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.

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

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

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
Measured Accounts	6,191
Customer Turnouts	
Delivery Gates	5,586
Small Parcels	792
Pipes	2,259
Measured Turnouts	5,586

Source: IID 2007 Water Conservation Plan

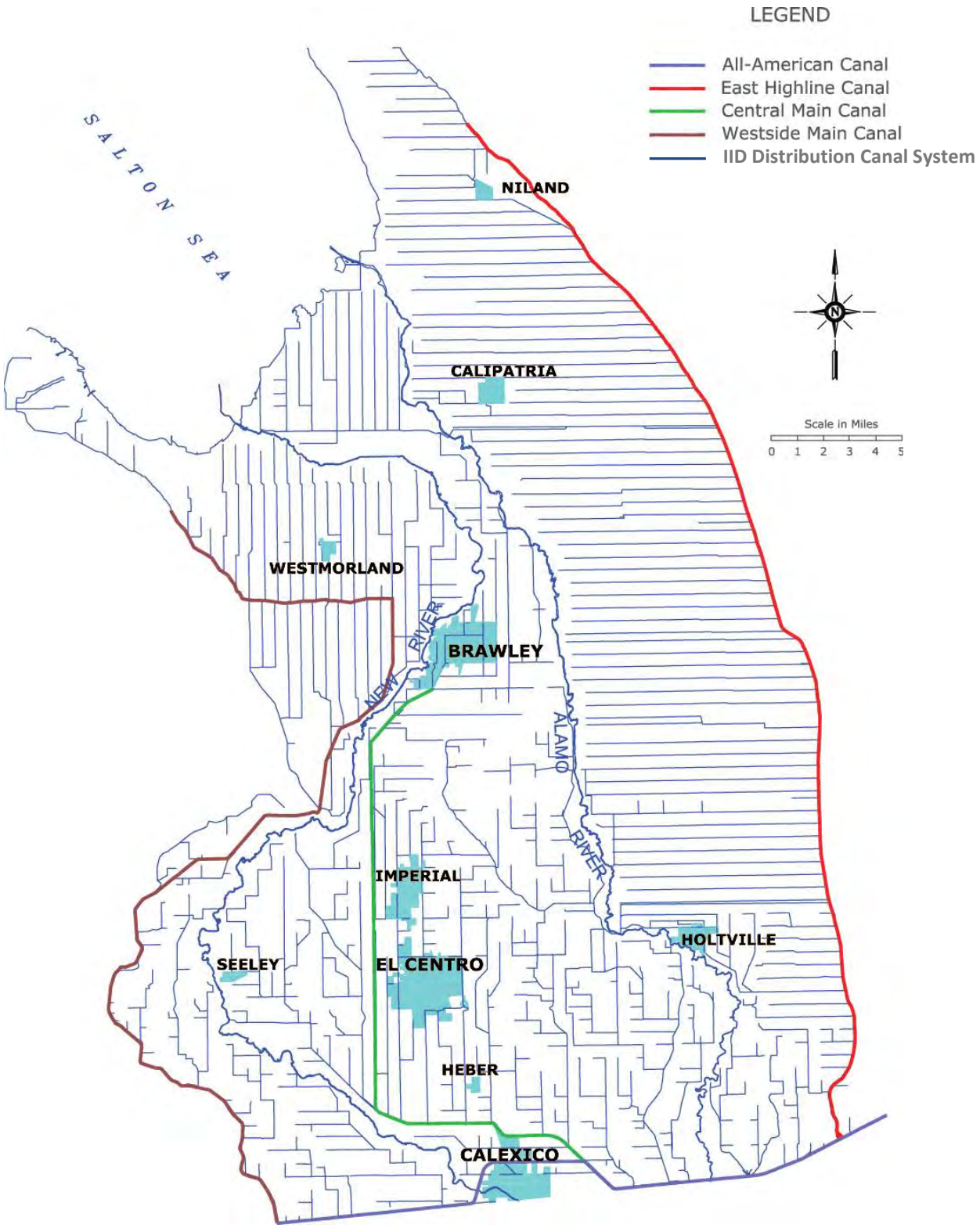

Figure 4-1. IID Main Canals and Lateral System

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

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		***425***
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 Measurements (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 (CIMIS and IID Sites)

Type	Station Number
Calipatria/Mulberry CIMIS	0041
Meloland CIMIS	0087
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

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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]

[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 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)
- 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)

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

Agricultural drainage flows into the Salton Sea. Based on information in the Definite Plan, the average drainage from Colorado River into the Salton Sea was approximately 1.1 million acre-feet per year (Table 4-8).

Table 4-8. Drainage to Salton Sea from Colorado River Water Diverted to IID, 1995-2005 Average Annual Volume

Component	Average Annual 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
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.

[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.

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.

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 – The Cities and 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 clear 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

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

- Andrata Place area improvement (cast iron pipeline replacement)

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 would 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

The 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. However, construction is ongoing for both raw water and clear water storage. An additional 5 million gallon raw water tank is being constructed while a total of 1.3 million gallons of clear water storage will be available when planned projects are completed. IID has a computer model of the existing distribution system. There are no system deficiencies identified by the model, but many pipes in the distribution system are old and pipe failure is

expected. IID received a USDA grant in September 2010 for pipeline replacement, and began implementation 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

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

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

Wastewater Treatment Plant	Current Conditions				Future Conditions	
	Plant Capacity [AFY]	**Average Flow** [AFY]	**Treatment Level**	**Discharge to** (Discharge point / End of Drainage Path)	**Plant Capacity** ^ [AFY]	**Average Flow** ^ [AFY]
City of Brawley wastewater treatment plant	6,608 +/^	3,920 +/^	Secondary	New River + / Salton Sea	13,440	5,712
City of Calexico Municipal wastewater treatment plant	4,816 +/^	3,024 ^	Secondary	New River / Salton Sea +	14,000	7,504
Calipatria wastewater treatment plant	1,938 +/^	1,120 +/^	Secondary	"G" Drain / Alamo River + (to Salton Sea)	"Upgrade by 2025" 1,938*	1,680
El Centro Municipal wastewater treatment plant	8,960 +/^	4,480 +/^	Secondary ^	Central Main Drain / Salton Sea via Alamo River +	22,400	7,437
El Centro Generating Station	1,165 +	N/A	Secondary	Central Drain No. 5 / Salton Sea via Alamo River +	1,165*	---
Gateway of the Americas wastewater treatment plant	224 ^	205 ^	Secondary	N/A	1,232	959
Heber Geothermal Company, Heber	4,816 +	N/A	N/A	Strout Drain +	4,816*	---
Heber PUD wastewater treatment plant	907 ^	392 ^	Primary	N/A	6,720	5,041
City of Holtville Municipal wastewater treatment plant	952 ^	728 ^	Secondary	Pear Drain/Alamo River^ (to Salton Sea)	2,464	1,151
City of Imperial Water Pollution Control Plant	1,568 +/^	1,073 +/^	Secondary	Dolson Drain / Salton Sea via Alamo River +	11,220	4,340
Second Imperial Geothermal Company, Heber	1,680 +	N/A	N/A	Beech Drain / New River + (to Salton Sea)	1,680*	---
Niland wastewater treatment plant	560 ^	258 ^	Primary	N/A	560	381
Seeley County wastewater treatment plant	224 +/^	95 +/^	Secondary	New River + / Salton Sea	224	224
Westmorland wastewater treatment plant	560 ^	291 ^	Secondary	Trifolium Drain No. 6 / Salton Sea via New River +	1,232	1,109
Totals	**34,978**	**15,586**	**--**	**--**	**83,092**	**--**

Key to Table 4-9

Note: Capacities and flows based on information in NPDES permits and Service Area Plans; therefore, the date of information varies.

+ From NPDES Permit

^ From Service Area Plan

*For total calculation, it was assumed that future plant capacity would remain the same for facilities where no information on future expansion has been found.

ᵖ Future average flows from Service Area Plan projections for 2020 except for El Centro Municipal water treatment plant and Heber PUD Wastewater treatment plant, which are for 2014.

Remarks:

City of Brawley Wastewater treatment plant
- NPDES permit CA0104523 (Effective June 29, 2005 to June 29, 2010).
- City of Brawley Final Service Area Plan, February 2007.

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

Calipatria Wastewater treatment plant
- NPDES permit CA0105015 (Effective June 29, 2005 to June 29, 2010).
- Final Calipatria Service Area Plan (CL1-04), November 2004.
- California Regional Water Quality Control Board Waste Discharge Requirements for the city of Calipatria, Calipatria Wastewater Treatment Plant 2010

El Centro Municipal Wastewater treatment plant
- NPDES permit CA0104426 (Effective 2003-2008).
- City of El Centro Service Area Plan, November 2005.

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

Gateway of the Americas Wastewater treatment plant
- NPEDES permit CA7000015 referenced in SAP, unable to locate copy of permit at this time.
- Gateway of the Americas Service Area Plan, December 2005.

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

Heber PUD Wastewater treatment plant
- Heber Public Utility District DRAFT Service Area Plan, June 2004.

Holtville Wastewater treatment plant
- City of Holtville Final Service Area Plan/Municipal Service Review, October 2006.
- NPDES permit CA 0104361 (Effective to June 21, 2011 identified, 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 Wastewater treatment plant
- Sanitation District Service Area Plan for Wastewater Facilities, February 2006.

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

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

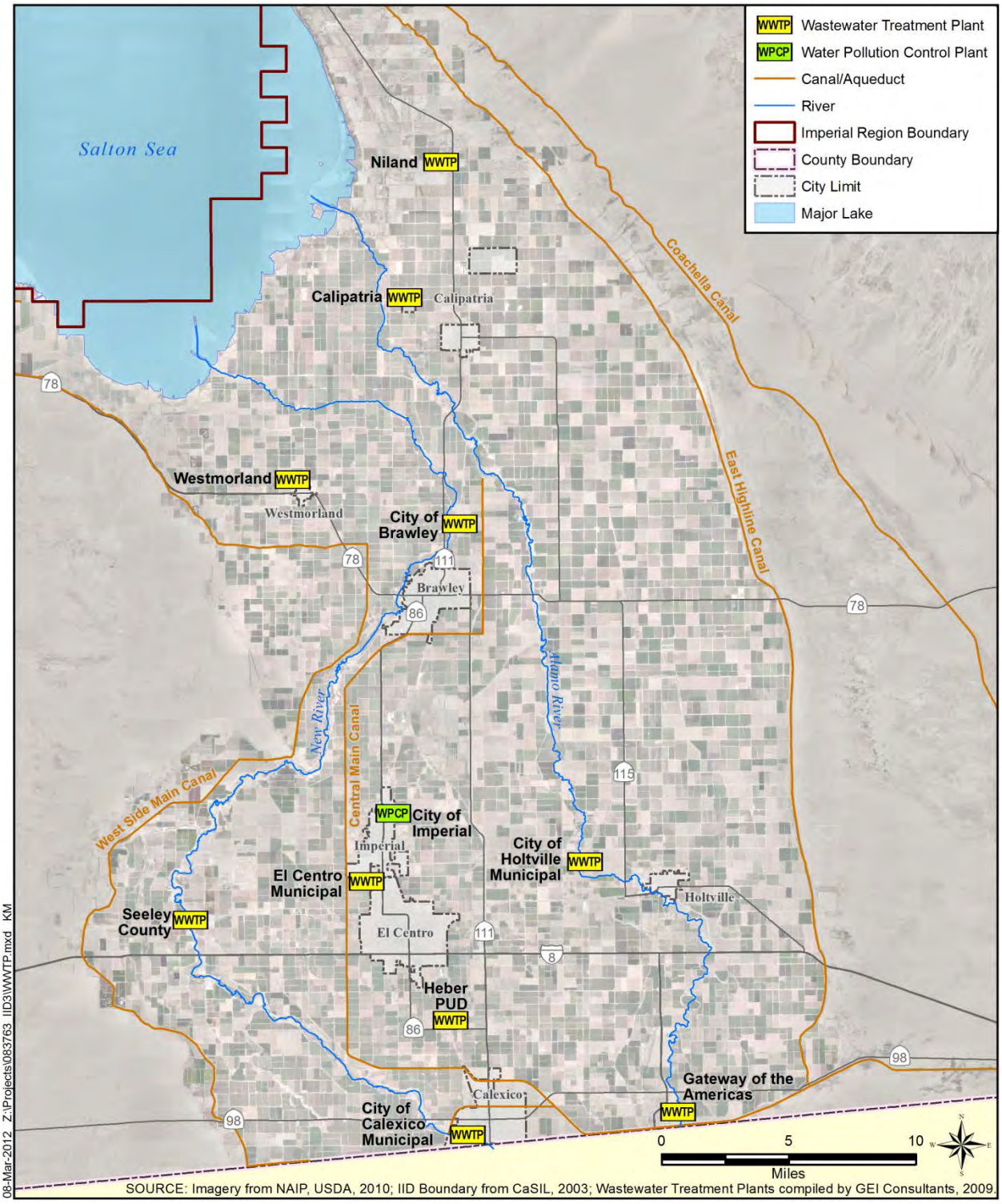

Figure 4-2. Large Wastewater Treatment Facilities

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 current 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 existingwastewater 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. The 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, the average daily flow into the wastewater treatment plant was 0.18 million gallons. This equates to 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 of the Imperial Region 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

The 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, producing $1.6 billion in 2010 (Table 4-10). Agricultural land uses predominate in the IID water service area and represent 97 percent of the water used in the Imperial Region (Table 4-11). There is limited agricultural land use in the areas outside of the IID service area and these areas are reliant on groundwater.

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

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

Source: Imperial County Agricultural Crop and Livestock Report 2010

Table 4-11. IID Water Delivered, 2006-2010 (Acre-Feet)

2006	2,506,209
2007	2,475,884
2008	2,513,697
2009	2,341,888
2010	2,327,051

Source: IID Annual Delivered to Users Report Includes MCI water supplies

Table 4-12 presents the annual Crop Survey for the years 2008 to 2010 (IID 2010). The 2010 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 to its customers. 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 future land use obtained from the Cities and County were used as the basis for forecasting future water demand (see Chapter 5). The intent was for the Imperial IRWMP water demand forecast to be consistent with the prevailing land use plans. The land use maps for the Cities and unincorporated areas are presented in the Imperial IRWMP report on Historical and Future Municipal, Commercial, and Industrial Water Demands (Appendix D)(GEI 2011a). MCI water uses historically accounted for approximately 3 percent of Imperial Region total water use. In 2011, that use increased to 4.5 percent.

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

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. Inventory of Areas Receiving Water, 2008-2010 (Acres)

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 & Area Covered By			
Salton Sea, Less Area Receiving Water	40,150	40,150	40,150
Area in Imperial Unit Not Entitled	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 That Is 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

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

There are extensive federal lands 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).

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. The proposed Northern and Eastern Colorado Desert Coordinated Management Plan and Final Environmental Impact Statement were released as an amendment to the CDCA Plan in summer 2002; nine years after the planning effort commenced. It continues to be the subject of 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.

The East Mesa is within the CDCA Plan and there are a number of Area of Critical Environmental Concerns (ACEC) that 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, and local, state, and federal policies promoting renewable energy, provide the primary drivers for the growth of the renewable energy industry 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.

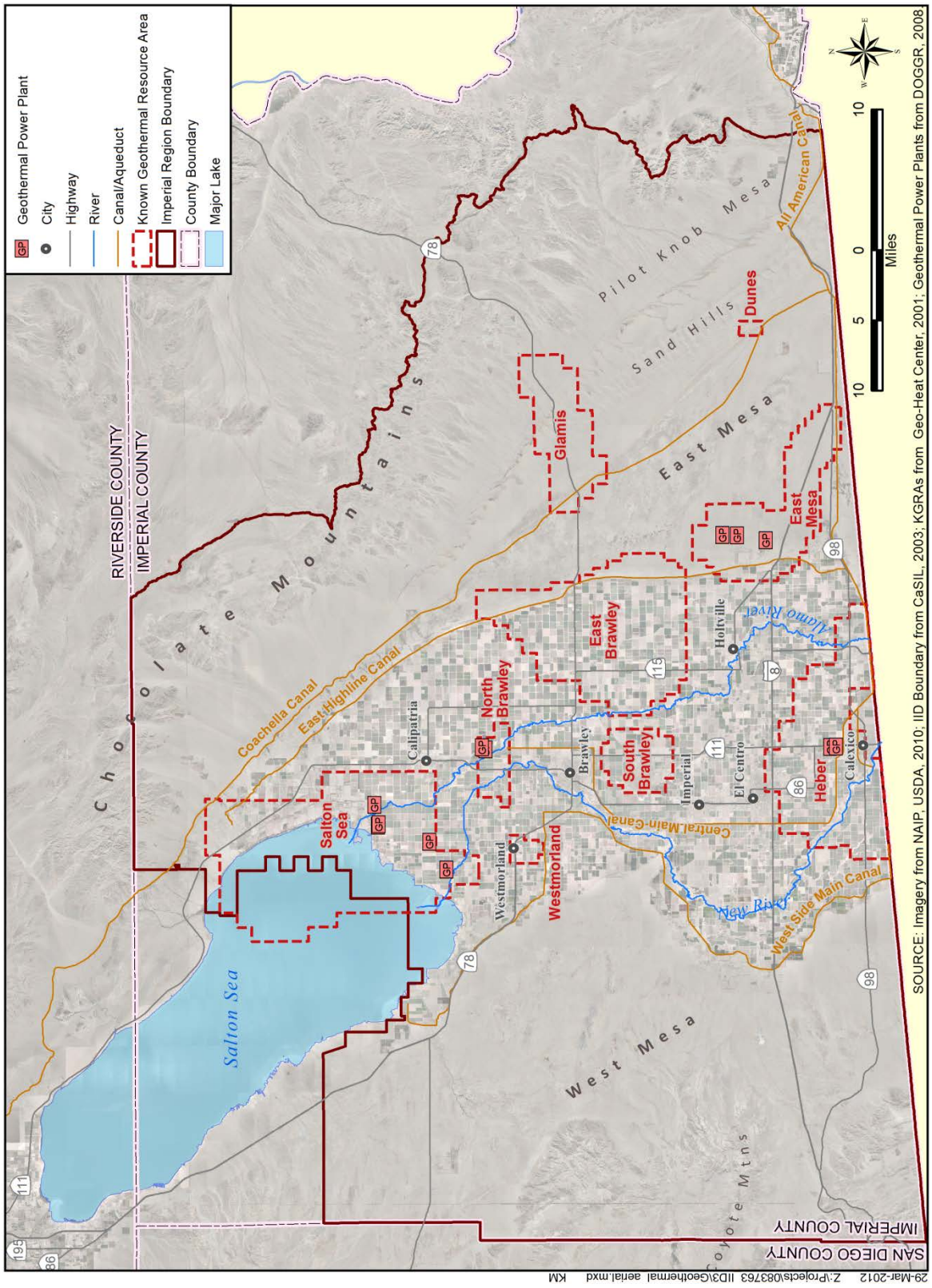

Figure 4-3. Known Geothermal Resources Areas (KGRA)

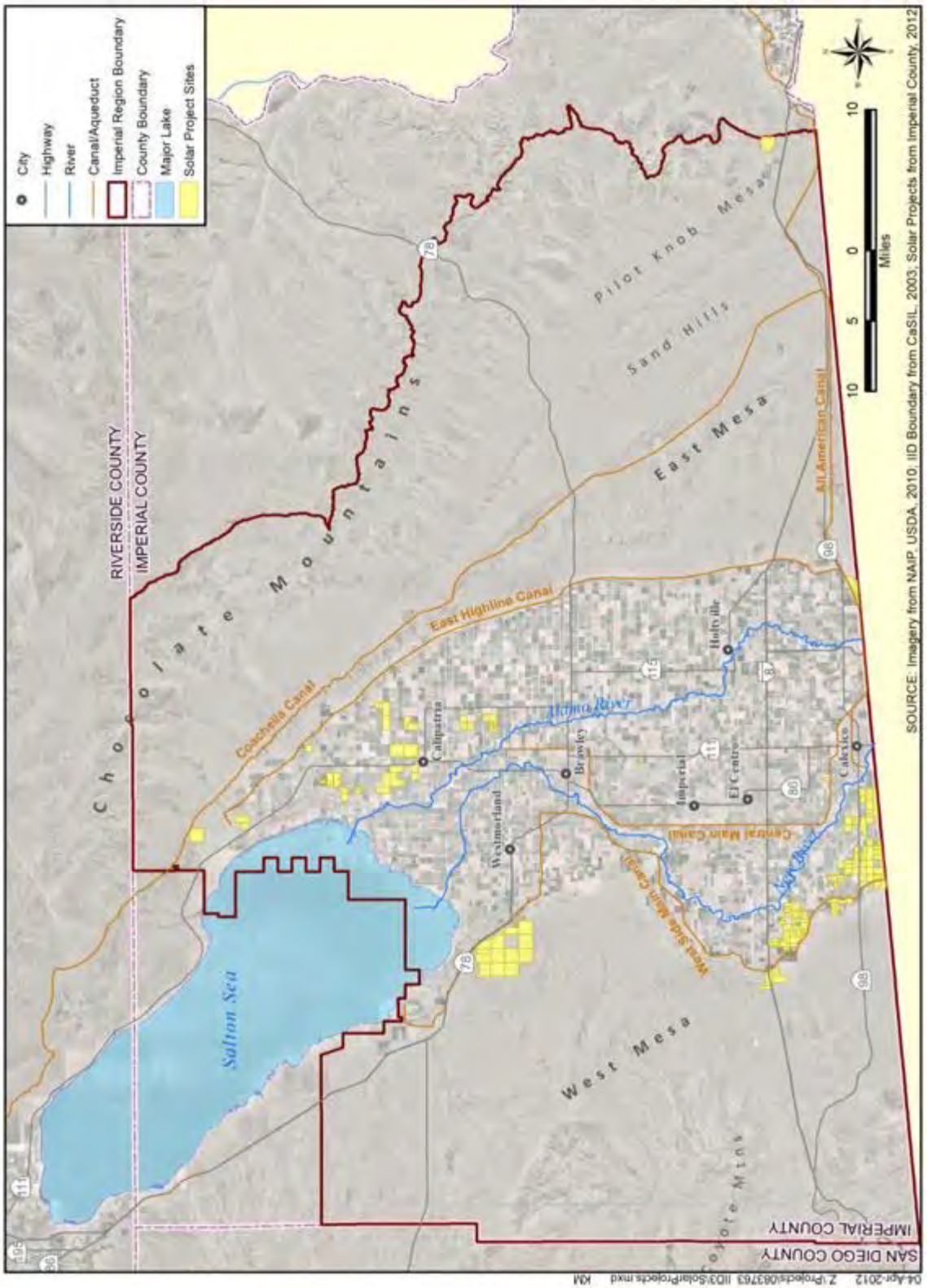

Figure 4-4. Known Solar Resources

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 SBx1-2 that establishes new renewable energy goals for California's utilities, as follows:

Compliance Period	Renewable Energy Target
01/01/2011 –12/31/2013	Average of 202 percent or retail sales throughout this period
01/01/2014 –12/31/2016	"Reasonable progress" to ensure 25 percent renewable energy by the *end* of this period
01/01/2017 – 12/31/2020	"Reasonable progress" to ensure 25 percent renewable energy by the *end* of this period

Source: IID Board Resolution 12-2012

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

1) Meet it 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 the rate impacts on its retail customers in accordance with SBx1-2.[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

[7] Codified in 2006 Senate Bill 107
[8] November 17, 2008, Executive Order S-14-08 and 2011 Senate Bill X1-2
[9] IID Board Resolution 12-2011 <http://www.iid.com/Modules/ShowDocument.aspx?documentid=4780>

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.

There are also proposals 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.

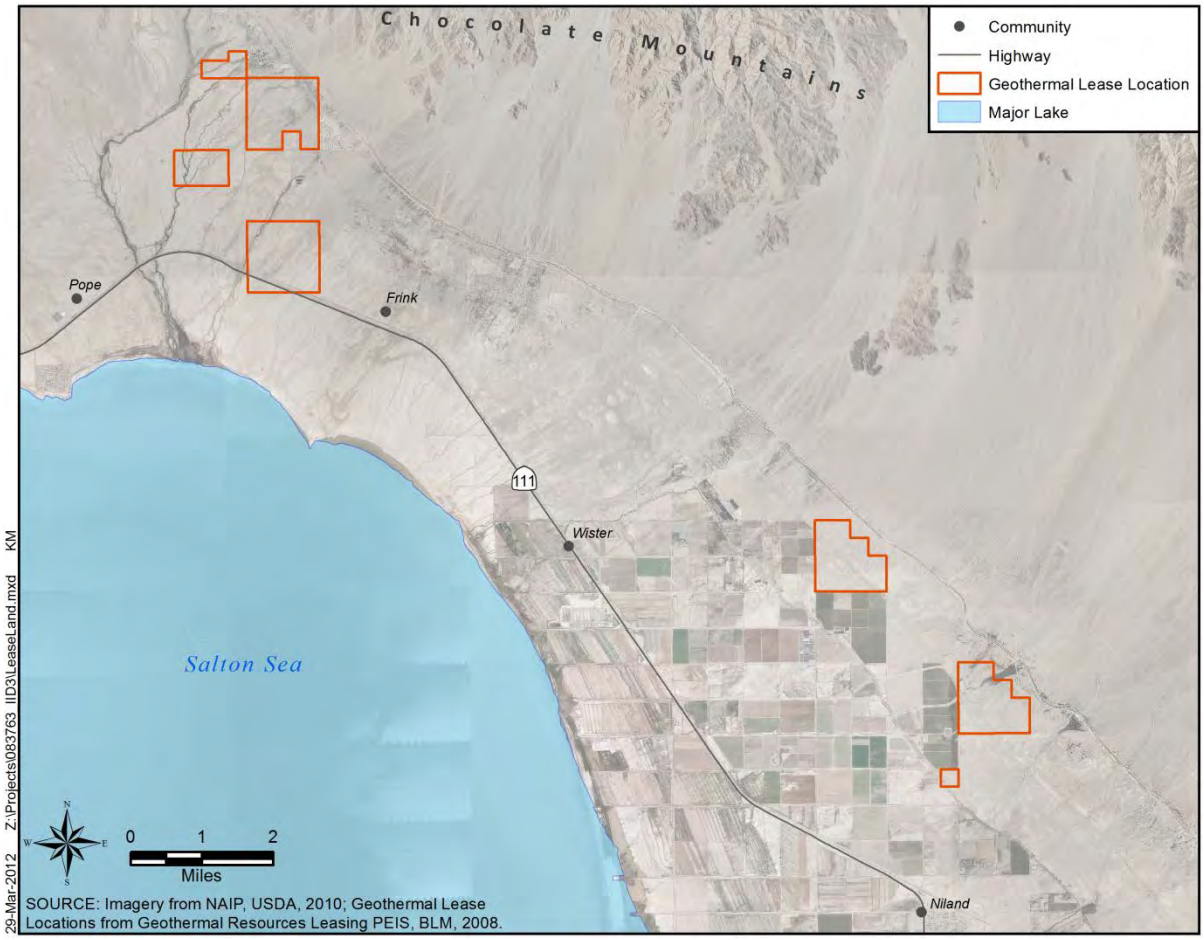

Figure 4-5. Geothermal Lease Locations, USBLM El Centro Field Office

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.

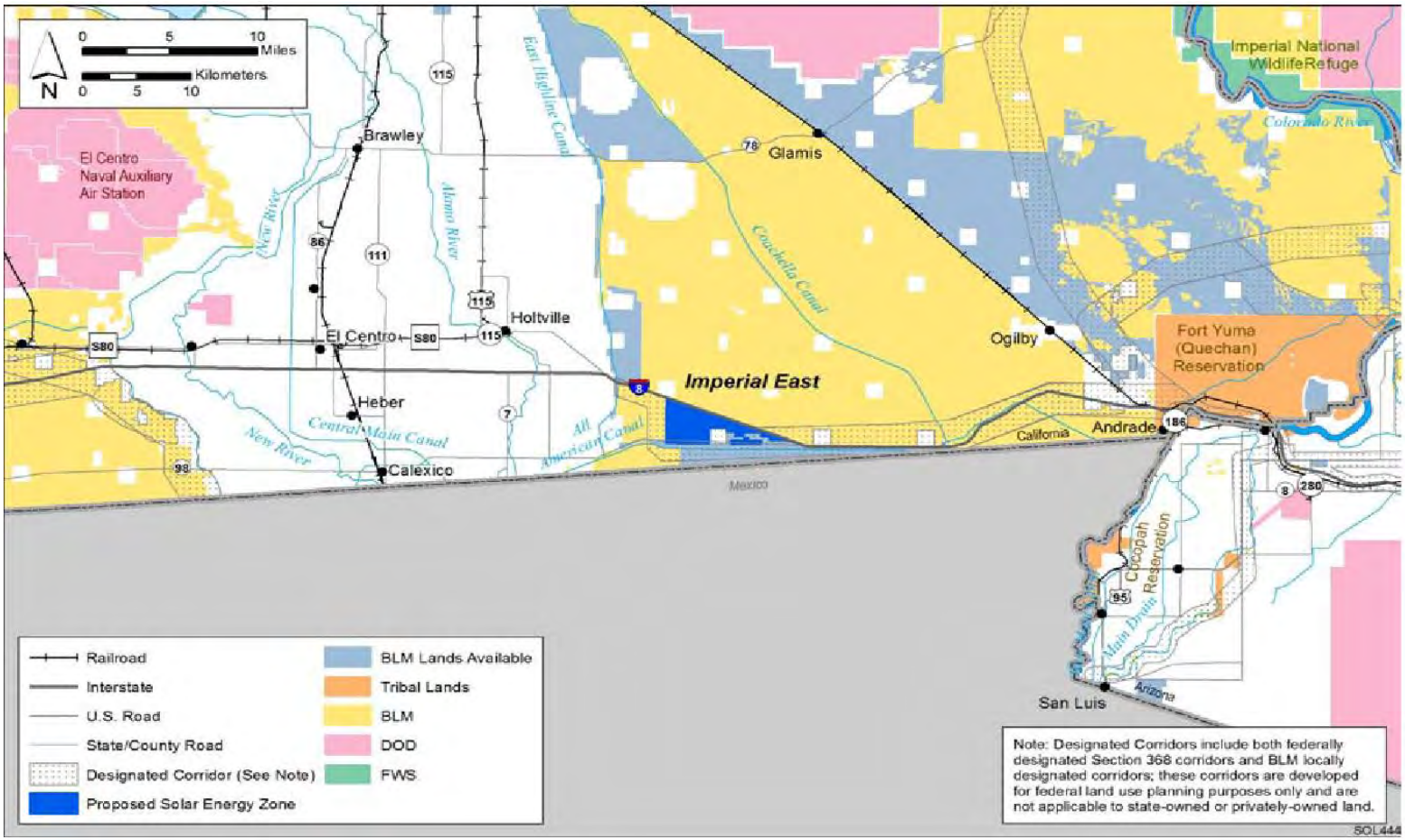

Figure 4-6. Potential Imperial East Solar Energy Zone and Other Federal Lands Potentially Available for Solar Facilities

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>

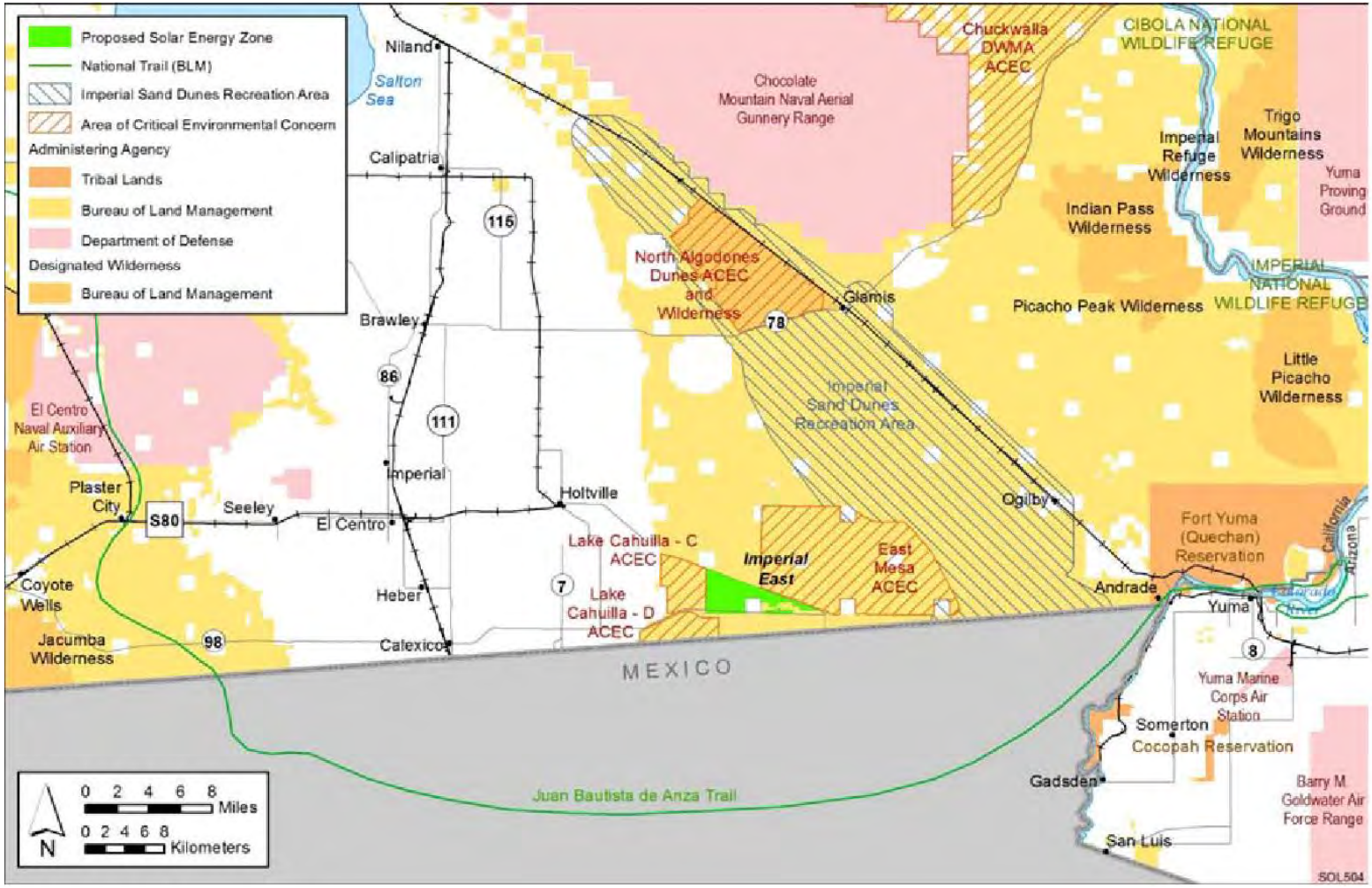

Figure 4-7. Imperial East Proposed Solar Energy Zone

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

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 4-14 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 4-14.Imperial Region Median Household Incomes and DAC Status

Census Tract (2010 Census)	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

Data from 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; however, 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.

The 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.

The California Department of Fish and Game owns and operates the Imperial Wildlife Area, which is made up of three units: Wister (5,423 acres), Hazard (535 acres), and Finney-Ramer (2,047 acres). The units consist of 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 decent comprised 14 percent of the population. Table 4-15 provides details of race and ethnicity of the population for Imperial County. Imperial County demographic data is presented in Table 4-16.

Government, agriculture, and retail trade that represent 70 percent of total county employment. Government services account for over one-third of total employment. Agriculture accounts 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 the U.S. Bureau of Labor Statistics. Unemployment in the region has been chronically high and well above the state averages (Figure 4-8).

Table 4-15.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 4-16. Imperial County Demographic Data

Demographic Categories	Percent
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 graduatesof 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>

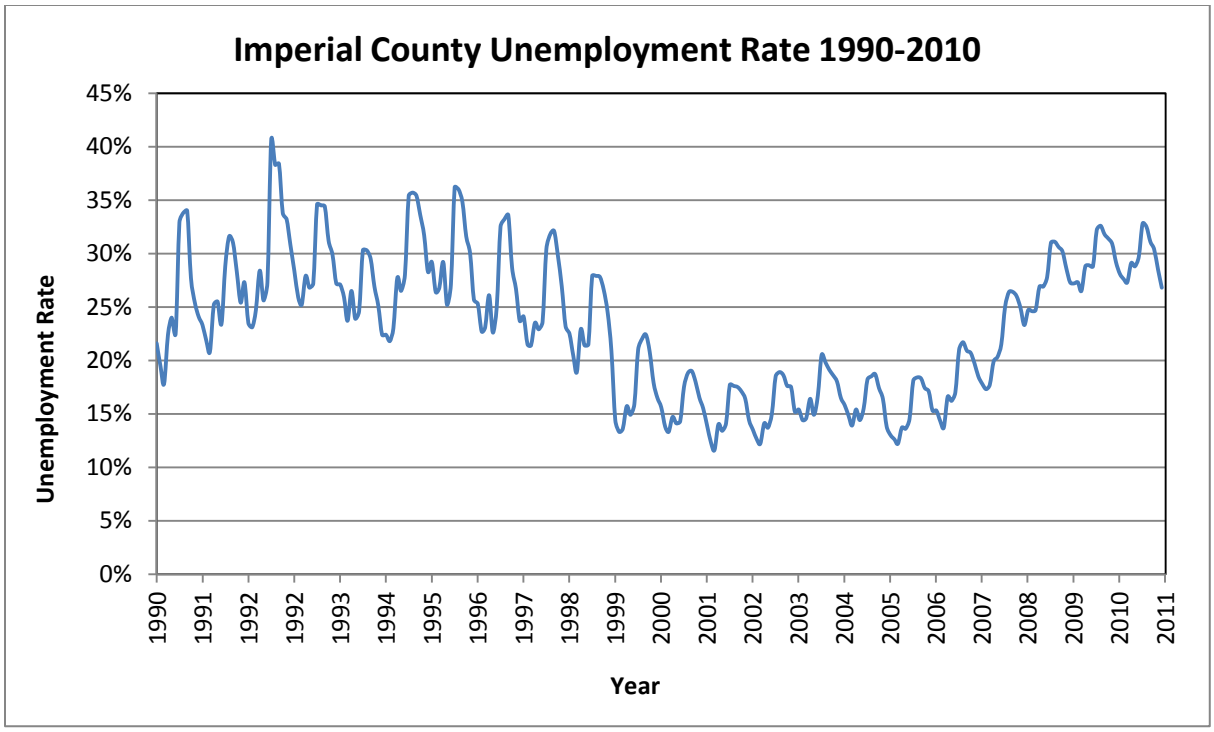

Figure 4-8. Imperial County Unemployment Rate

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

4.3 PHYSICAL AND NATURAL ENVIRONMENT

4.3.1 Climate

The 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). The Imperial Region is characterized by hot, dry summers. Average rainfall is less than three inches per year over the 93-year record, and the majority of rainfall occurs from November through March. Summer thunderstorms occur periodically 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. The average annual air temperature is 72 degrees Fahrenheit, and frost is rare. Climate change and the vulnerability to climate change are discussed in Chapter 5. Table 4-17 provides a monthly and annual climate summary.

Table 4-17. 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	114
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 Watersheds

CDWR divides the state into 10 hydrologic regions (Figure 4-9) corresponding to the state's major water drainage basins. The Region is located in the Colorado River Hydrologic Region (Region 10). Despite its dry climate, the Colorado River Hydrologic Region contains substantial surface water bodies, including the Colorado River and the Salton Sea. The south Salton Sea watershed includes the New and Alamo rivers and extends into Mexico.

Figure 4-9. California DWR Hydrologic Regions

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. It is 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 mountains to the west lies San Diego, California, and to the east beyond the Colorado River is 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.

Groundwater basins within the Imperial Region, displayed in Figure 4-11, and 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, which total approximately 2,800 square miles (CDWR 1975). The major surface water body within the Region is the Salton Sea, and the drainage is to the Salton Sea via the New River and Alamo River and various washes. Groundwater-bearing materials are generally younger than older alluvial sediments derived from the erosion of the surrounding mountain ranges.

The 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), shown in relation to the Region's groundwater basins on Figure 4-11 and in relation to the Region's watersheds in Figure 4-11. 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 County might experience a moderately damaging event (magnitude of 5.5 or greater). At least once every 50 years, there is likely to be a major earthquake (magnitude of 6.8 or greater). 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).

4.3.3.1 Aquifers and Groundwater Levels

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.

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 somewhat loosely defined region of gently sloping desert land that lies 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 (Bookman-Edmonston 1996; Bookman-Edmonston 2004) for US Gypsum provide information on both the quality and quantity of available groundwater that exists and which was designated a sole source aquifer by USEPA in 1996.[10] Underlying geology is a critical issue for both water levels and water quality in the Ocotillo-Coyote Wells basin, with some domestic wells having non-potable water. This area of West Mesa also 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 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 are 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 4-12 to Figure 4-14. 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 regarded as 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.[11]

[11] This information provided by Edie Harmon desertharmon@gmail.com, a resident in West Mesa.
[12] This information provided by Edie Harmon desertharmon@gmail.com, a resident in West Mesa.

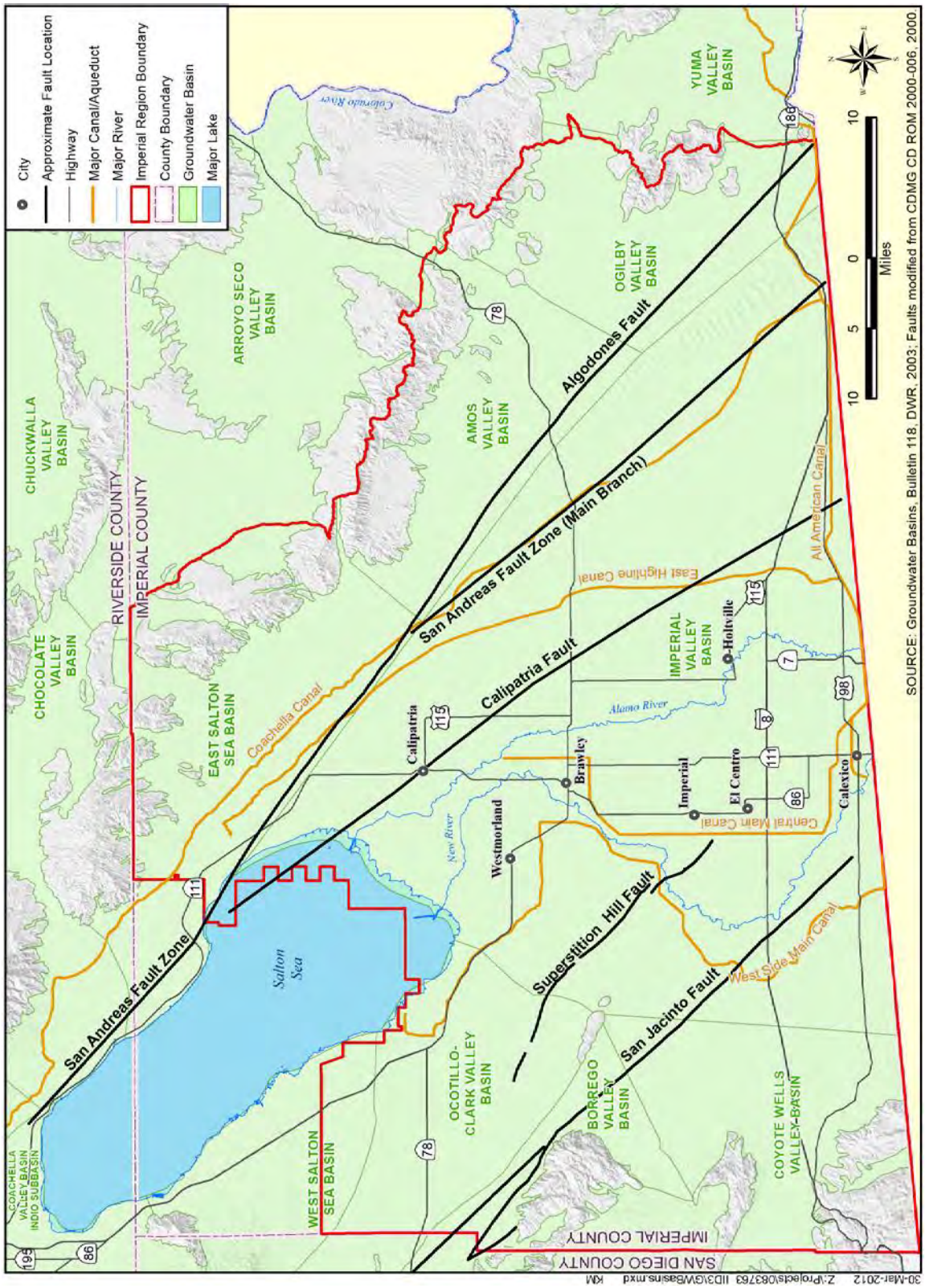

Figure 4-10. Imperial Region Groundwater Basin and Earthquake Faults

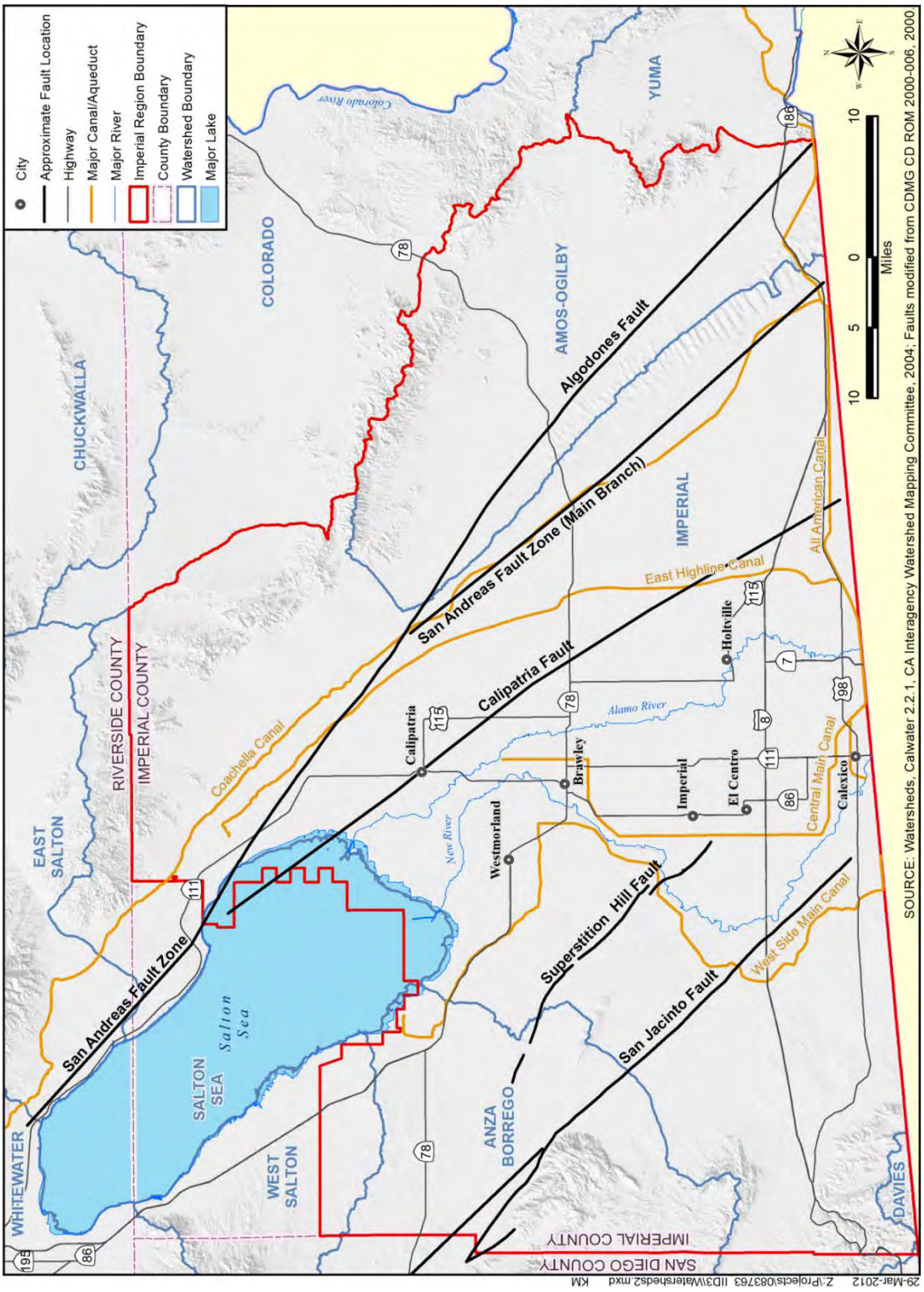

Figure 4-11. Imperial Region Watersheds

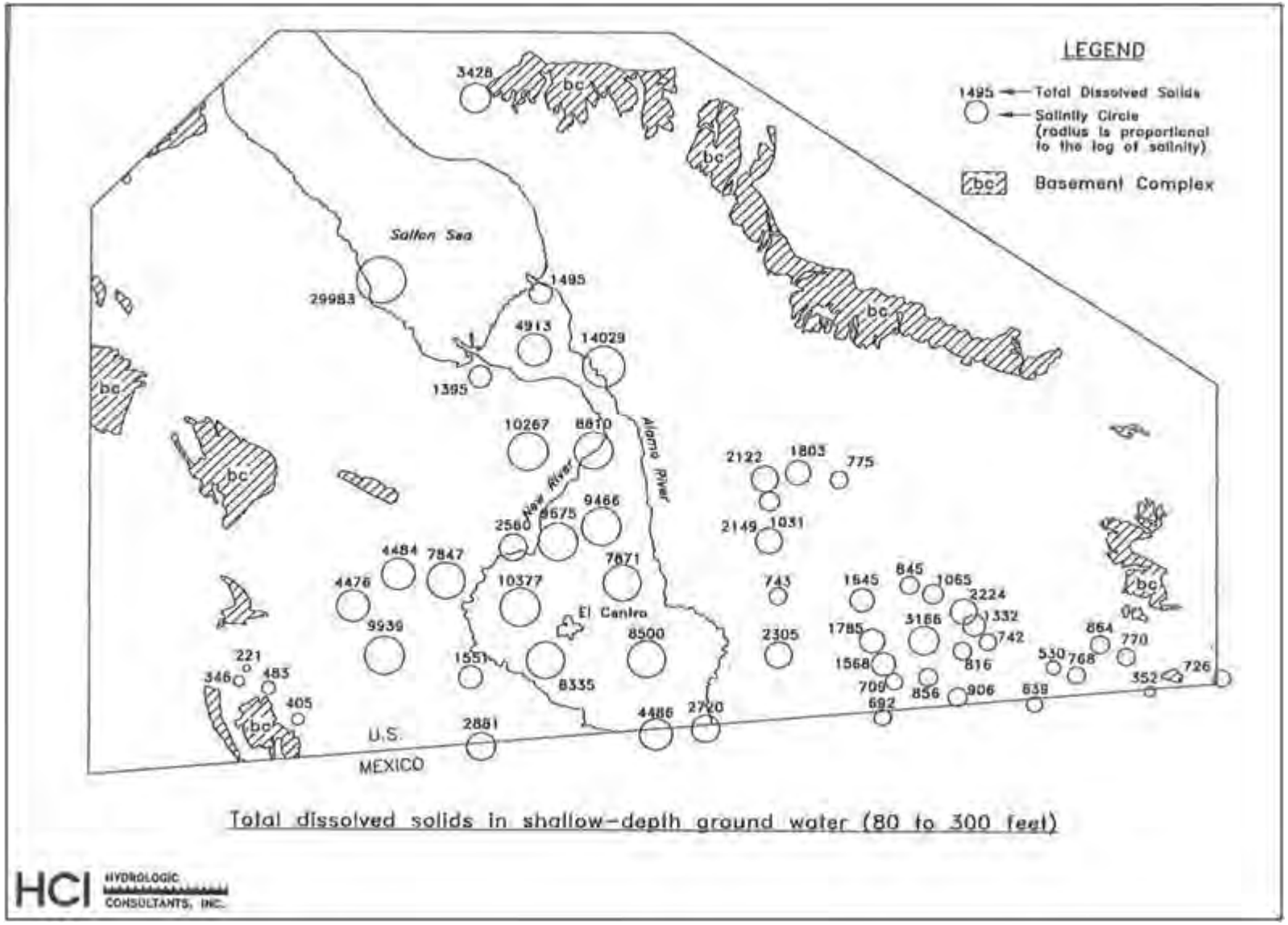

Figure 4-12. TDS Values in Shallow Groundwater Imperial Region

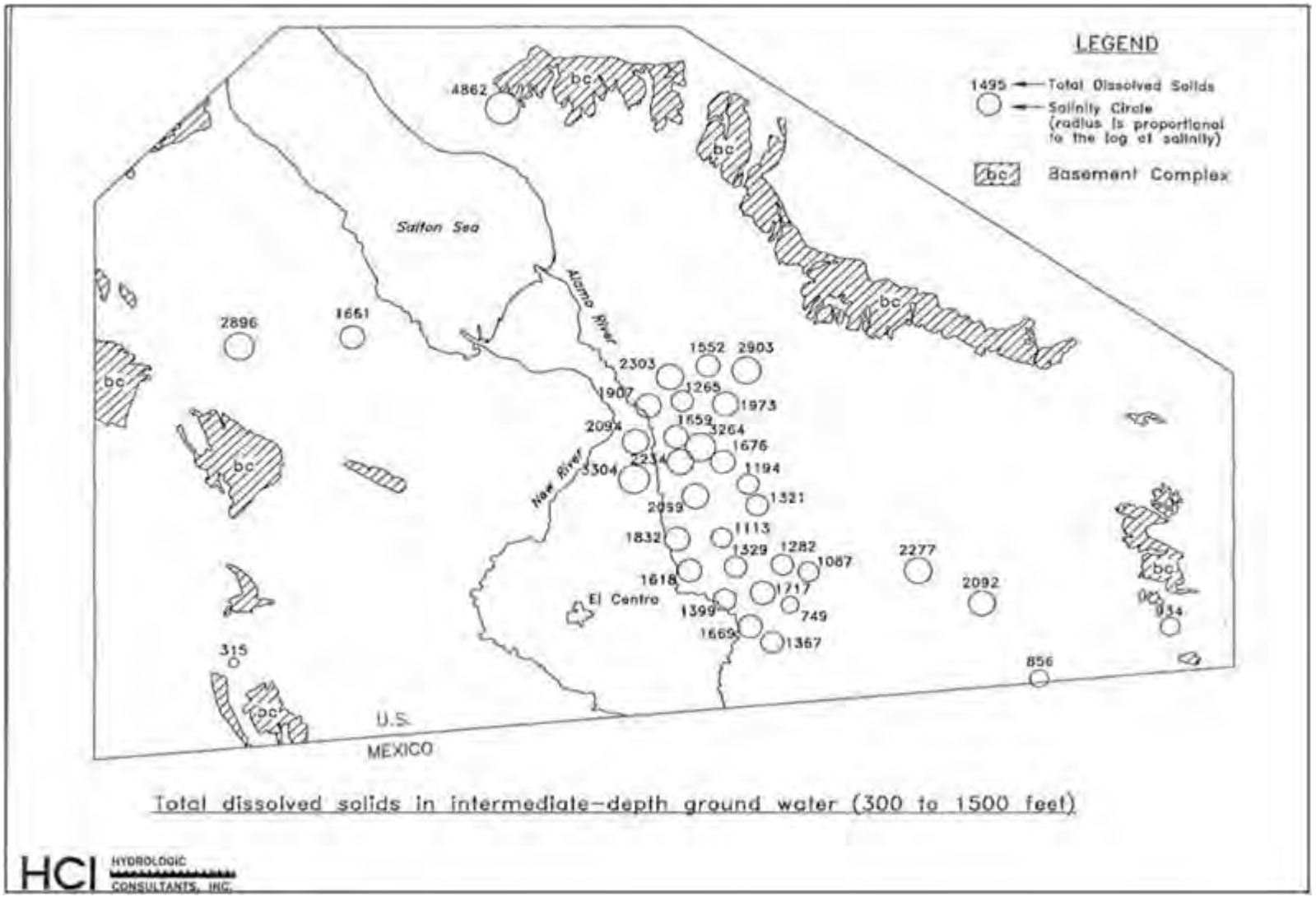

Figure 4-13. TDS Values in Intermediate Depth Groundwater Imperial Region

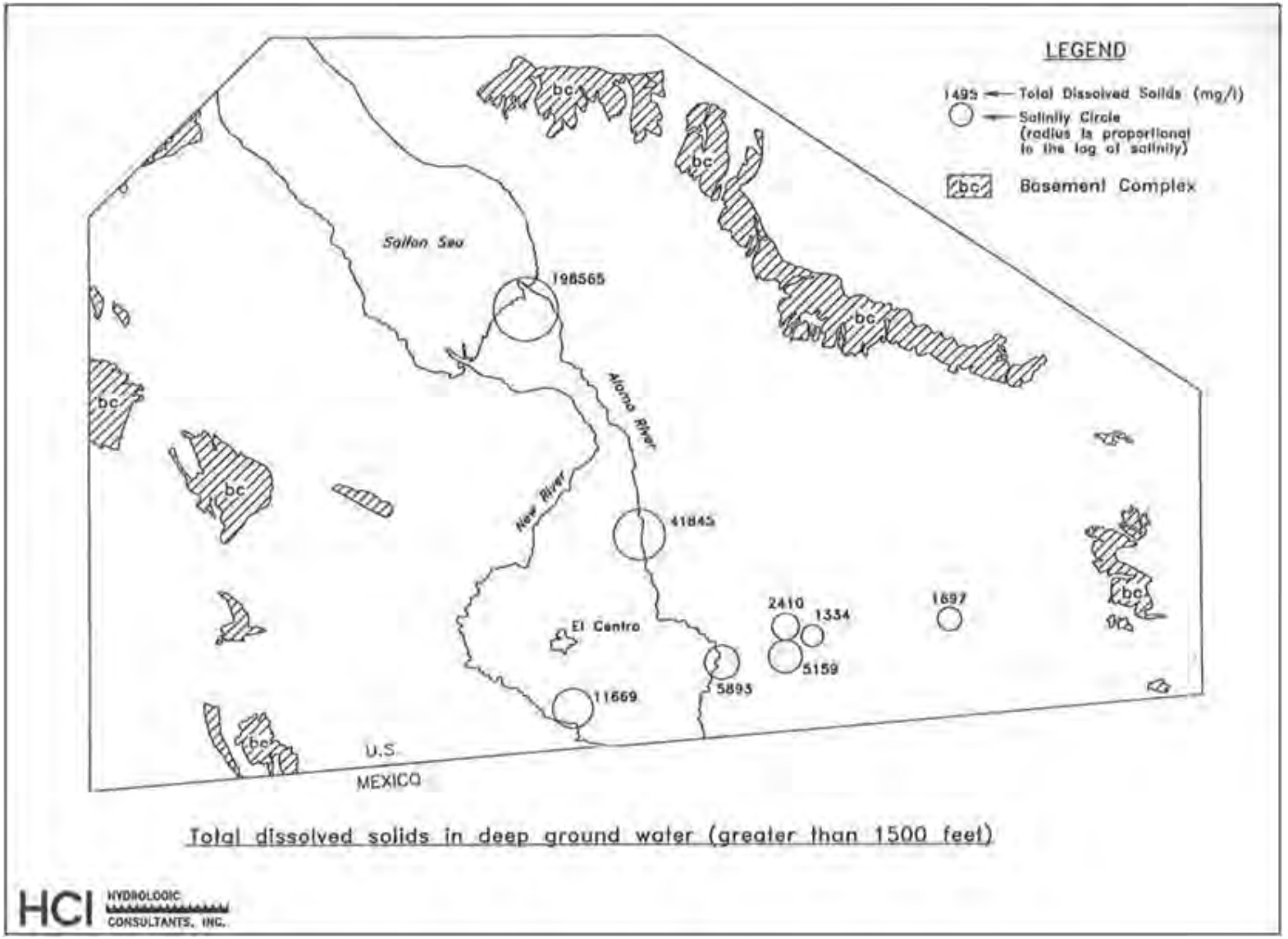

Figure 4-14. TDS Values in Deep Groundwater Imperial Region

4.3.3.3 Aquifer Storage, Recharge and Discharge

Available East Mesa aquifer storage between the East Highline Canal and the unlined 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.

In the 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 amounts of rainfall, virtually no direct precipitation reaches the groundwater aquifer in the East Mesa (Crandall 1983). Groundwater in the East Mesa is discharged at ground surface and in the subsurface. Discharge of groundwater onto ground surface occurs at areas of shallow groundwater along the AAC where the water may be discharged from interceptor wells. Subsurface outflow in the East Mesa occurs toward the central 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). However, 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 the rivers and drains where artificial wetlands have been created(Tetra Tech 1999). 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.

In the West Mesa area, recharge to the aquifer is from two sources: precipitation falling directly on the basin and percolation of stream runoff from the Coyote and Jacumba Mountains to the west. Sources of discharge in the West Mesa include pumpage by U.S. Gypsum, limited urban 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 mineral resources (rock and stone, sand, gravel, clay, and gypsum), metals (gold, silver, nickel, and lead), radioactive elements, and geothermal areas. In the 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 the DRECP Preliminary Conservation Strategy. The 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:

The 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 of the 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 the 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 tCDFG. 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

The 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 (O3), 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 4-18 for 2002 (USBLM 2010a).

Table 4-18. 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.[13] For the County in 2002, nonroad sources were major contributors to total SO2 and 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.

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

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 4-19 shows the County's designation based on state standards (CARB 2010a).

Table 4-19. 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 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 air quality issues.

IMPERIAL
IRWMP
INTEGRATED REGIONAL
WATER MANAGEMENT PLAN

GEI Consultants