr.gov/WaterSMART/water.html>

- *Grants to Develop Climate Analysis Tools*
- *Basin Studies*
- *Landscape Conservation Cooperatives*
- *Westwide Climate Risk Assessments*
- *Title XVI - Water Reclamation & Reuse*

WaterSMART Cooperative Watershed Management Program

- *Examples of Previously Selected Proposals*
- *Water Conservation Field Services Program*
- *WaterSMART Clearinghouse*

Source: USDOI/Bureau of Reclamation/ WaterSMART Grants <http://www.usbr.gov/WaterSMART/grants.html>

Table 12-13. WaterSMART Grants Information

Cost-shared funding for the following types of projects	
Water and Energy Efficiency Grants	Projects that save water, improve energy efficiency, address endangered species and other environmental issues, and facilitate transfers to new uses. More...
System Optimization Review Grants	A System Optimization Review is a broad look at system-wide efficiency focused on improving efficiency and operations of a water delivery system, water district, or water basin. The Review results in a plan of action that focuses on improving efficiency and operations on a regional and basin perspective. More...
Advanced Water Treatment and Pilot and Demonstration Project Grants	Pilot and demonstration projects that address the technical, economic, and environmental viability of treating and using brackish groundwater, seawater, impaired waters, or otherwise creating new water supplies within a specific locale. More...
Grants to Develop Climate Analysis Tools	Projects focused on the information gaps detailed in the joint Reclamation and United Stated Army Corps of Engineers (USACE) Report titled "Addressing Climate Change in Long-Term Water Resources Planning and Management: User Needs for Improving Tools and Information" (Section 3). Projects support the ongoing efforts under 9503(b) of the SECURE Water Act and may help narrow uncertainties, provide information in more usable forms, or develop more robust strategies for incorporating uncertainty into water management decision-making. **More...**

Source: USDOI/Bureau of Reclamation/ WaterSMART Grants <http://www.usbr.gov/WaterSMART/grants.html>

12.4 GRANT FUNDING MATRIX

As stated in the beginning of this section, the disposition of any grant or loan program is often unknown from year to year based on the funding appropriations process. Table 12-14 through Table 12-20 below provide a means of tracking and updating the most current understanding of the potential funding sources. These tables are comprehensive and categorized as follows:

- Table 12-14, Grant Funding Matrix Programs, Federal Stimulus
- Table 12-15, Grant Funding Matrix Programs, State Drinking Water
- 0, Grant Funding Matrix Programs, State IRWM and Groundwater
- Table 12-17, Grant Funding Matrix Programs, State Recycled and Storm Water
- Table 12-18, Grant Funding Matrix Programs, State Habitat Restoration
- Table 12-19, Grant Funding Matrix Programs, State Beaches and Federal Wetlands Restoration
- Table 12-20, Grant Funding Matrix Programs, USBR WaterSMART

Table 12-14. Grant Funding Matrix Programs, Federal Stimulus

Program	Brief Description	Key Points	Key Application	Contact Info
Federal Stimulus (American Recovery & Reinvestment Act) in California				
CDPH, Safe Drinking Water State Revolving Fund	Projects that assist in achieving or maintaining compliance with the Safe Drinking Water Act (SDWA). Includes source water protection projects	Eligible funding currently at $78.77 M	Planning applications due March 24, 2014 Construction applications due June 23, 2014	http://www.cdph.ca.gov/services/funding/Pages/SRF.aspx dwpfunds@cdph.ca.gov
SWRCB, Clean Water State Revolving Fund	Provides funding under the American Recovery and Reinvestment Act of 2009 to State of California to capitalize its revolving loan fund for financing and construction of wastewater treatment facilities and associated infrastructure, green infrastructure, nonpoint source projects, estuary projects, and program administration.	Program funding: $280 M (SFY 12/13) No state matching required. No upper limit for project; however maximum annual funding cap of $50 M per agency per year.	Applications under Economic Stimulus Package.	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/index.shtml CleanWaterSRF@waterboards.ca.gov Division of Financial Assistance home page: http://www.waterboards.ca.gov/water_issues/programs/grants_loans/ Note: The Division of Financial Assistance (DFA) administers the implementation of the State Water Resources Control Board's (State Water Board) financial assistance programs, that include loan and grant funding for construction of municipal sewage and water recycling facilities, remediation for underground storage tank releases, watershed protection projects, nonpoint source pollution control projects, etc.

Table 12-15. Grant Funding Matrix Programs, State Drinking Water

Program	Brief Description	Key Points	Key Application Dates	Contact Info
State				
Drinking Water, General – CA Department of Public Health (CDPH)				
CDPH, Prop 84 Section 75021: Safe Drinking Water Emergency Funding	To fund emergency and urgent actions to ensure safe drinking water supplies. Eligible projects include, but are not limited to, the following: • Provide alternate water supplies including bottled water where necessary to protect public health. • Improvements in existing water systems necessary to prevent contamination or provide other sources of safe drinking water including replacement wells. Establishing connections to adjacent water system. • Design, purchase, installation and initial operation costs for water treatment equipment and systems.	Minimum 50% cost share Maximum: $250,000 per project	Applications not currently open; prior pre- application period closed in September 2008.	http://www.cdph.ca.gov/services/funding/Pages/Prop84.aspx 916-449-5600 dwpfunds@cdph.ca.gov
CDPH, Prop 84 Section 75022: Small Community Infrastructure Improvements for Chemical and Nitrate Contaminants	To fund grants for small community drinking water system infrastructure improvements and related actions to meet safe drinking water standards. Priority shall be given to projects that address chemical and nitrate contaminants, and other health hazards.	Minimum: 50% cost share Maximum: $5 M per project.	CDPH is no longer accepting pre-applications for Prop 84 Section 75022 funding.	http://www.cdph.ca.gov/services/funding/Pages/Prop84.aspx 916-449-5600 dwpfunds@cdph.ca.gov

Table 12-16. Grant Funding Matrix Programs, State IRWM and Groundwater

Program	Brief Description	Key Points	Key Application Dates	Contact Info
Integrated Regional Water Management (IRWM)				
CDWR, Prop 84 Chapter 2 & Prop 1E Article 4: Integrated Regional Water Management (IRWM)	Projects that assist local public agencies to meet long-term state water needs, including delivery of safe drinking water, protection of water quality, and protection of the environment. For use in Development/Revision of IRWM Plans, or Implementation projects of IRWM Plans.	Funds awarded to date: Prop. 84 Round 1: $150 M Round 2: $131.1 M recommended to fund 139 projects Prop. 1E SWFM Round 1 and Round 2: $269 M	Proposed projects must be included in approved IRWM Plan Prop 84 Round 3: Expected to open in 2014 Prop 1E Round 3 Implementation Grant (pending appropriation): Winter 2014/2015	http://www.water.ca.gov/irwm/grants/index.cfm DWR_IRWM@water.ca.gov
Groundwater				
CDPH, Prop 84 Section 75025: Groundwater Contamination	Grants to prevent or reduce contamination of groundwater that serves as a source of drinking water.	Available Funding: $60 M Max per applicant: $10 M Funds awarded to date: Round 1 and 2: $46 M Projects must be completed within three years of funding agreement execution	Open invitation period has ended. CDPH is not accepting applications at this time.	www.cdph.ca.gov/ser vices/funding/Pages/ Prop84.aspx 946-449-5600 dwpfunds@cdph.ca.gov
CDWR, Prop 84: Local Groundwater Assistance Program	Groundwater studies, groundwater monitoring, groundwater management activities	Program funds: $4.7 M funded in 2011-2012 $4.8 M funding in 2012-2013 Up to $250,000 per applicant	Applications not currently open.	http://www.water.ca.gov/lgagrant/ Laura.Peters@water.ca.gov
SWRCB, Underground Storage Tank Cleanup Fund	Federal and state governmental entities are not eligible for reimbursement from the Fund. Program created to provide a means for petroleum UST owners and operators to meet federal and state requirements. Fund also assists in a large number of small businesses and individuals by providing reimbursement for unexpected and catastrophic expenses associated with the cleanup of leaking petroleum USTs.	Available Funding: $30 M from unexpended FY 11/12 site budgets to pay for over-budget costs incurred in FY 11/12 and additional funding for FY 13/14 site budgets Maximum reimbursement per occurrence is $1.5 million less the eligible claimant's applicable level of financial responsibility, also known as claimant's deductible.	Applications accepted on a continuous basis.	www.waterboards.ca.gov/water_issues/programs/ustcf/ USTcleanupfund@waterboards.ca.gov

Table 12-17. Grant Funding Matrix Programs, State Recycled and Storm Water

Program	Brief Description	Key Points	Key Application Dates	Contact Info
Recycled Water				
SWRCB, Prop 13/50: Water Recycling Construction Grants	Grants provided for design and construction of water recycling facilities. All proposed projects must be placed on the SWRCB's WRCP Competitive Project List (CPL) and/or the SRF Priority List to be considered.	25% of eligible construction cost up to $5 M	Applicants accepted on a continuous basis.	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/
SWRCB, Prop 13/50: Water Recycling Facilities Planning Grants	Grants provided for facilities planning studies to determine feasibility of using recycled water to offset use of fresh/potable water from state and /or local supplies. Pollution control studies, in which water recycling is an alternative, are not eligible.	50% of eligible costs up to $75,000	Applicants accepted on a continuous basis.	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/
Stream & Habitat Restoration				
CA State Parks, Prop 1E: Habitat Conservation Fund Program	Eligible funding categories: ▪ Deer/Mountain Lion habitat land acquisition ▪ Rare, endangered, threatened, or fully protected species habitat land acquisition ▪ Wetlands habitat projects ▪ Acquisition, enhancement, or restoration of anadromous salmonids and anadromous trout habitat ▪ Acquisition, enhancement, or restoration of riparian habitat ▪ Acquisition, enhancement, restoration of trails ▪ Acquisition or development of trails program ▪ Event or series of events intended to bring urban residents into areas with indigenous plants and animals	$2 M available annually through FY 2019/2020 No Min/Max; Recommended maximum $200,000 Required match of 50%	Applications deadline the first work day of October annually.	http://www.parks.ca.gov/?page_id=21361 localservices@parks.ca.gov
CDWR, Prop 84 Chapter 5: Urban Streams Restoration Program	Grants and technical assistance to local communities for projects to reduce flooding and erosion and associated property damages; restore, enhance, or protect the natural ecological values of streams; and promote community involvement, education, and stewardship. Eligible applicants: local public agencies, non-profit/citizens' groups.	$9 M remain in Proposition 84 and Proposition 13 funds to implement this program Eligible applicants: local public agencies, non-profit/citizens' groups	Next application solicitation is tentatively scheduled for release during Winter of 12/13 Fiscal Year	http://www.water.ca.gov/urbanstreams/

Table 12-18. Grant Funding Matrix Programs, State Habitat Restoration

Program	Brief Description	Key Points	Key Application Dates	Contact Info
Land and Water Conservation, Wildlife Conservation				
CA State Parks: Land and Water Conservation fund	Acquisition or development of lands and facilities that provide or support public outdoor recreation.	Max 50% of total project cost up to $2 M Funds are divided: 60% available for Local Agency Competitive Grants. 40% available to State Agencies on a pro-rata competitive basis.	Deadline: February 3 every year for Local Agency Applications	www.parks.ca.gov/?page_id=21360
CA Wildlife Conservation Board: Various	Wildlife Conservation Board's three main functions are land acquisition, habitat restoration and development of wildlife oriented public access facilities. Wildlife Conservation Board programs include: ▪ California Forest Conservation Program (CFCP) ▪ California Riparian Habitat Conservation Program (CRHCP) ▪ Ecosystem Restoration on Agricultural Lands (ERAL) ▪ Habitat Enhancement and Restoration Program (General)		Applications accepted continuously.	https://www.wcb.ca.gov/
Beaches and Stormwater				
SWRCB, Prop 84: Clean Beaches Initiative Grant	Provides funding for projects that restore and protect water quality and environment of coastal waters, estuaries, bays, and near shore waters. Funding priority is given to projects that reduce bacterial contamination on California public beaches. Two types of concept proposal applications: implementation projects and research projects Eligible applicants: Public agencies, 501(c)(3,4,5), nonprofit organizations, public colleges, Indian Tribes	Available Funding: $37 M $36 M for capital improvement projects that reduce bacterial contamination at priority beaches $10 M max towards FIB projects Potential award limits: $150,000 to $5 M 20% matching for projects > $1 M 15% match for projects < $1 M Matching for DACs: 10% match for projects >$1 M %5 match for projects <$1 M	Accepting concept proposals for implementation projects from October 25, 2013 to January 13, 2014	http://www.waterboards.ca.gov/water_issues/programs/beaches/cbi_projects/index.shtml
SWRCB, Prop 84: Stormwater Grant Program	Projects designed to reduce and prevent stormwater contamination of rivers, lakes, and streams. Eligible applicants: Local Public Agencies	Program funds: $38.4 M Award limits: $250 K-$3 M 20% match of total project cost match reduction for DACs	Round 2 Full Proposals due January 2014	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/prop84/

Table 12-19. Grant Funding Matrix Programs, State Beaches and Federal Wetlands Restoration

Program	Brief Description	Key Points	Key Application Dates	Contact Info
Federal				
U.S. Army Corps of Engineers- Section 206 Aquatic Ecosystem Restoration Projects	For local government projects to restore aquatic ecosystems. Projects are evaluated to determine if they benefit the environment through restoring, improving, or protecting aquatic habitat for plants, fish and wildlife. Proposed projects are also reviewed to determine if they are technically feasible, environmentally acceptable, and provide cost effective environmental benefits. Each project must be complete within itself and not part of a larger project.	Maximum federal expenditure per project is $5 M Project costs are shared 65% federal and 35% non-federal. Study costs: shared 50 percent Federal 50 percent Non-Federal after the first $100,000 in study costs. The first $100,000 in study cost is Federally funded.	Continuously soliciting programs to carry out the program objectives	http://www.nae.usace.army.mil/Missions/PublicServices/ContinuingAuthoritiesProgram/Section206.aspx
USEPA: Targeted Watersheds Grant Program	Designed to encourage community-based approaches and management techniques to protect and restore watersheds	Approximately $50 M awarded since inception Unknown future funding	Currently not accepting applications	
USEPA, Region 9: Wetland Program Development Grants	Assistance for public agencies and non-governmental organizations to improve their ability to protect and improve wetlands and related aquatic resources in the Pacific Southwest Region	$1.6 M available funding for 2013/2014 Award range: $50 K to $350 K EPA funding max = 75%	Currently not accepting applications	Suzanne Marr marr.suzanne@epa.gov

Table 12-20. Grant Funding Matrix Programs, USBR WaterSMART

Program	Brief Description	Key Points	Key Application Dates	Contact Info
USBR WaterSMART (Sustain and Manage America's Resources for Tomorrow)				
WaterSMART-Water and Efficiency Grants	Projects should seek to conserve and use water more efficiently, increase the use of renewable energy, protect endangered species, or facilitate water markets.	Reclamation provides 50/50 cost-shared funding on a competitive basis to non-Federal partners that wish to implement water conservation and efficiency projects. Irrigation and water districts, Tribes, States, and others with water or power delivery authority apply for funding of projects that can be completed in two to three years.	Continuously soliciting programs to carry out the program objectives	http://www.usbr.gov/WaterSMART/grants.html http://www.usbr.gov/WaterSMART/docs/WaterSMART-thee-year-progress-report.pdf
WaterSMART- System Optimization Review (SOR) Grants	For studies to evaluate means of saving water via conservation and to develop a plan that includes elements of water conservation, delivery, water management, water basin, water marketing and preventing conflicts over water.		Continuously soliciting programs to carry out the program objectives	
WaterSMART-Advanced Water Treatment and Pilot and Demonstration Grants	For pilot or demonstration projects that test the viability of advanced water treatment technologies.		Currently not accepting applications	
WaterSMART-Grants to Develop Climate Analysis Tools	For projects focused on information gaps detailed in joint USBR and US Army Corps of Engineers report titled "Addressing Climate Change in Long-Term Water Resources Planning and Management: User Needs for Improving Tools and Information" (Section 3).		Currently not accepting applications	
Water Conservation Field Services program	For water conservation and efficiency	$100 K max in federal funding per project	Currently not accepting applications	
USBR, Title XVI	Recycled water feasibility investigations, preliminary engineering studies and research projects. Brackish water desalination is also considered.	$126 M as stated in ARRA		http://www.usbr.gov/lc/socal/titlexvi.html Dennis Wolfe, Area Engineer, at dwolfe@usbr.gov or by phone at 951-695-5310

IMPERIAL
IRWMP

INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

IMPERIAL IRWMP

INTEGRATED REGIONAL WATER MANAGEMENT PLAN

Chapter 13

Implementation Plan

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Chapter 13. Implementation Plan

This section identifies specific actions, projects, and studies, ongoing or planned, through which the Imperial IRWMP will be implemented. In doing so, this section:

1. Identifies the agencies responsible for implementation
2. Describes a procedure for updating and amending the list of projects and programs
3. Identifies timelines for all active or planned projects
4. Identifies linkages between projects and programs
5. Demonstrates economic and technical feasibility on a programmatic level
6. Identifies the status of each element of the plan
7. Identifies the institutional structure that will ensure successful implementation of the Imperial IRWMP

13.1 Agencies Responsible for Implementation

The Imperial IRWMP Water Forum worked successfully throughout the IRWM planning process, demonstrated committed stakeholder involvement on the part of the important water sectors in the Region (supply, demand, urban, agricultural, renewable energy, environmental, environmental justice, DAC, state, federal, and others), and defined an effective decision making process as codified in the Imperial Water Forum and RWMG Charter (Charter). The Water Forum acted to continue using the existing governance structure and decision process during implementation of the Imperial IRWMP. In the event that a more formalized structure becomes necessary, changes would be made pursuant to the Program Organization section of the Charter. Some of these steps are described defined below.

Through Projects Work Group and Water Forum meetings and as directed by the Water Forum and using criteria approved by the Water Forum; GEI, Inc., developed a list of specific implementable projects and programs. Each project and program was prioritized within the context of this Imperial IRWMP. Actions, projects and plans that are incorporated into the Imperial IRWMP are described with the agency responsible for the top-rated 20 projects are shown in Table 13-1. A list of all projects considered is presented in Table 12-6.

Table 13-1. Imperial IRWMP 2012 Project List

Rank	Projects and Programs	Project Type	Sponsor	Cost	Status	Years to Project Start	Project Completion	Management Objectives Addressed
1	Keystone Water Reclamation Facility	Reclaim Wastewater	City of Imperial	$65,000,000	Final Design	< 1	2016	Water Supply
2	Keystone Desalination with IID Drainwater/ Alamo River Source (50 KAFY)	Desalination	Imperial Irrigation District	$147,440,000	Planning	3 - 6	2022	Water Supply
3	East Brawley 25 KAFY Desalination with Well Field and Groundwater Recharge	Desalination	Imperial Irrigation District	$101,000,000	Planning	3 - 6	2021	Water Quality
4	Large-Scale Microalgal Cultivation on Recently Exposed Playa Lands for Improving Salton Sea Water Quality and Regional Air Quality	Pilot Project, Algae	Scripps Institution of Oceanography (SIO), University of California San Diego (UCSD)	$5,620,000	Project Planning and Feasibility Study	< 1	2017	Environmental Protection, Regional Policies/Goals, Water Quality
5	City of Brawley Reclaim Water Project	Reclaim Wastewater	City of Brawley	$12,500,000	Preliminary Design	< 1	2015	Water Supply, Environmental Protection, Regional Policies/Goals, Water Quality
6	City of Brawley Water Meter Project	Metering, Conservation	City of Brawley	$4,000,000	Preliminary Design	< 1	2016	Water Supply, Environmental Protection, Regional Policies/Goals
7	City of Brawley Raw Water Storage Project	Storage, Reliability	City of Brawley	$4,000,000	Project Planning and Feasibility	1 - 3	2018	Water Supply
8	Holtville Wastewater Treatment Plant Improvement Project	Wastewater Treatment Plant Upgrade	City of Holtville	$6,149,000	Preliminary Design	< 1	2016	Water Quality
9	Spearheading with Spirulina: An Sustainable Approach to Desert Acquaculture	Pilot Project	Southern Low Desert Resource Conservation & Development Council	$350,000	Ready to Construct	< 1	2014	Regional Policies/ Goals
10	Drainage Improvements in the Township of Seeley; County Project No. 5363	Stormwater	Imperial County Public Works	$1,916,794	Project Planning and Feasibility	1 - 3	2017	Flood Protection and Stormwater Management
11	HPUD WWTP Upgrade to Tertiary Treatment	Reclaim Wastewater	Heber Public Utility District	$12,500,000	Preliminary Design	1 - 3	2017	Water Supply
12	New River Bioremediation and Wildlife Habitat Restoration and Process Evaluation Project	Habitat Restoration, Invasive Species Control, Conservation	San Diego State University Research Foundation	$600,000	Preliminary Design	< 1	2014	Water Quality
13	Holtville Wastewater Collection System Project	Fix Wastewater Outfall Pipeline	City of Holtville	$4,100,000	Final Design	< 1	2014	Water Quality
14	Water distribution storage tanks, 2 each 5MG	Storage, Reliability	City of El Centro	$10,000,000	Preliminary Design	1 - 3	2016	Water Supply, Regional Policies/ Goals, Water Quality
15	Holtville Water Distribution System Project	Water Supply Connector/ Pipeline Reliability	City of Holtville	$3,040,000	Preliminary Des	< 1	2016	Water Quality
16	Holtville Stormwater Conveyance System and Detention Basin Project	City Stormwater Management	City of Holtville	$7,095,000	Project Concept	< 1	2016	Flood Protection and Stormwater Management
17	Interconnection Projects between City of El Centro, City of Imperial and the Heber Utility District	Inter-connection, Reliability	City of El Centro	$1,400,000	Project Concept	3 - 6	2021	Water Supply, Regional Policies/Goals, Water Quality
18	Holtville UV Transmittance Water Treatment System Project	Drinking Water	City of Holtville	$540,000	Project Concept	< 1	2014	Water Quality
19	Holtville Stormwater Master Plan Project	Stormwater plan	City of Holtville	$60,000	Project Concept	< 1	2014	Flood Protection and Stormwater Management
20	Holtville Sewer Master Plan/ Map Update Project	Wastewater Treatment System Upgrade	City of Holtville	$84,000	Project Concept	< 1	2014	Water Quality

13.2 Updating and Amending the List of Projects and Programs

An adaptive management process creates a balance between a stable plan that guides action, and a flexible plan that allows for responding to changed circumstances. The approach to updating and amending the Imperial IRWMP is intended to ensure its effective implementation over time and to make the Imperial IRWMP a living document.

Changes to regional planning assumptions and priorities, to state and federal legislative and/or policy, or climate conditions (such as long-term drought in the Colorado River watershed) could create a need to update the list of projects and programs. Areas of uncertainty that could drive a plan update include QSA/Transfer Agreements litigation, changes in IID system and on-farm efficiency conservation programs, state and federal Salton Sea Restoration plans the major changes in land use that would have an effect on the Region's water use, and thus supply for "new" users. The process for making changes to the Imperial IRWMP is intended to provide the flexibility to respond to changing conditions in the Imperial Region.

Interim changes are defined as minor amendments to process, organization, or water management. These changes might occur with some frequency and don't require the update and re-adoption of the IRWMP. Interim changes include, but may not be limited to, maintaining the Priority List of Projects and Programs. Updating the Project Priority list will be based on a publicly noticed Call for Projects to the stakeholders that have adopted the Imperial IRWMP and to interested parties. The Project Work Group will review and rank the submitted projects and make a recommendation for Water Forum for action.

13.3 Timelines for Active and Planned Projects

The Imperial IRWMP will be implemented through short- and long-term projects and programs designed to achieve the regional objectives described herein. The prioritization strategy described in Chapter 12 is used to stage the progression of projects and programs identified in the Imperial IRWMP. Through short- and long-term regional project implementation, the planning agencies will begin to achieve the regional objectives.

The implementation schedule for each prioritized project and program in the Imperial IRWMP is shown in Table 13-1 and also includes the entity responsible for implementing a project or program.

Larger regional projects and programs include the Keystone reclamation project, desalination projects, and the interconnection projects between Heber PUD, El Centro, and the City of Imperial. Other projects will primarily benefit the DACs in the Region, which is an important aspect of this IRWMP. Projects such as the algae and habitat restoration projects will benefit the environment and may provide new local industries.

Groundwater development and recharge projects that could provide benefit throughout a large part of the Imperial Region are under study by IID. Flood/stormwater protection programs could provide

benefits to residents and property to communities throughout the Region. Regional benefits and costs as well as plans to finance projects were included in the evaluation and ranking of the listed projects. Engineering and economic studies are to be planned to support future action.

A number of projects and programs are part of the foundation of the IRWMP, including:

- County's and City land use plans which are the basis for projecting future urban water demand.
- County and Geothermal Energy Stakeholder Group plans for renewable energy development, including the County's proposed Solar Ordinance which is the basis for forecasting renewable energy water demand.
- DAC requirements to meet state and federal regulations and to provide storage reliability and storm protection for their residents.
- Concerns of the local community around issues of environmental justice and environmental enhancement, including protection of sole-source reservoirs and other state and federal BMPs, environmental regulations and programs.
- IID Fallowing Program, Definite Plan, and System Conservation Plan are the basis for reducing IID operational and agricultural sector discharge to the Salton Sea to meet the requirements of the QSA/Transfer Agreements. Impacts caused by the transfers are being mitigated with measures that have been and will be implemented under the QSA/Transfer Agreements environmental permits and authorization (Draft HCP and related permits) to protect the environment from associated impacts.
- IID Interim Water Supply Policy Regulations for Equitable Distribution Plan and Temporary Land Fallowing Conversion Policy, which allow IID to respond to changes to land use and in water use (urban and renewable energy).
- IID Annual QSA Implementation Report and 2007 Water Conservation Plan which are prepared for CDWR and USBR in compliance with state and federal regulations and allow IID to continue receiving imported Colorado River Water (there will be a 2013 WCP update).
- Imperial County Farm Bureau's TMDL Program and IID Drain Water Quality Improvement Plan, which are designed to meet the Basin 7 RWQCB requirements and to protect local habitat.

Potential projects and programs that could be further developed are related to:

- Further development and implementation of projects submitted by stakeholder for inclusion in the IRWMP.
- Preparing a Regional Urban Water Management Plan for update 2015 that complies with SBX7-7 water conservation program.
- Preparing and adopting a Groundwater Management Plan for the East Mesa where groundwater development and storage are proposed.
- Developing regional floodwater/stormwater protection and management policies.

13.4 LINKAGES BETWEEN PROJECTS AND PROGRAMS

All of the projects included in the Imperial IRWMP are slated to be initiated in the near future. Some of the projects have a long or short timeline for implementation while others are on-going. Linkages exist between most of the project type and programs; these potential linkages are described in Chapters 7 through 11. Other regional projects provide linkages that include benefits between the projects. For example, groundwater recharge projects (Chapter 7) are all related and provide synergistic benefits among the projects through regional groundwater storage. Various monitoring programs, such as water quality analysis of agricultural drains, demographic studies of wildlife species and wildlife habitat analysis are underway that will provide more information for the development of resource management strategies for the Salton Sea and the surrounding watershed.

13.5 ECONOMIC AND TECHNICAL FEASIBILITY

This Imperial IRWMP consists of projects, programs and planning activities that local and regional planners have found to be economical and technically feasible based on pilot studies, technical analysis, and data assessment. Table 13-2 presents the economic and technical feasibility of the projects on a programmatic level for each planning objective. Specific projects and programs associated with each management objective are identified in Table 13-2.

Status of Each Element of the Plan

The projects and programs in the Imperial IRWMP have been prioritized using a set of criteria discussed in Section 12-1. There are projects identified as near-term priorities for implementation that have completed or will complete the following elements within a year or less in order to meet their anticipated operational date:

- Project budgeted, with funding sources identified
- Preliminary design/environmental documentation complete (if applicable)
- Land acquisitions, right-of-way, and easements complete (if applicable)
- Permits and regulatory approvals complete (if applicable)

The projects identified in Table 13-1 as in earlier stages of planning (e.g., project concept) have not been completed and do not expect to complete the elements listed above in the near-term.

Table 13-2. Linkages between Project and Program Types

Regional Planning Objectives	Water Supply	Stormwater and Floodplain Management	Groundwater Management	Ecosystem Restoration	Recycled Water	Water Quality
Water Supply			X		X	X
Stormwater and Floodplain Management						X
Groundwater Management	X				X	X
Ecosystem Restoration		X			X	X
Recycled Water	X		X	X		X
Water Quality	X	X	X	X	X	

13.6 Institutional Structure to Ensure IRWMP Implementation

As described elsewhere (Chapter 3) in this document, the Regional Water Management Group (RWMG) is the lead decision making body with representation from each of the stakeholder interests for the development and implementation of the Imperial IRWMP. Once an agency/stakeholder adopts the IRWMP, it accepts responsibilities to participate in the implementation of the IRWMP. Thus, while, the IRWMP will be a living document that will change over time, an agency that adopts the IRWMP agrees to continue building common ground and collaborating to implement the Imperial IRWMP.

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Chapter 14

Measuring Plan Performance and Data Management

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Chapter 14. Measuring Plan Performance and Data Management

The purpose of this section is to outline an appropriate monitoring plan to measure plan performance for each Imperial IRWMP project planned for implementation. An appropriate monitoring plan is one that ensures effective use of available data, stakeholder access to data, and that data generated through IRWMP implementation activities can be integrated into existing monitoring databases. Cost efficiency to achieve a sustainable monitoring and reporting program over the IRWMP project implementation and operation period is an important consideration.

14.1 Primary Responsibility for Project Monitoring

Primary responsibility for development and implementation of project monitoring plans rests with the project proponent or partners consistent with requirements of any mitigation, monitoring and reporting program identified in the approved environmental review document. Projects funded through CDWR Proposition 84 grant programs will also need monitoring programs consistent with the CDWR implementation grant contract and/or other grant agreements. Project proponents will need to prepare a project -specific monitoring plan prior to any grant award.

14.2 Project-specific Monitoring Plan

The content of the project-specific monitoring plan must include a clear and concise description (in table format) of what is to be monitored to demonstrate how the project is going to meet IRWMP objectives and provide the anticipated benefits. A key component of all project-specific monitoring plans is to document the monetized and non-monetized economic benefits claimed in the grant application and any effectiveness analysis. Monitoring will include, but not be limited to, the following:

- Measurable benefits (acre-feet of yield, acres of habitat created, volume of water conserved, etc.)
- Location, method and frequency of monitoring
- Monitoring protocols/methodologies, including who will perform the monitoring
- Data Management System (DMS) or procedures to keep track of what is monitored
- Quality control/quality assurance plans, as required
- Procedures to ensure monitoring is carried out according to schedule and that adequate resources (funding and staff) are available to maintain project monitoring throughout the defined timeframe

Project proponents will document their progress at Water Forum meetings and will make available their monitoring reports as part of the implementation status and grant management activity.

14.3 DATA MANAGEMENT AND REPORTING

Data management is needed to ensure that the quality of the data is preserved and well documented with interpretation of changing trends and in achieving project goals. The data management and reporting programs will provide the efficient use of available data, stakeholder access to data, and to ensure that data generated by IRWM implementation activities can be integrated into existing State databases.

14.3.1 Adequacy of Available Data and Monitoring Efforts

The hydrologic system in and surrounding the Imperial Region has been extensively monitored for many years. Due to the number of agreements, compacts and legal requirements, the Imperial Region lies in one of the most monitored and measured water systems in the western United States, and existing monitoring and data management programs are extensive and complex.

Many of the historical, existing and future monitoring programs will be useful to the development and implementation of the plans and projects included in the IRWMP. Requisite data types depend on the type of project and might include canal, river and drain flows, surface water deliveries, groundwater elevations, groundwater pumping, precipitation, water demands, locations and sizes of water-related facilities, political and agency boundaries, land use, water quality, locations of sensitive habitats and species, and hydrogeologic data.

In concert with other agencies, the IRWMP implementation will continue to provide an exhaustive search for all data relevant to the IRWMP projects on an ongoing basis. Data gaps that are identified will need to be filled through new monitoring activities or new studies. Table 14-1 outlines typical data requirements for the priority projects included in the IRWMP. The data will include at a minimum any record relevant to surface water, groundwater, stormwater, and ecosystem restoration.

14.3.2 IID Data Management

As the manager of the imported Colorado River water supply, IID tracks the water supply, demand, delivery, conserved savings and produces a water budget for the water service area. The QSA/Transfer Agreements, related permits, and monitoring plans have led IID to implement an extensive monitoring network and data management system (the Water Information System, WIS). WIS incorporates quality assurance/quality control (QA/QC) operations and a data storage warehouse function for site-specific time-series flow data for water flowing through the IID system, including deliveries to over 5,500 gates and at measurement sites along nearly 1,670 miles of canals and laterals and 1,450 miles of drains. The WIS supports preparation of the IID Water Annual Report. [1]

[1] IID website: Water Annual Reports. <http://www.iid.com/index.aspx?page=440>

Table 14-1. Required Data for Priority Projects Outlined in the IRWMP

Data Type	Water Supply	Groundwater Management	Ecosystem Restoration	Recycled Water	Water Quality
Canal, Drain & River Flows	X		X		X
Locations of Sensitive Habitats and Species	X	X	X		X
Water Quality	X	X	X	X	X
Surface Water Deliveries	X	X			X
Groundwater Elevations		X			
Groundwater Pumping		X			X
Hydrogeologic Data		X			X
Precipitation	X	X			X
Water Demand	X	X		X	
Water Related Facilities - Location & Size	X	X		X	X
Political and Agency Boundaries	X	X	X	X	X
Land Use	X	X	X	X	X

The Imperial County Farm Bureau TMDL program is voluntary, however nearly all farmers in Imperial Valley participate because it offers growers and landowners a straightforward path to compliance with the mandatory TMDL regulation. Farmers implement a variety of Best Management Practices (BMPs) to reduce silt and mineral runoff on their own farms, and maintain a record of their efforts, and attend annual meetings to keep up-to-date and share information relating to BMPs and TMDL management on their farms. ICFB reports the resulting information to the Basin 7 RWQCB. The IID also has a TMDL monitoring program and monitoring data are provided to the RWQCB and thus to the Surface Water Ambient Monitoring Program (SWAMP).

Other surface water monitoring programs funded with state grants or to meet compliance requirements would include program-specific monitoring plans and requirements to submit data to SWAMP. IID is investing in an Integrated Information Management (IIM) system and an upgrade to its Supervisory Control and Data Acquisition (ClearSCADA) system (under development) to manage implementation of the EDP, Definite Plan and System Conservation Plan. Additional monitoring and data collection for other proposed IID projects would be defined in the project-specific monitoring plans as described above and would be added as needed or required to document benefits and other potential effects.

To comply with USEPA requirements and avoid termination of canal water service, residents in the IID service area who do not receive treated water service must obtain alternative water service for drinking and cooking from a state-approved provider. To avoid penalties that could exceed $25,000 a day, IID strictly enforces this rule. IID tracks nearly 4,000 raw water service accounts required by the California Department of Public Health (CDPH) to have alternate drinking water service. The section maintains a small-acreage pipe and drinking water database, and provides an annual compliance update to CDPH.

14.3.3 Groundwater Monitoring and Data Management

Groundwater monitoring would be needed for groundwater projects such as the one proposed for the East Mesa. The current plan is for the County, pursuant to the groundwater ordinance, to require

ambient groundwater monitoring with the proposed groundwater management areas, should such a project move forward. Project-specific monitoring would document specific project operations, benefits and ensure any impacts are avoided. An ambient monitoring program would be used to track seasonal and long term trends and regional conditions in the groundwater basin.

The County, as the authority for groundwater management, is the local monitoring entity that would coordinate groundwater monitoring activities with CDWR. In 2009, the Legislature passed SBX7 6, which establishes, for the first time in California, collaboration between local monitoring parties and CDWR to collect groundwater elevations statewide and make this information available to the public. With such limited groundwater development, the County has a limited monitoring program and limited groundwater data management capabilities currently. Data that is collected is managed and made available through agreements with the USGS.

When IRWMP groundwater related projects are implemented, or when further feasibility studies are conducted through cooperative IID/County study, then the final data management and quality control plan would be completed. The IID WIS manages time series data, and as the likely developer of a groundwater storage facility, any collected data would be submitted by IID to the California Statewide Groundwater Elevation Monitoring (CASGEM) program.

14.3.4 Imperial IRWMP Annual Report

On behalf of the Water Forum, IID will prepare an IRWMP Annual Report that documents progress towards meeting the IRWMP goals. It is anticipated that stakeholders would provide their project specific monitoring reports to the City of Imperial pursuant to CDWR requirements, and that these would be used by the City of Imperial to prepare quarterly reports and invoices. The progress will be summarized in the IRWMP Annual Report. Existing reporting will also be used for tracking the IRWMP. This includes the IID Annual Water Report and Water Conservation Plan Updates.[2] The most recent 2010 Water Department Annual report provided a summary of the IRWMP activity and this is expected to continue.

14.3.5 IRWMP Web Site

The IRWMP web site will be used for data and information sharing. Projects specific monitoring plans and reports will be provided by stakeholders and posted on the IRWMP web site as they are submitted to the City of Imperial and to CDWR. Project technical reports would also be posted.

14.3.6 Reliance on State of California Systems

The responsibilities, protocols and reporting requirements for the drinking water and wastewater quality sampling and reporting are based on the State law and the conditions in individual system

[2] IID website: Water Planning. < http://www.iid.com/index.aspx?page=185>

permits. All of the permitted systems provide data to the State in the form and format that is required, using the systems and tools available to the regulated facility.

To support both the regulated community and public access to data, the State's data submittal, public access and sharing capabilities are evolving. The Imperial Region relies on the responsible state agencies to provide technical support and systems that help the regulated community to provide the required data.

Existing data monitoring and measurement in the IID area are discussed in Chapter 5. At this time there are no specific plans for any new data management systems.

documents the data, monitoring and data management needs in the Region and how the existing data collection, management, and reporting programs can be used as the IRWMP is implemented.

Table 14-2. Data and Monitoring in the Region and Relation to the IRWMP

Need/Purpose	Program/System, Source/Access	Summary Reports/Plans/Description
Track progress implementing the Imperial IRWMP	Imperial Integrated Regional Water Management Plan web site. <http://imperialirwmp.org/>	• IRWMP documents and technical studies • Project list • Meeting schedules, agenda, notes and minutes • IRWMP Annual Report • Project Specific Monitoring Report
Track and Monitor Water in the Imperial Region		
Track and monitor flow data	IID Oracle-based Water Information system (WIS), tracks and warehouses time-series flow data, with monthly and annual QA/QC Other types of data also stored – e.g., QA/QC CIMIS record; USGS record for IID flow sites	• All IID reports that require QA/QC time-series flow record • IID reports with algorithms – verify conservation (ECP, IID/MWD Conservation Verification); IID Water Balance • QA/QC CIMIS record for the Imperial Valley
Track and monitor water deliveries. Support preparation of annual water report.	IID TruePoint System (TPS), stored in IID Water Information System (WIS)	Document results.
Monitor water operations	Integrated Information Management (IIM), Supervisory Control and Data Acquisition (ClearSCADA) system (under development)	System Conservation Plan and Delivery Measurement Description
Irrigation scheduling support and conservation	California Irrigation Management Information System (CIMIS). <http://www.cimis.water.ca.gov/cimis/welcome.jsp>	IID is a CIMIS cooperator. CIMIS provides daily and monthly climate record; supports tracking climate change. IID provides weekly CIMIS ET reports to growers. IID conducts a QA/QC procedure on Imperial Valley CMIS record for use in conservation verification, WB and other algorithms.
Tracking alternative water service for residents outside a treated water service area receiving water from IID service pipes.	IID Small-acreage Pipe and Drinking Water Database	IID annual report to CDPH
IID Title 22 (California Code of Regulations) source water sampling and analyses	<http://www.iid.com/index.aspx?page=183> Data submitted to CDPH	Annual monitoring results. IID samples and analyzes data to support local public water systems to facilitate annual production of a Customer Confidence Report.

Table 14-2. Data and Monitoring in the Region and Relation to the IRWMP, continued

Need/Purpose	Program/System, Source/Access	Summary Reports/Plans/Description
Monitor drain water quality to comply with TMDLs	<http://www.iid.com/index.aspx?page=184> Data is submitted to the RWQCB, Surface Water Ambient Monitoring Program (SWAMP). *See* <http://www.ca-watersheds.org/reg9-public/> *or* <http://bdat.ca.gov>	IID Drain Water Quality Improvement Plan (Revised DWQIP)
Monitor waste discharge water quality	California Integrated Water Quality System (CIWQS)	State Water Resources Control Board and RWQCB use to manage permits and other orders, track inspections, manage violations and enforcement activities. CIWQS allows online submittal of Permittee information for certain programs and makes data available to the public through reports. Imperial Region dischargers are using this system.
Monitor groundwater conditions	California Statewide Groundwater Elevation Monitoring (CASGEM) <http://www.water.ca.gov/groundwater/casgem/>	Ambient groundwater monitoring in the Region is limited. Future groundwater monitoring will submit data to CASGEM. Will support County to comply with SB7X 6 requirements if and when required.
Track Colorado River Conditions		
• Supply forecasting • Plan operations and deliveries • Address the effects of climate change • Protect water rights and the Region's supply	U.S. Bureau of Reclamation Regional Reports <http://www.usbr.gov/lc/reportsarchive.html>	*Annual Operating Plan for Colorado River Reservoirs.* Reports on operations of the Colorado River reservoirs for the completed year and the projected operations and releases for the current year. Water master report to document compliance with requirements.
	Lower Colorado River Reservoir and River Data <http://www.usbr.gov/lc/region/g4000/riverdata/index.html>	Hourly and daily data at key geographic locations
	<http://www.usbr.gov/lc/region/g4000/hourly/forecast12.pdf>	USBR Forecasted Water User Reports
	<http://www.usbr.gov/lc/region/g4000/hourly/use12.pdf>	USBR Actual Water User Reports

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